NORTHWEST NATURAL GAS COMPANY APPLICATION TO AMEND SITE CERTIFICATE FOR

MIST UNDERGROUND NATURAL GAS STORAGE FACILITY

Submitted to the
Oregon Energy Facility Siting Council
March 20, 1997

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I. AFFIDAVIT OF AUTHENTICITY

I, Carla L. Kelley being sworn, state that:

I am Associate Counsel of Northwest Natural Gas Company ("NNG") and am authorized to act on behalf of NNG.

NNG is submitting this Application to Amend the Northwest Natural Gas Company Mist Underground Natural Gas Storage Site Certificate.

To my best knowledge and belief, the information in this Site Certificate Application is true and accurate.

Dated: March 18, 1997.

NORTHWEST NATURAL GAS COMPANY

By:

Carla L. Kelley

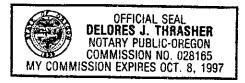
Associate Counsel for

Northwest Natural Gas Company

State of Oregon					
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Country of Marlemannah	Ś				
County of Multnomah	,				

On this 18th day of March, 1997, before me, the undersigned, a notary public in and for said state, personally appeared Carla L. Kelley, known or identified to me to be an authorized representative of Northwest Natural Gas Company ("NNG"), that executed this Affidavit of Authenticity ("Affidavit") or the person who executed this Affidavit on behalf of NNG, and acknowledged to me that NNG executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal on the day and year in this certificate first above written.



Notary Public for the State of Oregon

Residing at: Portland, Oregon

My Commission expires: 10-9-97

II. INTRODUCTION

By this application, Northwest Natural Gas Company ("NNG") proposes to amend the site certificate for its underground natural gas storage facility at Mist, Oregon. NNG intends to expand the facility by including the Calvin Creek Storage Area within the facility's boundary, and installing underground pipelines to connect one underground pool in the Calvin Creek Storage Area to upgraded compression facilities at Miller Station.

A. <u>Underground Gas Storage</u>.

A gas utility delivers energy to thousands of customers whose energy needs change significantly on a daily, monthly and seasonal basis due to changes in space heating requirements, harvest processing, annual production cycles and other factors. In Oregon, gas usage is generally lowest during summer months and peaks during December, January and February. Underground gas storage provides the most efficient means of balancing relatively constant pipeline gas supplies with widely fluctuating seasonal, daily and hourly market requirements. Gas is injected into storage during off-peak periods when market requirements are less than supply availability, and is withdrawn from storage when market demand exceeds available supplies from other sources. Storage reservoirs are usually replenished from April through September and are drawn down between October and March.

Underground reservoir storage requires suitable underground geological conditions in a specific geographic area. These conditions occur in depleted oil or gas pools like Al's Pool in the Calvin Creek Storage Area, which is the subject of NNG's current expansion project.

An underground storage reservoir, reduced to simplest terms, is little more than a gas production reservoir retrofitted to inject gas back into the ground and withdraw it on a cyclical basis. Some gas always remains in the reservoir, to maintain operating pressure. This gas is referred to as "cushion gas." Between one third and one half of the original gas in place in each reservoir (including some that could never have been produced) is used as cushion gas. The remainder of the reservoir's capacity is used to inject and withdraw gas relatively rapidly, to meet market needs. This gas is referred to as "working gas."

The principal differences between a natural gas production field and an underground storage reservoir are operational. The gas wells in a production field are designed to produce gas at flow rates that permit the efficient drainage of the reservoir over time. The Oregon Department of Geology and Mineral Industries ("DOGAMI") regulates the spacing of gas wells. Generally, no more than one well per quarter section (16 acres) is allowed. Closer well spacing could result in higher development costs with negligible increase in the overall gas production. Competing wells could also cause the premature demise of a reservoir, leaving behind commercial gas and making it uneconomic to produce.

A different operating concept applies to a storage reservoir. Instead of producing the major portion of the underground gas by careful management of field pressures and auxiliary compression over a period of years, the goal changes to that of an annual fill and empty cycle. Because the design withdrawal rate for the existing storage facility at Mist is 100 Mmcfd (over ten times greater than the original production capacity), a more closely spaced pattern of higher capacity wells has been used for storage operations. Compressors allow the storage pressure to be restored during a six month injection period and provide for sustained high delivery rates during withdrawal as the reservoir pressure depletes.

B. <u>Site Selection</u>.

Underground storage facilities can only be developed in rare locations where the underground geological conditions are right. The Mist gas field ("Mist Field") is such a place.

Millions of years ago, the present gas producing sands in the Mist Field were laid down by a large river delta advancing into the ocean (analogous to the modern Mississippi River delta). The delta subsided and water depths increased, resulting in mud being deposited over the sand. Compaction from the weight of the material consolidated the sand and muds into sandstone and mudstone. Decomposition of the organic remains in the rock formed natural gas. Large amounts of natural gas migrated into the sandstone and accumulated in areas where it could be trapped and displace the water from between the sand grains and form a "bubble." Further vertical gas migration is prevented by the compressed layers of clay that form the seal (caprock) over the sand. Tectonic forces from the collision of the continental and oceanic plate created the faults which formed the compartments that trap the gas and prevent lateral migration. The fact that gas remains in these reservoirs at high pressure (up to 1,000 pounds per square inch) after millions of years demonstrates the stable nature of these reservoirs. No man-made structures can be said to have been so thoroughly tested.

Gas storage facilities have been constructed in similar sandstones in Washington, but no native gas was present. That made exploration and development of the structures much more risky and expensive. It was necessary to pump salty water out of the sandstone and to inject gas produced in other states and transported to the site. There was no guarantee that the injected gas would stay put or that it would be recoverable. The gas reservoirs in the Mist Field are the only producing gas reservoirs discovered to date in Oregon and Washington, and thus they are the only "pretested" storage reservoirs, a rare and valuable resource.

C. Site Background.

By the late 1970s, NNG had anticipated its need for natural gas storage capacity in the Portland metropolitan area. NNG believed the area around Mist, in rural Columbia County, Oregon, might be one of the few areas in the state that contained sandstones of

reservoir quality that could be used to store natural gas. These sandstone zones, surrounded by impermeable rock, are referred to as underground "reservoirs" although they are not large caverns. The small spaces between sand grains add up to 30 percent of the rock's volume and can be filled with compressed natural gas. NNG recognized that the Mist area would be an excellent location for storage facilities to serve the region.

Reichhold Energy Company and Diamond Shamrock Exploration Company were exploring the Mist area with the hope that underground reservoirs containing commercial gas deposits would be discovered. NNG formed a subsidiary, Oregon Natural Gas Development Corporation ("ONG"), to participate with those two companies in exploring the Mist area by drilling exploration wells to depths of several thousand feet below the surface. From NNG's perspective, simply finding a good underground reservoir, even without commercial gas deposits, would have been satisfactory. The discovery of natural gas at Mist was a bonus.

The Mist Field was discovered in April, 1979. Natural gas production was established in December of that year when the first volumes of natural gas were transported to existing NNG pipelines through a new 12-inch pipeline. Subsequently, producing wells from the commercial discoveries in the Mist Field were connected by buried gathering lines to the natural gas processing equipment located at Miller Station. At Miller Station, the produced natural gas was collected, measured, treated and odorized before its transmission through a 12-inch pipeline to a connection with the NNG pipeline system about nine miles away, near Clatskanie. Since 1979, over \$100 million worth of natural gas has been produced from numerous separate gas reservoirs in the Mist Field.

Through the 1980s and into the 1990s, gas exploration and production in the Mist Field was carried on by ONG and a variety of industry partners including Reichhold Energy Company, Diamond Shamrock Exploration Company, ARCO Oil & Gas Company and Nahama & Weagant Energy Company. Gathering pipelines connecting individual production wells to Miller Station were constructed and operated by ONG. ONG also operated the production wells under contract with the various owners.

By the early 1980s, ONG had produced most of the economically recoverable natural gas in the Bruer and Flora pools, two of the first production reservoirs at Mist. In anticipation of that occurrence, in 1981, ONG applied for the permits necessary to convert the Bruer and Flora pools into an underground natural gas storage facility.

In September of 1981, based on an application from ONG, the Energy Facility Siting Council ("EFSC" or the "Council") approved a Site Certificate for an underground natural gas storage facility at the Mist Field in Columbia County (the "Site Certificate"). (Exhibit 1.) The Site Certificate authorized ONG to construct and operate "two naturally existing underground gas reservoirs (the Flora and Bruer pools) * * *; Miller Station with attendant equipment (including, but not limited to, compressors), gathering lines, access roads, existing natural gas wells, monitoring wells and proposed injection/withdrawal wells" (collectively known as the "Mist Site"). (Exhibit 1 at 2 and 3.) The Mist Site is located in rural

Columbia County in parts of Sections 2, 3, 4, 10 and 11 of Township 6 North, Range 5 West, Willamette Meridian.

In 1990, ONG assigned the Site Certificate to its parent, NNG. (Exhibit 2.) The Council approved three amendments to the Site Certificate in 1987, 1988 and 1990. The amendments modified several terms of the Site Certificate and authorized the construction and replacement of wells. (Exhibits 3, 4, 5.)

D. This Project; Council Jurisdiction.

By this application, NNG proposes to expand its underground natural gas storage facility at Mist. The project is Phase I of an expansion that may include four additional phases over a 10-year period.

The project will include improvements to the Miller Station gas-processing facility, including the replacement of two older 550-horsepower compressor units with a more efficient unit that will operate at a maximum of 3,950 horsepower, construction of a new building for the compressor and updates to related equipment. The expansion will also include natural gas storage in one additional naturally occurring underground pool, Al's Pool, in the Calvin Creek Storage Area; up to four new sites for injection/withdrawal wells, including one to four wells at each site; approximately one mile of buried eight-inch and six-inch gathering pipeline, which will be a twin line for about half of its length; and approximately two and one-half miles of buried twin 16-inch transmission pipeline (collectively, the "Project"). The Project is described in greater detail in Section IV.

When EFSC approved the Site Certificate for the Mist Site in 1981, its jurisdiction included both the surface and underground components of the facility. In 1993, the siting law was amended to include within the Council's jurisdiction only the

"surface facility related to an underground gas storage reservoir that, at design injection or withdrawal rates, will receive or deliver more than 50 million cubic feet of natural or synthetic gas per day, and require more than 4,000 horsepower of natural gas compression to operate * * *." ORS 469.300(9)(a)(H).

The underground storage reservoir, the injection, withdrawal and monitoring wells and the individual wellhead equipment remain under DOGAMI's pervasive authority over the wells and other subsurface components.¹ ORS 469.300(9)(a)(H)(i)-(ii); see 1993 Or Laws, ch 544, § 3.

State law grants DOGAMI broad authority "[t]o regulate the underground storage of natural gas and the drilling and operation of any wells required therefor." ORS 520.095(16). DOGAMI has exercised this authority through its adoption of comprehensive rules governing underground storage facilities. OAR ch 632, div 10. See, e.g., OAR 632-10-196 (gas injection of oil and gas properties).

The surface facilities at the Mist Site are subject to Council jurisdiction because they have the capacity to receive or deliver more than 50 million cubic feet per day and in its current configuration the facility utilizes up to 4,800 horsepower of compression to achieve permitted throughput rates.

Standing alone, the Project would not be an "energy facility" subject to EFSC jurisdiction because it will have the capacity to receive or deliver only 45 million cubic feet of natural gas per day and will require a maximum of 3,950 horsepower of compression to operate. The pipelines would not be subject to EFSC jurisdiction either, because their aggregate length is approximately three and one-half miles, less than the five-mile minimum length for jurisdictional pipelines. ORS 469.300(9)(a)(E)(ii). The Council's jurisdiction over the Project is therefore based on the Project's expansion of an existing jurisdictional facility. ORS 469.320(1); OAR 345-21-000(1).

E. Amendment Process.

The Site Certificate provides alternative amendment processes. The relevant provision² states in its entirety:

"For amendments not affecting the public health, safety or welfare and where ONG and EFSC agree that it is desirable to amend this site certification ONG may file with the EFSC an application for an amendment to the site certificate agreement, which application shall state the necessary reasons therefore. The EFSC may grant such application without further proceedings at its regular public meeting." (Exhibit 1 at 12-13.)

There is nothing in either the siting statute or the EFSC rules that requires a different process. Accordingly, the amendment process set forth in the Site Certificate itself controls this proceeding. ORS 469.401(3). Nonetheless, NNG proposes to follow a more inclusive process including an informational meeting in the community, first and second readings before the Council, notification of and comment from interested agencies and notice to property owners within 500 feet of the site boundary.

The statute and the Council's rules are similarly silent concerning the standards that apply to the amendment of a site certificate issued before November 30, 1994. See, e.g.,

² The other process applies if amendments are needed because "unforseen developments" cause the facility to "present a danger to the public health, safety or welfare" or if federal law requires a change. (Exhibit 1, at 11-12.) There is no federal law change related to this application, and there have been no unforseen developments at the Mist Site creating any danger to public health, safety or welfare. Indeed, the Mist Site has operated without incident since 1988 and has provided substantial financial benefit to the area. Accordingly, the alternative process does not apply.

ORS 469.503; ORS 469.405; OAR 345-01-030(1) (rules in OAR ch 345 do not apply to site certificates executed before November 30, 1994); OAR 345-27-011. NNG has therefore volunteered to demonstrate compliance with all current Council standards.

Finally, the siting statute is ambiguous on the question of whether the EFSC process for the amendment of an existing site certificate includes state permits relevant to siting that are ordinarily under the jurisdiction of another agency. This Project includes at least one, and possibly three, such permits:

- 1. A removal/fill permit that would normally be issued by the Division of State Lands ("DSL");
- 2. A limited license for water withdrawal of that would ordinarily be issued by the Water Resources Department ("WRD"); and
- 3. A water pollution control facility ("WPCF") permit that would ordinarily be issued by the Department of Environmental Quality ("DEQ").

NNG therefore proposes to work with Council staff on submittal of the necessary applications to DSL, WRD and DEQ and to provide the decisions of those agencies to the Council. NNG anticipates final responses from all three agencies before the Council's first reading on this application.

III. APPLICANT INFORMATION

Name and Address:

Northwest Natural Gas Company 220 NW 2nd Avenue Portland, Oregon 97209

Place of Incorporation:

Oregon and Washington

Contact Persons:

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IV. PROJECT DESCRIPTION

The Project will develop new underground gas storage capacity and expand the existing Miller Station facility so that an additional 45 MMcfd of storage gas can be delivered into the Portland load center on a design day. This expansion will increase the combined total Mist storage peak day delivery capability to 145 MMcfd from the current maximum capability of 100 MMcfd. This expansion will require the development of a new storage reservoir with high capacity injection/withdrawal wells, the installation of a new high-capacity gathering pipeline from Miller Station to the Calvin Creek well locations and the upgrading of processing and compression equipment at Miller Station.

A. Reservoir Development Phase.

The Calvin Creek Storage Area is located two and one-half miles south of NNG's Miller Station compressor plant near Mist, Oregon. (Exhibit 6.) There are two reservoirs located in this area that have sufficient storage capacity for this Project. NNG has secured the storage rights to both of these reservoirs.

A three-dimensional seismic survey was acquired for the entire Calvin Creek Storage Area. Based on this data and other geologic and reservoir engineering data, Al's Pool was selected for development in this Project. Test injection into Al's Pool is underway, and the pressure response of the pool is being monitored.

The reservoir will be developed using vertical and high-angle directional wells. Four locations from which to drill the injection/withdrawal wells have been selected and evaluated for geotechnical suitability. The integration of three-dimensional seismic data, reservoir engineering data and drilling engineering evaluation will determine which of the locations will actually be used. It may be possible that all wells can be drilled from as few as two of the four locations. It is anticipated that at least four wells will be needed to achieve the injection/withdrawal flow rates required for the Project. One to two observation/monitoring wells will also be drilled. These wells will be used to observe water movement within the reservoir and monitor the potential spill point of the reservoir.

B. <u>Gathering System Additions.</u>

The gathering system will consist of two parallel 16-inch pipelines from Miller Station to a pipeline transition point in the Calvin Creek Storage Area. At that point, the 16-inch pipelines will join eight-inch and six-inch twin gathering lines connecting them to the individual wellheads in the area. (Exhibit 7.)

The parallel pipelines will be installed in the same right-of-way and spaced approximately 10 feet apart. These pipelines will be the primary gathering line between Miller Station and the Calvin Creek Storage Area. To accommodate future storage expansion, each 16-inch pipeline is designed to transport up to 100 MMcfd. This exceeds the requirements of the Project by 75 percent. This larger line capacity is designed to mitigate the future environmental impacts of later stages of the storage expansion.

The total pipeline alignment will travel under approximately three and one-half miles of pasture land, clear cuts and reforested timberlands. It will also cross under the Nehalem River and State Highway 202. The anticipated right-of-way involves five landowners. The construction right-of-way requirements will not exceed 80 feet in width. NNG will maintain a permanent right-of-way approximately 40 feet wide in the area above the pipeline for maintenance and safety.

To avoid areas where slope stability is a concern, NNG conducted a geotechnical review of a preliminary route. NNG then realigned the pipeline right-of-way based on the study results in order to avoid geotechnical hazards. (Exhibits 10 and 11.) NNG has conducted a cultural and environmental review in accordance with existing regulations to ensure that there will be no adverse effect to any cultural or environmental resources. (Exhibit 21.) NNG will also work closely with all relevant permitting agencies during construction to satisfy all permitting requirements.

C. <u>Miller Station Improvements</u>.

The total gas throughput of Miller Station will be increased to accommodate the expanded storage capacity. The increased throughput will require improvements to Miller Station's compressor capacity, piping, control, dehydration and auxiliary systems. (Exhibit 8.) These improvements will be made so that station downtime is limited to 30 days and scheduled to avoid conflict with the 1997-98 winter delivery requirements. The existing compressor capacity consists of two 1,350-horsepower (large) and two 550-horsepower (small) compressors. All of the existing compressors are reciprocating compressors with natural gas-fired internal combustion engines. The two large compressors have newer engines that utilize clean burn technology that minimizes NOx emissions. The small compressors have older engines that are inefficient and have no emissions controls.

To increase the net compressor capacity, NNG will replace the two small compressors with a single gas-fired, turbine-driven centrifugal compressor that has state-of-the-art

emissions controls. The new compressor is rated at 5,035 BHP @ 59° F ambient air temperature. With the removal of the two older small compressors, the net compression available will increase by 3,935 BHP with a net reduction in NOx emissions.

The capacity of Miller Station will be expanded by 45 MMcfd to handle the full design capacity of this Project in addition to the existing Bruer and Flora reservoirs. The design modifications to Miller Station include upgrades to the gas dehydration system, station piping, controls and auxiliary systems so that in the future the station can be further upgraded to approximately 300 MMcfd if future storage projects prove to be viable.

V. DIVISION 22 STANDARDS

A. Organizational, Managerial and Technical Expertise (OAR 345-22-010).

Under this standard, the Council determines whether the applicant has the organizational, managerial and technical expertise to construct and operate the facility. To conclude that the applicant has the necessary expertise, the Council must determine that the applicant has "a reasonable probability of successful construction and operation of the facility considering the experience of the applicant, the availability of technical expertise to the applicant, and, if the applicant has constructed or operated other facilities, the past performance of the applicant, including but not limited to the number and severity of regulatory citations, in constructing or operating a facility, type of equipment, or process similar to the proposed facility." OAR 345-22-010(1).

1. NNG's Underground Storage Experience.

NNG is a 140-year-old company whose core business is the local distribution of natural gas. Around 1980, NNG began developing the natural gas fields in the Mist area for the reinjection and storage of natural gas. Since 1988, NNG has operated its underground natural gas storage operation at Mist under the Site Certificate that is now in the amendment process. NNG also has a site certificate authorizing it to build and operate the South Mist Feeder pipeline, which brings natural gas to and from the storage facility.

The storage facility allows NNG to store natural gas that it purchases from the interstate pipeline and to withdraw that gas when it is needed for particularly cold weather and peaking requirements. Company personnel who have been managing the existing storage operation will continue to operate the expanded facility. These include the operators who run Miller Station, the compressor station at Mist, and the geologists and engineers who were formerly employed by an NNG subsidiary, ONG. The subsidiary is now dissolved and its employees work directly for NNG. Many of the individuals now working for NNG, who are involved in the design and construction of the expanded facilities, have been with the underground storage project at Mist since its inception.

2. <u>Technical Expertise Available to NNG.</u>

NNG has assembled an experienced team of professional, technical and administrative personnel to manage all phases of the Project. Following is a brief description of several key members of the Project team:

Charlie Stinson, Project Manager--Charlie is an Oregon-registered petroleum engineer who has been continually involved in the Mist development since its discovery in 1979. Specific experiences at Mist include management of the Bruer/Flora storage reservoir development, supervision of the installation and operation of the gas production gathering system and management of various gas development ventures.

Dean Carter, KTI Fish Engineering; Miller Station Expansion Design--Dean has over 35 years of technical and managerial experience in the management of similar projects. His list of projects includes the installation of 10,000-horsepower of compression and related facilities at the Warren Gas Storage field in Mississippi.

Warren Harris, Pipeline Design & Installation--Warren is a mechanical engineer with over 28 years of experience in the design and construction of gas pipeline systems in the Pacific Northwest. Warren was a key member of NNG's South Mist Feeder project installed in 1989.

Jack Meyer, Reservoir Development--Jack is an Oregon-registered geologist with over 20 years of geological and geophysical mapping and interpretation experience. Jack has worked on the Mist Project for both exploration purposes and underground storage development at the Bruer and Flora pools continuously for the past 16 years.

Nick Potts, Storage Operations--Nick has a degree in mechanical engineering technology and has worked for NNG for the past 16 years in design and operations. For the past 12 years Nick has been the Superintendent of Storage, which includes the current Mist storage operations.

Todd Thomas, Field Development--Todd has a degree in geology but has operated for the past 15 years as a drilling superintendent and field operations engineer. Todd was a member of the Bruer/Flora reservoir development team and supervised the drilling of all the wells.

Tim Williamson, Mist Storage Supervisor--Tim has been the on-site supervisor at Miller Station for the past nine years. Before that Tim worked as an oil and gas field superintendent, drilling exploratory wells at Mist and in other areas of the United States. Tim was an integral member of the Bruer/Flora project.

NNG has contracted with KTI Fish Engineering to design the new compression facilities. A final contract award has not yet been made for the construction of the

compressor station and pipeline, but Mount West Fabrication, Plants and Stations, Inc. is a leading contender. NNG will notify EFSC as soon as a final selection is made. The pipeline will be designed by NNG's in-house pipeline engineers in conjunction with the KTI Fish design of the storage facility.

3. Past Performance.

The existing storage facility has been in operation since 1988. During that time, the facility has had an exemplary safety record, operating without a single safety citation from OSHA or a single lost time accident.

Similarly, NNG has not received a single regulatory citation from DOGAMI in connection with its underground storage operations.

Last May, the Oregon Public Utilities Commission (the "PUC") conducted an on-site inspection of the existing storage facility and reviewed the Operations and Maintenance Procedures for the plant. The PUC found no probable violations. (Exhibit 9.)

Based on NNG's experience with its existing underground storage facility, the expertise of key personnel and its past performance with the existing facility, NNG has demonstrated that it has a reasonable probability of successful construction and operation of the Project and has the requisite organizational, managerial and technical expertise.

B. <u>Structural (OAR 345-22-020)</u>.

Under the structural standard, the Council determines whether

- "(1) The applicant, through appropriate site-specific study, has adequately characterized the site in terms of seismic zone and expected ground response during the maximum credible seismic events; and
- (2) The facility can be designed, engineered and constructed adequately to avoid potential dangers to human safety presented by seismic hazards affecting the site, as defined in ORS 455.447(1)(d) and including amplification, that are expected to result from all reasonably probable seismic events."

The standard has two components, a site characterization requirement and a design and construction requirement. NNG engaged Dames & Moore to prepare a geotechnical investigation of the entire Project site, which is attached as Exhibit 10. Dames & Moore also prepared a separate geotechnical investigation with recommendations for design and construction of the Project. That report is attached as Exhibit 11. For the purposes of this section, the Project is divided into three site components: (a) the Miller Station site, (b) the injection/withdrawal wellsites, and (c) the pipeline alignment from Miller Station to the wellsites. (Exhibit 11 §§ 2.1-2.3.)

Before discussing each of those sites, we discuss the regional geologic setting of the Project and the seismic characteristics of the entire Project area. Then we discuss each of the three site components in turn, examining the site characterization and construction requirements responsive to the above regulation. References to Exhibits 10 and 11 point to more detailed information in the Dames & Moore reports supporting this discussion.

1. Regional Geology.

The Mist Field is located in the northern portion of the Coast Range physiographic province. Most rock layers in the area formed between 65 and 30 million years ago. A chain of volcanic islands, perhaps not unlike today's Hawaiian Islands, was carried eastward on the Pacific Ocean floor toward a collision with the westward moving edge of North America. That collision process continues today at a rate of one or two centimeters per year. As the more dense ocean floor is driven beneath the western edge of North America, stresses accumulate. Earthquakes occur when these stresses are released. The zone of collision between the Pacific Ocean floor and North America, running from British Columbia to northern California, is referred to as the Cascadia Subduction Zone. "Subduction" is the geologic term for the thrusting of the ocean floor beneath the continent. The chain of islands, being too thick to pass smoothly beneath North America, became part of Oregon's Coast Range. (Exhibit 10 § 3.1.)

As the island chain approached the continent, sediments collected in the gap between the two, varying from sand to mud and including substantial amounts of volcanic ash. The sediments derived from the erosion of the North American continent and were carried to the sea by rivers. As the sediments grew deeper, the compressive forces of their own weight transformed them into the rock layers recognizable in the Mist Field today. The basalt (black) lava flows of the volcanic island chain underlie the area at a depth of several thousand feet. Above that basement, in the Mist Field area, is a layer of clean sandstone known as the Clark and Wilson Sandstone which contains the producing gas reservoirs and storage reservoirs in the Mist Field.

Above the Clark and Wilson Sandstone (part of the Cowlitz Formation) are several layers of mudstone and siltstone, including up to 1,600 feet of mudstone and siltstone known as the Keasey Formation. The Keasey Formation is composed mainly of volcanic ash from the ancient Cascade Range. Above the Keasey Formation are additional thick sandstones and mudstones of the Pittsburgh Bluff Formation, formed approximately 30 million years ago. These are capped by relatively thin layers of the same Columbia River Basalt group that is so well exposed in the Columbia River Gorge, which erupted between 15 and 5 million years ago. Above the basalt are more recent clay and silt soils, reaching a depth in excess of 50 feet at Miller Station. (Exhibit 11 § 6.2.2.3.)

The entire volcanic and sedimentary assemblage of the Coast Range was compressed and arched upward by the collision between the Pacific Ocean floor and North America, creating numerous faults and structures that have trapped natural gas in the Clark and Wilson

Sandstone in the Mist Field. The stability of those reservoirs is confirmed by the fact that despite millions of years of uplift, the gas has not escaped. Though the uplift of the Coast Range continues at a rate of one inch every 36 years at Astoria, the rate of uplift at the Mist Field is slower. (Exhibit 10 § 3.1.)

Erosion has carved steep valleys in the sedimentary and volcanic layers of the Coast Range, creating alluvial soils in river valleys. The strength of the eroded rock layers varies according to composition, as might be expected, with basalt lava layers being more resistant to erosion and slumping while mudstones and recent alluvium are less competent. Landslides can occur in the less competent rocks and soils. A geologic map showing the rock layers, alluvium and known landslides as they occur in the project area is included at Exhibit 10, Figuire G-2.

2. Seismic Characterization.

Since 1993, all of western Oregon has been classified, for Uniform Building Code ("UBC") purposes, as being in Seismic Zone 3. The UBC provides design criteria for buildings in this zone based on the ground acceleration and likely amplification of shaking that may occur during an earthquake. Three general sources of earthquakes are recognized in the Project area.

First, there is geologic evidence that over the past 4,000 years as many as eight earthquakes with magnitudes in excess of eight may have occurred, with the most recent being over 300 years ago. These "interplate" earthquakes are centered off the Oregon coast, where the Pacific Ocean floor and North American "plates" of the earth's crust grind together. For design evaluation purposes, a quake of magnitude 8.5 originating 15 miles beneath the earth's surface at a distance of 45 miles from the project site is considered the maximum credible event.

The second source of earthquakes is farther inland, beneath the Willamette Valley and beneath the Cascade Range. There, the descending slab of Pacific Ocean floor begins to break within the earth's upper mantle, releasing stresses within the slab (an "intraplate" earthquake). A quake of magnitude 7 originating thirty miles beneath the earth's surface at a distance of 6 miles from the Project site is considered the maximum credible event from that source.

Finally, occasional movement along faults in the rocks of the Coast Range may occur, though historical activity is sparse (a "crustal" earthquake). A quake of magnitude 6 originating six miles beneath the earth's surface at a distance of six miles from the Project site is considered the maximum credible event from this source. (Exhibit 10 § 6.2.) There have been several small earthquakes within 50 miles of the Project site since the mid-1800's. A table of 15 events in the Magnitude 4-5 range is included in Exhibit 10 § 6.1.

Dames & Moore has calculated the peak ground accelerations and the expected amplification of vibrations that would occur at the Project site during the maximum credible event from each of these three earthquake sources. All calculated effects were less than the seismic loadings for UBC Seismic Zone 3. Accordingly, conventional UBC design methods are appropriate for design of project structures at Miller Station. Welded steel pipelines like those to be installed between Miller Station and the wellsites have not been damaged by earthquake shaking of this magnitude during earthquakes in California. (Exhibit 10 § 8, n. 12.) Note that in making these calculations, Dames & Moore used the maximum credible seismic event, rather than a lesser "reasonably probable" seismic event, and the resultant ground accelerations were within design criteria for the Project facilities, as described below. Therefore, the facilities can be designed to withstand any reasonably probable seismic event.

Earthquake shaking motions can be amplified or dampened by specific ground conditions. Some wet sandy soil types can become liquefied during earthquakes causing them to flow. Finally, earthquakes can produce ruptures at the surface of the earth. The Project site has been evaluated for potential amplification, liquefaction and rupture, as detailed in the following sections. Dames & Moore conclude that these factors do not create increased risk to the Project facilities, as detailed below.

3. Miller Station.

Miller Station is on a ridge at an elevation between 1,040 and 1,080 feet and has been graded to gentle slopes. Subsurface soil conditions were investigated with 10 borings to depths between 20 and 51 feet and two cone penetration tests. The results are included in Exhibit 11, Appendices A and B. The soil at the site is described as highly variable layers of silt and clay. (Exhibit 11 § 6.2.2.2.) The soils are moderately compressible but the limited capacity for subsidence should not affect small building foundations. Perched groundwater occurs 8 to 12 feet below the surface which may be encountered in some of the trench and foundation excavations. (Exhibit 11 § 6.2.3.)

Using data collected from the site, Dames & Moore analyzed the Miller Station soils for response to earthquake shaking. Dames & Moore concluded that no amplification would occur in the soil profile at Miller Station. Thus the facilities can be safely designed with conventional UBC methods. (Exhibit 10 § 7.2.) Neither is soil liquefaction a concern at Miller Station. (Exhibit 10 § 7.5.) Finally, there is no evidence of surface ruptures in the vicinity of Miller Station resulting from earthquake activity in the past 1.6 million years. Given the infrequency of earthquakes in the immediate project area, Dames & Moore believes that the risk of surface fault rupture in the entire project area is low. (Exhibit 10 § 7.6.)

Section 7 of Exhibit 11 contains extensive geotechnical recommendations for the construction of the Miller Station facilities. Dames & Moore has concluded that the facilities can be designed and constructed safely, with very low risk of damage during the maximum credible seismic event, and therefore, with very low risk of danger to human safety.

4. <u>Pipeline Alignment</u>.

The planned pipeline alignment extends approximately 2.5 miles south from Miller Station, dropping in elevation from 1,080 to about 600 feet in the Nehalem River Valley, then rising on the south side of the valley to an elevation of about 740 feet at the wellsites. (Exhibit 11, Figure 1.) Throughout most of the alignment, a trench will be cut approximately six feet deep. Deeper excavations will be required at the Highway 202 road crossing. Dames & Moore evaluated the alignment by reviewing geological maps and conducting surface investigations. The hillside areas are covered by sandy and clay soils. The soils are underlain by the Keasey Formation, a mudstone. The Nehalem River floodplain is covered with alluvium of silty sand over gravels. Subsidence is not an issue for the pipeline, since the pipe will exert very little load on the soils.

Seasonal groundwater springs may be expected in the hilly areas and groundwater levels in the Nehalem River Valley will vary seasonally, being at or close to the surface during the wet season and perhaps six to eight feet lower in the dry season. The soils tend to be quite wet, and because of their clay content and low strength, the soils and bedrock in the general area are susceptible to landsliding, which could be triggered by seismic shaking. The pipeline alignment has been revised to avoid unstable ground affected by landslides. (Exhibit 11 § 8.1.) Exhibit 11, Figures 3a and 3b show the areas affected by landslides and the suggested pipeline alignment. Dames & Moore concludes that the revised pipeline alignment has a low to very low risk from landsliding induced by seismic shaking. (Exhibit 10 § 7.3.) NNG has revised the pipeline alignment in accordance with the Dames & Moore recommendations.

Dames & Moore surveyed the geologic literature and inspected the pipeline alignment for expression of faults by rupturing of the surface. No such fault ruptures are mapped in the area. They concluded that the risk of surface fault rupture was very low throughout the Project area. (Exhibit 10 § 7.7.)

The sandy soils in the Nehalem River Valley within 10 feet of the surface may be subject to liquefaction during an earthquake. Engineering studies were performed to estimate the maximum movement of such soils when subjected to shaking even greater than the maximum credible seismic event, determining that movements of 12 inches may be experienced. (Exhibit 10 § 7.5.) Such liquefaction will not affect the pipeline near the Nehalem River, as NNG plans to directionally drill the pipeline beneath the river. The pipeline will be embedded in non-liquefiable mudstone deposits below the alluvium.

Nearer the edge of the valley, where the pipeline is closer to the surface, the pipeline will pass through the shallow layer of liquefiable alluvium. Statistical studies of the behavior of gas pipelines in liquifiable soil during historical earthquakes indicate that there is a very low probability that the welded steel pipeline that NNG will install would leak as a result of liquifaction of the thin alluvial soil layer. (Exhibit 10 § 7.6.)

In summary, the pipeline alignment has been evaluated for seismic hazards including shaking, amplification, landsliding, soil liquifaction and surface rupture. The pipeline can be designed and built through this corridor with very low risk of any damage from seismic hazards, and therefore, with very low risk of any danger to human safety.

5. The Wellsites.

The site conditions of the wellsites are the same as described for the southern end of the pipeline alignment. (Exhibit 11 § 6.3.) Wellsite locations are shown on Figure 3a in Exhibit 11. The wellsites may require up to 15 feet of cut and fill to make them level. There will be no large structures on the wellsites comparable to the compressor buildings and dehydration facilities at Miller Station. Dames & Moore has made recommendations based on its geotechnical investigation of the wellsite areas which will result in stable pads for construction of the wells. No risk to the wellsites is expected from shaking, amplification, subsidence, landsliding, soil liquifaction or surface fault rupture. The wellsites can be designed and constructed with very low risk of damage from seismic hazards, and therefore, with very low risk of any danger to human safety.

C. Soil Protection (OAR 345-22-022).

Under this standard, the Council determines whether the design, construction and operation of the facility, taking into account mitigation, is likely to result in a significant adverse impact to soils.

NNG has obtained from Dames & Moore a study of the major ecological communities and soil types in the project area, which is attached as Exhibit 12. A topographic map showing the elevations of Miller Station, the pipeline alignment and the wellsites is included in Exhibit 10, Figure G-1.

1. Plant Communities.

Exhibit 12, Figure N-1 details the major plant communities affected by the Project. Miller Station is within second growth conifer forest, between 20 and 50 years old. The pipeline alignment passes from Miller Station south and down slope through young conifer forest, and small wetlands. Crossing the Nehalem River Valley, the pipeline alignment intersects farmed hay and pasture land, then rises on the south side of the valley through mixed conifer and deciduous forest and two more small wetlands. The wellsites, and the gathering pipeline between wellsites, is within young and second growth conifer forest. The plant species found in these zones are listed in Exhibit 12 § 2.

The wetlands described above have been severely affected by human activity. One is bisected by a logging road, one is a pasture and one is a hay field. One has an existing gas pipeline and an access road, installed 10 years ago. (Exhibit 12 § 2.5.) Of all the small

wetlands, the one crossed by the existing gas pipeline has the best wildlife habitat, having recovered from the construction activity ten years before.

2. <u>Soil Types</u>.

Ten soil types will be subject to project construction activities. Exhibit 12, Figure N-2 is a map of the soil types. Descriptions of each soil type are within the text of Exhibit 12.

3. Miller Station; Effect on Soils.

Miller Station is an existing industrial site, already dedicated to gas storage activities. NNG elected to add new compression facilities to Miller Station, rather than to create a second compression facility near the wellsites, in part to reduce potential adverse impacts to soils in the area. There will be very little earthwork at Miller Station for new foundations. No significant cutting or trenching is expected. The planned equipment locations are already covered with crushed rock. Geotechnical studies and construction recommendations have been prepared by Dames & Moore and are included in Exhibit 11. Additional crushed rock will be added to protect the soils from erosion where there will be heavy traffic. Exhibit 11 § 7 (Miller Station Recommendations). Therefore, there will be no significant new adverse impact to soils at the Miller Station site.

4. Pipeline Alignment; Effect on Soils.

The pipeline alignment will contain two 16-inch diameter pipelines approximately 10 feet apart, and then dual eight-inch and six-inch pipelines, in a 40-foot wide right-of-way. The pipes will be surrounded in their trenches by special granular bedding materials for uniform support and drainage. The construction of the pipeline will result in temporary disturbance to a variety of soil types and plant communities. In the elevations above the Nehalem River Valley, timber and brush must be removed for pipeline construction. However, the pipeline corridor is of limited width and after pipeline burial, plant growth will be established to prevent erosion. Native soils will be used for backfill once the pipeline is surrounded by bedding sand.

As illustrated by the wetland already crossed by a gas pipeline, the presence of the pipeline will likely be more protective of the soils than other land uses in the area (timber harvesting, pasturing and hay harvesting) since less intensive surface use will be made of the pipeline corridor in the future.

As with Miller Station, Dames & Moore has provided detailed geotechnical information and construction recommendations with respect to the pipeline alignment, to prevent erosion during construction and to assure the future stability of the pipeline. (Exhibit 11 § 8.) Directional drilling will emplace the pipeline well under the bed and banks of the Nehalem River, avoiding disturbance to the alluvial soils along the river. The pipeline alignment has been changed following investigation of the slopes in the area, to avoid slopes

already affected by landsliding. Therefore, the pipeline will not exacerbate existing slope instability. Drainage conduits will be provided at the base of all sloping sections of the alignment, to safely conduct away water that will collect in the bedding sand. (Exhibit 11 § 8.2.5.) The net effect of the pipeline alignment on area soils will be minimal.

5. Wellsites, Effect on Soils.

Between one and four wellsites for injection and withdrawal facilities are planned, with each site capable of supporting several wells. Three or four monitoring wells will be installed on smaller pads near the main well pads. Each main wellsite will be approximately 230 feet by 100 feet, or approximately half an acre. The wellsites have been tentatively located as shown on Exhibit 12, Figures N-1 and N-2 (showing affected soils (mostly silty loam) and plant communities (young and second growth conifer)).

Dames & Moore has investigated the wellsites and finds that none are underlain by landslides or slope failures. (Exhibit 11 § 9.1.) Additional survey work will be done to assure that the site boundaries make optimal use of the existing topography. The wells will be designed to be free from creeping or sliding land masses during the 50-year design life of the injection/withdrawal wells. The pads will be constructed with berms and appropriate gradients to divert surface runoff away from cut slopes, to prevent erosion.

During construction of the wellsites, organic topsoil will be segregated for special handling. Wellsite cuts and grading may require up to 15 feet of fill to achieve the proposed elevations. Fill will be compacted to 92% relative compaction. Non-organic soils on the site will probably be suitable for fill. Organic soils may be used in areas at least 25 feet away from the wells, since they may decompose over time. Crushed rock will be placed on access roads to prevent erosion. All slopes will be revegetated as quickly as possible for the same reason.

In all, only about two acres of soils will be affected by the wellsites. Construction and design of the wellsites will ensure that landslides and erosion will not be caused by the construction of the wellsites. In the context of the substantial impacts on area soils related to timber harvesting and agricultural activities, the effect of the proposed wellsite construction will be minimal.

D. Land Use (OAR 345-22-030).

Under this standard, the Council determines whether "the facility complies with the statewide planning goals adopted by the Land Conservation and Development Commission" ("LCDC"). OAR 345-22-030(1). A proposed facility "shall be found in compliance" with the statewide planning goals "if * * * [t]he facility has received local land use approval under the acknowledged comprehensive plan and land use regulations of the affected local government * * *." OAR 345-22-030(2)(a).

The Project is located in Columbia County (the "County"), and the County has land use jurisdiction over the Project site. The County is therefore the "affected local government" under this standard. LCDC acknowledged the Columbia County Comprehensive Plan and the Columbia County Zoning Ordinance on July 25, 1985.

NNG submitted a consolidated conditional use permit and site design review application to the County for the Miller Station modifications on December 30, 1996. County staff recommended approval based on findings of compliance with the applicable Zoning Ordinance and Comprehensive Plan provisions. (Exhibits 13, 14.) The Columbia County Planning Commission held a public hearing on the application on February 3, 1997. At that meeting, the Planning Commission approved the application by a unanimous vote, adopting the findings and conclusions in the staff reports. No one opposed the application.

On February 12, 1997, the County issued notice of its approvals of the conditional use permit (CU-53-96) and site design review (DR 21-96). (Exhibits 15, 16.) The County's decisions became final 10 days later, on February 22, 1997.

On January 27, 1997, NNG submitted a consolidated conditional use permit and site design review application to the County for the underground storage reservoir, wells and pipelines. The staff again recommended approval based on findings of compliance with applicable Zoning Ordinance and Comprehensive Plan provisions. (Exhibits 17, 18.) The Planning Commission held a public hearing on the application on March 3, 1997. Again, no one opposed the application. NNG, however, sought several changes to the staff reports to correct and clarify certain points. The Planning Commission approved both the requested changes and the application by a unanimous vote, adopting the findings and conclusions in the staff reports, as modified.

The County issued notice of its approvals of the conditional use permit (CU 2-97) and site design review (DR 3-97) on March 7, 1997. (Exhibits 19, 20.) The County's decisions became final ten days later, on March 17, 1997.

NNG has therefore received local land use approvals under Columbia County's acknowledged Comprehensive Plan and land use regulations, enabling the Council to find that the Project complies with the statewide planning goals adopted by LCDC.

E. Protected Areas (OAR 345-22-040).

This standard prohibits the siting of an energy facility in any of the protected areas listed in the rule.

The standard permits the siting of a facility outside the listed protected areas so long as the "design, construction and operation" of the facility "is not likely to result in significant adverse impact to" any of the protected areas. OAR 345-22-040(1).

Listed protected areas include national parks, national monuments, wilderness areas, national and state wildlife refuges, national coordination areas, national and state fish hatcheries, national recreation and scenic areas, state parks and waysides, state natural heritage areas, state estuarine sanctuaries, scenic waterways, experimental areas established by the Rangeland Resources Program, agricultural experimental stations, research forests, Bureau of Land Management areas of critical environmental concern and state wildlife and management areas. Id.

To evaluate the Project's impacts to listed protected areas, NNG retained Dames & Moore to identify all listed areas in or near the Project's boundaries. (Exhibit 21 at 1.) The scope of the identification study extended beyond 90 miles for national areas and averaged 20 miles for state areas. The range of the identification study was based on the existence of any listed area within the northwest Oregon and southwest Washington geographic area rather than a set radius based on miles.³

No protected areas are located within the Project boundaries.

Listed national areas within the range of study include Mt. Rainier National Park at more than 90 miles, Goat Rocks Wilderness Area at more than 90 miles, Mt. St. Helens National Monument at 40 miles and the Columbia Gorge National Scenic Area at 50 miles from the site. The closest national or state wildlife refuge is located on the Columbia River at more than 20 miles from the site.

A state Estuarine Sanctuary was identified on the Columbia River about 15 miles from the site.

The following areas were not identified within the range of the study: national coordination area, national or state fish hatcheries, state Natural Heritage area, scenic waterways, experimental rangeland areas, agricultural experiment stations, research forests, Bureau of Land Management areas of concern or state wildlife or management areas.

³ Under EFSC's siting statutes and rules, in most cases the Office of Energy issues a "project order" that identifies "impact areas" for a project. These are based on "study areas" (see OAR 345-01-010(50)), which may be modified based on information obtained in the pre-application phase of the siting process. However, there is no project order for an amendment application; therefore no impact areas have been set for this Project. In most cases, NNG used the study areas established by rule for surface facilities related to underground storage projects.

However, OAR 345-01-010(50) does not set a study area for protected areas. The study area for protected areas is generally 20 miles. NNG reviewed an area that averaged 20 miles for state designated areas, but looked farther west toward the coast and farther north along the Columbia River.

The design, construction and operation of the Project will not have any adverse impact on any of the listed protected areas. The Project has minimal impacts even on its closest neighbors and is too far from the closest protected areas to affect them. The closest protected areas are a wildlife refuge and estuarine sanctuary located on the Columbia River approximately 15 miles from the Project site. Miller Station will not be visible 15 miles away and has no other features that could impact resources at that distance. The rest of the Project is underground and similarly has no potential for adverse impacts on remote protected areas.

Accordingly, the Project is not located in a protected area and its design, construction and operation will not have any adverse impact on any of the areas listed as protected by OAR 345-22-040.

F. Financial Assurance (OAR 345-22-050).

Under this standard, EFSC determines whether the applicant has a reasonable likelihood of obtaining a bond or comparable security, satisfactory to EFSC, in an amount adequate to restore the site if the site certificate holder: (1) begins but does not complete construction of the facility or (2) permanently closes the facility before establishing a financial mechanism or instrument, satisfactory to the Council, that will assure funds will be available to adequately retire the facility and restore the site.

This standard and the Retirement Standard in OAR 345-22-130 are designed to ensure that funds are available to restore the site in three different circumstances: (1) the facility construction is begun but not completed by the time required in the site certificate, (2) the facility is permanently closed before a retirement fund is fully funded and (3) the facility is permanently closed after the retirement fund is fully funded. Under this standard, EFSC addresses the availability of funds in the first two circumstances.

An underground storage facility has an indefinite useful life and retirement of the Mist storage facility is unforseeable at this time. However, retirement is theoretically possible at any time.

NNG estimates the cost of restoring the site to be approximately \$310,000 in 1996 dollars. This amount will be offset by an estimated salvage value of installed equipment of \$580,000. A description of the bases for those estimates is set forth in Section V.N.

NNG's annual reports for 1994 and 1995 are attached as Exhibits 22 and 23. NNG will submit its 1996 annual report as soon as it is available (April 1997).

Together, Section V.N and the annual reports demonstrate that the cost to restore the portions of the site related to this amendment is small relative to the value of existing certificated facilities at Mist and their salvage value. There is therefore no question that NNG could restore the site after construction began if it did not intend to proceed with the

Project or if NNG were to close the facility before establishing a funding mechanism for site restoration. Furthermore, the existing Site Certificate, which this application seeks to amend, does not require such a mechanism.

G. Fish and Wildlife Habitat (OAR 345-22-060).

Under this standard, the Council determines whether the design, construction, operation and retirement of the facility, taking into account mitigation, is consistent with the fish and wildlife habitat mitigation goals and standards of OAR 635-415-030.

OAR 635-415-030 describes four categories of habitat in order of their value. The rule then establishes mitigation goals and corresponding implementation standards for each habitat category.

Habitat Category 1 is habitat of exceptional value. The goal is "no loss of either habitat units or habitat value." OAR 635-415-030(1)(a). The implementation standard requires avoidance of impact.

Habitat Category 2 is high-value habitat. The goal is "no net loss of either habitat units or habitat value." OAR 635-415-030(2)(a). The implementation standard is avoidance or mitigation in-kind, on-site.

Habitat Category 3 is also high-value habitat. The goal is "no net loss of either habitat units or habitat value." OAR 635-415-030(3)(a). The implementation standard is avoidance or mitigation either in-kind or out-of-kind, and either on-site or off-site.

Habitat Category 4 is habitat of low value. The goal is to "minimize the loss" of habitat value or, if possible, conserve or enhance habitat. OAR 635-415-030(4)(a). The implementation standard provides for flexible mitigation.

To ensure compliance with the fish and wildlife habitat mitigation goals and standards, NNG engaged Dames & Moore to conduct a biological resource investigation and evaluation (the "Biological Study") of the proposed project area. The Biological Study identifies the major ecological habitats, characterizes the habitat by category, identifies the potentially affected fish and wildlife species, evaluates the potential impacts to habitats and establishes mitigation measures. (Exhibit 21 at 1-7.)

As part of the study, a biologist walked the entire length of the pipeline route and well sites to identify all habitat, wetlands and streams that would be affected by the Project. A 200-foot-wide corridor was evaluated to accommodate potential route adjustments. Areas were recognized as wetlands if they contained evidence of hydrophytic vegetation, hydric soils and wetland hydrology. Any watercourse with a defined channel was recognized as a stream. (Id.)

The Biological Study did not include the 12-acre Miller Station site because it is completely fenced, most of the site is paved with gravel or covered with buildings and the remainder is of no habitat value due to continuous human activity in the area.

1. Habitat Identification.

The Project will extend though five major ecological habitat types. The pipeline will cross two second-growth conifer forests ranging in age from 20 to 50 years, two regenerating clear-cut areas with trees ranging in age from five to 10 years and a stand of mixed conifer and deciduous forest. The pipeline will traverse the Nehalem Valley where it will cross under cultivated hay and pasture fields and cross under the Nehalem River. The pipeline will cross wetlands on each side of the Nehalem Valley, and on the south side of the valley it will cross three unnamed tributaries.

Five areas of wetland were found in the pipeline corridor. The wetlands are palustine emergent wetlands that have been severely affected by human activity. The first wetland is adjacent to Barnhardt Road and was probably created or enlarged when the road was built. It is about one-half acre in size and dominated by small willows.

The second wetland is a soft rush-dominated swale. A logging road traverses though this wetland. There is no defined channel in this part of the swale. If the pipeline goes along the logging road as planned, only a few hundred square feet of degraded wetland will be affected.

The third wetland is a small sloping wetland in a pasture in the Nehalem Valley. It is dominated by pasture grasses and weedy species such as creeping buttercup. The crossing width would be less than 100 feet.

The fourth wetland is a finger of wetland that extends into the hayfield north of the paved road. It is occupied by grass hay species and creeping buttercups. The crossing width will be about 20 feet.

The fifth wetland is the largest and the most significant. This wetland is at the base of the hill north of the hayfield and Highway 202. This wetland is part of a larger wetland complex with at least three types of cover. At the proposed pipeline crossing, the wetland is dominated by slough sedge and has standing water seasonally. One edge is dominated with the shrub species ninebark. The wetland complex outside the construction corridor is dominated by willows. This wetland is currently crossed by a gas pipeline at the proposed crossing location for this Project. The existing pipeline was installed about 10 years ago. The vegetative cover has completely recovered and there is no sign of earlier disturbance. This wetland appears to be excellent habitat for amphibians and birds.

One small unnamed tributary of the Nehalem River will be crossed in the valley south of the river. The crossing is in a heavily used pasture, and the stream is severely affected by

livestock. At the proposed crossing point there is no in-stream cover and the banks and stream substrate are mostly trampled soil with a few blackberry bushes. The pipeline will cross a second, smaller tributary on the plateau south of the river valley. The channel is one to two feet across with a water depth of about eight inches, and the substrate soil is sandy clean soil. The crossing is approximately 100 yards below the headwaters where the stream seeps from a wetland. The pipeline will cross a similar-sized tributary of Calvin Creek just upstream of Barnhardt Road.

2. Habitat Characterization.

Dames & Moore assigned habitat categories to the habitats described above, under OAR 635-415-030, based on the best professional judgment of its Senior Ecologist, Dr. David Every, considering characteristics of the habitat and the common wildlife and fish species likely to use the respective habitats. The habitat categories for each of the identified habitats are as follows:

- (a) <u>Second-growth conifer forest</u>. Category 4. This habitat is low value because the forest is on private timber land used as a tree farm. The habitat value of this forest has been severely affected by timber harvest activities. Future timber harvesting will continue to affect the habitat value.
- (b) <u>Second-growth mixed conifer/deciduous forest</u>. Category 4. This habitat is low value because the forest is on private timber land used as a tree farm. The habitat value of this forest has been severely affected by timber harvest activities. Future timber harvesting will continue to affect the habitat value.
- (c) <u>Regenerated clear cuts</u>. Category 4. This habitat is low value because the forest is on private timber land used as a tree farm. The habitat value of this forest has been severely affected by timber harvest activities. Future timber harvesting will continue to affect the habitat value.
- (d) <u>Farmed hay and pasture</u>. Category 4. This habitat is also low value due to little habitat diversity.
- (e) <u>Nehalem River</u>. Category 1 or 2. Ultimate classification will depend on whether the coho salmon or steelhead become listed as threatened.
- (f) <u>Small tributaries</u>. Category 4. This habitat is low value because of the degraded nature of the streams and blockage of fish passages.
- (g) <u>Wetlands</u>. Categories 2 and 4. The large wetland north of Highway 202 and the hayfield is Category 2 habitat. All other wetlands are degraded and are Category 4.

3. Potentially Affected Fish and Wildlife Species.

The wildlife species that potentially use the identified habitats are the common species of the coastal region of Oregon. No species or evidence of species were observed in the field component of the Biological Study. Large mammals that potentially use the habitat include elk and black-tailed deer. Other mammals include coyotes, weasels, mink and river otters. The small mammal complement includes red squirrels, deer mice, jumping mice, shrews, moles, voles and other small rodents. Birds include red-tailed hawk, crows, robins, song sparrows and chickadees.

4. Potential Impacts; Compliance with Goals and Standards.

(a) <u>Category 1</u>. The only potential Category 1 habitat is the Nehalem River, whose status as Category 1 depends on future listing of the coho salmon or steelhead as threatened species. Rather than disturb the river, NNG will place the pipeline under the river by using a "directional drilling" process. (Exhibit 24.) The directional bore will begin at points about 300 feet from either side of the river. The bore will be designed so that the pipelines will be at least 20 feet below the bottom of the river bed. At each endpoint 300 feet from the river, an elbow joint will be inserted into the pipeline and it will continue from that point at a depth of about four feet beneath the surface. The directional bore approach will avoid the need to disturb the river and the riparian and wetlands areas along it.

Accordingly, there will be "no loss of either habitat units or habitat value" in the Nehalem River or its riparian area and the avoidance standard will be met.

(b) <u>Category 2</u>. The Nehalem River will be Category 2 habitat if the coho salmon and steelhead are not listed. For the reasons described immediately above, there will be no loss of either habitat units or value in the Nehalem River and the avoidance standard will be met.

The larger wetland north of Highway 202 is also Category 2 habitat. The impacts to this habitat will be minimized by:

- 1. Using a single trench instead of two trenches for the dual pipelines;
- 2. Keeping the pipeline installation trench as narrow as possible, consistent with safety considerations and practical installation requirements;
 - 3. Timing construction to occur during the driest time of year;
 - 4. Separating and returning topsoil to the trench back-fill surface;

- 5. Avoiding changes to the hydrology of the wetland by installing clay barriers at each end of the wetland crossing; and
- 6. Avoiding the rest of the wetland during construction by use of an existing road through the wetland for construction equipment.

Upon completion of construction, the habitat will be completely restored to its preconstruction condition within one or two growing seasons, as has occurred at the existing pipeline crossing at this same location. Accordingly, there will be no net loss of either habitat units or habitat value. Mitigation will occur in-kind, on-site through complete restoration of the habitat.

- (c) Category 3. No Category 3 habitat will be affected by the Project.
- (d) <u>Category 4</u>. The Category 4 habitat identified by the Biological Study includes:
 - 1. Second-growth conifer forest;
 - 2. Second-growth mixed conifer/deciduous forest;
 - 3. Regenerated clear cuts;
 - 4. Farmed hay and pasture;
 - 5. Small tributaries to the Nehalem River and Calvin Creek; and
 - 6. All wetlands except the Category 2 wetland north of Highway 202.

Impacts to the first three habitats will consist of the removal of vegetative cover, temporary disturbance of the subsurface soil and disturbance of adjacent surface from the movement of construction equipment. The vegetation cover will be allowed and encouraged to grow back in the construction corridor except in the area directly over the pipeline, which must be kept free of trees for visual inspections. The area directly over the pipeline will be a 40-foot corridor, which is the minimum necessary for maintenance access and safety purposes.

The impact on forested habitat in the part of the corridor not directly over the pipeline will be temporary, and the habitat value will be gradually restored over time to the existing habitat as a tree farm. In the area directly over the pipeline, trees will be discouraged but other vegetation will be encouraged to prevent erosion and provide some habitat value. The loss of habitat value is therefore minimized and no mitigation is needed.

In the farmed areas, the surface will be restored following pipeline construction and the land will continue to be farmed. Thus, the impacts to the farmed areas are small and short term. There will be no loss of habitat value apart from temporary construction activities and no need for mitigation.

The impacts to the Nehalem River and Calvin Creek tributaries will be very small because the crossings will be done during the low flow period when they will likely be dry, and the stream bed and banks will be restored before the rainy season. There will be little or no loss of habitat value and no need for mitigation.

Impacts to the Category 4 wetlands will be short term because the wetlands will be restored soon after the completion of construction. Best management practices will be used during construction to minimize impacts, including separating the upper foot of topsoil from the rest of the trench spoils and replacing it on the top of the trench and minimizing the amount of time that equipment is in the wetlands. Any water that is pumped from the trench during construction will be filtered, to remove sediments, before it is returned to the wetland. There will therefore be little or no loss of habitat value and no need for mitigation.

For these reasons, the design, construction, operation and retirement of the Project, taking mitigation into account, is consistent with the habitat mitigation goals and standards of OAR 635-415-030.

H. Threatened & Endangered Species (OAR 345-22-070).

Under this standard, the Council determines whether the design, construction, operation and retirement of a facility will be consistent with any applicable conservation program adopted pursuant to ORS 496.172(3) or ORS 564.105(3). If no conservation program applies, the Council determines whether the facility has the potential to significantly reduce the likelihood of the survival or recovery of any threatened or endangered species listed under ORS 496.172(2) or ORS 564.105(2). These standards relate to the protection of both wildlife and plant species listed as threatened or endangered.

No conservation program adopted under ORS 496.172(3) or ORS 564.105(3) applies to the study area.

In order to evaluate the potential of the Project to affect threatened or endangered species, NNG contacted the U.S. Fish and Wildlife Service, the National Marine Fisheries Service and the Oregon Natural Heritage Program to obtain information concerning threatened and endangered species and habitats. These agencies provided information on listed species, species proposed to be listed and species of concern. (See, e.g., Exhibit 25.) In February 1997, NNG engaged Dames & Moore to conduct a field study to look for evidence of use of the area by any of the relevant species. (Exhibit 21 at 7-17.) Habitats were observed and compared with the habitat types expected to be used by the subject species.

During the field study, no evidence was found of any listed bird, mammal or plant species or habitat suitable for them that would be affected by the Project. A summary of the species studied and evaluation of the potential effects of the Project is presented below. Additional detail appears in Exhibit 21.

1. <u>Listed Species</u>.

- (a) Aleutian Canada Goose. Threatened. This species is very unlikely to be affected. The Aleutian Canada goose passes through this area during spring and fall migration (generally April and October), and may use fields and wetlands as resting and feeding areas. The fields and wetlands in the Project area that will be affected by construction of the pipeline and other facilities are small and either near houses and farm buildings or near cover for potential predators and not likely to be attractive to the geese. Thus, pipeline construction, even if it occurs during migration time, would only make an already unattractive site less inviting to the geese. There are plenty of more attractive sites in the valley and elsewhere, so pipeline construction would not restrict the use of habitat in limited supply.
- (b) <u>Peregrine Falcon</u>. Endangered. This species is very unlikely to be affected. It uses this area only in passing during migration if at all. No affected habitat offers either prey items in abundance or other habitat features of importance to migrating peregrine falcons.
- (c) <u>Bald Eagle</u>. Threatened. This species will not be affected. No nests are known in or near the Project area, and migrating birds will not be in the area during construction.
- (d) <u>Northern Spotted Owl</u>. Threatened. This species is very unlikely to be affected. The forests in this area are young and not suitable for spotted owl nesting. The small amount of forest removed will not affect the spotted owl.
- (e) <u>Nelson's Checker-Mallow</u>. Threatened. This species will not be affected. No suitable habitat occurs in the Project area.

2. Proposed Species.

(a) <u>Coho Salmon</u>. This species is very unlikely to be affected. The Nehalem River will be crossed by directional drilling, and the small tributaries will be crossed during low flow and restored. One of the unnamed tributaries goes through an active cow pasture, and the stream has no instream cover for fish. The other tributaries are very small and have steep approaches to their confluence with the Nehalem River. They will probably be dry during the period of construction, and since the stream bed will be restored

and protected from erosion, there will be very small or no effect on aquatic resources in the streams.

(b) <u>Steelhead</u>. This species is very unlikely to be affected. The Nehalem River will be crossed by directional drilling, and the small tributaries will be crossed during low flow and restored. One of the unnamed tributaries goes through an active cow pasture, and the stream has no instream cover for fish. The other tributaries are very small and have steep approaches to their confluence with the Nehalem River. They will probably be dry during the period of construction, and since the stream bed will be restored and protected from erosion, there will be very small or no effect on aquatic resources in the streams.

3. Species of Concern Also Considered.

- (a) White-Footed Vole. This species will not be affected. The temporary effects of Project construction will be imperceptible to the habitat of the white-footed vole in this already disturbed series of habitats.
- (b) <u>Pacific Fisher</u>. This species will not be affected. The temporary effects of Project construction will be imperceptible to the habitat of the Pacific fisher in this already disturbed series of habitats.
- (c) <u>Bat Species</u>. The study considered the following bat species: long-eared myotis, fringed myotis, long-legged myotis, Yuma myotis and the Pacific western big-eared bat. These species will not be affected. There is no ideal roosting habitat in this area to be disturbed. Any incidental use of the existing habitats by bats will be unaffected by the Project.
- (d) <u>Little Willow Flycatcher</u>. This species is not likely to be affected if it occurs in the Project area. The most likely habitat is along the Nehalem River where horizontal boring, with entrance points approximately 300 feet from each bank, will avoid impacts to habitat.
- (e) <u>Tailed Frog.</u> This species will not be affected. No suitable habitat for this species will be affected by the Project.
- (f) <u>Northwestern Pond Turtle</u>. This species will not be affected. No suitable habitat for this species will be affected by the Project.
- (g) Northern Red-Legged Frog. This species will not be affected. Suitable habitat for this species occurs along the Nehalem River and in one wetlands complex that will be crossed by the pipeline. However, it is unlikely that any population of the species will be affected because construction will occur during the dry season.

- (h) <u>Pacific Lamprey</u>. This species will not be affected. The Nehalem River will not be disturbed because the pipeline will run through the bedrock at least 20 feet underneath the river using horizontal boring technology. The small tributaries will be crossed during low flow periods and restored to their natural condition.
- (i) <u>Tall Bugbane</u>. This species is not likely to be affected. Habitat in the corridor is generally suitable but has undergone several logging episodes. No indication of the species was found during field reconnaissance by a botanist in February 1997.

For these reasons, the Project does not have the potential to reduce the likelihood of the survival or recovery of any threatened or endangered species listed under Oregon law.

I. Scenic/Aesthetic (OAR 345-22-080).

Under this standard, the Council determines whether

"the design, construction, operation and retirement of the facility, taking into account mitigation, is * * * likely to result in significant adverse impact to scenic and aesthetic values identified as significant or important in applicable federal land management plans or in the local land use plan for the site or its vicinity." OAR 345-22-080.

In order to address this standard, the following text includes a description of the visual appearance of the Project site and its vicinity, a description of points from which the existing project is visible, a list of county- and state-designated scenic and aesthetic resources in the vicinity of the Project and an analysis of the proposed Project's impacts on these resources.

1. Baseline Description of Visual Features of Project Area.

The project area is located on either side of the Nehalem River west of Mist, Oregon. (Exhibit 27.) The river in this area follows a winding course through a flat valley floor at about 500 feet above sea level. The valley is about one-quarter to one-half of a mile wide. The valley floor is bounded by a network of ridges rising to elevations of 1,000 to 1,500 feet above sea level. These ridges are forested with second-growth fir and checker-boarded with clear cuts. All of the surface lands around the project area are in private ownership. The lands along the valley floor are primarily dedicated to agricultural use, and the rest of the area is largely owned by private timber concerns.

2. Points from Which Existing Project Is Visible.

Miller Station occupies several acres along a ridge line northwest of Mist, at an elevation of approximately 1,000 feet. (Exhibit 7.) The main visual elements are two adjacent compressor buildings and a combined office and maintenance building. The site is

surrounded by second-growth fir trees that are generally 30 to 40 feet tall. These trees and the surrounding hilly terrain block views of Miller Station from most directions. The existing compressor building and other buildings at Miller Station are visible from the following locations:

- (a) The intersection of Highway 47 and Highway 202 in Mist (see Exhibit 26, Photo 1).
- (b) About one-quarter mile along Highway 202, west of the intersection with Highway 47.
- (c) A bend in Highway 47, at milepost 8, north of Mist (see Exhibit 26, Photo 2).
 - (d) Privately owned lands near the sites mentioned above.

A field reconnaissance of the area did not reveal any other points on publicly owned land or rights-of-way from which Miller Station could be seen.

In addition, the line of sight from the top of the water tank at the upper end of the Miller Station property includes a significantly broader area because the top of the tank is at or slightly above the level of surrounding trees. (See Exhibit 26, Photos 3-6.) The water tank itself, however, is not among the visible elements of Miller Station when viewed from any significant distance. For instance, Photos 1 and 2 show the roofs of the existing compressor and office buildings at Miller Station, but the water tank is not visible. This may be because the water tank is painted green and, unlike the roofs of the existing buildings, is not a reflective surface. In any case, no modifications to the water tank are proposed in this application.

3. Scenic and Aesthetic Values near the Project Area.

Under OAR 345-22-080, the Council considers impacts to "scenic and aesthetic values identified as significant or important in applicable federal land management plans or in the local land use plan for the site or its vicinity."

There is no federally owned surface land in the vicinity of the Project and no applicable federal land management plan. There thus are no scenic or aesthetic values in the vicinity that have been identified as significant or important for federal purposes.

The Project site is located in Columbia County. The County's Comprehensive Plan contains an inventory of "County Scenic Resources." (Exhibit 28.) None of these resources are located within five miles of the Project area. Neighboring Clatsop County also has an inventory of scenic resources. (Exhibit 29.) None of these resources are located within 10 miles of the Project area. The existing underground storage facility, including Miller Station

and all other surface facilities, is not visible from (or within the viewshed of) any area identified by Columbia or Clatsop County as a scenic resource.

The Nehalem River in the vicinity of the Project has not been designated a scenic waterway by the federal, state or local governments.

Miller Station is visible from two points along Highway 47 (see Exhibit 26, Photos 1 and 2). Highway 47 is a state-designated scenic highway through much of Columbia County, including from Pittsburgh (six miles south of Mist) to Clatskanie (12 miles north of Mist). These views of Miller Station are the existing facility's only impact on any area identified as scenic by any governmental body.

4. Proposed Project's Impact on Scenic Resources.

The only proposed visible surface facility is a new compressor building at Miller Station. The new compressor building will be located adjacent to an existing compressor building and will be similar in size. (Exhibit 8.) There is also one other existing office and maintenance building of similar size at Miller Station.

No portions of the proposed surface facilities will be visible from or within any federal- or county-designated scenic or aesthetic resources.

The proposed compressor building at Miller Station will likely be visible from two points along state Highway 47, a state-designated scenic highway. Viewed from the intersection of Highways 202 and 47 in Mist, the new compressor building will be in front of and will largely block the view of the existing compressor building. Conversely, viewed from Highway 47 at mile post 8 north of Mist, the existing building will largely block the new compressor building from view. In either case, to the extent the new building neither blocks nor is blocked by existing structures, it will make only a small incremental contribution to the overall view presented by the cluster of currently existing structures at Miller Station.

From both points along Highway 47, Miller Station is visible along a ridge line. Although the rolling hills and river valley make for a generally pleasing view, it is not a pristine one. Most of the timber lands in the area are in commercial production, and the view of Miller Station from either angle includes numerous clear-cut areas.

For these reasons, the addition of one new building to the existing group of buildings at Miller Station will not cause any significant adverse impact on the view from Highway 47 and the Project will not adversely impact any scenic or aesthetic value identified as significant or important in any applicable federal land management or local land use plan for the Project site or its vicinity.

J. <u>Historic</u>, Cultural and Archeological Resources (OAR 345-22-090).

Under this standard, the Council considers whether the construction, operation and retirement of a facility, taking into account mitigation, is likely to result in significant adverse impacts to:

- 1. Historic, cultural or archeological resources that have been listed on, or would likely be listed on, the National Register of Historic Places;
- 2. For a facility on private land, archeological objects, as defined in ORS 358.905(1)(a), or archeological sites, as defined in ORS 358.905(1)(c); and
- 3. For a facility on public land, archeological sites, as defined in ORS 358.905(1)(c).

ORS 358.905(1)(a) defines an "archeological object" as an object that (1) is at least 50 years old, (2) comprises "the physical record of" any culture and (3) is "material remains of past human life or activity that are of archeological significance."

ORS 358.905(1)(c)(A) defines "archeological site" as any location that "contains archeological objects and the contextual associations of the archeological objects" with each other or biotic or geological remains or deposits.

To determine the extent of previous research in the project area, a record search was conducted at the State Historic Preservation Office ("SHPO") in Salem, Oregon on January 29, 1997. This search indicated that no extensive archeological investigations have been conducted in this region of Oregon. More specifically, no archeological inventories have been conducted within a one-half mile radius of the project area. As a result, no previously recorded archeological objects or sites are known in the immediate area. This search did not reveal any resources currently listed on, or likely to be listed on, the National Register of Historic Places. In general, given the terrain and environment of the project area, overall archeological sensitivity appears low.

Three archeological sites were recorded approximately one mile east of the Project, in conjunction with a survey conducted for the South Mist Feeder. These sites, all consisting of prehistoric artifact scatters, lie east of and adjacent to the Nehalem River. No subsurface testing was conducted at these sites so the extent of the cultural deposits remains unknown. The presence of these sites suggests that the lands adjacent to the Nehalem River should be considered sensitive.

An archeological inventory of the study area was completed on February 4, 1997. (Exhibit 21 at 18-23.) The inventory was conducted by an archaeologist walking the approximate center of the proposed pipeline corridors. Vegetation along much of the route consists of dense forest, resulting in poor ground visibility. To enhance visibility, trowel

scrapings were conducted in areas of higher potential sensitivity, particularly close to the Nehalem River crossing. With the exception of numerous springboard-cut tree stumps observed in the eastern half of Section 22 and the western half of Section 23, indicative of early twentieth century logging, no resources that might be considered archeological objects or sites were identified within this area. If Project construction will require removal of any of these tree stumps, NNG will consult with SHPO concerning their archeological significance and, if necessary, will comply with SHPO permit requirements.

As noted, the proposed Project is in an area of low archeological sensitivity. Exceptions to this are the terraces north and south of the Nehalem River, where NNG proposes grading and excavation to facilitate boring under the river for the pipeline crossing. No archeological resources were observed in these areas, which now consist of pasture land, but sensitivity should be considered moderate to high. Archeological sites have been recorded in similar settings upriver from Mist, just east of the Project area.

To allow for the potential of undiscovered resources in this area, all grading and excavating activities associated with the boring operation will be monitored by a qualified archeologist. If any artifacts or other cultural materials that might qualify as "archeological sites" or "archeological objects" are identified during monitoring, all ground-disturbing activities will cease until the archaeologist can evaluate their potential significance. If the materials are likely to be eligible for listing on the National Register of Historic Places or to qualify as archeological objects or sites, NNG will consult with SHPO and will comply with the archeological permit requirements administered by SHPO (currently set forth in OAR ch 736, div 51).

K. <u>Recreation (OAR 345-22-100)</u>.

Under this standard, the Council determines whether the "design, construction and operation" of a facility will result in "significant adverse impact to important recreational opportunities in the impact area." OAR 345-22-100. Factors considered in judging the importance of a recreational opportunity include:

- "(1) Any special designation or management of the location;
- "(2) The degree of demand;
- "(3) Uniqueness;
- "(4) Outstanding or unusual qualities;
- "(5) Availability or rareness; and
- "(6) Irreplaceability or irretrievability of the opportunity." Id.

As noted in Section V.E above (footnote 1), there is no "impact area" for the Project. Accordingly, NNG evaluated recreational impacts based on the study area defined in OAR 345-01-010(50)(g) for a surface facility related to an underground gas storage reservoir. That study area is the area within five miles of the site boundary.

1. Existing Recreational Facilities.

In 1993, Columbia County adopted the Columbia County Forests, Parks and Recreation Master Plan (the "Plan"). (Exhibit 30.) The Plan was updated in 1995. The Plan identifies 16 County parks, forests, forest/parks and boat dock facilities and another 20 public and private recreational facilities that now provide recreational opportunities to County residents and visitors. (Exhibit 30 at 3 and 9.)

According to the Director of the Columbia County Forests, Parks and Recreation Department, none of the identified facilities are within five miles of the Project site. (Exhibit 31.)

2. Proposed Recreational Facilities.

Columbia County plans to develop bicycle trails in the future. Preliminary plans call for a bike trail to be located along Highway 202 in the vicinity of the Project, including the portion of Highway 202 that the twin 16-inch pipelines will cross below. (Id.)

However, the development of this bicycle trail is at least five years away. (Id.) Construction of the pipeline will be concluded by the end of 1997. Accordingly, the construction activities will not have any impact on the proposed bike trail. Because the pipelines will be buried, they will not affect the bike trail once it is developed.

There are no other proposed recreational facilities within five miles of the Project site.

3. <u>Fishing</u>.

The pipelines will cross the Nehalem River, which is used for fishing. Because the pipeline will be buried at least 20 feet below the bed of the river, it will have no impact on Nehalem River fishing.

The pipeline will also cross three small tributaries of the Nehalem River and Calvin Creek. (Exhibit 21 at 4.) All three are on private land. One is in a heavily used pasture severely affected by cattle. The other two are one to two feet across with a water depth of no more than eight inches. (Id.) Both have blockages and are likely to be dry during pipeline construction. Consequently, the three tributaries have little or no value as recreational fishing opportunities.

4. Hunting.

The Project site is within a major big game habitat area. (Exhibit 32.) The area is used for hunting elk, deer, pheasant, grouse and bears.

Changes to Miller Station will all be within the current, fenced Miller Station site. The remainder of the Project will be underground. Accordingly, the only impact to hunting will be some habitat loss and possible minor disturbance of hunting activities during Project construction.

Out of a total Project area of approximately 1,300 acres, only 15 acres will be permanently cleared for the Project. The vast majority of those 15 acres is low-value habitat. See Section V.G. Habitat loss therefore will not have an adverse impact on recreational hunting opportunities in the area.

Similarly, the area that will be affected by Project construction is a minute fraction of the land available for hunting in the area and is in no way unique. (Exhibits 21 and 32.) Well and pipeline construction activities will last approximately four months. Consequently, construction of the proposed Project will not have an adverse impact on important hunting opportunities in the area.

There are no other recreational opportunities, important or otherwise, within the study area. (Exhibit 31.)

For these reasons, the Project will not result in a significant adverse impact to important recreational opportunities within the study area for the Project.

L. Socioeconomic Impacts (OAR 345-22-110).

Under this standard, the Council determines whether the construction and operation of a facility, taking into account mitigation, will result in significant adverse impact to the ability of communities within the study area to provide the following governmental services: sewers and sewage treatment, water, storm water drainage, solid waste management, housing, traffic safety, police and fire protection, health care and schools.

The study area for socioeconomic impacts of a surface facility related to an underground gas storage reservoir is the area within 30 miles of the site boundary. OAR 345-01-010(50)(g)(G). Potential providers of governmental services in the study area include Columbia and Clatsop Counties and the incorporated cities and towns within 30 miles of the site boundary. The nearest communities include Mist, which is unincorporated, Vernonia, which is approximately 15 miles away, and Clatskanie, which is approximately 12 miles away.

Construction workers will be on site for pipeline construction and modifications to Miller Station for a nine-month period from July 1997 through March 1998. There will be an average of 61 workers on site during that period, with a peak of 75 workers each month in August, September and October. Sixty to 70 percent of the work force will be from outside of the study area. However, only three families with school-age children are expected to come into the area as a result of Project construction. There will be two or three possible additional employees at Miller Station as a result of the facility expansion. (Exhibit 33.)

The population of Columbia County is approximately 39,400. Oregon Blue Book, 1995-96, p. 305. Accordingly, even during the peak construction period, the Project will not have a significant impact on the population in the area.

1. Sewers and Sewage Treatment.

No community in the study area provides sewers or sewage treatment to the existing storage facility or the surrounding area. Both the existing and expanded facility have been and will be served by on-site sewage disposal systems. During construction, contract portable toilets will be used. The Project therefore will not have any adverse impact on any community's ability to provide sewers or sewage treatment.

2. Water.

No community in the study area provides water to the existing storage facility or the surrounding area. Both the existing and expanded facility have been and will be served by existing water wells. Accordingly, the Project will not have an adverse impact on the ability of any community to provide water.

3. Storm Water Drainage.

Again, no community in the study area provides storm water drainage to the existing storage facility or the surrounding area. Storm water drainage will be handled on site by natural drainage and the existing collection system for facility pad runoff. The Project therefore will not have an adverse impact on the ability of any community to provide storm water drainage.

4. Solid Waste Management.

No community in the study area provides solid waste management services to the existing storage facility or the area around it. Current and future solid waste disposal for the underground storage facility is and will be handled through private contracts with local service companies. There will therefore be no adverse impact on the ability of any community in the area to provide solid waste management services.

5. Housing.

At the peak of construction activity there will be approximately 75 workers on site, only 50 of which will be from out-of-the-area and will require temporary housing. Even though there is very little temporary housing near the construction site, there are numerous communities within a 30 mile commute distance that have a wide array of facilities. The cities of Vernonia, Clatskanie and St. Helens have motel facilities totaling approximately 100 rooms. Longview and Kelso, Washington are also within 30 miles of Mist and there are several hundred motel rooms available in these communities. In addition, many of the construction workers will be bringing travel trailers and recreational vehicles which can be parked at a variety of parks established to accommodate this type of mobile housing.

Temporary housing in the area is therefore adequate to handle the number of construction workers for the Project. There will be no adverse impact on the ability of the communities in the area to provide housing.

6. Traffic Safety.

Once the expanded facility is operational, there will be no additional traffic in the area other than the several additional employee vehicles trips per day associated with two or three new employees operating out of Miller Station. This will not represent a significant increase in traffic for the area.

The principal roads in the vicinity of the Project are State Highway 202, a two-lane highway that bisects the project area as it runs generally southeast/northwest from Mist to Astoria, and State Highway 47, a two-lane highway that runs generally north/south from Clatskanie, through Mist, to its intersection with State Highway 26 west of Hillsboro. (Exhibit 34.) The southeastern endpoint of Highway 202 occurs at its intersection with Highway 47 in Mist.

Oregon Department of Transportation (ODOT) statistics for these highways indicate that average daily traffic on State Highway 202 was 870 vehicles per day in 1995 and that average daily traffic on State Highway 47 was 800 vehicles per day in 1995. According to ODOT, neither highway is at or near its capacity of approximately 50,000 to 75,000 vehicles per day.

During the construction phase, most related traffic will access the Project area on one of these two highways and then on local roads, primarily Mainline Road, a private logging road controlled by Longview Fibre Company.

During the construction phase, the Project will require a maximum of 75 workers on site. This could yield up to 150 additional vehicle trips per day (ODOT counts each direction of an out and back journey as a "trip") if single occupancy vehicles are used. Other construction related traffic will include equipment delivery and NNG project personnel

totalling up to 100 additional vehicle trips per day. Together with employee vehicle trips, the maximum total number of additional trips on area roads will be 250 per day which is 0.5 percent of the 50,000 daily vehicle capacity for these roads.

The only other road that will host significant additional traffic is Longview Fibre's private Mainline Road that currently provides access to Miller Station. Access to this road is controlled with close cooperation between Longview Fibre and NNG. Longview Fibre has expressed no concern about Project impacts on this road. In fact, Longview Fibre expressed its support for the Project in a recent letter to Columbia County, noting the successful degree of cooperation between the two companies. (Exhibit 35.)

Given the excess capacity of the existing roads in the area, the negligible traffic associated with facility operation and the relatively light traffic associated with Project construction, the Project will not have a significant adverse impact on the ability of communities in the area to ensure traffic safety.

7. Police Protection.

Police protection in the area is provided by the City of Vernonia and the Columbia County Sheriff. The small number of new employees for the expanded facility and the relatively small construction work force should not place a significant additional demand on police services. The Vernonia Police Chief and Columbia County Sheriff have both confirmed that the Project will not place a significant burden on their abilities to provide police protection. (Exhibits 36 and 37.)

The Project therefore will not have a significant adverse impact on the ability of communities in the area to provide police protection.

8. Fire Protection.

The Mist-Birkenfeld Rural Fire Protection District ("District") provides fire protection services in the area. In a recent letter to Columbia County, District Chief Dave Crawford stated:

"We have discussed the project with NNG representatives and are confident that the project has adequate personal safety features and, as planned, presents no unreasonable fire hazards. Fire prevention and detection equipment has been augmented by new fire suppression equipment which should control a fire incident until the fire department can arrive. Agreements between NNG and our district have helped to insure that adequate personnel and apparatus are available for an emergency such as might occur in the field or at the plant." (Exhibit 38.)

Moreover, the Project will pose very little if any additional fire hazard in the area. NNG has operated its existing underground natural gas storage facility for approximately 10 years without causing any fires or other hazards. The wellhead and pipeline facilities have numerous safety features, including relief valves and automatic shutdown systems. In addition, the facilities are monitored from the "nerve center" at Miller Station by NNG's trained personnel. Miller Station was inspected by the PUC in 1996 and was found to be in full compliance with the Pipeline Safety Regulations of the U.S. Department of Transportation (49 CFR pt 192 (1996)). (Exhibit 9.) Accordingly, the Project will not have an adverse impact on the ability of communities in the area to provide fire protection.

9. <u>Health Care</u>.

The minimal number of permanent employees and the relatively small construction work force should place little additional demands on the health care facilities that serve the area. In fact, there are few health care facilities actually in the study area. Local hospitalization needs are currently met by hospitals in the Portland area, Astoria and Longview, Washington. The communities in the area therefore provide very little in the way of health care.

However, to the extent that there are injuries or other health care needs associated with the Project, the Mist-Birkenfeld Rural Fire Protection District has a Multiple Casualty Incident Plan in place, has confirmed that it has the supplies and materials necessary to support the plan and has indicated that its resources are available in connection with the Project. (Exhibit 39.)

The Project therefore will not have a significant adverse impact on the ability of the communities in the area to provide health care services.

10. Schools.

As noted above, only three families with potential school-age children are expected to come into the area during the construction phase of the Project and no more than that number during the operational phase. The Project therefore will not have a significant adverse impact on the ability of communities in the area to provide schools.

M. Waste Minimization (OAR 345-22-120).

This standard requires an applicant, to the extent reasonably practicable, to

"minimize generation of solid waste and wastewater in the construction, operation, and retirement of the facility, and when solid waste or wastewater is generated, recycle and reuse such wastes." OAR 345-22-120(1).

In addition, to the extent reasonably practicable,

"the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility must have minimal adverse impact on surrounding and adjacent areas." OAR 345-22-120(2).

1. Introduction.

The following is a description of NNG's plan to minimize the generation of solid waste or waste water, the use of water and to recycle or reuse solid waste and waste waters.

NNG has in place a hazardous and nonhazardous waste reduction and recycling program for all of its facilities. Recycling and reuse is a priority for NNG and, as described below, will be administered during the construction phase and during the day-by-day operations of the Project.

2. Minimization of Solid Waste.

There will be no solid waste produced on a continuous basis from the Project processes. Operational maintenance will be the only activity producing solid waste after the construction of the Project has been completed.

3. <u>Construction Phase</u>.

There will be solid wastes generated during construction of both the additions to Miller Station and the gathering lines.

Construction wastes from the Miller Station additions will consist of nonhazardous equipment packaging and general construction debris. The material will consist of concrete, fiber board, wood, piping and scrap steel. The waste materials will be transported to an appropriate recycling facility, utilizing NNG's established recycling program, or to a nearby sanitary landfill for nonrecyclable goods.

The wastes generated from the installation of the gathering line system will consist of nonhazardous construction materials. The solid materials will consist of scrap steel, welding rod and erosion control materials such as straw bales and silt fencing. The scrap steel and welding rod will be collected and transported to a recycling facility. The silt fence material and the straw bales will be transported to a local landfill.

Using directional boring to cross the river minimizes the amount of erosion control materials necessary for the gathering line construction.

4. Operational Phase.

- (a) <u>Hazardous Solid Waste</u>. The only operation that produces hazardous wastes is spray can depressurization. Spray cans are depressurized and the contents collected as paint wastes.
- (b) <u>Nonhazardous Solid Waste</u>. Operations produce nonhazardous solid wastes from maintenance activities. Compressor crankcase oil, occasionally oil-contaminated triethylene glycol, oil/water separator oils, oily rags, oil filters and granular activated carbon (a filtering media) are generated as waste. The crankcase oil, triethylene glycol and oil/water separator oils are collected, transported and recycled by a vendor as bunker fuel. Oily rags and oil filters are incinerated off site by a permitted disposal facility. The granular activated carbon is collected and sent to a permitted facility for regeneration and returned for later use.

Office waste consists of paper and trash. Papers are collected and returned to a central NNG location for recycling. A local hauler will continue to transport trash to a landfill.

5. Minimization of Waste Water.

Waste water is generated from the process of withdrawing storage gas from the reservoir, compressor ancillary piping and facility storm water runoff. The collected water is piped to an oil/water separator where the collected oils are pumped to an oil tank and the water to a separate tank. The water is then pumped to an evaporator for evaporation.

During the gathering line construction, water will be used for directional boring and hydrostatic testing of the pipeline. All excess waters will be disposed of in a manner consistent with requirements specified in approved permits.

6. Minimization of Water Use.

The water source for the Project is an on-site well at the existing storage facility. The water from the well is used for drinking, occasional plant cleaning and for the fire suppression system. There are no plant processes that require continuous use of water.

The addition of a turbine-powered compressor will eliminate the need for additional water usage. The turbine utilizes an oil circulating system for cooling purposes, therefore eliminating the need for additional water or water/chemical mixtures.

The fire suppression system contains a tank that is seasonally filled using well water. The tank is drained annually for the winter months to prevent freezing.

The foregoing discussion demonstrates that NNG will minimize the generation of solid waste and wastewater in the construction, operation and retirement of the Project and will recycle or reuse the wastes that are produced to the extent reasonably practicable.

7. <u>Impact on Surrounding Areas</u>.

The accumulation and storage of Project waste will take place at Miller Station and transportation will be from Miller Station. Miller Station is fully fenced and virtually surrounded by second-growth forest with no neighbors nearby. The accumulation, storage and transportation of Project waste will therefore have little impact, if any, on surrounding and adjacent areas.

N. Retirement (OAR 345-22-130).

Under this standard, EFSC determines whether "the site * * * can be restored adequately to a useful, non-hazardous condition following facility retirement." OAR 345-22-130.

Retirement of the Mist storage facility, either as it currently exists or in its proposed expanded state, is unforeseeable at this time. The estimated facility life is indefinite because it is not anticipated that the natural reservoirs will lose their storage capacity and the process equipment will be replaced as needed. The original Mist storage facility has been fully operational since 1988. The integrity of the formation and capacity of the reservoir have not changed in nearly 10 years of operation. However, if retirement is necessary, the site can be restored to a useful nonhazardous condition.

The facility is composed of three distinct areas: the gas processing facility, the gathering lines and the injection/withdrawal wells. Retirement would be conducted in accordance with the nature of the equipment and structures in these areas.

1. Gas Processing Facility.

The gas processing facility at Miller Station is located on a 12-acre site and contains the gathering line manifold and six buildings, including the new compressor building for this Project. A chain link fence surrounds the site. The buildings are steel prefabricated structures mounted on a concrete slab. The buildings house process equipment such as compressors, a gas dehydration system, control systems and safety equipment. The gathering line manifold consists of a series of aboveground pipes and valves.

Upon decommission, the process equipment would be removed and sold as used equipment or scrap. Any hazardous materials stored in the buildings or located within the process equipment would be removed and disposed of following the applicable state hazardous materials statutes and rules. The buildings would be disassembled and the steel siding and frames would be sold as scrap metal. The concrete slabs would be broken up and

the concrete would be disposed of at an appropriate landfill. The gathering line manifold and the above-ground portion of the pipelines would be removed and sold as scrap metal. The fence would be removed and sold as scrap metal. If necessary, NNG would revegetate the area to prevent erosion and to encourage habitat redevelopment.

2. <u>Gathering Lines</u>.

The gathering lines extend underground from the processing facility at Miller Station to the wellheads, including the twin 16 inch, eight-inch and six-inch pipelines. Upon decommission, the pipelines would be left in place because removing the pipelines would cause unnecessary disruption to the environment. Before abandoning the pipelines, NNG would inspect them for hazardous materials and would remove any hazardous materials in the pipelines. The aboveground portions of the pipelines would be removed, and the remaining pipelines would be capped. Any hazardous materials generated from cleaning the pipelines would be managed and disposed of in accordance with applicable state hazardous materials statutes and rules. The removed portions of the pipelines would be sold as scrap metal. If necessary, NNG will revegetate the right-of-way in the area above the pipelines to encourage habitat redevelopment.

3. Injection/Withdrawal Wells.

The injection/withdrawal wells⁴ are comprised of an above-ground portion, the wellhead, and a below-ground portion, the encased well. The wellhead is installed on a concrete base. Upon decommission, the wellhead would be removed and the well would be plugged in compliance with DOGAMI regulations. The wellhead would be sold as scrap metal. The concrete base would be broken up and the concrete would be disposed of at an appropriate landfill. The well would be capped at a point below ground level. If necessary, NNG would revegetate the wellhead area to prevent erosion and encourage habitat redevelopment and would otherwise reclaim the well site in accordance with DOGAMI regulations.

4. <u>Cost of Restoration</u>.

The costs of retiring the Project are nearly all associated with Miller Station. The restoration cost of the Miller Station plant site is equal to its salvage value less the removal and disposal cost of all the structures and foundations.

⁴ These wells probably are not technically subject to the Retirement Standard. <u>See</u> ORS 469.300(9)(a)(H), (23). They are nonetheless included in this discussion in order to give EFSC a complete picture of the decommissioning of the underground storage facility at Mist.

The major items that have significant salvage value are the station compressors, which consist of a single 5035 horsepower turbine driven centrifugal compressor and two 1350 horsepower reciprocating compressors. The nominal salvage value of these units is estimated to be fifteen percent of their cost. The remaining items are the buildings, valves, pressure vessels, above-ground piping and all other auxiliary equipment. All of these items will also have some intrinsic value, but it is assumed they will be removed and disposed of for their salvage value.

The demolition and disposal cost will consist of the labor costs of disassembling the above-ground equipment and the disposal costs for the foundations. It is assumed that all gravel would be left on location and the grade left as is. It is also assumed that all buried piping will be purged then cut and capped below grade and left in place.

The total estimated salvage value is \$580,000. This is offset by approximately \$310,000 of demolition and disposal costs. As the salvage value of the facility is greater than the removal and disposal costs, NNG estimates that a cash surplus of \$270,000 would result from the retirement of the facility. All estimates are in 1996 dollars.

5. Financial Mechanism.

Under this standard, EFSC determines whether the site can be restored to a useful, nonhazardous condition upon retirement. EFSC has interpreted this standard to require a finding that the applicant will be able to cover the cost of that retirement.

As noted above, the salvage value of the facility exceeds the total cost of retiring the entire underground storage facility at Mist, including both the Project and the existing facility. The Site Certificate for the existing facility does not require NNG to establish a funding mechanism for facility retirement. These facts coupled with NNG's financial strength demonstrate that NNG will be able to cover the cost of facility retirement and that no new funding mechanism needs to be established in anticipation of facility retirement.

The foregoing discussion demonstrates that the Project site can be restored to a useful, nonhazardous condition following facility retirement.

VI. DIVISION 24 STANDARDS

A. <u>Public Health and Safety Standards for Surface Facilities Related to Underground Gas Storage Reservoirs (OAR 345-24-030)</u>.

This standard provides:

"(1) The following surface facilities related to underground gas storage reservoirs shall be located at distances in accordance with the schedule below from any existing permanent habitable dwelling:

- "(a) Major facilities -- 220 meters;
- "(b) Minor facilities, excluding compressors -- 15 meters;
- "(c) Compressors rated less than 1,000 horsepower -- 100 meters; and
- "(d) Roads and road maintenance equipment housing -- 15 meters.
- "(2) The surface facilities related to an underground gas storage reservoir shall be constructed and maintained in accordance with the applicable requirements of the U.S. Department of Transportation as set forth in 49 CFR, Part 192, and OAR 860-24-020 in effect as of the date of this rule.
- "(3) The surface facilities related to an underground gas storage reservoir shall be designed so that noise resulting from operation of the facilities shall not violate standards specified in OAR 340, Division 35, in effect as of the date of this rule.
- "(4) The surface facilities related to an underground gas storage reservoir shall be designed, constructed, operated and retired so as not to allow leakage of natural gas that endangers public health and safety.
- "(5) A program shall be developed using technology that is both practicable and reliable to monitor surface facilities related to underground gas storage reservoirs to ensure the public health and safety.
- "(6) The surface facilities related to an underground gas storage reservoir shall be designed, constructed and operated so as not to produce or contribute to seismic hazards that could endanger the public health and safety or result in damage to property." OAR 345-24-030.

Each section of this rule is discussed below.

Section 1.

All major surface facilities, including compression, are located at NNG's Miller Station. This facility is located in a second growth conifer forest approximately 2,750 meters (9,000 feet) north-northwest of the town of Mist. (Exhibit 40.) The nearest permanent habitable dwelling is located approximately 1,980 meters (6,500 feet) south-southwest of the facility. (Id.)

Minor surface facilities will be located at the well sites. Approximately 1,070 meters (3,510 feet) is the distance between any well site and the nearest permanent habitable dwelling. (Id.)

All compressors will be located at Miller Station.

Road construction will be limited to improving existing logging roads and constructing short extensions (<800 feet) of existing logging roads to well sites. There will be no road maintenance equipment housing constructed.

Section 2.

The facilities will be constructed and maintained in accordance with the applicable requirements of the U.S. Department of Transportation as set forth in 49 CFR part 192 and OAR 860-24-020 in effect as of November 30, 1994, the effective date of the rule. The existing underground storage facility at Mist was constructed and is maintained in accordance with the same regulations. The PUC, which administers these rules under a delegation from the federal government, inspected the current facility and its Operation and Maintenance Procedures last May and found them to be in complete compliance. (Exhibit 9.) NNG intends to adhere to the same degree of compliance in the construction of the Project and to use the same operation and maintenance procedures.

Section 3.

The subject facilities will be designed so that resulting noise will not violate the standards in OAR chapter 340, division 35, in effect as of November 30, 1994. NNG is now performing a noise study and will provide it to EFSC as soon as it is complete.

Section 4.

The subject facilities will be designed, constructed, operated and retired so as not to allow natural gas leakage that endangers public health and safety. As noted under Section 1 above, the facilities will be designed, constructed and operated in accordance with federal safety regulations enforced by the PUC. Among other things, these regulations require measures to prevent leakage, including factory installed pipeline coating, individual joint wrap, cathodic protection and insulation from other pipes that could cause inadvertent electrical contact. NNG has a perfect record of compliance with these regulations at its existing Mist storage facility.

The wellhead and pipeline facilities' numerous safety features include relief valves and automatic shutdown systems. In addition, the facilities are monitored by trained personnel from NNG's nerve center at Miller Station.

As a normal course of abandonment, underground pipelines are plugged at intervals to ensure minimum migration of gas should leakage occur.

Section 5.

NNG has an existing practicable, reliable monitoring program for its surface facilities.

U.S. Department of Transportation Pipeline Safety Regulation, 49 CFR part 192 subpart D--Design of Pipeline Components, addresses specifically the design and operational safety requirements for compressor plants. These requirements have been strictly adhered to in both the original plant design and the current proposed additions.

An Emergency Shutdown (ESD) system is in place that can be either manually or automatically activated. It stops all active plant process, closes all plant inlet and outlet valves, shuts off engine fuel and start gas systems and upon closure of necessary valves vents to atmosphere all process and fuel gas within the plant. As methane is lighter than air, the safe location is to vent vertically. These systems are maintained on a regular basis and tested at least annually to assure proper response.

Systems are in place that monitor compressor, process and control building atmospheres for the presence of flammable vapors as well as systems that detect the presence of a fire. These instruments will trigger an alarm or plant shutdown when certain preset levels are reached.

The plant has a staff of seven operators and maintenance personnel working rotating shifts. A communication link is maintained between the plant and the NNG Operations control room in Portland.

In addition, the following items are indications of NNG's commitment to public health and safety:

- (1) Fire training school for plant operators and maintenance personnel, generally on an annual basis.
- (2) Written action emergency procedures for Company Gas Dispatchers and plant personnel.
- (3) Maintenance of both Life Flight and C-Com procedures and phone numbers.
- (4) The original emergency plan from the original storage development will be expanded to include the proposed additional reservoir and equipment at Miller Station.

Section 6.

Section V.B of this application fully demonstrates that the facilities will not produce or contribute to seismic hazards that could endanger the public health and safety or result in property damage.

The public health and safety standards in OAR 345-24-030 are therefore satisfied.

B. Public Health and Safety Standards for Pipelines (OAR 345-24-060).

This standard provides:

- "(1) This rule applies to all pipelines under Council jurisdiction.
- "(2) Pipelines shall be constructed in accordance with the requirements of the U.S. Department of Transportation as set forth in 49 CFR part 192, in effect as of the date of this rule.
- "(3) A pipeline shall be designed so that noise resulting from operation of compressor stations and other related or supporting facilities shall not violate standards specified in OAR 340, Division 35, in effect as of the date of this rule.
- "(4) A pipeline shall have mechanical structures that allow the pipeline to be sealed off, in the event of leakage, in a manner that will minimize the release of flammable materials. This is rebuttably presumed to be satisfied by the requirements of Title 49, Code of Federal Regulations, Part 192, in effect as of the date of this rule.
- "(5) A program shall be developed using the best available practicable technology to monitor a proposed pipeline to ensure protection of public health and safety."

 OAR 345-24-060.

Section 1 of this rule does not contain a siting standard. Sections 2 through 5 are addressed below.

Section 2.

The pipelines will be constructed and maintained in accordance with the applicable requirements of the U.S. Department of Transportation as set forth in 49 CFR, part 192, in

effect as of November 30, 1994, the effective date of the rule. The existing underground storage facility at Mist, including pipelines, was constructed and is maintained in accordance with the same regulations. As noted above, the PUC inspected the current facility and its Operation and Maintenance Procedures last May and found them to be in complete compliance. (Exhibit 9.) NNG intends to adhere to the same degree of compliance in the construction of the Project and to use the same operation and maintenance procedures.

Section 3.

The subject facilities will be designed so that resulting noise will not violate the standards in OAR chapter 340, division 35, in effect as of November 30, 1994. NNG is now performing a noise study and will provide it to EFSC as soon as it is complete.

Vibration monitoring has been performed quarterly since the first year of the Mist Storage operation. Each and every report to EFSL has been negative; that is, there have been no complaints or reports of vibrations potentially related to Mist operations.

Section 4.

This standard is presumed to be met because the pipelines will be constructed in accordance with the 49 CFR part 192 regulations. Isolation valves will be located at both ends of the 16-inch gathering lines terminating at Miller Station and at both ends of the eight-inch and six-inch gathering lines connecting the well sites with the 16-inch lines. 49 CFR pt 192.179.

Section 5.

NNG has a program that uses the best available practicable technology to monitor the pipelines to ensure protection of public health and safety. Pressure sensing devices are positioned on the pipelines at Miller Station and near the wellheads to relay critical information to both the Miller Station and Portland gas control centers. High and low pressure alarms monitored on a 24-hour basis detect and locate areas where pressure variations may indicate abnormal conditions. Trained emergency response personnel are on duty 24 hours a day to react to any situation that requires immediate attention.

The public health and safety standards in OAR 345-24-060 are therefore satisfied.

VII. OTHER STATE STANDARDS

The construction of the twin 16-inch pipelines from the Calvin Creek Storage Area to Miller Station will require removal or fill of more than 50 cubic yards of material from a wetland identified by Dames & Moore in the Environmental Studies Report for the Project. (Exhibit 21 at 23-25.) NNG will therefore need a removal/fill permit issued pursuant to ORS chapter 196 and the regulations of the Oregon Division of State Lands.

Hydrostatic testing of the pipeline will require the temporary withdrawal of less than approximately 40,000 cubic feet of water from the Nehalem River and subsequent disposal of that water following completion of the testing. NNG intends to apply the wastewater to nearby agricultural land.

The water withdrawal from the Nehalem River will require review by the Water Resources Department ("WRD") under ORS chapter 537 and the implementing rules of the Water Resources Commission. Land application of the water may require a water pollution control facility permit issued pursuant to ORS chapter 468B and DEQ rules.

As noted in the Introduction, it is not clear from the siting statute whether the EFSC process for amendment of an existing site certificate includes relevant permits that are ordinarily issued by another agency. NNG therefore plans to work with Council staff on submittal of the necessary applications to DSL, WRD and DEQ, and to provide the decisions of those agencies to the Council before its action on this application.

NNG intends to submit the applications by the end of March 1997 and expects action from the three agencies before the first reading on this application, now scheduled for May 30, 1997.

VIII. NOTICE LIST - See next page.

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L. 6514-000-00806 14090 Wallace Rd., Mist, OR 97016 Trst. 6514-000-00801 Box 203, Rancho Cordova, CA 95741 G514-000-00300 14040 Hwy. 202, Clatskanie, OR 97016 L. 6514-000-00803 Wallace Rd., Mist, OR 97016 L. 6514-000-00800 14090 Wallace Rd., Mist, OR 97016 C. 6514-000-00804 14090 Wallace Rd., Mist, OR 97016 C. 6514-000-00804 14090 Wallace Rd., Mist, OR 97016 C. 6514-000-00802 Mist Rt., Clatskanie, OR 97016 C. 6515-000-00100 PO Box 3600, Longview, WA 98632 6515-000-00200 13753 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00200 1365 Busch Lane, Mist, OR 97016 6515-000-00400 6515-000-00400 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6521-000-00400 13163 Busch Lane, Mist, OR 97016 6521-000-00400 13163 Busch Lane, Mist, OR 97016 </td <td>Ferguson, Walter V.</td> <td>6514-000-00400</td> <td>14563 Hwy. 202, Mist, OR 97016</td>	Ferguson, Walter V.	6514-000-00400	14563 Hwy. 202, Mist, OR 97016
Trst. 6514-000-00801 Box 203, Rancho Cordova, CA 95741 6514-000-00300 14040 Hwy. 202, Clatskanie, OR 97016 L. 6514-000-00803 Wallace Rd., Mist, OR 97016 L. 6514-000-00804 14090 Wallace Rd., Mist, OR 97016 L. 6514-000-00802 Mist Rt., Clatskanie, OR 97016 L. 6514-000-00802 Mist Rt., Clatskanie, OR 97016 L. 6514-000-00802 Mist Rt., Clatskanie, OR 97016 G515-000-00100 PO Box 3000, Longview, WA 98632 6515-000-00200 13753 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6500-000-04700 13163 Busch Lane, Mist, OR 97016 6523-000-00500 13163 Busch Lane, Mist, OR 97016 6500-000-04700 13163 Busch Lane, Mist, OR 97016	Hemeon, Forest L. & Geraldine L.	6514-000-00806	14090 Wallace Rd., Mist, OR 97016
Trst. 6514-000-00801 Box 203, Rancho Cordova, CA 95741 6514-000-00300 14040 Hwy. 202, Clatskanie, OR 97016 L. 6514-000-00803 Wallace Rd., Mist, OR 97016 L. 6514-000-00804 14090 Wallace Rd., Mist, OR 97016 L. 6514-000-00802 Mist Rt., Clatskanie, OR 97016 L. 6514-000-00802 Mist Rt., Clatskanie, OR 97016 L. 6514-000-00302 1431 Wallace Rd. Mist, OR 97016 Colococologo 13753 Hwy. 202, Mist, OR 97016 6515-000-00300 13753 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00500 13854 Hwy. 202, Mist, OR 97016 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00801 13163 Busch Lane, Mist, OR 97016 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6515-000-00400 13163 Busch Lane, Mist, OR 97016	Buyer: Weller, J.A. & V.L.		Wallace Rd., Mist, OR 97016
6514-000-00803 Wallace Rd., Mist, OR 97016 6514-000-00803 Wallace Rd., Mist, OR 97016 6514-000-00804 14090 Wallace Rd., Mist, OR 97016 6514-000-00804 14090 Wallace Rd., Mist, OR 97016 6514-000-00802 Mist Rt., Clatskanie, OR 97016 6515-000-00100 PO Box 3000, Longview, WA 98632 6515-000-00100 PO Box 3000, Longview, WA 98632 6515-000-00300 13753 Hwy. 202, Mist, OR 97016 6515-000-00300 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00800 13854 Hwy. 202, Mist, OR 97016 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00801 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6500-000-04000 13163 Busch Lane, Mist, OR 97016	Good, Shirley A. Trste. Revoc. Trst.	6514-000-00801	Box 203, Rancho Cordova, CA 95741
6514-000-00803 Wallace Rd., Mist, OR 97016 6514-000-00804 14090 Wallace Rd., Mist, OR 97016 6514-000-00802 Mist Rt., Clatskanie, OR 97016 6514-000-00802 Mist Rt., Clatskanie, OR 97016 6515-000-00700 14431 Wallace Rd. Mist, OR 97016 6515-000-00200 13753 Hwy. 202, Mist, OR 97016 6515-000-00200 13753 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00800 13854 Hwy. 202, Mist, OR 97016 6515-000-00800 13854 Hwy. 202, Mist, OR 97016 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6523-000-00400 13163 Busch Lane, Mist, OR 97016 6523-000-00400 13163 Busch Lane, Mist, OR 97016	Davis, Rick L. & Elita D.	6514-000-00300	14040 Hwy. 202, Clatskanie, OR 97016
6514-000-00900 14090 Wallace Rd., Mist, OR 97016 6514-000-00804 14090 Wallace Rd., Mist, OR 97016 6514-000-00700 Mist Rt., Clatskanie, OR 97016 6515-000-00700 14431 Wallace Rd. Mist, OR 97016 6515-000-00300 13753 Hwy. 202, Mist, OR 97016 6515-000-00200 13390 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00200 13854 Hwy. 202, Mist, OR 97016 6515-000-00200 13163 Busch Lane, Mist, OR 97016 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6500-000-00400 13163 Busch Lane, Mist, OR 97016 6523-000-00400 13163 Busch Lane, Mist, OR 97016 6523-000-00400 13163 Busch Lane, Mist, OR 97016 6523-000-00400 13163 Busch Lane, Mist, OR 97016	Weller, Vicki L. & John A.	6514-000-00803	Wallace Rd., Mist, OR 97016
6514-000-00802 Mist Rt., Clatskanie, OR 97016 6514-000-00802 Mist Rt., Clatskanie, OR 97016 6515-000-00100 PO Box 3000, Longview, WA 98632 6515-000-00200 13753 Hwy. 202, Mist, OR 97016 6515-000-00200 13390 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00800 13854 Hwy. 202, Mist, OR 97016 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00801 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6523-000-004700 13163 Busch Lane, Mist, OR 97016 6523-000-004700 13163 Busch Lane, Mist, OR 97016 6523-000-004700 13163 Busch Lane, Mist, OR 97016	Hemeon, Forest L. & Geraldine L.	6514-000-00900	14090 Wallace Rd., Mist, OR 97016
ivian L. 6514-000-00802 Mist Rt., Clatskanie, OR 97016 6515-000-00700 14431 Wallace Rd. Mist, OR 97016 6515-000-00300 13753 Hwy. 202, Mist, OR 97016 6515-000-00300 13753 Hwy. 202, Mist, OR 97016 6515-000-00300 13950 Hwy. 202, Mist, OR 97016 6515-000-00200 13950 Hwy. 202, Mist, OR 97016 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 6515-000-00500 13854 Hwy. 202, Mist, OR 97016 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6500-00400 13163 Busch Lane, Mist, OR 97016 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6523-000-00400 13163 Busch Lane, Mist, OR 97016 6500-00400 14000 14000 14000 14000 14000 14000	Hemeon, Forest L. & Geraldine L.	6514-000-00804	14090 Wallace Rd., Mist, OR 97016
ivian L. 6514-000-00700 14431 Wallace Rd. Mist, OR 97016 6515-000-00100 PO Box 3000, Longview, WA 98632 6515-000-00200 13753 Hwy. 202, Mist, OR 97016 13753	Hemeon, Steven	6514-000-00802	Mist Rt., Clatskanie, OR 97016
i H. 6515-000-00100 PO Box 3000, Longview, WA 98632 6515-000-00300 13753 Hwy. 202, Mist, OR 97016 13750 Hwy. 202, Mist, OR 9	Reynolds, H. Wayne & Vivian L.	6514-000-00700	14431 Wallace Rd. Mist, OR 97016
i H. 6515-000-00300 13753 Hwy. 202, Mist, OR 97016 6515-000-00200 13390 Hwy. 202, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13163 Busch Lane, Mist, OR 97016 6515-000-00200 13163 Busch Lane, Mist, OR 97016 6515-000-00200 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6515-000-00400 13163 Busch Lane, Mist, OR 97016 6500-000-04700 13163 Busch Lane, Mist, OR 97016 6500-000-04700 13163 Busch Lane, Mist, OR 97016 6500-000-04700 13163 Busch Lane, Mist, OR 97016 6503 000-04700 13163 Busch La	Longview Fibre Company	6515-000-00100	PO Box 3000, Longview, WA 98632
i H. 6515-000-00200 13390 Hwy. 202, Mist, OR 97016 6515-000-00900 13950 Hwy. 202, Mist, OR 97016 1316. H. 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00800 13163 Busch Lane, Mist, OR 97016 6515-000-00801 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6500-000-04700 13163 Busch Lane, Mist, OR 97016 6500-000-04700 13163 Busch Lane, Mist, OR 97016 6503-000-00500 13163 Busch Lane, Mist, OR 97016 6503 Busch Lane, Mist, OR 97016 6503 Busch Lane, Mist, OR 97016 6503 Busch Lane, Mis	Gibbens, Robbie K.	6515-000-00300	13753 Hwy. 202, Mist, OR 97016
ri 6515-000-00900 13950 Hwy. 202, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13854 Hwy. 202, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13163 Busch Lane, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13163 Busch Lane, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13163 Busch Lane, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13163 Busch Lane, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13163 Busch Lane, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13163 Busch Lane, Mist, OR 97016	Hansen, Randall C.& Kari H.	6515-000-00200	13390 Hwy. 202, Mist, OR 97016
ri H. 6515-000-00201 13950 Hwy. 202, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 13950 Hwy. 202, Mist, OR 97016 6515-000-00500 13854 Hwy. 202, Mist, OR 97016 ri H. 6515-000-00800 13163 Busch Lane, Mist, OR 97016 ri H. 6515-000-00801 13163 Busch Lane, Mist, OR 97016 R. 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6515-000-00400 R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 100 Box 3000 Lonaview WA 98632	Hansen, Randall C.	6515-000-00900	13950 Hwy. 202, Mist, OR 97016
ri H. 6515-000-00500 13854 Hwy. 202, Mist, OR 97016 ri H. 6515-000-00800 13163 Busch Lane, Mist, OR 97016 ri H. 6515-000-00800 13390 Hwy. 202, Mist, OR 97016 ri H. 6515-000-00801 13163 Busch Lane, Mist, OR 97016 R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 PO Box 3000 Lonaview WA 98632	Hansen, Randall C. & Kari H.	6515-000-00201	13950 Hwy. 202, Mist, OR 97016
ri H. 6515-000-00500 13854 Hwy. 202, Mist, OR 97016 ri H. 6515-000-00800 13163 Busch Lane, Mist, OR 97016 ri H. 6515-000-00800 13390 Hwy. 202, Mist, OR 97016 R. 6515-000-00801 13163 Busch Lane, Mist, OR 97016 R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 DO Box 3000 Lonaview WA 98632	Buyer: Hansen, Norman		13950 Hwy. 202, Mist, OR 97016
ri H. 6515-000-00800 13163 Busch Lane, Mist, OR 97016 ri H. 6515-000-00200 13390 Hwy. 202, Mist, OR 97016 R. 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, 6835 Capitol Hill Rd. #34, Portland, 6500-000-04700 R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 PO Box 3000 Longview WA 98632	Libel, Shalmon L.	6515-000-00500	13854 Hwy. 202, Mist, OR 97016
ri H. 6515-000-00200 13390 Hwy. 202, Mist, OR 97016 6515-000-00801 13163 Busch Lane, Mist, OR 97016 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 13163 Busch Lane, Mist, OR 97016	Busch, Fred Jr. & Phylis	6515-000-00800	13163 Busch Lane, Mist, OR 97016
R. 6515-000-00801 13163 Busch Lane, Mist, OR 97016 R. 6515-000-00400 6835 Capitol Hill Rd. #34, Portland, R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 PO Box 3000 Longview WA 98632	Hansen, Randall C. & Kari H.	6515-000-00200	13390 Hwy. 202, Mist, OR 97016
R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6500-000-04700 13163 Busch Lane, Mist, OR 97016 R. 6523-000-00500 13163 Busch Lane, Mist, OR 97016	Busch, Mary Lou	6515-000-00801	13163 Busch Lane, Mist, OR 97016
R. 6500-000-04700 R. 6523-000-00500	Vewter, Agnes J.	6515-000-00400	6835 Capitol Hill Rd. #34, Portland, OR 97219
R. 6523-000-00500	Busch, Fred W. & Phylis R.	6500-000-04700	13163 Busch Lane, Mist, OR 97016
6523 000 00400	Busch, Fred W. & Phylis R.	6523-000-00500	13163 Busch Lane, Mist, OR 97016
00±00-000-0700	Longview Fibre Company	6523-000-00400	PO Box 3000, Longview, WA 98632

TAX LOTS	AND OWNERS INSIDE CAL	TAX LOTS AND OWNERS INSIDE CALVIN CREEK BOUNDARY NOT
OS .	BJECT TO SURFACE-DISTURBING CONSTRUCTION	BING CONSTRUCTION
OWNER	TAX LOT #	ADDRESS
Banzer, Joseph D.	6521-000-04300	
Longview Fibre Company	6522-000-04800	
Busch, Fred W.	6522-000-04700	
TAX LOTS WI	AND OWNERS INSIDE OR OUTSIDE STORAGE ARE ILL HOST WELLSITES, PIPELINES, CONSTRUCTION	AND OWNERS INSIDE OR OUTSIDE STORAGE AREA THAT LL HOST WELLSITES, PIPELINES, CONSTRUCTION
Longview Fibre Company	6522-000-04900	P.O. Box 3000, Longview, WA 98632
Busch, Fred W.	6522-000-04500	13163 Busch Lane, Mist, OR 97016
Longview Fibre Company	6522-000-04600	P.O. Box 3000, Longview, WA 98632
Longview Fibre Company	6522-000-05000	P.O. Box 3000, Longview, WA 98632
Longview Fibre Company	6522-000-04900	P.O. Box 3000, Longview, WA 98632
Busch, Fred W.	6522-000-00500	13163 Busch Lane, Mist, OR 97016
Hemeon, Forest L. & Geraldine L.	6514-000-00900	14090 Wallace Road, Mist, OR 97016
Hansen, Randall C. & Kari H.	6515-000-00200	13390 Hwy. 202, Mist, OR 97016
Libel, Shalmon L.	6515-000-00500	13854 Hwy 202, Mist, OR 97016
Longview Fibre Company	6515-000-00100	P.O. Box 3000, Longview, WA 98632
Longview Fibre Company	6514-000-00100	P.O. Box 3000, Longview, WA 98632
Longview Fibre Company	6511-000-02600	P.O. Box 3000, Longview, WA 98632
John Hancock Mutual Life Ins. Co.	6511-000-02500	One SW Columbia - Ste. 1720, Portland, OR 97258
(c/o Campbell Group)		
OWNERS INSIDE OR 1 AND ALL PROP	VITHIN 500 FT. OF CALVIN ERTY OWNERS WITHIN 500	OWNERS INSIDE OR WITHIN 500 FT. OF CALVIN CREEK STORAGE AREA, MILLER STATION AND ALL PROPERTY OWNERS WITHIN 500 FEET OFCENTER LINE OF PIPELINE
Davis, Rick L. & Elita D.	6514-000-00300	14040 Hwy. 202, Mist, OR 97016
Gibbens, Robbie K.	6515-000-00300	13753 Hwy. 202, Mist, OR 97016
Longview Fibre Company	6510-000-02600	P.O. Box 3000, Longview, WA 98632
John Hancock Mutual Life Ins. Co.	6511-000-02500	One SW Columbia - Ste. 1720, Portland, OR 97258
(c/o Campbell Group)		
John Hancock Mutual Life Ins. Co.	6511-000-02700	One SW Columbia - Ste. 1720, Portland, OR 97258
(c/o Campbell Group)		
Longview Fibre Company	6521-000-04400	WA
Longview Fibre Company	6523-000-00300	Longview, WA
Longview Fibre Company	6523-000-00400	WA
Longview Fibre Company	6527-000-02500	₩
Longview Fibre Company	6527-000-05000	P.O. Box 3000, Longview, WA 98632

OWNER	TAX LOT #	ADDRESS
Banzer, Joseph D.	6516-000-00100	69780 Banzer Road, Mist, OR 97016
Banzer, Joseph D.	6521-000-04200	69780 Banzer Road, Mist, OR 97016
Banzer, Joseph D.	6521-000-04300	69780 Banzer Road, Mist, OR 97016
Epling, Etta & Donald	6524-000-00600	68445 Nehalem Hwy North, Vernonia, OR 97064
Busch, Fred W. & Phylis R.	6522-000-04700	13163 Busch Lane, Mist, OR 97016
Busch, Fred W. & Phylis R.	6515-000-00800	13163 Busch Lane, Mist, OR 97016
Busch, Fred W. & Phylis R.	6522-000-04500	13163 Busch Lane, Mist, OR 97016
Busch, Fred W. & Phylis R.	6523-000-00500	13163 Busch Lane, Mist, OR 97016
Larkins Trust	6523-000-00300	2600 Larkins Lane, Forest Grove, OR 97116
Libel, Shalmon L.	6515-000-00500	13854 Hwy 202, Mist, OR 97016
Libel, Shalmon L.	6514-000-00200	13854 Hwy 202, Mist, OR 97016
Hansen, Randall C. & Kari H.	6515-000-00200	13990 Hwy 202, Mist, OR 97016
John Hancock Mutual Life Ins. Co.	6525-000-05100	One SW Columbia - Ste. 1720, Portland, OR 97258
(c/o Campbell Group)		

IX. CONSTRUCTION SCHEDULE - See next page.

3/13/97

Calvin Creek Underground Storage Project PROPOSED CONSTRUCTION SCHEDULE

			197	Ctr 3, 1997	1997	of 1	Qtr 4, 1997	ਰ	Otr 1, 1998	\vdash	Otr 2, 1998	868	ਰਿ	Otr 3, 1998	┝	Otr 4, 1998	1998
0	Task Name	Plan Start	Plan Finish	n Jul	Aug Sep	동 O	Oct Nov Dec		Jan Feb Mar	ar Apr	к Мау	Jun	3	Aug Sep	Ŏ Đ	Oct Nov Dec	<u>8</u>
-	CALVIN CREEK CONSTRUCTION SCHEDULE	18/2/97	11/20/98							······································							
~	GATHERING SYSTEM GATHERING SYSTEM	7/28/97	1/5/98									********	*********	•••••			
**	Construct Gathering Line	7128/97	11/7/97				•••••										
*	Mobilize Crews & Equipment	71/28/97	8/15/97	. 		••••						**********		********			
9	Construct Gathering Line	8/18/97	10/10/97	**********									********				
•	Complete River Crossing	8/18/97	8/12/97		I		,							*******			
7	Cleanup & Replant ROW	10/13/97	11/7/97														
∞	Wellhead Production Equipment	11/10/97	1/5/98											•••••		••••••	
a	install Equipment	11/10/97	12/22/97	-													
2	Tie-in to Gathering	12/22/97	1/5/98		••••			-12		••••••					,	••••••	
=	Gathering Systems Complete	1/5/98	1/5/98														
2	MILLER STATION RETROFIT	7/15/97	3/27/98														
5	Sitework	7/15/97	8/29/97														
7	Concrete	8/15/97	10/10/97				*******				•••••						
19	Structural Steel	10/13/97	11/7/97														
92	Equipment Erection	11/10/97	12/5/97	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						•••••						•••••	
4	Bulkings	10/10/97	12/5/97														
\$	Piping Erection	12/8/97	1/16/98			,				•••••••						•••••	
2	Electrical/Instrumentation	12/1/97	2/13/98														
20	Insulation/Paint	2/16/98	3/27/98								••••••						
2	Compressor Plant Complete	3/27/98	3/27/98							•							
Z	COMMISSIONING & START UP	3/30/98	11/20/98														

Construction schedule should be considered tentative until the compressor plant detailed design is completed.

3/13/97

Calvin Creek Underground Storage Project PROPOSED CONSTRUCTION SCHEDULE

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EXHIBITS

TO

APPLICATION TO AMEND SITE CERTIFICATE FOR MIST UNDERGROUND NATURAL GAS STORAGE FACILITY

March 20, 1997

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UNDERGROUND STORAGE FACILITY SITE CERTIFICATION AGREEMENT

for the

MIST SITE

between

The State of Oregon

acting by and through its ENERGY FACILITY SITING COUNCIL

and

OREGON NATURAL GAS DEVELOPMENT CORPORATION

UNDERGROUND STORAGE FACILITY
SITE CERTIFICATION AGREEMENT

for the

MIST SITE

between

The State of Oregon
acting by and through its
ENERGY FACILITY SITING COUNCIL

and

OREGON NATURAL GAS DEVELOPMENT CORPORATION

This Certification Agreement is made and entered into in the manner provided by ORS 469.300 through ORS 469.570 and ORS 469.992, by and between the State of Oregon (State), acting by and through its Energy Facility Siting Council (EFSC) and Oregon Natural Gas Development Corporation, (ONG), a wholly owned subsidiary of Northwest Natural Gas Company (NNG). Any reference herein to ONG shall also include NNG.

I. SITE CERTIFICATION

A. This agreement certifies that, to the extent authorized by State law and those warranties and conditions set forth herein, the State approves and authorizes the construction and operation of an underground storage facility for natural gas and related or supporting facilities at the Mist Site, in the manner described in ONG's site certificate application, this agreement, and the record of the administrative hearings held pursuant to ORS 469.300 through ORS

469.570, including supporting testimony filed by ONG with EFSC. This approval by the State binds the State and all counties, cities and political subdivisions in the State as to the approval of the site and the construction and operation of the underground storage reservoir and related or supporting facilities, subject only to the conditions of this agreement. However, each agency that issues a permit, license or certificate shall continue to exercise enforcement authority over such permit, license or certificate.

B. This certificate requires ONG to comply with applicable state laws as they exist on the date it is executed by EFSC, and with stricter state laws adopted subsequent thereto if compliance with such stricter state laws is necessary to avoid a clear danger to the public health and safety.

II. SITE DESCRIPTION OF THE UNDERGROUND STORAGE RESERVOIR AND RELATED OR SUPPORTING FACILITIES

- A. The underground storage reservoir and related or supporting facilities to be constructed and operated consist of:
 - two naturally existing underground gas reservoirs (the flora and bruer pools) in portions of 6 sections of land in Columbia County, Oregon, entirely within the project boundaries described in Appendix 1 attached hereto and by this reference incorporated herein; and

2. located in Columbia County, Oregon the following related or supporting facilities as shown on the attached Appendix 1: Miller Station with attendant equipment (including, but not limited to, compressors), gathering lines, access roads, existing natural gas wells, monitoring wells and proposed injection/withdrawal wells. These locations may be adjusted as reasonable or necessary because of physical conditions.

III. WARRANTIES

In consideration of the execution of this Certification Agreement by the EFSC, and pursuant to ORS 469.400(4) and ORS 469.470(3) the following warranties are made:

A. Completion of Construction

ONG warrants that the construction of the underground natural gas storage facility and related and supporting structures will be completed prior to August 31, 1987.

B. Financial Ability

ONG warrants that it has reasonable assurance of obtaining sufficient financial resources to construct and operate the underground storage facility, and related and supporting facilities including funds necessary to cover construction

costs, operating costs for the design lifetime of the underground storage facility, and the costs of permanently shutting the underground storage facility down and maintaining it in a safe condition.

C. Ability to Construct and Operate

ONG warrants that it has the ability to take those actions necessary to ensure that the underground storage facility and related and supporting facilities will be constructed and operated in a manner consistent with its representations regarding effects on the public health, safety, and welfare contained in its site certificate application, and supporting testimony and the terms and conditions of this agreement including compliance with all design, quality assurance and personnel qualifications and training requirements.

D. Protection of Public Health and Safety

ONG warrants that it will take those actions, including compliance with all state and Federal statutes, rules and regulations necessary to ensure that construction and operation of the Mist underground storage facility poses no danger to the public health and safety.

IV. CONDITIONS

The following conditions are provided pursuant to the provisions of ORS 469.400 and OAR 345-100-011.

A. State and Federal Law

- 1. ONG and EFSC shall abide by all applicable state laws including all laws and state administrative rules and regulations in effect on the date this site certificate is executed, except upon a clear showing that there is danger to the public health and safety that requires stricter laws or rules, then, in that case, EFSC may, subject to ORS 469.400 require ONG to meet stricter state statutes or rules of EFSC or other state agencies or ordinances of cities or counties adopted subsequent to the execution of this agreement.
- 2. Nothing in this agreement shall relieve ONG from complying with requirements of Federal laws and regulations which may be applicable to construction and operation of the underground storage reservoir and associated facilities, and with the terms and conditions of any permits and licenses which may be issued to ONG by pertinent federal agencies.

B. Control of Site

Prior to commencement of construction of the Facility
ONG shall present evidence satisfactory to EFSC that
ONG has access to the facility and full control
over the underground reservoirs and sites for

related and supporting facilities, whether by ownership, lease or easement or otherwise as necessary to: Construct and maintain the underground reservoir, compressors, pipelines, gathering lines, injection withdrawal and other wells, and access roads to the facility necessary for the construction, operation, monitoring and regulation of the underground storage reservoir.

Mandatory Conditions Required by OAR 345-100-011 С.

1. Location

345 ,4.635. Related or supporting facilities shall not be located at less than the minimum distances from any existing permanent habitable dwelling specified in OAR 345-100-036(1) in effect on the date of this Certificate.

2. Pipelines

74.60 (2) All pipelines in the project area shall be designed, built and operated in compliance with the requirements of the U.S. Department of Transportation set forth in Title 49, Code of Federal Regulations, Part 192 subpart C, in effect on the date of this Certificate, as administered by the Public Utility Commissioner of Oregon.

З. Noise

All compressors, pipelines, roads and related

facilities shall be designed, constructed, installed and operated in such a manner so as not to violate the standards specified by the Oregon Department of Environmental Quality in OAR 340-35-35, (Noise Control Regulation,) in effect on the date of this Certificate.

4. Wells

Operation, maintainence and abandonment of all wells on the site shall be in compliance with the applicable provisions of ORS chapter 520 and OAR ch. 632, Division 10, in effect on the date of this Certificate, as administered by the Oregon Department of Geology and Mineral Industries.

5. Monitoring Program

Design, construction, and operation of the underground storage reservoir and related or supporting facilities shall incorporate a monitoring program to ensure the public health and safety and to detect leakage using the best available surface and subsurface monitoring technology and testing procedures available as of the date of this Certificate or as described in ONG's application and supporting testimony relating to OAR 345-100-040(6) and (7).

6. Water Quality Protection

ONG shall construct, build and operate the underground storage reservoir and related or supporting facilities so as to prevent emissions of pollution into ground or surface waters in violation of OAR 345-100-40 (1)(a),(b), and (c) and other state and Federal water pollution rules and statutes in effect on the date of this agreement.

7. Fragile Soils

The ONG underground storage reservoir and related or supporting facilities shall be designed, built, and operated so as to reduce adverse impacts on unstable or fragile soils.

8. Socio-Economic Impacts

Throughout the design, construction, and operation of the underground storage facility ONG shall continuously cooperate with Columbia County to identify any adverse socioeconomic impacts.

9. Water Rights

ONG shall design, build and operate the underground storage facility and related or supporting facilities without infringing on the existing water rights of other persons.

10. Applicant's Representations

The facility shall be designed, built and operated in compliance with the representations made by ONG in satisfaction of OAR 345-100-040(2),(4), and (8), and any other EFSC standard.

11. Gas Pressure

ONG shall maintain average gas pressures in the underground storage reservoirs at levels equal to or below the natural gas pressures in the reservoirs, prior to production of natural gas which was 1000 psi in the Flora pool and 940 psi in the Bruer pool. Provided, however, that ONG may maintain natural gas pressures at higher levels if ONG provides EFSC with results of a breakdown test of the caprock which shows to EFSC's satisfaction that a higher level of pressure will not endanger the public health and safety. Such higher level in any event shall not exceed 1250 psi.

V. Other Conditions

It is agreed by ONG and EFSC that construction of any other injection/withdrawal well, pipeline or gathering line, or any other facility not shown in Appendix I or identified in part II of this agreement shall require an amendment of this agreement as provided in part VII below.

VI. Approvals

The following approvals, permits, licenses, or certificates by governmental agencies are considered necessary to construct and operate this underground storage of natural gas facility. Each appropriate state agency shall issue the permits identified below consistent with the conditions in this agreement and not later than 90 days or sooner as provided by the appropriate agency's rules, from the time of filing of a complete application by ONG. ONG shall make application for these approvals, permits, licenses, or certificates, paying all applicable fees prior to construction of this facility or later as appropriate.

Department of Geology

Well drilling and other permits required by ORS ch 520 and OAR ch 632 Division 10.

2. Department of Environmental Quality

Air Contaminant Discharge Permit for the operation of the Mist underground storage facility.

3 Public Utility Commissioner

Compliance inspection of pipelines pursuant to Title 49 CFR, Part 192, as necessary.

4. Department of Commerce

Pressure vessel inspection, State Fire Marshall approvals and plan review of construction drawings.

- 5. Department of Transportation

 Single trip permits for oversize or overweight loads.
- 6. Columbia County

 Building, plumbing and electrical permits.

VII AMENDMENT OF SITE CERTIFICATION AGREEMENT

- ONG and EFSC recognize a need to provide a A. means of amending this agreement because of the length of time which will pass between the date of its execution and the date of construction and the length of the operation of the facilities. Therefore, the parties agree that in the event future unforeseen developments cause the construction or operation of the underground storage reservoir or related or supporting facilities to present a danger to the public health, safety or welfare or if Federal law requires a change, this agreement may be amended by further written agreement, executed in the manner provided in ORS 469.400(3), after compliance with the procedures of B. through F. below.
- B. Either ONG or EFSC may propose a corrective amendment. The proposal shall set forth the amendment verbatim, together with a statement of the reasons therefor.

- C. EFSC shall distribute the proposed amendment to the interested state agencies, and to the county advisory group as defined in ORS 469.480 requesting comments and recommendations on the proposed amendment within 30 days of the date of distribution.
- D. If ONG and EFSC do not agree on an amendment or if after public notice in a regularly published EFSC meeting agenda 10 or more members of the public or an organization representing 10 or more members of the public request a hearing, EFSC shall hold a public hearing on the proposed amendment within 90 days after distribution of the proposed amendment.
- E. At the conclusion of any hearing, and in no case more than 120 days after the proposed amendment was distributed, the EFSC will, based upon its findings as to danger to the public health, safety and welfare, either approve or reject the proposed amendment. Rejection or approval of the proposed amendment will be subject to judicial review the same as this agreement.
- F. For amendments not affecting the public health, safety or welfare and where ONG and EFSC agree that it is desirable to amend this site certification ONG may file with the EFSC an

application for an amendment to the site certificate agreement, which application shall state the necessary reasons therefore. The EFSC may grant such application without further proceedings at its regular public meeting.

VIII SUCCESSORS AND ASSIGNS

This agreement is binding upon ONG and any co-owners, partners or joint venturers of ONG in the construction and operation of the underground storage facility and related and supporting facilities and upon any successors in interest to or assignees of either ONG or any co-owner, partner or joint venturer.

IN WITNESS WHEREOF, this Site Certificate Agreement has been executed by the State of Oregon, acting by and through its Energy Facility Siting Council and Oregon Natural Gas

Development Corporation as below subscribed on this 30^{m} day of 20^{m} , 1981.

State of Oregon

Energy Facility Siting Council

Attest: Donald Wondowl

Oregon Natural Gas Development Corporation

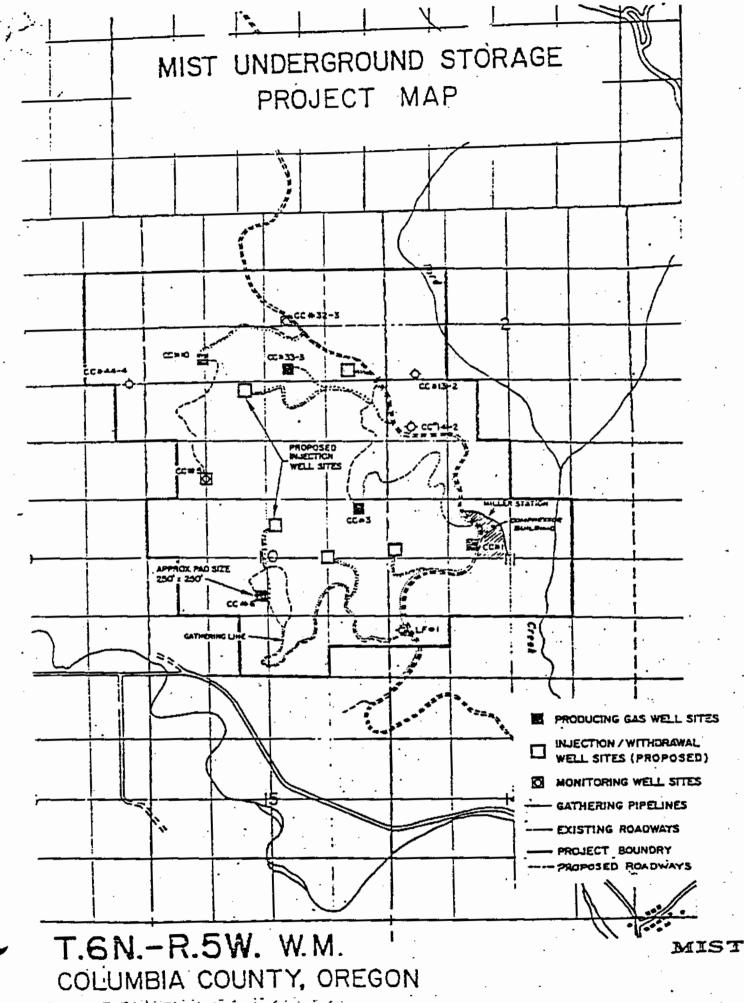
Northwest Natural Gas Company

: Koneld

President - Ronald T. Miller

Attest:

Secretary - Wesley E Radfo



APPENDIX TO THE SITE CERTIFICATE

Mist Underground Gas Storage Project Area

T. 6N, R. 5W, W.H.

Sec. 2: SW4 NW4, W4 SW4, W4 SE4 SW4.

Sec. 3: Sty NEt, Sty NWty, SWty, SEty.

Sec. 4: SE; NE; NE; SE; E; SE; SE;.

Sec. 11: SWL NEL, NWL, NL SWL, NL SWL SWL, NWL SEL.

ASSIGNMENT

of

UNDERGROUND STORAGE FACILITY

SITE CERTIFICATION

for the

MIST SITE

Oregon Natural Gas Development Corporation, an Oregon corporation with its principal place of business at 221 N.W. Second Avenue, Portland, Oregon ("Assignor"), does hereby assign and convey to Northwest Natural Gas Company, an Oregon corporation with its principal place of business at 220 N.W. Second Avenue, Portland, Oregon ("Assignee") all of its right, title and interest in the Site Certification for the MIST SITE dated September 30, 1981, including any and all approvals and authorizations therein received by Assignor from the State of Oregon acting by and through its Energy Facility Siting Council.

The true consideration for this Assignment is Ten Dollars (\$10.00) and other good and valuable consideration, the receipt and sufficiency are hereby acknowledged.

This Assignment is made in accordance with the above-referenced certification and shall be binding upon and inure to the benefit of the Assignor and Assignee, and their successors and assigns, and shall be effective for all purposes as of April 11, 1988.

Assignor:

OREGON NATURAL GAS DEVELOPMENT

CORPORATION

STATE OF OREGON

County of MYLTNOM4H s.s.

On this 31 day of 1017, 19 Phefore me, the undersigned, a Notary Public in and for said County and State, personally appeared Danyvie Life Medical Known to me to be the Person who executed the within instrument, and known to me to be the person who executed the within instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the same pursuant to its by-laws or a resolution of its board of directors.

R.L. HORDICHOK
NOTARY PUBLIC - OREGON
Commission Expires 10-9-92

Assignee:

NORTHWEST NATURAL GAS COMPANY

STATE OF OREGON

County of MULTINGA 444 9.5.

On this \$\frac{1}{2}\ day of \frac{1000}{2000}, 19\ \text{Motoror me, the undersigned, a Notary Public in and for said County and State, personally appeared \frac{1000}{2000}\ \text{RUE} \\
known to me to be the \frac{5000}{2000}\ \text{RUE} \\
known to me to be the \frac{5000}{2000}\ \text{RUE} \\
known to me to be the \text{person decoupled the within instrument, and known to me to be the person who executed the within instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the same pursuant to its by-laws or a resolution of its board of directors.

Romannoa

R.L. HORDICHOK

NOTARY PUBLIC - OREGON

My Commission Expires 10-4-92

Amendment No. 1 to

Underground Storage Facility Site Certification Agreement

for the Mist Site

between

The State of Oregon
acting by and through its
Energy Facility Siting Council
and

Oregon Natural Gas Development Corporation

- The Mist Site Certification Agreement ("Agreement") was executed by Oregon Natural Gas Development Corporation (CNG) and the State of Oregon (State), acting by and through its Energy Facility Siting Council (EFSC), on September 30, 1981. The Agreement authorizes CNG to construct and operate an underground storage facility for natural gas and associated facilities at the Mist Site in Columbia County, Oregon.
- ONG wishes to amend this Agreement in order to extend the deadline for constructing the proposed facility.
- Columbia County, the Mist-Birkenfeld Rural Fire District and local residents requested additional amendments to the Agreement.
- EFSC has reviewed CNG's request and the concerns and requests made by the public. EFSC agrees that certain amendments to the Agreement should be executed.

In consideration of the foregoing, it is agreed that:

- a. Section III.A. of the Agreement is amended to read as follows: "ONG warrants that the construction of the underground natural gas storage facility and related and supporting structures will be completed prior to August 31, 1990."
- b. The map in Appendix 1 of the site certificate is replaced by the map attached herein.
- c. Section II.A.1 is amended to read as follows: "two naturally existing underground gas reservoirs (the Flora and Bruer pools) in portions of 3 sections of land all in Township 6 North, Range 5 West of the Willamette Meridian in Columbia County, Oregon, containing 940 acres, more or less from the surface of the earth to the base of the Clark and Wilson Sands and the stratigraphic equivalent thereof, which in the case of the Bruer pool was identified at a measured depth of 3,095 feet in the REC CC(1 RD 1 well and in the case of the Flora pool was identified at measured depth of 2,760 feet in REC CC(33-3 well and are entirely within project boundaries described in Appendix 1 attached hereto and by reference incorporated herein; and"

- d. Section IV.C.5 is amended to read as follows: "Design, construction and operation of the underground storage reservoir and related of supporting facilities shall incorporate a monitoring program to ensure the public health and safety and to detect leakage using the best available technology and testing procedures available as of the date of this Certificate or as described in ONG's application and supporting testimony relating to CAR 345-100-040(6) and (7). ONG shall recommend for EFSC approval a program to evaluate reported local unusual vibrations. The program shall include reports not less than annually to EFSC. If ONG or EFSC believes there is a correlation between reported vibrations and storage reservoir activity, ONG shall recommend to EFSC a program to install and monitor seismic instruments."
- e. The following sentence is added to the end of Section IV.C.ll: "ONG shall notify Columbia County when it notifies EFSC that it wishes to increase reservoir gas pressures above discovery pressure."
- f. Section V.l is amended to read as follows: "It is agreed by ONG and EFSC that construction or replacement of any monitoring well, injection/withdrawal well, pipeline or gathering line, or any other facility not shown in Appendix 1 or identified in part II of this agreement shall require an amendment of this agreement as provided in part VII below."
- g. Section VI.6 is amended to read as follows: "Building, plumbing, electrical, and conditional land use permits."

IN WITNESS WHEREOF, this Amendment No. 1 to the Mist Site Certification Agreement has been executed by the Chairman of the Energy Facility Siting Council of the State of Oregon and Oregon Natural Gas Development Corporation, as below subscribed this A day of Caloba., 1987.

OREGON NATURAL CAS DEVELOPMENT
CORPORATION

1

President

Attest:

At At

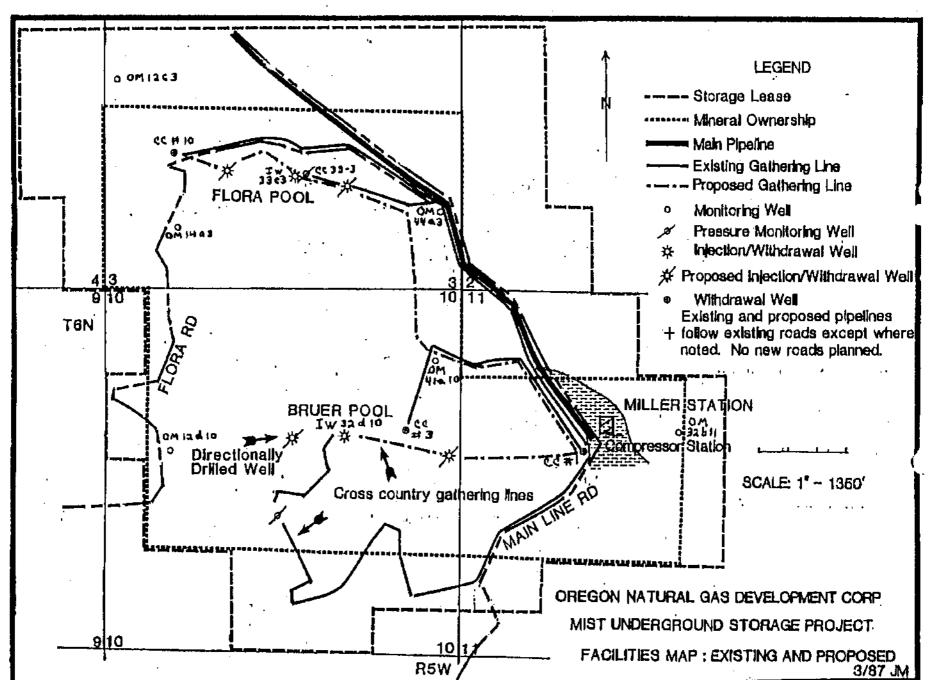
STATE OF OREGON

ENERGY FACILITY SITING COUNCIL

Chairman

Attest:

Secretary



☎503 556 7257

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Underground Storage Facility Site Certification Agreement

for the Mist Site

between

The State of Oregon
acting by and through its
Energy Facility Siting Council
and
Oregon Natural Gas Development Corporation

- 1. The Mist Site Certification Agreement ("Agreement") was executed by Oregon Natural Gas Development Corporation (ONG) and the State of Oregon (State), acting by and through its Energy Facility Siting Council (EFSC), on September 30, 1981. The Agreement authorizes ONG to construct and operate an underground storage facility for natural gas and associated facilities at the Mist Site in Columbia County, Oregon.
- ONG wishes to amend this Agreement to add one new monitoring well to the related and supporting facilities authorized by the Site Certificate.
- The monitoring well, known as OM 43B-10, is needed to monitor aquifer activity on the south side of the Bruer Reservoir.
- 4. The site of and specifications for the proposed monitoring well are generally described and discussed in ONG's original application, testimony, and Site Certificate Agreement for the storage facility. These descriptions and specifications adequately describe the health and safety requirements for monitoring wells. ONG assures that those descriptions and specifications apply to the proposed monitoring well. Therefore, the amendment does not present danger to the public health, safety or welfare. The Agreement authorizes EFSC to make amendments at regular public meetings if health and safety are not affected. (Section VII.F.)
- 5. EFSC has reviewed ONG's request and staff have consulted Columbia County, the Oregon Department of Geology and Mineral Industries, and Oregon Public Utility Commission staff. No objections to the proposed well were raised. EFSC agrees that the amendment to the Agreement should be executed.

In consideration of the foregoing, IT IS AGREED that:

a. The map in Appendix 1 of the site certificate is replaced by the map attached herein, titled Exhibit 2 (Revised 5-19-88), to allow the addition of one monitoring well, known as OM 43B-10, on the south side of the Bruer reservoir.

IN WITNESS WHEREOF, this Amendment No. 2 to the Mist Site Certification Agreement has been executed by the Chairman of the Energy Facility Siting Council of the State of Oregon and Oregon Natural Gas Development Corporation, as below subscribed this day of

OREGON NATURAL GAS DEVELOPMENT CORPORATION

STATE OF OREGON ENERGY FACILITY SITING COUNCIL

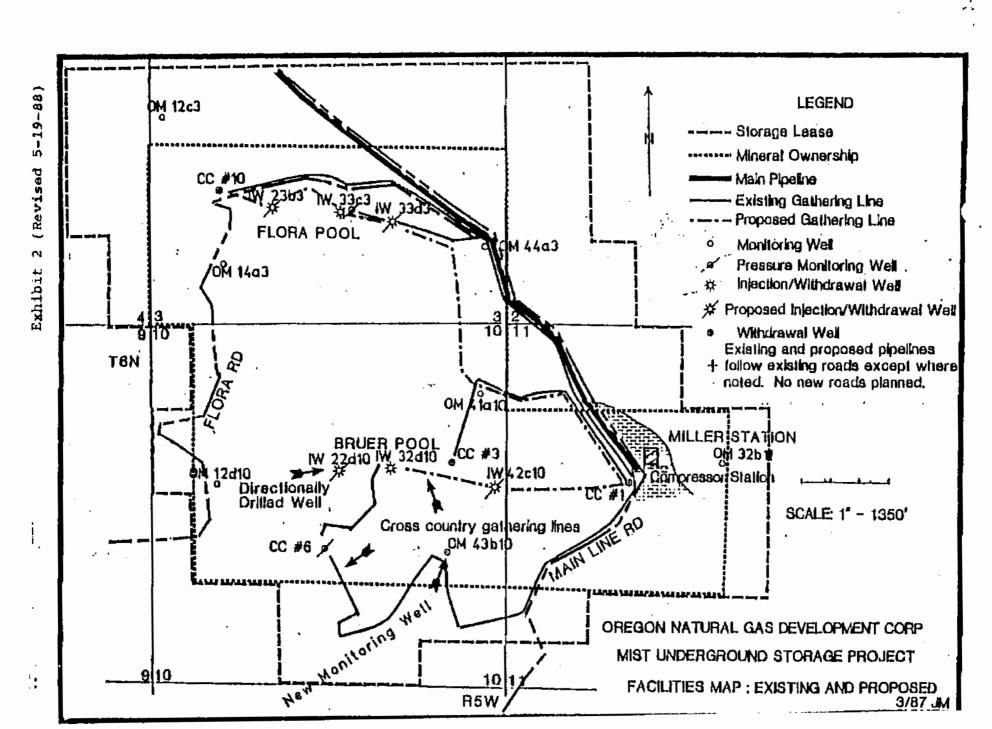
By: Swagned Toley

Chairman

Attest: (1). Kee

Secretary

CG:jf 2710K(d1) 05/26/88



Amendment No. 3 to Underground Storage Facility SITE CERTIFICATION AGREEMENT

for the Mist Site

between

The State of Oregon

and

Northwest Natural Gas Company

RECITALS

- 1. The Site Certification Agreement ("Certificate") for the Mist Site was executed by Oregon Natural Gas Development Corporation ("ONG") and the State of Oregon Energy Facility Siting Council ("EFSC" or "Council") on September 30, 1981. The Certificate authorized ONG and its parent company, Northwest Natural Gas Company ("NNG") to construct and operate an underground storage facility for natural gas and related or supporting facilities at the Mist site. The Mist storage facility was transferred from ONG to NNG effective April 11, 1988.
- 2. Construction or replacement of any monitoring wells or injection/withdrawal wells requires an amendment of the Certificate. Such amendment may be granted at a regular public meeting of the Energy Facility Siting Council if in the opinion of EFSC and the company it is desirable to amend the Certificate and the amendment will not adversely affect the public health, safety, or welfare.

- 3. NNG seeks to amend the Certificate to permit construction of two replacement wells for two poorly functioning injection/withdrawal wells (IW 33d-3; IW 22d-10) and two new wells to increase the capacity for withdrawal. The two replacement wells (IW 33ac-3; IW 32c-10) will permit withdrawal up to the current needs of 80 MMcf per day for the 1990-1991 heating season, which cannot be reliably sustained because of the two poorly functioning wells. The two additional wells (IW 23d-3; IW 13b-11) will allow a Mist system increase to 100 MMcf per day in the 1991-1992 heating season.
- 4. The new wells will be located within the approved boundaries of the Mist storage project and within existing areas of NNG mineral rights and leases.
- 5. NNG requests that the Certificate be amended to permit construction of the four wells as shown on Exhibit A to this document, which will become Revised Appendix 1 to the Certificate.

FINDINGS AND CONCLUSIONS

1. EFSC sent notice of NNG's request to all affected state agencies and all persons on the EFSC's mailing list. EFSC placed a public notice and request for public comment in the local area newspaper on August 15, 1990, and a notice of public hearing in the same newspaper on September 12, 1990.

- 2. NNG's request and comments on it were reviewed and considered by EFSC at a special public meeting in Portland on September 21, 1990.
- NNG has obtained permits for the four wells from the Oregon State Department of Geology and Mineral Industries;
 Columbia County Planning Division; Mist-Birkenfeld Fire District;
 and the Oregon Department of Forestry.
- Based on its review and consideration, EFSC finds that NNG's request is reasonable, does not adversely affect the public health, safety, or welfare, and is consistent with all applicable standards. EFSC agrees that an amendment to the Certificate is desirable and should be made pursuant to Section VII. F. of the Certificate to allow drilling and operation of four wells as shown on revised Appendix 1 to the Certificate (Exhibit A).

IN CONSIDERATION OF THE FOREGOING, the following

Amendment No. 3 to the Mist Site Certification Agreement is made

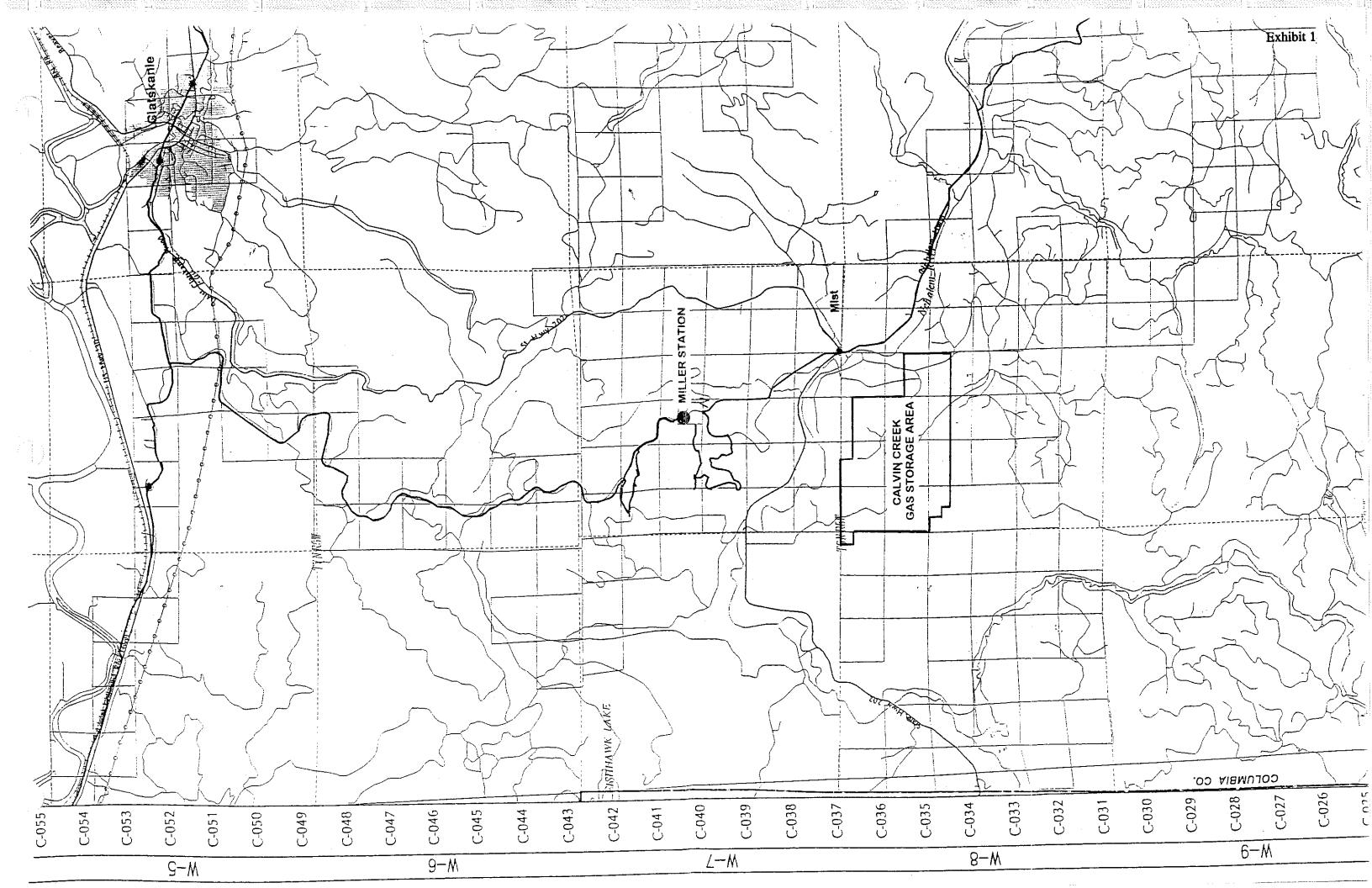
and entered into by the State of Oregon, acting by and through

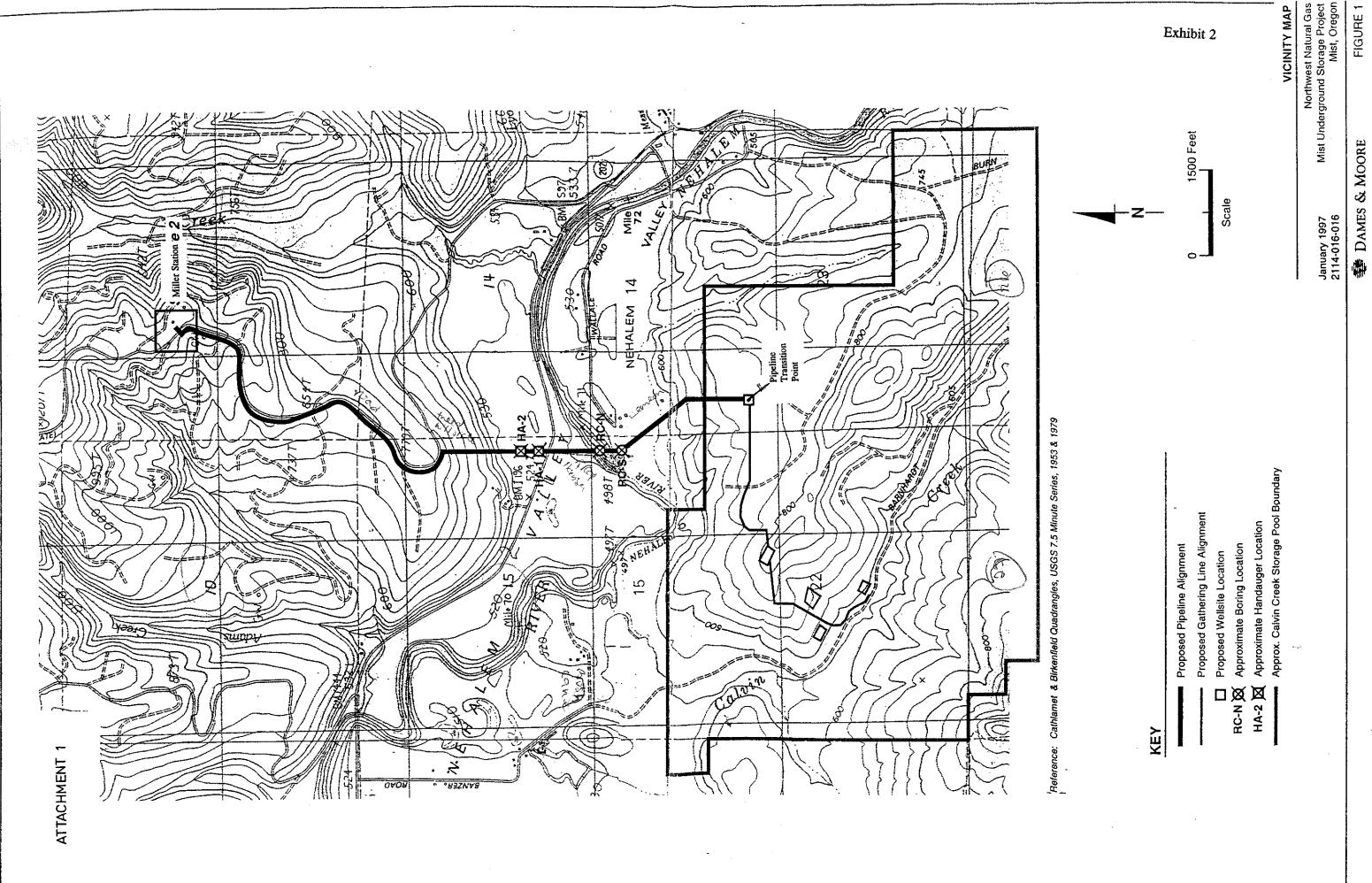
EFSC, and NNG, an Oregon corporation:

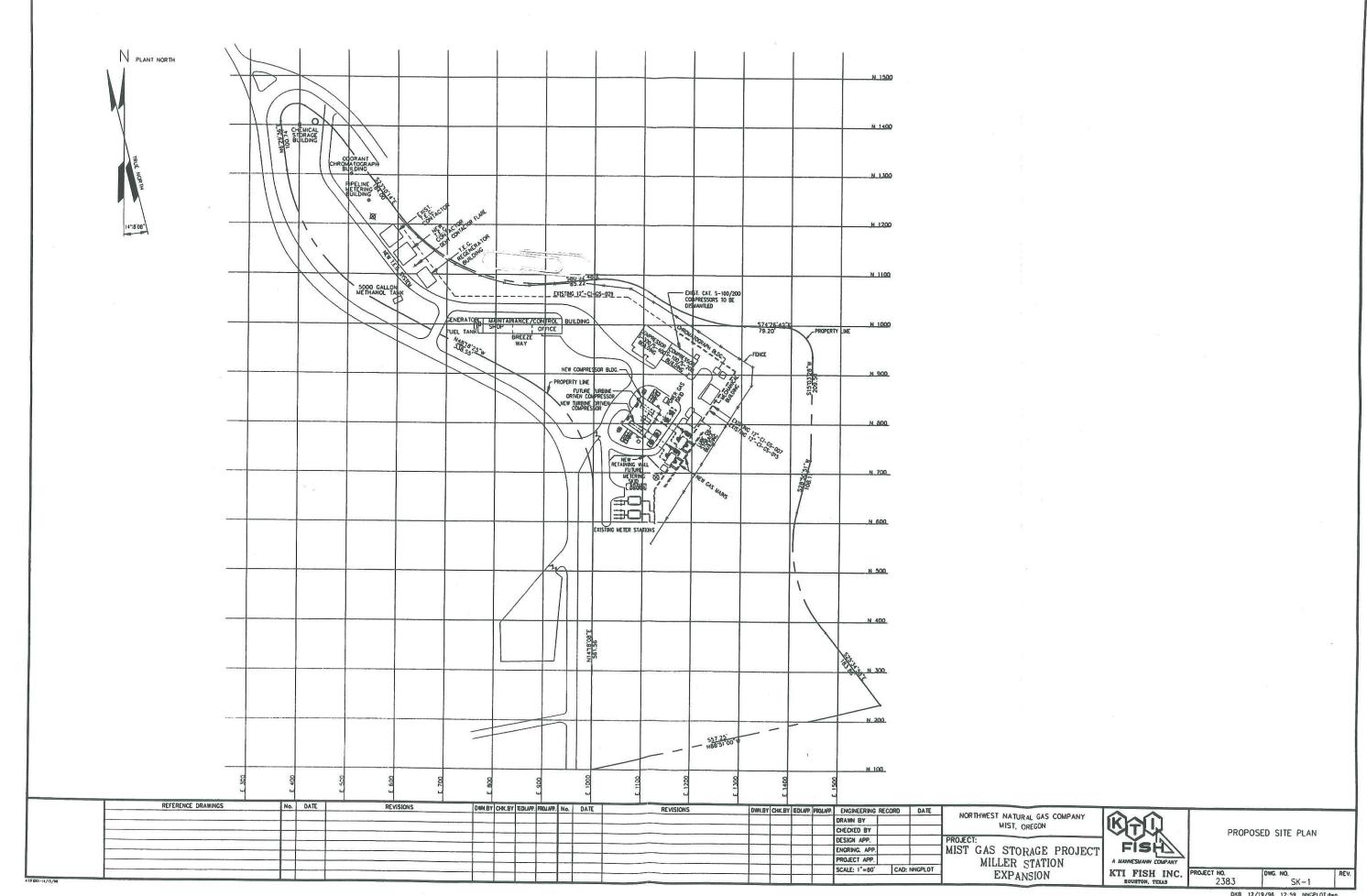
- A. Exhibit A attached hereto describes the well locations at the Mist site. Existing well IW 33d-3 will be retained solely as a monitoring well.
- B. Exhibit A is hereby substituted for all prior versions of Appendix 1 for all purposes of

the Underground Storage Site Certificate
Agreement for the Mist site, as amended.

IN WITNESS WHEREOF, the	his Amendment No. 3 to the
Certificate for Underground Storage 1	Facility at the Mist Site has
been executed by the Chairman of the	Energy Facility Siting
Council of the State of Oregon and No	orthwest Natural Gas Company,
as below subscribed this day of	, 1990.
s	TATE OF OREGON
E1	NERGY FACILITY SITING COUNCIL
B	y:
	Chairman
A	ttest:
	Secretary
N	ORTHWEST NATURAL GAS COMPANY
B	y:
A	ttest:







P.04

CC: BLP, JFE, CFILE

MAY 1.4 1996 regon

PUBLIC UTILITY COMMISSION

MAY 13, 1996

DWAYNE L. FOLEY
SENIOR VICE PRESIDENT
NORTHWEST NATURAL GAS COMPANY
ONE PACIFIC SQUARE
220 NW SECOND AVENUE
PORTLAND, OREGON 97209

Enclosed is a copy of Inspection Report #96-15 concerning a PUC inspection of the company's facilities at the Mist Gas Storage Field and Compressor Station. The inspection was conducted on May 7 and 8, 1996.

The physical facilities as well as the records pertaining to Miller Station appear to be satisfactory, and no probable violations of the gas pipeline safety regulations were found.

If you have any questions or would like to discuss the report further, please feel free to contact me, or Bill Ogilvie at (503)378-6688

Jack P. Dent

Chief, Pipeline Safety

Electric & Natural Gas Division

(503) 378-6760

Enclosure

John A. Kitzhaber Governor



550 Capitol St. NE Salem, OR 97310-1380 (503) 378-5849

PUBLIC UTILITY COMMISSION OF OREGON GAS SAFETY INSPECTION REPORT

DATE OF INSPECTION:	May 7 & 8, 1996	REPORT NO. :	96-15					
OPERATOR:	Northwest Natural Gas Compan	<u>y</u>						
HEADQUARTERS ADDRESS:	220 N. W. Second Av.		·					
LOCATION OF INSPECTION:	Mist Gas Storage Field and Com	pressor Station						
OPERATOR'S REPRESENTATIVE: (Present During Inspection)	Nick Potts, Roy Rogers, Dave Taylor							
PUC REPRESENTATIVE: (Conducting Inspection)	Bill Ogilvie							
COVERAGE: It should not be assume be involved, or that the Remarks and/o Code of Federal Regulations (CFR 49). Commission orders. The reader is refesafety requirements.	or Recommendations, if followed Remarks or Recommendations erred to the CFR 49, Parts 191, 1	, would insure complian s are not to be construed	ce with the					
CITATION PROBABLE VIOLA NUMBER INVOLVED								
<u>None</u>								
REMARKS:								
Inspection of the Mist Gas Storage Field an conducted on site evaluated the physical platte plant.	•	• .	•					
Inspection of the records for relief capacity office on May 8, 1996.	and the cathodic protection of the	piping was conducted in the	e Portland					
All site inspections and related records wer	e found to be satisfactory.							
RECOMMENDATIONS:		·						
Prepared By: Bill Ogilvic								
Date: May 13, 1996								



Exhibit G
Geology, Slope Stability
and Seismicity
Mist Underground Storage
Project
Mist, Oregon

for

Northwest Natural Gas February 21, 1997 Job No.

Portland, Oregon



February 21, 1997

Northwest Natural Gas 220 NW Second Avenue Portland, OR 97209

Attn: Mr. H. Jack Meyer

Re: Exhibit G

Geology, Slope Stability, and Seismicity Mist Underground Storage Project

Mist. Oregon

Dear Mr. Meyer:

Transmitted herewith are 15 copies of our report entitled "Geology, Slope Stability, and Seismicity, Mist Underground Storage Project, Mist, Oregon". This report is intended to fulfil the requirements of Exhibit G of the Mist Underground Storage Project site certificate amendment application. This work was performed under Change Order 1 to Purchase Order No. 43642, dated January 8, 1997.

Dames & Moore also performed a geotechnical investigation of the Mist gas storage site. The results of the investigation, along with geotechnical conclusions and recommendations, are summarized in a report dated January 24, 1997. The subsurface information developed during the geotechnical investigation forms the basis for this current study.

We appreciate the opportunity to be of continued service. Please call if you have any questions or need more information.

Very truly yours.

DAMES & MOORE

Donglas R. Schwarm, P.E.

Senior Engineer

1750 S.W. Harbor Way, Suite 400

Portland, Oregon 97201 503 228 7688 Tel 503 223 6083 Fax

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Exhibit G Geology, Slope Stability, and Seismicity Mist Underground Storage Project Mist, Oregon

1.0 INTRODUCTION

This exhibit presents the results of a geology and seismicity evaluation for the proposed expansion of the Northwest Natural Gas underground gas storage facility near Mist, Oregon. This exhibit addresses geologic and seismic hazards pertinent to site selection issues, and is prepared as required in OAR 345-21-010(1)(g) for energy facility site certificate applications. Recommendations for mitigating geologic and seismic hazards are provided in each section, where appropriate.

The subsurface information used in this evaluation was developed during a geotechnical investigation of Miller Station, the pipeline alignment, and the wellsites. Geotechnical recommendations regarding foundation design, pipeline alignment and construction, and wellsite siting and construction are provided in our report dated January 24, 1997¹.

2.0 PROJECT DESCRIPTION

The planned construction includes two turbine compressors at Miller Station (one in 1997 and one in the future), approximately 2½ miles of double pipeline connecting Miller Station with the Calvin Creek storage pool area, and four wellsites between the Nehalem River and Calvin Creek. Figure G-1 shows the planned pipeline alignment and the wellsite locations. Figure G-2 shows the planned equipment locations at Miller Station.

3.0 GEOLOGIC CONDITIONS

This section summarizes the geologic origins of the Mist area and describes significant conditions which could affect the planned construction.

3.1 GEOLOGIC SETTING

The Mist storage project site is located in the northern portion of the Coast Range physiographic province, an uplifted mountain range which extends from the continental shelf on the west to the Willamette Valley on the east. The Coast Range province is bounded on the north and south by the Columbia River and the middle fork of the Coquille River, respectively.

The basement rocks of the Coast Range originated between 50 and 65 million years ago as a chain of islands formed by volcanic eruptions from the ocean floor. The island chain collided with the westward-moving North American tectonic plate approximately 45 to 50 million years ago. The undersea valley, which was created between the west slope of the plate boundary and the east slope of the volcanic mountains filled with sediments transported by west-flowing streams. The sediment source changed as the stream channels matured and extended farther west, beginning with the Klamath Mountains and ending at the Idaho batholith. The parent material for the fine-grained sedimentary rocks underlying most of the pipeline alignment is volcanic ash and clasts from the ancestral Cascade volcanoes, which originated approximately 36 to 40 million years ago. A series of volcanic eruptions originating in eastern Washington contributed the isolated pockets of basalt formation which cap the highest hills of the area north of Miller Station.

The younger geologic units were all deposited in relatively flat conditions, mostly in shallow marine waters, and were then uplifted into a low coastal mountain range as the Juan de Fuca plate was overridden by the North American crustal plate. The uplift continues at varying rates along the coast, with Astoria rising at a rate of approximately 1 inch every 36 years. Although not measured, uplift in the Mist area is likely much slower due to the distance from the coast. Erosion and weathering have affected the near-surface materials throughout the site area. Landslides have occurred where erosion created steep slopes in the relatively weak claystone and mudstones.

3.2 STRATIGRAPHY

Basement rock in the Mist gas storage area is the middle to late Eocene Tillamook volcanics deposit². This unit is approximately 10,000 feet thick, and is buried by approximately 3,000 to 5,000 feet of sedimentary rock. The Hamlet formation, a mudstone formation deposited in deep marine conditions, is interfingered with the Tillamook volcanics basalt in the Mist area.

The Cowlitz formation overlies the Tillamook volcanics and is the source of natural gas production in the Mist field³. The lower portion of the Cowlitz is informally named the C&W sandstone, because it was first recognized in a 1946 exploration well named the "Clark and Wilson Well." The C&W sandstones are typically 600 feet thick, and are overlain by mudstone of the upper Cowlitz formation. Together, the lower sandstone and upper mudstone units of the Cowlitz formation are 750 to 1600 feet thick in the Mist area.

The Cowlitz formation is unconformably overlain by marine mudstone of the Keasey formation, which is typically 1,300 to 1,600 feet thick. The Keasey formation is overlain

unconformably in places by either mudstone of the Sager Creek formation or mudstones, siltstones, and sandstones of the Pittsburg Bluff formation. The Sager Creek formation fills broad erosional channels cut into the Keasey formation, and is not differentiated on some geologic maps. The uppermost sedimentary unit in the area, the Pittsburg Bluffs formation, was deposited approximately 30 million years ago.

The most recent geologic unit in the Nehalem basin is a thin and non-continuous basalt deposit of the Columbia River Basalt group, which is approximately 5 million years old. The basalts have been eroded and transported in some areas to form a conglomerate, which is generally referred to as the Scappoose formation.

Surface deposits in the Nehalem valley floor consist of river-deposited alluvium derived from the surrounding hillside areas blanketing an eroded surface of Keasey or Pittsburg Bluffs mudstone. The alluvium is less than 20 feet thick in two borings drilled at the Nehalem River crossing. Surface deposits in the upland areas consist of silts and clays derived from weathered sedimentary rocks.

Figure G-3 shows a generalized geologic map of the site area, derived primarily from an early oil and gas exploration map⁴. The Sager Creek formation is still informally named, and is referred to as undifferentiated sedimentary rock on the map. In addition, other researchers show the Columbia River basalt unit as much less extensive and the Keasey and Pittsburg Bluffs formations as more extensive in the Miller Station area. A revised geologic map of the Nehalem valley area is being developed, but was not available at the time of this report.

3.3 GEOLOGIC STRUCTURE

The Mist gas field is located close to the axis of a gravity high of Tillamook volcanics called the Nehalem arch. The arch is bounded on the east and west by the Astoria and Nehalem Basins, respectively, which are filled predominantly with marine sedimentary rocks. Detailed surface mapping, drilled borings, and seismic reflection profiles show that the Mist field is extensively faulted. Although the fault pattern is very complex, it is dominated by NW- and EW-trending faults with subordinate NE-trending faults. The Nehalem graben, an area of closely-spaced, high angle normal faults, trends northwestward across the Nehalem arch and controls the course of the Nehalem river within the site boundaries. The complex structure results in fault traps which collect upward-diffusing natural gas generated from lower sedimentary rocks.

The Mist gas field has been subjected to two periods of intense tectonism. The first occurred after deposition of the Cowlitz mudstone, and formed the primary hydrocarbon-trapping

normal faults. Vertical displacements between 80 and several hundred feet have been measured in well bores and in seismic refraction surveys used to explore for gas pools. These faults do not appear to displace the overlying Keasey formation.

The second period of tectonism accomplished much of the regional uplift of the northern Oregon Coast Range. Many of the pre-existing normal faults in the Cowlitz formation were reactivated and a new set of NW- and NE-trending faults formed through the Keasey formation in response to the renewed stress of the Juan de Fuca plate subducting beneath the North American plate. Most of these faults have vertical throws less than 50 feet. Fault planes at the surface typically dip 80 to 90° whereas those in the subsurface typically have dips of 65° or less.

4.0 TOPOGRAPHY AND SOIL CONDITIONS

4.1 TOPOGRAPHY

Miller Station is located approximately 2 miles north-northwest of the Highway 47/Highway 202 junction. Topographically, the station is located on a poorly defined, NS-trending ridge between Elevation 1040 and 1080 feet. The ridge sides slope down from the Miller Station area at overall inclinations of approximately 10:1 (horizontal to vertical) on the west and 2:1 on the east.

The planned equipment areas were graded during initial site development, so topography within the Miller Station site is relatively gentle. The planned equipment areas are currently covered with crushed rock surfacing, with no vegetation or existing structures.

The planned pipeline alignment extends approximately 2½ miles south from Miller Station across the floor of the Nehalem valley and back up the south valley side. Topographically, the pipeline origin is near Elevation 1060 feet (MSL), the valley floor is near Elevation 525 feet, and the wellsite elevations range from Elevation 600 to 820 feet. The maximum slope inclination (excluding short slopes) is approximately 19 percent between the Miller Station Access Road and the floor of the Nehalem valley. Table G-1 summarizes the overall slope conditions along the pipeline alignment.

TABLE G-1 PIPELINE SLOPE CONDITIONS

Segment Name	Length (ft)	Begin Elevation (ft)	End Elevation (ft)	Maximum Slope (%)
Roadway	6,000	1,040	680	8
North Valley Slope	1,000	680	530	19
Nehalem River Valley	3,000	530	600	6
South Valley Slope	2,700	600	740	12
Gathering Line	7,200	740	600	3

4.2 SUBSURFACE SOIL CONDITIONS

This section summarizes the site exploration work completed to date and describes the geologic and geotechnical conditions encountered at the site.

4.2.1 Site Specific Geotechnical Work

Subsurface conditions at Miller Station were explored by drilling 10 borings to depths of between 20 and 51½ feet below existing site grades. The borings revealed a relatively thin layer of crushed rock overlying relatively stiff native soils. Hard bedrock was not encountered within the depth of the Miller Station borings.

Dynamic soil properties were evaluated by means of 2 cone penetration tests (CPT's) with a seismic cone tip. One of the CPT's reached practical refusal due to sleeve friction at a depth of 61 feet. A friction reducing pipe was added to the second CPT, which reached abrupt tip refusal at a depth of 65 feet. Although we did not obtain a sample of the hard material, we suspect that the CPT encountered a cemented calcium carbonate nodule in the Keasey formation.

Subsurface conditions along the pipeline alignment were investigated by reviewing geologic maps and by field observation of rock outcroppings and exposures. Subsurface conditions at the Nehalem River crossing were explored by drilling 2 borings to depths of 40½ and 50½ feet.

In response to Sections G and F of the Exhibit G requirements, in our judgement the level of subsurface exploration completed to date is adequate for siting and design of the planned facility. No additional explorations are planned.

4.2.2 Alluvium

The Nehalem River valley floodplain is occupied by a thin layer of young alluvium comprised of silty sand over gravel. At the river crossing locations, the upper silty sand is loose to very loose and has moisture contents between 32 and 50 percent. The gravel is also loose, with rounded particles and lenses of silt.

4.2.3 Colluvium/Weathered Soils

The hillside areas on both sides of the Nehalem valley are mantled by silty and clayey native soils derived from weathering of the underlying sedimentary rocks. Some of these materials are exposed in shallow road cuts in the Calvin Creek area and along the Miller Station access road. At Miller Station, these materials consist of a variable sequence of silts and clays extending to a depth of at least 65 feet. In general, the upper 13 feet of this unit consists of stiff to very stiff, low-plasticity silts and clays. The upper soils have moisture contents of between 40 and 55 percent and dry densities between 60 and 85 lbs/ft³.

Highly plastic clay soils were encountered at a depth of about 13 to 20 feet beneath present site grades. The plastic soils are generally medium stiff to stiff and moderately compressible, with an overconsolidation ratio of about 3.

4.2.4 Keasey Formation

The alluvium and weathered soil deposits are underlain by the Keasey formation, a relatively thick unit comprised of gray claystone and mudstone derived from volcanic ash transported from the ancestral Cascade volcanoes. The Keasey formation materials can be considered either a soft rock or a very hard soil. The deposit is generally massive, with no open joints and few thin shear planes. The moisture content of this material is generally between 22 and 25 percent, with a dry density of approximately 110 lbs/ft³. The Plasticity Index of a sample from 30 feet deep was found to be 108 percent, classifying that portion of the deposit as a highly plastic clay.

4.2.5 Groundwater

A regional groundwater table was not encountered in the borings drilled at Miller Station. Perched water was encountered between 8 and 12 feet beneath present grades, generally in silt layers which overlie very low-permeability clay deposits. Significant groundwater should not affect the planned construction.

Groundwater along the pipeline alignment will probably consist of isolated seeps and springs in the sloping segments and near-surface groundwater in the alluvium perched on top of the Keasey claystone. Groundwater seeps should be generally seasonal in nature, so dry-season construction will require less effort to maintain dry and stable trenches. Perched seeps and springs encountered by the trench excavations can probably be controlled with conventional sump-and-pump methods. Temporary dewatering and erosion control measures may be required if seasonal groundwater is captured by the trench excavation.

Groundwater in the valley floor will probably be slightly higher than the Nehalem River level. For planning purposes, we recommend that the groundwater level be considered approximately 3 feet below the ground surface until additional data are available regarding seasonal variation. Seasonal changes in rainfall and river level may result in significant changes in groundwater level, possibly as much as 6 or 8 feet, which could make trenching across the valley floor much less difficult.

4.3 LANDSLIDING

The Keasey formation mudstones and the other sedimentary deposits are susceptible to landslides in sloping areas created by stream and river erosion. Figure G-3 shows several of the landslides which were identified through review of stereoscopic aerial photographs and confirmed through field reconnaissance. As shown, the selected pipeline alignment avoids areas of known slope instability.

The most significant group of landslides are located in the south valley side where the meandering Nehalem River flows very close to the toe of the slope. The landslides probably formed as erosion at the toe of the slope caused localized over-steepening, exceeding the strength of the sedimentary deposits. The other landslides shown on Figure G-3 all appear to have streams or creeks near the toe. Due to continuing erosion throughout the site, all of the mapped landslides should be considered active and capable of significant displacement during the design life of the planned pipeline.

5.0 ANTICIPATED IMPACTS OF CONSTRUCTION AND OPERATION

This section addresses Section B of the Exhibit G requirements, which concerns nonseismic geologic hazards which could affect the planned construction.

5.1 SOIL COMPACTION

For the purposes of this report, the term soil compaction used in OAR 345 will include the engineering terms settlement and consolidation. The primary cause of soil settlement is increased pressure imposed by fill soils or foundation loads. At Miller Station, the near-surface soils are moderately compressible, and relatively light foundation bearing pressures have been used for design in order to limit foundation settlements within acceptable tolerances. Fills at Miller Station will be very thin, and little settlement is expected outside the equipment foundations. The buried pipeline will not change significantly the effective stress acting on the compressible alluvial deposits, so settlement along the pipeline should be minimal.

The level wellsite pads will be built by cutting soil from the high side and compacting it as structural fill on the low side. Detailed recommendations are provided in a geotechnical report dated January 24, 1997 concerning fill placement and compaction methods. Settlement of the pads after construction should be well within tolerances.

5.2 EROSION

Erosion can be caused by air or water. Wind erosion is not a significant concern because of the tree cover along most of the alignment, revegetation of the pipeline trench strip, and the subgrade protection measures necessary to provide equipment access in the Miller Station and Wellsite areas.

Water erosion at the Miller Station site will be minimal because the site is covered with crushed rock fill. The pipeline alignment will be relatively narrow, and will be encouraged to revegetate over the trench backfill, so the potential for erosion from on top of the pipe will also be small. Temporary erosion control may be required until native plants are re-established over the trench backfill. The wellsite pads will be covered with crushed rock in order to provide a reliable travel surface for construction and drilling equipment.

Erosion from the uncovered cut slopes on the high sides of the wellsites will be controlled on the pads, and should not be of sufficient quantity to cause stream degradation. Uncontrolled slope face erosion can cause slope instability, which would adversely affect the

wellsite performance. Recommendations for erosion control on slopes are provided in the geotechnical report.

5.3 MASS WASTING, SLUMPING, AND SLIDING

As discussed in Section 4.3, portions of the general site area are affected by ancient and active landslides. Miller Station is not affected by landslides, and the planned construction should not impact any existing slopes.

The pipeline alignment crosses moderately sloping terrain on both sides of the Nehalem valley, including localized areas with moderately steep inclinations. The pipeline alignment shown on Figure G-3 was selected to traverse the most gently-sloping terrain between Miller Station and the Calvin Creek pool, and does not cross any mapped areas of slope instability. In addition, the alignment is designed to be generally parallel with the fall-line of the isolated steep slopes, further reducing the potential for slope failure affecting the pipe.

The planned construction should have minimal impact on existing slope stability. Cut slopes necessary to level the wellsite pads will be laid back to stable inclinations, and will be monitored for unfavorable bedding conditions or shear planes during excavation.

6.0 SEISMIC HAZARD ASSESSMENT

This section describes the general seismicity of the Mist area and summarizes the selection of maximum credible earthquakes for use in evaluating the seismic vulnerability of the site. Earthquake hazards, including ground shaking caused by the selected MCE events, are addressed in Section 7.0.

6.1 HISTORICAL SEISMICITY

Historical records of regional seismicity indicate that several measurable, small earthquakes have occurred within 50 miles of the site since the mid-1800's. Figure G-4 shows the epicentral locations for most of the recorded events⁵. Table G-2 summarizes the significant earthquakes reported by DOGAMI⁶ and other publications⁷.

TABLE G-2 SIGNIFICANT HISTORICAL EARTHQUAKES

Date	Latitude	Longitude	Mægnitude	Maximum Intensity
December 3, 1841	45.6	122.7		v
October 12, 1877	45.5	122.7	5¼	VΠ
November 18, 1915	45.9	122.7		V
December 29, 1941	45.5	122.8	41/2	VI
November 1, 1942	45.6	122.7	<u></u>	V
December 15, 1953	45.5	122.8	41/2	VI
November 16, 1957	45.3	123.8	41/2	v
October 7, 1958	46.7	124.0		VI
Јапиагу 7, 1960	46.7	122.7		VI
February 2, 1961	46.7	122.8		v
August 11, 1962	46.0	123.5		VI
November 5, 1962	45.5	122.6	51/2	VII
December 27, 1963	45.7	123.4	41/2	VI
October 1, 1964	45.7	122.8	5.1/4	v
February 13, 1981	46.3	122.2	5.1/2	VI

The intensity values reported in Table G-2 are the maximum values for the event, typically at the epicenter. The Mist area experienced intensity V earthquake shaking during the 1962 event and intensity IV shaking during the 1963 and 1981 events. For reference, an earthquake with an intensity of V causes minor to moderate building damage and is generally felt by people up to about 50 to 90 miles from the epicenter. Intensity VI earthquakes can ring church bells and move dishes off of shelves, but generally do not cause widespread structural damage.

As shown on Figure G-4, recorded earthquakes near the Mist site generally consist of small events with no apparent pattern or regular recurrence interval. The low number and small

magnitude of reported events suggests that the area has relatively low seismic activity. Magnitudes are not reported for many pre-1962 earthquakes because seismic monitoring equipment had not yet been installed in the region. The reported magnitudes for pre-1962 events are estimated based on correlations with the area affected and the maximum severity of shaking.

6.2 DESIGN EARTHQUAKES

The current understanding of seismicity in Oregon considers three main seismic sources. Two of the possible earthquake sources are associated with the Cascadia subduction zone, and the third source includes shallow earthquakes which occur within the North American crust. The three earthquake scenarios are discussed in the following paragraphs.

6.2.1 Regional Events

The Cascadia subduction zone (CSZ) is the region where the Juan de Fuca Plate is being subducted beneath the North American Plate. This subduction is occurring in the coastal region which stretches from Vancouver Island to northern California. During the last ten years, evidence has accumulated suggesting that this subduction zone has generated eight great earthquakes in the last 4,000 years, with the most recent event occurring about 300 years ago⁸. Figure G-5 shows a generalized plan of the subduction zone. Figure G-6 shows a simple cross section through the subduction zone indicating possible sources for earthquake generation.

Two types of subduction-zone earthquakes were considered in this study: (1) an earthquake on the seismogenic part of the interface between the Juan de Fuca Plate and the North American Plate on the CSZ with a Moment Magnitude of 8.5 (interplate event), and (2) a deep earthquake with a Moment Magnitude of 7 on the seismogenic part of the subducting plate of the CSZ (intraplate event). These magnitudes are the generally accepted maximum credible events for the CSZ, given the current level of information regarding subduction zone earthquakes in the Pacific northwest.

6.2.2 Local Events

Seismic source maps of Oregon⁹ show several potentially active faults within a 50 mile radius of the site. None of the faults, however, have well-defined slip rates or have caused a recorded earthquake. Seismicity in the northern Coast Range area is sparsely scattered with no defined pattern or association with known faults.

It is difficult to select a deterministic model of crustal seismicity without making unsupportable assumptions regarding fault activity, slip rate, and fracture length. The preferred

solution, aside from developing a probabilistic seismicity model, is to assign regional source zones with uniform levels of seismic hazard. A magnitude 6 earthquake at a random location near the site is considered appropriate to represent the maximum credible crustal earthquake in the Northern Coast Range zone, which includes the Mist area. The epicenter is assumed to be 6 miles from the site at a depth of 6 miles. In our judgement, placing the epicenter closer to the site is unreasonably conservative in an area with no specific seismic sources. The selected magnitude of this event exceeds the magnitude of all recorded seismic events in the Portland area.

7.0 SEISMIC HAZARDS

This section summarizes the significant earthquake-related geologic hazards which could affect the planned construction and provides our conclusions and recommendations regarding mitigating the effect of these hazards. This section addresses Section D of the Exhibit G requirements.

7.1 GROUND SHAKING

Horizontal peak ground accelerations (PGA) were estimated for the three design earthquakes using the attenuation equation of Crouse¹⁰ for the two postulated CSZ events and the attenuation equation developed by Boore et al¹¹ for the local event. These attenuation relationships were selected because they are based on ground motion recordings at the ground surface of stiff soil sites similar to the Miller Station site. Table G-3 summarizes the selected magnitudes and distances of the three events, as discussed in Section 6.2, with the ground surface PGA values computed from the attenuation relationships.

TABLE G-3
CALCULATED PGA VALUES

Earthquake Event	Moment Magnitude	Focal Depth (mi)	Epicentral Distance (mi)	PGA (g)
CSZ Interplate	8.5	15	45	0.24
CSZ Intraplate	7	30	6	0.16
Local	6	6	6	0.21

The expected surface ground motion levels from the three scenario events are less than the UBC Zone Factor of 0.30 g. As shown on Figure G-7, the computed spectral accelerations (5% damping) for the three scenario events are also lower than the response spectrum computed using UBC methods. Consequently, we conclude that the UBC equivalent static force procedures are appropriate for design of structures and equipment at Miller Station.

Modern buried pipes with welded joints have very low vulnerability to ground shaking without permanent ground deformation. A detailed study of the Southern California Gas Company's transmission and distribution system¹² found that there are no reported cases of damage to a steel pipeline with arc-welded joints (post World War II construction techniques) due to ground shaking. It is our opinion that the planned pipeline and wells are not vulnerable to seismic ground shaking.

7.2 SITE AMPLIFICATION

Earthquake ground motions are modified as they propagate up from bedrock through the overlying soil deposits. Ground motion levels can amplify, particularly in the spectral range near the natural site period, due to conservation of energy between layers with different shear module. Ground motion levels can also attenuate due to energy losses associated with non-linear soil behavior. As discussed in Section 7.1, earthquake accelerations were computed for the ground surface, with all site amplification effects included. Site response analyses were performed to confirm that the soil profile at Miller Station is not subject to amplification levels exceeding the levels included in the ground motion equations.

7.2.1 Input Data

The stratigraphic profile of the Miller Station site and the dynamic soil properties necessary for site response analysis were collected from the drilled borings and from two shear wave velocity profiles measured during performance of the cone penetration tests (CPT's). Figures G-8 shows the two measured shear wave velocity profiles and the interpreted profile used in the analysis.

Input acceleration records were selected based on comparison of the recorded spectrum and the computed ground motion spectrum. The following records were found to offer the best fit for the site conditions:

TABLE G-4 SELECTED INPUT ACCELERATION RECORDS

Seismic Source	: Event	Station	Component
Interplate	1968 Japan	TH029	EW
Intraplate	1949 Western Washington	Highway Test Lab, Olympia	S40E
Crustal	1966 Parkfield, California	Shandon Array, Station 8	N50E

The spectral shape of the natural recorded motions were modified to fit the target 5% damped spectra within approximately 10 percent over the period range of interest for the Miller Station structures. Two types of modifications were performed:

- The acceleration data were scaled in the time domain by multiplying all values comprising the records by a constant factor.
- The Fourier components of the acceleration data were scaled at selected frequencies to further improve the fit between the response and the design spectra over the period band important to the structures at the Miller Station facility.

Figures G-9a through G-9c show the target spectra and modified spectra for the three input motions. The modifications focused on relatively short-period motion between 0.1 and 0.2 seconds due to the dynamic characteristics of the planned structures. A side effect of improving the fit within one period band is that the fit is considerably worse outside the periods of interest. However, this side effect has minimal effect on the analysis results. Figures G-10a through G-10c show the modified acceleration records.

7.2.2 Site Response Computation

Site response analyses were performed using the computer program SHAKE91¹³. The program computes the response of a semi-infinite horizontally layered soil deposit overlying a uniform half-space subjected to vertically propagating shear waves. The analysis is linear because the computations are performed in the frequency domain. Nonlinear soil behavior is accommodated using an iterative procedure to obtain values for modulus and damping which are compatible with the equivalent uniform strain induced in each sublayer. The initial shear modulus profile was computed from the shear wave velocity profile by SHAKE using elastic relationships.

7.2.3 Results

Figures G-11a through G-11c show the site response analysis results, with site amplification indicated by the difference between the bedrock (input) and surface (output) spectra. Figure G-12 shows the spectral amplification for the three scenario events compared with the normalized spectrum used in the UBC design method. The natural site period is indicated by higher amplification levels between 0.18 and 0.40 seconds. As shown, the site-specific amplification spectra have a very conventional shape and are well represented by the standard UBC normalized response spectrum. The results indicate that the site should experience typical shaking during the design seismic events, and that conventional UBC methods are appropriate for seismic design.

7.3 MASS MOVEMENT

Earthquake forces can cause slope failures and movement of sloping ground. Active landslides are most susceptible to seismic slope failure, but very steep slopes and jointed rock outcrops are also vulnerable.

The pipeline alignment does not pass through or below areas of known slope failures. The slopes traversed by the alignment are generally flatter than 1½H:1V, and are comprised of stiff, cohesive soils and weathered sedimentary rock. There are no prominent ridges or steep canyon sidewalls along the alignment or at the wellsites. In our judgement, the project area has a low to very low risk of seismic mass movement.

7.4 DIFFERENTIAL SOIL COMPACTION AND SETTLEMENT

Earthquake shaking can cause loose cohesionless soils to densify, resulting in surface settlements. The Nehalem valley floor contains the only sandy soils in the site area, which are no more than 20 feet thick in the two drilled borings. Miller Station and the wellsites are all underlain by cohesive soils. The risk of seismic settlement is very low due to the thin deposit of cohesionless soils.

7.5 LIQUEFACTION

Liquefaction is a term used to describe a sudden shear strength reduction in granular soils caused by earthquake shaking. The horizontal shear stresses induced by earthquake shaking cause the soil fabric to deform slightly, which results in a small volume decrease. Excess pore pressure can develop if the deformation occurs faster than groundwater trapped in the spaces between sand grains can drain, resulting in reduced effective stress between particles and

reduced shear strength. Liquefied soils can flow under gravity and seismic forces until the excess pore pressures drain and the shear strength increases to greater than the driving stress.

Loose sandy soils saturated by a shallow water table are the most prone to liquefaction. Damaging permanent ground deformations are most likely to develop where susceptible soils are located near a free face, such as a river bank or a bulkhead wall. Clayey soils, which derive the majority of strength through cohesion, are not susceptible to liquefaction.

Liquefaction is not a significant concern at Miller Station and along the upland portions of the pipeline alignment due to the high plasticity of the near-surface soils. The sandy soils in the low-lying portions of the Nehalem Valley could be liquefiable, and were evaluated as discussed in the following paragraphs.

The liquefaction potential of the soils encountered in the borings on both sides of the Nehalem River crossing was evaluated using the conventional cyclic stress ratio "triggering" method developed by Seed and Idriss¹⁴, with generally accepted modifications and refinements. In this simplified method, the safety factor against liquefaction is computed as the ratio of the cyclic shear strength (liquefaction resistance) divided by the cyclic shear stresses caused by the design earthquake (driving stresses). The driving stress is computed using the peak ground acceleration multiplied by the total vertical stress at the depth under consideration, which is then multiplied by empirical factors to account for earthquake duration. The design earthquakes were all assumed to generate a peak ground acceleration of 0.30g, based on the controlling UBC zone factor rather than the PGA values computed in the ground motion analysis.

The capacity of the soil to resist liquefaction is computed from empirical relationships between the Standard Penetration Test (SPT) penetration resistance and observed liquefaction occurrences. For this analysis, we used correlations appropriate for silty sand soils and the SPT results from the two borings drilled at the river crossing.

The factor of safety against liquefaction was calculated throughout the depth of the upper alluvial deposit. Figure G-13 shows the safety factor profile at the Nehalem River crossing for a range of earthquake magnitudes. As shown, the upper silty sand soils within approximately 10 feet of the ground surface are susceptible to liquefaction during the design earthquake.

7.6 LATERAL SPREAD

Potential lateral spread magnitudes were computed using the method developed by Bartlett and Youd¹⁵, using a liquefiable thickness of 10 feet and the range of earthquakes summarized in Table G-3.

Lateral spreading at the banks of the Nehalem River was found to be inconsequential because the planned pipelines will be embedded in non-liquefiable mudstone deposits. The embedment is due to the relatively long radius of curvature required by the stiff pipe sections and the relatively short river crossing. A minimum drill length of 800 feet is planned in order to achieve the required depth at the center of the river. In this view, lateral spreading at the banks of the Nehalem River is not a significant threat to the planned pipeline.

The alluvial deposits comprising the valley floor away from the river are also considered liquefiable. For this evaluation, we assumed that the soil profile at the river crossing was consistent throughout the valley floor. This assumption is considered conservative because the thickness of liquefiable deposits likely decreases with distance from the river. Based on this assumed soil profile, we estimate that portions of the valley floor could move between 0 and 12 inches.

Steel pipe with welded joints has very high tolerance for lateral displacement. Statistical evaluations of buried pipe performance during previous earthquakes indicate that welded steel pipelines generally experience approximately 1 leak or break per 10,000 feet of pipe in liquefied ground¹⁶. This average value is based on analysis of liquefied thicknesses significantly greater than the 10-foot zone identified in this study. Based on the limited liquefiable thickness, the small potential spread magnitude, and the high strength of the pipeline material, it is our opinion that liquefaction of the alluvial soils surrounding the planned pipeline should not affect the functionality of the pipe.

7.7 SURFACE FAULT RUPTURE

As discussed in Section 3.3, the Mist area is extensively faulted. However, not all faults are capable of generating earthquakes, and generally only significant and highly active faults are capable of generating displacements at the ground surface.

The faults in the Mist gas field are generally short, high-angle breaks which typically show minor vertical displacement in 30 million year-old materials. The faults were probably formed during a period of intense uplift which formed the Coast Range during Miocene time (approximately 6 to 20 million years ago). The faults appear to have formed along the existing weak planes of existing faults in Eocene-age Tillamook volcanics. Although uplift of the Coast range continues through the present, it does not appear to be causing the same degree of faulting caused during the Miocene.

The presence of fault displacements through young (less than 1.6 million year-old) Quaternary-age deposits is the best indicator of possible surface fault rupture within the design life of the planned facility. Although there are no mapped faults which extend through Quaternary materials, there is also very little young material in the Mist area. The youngest materials in the site area are the weathered colluvial soils in the hillside areas and the alluvial deposits in the Nehalem valley floor. The lack of surface faulting in these younger materials indicates that recent displacements have not occurred, although the scarcity of Quaternary material does not support a definitive conclusion.

Previous earthquake activity, even very small microseismic events, indicates an actively deforming area which could experience a future larger event. The lack of small earthquakes in the recent historical record indicates a low probability of a future earthquake large enough to cause ground rupture.

Based on these several contributing factors, we conclude that the risk of surface fault rupture throughout the Miller Station, pipeline alignment, and wellsite areas is low.

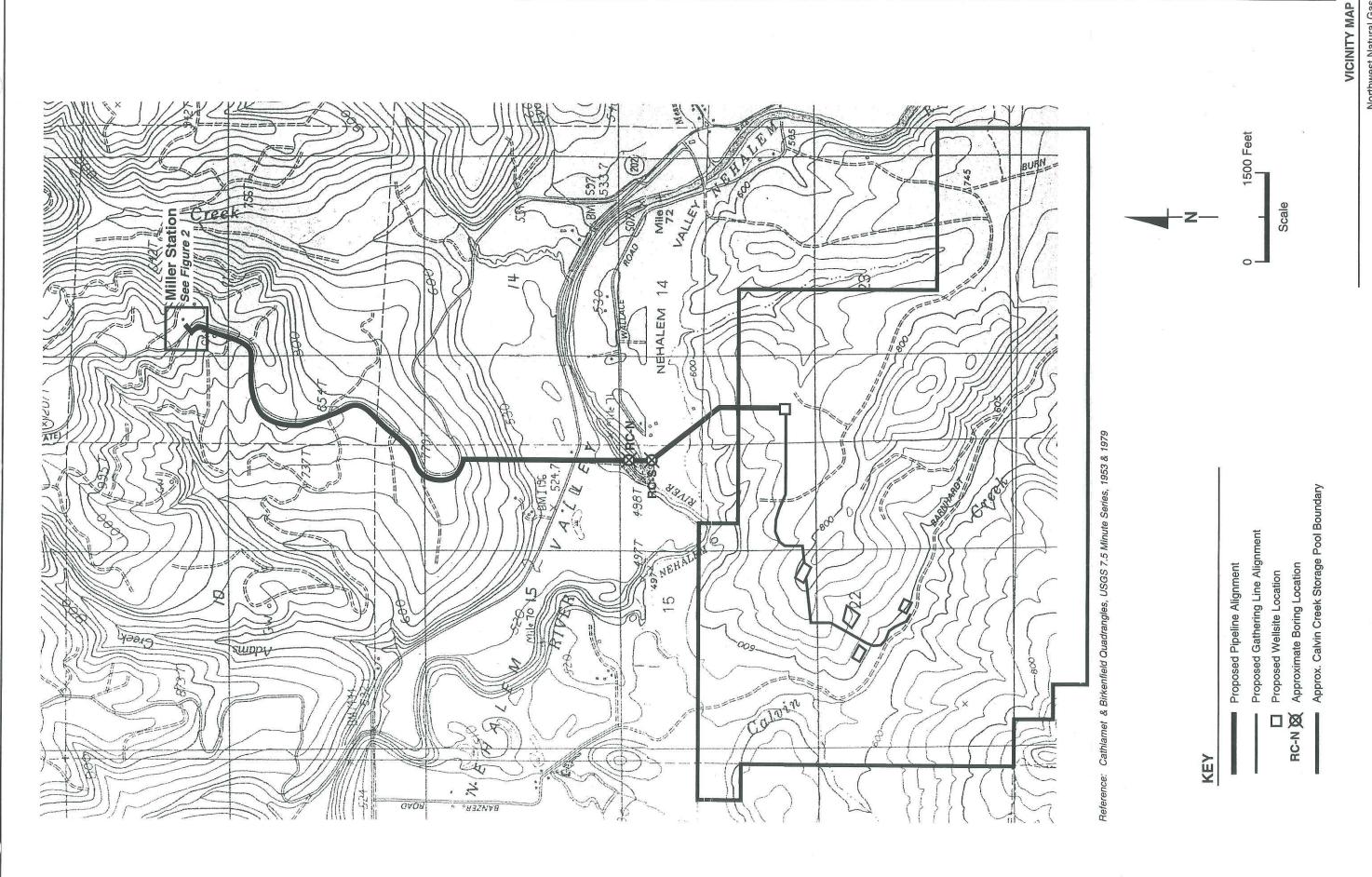
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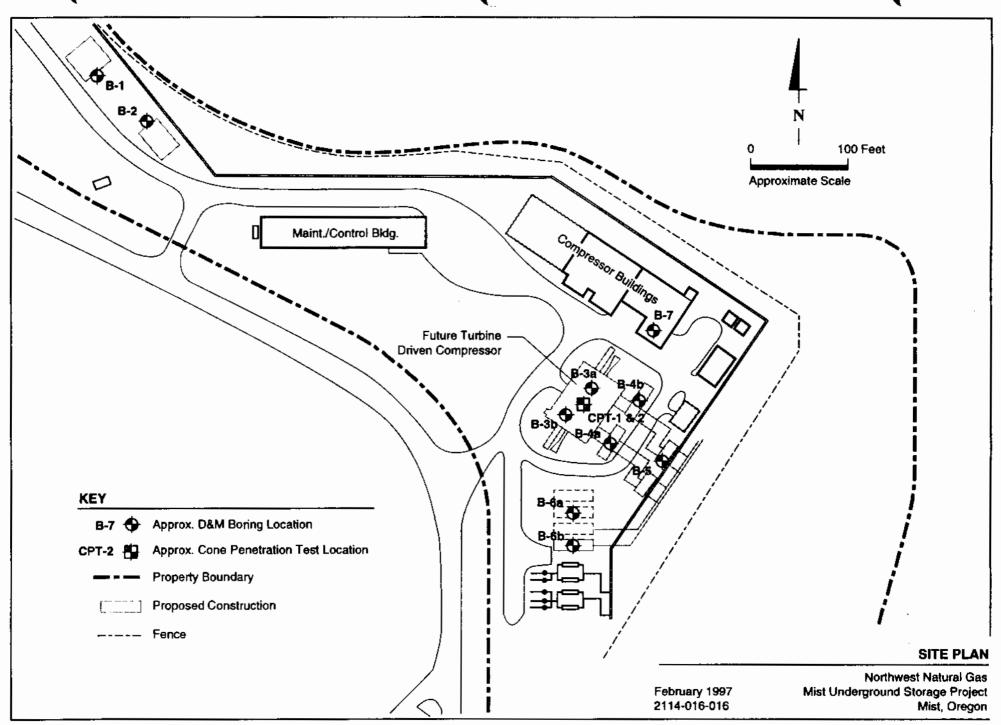
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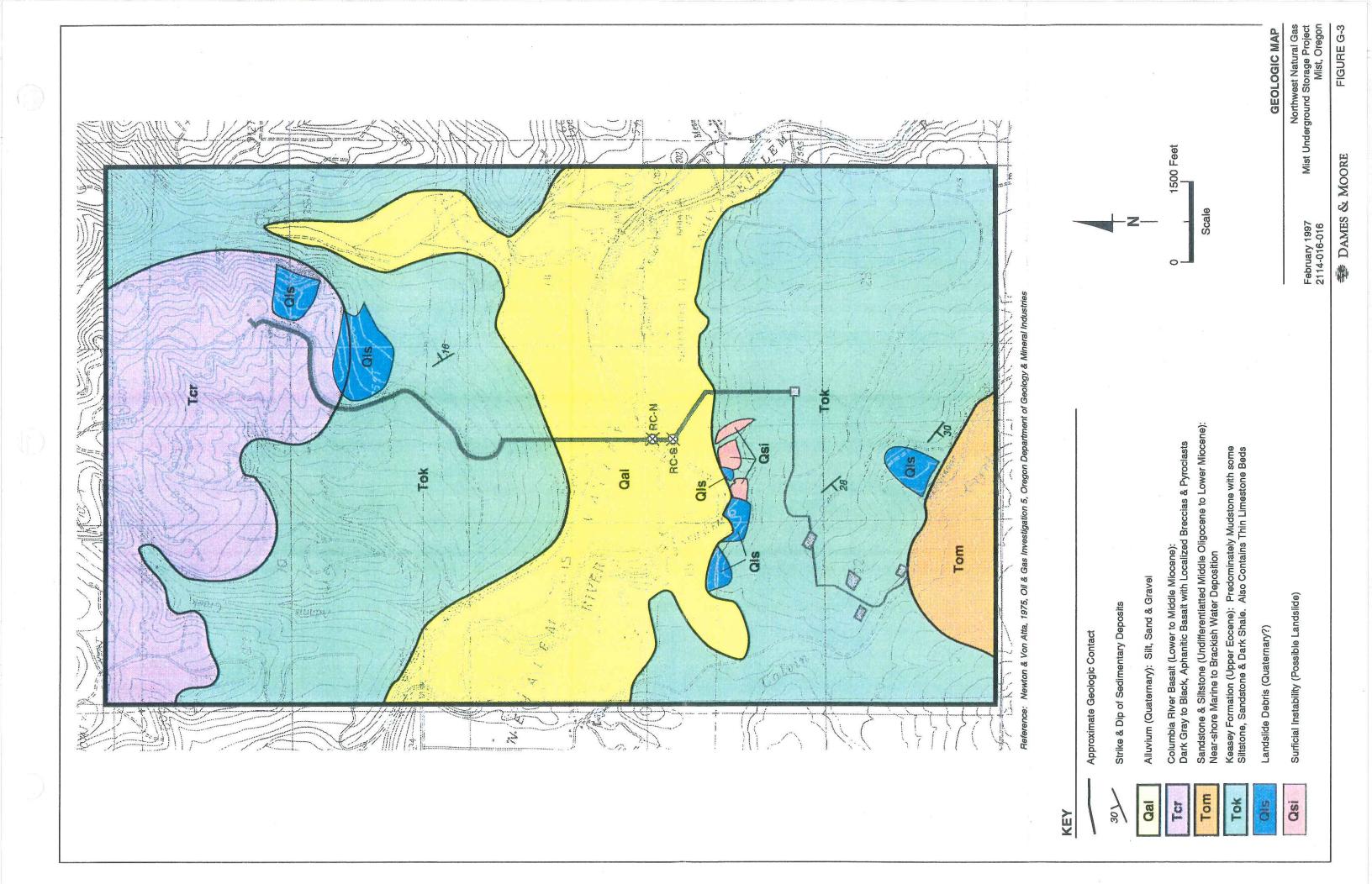


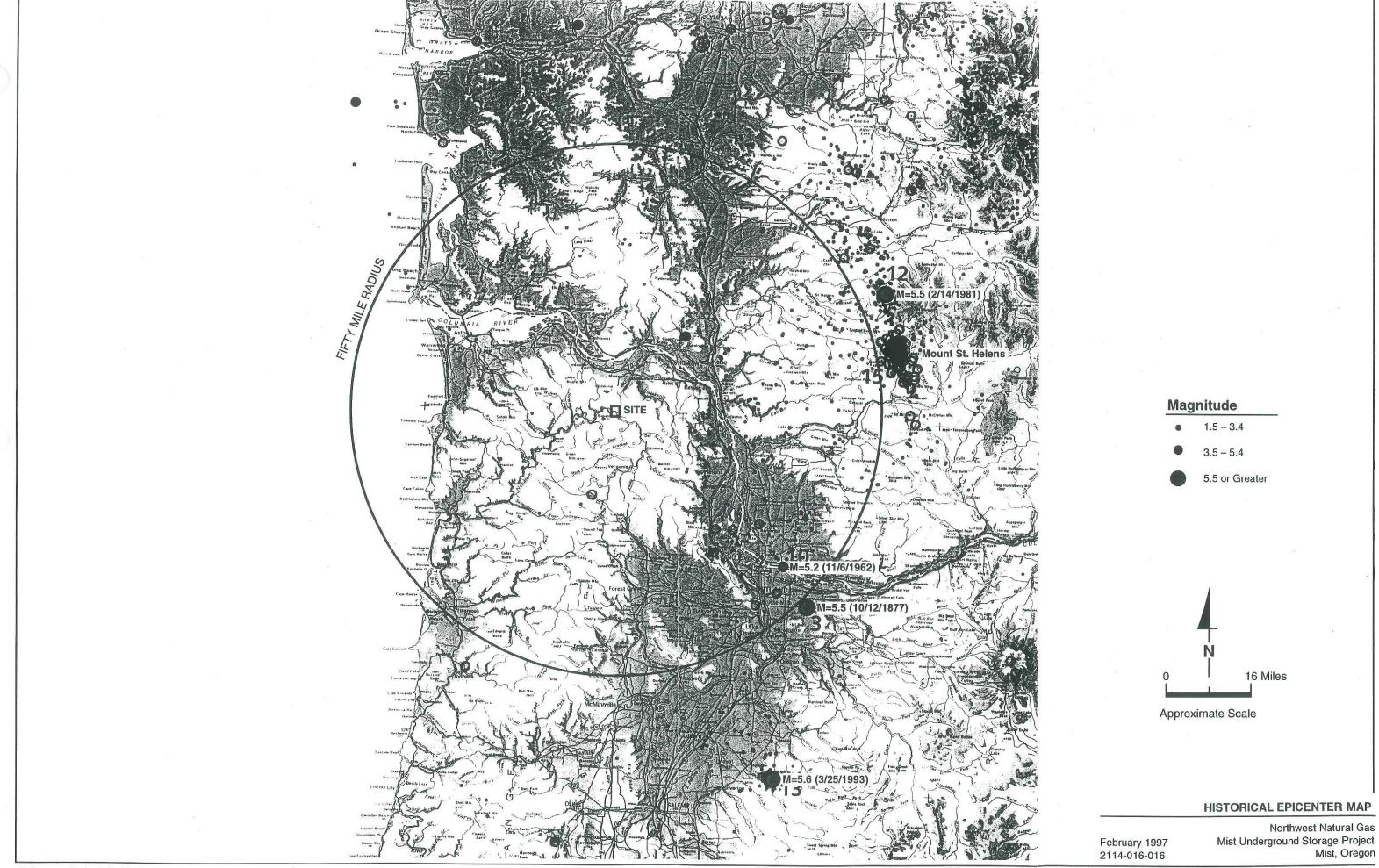
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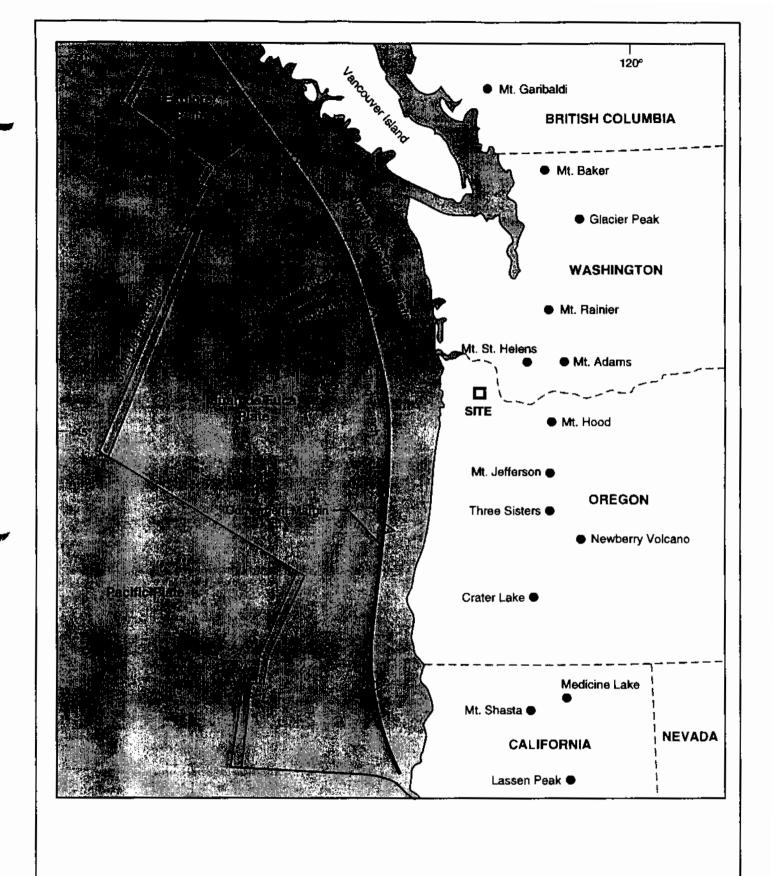
Northwest Natural Gas Mist Underground Storage Project Mist, Oregon

February 1997 2114-016-016





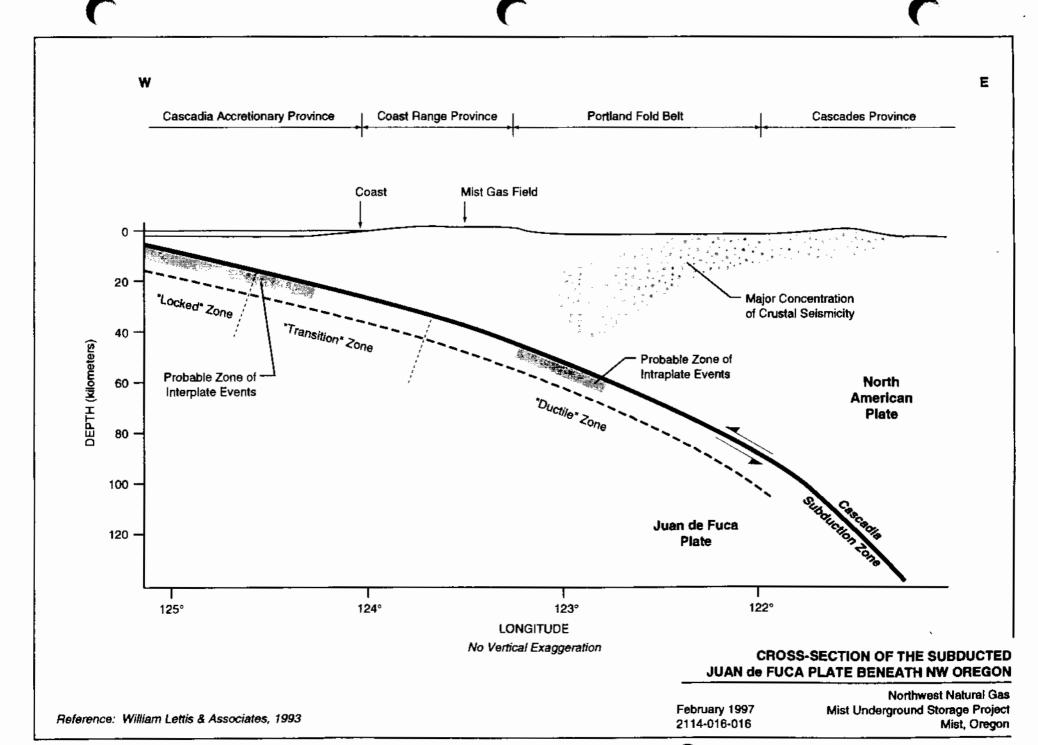


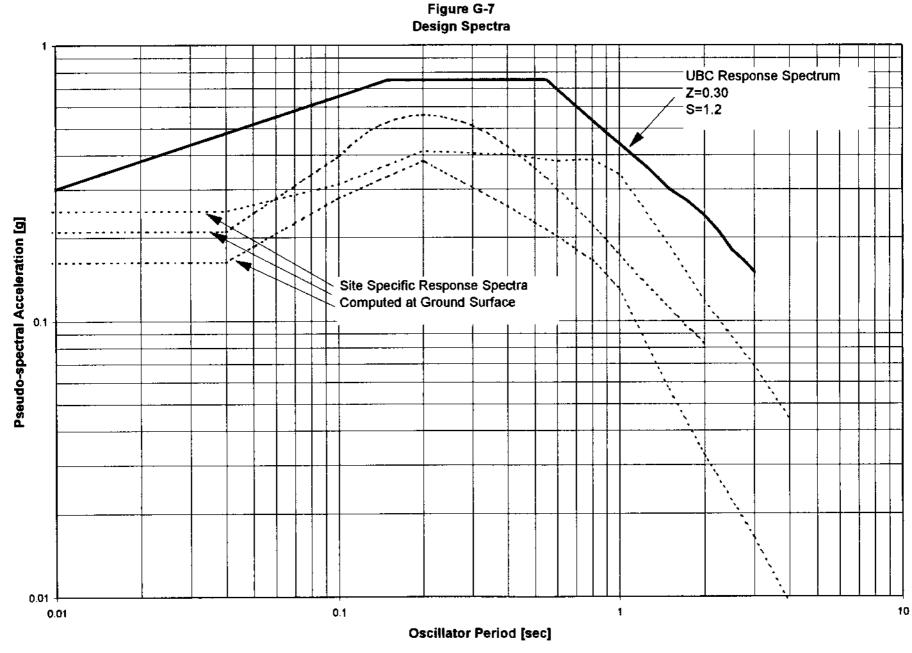


CONVERGENT MARGIN OF THE PACIFIC NORTHWEST

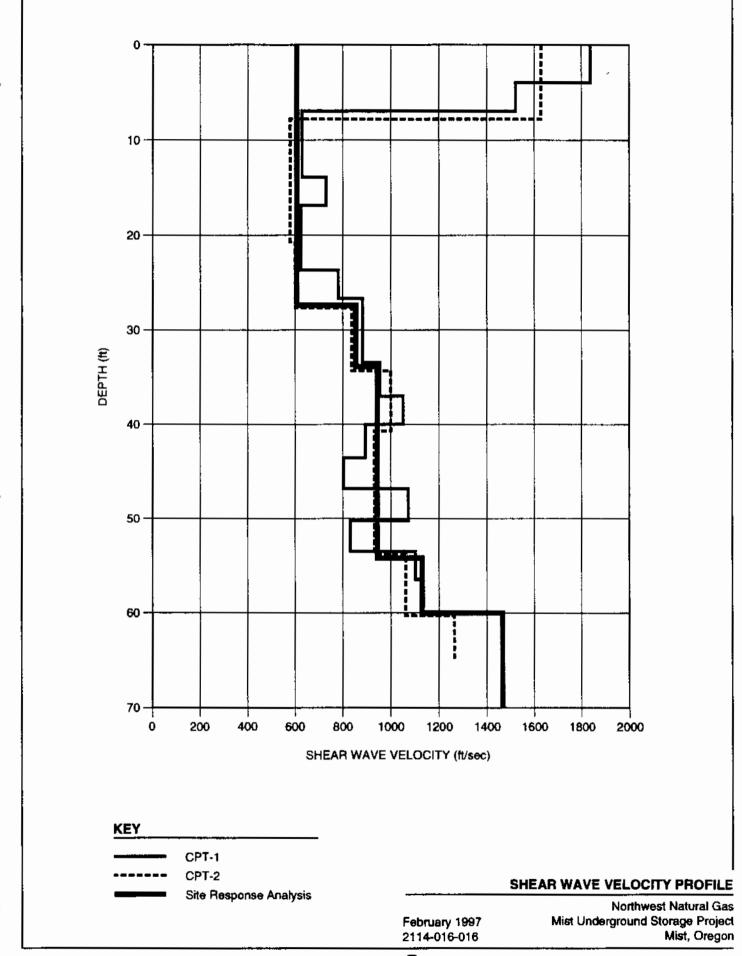
February 1997 2114-016-016 Northwest Natural Gas Mist Underground Storage Project Mist, Oregon

Reference: Niem and Others, 1992





2/19/97 SPECTRA.XLS Design Response Spectra



Interplate Ground Motions Target Response Pseudo-spectral Acceleration [g]

Oscillator Period [sec]

0.1

Figure G-9a Interplate Ground Motions

2/19/97 Spectra Match Chart 1

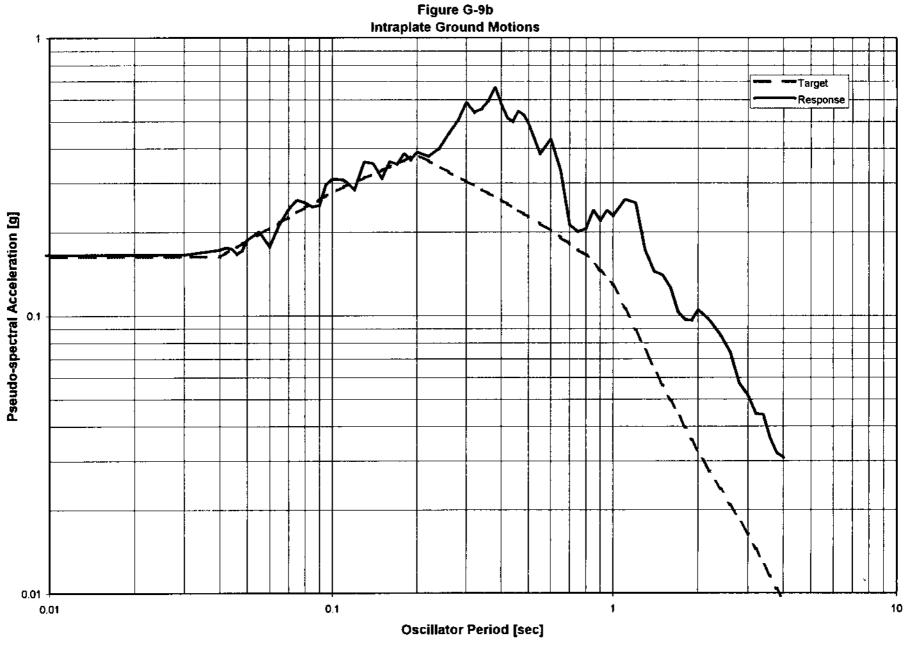
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Northwest Natural Gas Mist Underground Storage Project 2114-016-016

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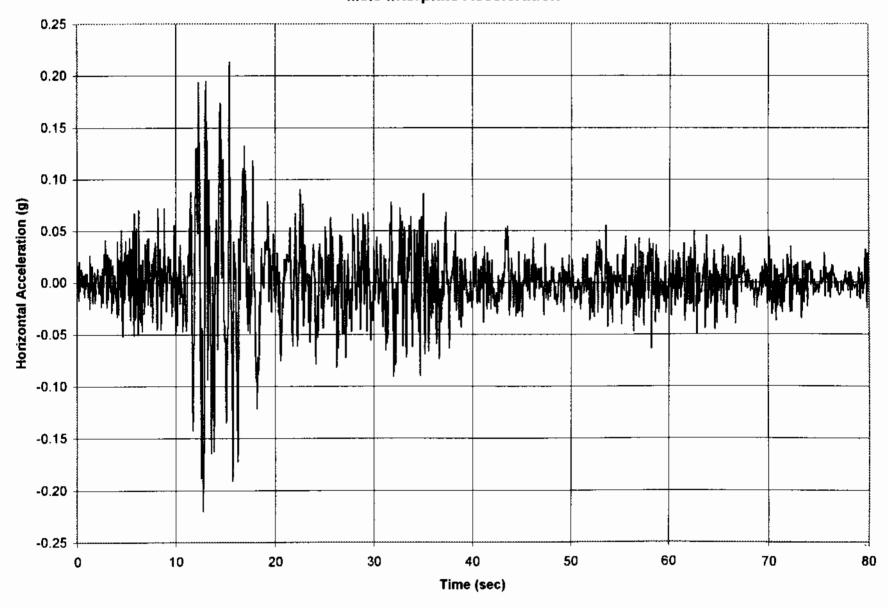
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Figure G-9c Shallow Crustal Ground Motions



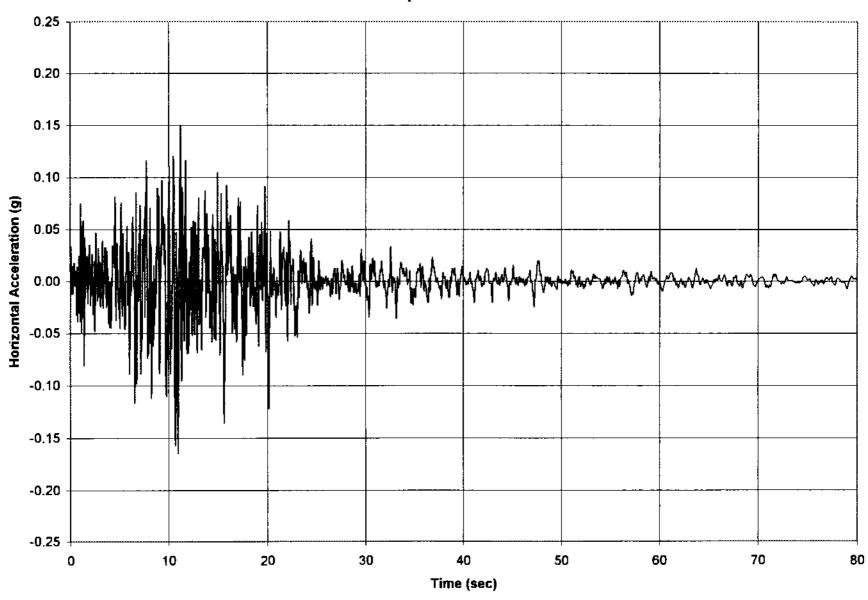
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Figure G-10a M8.5 Interplate Acceleration



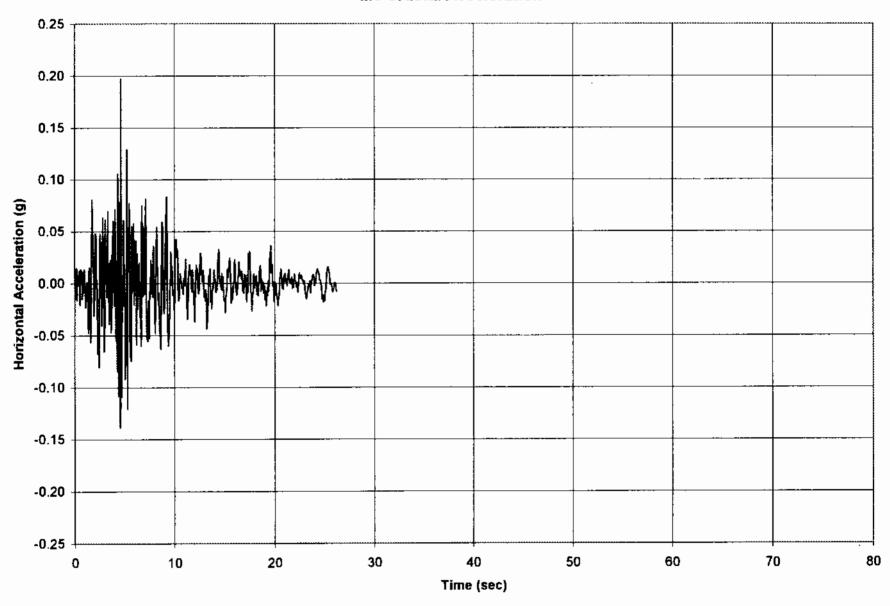
2/19/97 INTER.XLS Plot

Figure G-10b
M7 Intraplate Acceleration



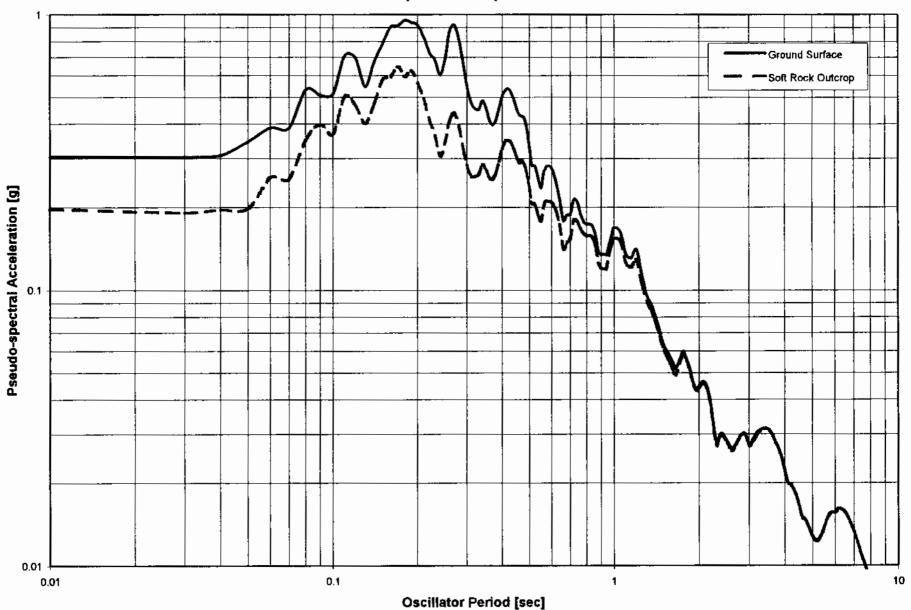
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Figure G-10c M6 Crustal Acceleration



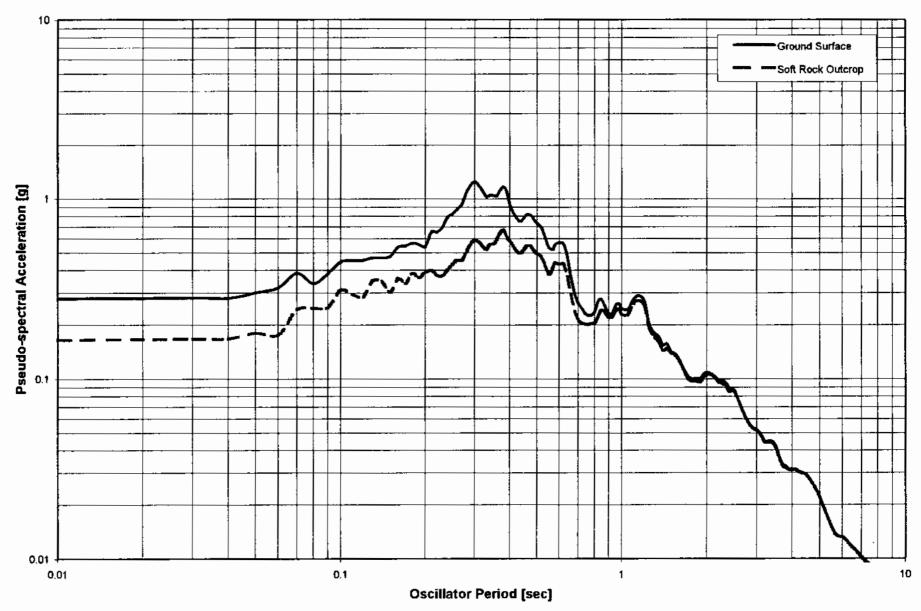
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Figure G-11a Interplate Site Response



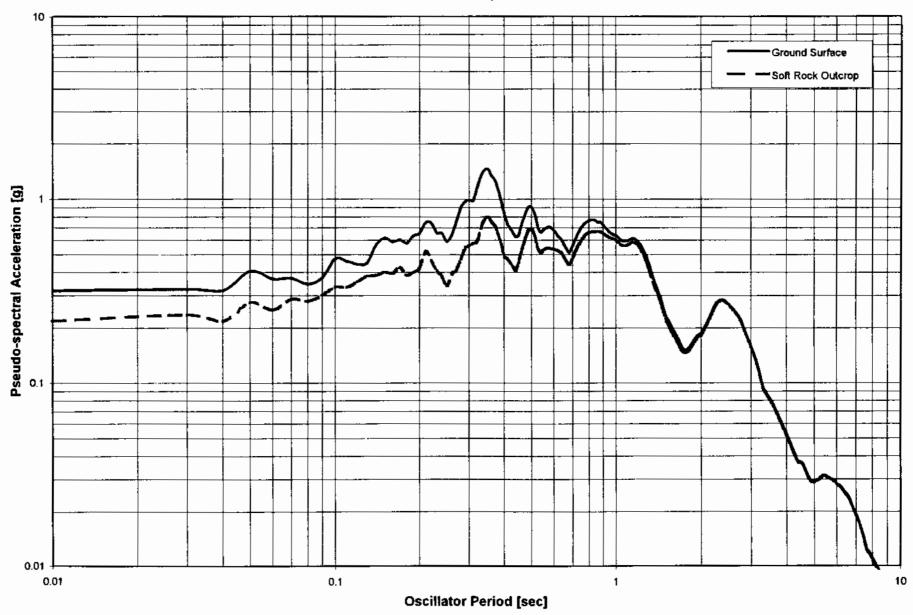
2/19/97 ARS.XLS Interplate

Figure G-11b Intraplate Site Response



2/19/97 ARS.XLS Intraplate

Figure G-11c Crustal Site Response

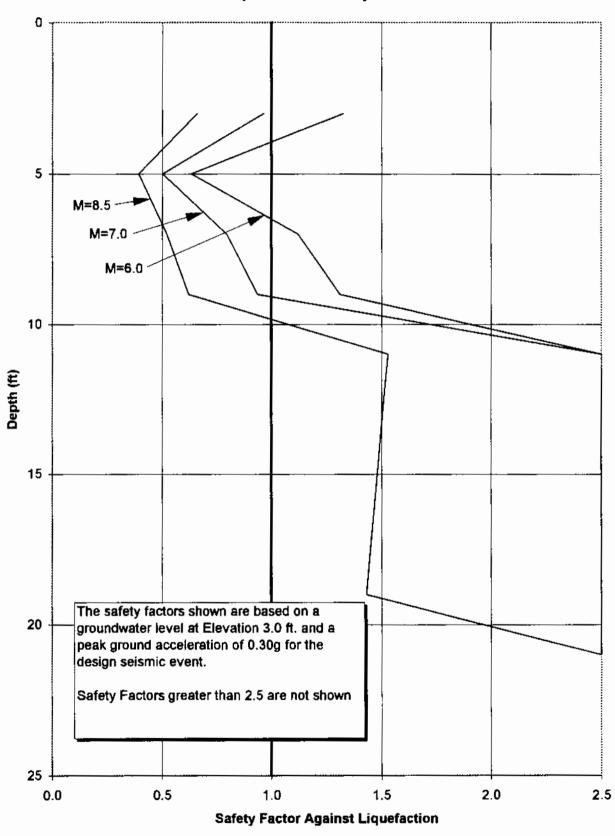


2/19/97 ARS.XLS Crustal

Figure G-12 Site Amplification 3.0 2.5 UBC Soil Type 2 Normalized Response Spectrum Pseudo-spectral Amplification Amplification Spectra from Site Response Analysis 0.5 0.0 2.5 0.5 1.5 2 3 0 Oscillator Period [sec]

2/20/97 ARS.XLS Amplification

Figure G-13
Liquefaction Safety Factor



2/19/97 LIQUEFCT.XLS Imp. Plot



Report
Geotechnical Investigation
Miller Station Expansion and
Calvin Creek Pipeline Alignment
Mist Underground Storage
Project
Mist, Oregon

for
Northwest Natural Gas
January 24, 1997
Job No. 02114-016-016



January 24, 1997

1750 S.W. Harbor Way, Suite 400 Portland, Oregon 97201 503 228 7688 Tel 503 223 6083 Fax

Northwest Natural Gas 220 NW Second Avenue Portland, OR 97209

Attn: Mr. John R. McQuillan III, C.P.M.

Re: Report

Geotechnical Investigation
Miller Station Expansion and
Calvin Creek Pipeline Alignment
Mist Underground Storage Project
Mist. Oregon

Dear Mr. McQuillan:

Transmitted herewith are five copies of our report entitled "Geotechnical Investigation, Miller Station Expansion and Calvin Creek Pipeline Alignment, Mist Underground Storage Project." The scope of the investigation is outlined in our proposal dated October 31, 1996.

During the course of our investigation we have maintained contact with you and with the rest of the Gas Storage team, and have provided preliminary recommendations as information has been developed. Our recommendations, along with supporting information, are formally documented in this report.

We appreciate the opportunity to be of service, and look forward to our continued involvement in the project. Please call if you have any questions or need additional information.

Very truly yours.

DAMES & MOORE

Douglas R. Schwarm, P.E.

Senior Engineer

cc: (2) Jose Fernandez - KTI/Fish

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Report Geotechnical Investigation Miller Station Expansion and Calvin Creek Pipeline Alignment Mist Underground Storage Project Mist, Oregon

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation for the proposed expansion of the Northwest Natural Gas underground gas storage facility near Mist, Oregon. The planned construction includes 2 turbine compressors, approximately $2\frac{1}{2}$ miles of pipeline from the station to new wellsites in the Calvin Creek storage pool area, and up to four wellsites with injection/withdrawal wells. Figure 1 shows the general site location and pipeline alignment relative to the surrounding topographic features.

Dames & Moore performed this investigation under Purchase Order No. 43642, dated November 21, 1996. The scope of the investigation is described in our proposal dated October 31, 1996.

Information used in developing the recommendations presented herein includes preliminary equipment layout and load data provided by KTI/Fish, the project engineer, and pipeline alignment and wellsite location maps provided by Northwest Natural Gas (NNG).

2.0 PROJECT DESCRIPTION

Natural gas deposits were developed beginning in 1979 near Mist, Oregon, by drilling several extraction wells and constructing a gas processing and compressing station, called Miller Station. The processed gas is conveyed via pipeline to the NNG distribution system near Rock Creek. By mid-1992, approximately 45-billion cubic feet (bcf) had been extracted from 27 reservoirs near the discovery site. Current production from the reservoirs is approximately 5 to 10 million cubic feet per day.

In 1987, the two largest gas reservoirs, which were largely depleted, were converted to temporary storage by drilling injection/withdrawal (I/W) wells which allow imported natural gas to be pumped into the pools. The Mist Underground Storage Project will increase the storage capacity of the Mist facility by constructing additional high-capacity I/W wells in other depleted natural gas pools.

The Mist Underground Storage Project will be accomplished in several phases, each making an incremental increases in storage capacity through development of individual storage pools. The Calvin Creek gas pool has been selected for the first phase of development. The scope of the project's first phase includes improvements to the Miller Station gas handling capacity, approximately 2½ miles of double pipeline connecting Miller Station with the Calvin Creek storage pool area, and development of up to four wellsites between the Nehalem River and Calvin Creek. The following paragraphs describe the planned Phase I construction.

2.1 MILLER STATION EXPANSION

Additions to Miller Station include a dehydration tower, two 4,000 HP turbine-driven compressors, and associated pipes, valves, and meters. Figure 2 shows the general location of the planned additions relative to the existing facilities. The dehydration tower and associated piping and equipment will be supported on a concrete mat foundation near the existing dehydration tower. The compressors will be housed in a new metal-frame building located hetween the existing compressor huilding and the existing meter stations.

We understand that the planned glycol dehydration unit will have a dead weight of approximately 95 kips and will be approximately 6.5 feet in diameter. The unit will probably be supported on a mat foundation much wider than 6.5 feet to resist overturning loads. The planned compressors have an expected dead weight of 80 kips each, and will be supported on skids measuring approximately 8.5 feet by 36 feet. Dynamic loads are not known at this time, but are expected to be small because of the turbine, rather than reciprocating, compressing mechanism.

2.2 CALVIN CREEK PIPELINE ALIGNMENT

Gas will be conveyed to the Calvin Creek storage pool via two 16-inch diameter pipelines installed approximately 10 feet apart in a 40-foot wide easement. The pipeline alignment trends generally north-south, and crosses the Nehalem Highway (State Route 202), the Nehalem River, and a seasonal, unnamed creek south of the Nehalem River channel. Figure 1 shows the general pipeline alignment.

The planed pipe will consist of relatively thick-walled steel pipe with welded joints. The pipe will be surrounded by select granular bedding and shading materials. Shaped bedding or special support are not expected.

2.3 WELLSITES

Between 1 and 4 level wellsites will be constructed which support up to three I/W wells each. In addition, 3 or 4 water monitoring wells will be installed on smaller pads near the main well pads. The I/W wellsite dimensions can be adjusted depending on specific conditions, but overall plan dimensions of 230 feet by 100 feet are preferred. These dimensions are difficult to achieve without significant cutting and filling due to the steep topography in the Calvin Creek area.

The wellsite pads have a design life of at least 50 years, and will support heavy drilling equipment during well construction and periodic maintenance equipment thereafter. Each wellsite will have a gravel access road capable of supporting production drilling equipment and moderate service vehicle loads.

3.0 OBJECTIVE AND SCOPE OF WORK

The purpose of this investigation is to provide geotechnical data and design recommendations for foundation support of the planned equipment at Miller Station and to provide geologic hazard and design and construction recommendations for the planned pipeline and wellsites. The scope of the Miller Station investigation is described in the Soil Investigation Specifications provided by KTI-Fish dated October 23, 1996 and our proposal dated October 31, 1996. The principal purposes of the pipeline alignment study are to confirm that the pipeline alignment is not affected by unstable soils and to collect geotechnical data at the river crossing and at other key points. Specifically, we have performed the following scope of work:

3.1 MILLER STATION INVESTIGATION

- Drill 10 borings at the locations specified by KTI-Fish using truck-mounted auger drilling equipment to depths of between 21½ and 51½ feet. A Dames & Moore engineer located the borings, maintained continuous boring logs, and obtained samples at representative intervals.
- Perform geotechnical laboratory tests on samples obtained from the borings. Tests
 included natural moisture content and density, gradation, unconfined compressive
 strength, compressibility, and shear strength.
- Perform engineering analysis of the data obtained, and prepare recommendations for earthwork and foundation construction.

 Prepare this illustrated report documenting the investigation and providing our conclusions and recommendations regarding the planned station expansion.

A detailed seismicity and site response analysis of the Miller Station site is currently in progress. Additional subsurface investigation was performed at Miller Station, consisting of 2 cone penetration tests (CPT's) with shear wave velocity profiles. The subsurface information is available at this time, and is included in Appendix A of this report. The results of this study will be summarized in a separate report, which will be presented as Appendix G of the Energy Facilities Siting Commission (EFSC) permit amendment application.

3.2 PIPELINE ALIGNMENT EVALUATION/INVESTIGATION

- Review available aerial photographs of the planned pipeline alignments to evaluate the presence of landslides or other potentially unfavorable geologic conditions.
- Perform of a detailed geologic reconnaissance of the pipeline alignment. A geologic map was prepared indicating areas of concern and suggesting potential routes which avoid or minimize exposure to unstable conditions.
- Explore subsurface conditions near the Nehalem river crossing by means of two
 drilled borings extending to a depths of 40½ and 50½ feet. A Dames & Moore
 engineer located the borings, maintained continuous logs, and obtained samples at
 appropriate intervals.
- Explore near-surface soil and groundwater conditions on the flat ground between the Highway 202 and the north valley slope by means of 2 hand-auger borings. Borings were excavated by a Dames & Moore technician, and extended to a maximum depth of 4 feet.
- Perform limited laboratory testing to develop engineering parameters necessary for design of the directional drill or microtunnel crossing. The laboratory program included index tests, moisture content and density determinations, and unconfined compressive strength tests.
- Analyze the data obtained, and prepare recommendations for alignment modifications, trench excavation, dewatering or high-water construction, excavation support, and directional drilling or microtunneling of the river and road crossings.

 Include final versions of the geologic hazard maps and our recommendations for construction of the planned pipeline in this report.

3.3 WELLSITE EVALUATION

- Review available aerial photographs of the planned wellsite locations to evaluate the
 presence of landslides or other potentially unstable geologic conditions.
- Perform a detailed geologic reconnaissance of the wellsite locations to confirm the geologic hazards indicated by the aerial photographs.
- Provide field engineering services for preliminary wellsite design.
- Include the geologic information on the geologic map in this report.

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation of the Miller Station area was performed between December 2 and 5, 1996, and consisted of 10 borings drilled at the locations shown on the Site Plan, Figure 2. The specific boring locations were selected by KTI/Fish, and were marked in the field by NNG's surveying crew.

Two cone penetration tests (CPT's) were performed at Miller Station on January 10, 1997, to collect additional data for a detailed seismic vulnerability and site response evaluation. This evaluation is currently in progress, and will be summarized in a separate report. The CPT data is included in Appendix A.

The subsurface investigation of the Nehalem River crossing was performed on December 3 and 4, 1996, and consisted of one boring on each side of the river. The approximate boring locations are shown on Figure 1. The boring locations were selected by Dames & Moore with input from NNG's surveyor.

Appendix A provides a detailed discussion of drilling and sampling techniques used for this investigation. Interpreted boring logs, including soil descriptions, laboratory test data, and in-situ test results are also included in Appendix A.

5.0 LABORATORY TESTING

The laboratory testing program was developed considering the soil properties needed for engineering analysis and the character and quality of the samples obtained from the borings. The tests included moisture content, density, index, gradation, strength, and compressibility tests. The test results are summarized on the boring logs in Appendix A and in detailed form in Appendix B.

6.0 SITE CONDITIONS

This section summarizes the geologic origins of the Mist area and describes significant conditions which could affect the planned development. A more detailed geologic assessment will be included in the forthcoming seismicity and site response report.

6.1 GEOLOGIC SETTING

The Mist storage project site is located in the northern portion of the Coast Range physiographic province, an uplifted mountain range which extends from the continental shelf on the west to the Willamette Valley on the east. The Coast Range province is bounded on the north and south by the Columbia River and the middle fork of the Coquille River, respectively.

The basement rocks of the Coast Range originated between 65 and 50 million years ago as a chain of islands formed by volcanic eruptions from the ocean floor. The island chain collided with the westward-moving North American tectonic plate approximately 45 to 50 million years ago. The undersea valley which was created between the west slope of the plate boundary and the east slope of the volcanic mountains filled with sediments transported by west-flowing streams. The sediment source changed as the stream channels matured and extended farther east, beginning with the Klamath Mountains and ending at the Idaho bathysphere. The parent material for the fine-grained sedimentary rocks underlying most of the pipeline alignment is volcanic ash from the newly-formed ancestral Cascade volcanoes, which originated approximately 40 to 43 million years ago. A series of volcanic eruptions west of present-day Portland contributed the basalt formation which underlies a relatively thin layer of more recent sedimentary material in the Miller Station area.

The marine sedimentary and basalt flow deposits were then uplifted into a low coastal mountain range as the Juan de Fuca plate is overridden by the North American crustal plate. The uplift continues at varying rates along the coast, with Astoria rising at a rate of approximately 1 inch every 36 years. Uplift in the Mist area is likely much slower due to the distance from the coast. Erosion and weathering have affected the near-surface materials throughout the site area. Landslides have occurred where erosion creates steep slopes in the relatively weak claystone and mudstones.

6.2 MILLER STATION

6.2.1 Surface

Miller Station is located approximately 2 miles north-northwest of the Highway 47/Highway 202 junction. Topographically, the station is located on a poorly defined, north-south trending ridge between Elevation 1040 and 1080 feet. The ridge sides slope down from the Miller Station area at overall inclinations of approximately 10:1 (horizontal to vertical) on the west and 2:1 on the east. Figure 1 shows the site location relative to existing topographic features.

The planned equipment areas were graded during initial site development, so topography at the Miller Station site is relatively gentle. The planned equipment areas are currently covered with crushed rock surfacing, with no vegetation or existing structures.

6.2.2 Subsurface

Subsurface conditions at Miller Station were explored by drilling 10 borings to depths of between 20 an 51.5 feet below existing site grades. Figure 2 shows the boring locations. The borings revealed a relatively thin layer of crushed rock overlying relatively stiff native soils. The following sections provide additional detail regarding the subsurface conditions at the site.

6.2.2.1 Fill

Fill soils at the site generally consist of crushed bar run gravel with cobbles used as a surface protection blanket. The thickness of this layer generally varied between 8 and 12 inches.

The planned turbine area was reportedly filled during initial site development. Grading plans dated July 31, 1989 indicate that up to about 5 feet of fill could be present in the vicinity of Borings B-6a and B-6b. However, the consistency and appearance of the upper samples obtained from these borings suggest that either the fill is not present or that if it is, it is similar to the native soils. Soft or unsuitable fill soils were not encountered in any of the borings.

6.2.2.2 Native Sedimentary Deposits

The thin layer of gravelly fill is underlain by a highly variable sequence of silts and clays extending to the maximum depth explored. In general, the upper 10 feet of this unit consists of stiff to very stiff, low-plasticity, silty sands, silts, and clays. The upper soils have

moisture contents of between 40 and 55 percent and dry densities between 60 and 85 lbs/ft³. The native silty soils are moderately compressible, and are slightly overconsolidated. These soils should provide adequate foundation support for moderately-loaded shallow foundations, but are extremely sensitive to disturbance.

Highly plastic clay soils were encountered at a depth of about 13 to 20 feet beneath present site grades. The plastic soils are generally medium stiff to stiff and moderately compressible, with an overconsolidation ratio of about 3. These soils will contribute to settlement of large foundations, but should not affect small building foundations.

6.2.2.3 Basalt

Geologic maps of the site area indicate that Miller Station is underlain by basalt bedrock at depth. Basalt was not encountered in any of the borings, which penetrated to a maximum depth of 51.5 feet. One of the cone penetration tests encountered abrupt refusal at a depth of 65 feet. Although not directly observed or sampled, this could be the contact between the overlying soils and the basalt. Regardless, the basalt is too deep to affect any of the planned construction.

6.2.3 Groundwater

A regional groundwater table was not encountered in the borings drilled at Miller Station. Perched water was encountered between 8 and 12 feet beneath present grades, generally in silt layers which overlie very low-permeability clay deposits. Significant groundwater should not affect the planned construction. However, the Mist area experiences significant rainfall throughout the year, and perched water could be encountered in any of the higher-permeability silt deposits. We expect that perched water will probably be encountered in some of the foundation and trench excavations, particularly those deeper than about 8 feet.

6.3 PIPELINE ALIGNMENT AND WELL SITE LOCATIONS

The following sections describe important site conditions which may affect the pipeline alignment between Miller Station and the planned Calvin Creek wellsites. For the purposes of this section of the report, transmission lines and gathering lines are considered essentially the same. The wellsite locations are included in this section because topographic and geologic conditions are essentially the same as in the southern portion of the pipeline alignment.

6.3.1 Surface

The planned pipeline alignment extends approximately 2½ miles south from Miller Station across the floor of the Nehalem valley and back up the south valley side. Topographically, the pipeline origin is near Elevation 1060 feet (MSL), the valley floor is near Elevation 525 feet, and the wellsite elevations range from Elevation 600 to 820 feet. The maximum slope inclination (excluding low slopes) is approximately 19 percent between the Miller Station Access Road and the floor of the Nehalem River valley. Table 6-1 summarizes the overall slope conditions along the pipeline alignment.

TABLE 6-1
PIPELINE SLOPE CONDITIONS

Segment Name	Length (ft)	Begin Elevation (ft)	End Elevation (ft)	Maximum Slope (percent)
Roadway	6,000	1,040	680	8
North Valley Slope	1,000	680	530	19
Nehalem River Valley	3,000	530	600	6
South Valley Slope	2,700	600	740	12
Gathering Line	7,200	740	600	3

Surface vegetation above Elevation 550, above the flat valley floor, consists primarily of second-growth forests with dense undergrowth. The trees are commercially valuable, and tree removal will significantly increase the cost of pipeline construction. The underbrush is dense enough to hamper pipeline construction. Vegetation in the valley segment of the alignment consists primarily of pasture with sparse brush, and should not affect the planned construction.

6.3.2 Subsurface

The planned pipeline will be constructed in a trench approximately 6 feet deep throughout most of the alignment. Deeper excavations may be required in response to abrupt slope changes and at the Highway 202 crossing. Cuts and fills required to level the wellsites should be less than about 15 feet each. In general, only near-surface conditions will affect the planned pipeline and wellsites.

Subsurface conditions along the pipeline alignment and at the wellsites were evaluated by reviewing geologic maps and by surficial mapping an observation of rock outcroppings and exposures. Figure 3 summarizes the information developed from the geologic maps. Subsurface conditions at the Nehalem River crossing were explored by drilling 2 borings to depths of 40½ and 50½ feet. Borings were not drilled in the hilly portions of the alignment.

6.3.2.1 Alluvium

The Nehalem River valley floodplain is occupied by a thin layer of young alluvium comprised of silty sand over gravels. The alluvium was explored in only 2 locations, and could vary widely throughout the study area. At the river crossing locations the upper silty sand is loose to very loose and has moisture contents between 32 and 50 percent. The gravel is also loose, with rounded particles and lenses of silt. The alluvial soils will probably not stand vertical in trench excavations, requiring shoring or relatively flat side slope inclinations.

6.3.2.2 Colluvium/Weathered Soils

The hillside areas on both sides of the Nehalem River valley are mantled by silty and clayey native soils derived from weathering of the underlying sedimentary rocks. Some of these materials are exposed in shallow road cuts in the Calvin Creek area and along the Miller Station access road. We do not expect that hard rock or oversized materials (boulders) will be encountered during trenching of the surface soils. Although not specifically explored for this investigation, we expect that natural soils will be very wet. Firm natural soils should stand vertical in shallow excavations, although specific trench slope stability should be evaluated during construction. The native soils are not suitable for use as pipe bedding or shading soils.

6.3.2.3 Keasey Formation

The alluvium and weathered soil deposits are underlain by the Keasey Formation, a relatively thick unit comprised of gray claystone and mudstone derived from volcanic ash transported from the ancestral Cascade Volcanoes. The Keasey Formation materials can be considered either a soft rock or a very hard soil. The deposit is generally massive, with no open joints and few thin shear planes. The moisture content of this material is generally between 22 and 25 percent, with a dry density of approximately 110 lbs/ft³. The Plasticity Index of a sample from 30 feet deep was found to be 108 percent, classifying that portion of the deposit as a highly plastic clay.

6.3.3 Groundwater

Groundwater along the pipeline alignment will probably consist of isolated seeps and springs in the sloping segments and near-surface groundwater in the alluvium perched on top of the Keasey claystone. Groundwater seeps should be generally seasonal in nature, so dry-season construction will require less effort to maintain dry and stable trenches. Perched seeps and springs encountered by the trench excavations can probably be controlled with conventional sump-and-pump methods.

Groundwater at the wellsites will probably be encountered as scattered seeps which emanate from cut slope faces. If not controlled diligently, groundwater of this type can seriously degrade the slope integrity and soften the wellsite pad. Cut slope seeps can probably be controlled by providing a swale at the toe of the cut slope which diverts the water around the pad. Slope face erosion can usually be controlled by excavating a shallow (4-inch deep) drainage channel and filling it with crushed rock.

Groundwater in the valley floor will probably be slightly higher than the Nehalem River level. Groundwater was observed standing at grade in the lower portions of the planned alignment at the time of our field reconnaissance. For planning purposes, we recommend that the groundwater level be considered equal to the ground surface until additional data is available regarding seasonal variation. Seasonal changes in rainfall and river level may result in significant changes in groundwater level, possibly as much as 6 or 8 feet, which could make trenching across the valley floor much less difficult.

6.3.4 Geologic Hazards

The weak and plastic claystones of the Keasey Formation and the other sedimentary deposits are highly susceptible to landslides. Figure 3a shows the landslides which were identified through review of stereoscopic aerial photographs and confirmed through field reconnaissance. Figure 3b shows a more detailed view of the cluster of landslides which are close to the planned pipeline alignment.

The most significant group of landslides are located in the south valley side where the meandering Nehalem River flows very close to the toe of the slope. The landslides probably formed as erosion at the toe of the slope caused localized over steepening, exceeding the strength of the weak sedimentary deposits. The other landslides shown on Figure 3a all appear to have streams or creeks near the toe. Due to continuing erosion at the toe, all of the landslides should be considered active and capable of significant displacement during the design life of the planned pipeline.

There are no active faults reported crossing the planned pipeline alignment or underlying the planned wellsites. Consequently, the potential for fault displacement affecting the planned pipeline is nil.

7.0 MILLER STATION RECOMMENDATIONS

The following sections provide our preliminary recommendations for earthwork at the Miller Station site and design and construction of the planned equipment foundations. Specific information regarding equipment foundation types and loads was provided by KTI/Fish in a memorandum dated January 14, 1997. Dames & Moore should review the earthwork and foundation drawings prior to construction to confirm that the recommendations provided herein are adequate for the final planned construction.

7.1 EARTHWORK

We understand that earthwork at Miller Station will be limited to the minimum amount necessary to provide adequate foundation support at the planned foundation grades. Significant cuts and fills are not expected. The following paragraphs provide recommendations for treatment of surface soils and existing fills, excavation, and fill placement and compaction.

7.1.1 Clearing and Grubbing

Prior to grading, the site should be cleared of surface obstructions and stripped of debris, brush, vegetation, stumps, and trees. Most of the planned equipment locations are currently covered with 4 to 12 inches of compacted crushed rock, which may be stripped and stockpile for later re-use. Materials generated from other clearing operations should be removed from the site and disposed of in an approved landfill.

7.1.2 Excavation

Excavation can be accomplished with conventional heavy earthmoving equipment in proper working condition. Hard rock or oversize material were not encountered in any of the borings.

Due to the high moisture content and sensitive nature of the near-surface soils, we suggest that excavations be accomplished with smooth bucket tracked excavators. Excavation with dozers and/or scrapers may cause significant subgrade disturbance and very muddy site conditions.

7.1.3 Fill Placement and Compaction

We recommend that all structural fill be placed in uniform, horizontal lifts and compacted to at least 95 percent of maximum density as established in accordance with ASTM Test Method D1557 (modified Proctor). All fill materials should be compacted at a moisture content near optimum. The optimum lift thickness will vary depending on the compaction equipment used, but should generally not exceed about 8 inches in loose thickness. Thicker lifts may be acceptable for clean granular soils and heavy, vibratory compaction equipment.

In unimproved areas, trench backfill above pipe shading may consist of non-structural fill placed with nominal compaction. Trench backfill beneath buildings, equipment foundations, and pavements should be compacted to at least 92 percent of maximum density as established in accordance with ASTM Test Method D1557.

Placement and compaction of all fill materials should be monitored and tested by a qualified soil technician under supervision of a geotechnical engineer. We recommend that all fill placement be tested in accordance with ASTM D2966 (Nuclear Density Method) to verify the density, degree of compaction, and moisture content of the fill. Furthermore, it is suggested that the specifications for this project call for frequent testing on each lift. In the event where any portion of the fill fails to meet the compaction requirements, the area should be reworked, recompacted, and retested until the specified compaction is achieved.

7.1.4 Fill Suitability

The native soils are not suitable for use as structural fill except under very favorable conditions, and then only with significant drying efforts. Based on the moisture content test results, the in-situ moisture of the native soils is at least 10 to 15 percent above optimum. Drying the excavated materials back to a moisture content near optimum will require a large area for spreading and plowing, as well as prolonged periods of dry weather. Due to this difficulty, we recommend that all structural fill consist of imported granular soils.

Imported structural fill should consist of sand or crushed rock free of trash, roots, debris, vegetation, or other deleterious materials. Fill to be placed during periods of wet weather should contain less than 5 percent passing the No. 200 sieve. Base rock materials should consist of angular, durable material with a maximum particle size of $1\frac{1}{2}$ inches and no more than 10 percent by weight finer than the No. 200 sieve. Material proposed as crushed rock should be tested and approved by a qualified geotechnical engineer prior to importation to the site.

7.1.5 Slope Inclinations

We recommend that all permanent cut and fill slopes be laid back at an inclination no steeper than 2:1 (horizontal to vertical). Steeper excavation inclinations may be possible in competent soils with erosion-resistant vegetation or significant surface water handling provisions. Additional recommendations for slopes steeper than 2:1 can be provided when the site grading plans are confirmed.

We understand that temporary excavations approximately 2 to 4 feet deep are required for foundation construction and up to 6 or 8 feet for pipe installation. Excavations of this depth which penetrate competent native soils should stand vertical. We recommend that excavations deeper than 5 feet be laid back at an inclination no steeper than 1:1 unless the excavation stability is evaluated specifically by a Dames & Moore engineer. All excavations should comply with Occupational Safety and Health Administration (OSHA) standards. The contractor should be responsible for maintaining stable excavation slopes at all times.

Groundwater is not expected to affect the foundation excavations. Surface water which flows into foundation excavations should be collected in sumps and removed. Standing surface water will adversely affect the stability of adjacent slopes as well as the stiffness of the excavation subgrades.

7.1.6 Subgrade Preparation

We recommend that subgrades which will receive structural fill be excavated to neat grades and proof rolled with a loaded dump or water truck prior to placing the first lift of fill. Proof rolling should be monitored by a Dames & Moore engineer.

Soft areas identified by proof rolling should be excavated to firm subgrade conditions and filled back to grade in accordance with Section 7.1.3. Deep soft pockets are possible in the weathered soil and rock strata present at the Miller Station site. We suggest that overexcavation and replacement be limited to a maximum depth of 24 inches. A layer of woven geotextile (Mirafi 500X or similar) should be placed on the excavated surface before backfilling. Very deep soft conditions should be evaluated on a case-by-case basis by a Dames & Moore engineer.

Proof rolling may not be possible during wet weather conditions. Alternative subgrade evaluation procedures will be necessary depending of the specific soil and water conditions present at the time of construction.

7.1.7 Subgrade Protection

Subgrade protection measures will be required for all surfaces supporting construction traffic, including storage and laydown areas. We suggest that subgrade protection consist of compacted crushed rock or bar run gravel placed in layers and compacted. For planning purposes, we recommend the following protection sections:

TABLE 7-1 SUBGRADE PROTECTION THICKNESS

Traffic Loading	Crushed Rock Thickness (inches)	Bar Run Gravel Phickness (inches)	
Frequent Heavy Trucks	12	18	
Infrequent Trucks or	6	10	
Frequent Light Vehicles	0		
Infrequent Light Vehicles	4	6	

The bar run sections are thicker because round rock does not provide the same level of protection as angular crushed rock. We recommend that heavily-traveled roadways be underlain by a woven geotextile fabric (Mirafi 500X or similar).

Crushed rock should consist of sound, durable material with at least 2 fresh faces on each particle larger than ½-inch. Crushed rock should have a maximum particle size of 2 inches and should be relatively well graded down to a minimum size of a No. 40 sieve. Crushed rock used for subgrade protection should have less than 5 percent by weight passing the No. 200 sieve.

We understand that mat foundation areas will be excavated to a depth of approximately 2 to 4 feet. The excavation subgrade will likely consist of native silts or clays, which will provide a marginal travel surface for equipment and foot traffic. A concrete mud mat or rock protection layer should be provided for mat foundation subgrades if they will be exposed to prolonged foot or equipment traffic.

Trafficability will depend highly on the composition of the subgrade materials and the weather during construction. We recommend that specific subgrade protection measures be selected during construction in response to the subgrade materials exposed, the moisture conditions, and the frequency and intensity of traffic loading. We recommend that an experienced Dames & Moore

engineer assist with selecting and constructing subgrade protection measures for the first part of the construction period.

7.1.8 Dewatering

Dewatering of excavations is currently not anticipated, except in localized areas if the excavation encounters perched groundwater. Localized dewatering can be accomplished by pumping from sumps approximately 1-foot deeper than excavation grades. Sump locations should be determined during construction.

7.1.9 Fill-induced Settlement

The weight of new fill placed above existing site grades will induce settlement of the upper compressible clays. Fill loads will likely induce more settlement than foundation loads, but should also be relatively broad and may not significantly affect isolated equipment or facilities. It is important to consider fill-induced settlement as differential settlements between areas which receive differential fill heights or for equipment such as pipe racks which extend beyond the fill boundaries.

Our analysis of fill-induced settlement is based on an assumed fill density (total unit weight) of 125 pounds per cubic foot. Figure 4 shows the estimated total settlement caused by fill placement. The increase in slope at 4 feet (500 lb/ft²) is caused by the transition from overconsolidated to normally consolidated behavior.

The rate of settlement will be controlled by the rate at which water can escape from the pore spaces of the compressing clay deposits. The results of the consolidation tests indicates that this settlement rate will vary significantly with changes in vertical stress and with changes in material type. Based on our understanding of possible fill heights, it appears that the new vertical stress will remain within the overconsolidated range. Consequently, we expect that most of the settlement will occur during construction and within 1 to 3 months thereafter.

7.1.10 Pavement

At present, we do not expect that new asphaltic concrete pavements will be constructed. Gravel travel surfaces should be constructed as discussed in Section 7.1.7 above. However, if paved roadways are necessary, we recommend that the pavement section consist of at least 3 inches of asphaltic cement concrete over at least 8 to 12 inches of compacted aggregate base. Table 7-2 summarizes the recommended gradation for aggregate base. The actual pavement section thicknesses should be determined when the traffic loads are known.

TABLE 7-2
RECOMMENDED AGGREGATE BASE GRADATION

Sieve Size	Percentage Passing
1"	. 100
3/4"	90 - 100
1/2"	40 - 100
No. 4	25 - 40
No. 8	18 - 33
No. 30	5 - 15
No. 50	0 - 7
No. 200	0 - 3

7.2 FOUNDATION SUPPORT

We recommend that the planned equipment and structures be supported by conventional shallow foundations bearing in undisturbed native soils or in compacted structural fill. We recommend a minimum penetration depth of 24 inches to reduce the potential for frost-related foundation movement. Design of shallow foundations should consider both bearing capacity and settlement effects, as discussed in the following sections.

7.2.1 Bearing Capacity

We recommend that foundations be proportioned using a net allowable bearing capacity of 2,500 lb/ft². This value is appropriate for use when considering dead plus frequently applied live loads, and may be increased by one-third when considering transient loads such as wind and seismic forces. Foundation more than 2 to 3 feet wide will probably experience excessive settlement under the recommended design bearing pressure. The design bearing pressure should be reduced to achieve acceptable settlement magnitudes, as discussed in Section 7.2.3

The net foundation bearing pressure is calculated by subtracting the weight of excavated soil from the foundation bearing pressure. We recommend that a unit weight of 125 lb/ft³ be used to calculate the pressure reduction due to foundation excavation.

We recommend that any foundation larger than 18 feet in least plan dimension and/or with a net (compensated) bearing pressure less than 1500 lb/ft² be designed as a mat using the recommendations in Section 7.2.3.

All shallow foundations should bear on a prepared surface consisting of undisturbed native soils or compact crushed rock. Loose materials and soils disturbed by foundation excavation should be removed or compacted in place prior to placing reinforcing steel and concrete. A 3-inch thick layer of crushed rock is typically adequate to protect the subgrade soils from disturbance by foot traffic while placing reinforcing steel.

We do not expect that foundation excavations will encounter significant amounts of groundwater, except possibly during extended periods of wet weather. Any water in the excavations must be removed prior to placing concrete.

We recommend that an experienced geotechnical engineer observe all foundation excavations prior to placing reinforcing steel. The purpose of geotechnical monitoring is to confirm that adequate bearing surfaces are achieved and that foundation conditions are as anticipated in the recommendations presented in this report.

7.2.2 Lateral Resistance

We recommend that shallow foundations be designed to resist lateral loads using a friction coefficient of 0.35 and a passive earth pressure of 300 pounds per square foot per foot of depth. These values do not include a safety factor; we recommend a safety factor of 3 for dead loads plus frequently applied live loads and a safety factor of 2 when considering transitory loads such as wind and seismic forces. The friction and passive earth pressure components can be combined provided that passive earth pressures do not exceed two-thirds of the total lateral resistance. The top 1-foot of soil should be neglected when calculating passive lateral earth pressures unless the foundation area is covered with pavement or is inside a building.

7.2.3 Foundation Settlement

Settlement considerations, rather than bearing capacity, generally control foundation selection and shallow foundation design. The upper clays are overconsolidated, so minor stress increases will result in small settlement while high foundation pressures will cause disproportionately larger settlements. The effect of shallow foundation loads can be minimized by reducing the bearing pressures.

Shallow foundations designed in accordance with the recommendations presented in Section 7.2.1 above are expected to settle depending on the applied net load, the applied net bearing pressure, and the depth of embedment. Figure 5 shows the magnitude of anticipated long-term foundation settlement for square foundations with an embedment depth of 24 inches. Strip footings are expected to settle approximately 10 to 15 percent more than the value shown on Figure 5 for a square of the same width. Compute the foundation load for this analysis as the line load multiplied by the strip footing width. Settlement due to placement of fill soils (Section 7.1.6) must also be considered when evaluating total settlement of shallow foundations.

The rate of settlement of shallow foundations will vary depending on the on the effective stress increase within the clay soils. Based on the relatively light foundation loads and the small expected settlement magnitudes, we expect that most settlement will occur during construction.

7.2.4 Differential Settlement

Differential settlement between shallow foundations are generally caused by two separate factors:

- 1. Variations in soil profile, including layer thickness and compressibility characteristics.
- Variations in applied load, bearing pressure, foundation dimension, and foundation stiffness.

Although the soil profile at the Miller Station site is relatively uniform, differential settlement should still be anticipated. Based on our experience, variations in soil profile can cause a differential settlement equal to 25 percent of the total anticipated settlement over a distance of 100 feet for identical loading conditions. Differential settlement should be calculated based on this criteria and the expected total settlements shown on Figure 5.

For the second cause of differential settlement, it is important to consider both bearing pressure and foundation size when calculating differential settlement between nearby foundations. Large foundations will experience greater settlement than small for identical bearing pressures.

Flexible foundation systems such as large mats and tank foundations without internal stiffeners create their own differential bearing conditions due to the compliance of the soil/foundation system. For mats larger than 10 feet in least plan dimension without stiffening beams, we estimate that settlement at the edge of the loaded area should be about one-half that near the center of the loaded area.

7.3 LATERAL EARTH PRESSURES

Table 7-3 provides the recommended earth pressure coefficients and other soil properties for use in designing sumps, open trenches, retaining walls, and other buried facilities. These values are appropriate for existing native soils and most sand and clayey sand backfill soils, assuming backfill compaction as recommended in Section 7.1.3. The values presented in Table 7-3 do not include safety factors. We recommend that the resisting elements of retaining systems be designed using the safety factors shown in Table 7-4.

TABLE 7-3
RECOMMENDED LATERAL EARTH PRESSURE COEFFICIENTS

Parameter	Value
Active Earth Pressure Coefficient K.	0.4
Passive Earth Pressure Coefficient K _p	2.5
At-Rest Earth Pressure Coefficient K _o	0.5
Internal Friction Angle	25°
Total Unit Weight	115 lb/ft³
Effective Unit Weight	53 lb/ft³
Concrete/Soil Friction Coefficient	0.35

TABLE 7-4
RECOMMENDED RETAINING SYSTEM SAFETY FACTORS

Failure Mode	Minimum Safety Factor	
Sliding	1.5	
Overturning	2.0	
Bearing Failure at Toe	3.0	
(Dead plus Operating Loads)		
Bearing Failure at Toe	2.0	
(Including Transient Loads)	2.0	

7.4 MAT FOUNDATIONS

7.4.1 Short-Term Loading

The appropriate modulus for use in design of shallow mat foundations depends on the mat dimensions, the duration and magnitude of the load, and the stiffness of the mat relative to the supporting soil. We recommend that mats supporting short-duration loads be designed using the subgrade reaction modulus relationship shown on Figure 6.

7.4.2 Long-Term Loading -

For long-term loading we recommend that mat foundation design include appropriate settlement magnitudes as shown on Figure 5. The long-term modulus of subgrade reaction can be estimated by dividing the net bearing pressure on the mat by the expected long-term settlement. Construction modification near the mat foundation area, including excavation or fill placement, will induce settlements which will change the subgrade reaction modulus value for the mat. A Dames & Moore engineer should confirm the modulus value used in areas which may be susceptible to settlement from nearby fill placement.

7.5 SEISMIC DESIGN PARAMETERS

We understand that lateral seismic design of the facility will be performed using conventional Uniform Building Code (UBC) equivalent static load methods. The EFSC permit governing this project requires that the facility be designed to avoid seismic hazards affecting the site, including ground shaking and amplification. Consequently, a site-specific seismicity and dynamic response evaluation is necessary to confirm that the simple UBC design method is appropriate. This study is currently in progress.

Based on the site location and the soil conditions revealed in the borings and CPT's, we do not expect any unusual seismic behavior. For planning purposes, we recommend that lateral earthquake loads be computed using standard UBC methods with a Zone Factor of 0.3 and a Site Coefficient of 1.2. Final seismic design recommendations will be provided in our forthcoming site response evaluation report.

7.6 DYNAMIC LOADING CONSIDERATIONS

We understand that soil-structure interaction analyses will be performed by KTI/Fish to confirm that vibration of dynamically-loaded foundations do not exceed tolerable limits. Based on our understanding of the planned construction, the compressors are the only equipment with dynamic

loads. The specific loads and structural configuration of the compressor is not known at this time, but will likely be supported by a concrete mat supported at grade. The thickness of the mat will depend on the loading and settlement tolerance of the compressor. Additional recommendations for design of the compressor foundation against resonance and rocking can be provided when the equipment loads are determined.

8.0 PIPELINE ALIGNMENT RECOMMENDATIONS

8.1 GEOLOGIC HAZARDS

The principal geologic hazards affecting the planned pipeline alignment are landslides and surficial slope failures. High groundwater and loose surficial soils will be encountered in the low-lying portions of the alignment, and can be controlled using conventional soft-ground trenching methods. Faults and other geologic hazards, aside from landslides, do not pose a significant threat to the planned pipeline alignment.

Figures 3a and 3b show the results of our geologic hazard evaluation. As shown, hillsides throughout the Mist area are affected by landslides and surficial slope failures. Stereoscopic aerial photographs of the site area indicate the presence of several ancient landslides on both sides of the Nehalem Valley. The geologic reconnaissance confirmed the presence of the major landslide features and revealed clusters of shallow slope failures. Hummocky terrain and the presence of seeps and springs were the primary indicators of shallow instability.

Based on the results of the geologic reconnaissance, Dames & Moore engineers met with NNG to suggest modifying the initial pipeline alignment to avoid the unstable ground on the south side of the Nehalem Valley. Figures 3a and 3b show the revised alignment.

8.2 TRENCHING

The following sections provide recommendations for excavation, groundwater control, and backfilling of the planned pipeline. Directional drilling for the river crossing is discussed in Section 8.3.

8.2.1 Excavation

None of the borings drilled for this study encountered hard rock or significant oversize materials within the depth of the planned trench excavations. Consequently, we expect that pipeline trenches can be excavated with conventional heavy earthmoving equipment in proper working condition.

Steep slopes in portions of the alignment may slow the excavation, but we expect that trackmounted excavators should be able to work on the slopes.

8.2.2 Groundwater

Two hand-auger borings drilled between the Highway 202 and the north side of the valley encountered soft clayey alluvium and groundwater at a depth of 3 to 3½ feet. The hand augers were drilled on the highest ground along this portion of the alignment because the lower ground was flooded.

We expect that very soft ground and high groundwater will be encountered along the entire length of the valley floor crossing. Excavations up to 6 feet deep will probably require side slope inclinations as flat as 1:1. We expect that the pipes will have to be flooded to overcome buoyancy in the flooded trenches.

Groundwater conditions in the valley floor can vary widely between wet and dry seasons. We suggest that the groundwater conditions be checked immediately prior to construction. It is possible that the low-lying trench segments may be dry if the excavation is made near the end of the dry season.

8.2.3 Subgrade Stabilization

The soft alluvial soils in the valley bottom will probably provide very poor support for the planned pipe. Although the loads on the planned pipes will be relatively low and the welded steel pipe is only moderately sensitive to settlement, we recommend that very soft subgrades be stabilized prior to placing bedding and pipe. Subgrade stabilization is generally warranted when workers are not able to walk on the subgrade while spreading bedding sand.

We recommend that soft subgrade stabilization consist of 3-inch or 2-inch ballast rock placed in a single lift at least 8 inches thick. The stabilization rock should be placed immediately after excavating the trench. Stabilization rock should not be compacted, and the bedding sand should be compacted in a single lift to reduce the amount of vibration in the soft native soils.

There are several other methods of subgrade stabilization, each appropriate for different subgrade materials, groundwater conditions, and excavation widths. A Dames & Moore engineer should monitor subgrade stabilization efforts and should provide additional recommendations where increased efficiency could be achieved.

8.2.4 Backfill

We recommend that the pipes be constructed using standard NNG bedding and shading details. None of the materials encountered in the borings are suitable for use as bedding or shading. We expect that imported sand will be required for all bedding and shading.

Almost all of the soils which will be encountered in the trench excavations will be clayey and significantly above optimum moisture content. We expect that native soils will be suitable for general backfill in non-structural areas, but that imported granular fill will be required for trenches which cross under roads or yard areas. Additional backfill recommendations for the road crossing are provided in Section 8.4.

8.2.5 Bedding Drainage

The granular bedding and shading materials will convey water more easily than the low-permeability native soils. Significant hydraulic head can develop at the toe of sloping sections of the pipe, where water can be impounded in the bedding soils. We recommend that drainage be provided at the toe of all sloping sections longer than about 100 feet and steeper than about 5 percent.

Conventional sandbags and crushed rock used by NNG in similar situations should be adequate for most of the sloping sections. However, the south side of the Nehalem River Valley is very wet and is affected by springs and seeps. If the sandbag drainage is not adequate, we recommend that a perforated drainage pipe surrounded by filter fabric be installed in the bedding. Generally, a length of 25 feet is adequate. The end of the perforated drainage pipe should be connected to a non-perforated outlet pipe which drains into a suitable area.

8.3 RIVER CROSSING

Directional drilling is proposed for the Nehalem River crossing. We recommend that the specific drilling procedures be selected by the drilling contractor based on the subsurface information included in Appendices A and B of this report.

Based on our experience with directional drilling at river crossings, the planned Nehalem River crossing should be possible provided the soft upper soils and the intermediate silty gravels can be addressed. We expect that the following conditions will affect the planned directional drill:

1. The upper 8 to 9 feet of soil at both river banks is comprised of loose silty sand with a high water table. We expect that this material will not be self-supporting and that casing will be required.

- 2. Loose, silty gravel was encountered beneath the sandy alluvium extending 15 to 22 feet below present grades. This material is saturated and the particles are rounded, so this deposit will not stand in an uncased boring. Lenses of this deposit are opengraded, so drilling fluid will probably not be effective.
- 3. Soft, massive claystone was encountered beneath the gravel deposits to the maximum depth explored. As shown on the boring logs, both core runs of this material had Rock Quality Designations (RQD) of 100. The unconfined compressive strength of this material ranges between 14 and 19.5 kips/ft². Atterberg limits and gradation analysis test results for this material are provided in Appendix B.

8.4 HIGHWAY 202 CROSSING

The planned pipeline alignment will cross under Highway 202 approximately half way between the north valley slope and the Nehalem River crossing. The roadway is elevated above the low-lying valley floor by an embankment approximately 3 to 4 feet high. The following sections provide recommendations for installing the pipe beneath the roadway.

8.4.1 Cut-and-Cover Trench

We expect that the preferred method of crossing will be a conventional cut-and-cover trench. The trench will be at least 10 feet deep, so shoring will be required to support the road. In addition, utilities in the roadway will require protection and support. Groundwater may be present in the excavation beneath the embankment soils, which will further reduce the excavation stability.

Due to the potentially unstable nature of the native alluvial soils at the bottom of the trench, we recommend that shoring have hydraulic jacks or screw braces to allow the shoring to apply an active force against the trench sidewalls. Passive shoring, such as a trench box, may allow too much displacement before being engaged on the soil. Excessive displacement will damage the pavement and any buried utilities.

Select granular materials should be used to backfill the trench beneath the roadway. The excavated native soils will not be suitable for use as backfill. We have no specific information regarding the existing embankment soils, so for planning purposes we recommend that these soils be considered unsuitable. The embankment soils may be stockpiled for re-use if they are found to be select granular materials.

Compaction of the backfill soils between the top of the pipe shading and the bottom of the replacement pavement section is essential to reducing the potential for settlement. We recommend

that all backfill in the roadway be compacted to at least 95 percent relative compaction as evaluated by ASTM Test Method D1557 (modified Proctor).

We recommend that the replacement pavement section match the existing section in thickness and materials. We recommend that the replacement asphalt consist of standard Class B hot-mix asphaltic concrete placed in uniform lifts and compacted to at least 92 percent of the theoretical maximum (Rice) density. Cold-patch asphalt is probably acceptable for temporary applications, but is not recommended for the final pavement restoration.

8.4.2 Pipe Jacking/Horizontal Drilling

It may be necessary to jack the pipe under the road, rather than dig a trench through the pavement and supporting embankment. Specific subsurface information was not collected at the Highway 202 road crossing, so we have little real data. However, for planning purposes, we recommend that the following issues be considered if jacking or drilling is selected.

- The native soils immediately beneath the roadway embankment are assumed to be very similar to the native soils in the pastures on either side of the road. High groundwater and loose soil will make directional drilling difficult without a full-length casing.
- 2. The soft alluvial soils and high groundwater will require shoring and dewatering for a jacking pit. Excavation bottom stability could also be a significant concern if the gravels are present within a few feet of the excavation base. Specific recommendations should be provided for jacking pit construction if this alternative is selected.
- The soft alluvial soils will provide poor reaction against pipe jacking forces. A large reaction block will be required, possibly extending below the groundwater table.

In view of the soft ground conditions, we expect that horizontal drilling with continuous casing is the better of the two alternative road crossing methods. We recommend that the drilling contractor be responsible for means and methods of making the crossing. Dames & Moore would be pleased to collect additional data at the crossing location if necessary.

9.0 WELLSITES

9.1 WELLSITE SELECTION

A Dames & Moore engineer worked with Mr. Todd Thomas of NNG to select preliminary wellsite locations. Figure 3a shows the wellsites identified during this field effort. The locations were selected based on the following criteria, in order of importance:

- The wellsite must be located reasonably close to a storage pool. Mr. Jack Meyer of NNG provided suggestions for general wellsite locations.
- The wellsite must be located on stable ground which will not creep or slide during the 50 year design life of the I/W wells.
- 3. The wellsite should be located on relatively flat ground to minimize the amount of earthwork required to provide a large flat area for the drilling equipment. Although the selected locations are considered the best available sites, there will be some large cuts and fills required due to the irregular topography of the general area and the large pads required for I/W well drilling.
- 4. The sites should have convenient access for drilling and service equipment. Almost all of the wellsites can be accessed by building short driveways from existing gravel roads

Based on our observations, none of the wellsite locations shown on Figure 3a are underlain by landslides or surficial slope failures. The site boundaries were field located to maximize the use of naturally level ground. Additional topographic information is necessary to confirm that the site boundaries make optimal use of the existing topography.

9.2 WELLSITE DESIGN AND CONSTRUCTION

The current wellsite layouts are considered adequate for planning and preliminary engineering. We recommend that topographic surveys be performed at all of the wellsites. The surveys should extend at least 100 feet beyond the uphill site boundaries and at least 50 feet on the downhill side so that cut and fill slopes can be designed.

We understand that the existing wellsites in the Mist area were designed in the field and built with limited quality control. This approach can result in durable finished pads at low cost, particularly

if fill heights are less than a few feet. Some of the cuts and fills required to level the planned 3-well pads for this project will be significantly higher than at the existing wellsites. The recommendations provided in this section are intended for use on the larger cuts and fills, where typical construction procedures may not result in a pad with a reliable 50-year design life.

9.2.1 Slope Inclinations

Table 9-1 summarizes the recommended steepest inclination for cut and fill slopes surrounding wellsites. A Dames & Moore geologist should monitor all cut slopes to confirm that adverse bedding conditions or pre-existing shear zones are not present. Flatter slope inclinations may be necessary if unfavorable bedding or shear zone conditions are encountered during excavation. Seepage from cut slope faces will reduce the stability of the slope and should be evaluated on a case-by-case basis.

TABLE 9-1 STEEPEST RECOMMENDED SLOPES INCLINATIONS

Slope Height Steepest Cut Slope Inclination (ft) Steepest Fill Slope Inclination (horizontal to vertical)		
0 - 5	1:1	1½:1
5 - 20	1½:1	2:1
20+	2:1	2:1

9.2.2 Clearing, Grubbing, and Stripping

The wellsites should be cleared of all debris, brush, vegetation, tree stumps, and primary root systems. Materials generated from clearing operations should be removed from the site. All slash piles from previous logging operations should be removed during clearing. Similarly, any depressions from toppled trees should be cleaned of accumulated organic soils and backfilled with compacted structural fill.

After clearing, the surface of the wellsites should be stripped to remove surface vegetation and organic topsoil. Soil containing more than about 2 percent organic content by weight should be considered organic and segregated for special handling. Required stripping depths should be evaluated by a Dames & Moore representative in the field at the time of grading. For planning purposes, we recommend that an average stripping depth of about 18 inches be assumed.

9.2.3 Fill Placement and Compaction

Wellsite grading may require up to 15 feet of fill to achieve the proposed elevations. Fill embankments of this thickness will be much more durable if constructed in a controlled manner with high-quality compaction. All fill should be placed in uniform, horizontal lifts and compacted to at least 92 percent relative compaction as evaluated by ASTM Test Method D1557. To achieve uniform compaction, we recommend that fill slopes be over-built and subsequently cut back to expose well-compacted fill.

All fill materials should be placed and compacted at a moisture content near optimum. The optimum lift thickness will vary depending on the compaction equipment used, but should generally not exceed about 8 to 10 inches in loose thickness.

The fill soils generated from cuts at the wellsites will probably be very wet of optimum, and it may not be possible to achieve 92 percent relative compaction. In this case, a Dames & Moore engineer should monitor wellsite grading operations and provide additional recommendations regarding blending, alternative acceptance criteria, and other non-standard earthwork procedures.

We recommend that prior to placing fill on slopes steeper than 5H:1V, the exposed existing slope surface be terraced with maximum 4-foot vertical and 10-foot horizontal benches. Further, we recommend that the toe of the benched fills be keyed at least 2 feet into competent soil. Toe keys should be at least 8 feet wide, or as recommended in the field by a Dames & Moore engineer.

Placement and compaction of all fill materials should be monitored and tested by a qualified soil technician under the supervision of a geotechnical engineer. We recommend that all fill placement be tested in accordance with ASTM D2966 (Nuclear Density Method) to verify the density, degree of compaction, and moisture content of the fill. Furthermore, it is suggested that the specifications for this project call for frequent testing on each lift. In the event where any portion of the fill fails to meet the compaction requirements, the area should be reworked, recompacted, and retested until the specified compaction is achieved.

9.2.4 Fill Suitability

Fill material should be free of trash, roots, debris, vegetation, or other deleterious materials. In general, fill should be free of rocks or hard lumps larger than 6 inches nominal diameter. Based on our observations and the results of our laboratory tests, the non-organic native soils on the site are generally suitable for use as compacted fill, provided the moisture content can be adjusted to near optimum during compaction.

Organic soils can be used as fill, but must be placed using special procedures in order to reduce the potential for failure of the wellsite. Organic soils will decompose over time and will allow significant settlement. Settlement near the wellheads is unacceptable, so organic soils should not be placed within 25 feet of any well location. Similarly, settlement near the crest of the embankment will allow cracking, which will allow water infiltration and eventually lead to fill slope failure. In this view, organic soils should not be placed any closer than 5 feet to the finished pad surface and no closer than 10 feet from the finished slope face. Organic soils should be placed in uniform horizontal layers whenever practical to reduce the magnitude of differential settlement.

It is our experience that the native soils do exhibit slight shrinkage when compacted to the recommended relative compaction. We recommend a shrinkage factor of about 10 percent be used for calculating fill volumes generated from cut slopes.

Crushed rock used for access roads should consist of angular durable material with a maximum particle size of 1½ inches and no more 10 percent by weight passing the No. 200 sieve. Select granular fill to be placed during periods of wet weather should contain less than 5 percent passing the No. 200 sieve. Material proposed as crushed rock should be tested and approved by a qualified geotechnical engineer prior to importation to the site.

9.2.5 Slope Protection

Fill slopes should be vegetated as soon as possible to reduce the likelihood of erosion and failure. Low berms should be constructed along the crest of all slopes to reduce the amount of water flowing down the slope face. Further, we recommend that positive drainage be established away from the slope crest. This can be accomplished utilizing a pad gradient of at least 2 percent at the top of the slope areas.

10.0 CLOSURE

Dames & Moore's services are performed, within the limitations imposed by the firm's clients, using the degree of care and skill ordinarily exercised under similar circumstances by reputable engineers and geologists practicing in this locality.

The findings in this report are believed to describe site conditions to the extent practical given the scope of the investigation. However, this investigation, like all such investigations, can directly explore subsurface conditions at only a few isolated locations within the site. Soil and geologic conditions can vary greatly from place to place, and different conditions may be found during subsequent investigations or project construction. Any such changed conditions should be brought promptly to Dames & Moore's attention for evaluation. Changes to the conclusions and recommendations, and to any designs based on them, may be needed if changed conditions are discovered.

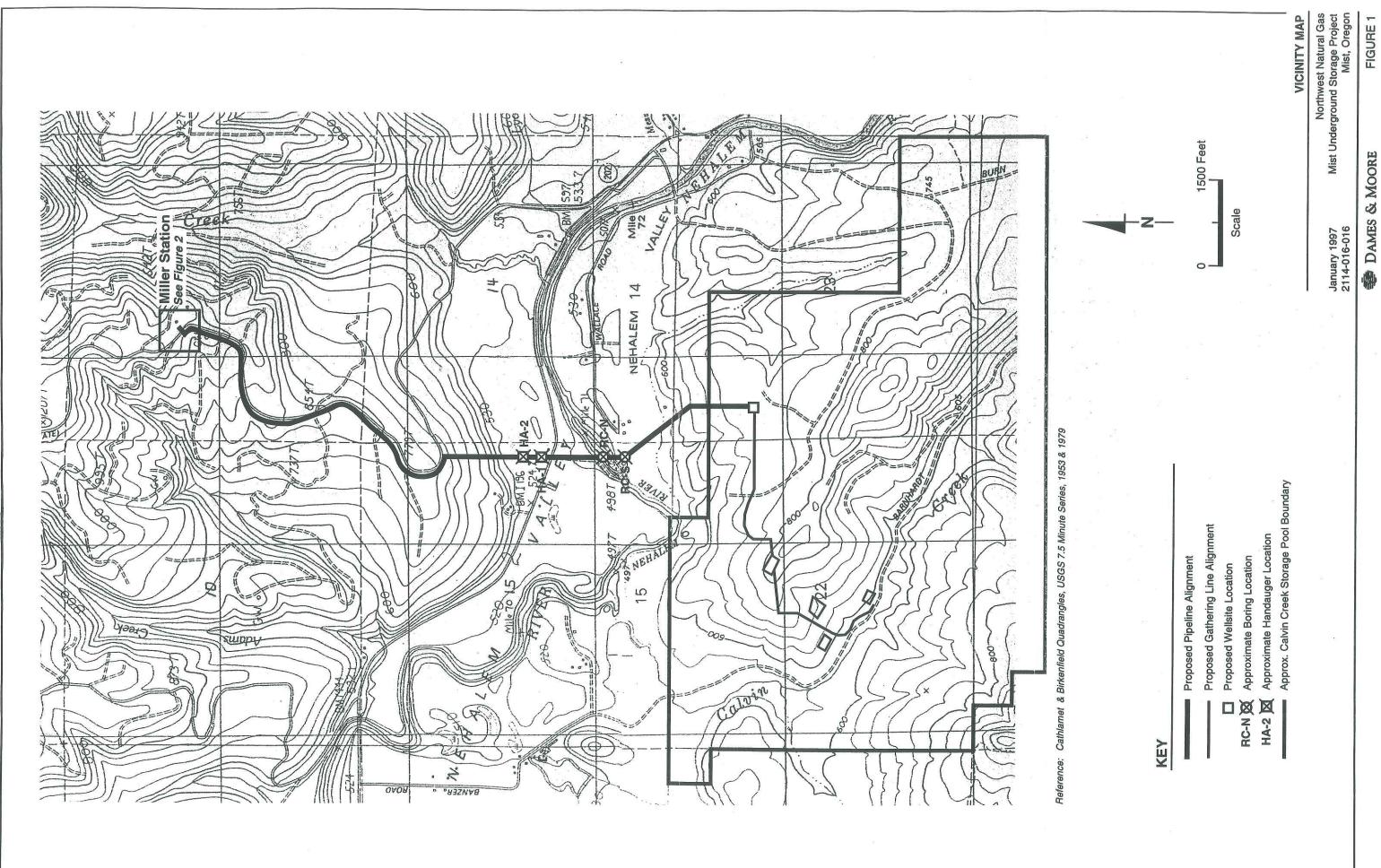
The conclusions and recommendations presented in this report were developed specifically for this project and do not necessarily apply to any other site or project. If the nature of the planned construction changes significantly from that described in this report, Dames & Moore should be contacted to confirm the validity of these conclusions and recommendations.

The condition of a site can change with the passage of time, due either to natural processes or to the works of man on this or adjacent properties. In addition, changes to the applicable laws, regulations, codes and standards of practice may occur because of governmental action and the broadening of knowledge. The findings of this report may be invalidated wholly or in part by such changes, over which Dames & Moore has no control. If more than two years have passed since the date of issue for this report, the report should be reviewed by Dames & Moore to check the validity of the conclusions in light of possible changes.

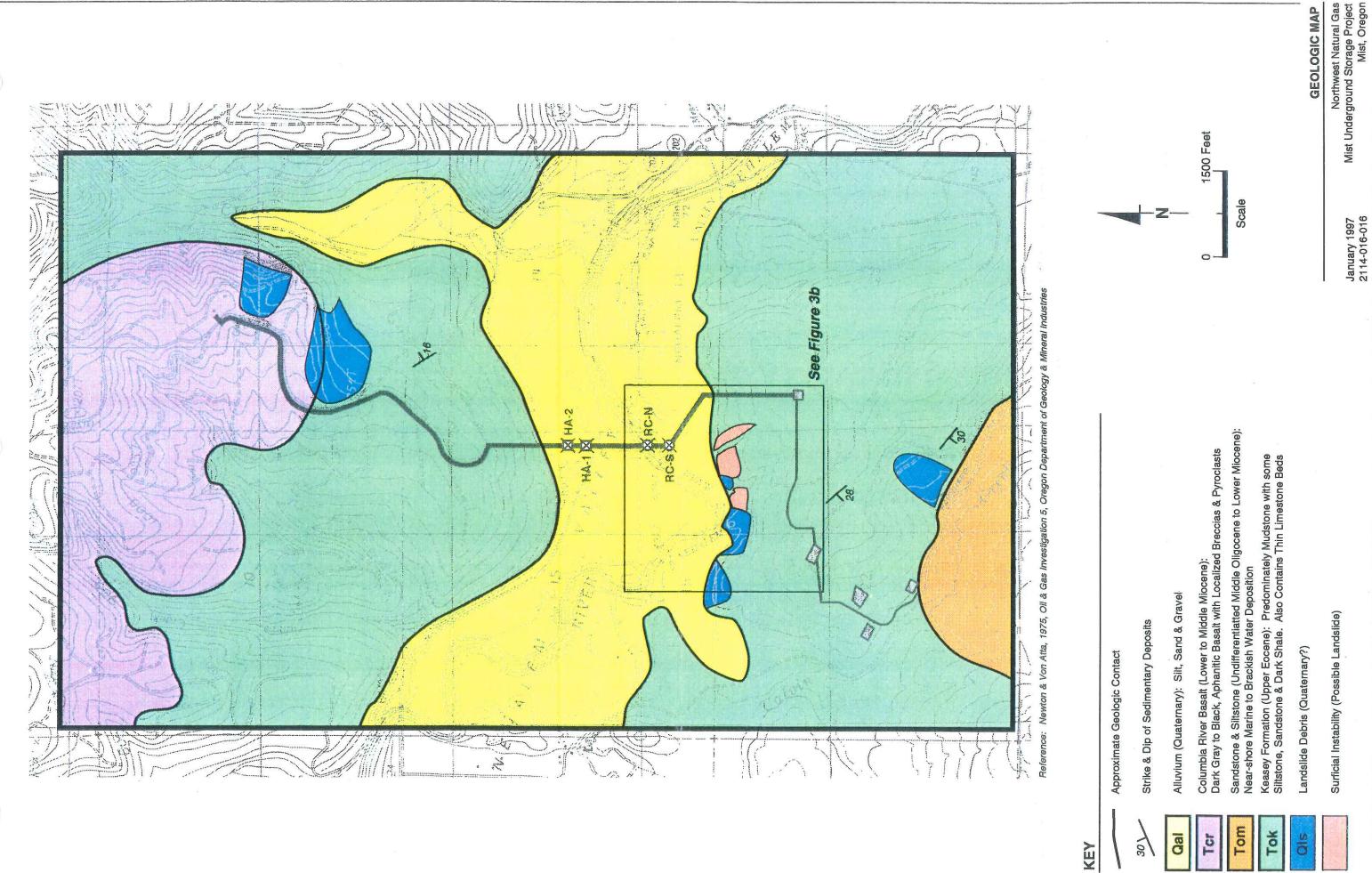
The following appendices are attached and complete this report:

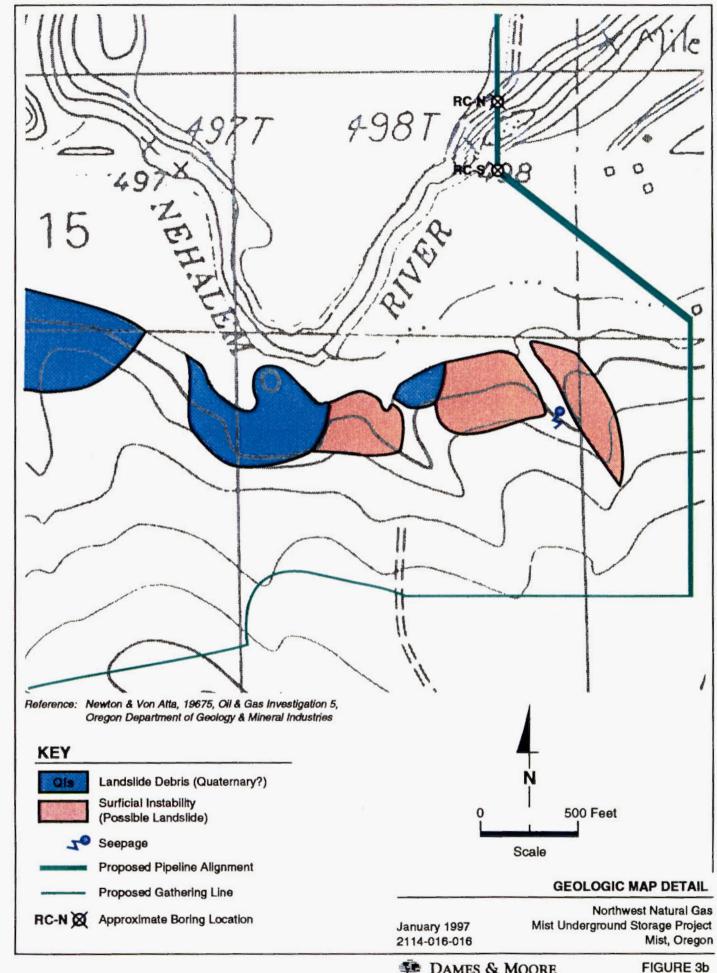
Appendix A - Subsurface Investigation

Appendix B - Laboratory Test Results



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Fill Induced Settlement Magnitude 0.0 0.5 1.0 1.5 Settlement (in) 2.0 2.5 Fill is assumed to be compacted sand or rock with a unit weight of 125 lb/ft^3 3.0 3.5 4.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10,0 Fill Height (ft)

Figure 4

Figure 5
Estimated Foundation Settlement

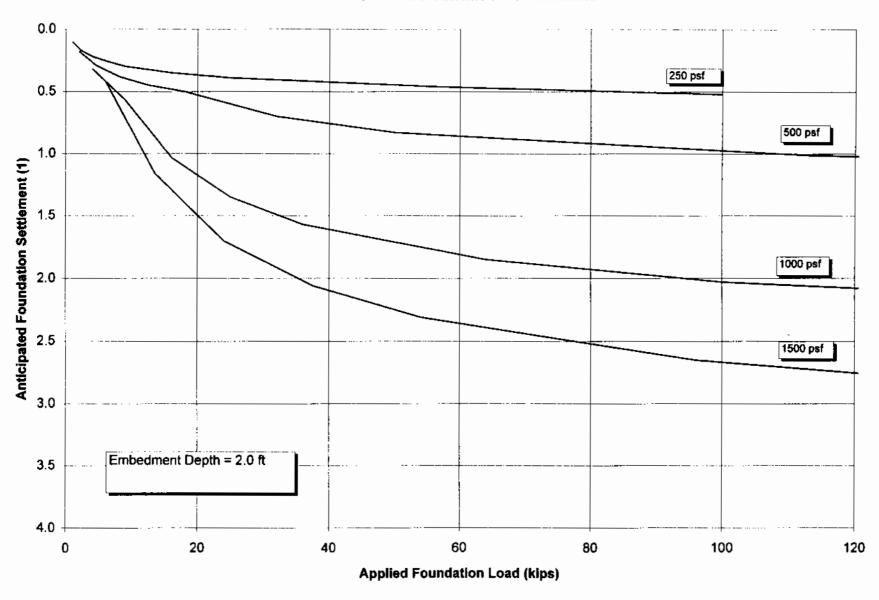
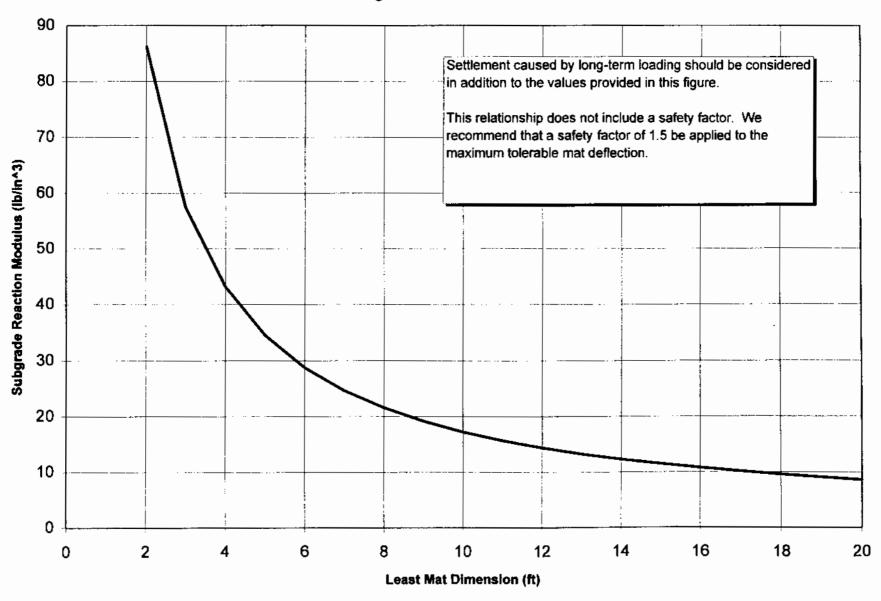


Figure 6
Subgrade Reaction Modulus



APPENDIX A

APPENDIX A SUBSURFACE INVESTIGATION

Subsurface exploration of the Miller Station site consisted of drilling, logging, and sampling ten borings to a maximum depth of approximately 51.5 feet. Eight of the ten Miller Station borings were drilled by a truck mounted CME55 drilling rig using hollow stem auger methods. Two borings at the river crossing and the remaining two Miller Station borings were drilled using a CME 45 drill rig mounted on a custom tracked carrier. The river crossing borings were drilled using mud rotary methods. Two hand-auger borings were drilled using a 3-inch diameter manual auger. These borings were drilled to check groundwater-conditions, so samples were not collected.

The borings were completed under the supervision of a Dames & Moore geotechnical engineer who classified the soils encountered, maintained a continuous boring log, and selected representative samples for geotechnical laboratory testing. Figures A-1 through A-14 provide graphical logs of conditions encountered in the borings.

Standard Penetration Tests (SPT) were performed at regular intervals in each boring in accordance with ASTM Test Method D1586. The SPT is performed by driving a 2-inch diameter split barrel sampler into the soil with a 140 lb hammer falling 30 inches. The number of blows required to drive the sample from a penetration of 6 to 18 inches is the SPT penetration resistance, "N". The initial 6 inches of the drive is not considered due to the potential for soil disturbance near the auger tip.

Relatively undisturbed samples were obtained by driving a Dames & Moore U-Type ring sampler with a 300 lb hammer falling 30 inches. The number of blows required to drive the hammer the last 12 inches of an 18-inch sampling interval is shown on the logs. Figure A-16 shows a schematic drawing of the sampler. It is important to note that the tracked drill rig does not carry a 300 lb hammer, so the U-Type sampler was driven with a 140 lb SPT hammer. The hammer weight for each boring is shown in the Key on the boring logs.

The auger borings were backfilled by mixing bentonite chips with auger cuttings and shoveling from the ground surface. The mud rotary boreholes were backfilled by mixing cement into the drilling mud to form a weak grout, which was then circulated through the hole prior to removing the drill rod.

A piezometer was installed in Boring RC-N after the boring was complete. The boring was backfilled to a depth of 20 feet, and a 2-inch diameter casing was lowered into the hole. The piezometer casing was field slotted over the bottom 10 feet and capped on the bottom. The piezometer is not locked or covered due to the remote nature of the site and the low potential for disturbance or tampering.

Two Cone Penetration Tests (CPT's) were performed near the center of the planned turbine area as a part of the seismicity and site response evaluation, which is currently in progress. The tests were performed to evaluate the shear wave velocity of the soil profile at Miller Station, but other data from the CPT's were used in settlement and strength analyses. Only one test had been planned, but CPT-1 encountered refusal due to excessive skin friction on the CPT rod. CPT-2 was performed using a bentonite-filled casing in the upper 10 feet. The friction reduction on the following rod allowed the CPT to penetrate to a depth of 65 feet, where it met abrupt cone refusal. The CPT logs and the shear wave velocity profiles are included at the end of this appendix.

NOTES:

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 300 pound harmer felling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.

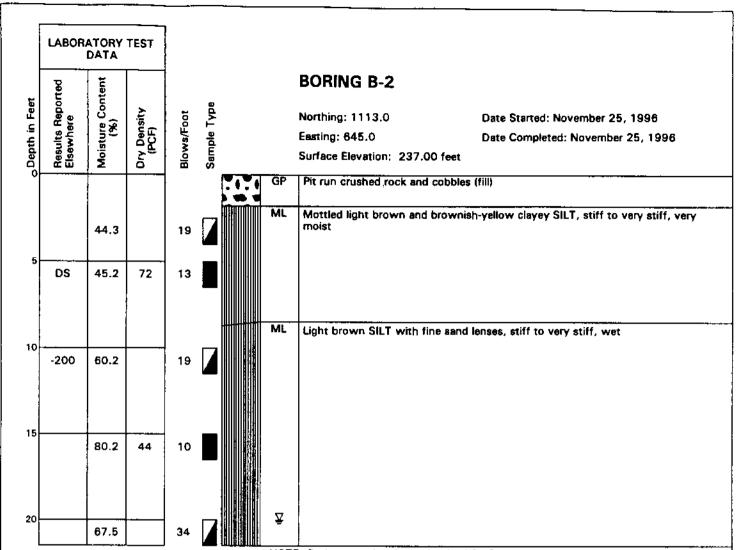
80.5

56

- Disturbed sample.
- ☐ Groundwater depth at time of drilling
- SA Sieve Analysis
 - -200 Fines Content Analysis
 - AL Atterberg Limits
 - UC Unconfined Compression
 - DS Direct Shear
 - C Consolidation

BORING LOG





NOTE: Boring completed at a depth of 21.5 feet on 11/25/96.
Groundwater encountered at a depth of 20.0 feet on 11/25/96.

KEY:

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 300 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- ☑ Groundwater depth at time of drilling

NOTES:

- SA Sieve Analysis
- -200 Fines Content Analysis
- AL Atterberg Limits
- UC Unconfined Compression
- DS Direct Shear
- C Consolidation

BORING LOG



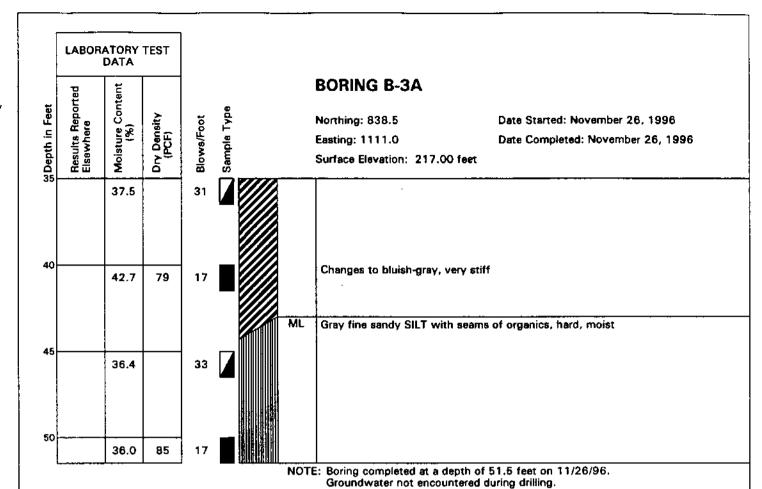
DS - Direct Shear

C - Consolidation

Rock Core sample.

Disturbed sample.

☑ Groundwater depth at time of drilling



Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 300 pound hammer falling

- Standard Penetration Test sample.
- Rock Core sample.

30 inches.

- Disturbed sample.
- ☑ Groundwater depth at time of drilling.

NOTES:

SA - Sieve Analysis

-200 - Fines Content Analysis

AL - Atterberg Limits

UC - Unconfined Compression

DS - Direct Shear C - Consolidation **BORING LOG**

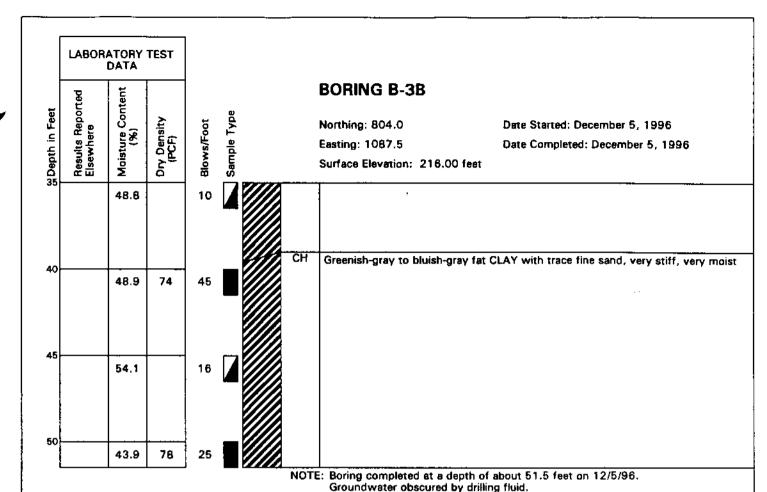


NOTES:

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- ☐ Groundwater depth at time of drilling
- SA Sieve Anatysis
 - -200 Fines Content Analysis
 - AL Atterberg Limits
 - UC Unconfined Compression
 - DS Direct Shear
 - C Consolidation

BORING LOG





NOTES:

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core semple.
- Disturbed sample.
- Groundwater depth at time of drilling
- SA Sieve Analysis
- -200 Fines Content Analysis
- AL Atterberg Limits
- UC Unconfined Compression
- **DS Direct Shear**
- C Consolidation

BORING LOG



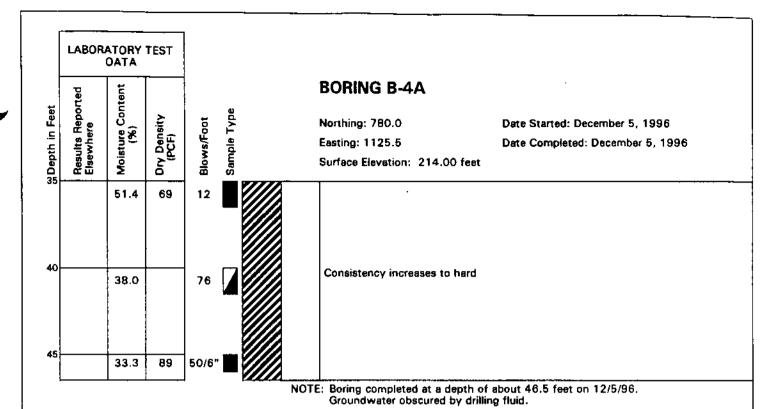
- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- $\overline{\underline{V}}$ Groundwater depth at time of drilling

NOTES:

- SA Sieve Analysis
- -200 Fines Content Analysis
- AL Atterberg Limits
- UC Unconfined Compression
- DS Direct Shear
- C Consolidation

BORING LOG





- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- $\overline{\underline{\mathbf{y}}}$ Groundwater depth at time of drilling

NOTES:

SA - Siava Analysis

-200 - Fines Content Analysis

AL - Atterberg Limits

UC - Unconfined Compression

DS - Direct Shear

C - Consolidation

BORING LOG



- Relatively undisturbed eample obtained with a Dames & Moore Type-U sampler driven with a 300 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- ☑ Groundwater depth at time of drilling

NOTES:

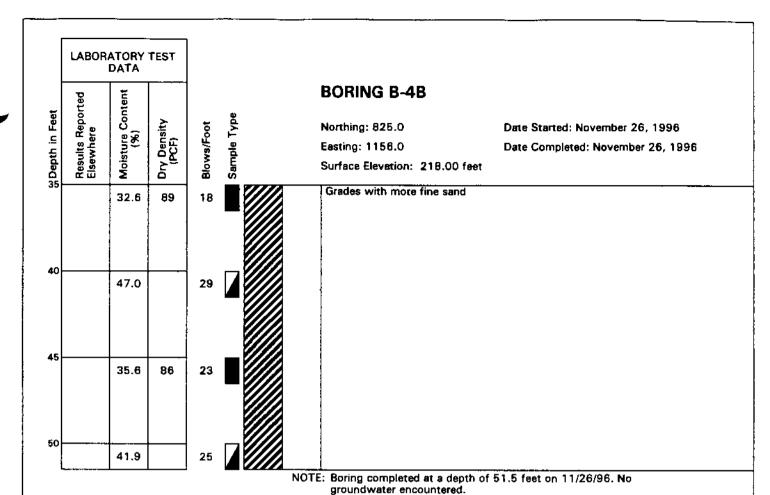
- SA Sieve Analysis
- -200 Fines Content Analysis
- AL Atterberg Limits
- UC Unconfined Compression
- DS Direct Shear
- C Consolidation





DAMES & MOORE

24, 1997



Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 300 pound hammer falling 30 inches.

Standard Penetration Test sample.

Rock Core semple.

Disturbed sample.

NOTES:

SA - Sieve Analysis

-200 - Fines Content Analysis

AL - Atterberg Limits

UC - Unconfined Compression

DS - Direct Shear

C - Consolidation





DAMES & MOORE

016MIST

NOTE: Boring completed at a depth of 31.5 feet on 12/3/96. No groundwater encountered.

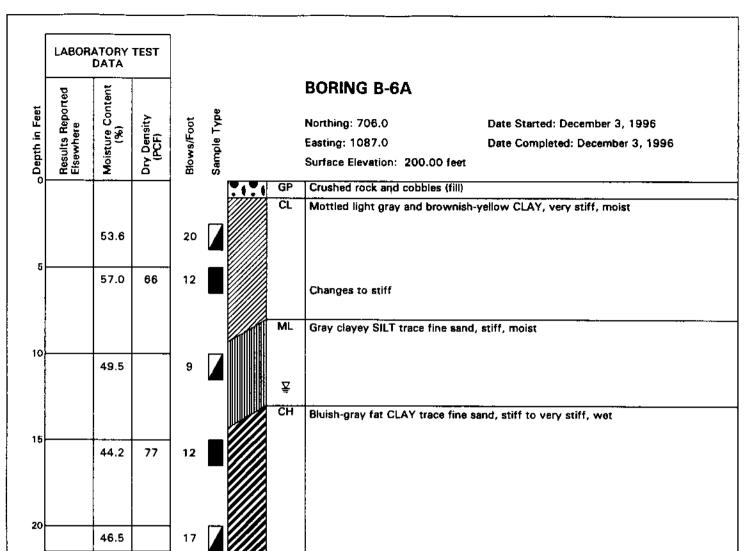
KEY:

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 300 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- Groundweter depth at time of drilling

- NOTES:
 - SA Sieve Analysis
 - -200 Fines Content Analysis
 - AL Atterberg Limits
 - **UC Unconfined Compression**
 - DS Direct Shear
 - C Consolidation

BORING LOG





NOTE: Boring completed at a depth of 21.5 feet on 12/3/96. Groundwater encountered at a depth of 12.0 feet on 12/3/96.

KEY:

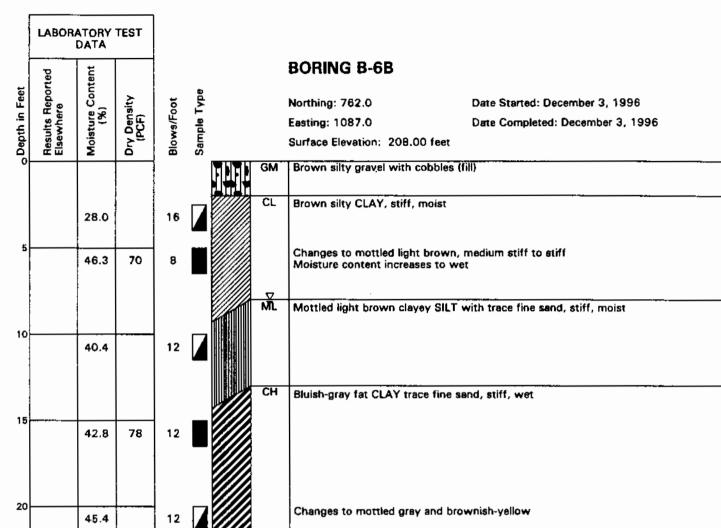
- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 300 pound hamner falling 30 inches.
- Stendard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- Groundwater depth at time of drilling

NOTES:

- SA Sieve Analysis
- -200 Fines Content Analysis
- AL Atterberg Limits
- UC Unconfined Compression
- DS Direct Shear
- C Consolidation

BORING LOG





NOTE: Boring completed at a depth of 21.5 feet on 12/3/96. Groundwater encountered at a depth of 8.0 feet on 12/3/96.

KEY:

January 24, 1997

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 300 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- Groundwater depth at time of drilling

NOTES:

- SA Sieve Analysis
- -200 Fines Content Analysis
- AL Atterberg Limits
- UC Unconfined Compression
- DS Direct Shear
- C Consolidation

BORING LOG



NOTE: Boring completed at a depth of about 31.5 feet on 11/25/96. No groundwater encountered.

KEY:

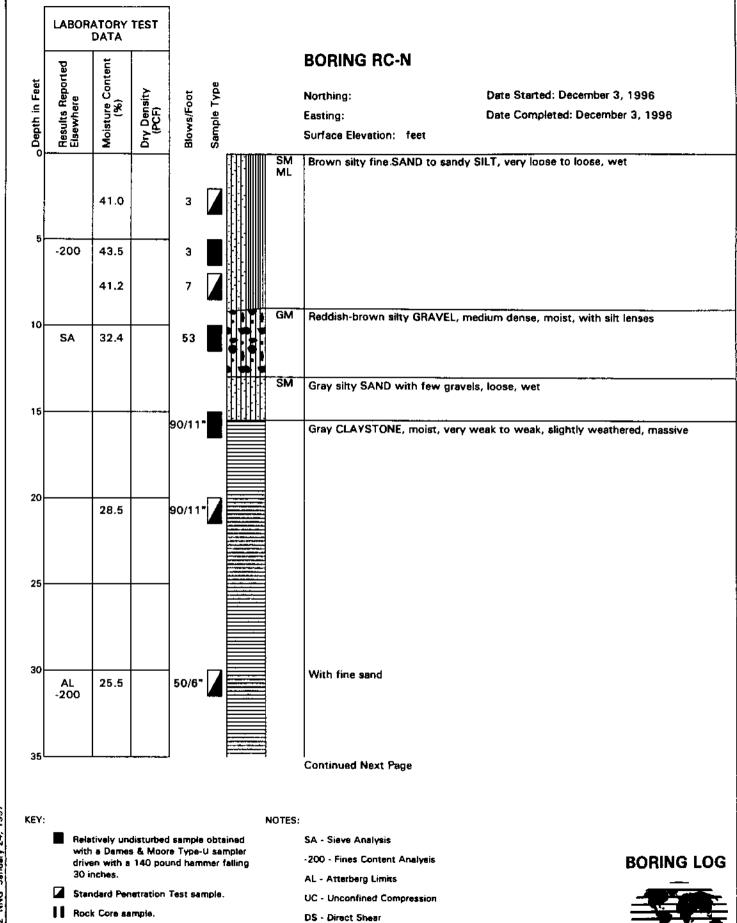
NOTES:

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 300 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core semple.
- Disturbed sample.
- ☑ Groundwater depth at time of drilling

- SA Sieve Analysis
 - -200 Fines Content Analysis
 - AL Atterberg Limits
 - UC Unconfined Compression
 - DS Direct Shear
 - C Consolidation

BORING LOG





C - Consolidation

Disturbed sample.

☑ Groundwater depth at time of drilling.

installed to 20 feet on 12/3/96. Groundwater obscured by drilling

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- ☑ Groundwater depth at time of drilling

NOTES:

- SA Sieve Analysis
- -200 Fines Content Analysis
- AL Atterberg Limits
- UC Unconfined Compression
- DS Direct Shear
- C Consolidation

BORING LOG



NOTES:

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.
- Standard Penetration Test sample.
- Rock Core sample.
- Disturbed sample.
- ☐ Groundwater depth at time of drilling
- SA Sieve Analysis
 - -200 Fines Content Analysis
 - AL Atterberg Limits
 - UC Unconfined Compression
 - DS Direct Shear
 - C Consolidation

BORING LOG



obscrued by drilling fluid.

KEY:

Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.

Standard Penetration Test sample.

Rock Core sample.

Disturbed sample.

Groundwater depth at time of drilling

NOTES:

SA - Sieve Analysis

-200 - Fines Content Analysis

AL - Atterberg Limits

UC - Unconfined Compression

DS - Direct Shear

C - Consolidation

BORING LOG



	LABOR	ATORY DATA	TEST			
	70	Moisture Content (%)	Dry Density (PCF)		_	BORING HA-1 Date Drilled: December 5, 1996
	Test Reported Elsewhere			Blows/Foot	Sample 1ype	Surface Elevation: feet
,,					ОН	Dark brown silty CLAY to CLAY with organics, wet
1					CL	Brown sitty CLAY, very moiet
2						Color grades mottled brown and reddish brown
3					₽	Color grades brown, moisture increases to wet

- Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.
- Sampling attempt with no recovery.
- Standard Penetration Test sample.
- Disturbed sample.

BORING LOG



LABORATORY TEST DATA **BORING HA-2** Moisture Cantent (%) Date Drilled: December 5, 1996 Depth in Feet Sample Type Dry Density (PCF) Blows/Foot Surface Elevation: feet ОН Dark brown silty CLAY to CLAY with organics, wet CL Brown silty CLAY, very moist Color grades mottled brown and reddish brown, moisture increases to wet ⊻ NOTE: Hand auger boring completed at a depth of 4 feet on 12/05/96. Groundwater measured at a depth of 3.8 feet on 12/05/96.

KEY:

Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.

■ Sampling attempt with no recovery.

Standard Penetration Test sample.

Disturbed sample.

Groundwater depth at time of drilling.

BORING LOG



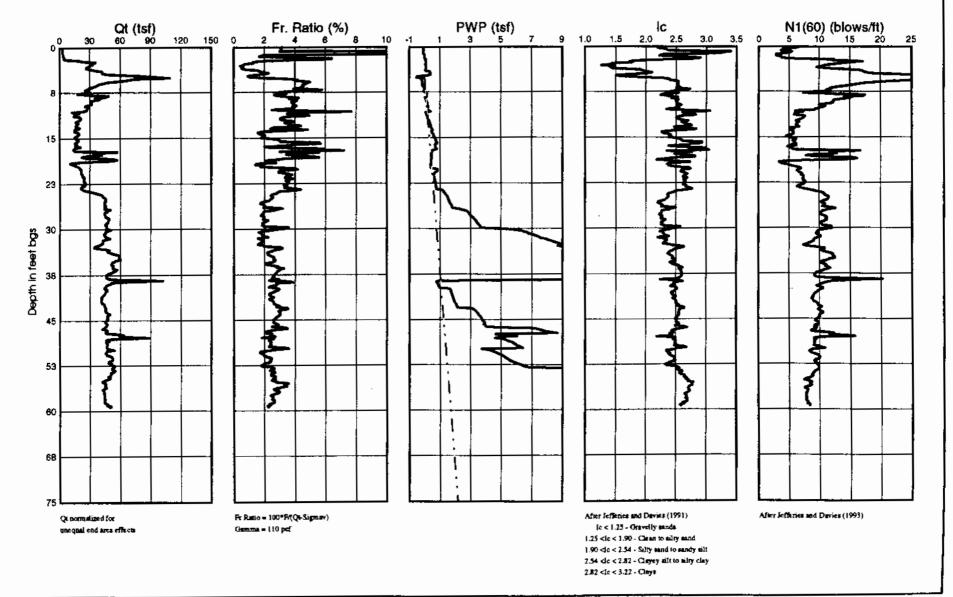
Cone Penetration Test - CPT-1

Test Date: Jan 10, 1997

Location: Miller Staion, Northwest Natural Gas

Operator: Northwest Cone Exploration

Ground Surf. Elev.: 0.00 Water Table Depth: 5.00



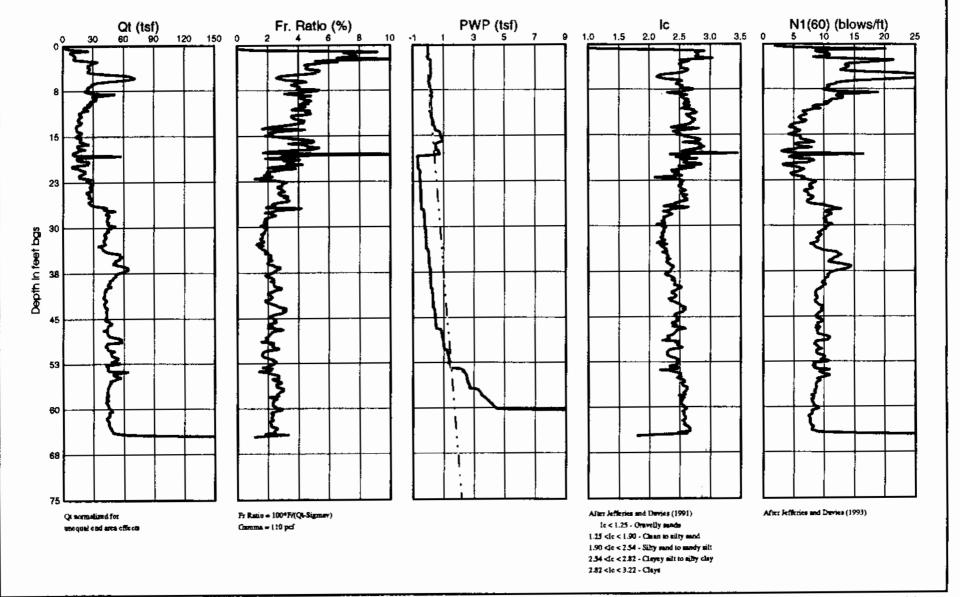
Cone Penetration Test - CPT-2

Test Date : Jan 10, 1997

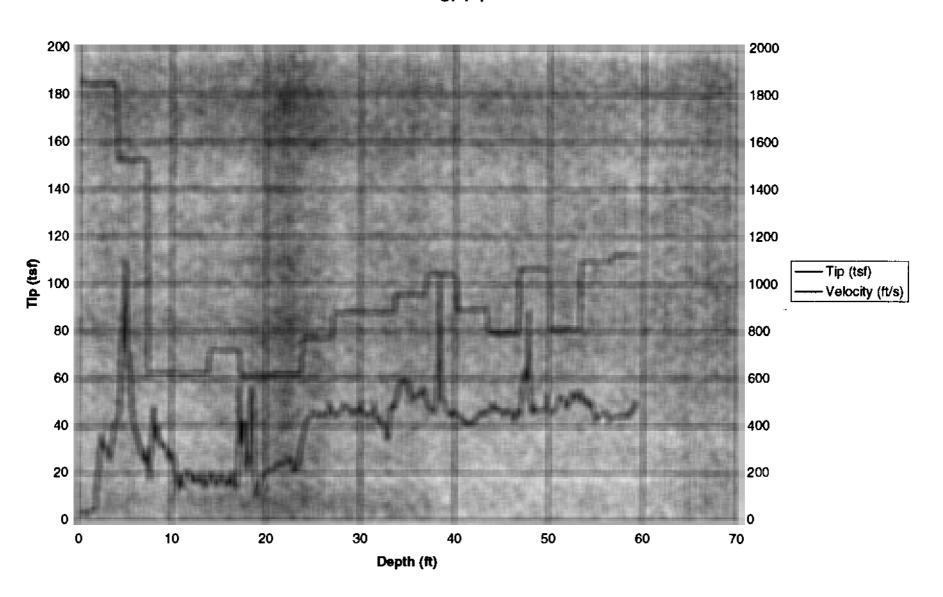
Location: Miller Staion, Northwest Natural Gas

Operator: Northwest Cone Explorations

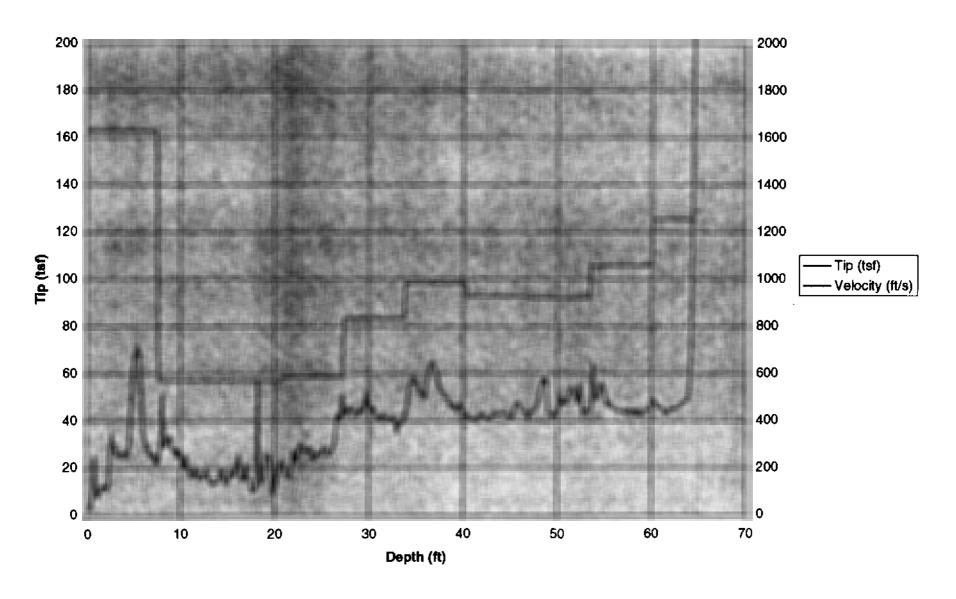
Ground Surf. Elev.: 0.00 Water Table Depth: 5.00



CPT-1



CPT-2



SOIL CLASSIFICATION CHART

5.0	LIOD DIVICI	ONC	SYM	BOLS	TYPICAL
IVI IVI I	AJOR DIVISI	UNS	GRAPH	LETTER	DESCRIPTIONS
	GRAVEL	CLEAN GRAVELS		GVV	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
-	AND GRAVELLY SOILS	(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
COARSE GRAINED SOILS	MORE THAN 50% OF COARSE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
55,55	FRACTION RETAINED ON NO. 4 SIEVE	APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND	CLEAN SANDS		sw	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	AND SANDY SOILS	(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
	PASSING ON NO. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		sc	CLAYEY SANDS, SAND - CLAY MIXTURES
		LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
FINE GRAINED	SILTS AND CLAYS			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
SOILS				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS				мн	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		СН	INORGANIC CLAYS OF HIGH PLASTICITY
				ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HI	GHLY ORGANIC	SOILS		PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

APPENDIX B

APPENDIX B LABORATORY TEST RESULTS

Samples obtained from the borings were transported to Dames & Moore's geotechnical testing laboratory in Portland, Oregon for analysis. The laboratory test assignments were made based on the conditions encountered in the borings and the expected design requirements. The laboratory program included index property, consolidation, and strength tests.

Moisture Content and Dry Unit Weight

The natural moisture content and dry unit weight of relatively undisturbed samples was evaluated in accordance with ASTM Test Method D2216. The test results are presented on the Boring Logs in Appendix A.

Atterberg Limits

Atterberg limits tests were performed on selected samples in accordance with ASTM Test Method D4318. The test results were used for soil classification purposes and for correlation with established strength and compressibility relationships. Table B-1 summarizes the test results.

TABLE B-1
ATTERBERG LIMITS TEST RESULTS

Boring	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	USCS Classification
B-1	20.5	56.5	30.1	26.4	СН
B-7	20.5	63.8	27.9	35.9	СН
RC-N	30.0	129.0	26.2	102.8	СН

Fines Content

The fraction of soil smaller than a U.S. Standard No. 200 Sieve (fines) was evaluated for several samples in accordance with ASTM Test Method D1140. The test results were used to aid in soil classification and for correlation with hydraulic conductivity parameters. Table B-2 summarizes the test results.

TABLE B-2 FINES CONTENT TEST RESULTS

Boring	Depth (ft)	Fines Content
B-1	3.0	46.6
B-1	10.5	56.9
B-2	10.5	45.7
B-3a	10.5	39.4
B-3a	30.5	50.6
RC-N	5.0	50.8
RC-N	10.0	51.5
RC-N	30.0	87.0
RC-N	41.5	93.7
RC-S	15.0	100.0
RC-S	27.0	82.0
RC-S	35.0	99.3

Sieve Analysis

One particle size gradation test was performed in accordance with ASTM Test Method D422. The test results were used to aid in classification and to evaluate the drilling properties of the soil. The test results are presented on Figure B-1.

Consolidation Tests

Four consolidation tests were performed on selected samples in general conformance with ASTM Test Method D2435. The test results will be used to evaluate consolidation settlement due to mat foundations and fill placement. The tests results are summarized on Figures B-2 through B-5.

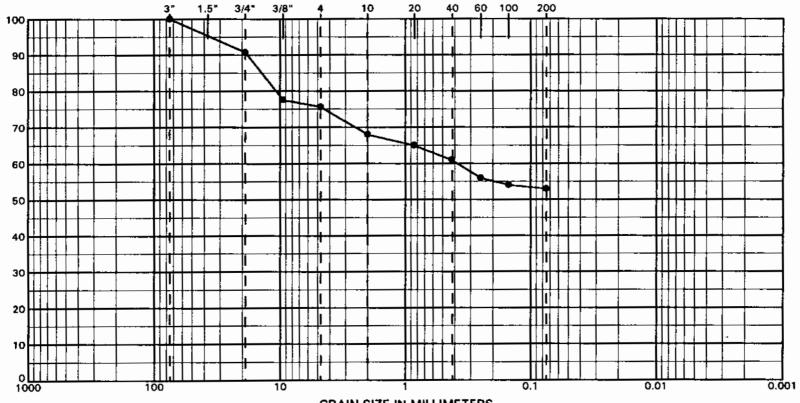
Direct Shear Tests

The shear strength parameters of foundation soils were evaluated by performing two 3-point direct shear tests. The tests were performed in general conformance with ASTM Test Method D3080. The shear strength parameters are used for computing bearing capacity of shallow footings. The test results are summarized on Figure B-6.

Unconfined Compression Tests

The unconfined compressive strength of select soil and rock samples was evaluated in accordance with ASTM Test Method D2166. The elastic modulus of the samples was evaluated under small-strains (initial tangent modulus) and at the peak strength (secant modulus). Figure B-7 summarizes the unconfined compressive strength test results, and Figure B-8 summarizes the elastic modulus results.





GRAIN SIZE IN MILLIMETERS

	COBBLES	GRAVEL			SAND		SILT OR CLAY
i		Coerse	Fine	Coarse	Medium	Fine	SILI ON CLAT

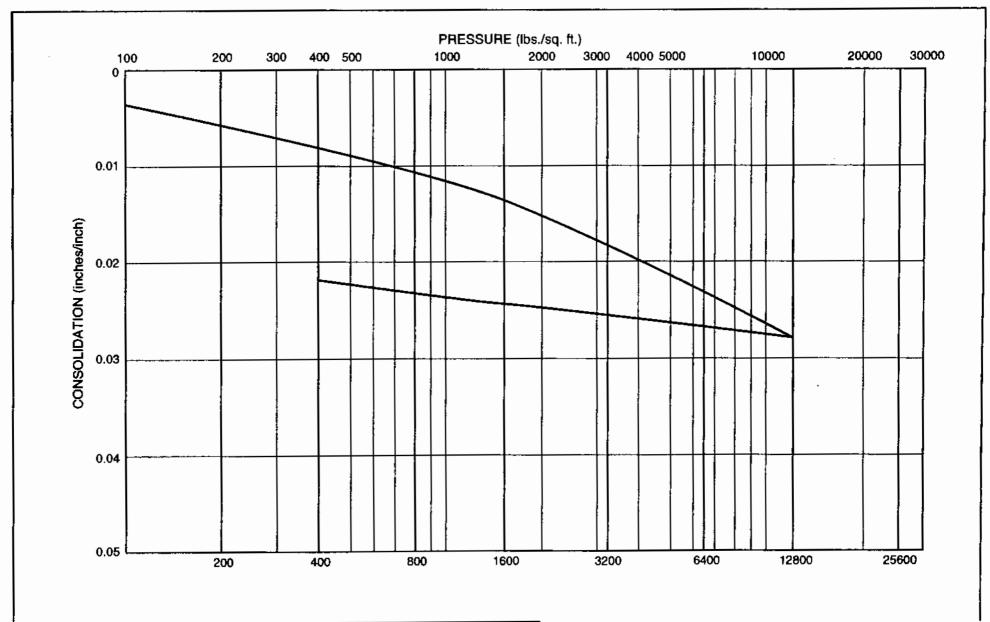
ſ	BORING	SAMPLE DEPTH	CLASSIFICATION		Nat. WC	LL	PL	PI	%GRAVEL	%SAND	%FINES
Ī	● RC-N	10.00-11.50 ft	ML	ML GRAVELLY SILT with SAND		NP	NP	NP	24.4	22.6	63 .0
ı											

SIEVE ANALYSIS



DAMES & MOORE

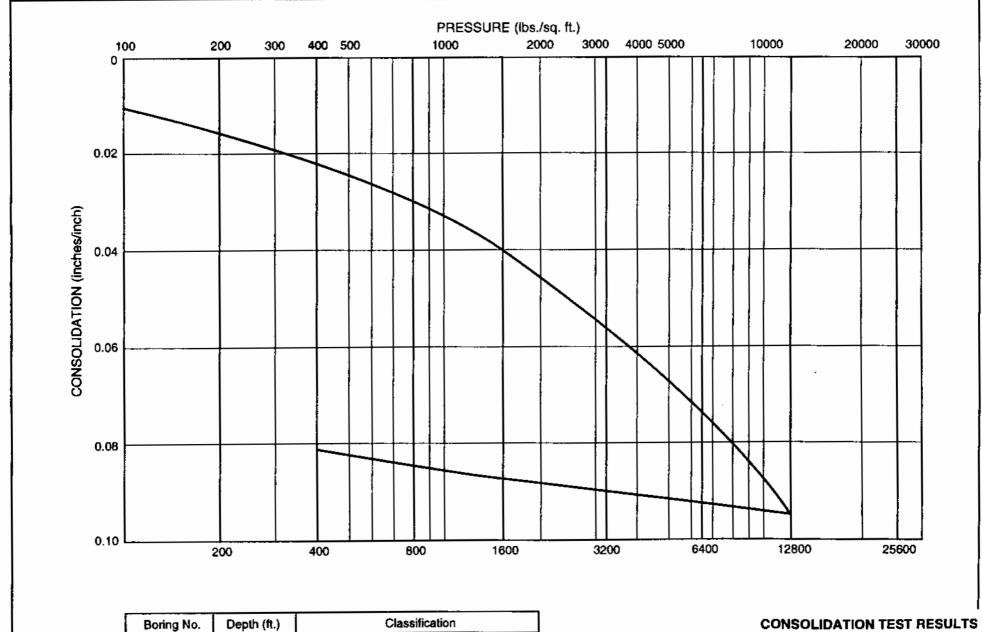
Figure B-1



Boring No.	Depth (ft.)		Classification
B-1	2.5 4.0	ML	Sandy Silt

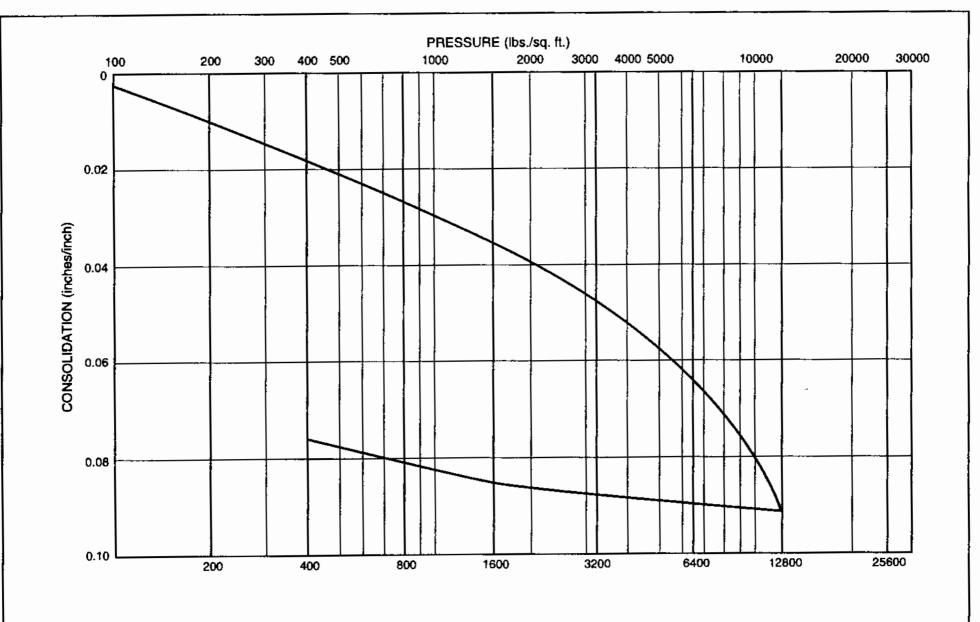
CONSOLIDATION TEST RESULTS

January 1997 2114-016-016



Boring No.	Depth (ft.)		Classification
B-1	5.0 - 6.5	СН	Clay

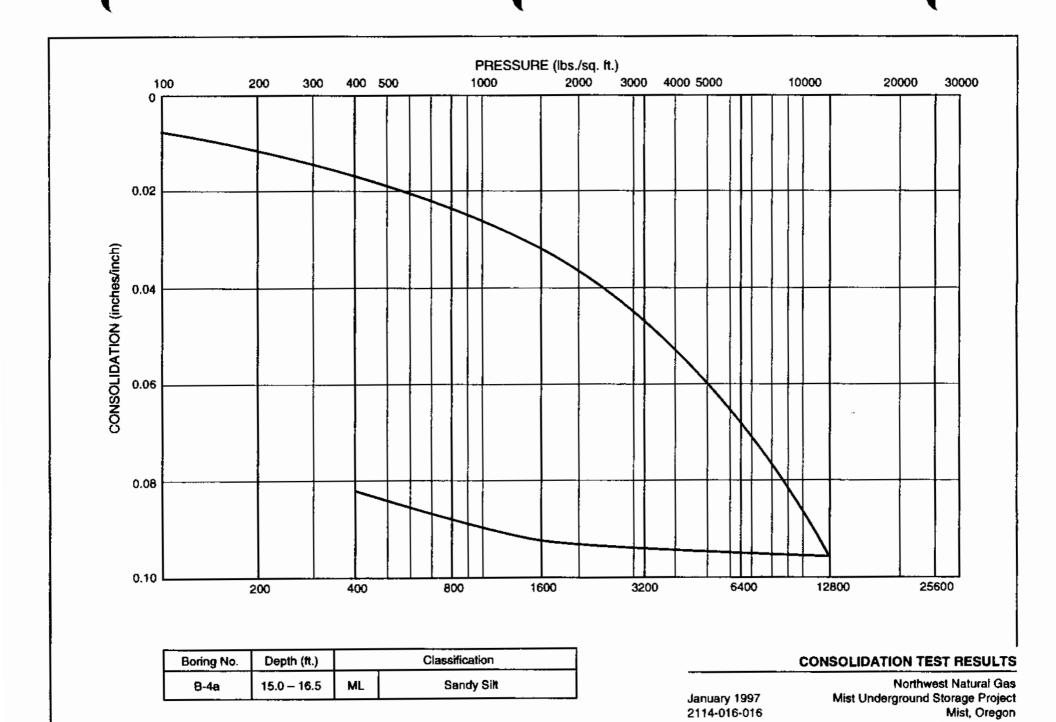
January 1997 2114-016-016

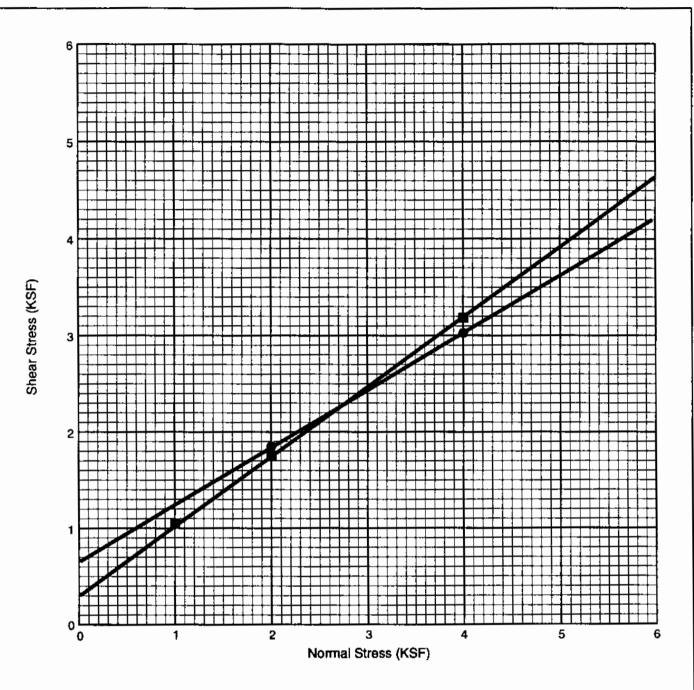


Boring No.	Depth (ft.)	Classification			
B-3a	5-6.5	ML	Sandy Silt		

CONSOLIDATION TEST RESULTS

January 1997 2114-016-016





Symbo	Boring No.	Depth (ft.)	Classification		Friction Angle	Cohesion (lbs/ft.2)
•	B-2	5.5	ML	Clayey SILT	30°	700
	B-4a	5.5	СН	Silty CLAY	34°	300

DIRECT SHEAR TEST RESULTS

January 1997 2114-016-016

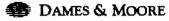


Figure B-7
Unconfined Compression Test Results

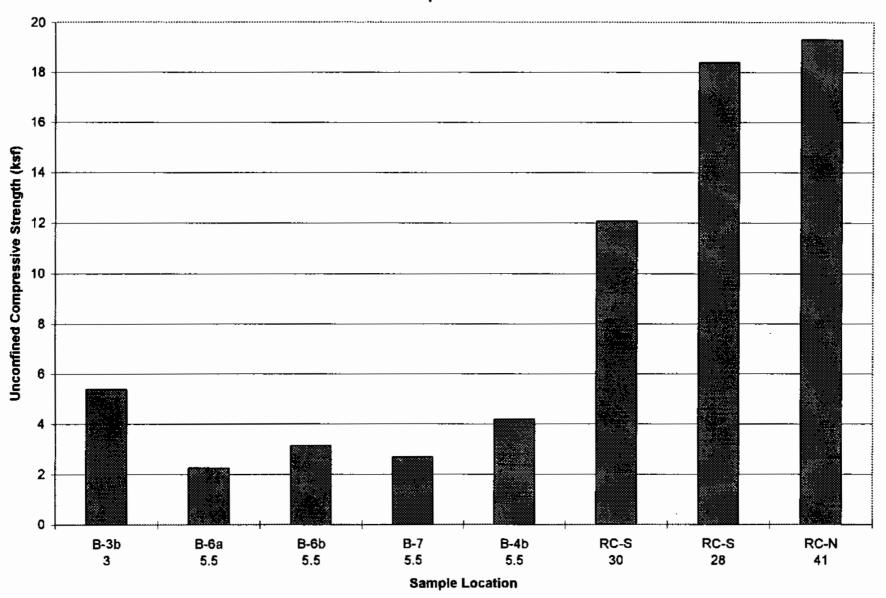
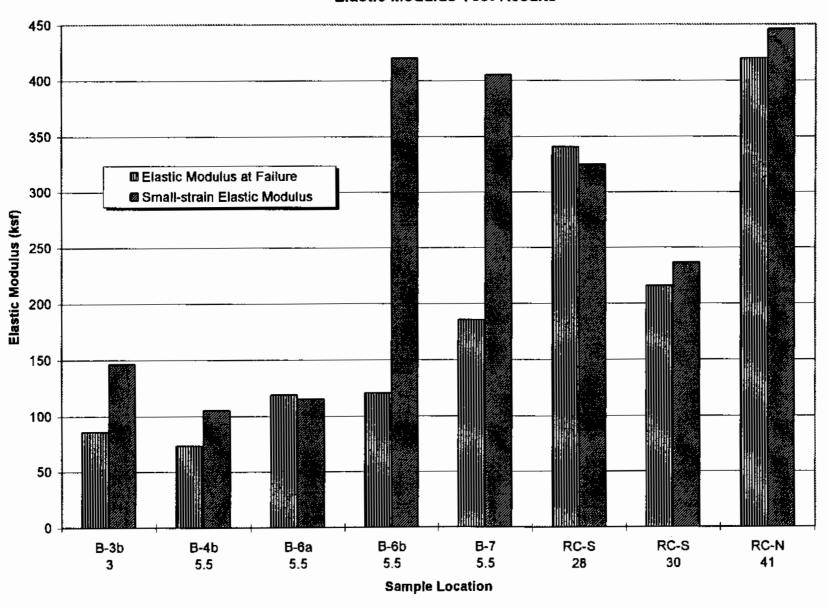


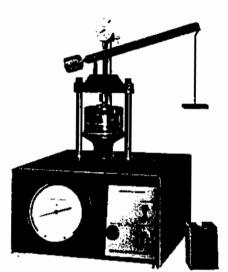
Figure B-8
Elastic Modulus Test Results



METHOD OF PERFORMING CONSOLIDATION TESTS

CONSOLIDATION TESTS ARE PERFORMED TO EVALUATE THE VOLUME CHANGES OF SOILS SUBJECTED TO INCREASED LOADS. TIME-CONSOLIDATION AND PRESSURE-CONSOLIDATION CURVES MAY BE PLOTTED FROM THE DATA OBTAINED IN THE TESTS. ENGINEERING ANALYSES BASED ON THESE CURVES PERMIT ESTIMATES TO BE MADE OF THE PROBABLE MAGNITUDE AND RATE OF SETTLEMENT OF THE TESTED SOILS UNDER APPLIED LOADS.

EACH SAMPLE IS TESTED WITHIN BRASS RINGS TWO AND ONEHALF INCHES IN DIAMETER AND ONE INCH IN LENGTH, UNDISTURBED SAMPLES OF IN-PLACE SOILS ARE TESTED IN RINGS
TAKEN FROM THE SAMPLING DEVICE IN WHICH THE SAMPLES
WERE OBTAINED, LOOSE SAMPLES OF SOILS TO BE USED IN
CONSTRUCTING EARTH FILLS ARE COMPACTED IN RINGS TO
PREDETERMINED CONDITIONS AND TESTED.



IN TESTING, THE SAMPLE IS RIGIDLY CONFINED LATERALLY
BY THE BRASS RING. AXIAL LOADS ARE TRANSMITTED TO THE
ENDS OF THE SAMPLE BY POROUS DISKS, THE DISKS ALLOW

DEAD LOAD-PREUMATIC CONSOLIDOMETER

DRAINAGE OF THE LOADED SAMPLE. THE AXIAL COMPRESSION OR EXPANSION OF THE SAMPLE IS MEASURED BY A MICROMETER DIAL INDICATOR AT APPROPRIATE TIME INTERVALS AFTER EACH LOAD INCREMENT IS APPLIED. EACH LOAD IS ORDINARILY TWICE THE PRECEDING LOAD. THE INCREMENTS ARE SELECTED TO OBTAIN CONSOLIDATION DATA REPRESENTING THE FIELD LOADING CONDITIONS FOR WHICH THE TEST IS BEING PERFORMED. EACH LOAD INCREMENT IS ALLOWED TO ACT OVER AN INTERVAL OF TIME DEPENDENT ON THE TYPE AND EXTENT OF THE SOIL IN THE FIELD.

METHOD OF PERFORMING DIRECT SHEAR AND FRICTION TESTS

DIRECT SHEAR TESTS ARE PERFORMED TO DETERMINE THE SHEARING STRENGTHS OF SOILS, FRICTION TESTS ARE PERFORMED TO DETERMINE THE FRICTIONAL RESISTANCES BETWEEN SOILS AND VARIOUS OTHER MATERIALS SUCH AS WOOD, STEEL, OR CONCRETE. THE TESTS ARE PERFORMED IN THE LABORATORY TO SIMULATE ANTICIPATED FIELD CONDITIONS.

EACH SAMPLE IS TESTED IN A SPLIT SAMPLE HOLDER, TWO AND ONE-HALF INCHES IN DIAMETER AND ONE INCH HIGH. UNDISTURBED SAMPLES OF IN-PLACE SOILS ARE EXTRUDED FROM RINGS TAKEN FROM THE SAMPLING DEVICE IN WHICH THE SAMPLES WERE OBTAINED. LOOSE SAMPLES OF SOILS TO BE USED IN CON-



DIRECT SHEAR APPARATUS WITH ELECTRONIC RECORDER

STRUCTING EARTH FILLS ARE COMPACTED IN RINGS TO PREDETERMINED CONDITIONS AND TESTED.

DIRECT SHEAR TESTS

A ONE-INCH LENGTH OF THE SAMPLE IS TESTED IN DIRECT SINGLE SHEAR. A CONSTANT PRESSURE, APPROPRIATE TO THE CONDITIONS OF THE PROBLEM FOR WHICH THE TEST IS BEING PERFORMED, IS APPLIED NORMAL TO THE ENDS OF THE SAMPLE THROUGH POROUS STONES. A SHEARING FAILURE OF THE SAMPLE IS CAUSED BY MOVING THE UPPER SAMPLE HOLDER IN A DIRECTION PERPENDICULAR TO THE AXIS OF THE SAMPLE. TRANSVERSE MOVEMENT OF THE LOWER SAMPLE HOLDER IS PREVENTED.

The shearing failure is accomplished by applying to the upper sample holder a constant rate of deflection, the shearing load and the deflections in both the axial and transverse directions are recorded and plotted, the shearing strength of the soils is determined from the resulting load-deflection curves.

FRICTION TESTS

In order to determine the frictional resistance between soil and the surfaces of various materials, the lower sample holder in the direct shear test is replaced by a disk of the material to be tested. The test is then performed in the same manner as the direct shear test by forcing the soil over the friction material surface.



Exhibit N
Major Ecological Communities
and Soil Types
Miller Station Expansion and
Pipeline Alignment
Mist Gas Storage Project
Mist, Oregon

for Northwest Natural Gas Fehruary 21, 1997 Job No. 02114-016-016

Portland, Oregon



February 21, 1997

Northwest Natural Gas 220 NW Second Avenue Portland, OR 97209

Attn: Mr. H. Jack Meyer

Re: Exhibit N

Major Ecological Communities and Soil Types

Mist Underground Storage Project

Mist. Oregon

Dear Mr. Meyer:

Transmitted herewith are 15 copies of our report entitled Major Ecological Communities and Soil Types, Mist Underground Storage Project, Mist, Oregon". This report is intended to fulfil the requirements of Exhibit N of the Mist Underground Storage Project site certificate amendment application. This work was performed under Change Order 1 to Purchase Order No. 43642, dated January 8, 1997.

Dames & Moore also performed a geotechnical investigation of the Mist gas storage site. The results of the investigation, along with geotechnical conclusions and recommendations, are summarized in a report dated January 24, 1997. The subsurface information developed during the geotechnical investigation forms the basis for this current study.

We appreciate the opportunity to be of continued service. Please call if you have any questions or need more information.

Very truly yours.

DAMES & MOORE

Douglas R. Schwarm, P.E.

Senior Engineer

WP\016\02114\03/DRS:lih/02114-016-016

1750 S.W. Harbor Way, Suite 400 Portland, Oregon 97201 503 228 7688 Tel 503 223 6083 Fax

EXHIBIT N TABLE OF CONTENTS

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2.3 REGENERATING CLEARCUTS	2
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gure N-2 - Surface Soil Map	

Exhibit N

Major Ecological Communities and Soil Types
Miller Station Expansion and Pipeline Alignment
Mist Gas Storage Project
Mist, Oregon

1.0 INTRODUCTION

This exhibit presents the results of a ecological community and soil type evaluation for the proposed expansion of the Northwest Natural Gas underground gas storage facility near Mist, Oregon. The planned construction includes two turbine compressors (one in 1997 and one in the future), approximately 2½ miles of pipeline from the compressors to new wellsites in the Calvin Creek storage pool, and four wellsites with injection/withdrawal wells. This exhibit addresses major ecological communities and soil types as required in OAR 345-21-010(1)(n) for energy facility site certification applications.

2.0 MAJOR ECOLOGICAL COMMUNITIES

Figure N-1 shows the extent of the major ecological community types within the project area. The Mist Underground Storage Project will extend through five major ecological community types. Both ends of the project are in second growth conifer forest ranging in age from about 20 years to about 50 years. It also will go through two regenerating clearcut areas with trees 5 to 10 years old. On the south side of the Nehalem Valley, the pipeline will cross a stand of mixed conifer and deciduous forest. Through the Nehalem Valley it will traverse cultivated hay and pasture fields. The Nehalem River crossing will be by directional drilling, so no additional ecological community will be affected at that point. Wetlands will be crossed on each side of the valley and in two other limited areas. Each of these community types is described below.

2.1 SECOND GROWTH CONIFER FOREST

Some of these forest stands are actually third generation rather than second from the original logging, as they clearly contain two generations of stumps. Douglas fir (Pseudotsuga menziesii) is the dominant tree species, joined in much lower numbers by western red cedar (Thuja plicata), western hemlock (Tsuga heterophylla), and grand fir (Abies grandis). The dominant understory is variable, but includes salmonberry (Rubus spectabilis), salal (Gaultheria shallon), vine maple (Acer circinatum), long-leaved Oregon grape (Berberis nervosa), trailing blackberry (Rubus ursinus), deer fern (Blechnum spicant), and sword fern (Polystichum munitum).

2.2 MIXED CONIFER/DECIDUOUS FOREST

This stand is also a second-growth stand not more than 50 years old. The dominant tree species include Douglas fir, bigleaf maple (*Acer macrophyllum*), western red cedar, red alder (*Alnus rubra*), and western hemlock. The dominant understory species include the species listed for the second growth conifer stands with the addition of ocean spray (*Holodiscus discolor*).

2.3 REGENERATING CLEARCUTS

The more recent clearcut harvest areas are regenerating a forest cover dominated by Douglas fir with a scattering of other conifer species and deciduous species in places as in the older second growth stands. The trees are mostly 5 to 10 years old, and the understory has more species than the older stands. Additional understory species include Himalayan and evergreen blackberries (Rubus discolor and R. laciniatus), blackcap (Rubus leucodermis), bracken fern (Pteridium aquilinum), fireweed (Epilobium angustifolium), and bleeding heart (Dicentra formosa).

2.4 FARMED HAY AND PASTURE

The farmed areas crossed in the Nehalem Valley are dominated by grasses (mostly introduced species). Species include smooth brome (*Bromus inermis*), tall fescue (*Festuca arundinacea*), Kentucky bluegrass (*Poa pratensis*), perennial rye (*Lolium perenne*), and redtop (*Agrostis alba*). The river shores have willows (*Salix sitchensis*) as dominants.

2.5 WETLANDS

Most of the wetlands crossed by the pipelines are palustrine emergent wetlands that have been severely affected by man's activities. One has a logging road through its length and is dominated by common or soft rush (*Juncus effusus*). Another is in a pasture and is dominated by creeping buttercup (*Ranunculus repens*) and redtop grass. One is in a hay field dominated by the hay grass species.

One wetland, located north of the hay field and Highway, is part of a larger wetland complex with at least three types of cover. At the location of the crossing, the wetland is dominated by slough sedge (Carex obnupta) and has standing water seasonally. One edge is shrub dominated, the main shrub species being ninebark (Physocarpus capitatus). Elsewhere in the wetland complex (outside the construction corridor) parts are dominated by willows (Salix lasiandra and S. sitchensis). This wetland is crossed by an existing gas pipeline near the proposed crossing location, which was installed about 10 years or more ago. The vegetative

cover has completely recovered, leaving no sign of the earlier disturbance. There is also an adjacent access road that crosses the wetland using a culvert to pass the water flow in the wetland. This wetland appears to be excellent habitat for amphibians and birds.

3.0 SOILS

The Mist Underground Storage Project will extend through ten soil types. The following sections provide brief descriptions of these soil types from the U.S.D.A. Soil Conservation Service's Soil Survey of Columbia County. The index numbers preceding the soil group names are conventional S.C.S. map unit symbols. Figure N-2 shows the extent of the soil types within the project.

Bra un-Scaponia silt loams, 5 to 30 percent slope: Typically, the Braun surface layer is dark brown silt loam about 4 inches thick. The subsoil is dark brown and dark yellowish brown silt loam about 26 inches thick over fractured soft siltstone. Depth to the soft rock ranges from 20 to 40 inches. The subsoil is 25 to 60 percent soft rock fragments. Permeability is moderate. Available water capacity is about 3 to 6 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is high.

Typically, the Scaponia surface layer is dark brown silt loam about 7 inches thick. The subsoil is dark brown and dark yellowish brown silt loam about 25 inches. The substratum is dark brown silt loam about 10 inches thick over soft siltstone. Depth to the soft siltstone ranges from 40 to 60 inches. The subsoil is 25 to 60 percent soft rock fragments. Permeability is moderate. Available water capacity is about 6 to 9 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is high. This unit is mainly used for timber production. It is also used for recreation and wildlife recreation.

This type of soil is found at Miller Station and along the roadway segment of the pipeline alignment.

<u>Eilertsen silt loam:</u> Typically, the surface layer is very dark brown and very dark grayisb brown silt loam about 17 inches thick. The upper 8 inches of the subsoil is dark brown silty clay and the lower 24 inches is dark yellowish brown silt loam and brown loam. The substratum to a depth of 60 inches or more is brown fine sandy loam. Permeability is moderate. Available water capacity is about 10 to 12 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is

slight. This unit is used for hay, pasture, timber production, homesites, recreational development, and wildlife habitat.

This type of soil is found along the pipeline alignment both north and south of the Nehalem River.

Kenusky silty clay loam, 0 to 15 percent slopes: Typically, the surface layer is black, mottled silty clay loam and silty clay about 13 inches thick. The upper 6 inches of the subsoil is dark gray, mottled silty clay, and the lower 25 inches is dark gray, mottled clay. The substratum to a depth of 60 inches or more is grayish brown, distinctly mottled clay. Permeability is slow to a depth of 19 inches and very slow below this depth. Available water capacity is about 3 to 4 inches. Effective rooting depth is limited by the water table. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. Water is perched above the claypan in November through May. This unit is used for wildlife habitat, timber production, and recreation.

This type of soil is found along the wellsite gathering line alignment.

Mayger silt loam, 3 to 30 percent slopes: Typically, the surface layer is very dark grayish brown and dark brown silt loam about 11 inches thick. The upper 6 inches of the subsoil is dark yellowish brown silty clay loam, and the lower 21 inches is grayish brown, mottled silty clay. The substratum to a depth of 60 inches or more is grayish brown, mottled clay. Permeability is moderately slow to a depth of 38 inches and very slow below this depth. Available water capacity is about 5 to 7 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. Water is perched above the claypan at a depth of 18 to 36 inches in winter and spring. This unit is used for timber production, wildlife habitat, and recreation.

This type of soil is found along the pipeline alignment south of the Nehalem River, along the wellsite gathering line alignment, and at several wellsite locations.

McNulty silt loam: Typically, the surface layer is very dark grayish brown and dark brown silt loam about 9 inches thick. The upper 14 inches of the subsoil is dark brown silt loam, and the lower 9 inches is dark brown loam. The upper 8 inches of the substratum is dark yellowish brown sandy loam, and the lower part to a depth of 60 inches or more is dark yellowish brown silt loam. Permeability is moderate. Available water capacity is about 8 to 11 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate along streambanks or barren soil areas. Thus soil is subject to flooding during prolonged, high-intensity storms.

Channeling and deposition are common along streambanks. This unit is used for hay, pasture, recreational development and wildlife habitat.

This type of soil is found along the pipeline alignment both north and south of the Nehalem River.

Natal silty clay loam: Typically, the surface layer is black silty clay loam about 9 inches thick. The subsoil is mottled, very dark grayish brown and dark grayish brown silty clay about 31 inches thick. The substratum to a depth of 60 inches or more is mottled, very dark grayish brown and dark grayish brown silty clay. Permeability is slow. Available water capacity is about 9 to 11 inches. Effective rooting depth is limited by a seasonal high water table that is at a depth of less than 1 foot from November through May. Runoff is very slow or ponded and the hazard of water erosion is slight. This unit is used for hay, pasture, recreation, homesite development, and wildlife habitat.

This type of soil is found along the pipeline alignment north of the Nehalem River.

Scaponia-Braun silt loams, 30 to 60 percent north slopes: Typically, the Scaponia surface layer is dark hrown silt loam about 7 inches thick. The subsoil is dark brown and dark yellowish hrown silt loam about 25 inches thick. The substratum is dark brown silt loam about 10 inches thick over fractured, soft siltstone. Depth to soft rock ranges from 40 to 60 inches. The subsoil is 30 to 55 percent soft siltstone fragments. Permeability is moderate. Available water capacity is about 6 to 9 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

Typically, the Braun surface layer is dark brown silt loam about 4 inches thick. The subsoil is dominantly dark yellowish brown silt loam about 26 inches thick over fractured, soft siltstone. Depth to the soft rock ranges from 20 to 40 inches. The subsoil is 25 to 60 percent soft siltstone fragments. Permeability is moderate. Available water capacity is about 3 to 6 inches. Effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is high. This unit is mainly used for timber production. It is also used for recreation and wildlife recreation.

This type of soil is found along the pipeline alignment south of the Nehalem River, along the wellsite gathering line alignment, and at wellsite locations.

Scaponia-Braun silt loams, 30 to 60 percent south slopes: Typically, the Scaponia surface layer is dark brown silt loam about 7 inches thick. The subsoil is dark brown and dark yellowish brown silt loam about 25 inches thick. The substratum is dark brown silt loam about 10 inches thick over fractured, soft siltstone. Depth to soft rock ranges from 40 to 60 inches. The subsoil is 30 to 55 percent soft siltstone fragments. Permeability is moderate. Available water capacity is about 6 to 9 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

Typically, the Braun surface layer is dark brown silt loam about 4 inches thick. The subsoil is dominantly dark yellowish brown silt loam about 26 inches thick over fractured, soft siltstone. Depth to the soft rock ranges from 20 to 40 inches. The subsoil is 25 to 60 percent soft siltstone fragments. Permeability is moderate. Available water capacity is about 3 to 6 inches. Effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is high. This unit is mainly used for timber production. It is also used for recreation and wildlife recreation.

This type of soil is found at Miller Station, along the wellsite gathering line alignment and at several wellsite locations.

Treharne silt loam: Typically, the surface layer is very dark grayish brown and dark brown silt loam about 15 inches thick. The upper 14 inches of the subsoil is brown silty clay loam, and the lower 12 inches is mottled, brown silty clay loam. The substratum is mottled, dark grayish brown silty clay loam about 14 inches thick over dark gray silty clay that extends to a depth of 60 inches or more. Permeability is moderately slow. Available water capacity is about 10 to 12 inches. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The water table is at a depth of about 24 to 36 inches in winter and early spring. This unit is used for hay, pasture, timber production, homesites, recreational development, and wildlife habitat.

This type of soil is found along the pipeline alignment north of the Nehalem River.

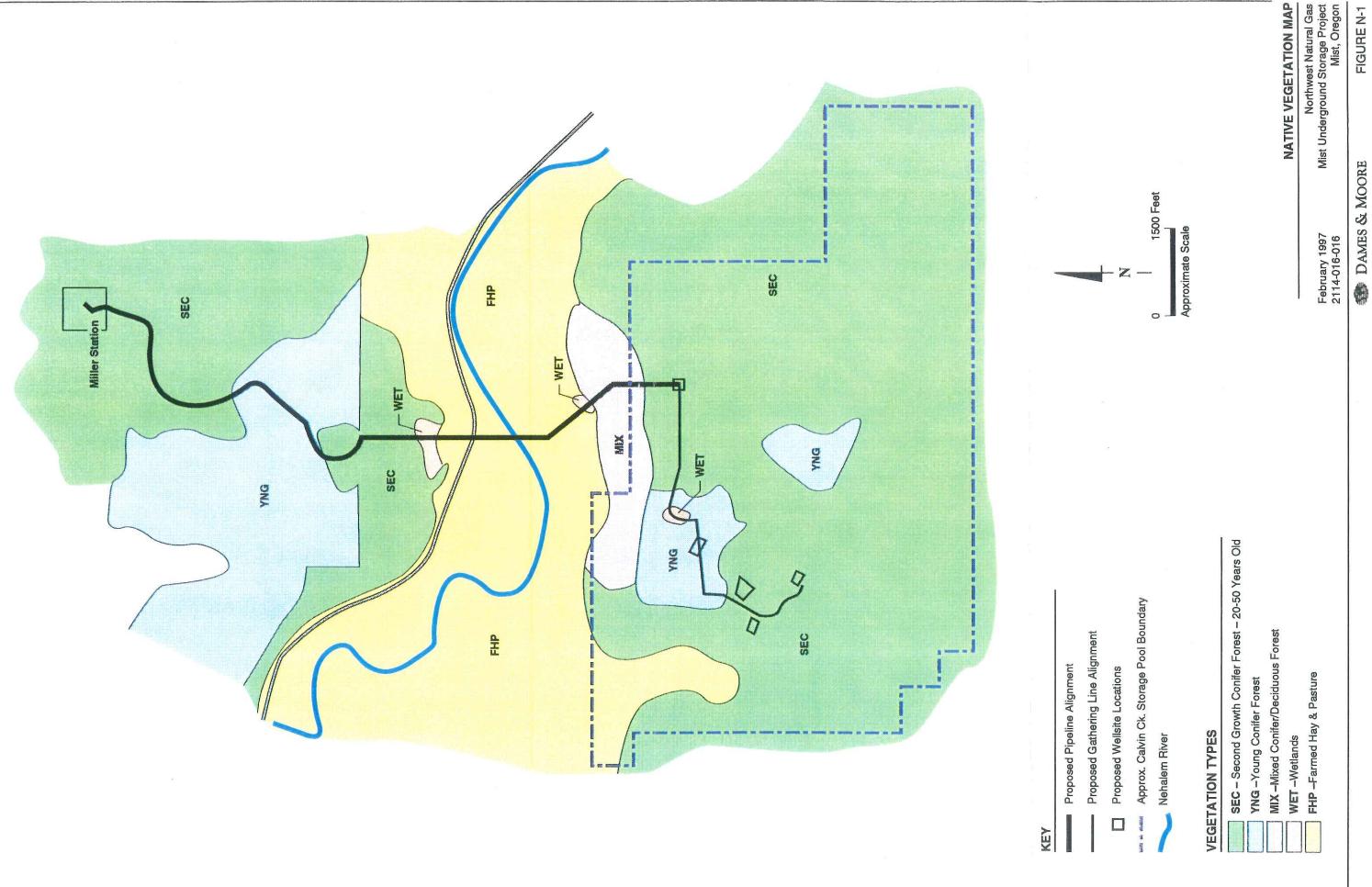
Vernonia silt loam, 3 to 30 percent slopes: Typically, the surface layer is very dark grayish brown and dark brown silt loam about 9 inches thick. The subsoil is dark brown silt loam and silty clay loam about 43 inches thick. Sedimentary rock is at a depth of 52 inches. Depth to bedrock ranges from 40 to 60 inches. Permeability is moderately slow. Available water capacity is about 8 to 12 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium to rapid, and the hazard of water erosion is medium to

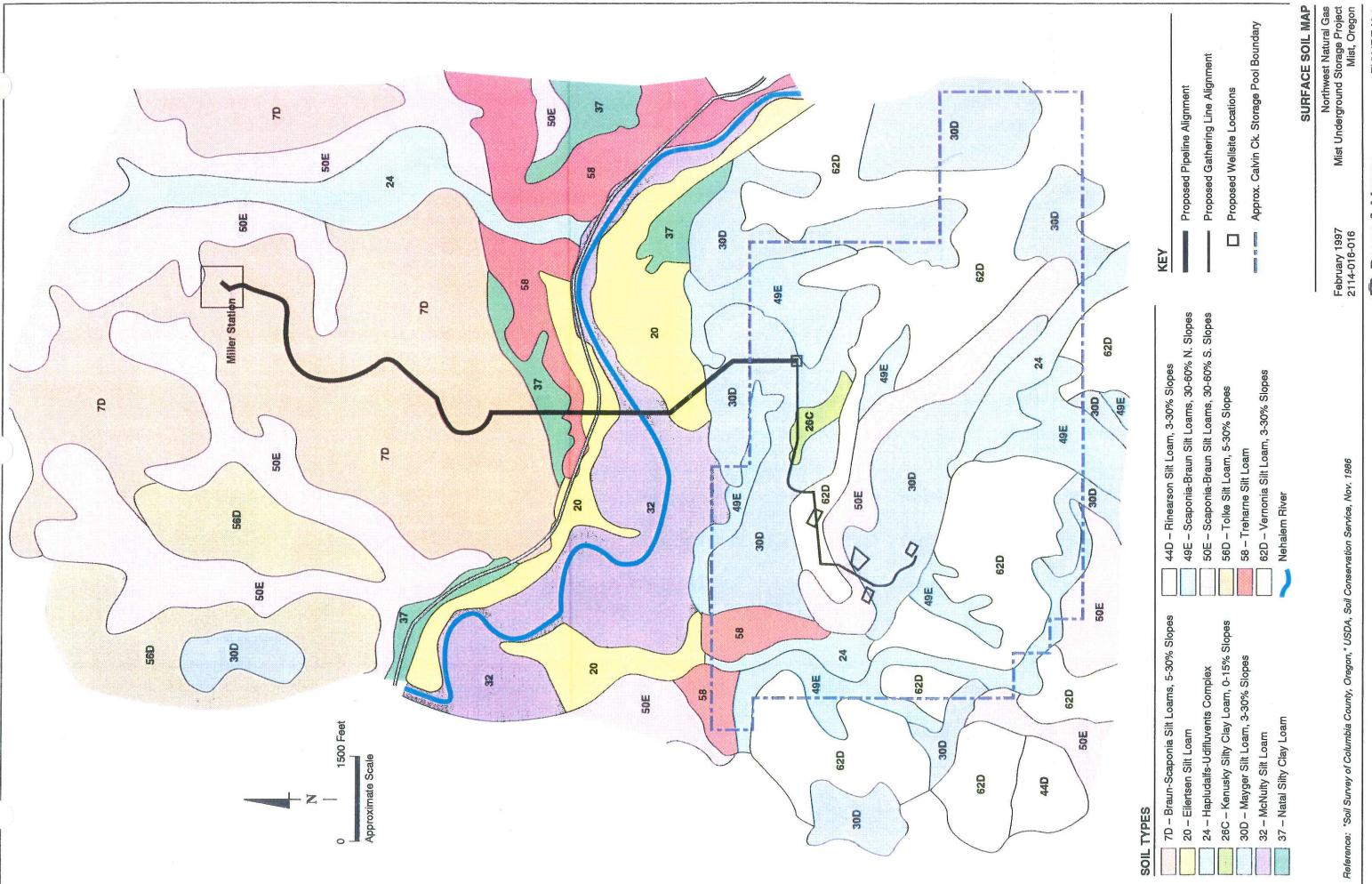
high. This unit is used for timber production, recreational development, and wildlife habitat.

This type of soil is found along the wellsite gathering line alignment and at Wellsite locations.

***** * *

FIGURES





Columbia County Planning Commission STAFF REPORT

Conditional Use Permit - PF-76 Zone

FILE NUMBER:

CU 53-96

APPLICANT/OWNER:

Northwest Natural Gas Company

220 NW Second Avenue Portland, OR 97209

AGENTS:

Michael C. Robinson

Peter D. Mostow Stoel Rives LLP

900 SW Fifth Avenue, Ste. 2300

Portland, OR 97204-1268

PROPERTY LOCATION: Miller Station, about 3 miles northwest of Mist.

REQUEST:

To replace two 550-hp compressors with one 3950-hp compressor at a

gas processing facility on a parcel of 12.23 acres in the PF-76 zone, for

which a Conditional Use Permit is required.

TAX ACCT. NUMBER:

6500-000-02501

ZONING:

Primary Forest (PF-76)

APPLIC'N. COMPLETE: 1-6-97

120 DAY DEADLINE:

5-6-97

WAIVER SIGNED?:

No.

BACKGROUND:

The applicants request approval to replace two 550-HP compressors with one 3950-HP compressor at a gas processing facility on a 12.23 acre parcel in the Primary Forest PF-76 zone.

Surrounding properties are in forest use. There are several existing structures on the property, which has access to South Mainline Road about 3 miles northwest of Mist. The topography of the property is fairly gentle, sloping up from the road and then leveling off at the compressor site.

There are no flood plains or wetlands on the property (FEMA map 41009C0125 C)(National Wetlands Inventory, Clatskanie guad map).

The property is within the Mist-Birkenfeld Rural Fire Protection District.

FINDINGS:

The following sections of the Zoning Ordinance and state laws are pertinent to this application:

Columbia County Zoning Ordinance Section 503 requires the following:

"Section 503 <u>Conditional Uses:</u> In the PF zone the following conditional uses and their accessory uses are permitted subject to the provisions of Sections 504 and 505. A conditional use shall be reviewed according to the procedures provided in Section 1503.

.2 Operations conducted for the exploration, mining, and processing of...mineral or subsurface resources not permitted outright."

<u>Finding 1:</u> In the PF-76 zone, an expansion of a mineral resources processing facility requires a Conditional Use Permit.

Zoning Ordinance Section 504 requires the following:

"Section 504 All Conditional Uses Permitted In The PF Zone Shall Meet The Following Requirements:

.1 The use is consistent with forest and farm uses and with the intent and purposes set forth in the Oregon Forest Practices Act."

The Oregon Forest Practices Act (ORS Chapter 527) includes the following:

"527.630 <u>Policy.</u> (1) ...it is declared to be the public policy of the State of Oregon to encourage economically efficient forest practices that assure the continuous growing and harvesting of forest tree species and the maintenance of forest land for such purposes as the leading use on privately owned land, consistent with sound management of soil, air, water and fish and wildlife resources that assures the continuous benefits of those resources for future generations of Oregonians."

<u>Finding 2:</u> The proposed use of the property is to replace two small compressors with one larger one, to increase the efficiency of the natural gas injecting operation. This is on a site which has been in non-forest use for many years. No forest land will be taken out of production and the site will not be expanded; all new facilities will be well within the boundaries of the site. The above criteria do not seem to apply to this request.

Continuing with Zoning Ordinance Section 504:

".2 The use will not significantly increase the cost, nor interfere with accepted forest management practices or farm uses on adjacent or nearby lands devoted to forest or farm use."

<u>Finding 3:</u> The proposed use will not interfere with farm or forest uses on adjacent lands if appropriate measures are taken to prevent fire from spreading to adjacent forests.

Continuing with Zoning Ordinance Section 504:

".3 The use will be limited to a site no larger than necessary to accommodate the activity and, as such will not materially alter the stability of the overall land use pattern of the area or substantially limit or impair the permitted uses of surrounding properties. If necessary, measures will be taken to minimize potential negative effects on adjacent forest lands."

<u>Finding 4:</u> The proposed compressor building will be limited to a small area in the north central part of the property. The overall land use pattern of the area is timber and natural gas production. Appropriate measures will need to be taken to minimize the danger of fire spreading to adjacent forest lands.

Continuing with Zoning Ordinance Section 504:

".4 The use does not constitute an unnecessary fire hazard, and provides for fire safety measures in planning, design, construction, and operation."

<u>Finding 5:</u> Fire safety measures will need to be strictly enforced in planning, design, construction and occupation of the new building. The site has many established fire detection and prevention facilities on the site, including gas leak detectors, alarms, fire extinguishers, a 20,000 gallon water tank and an onsite fire truck.

Continuing with Zoning Ordinance Section 504:

".5 Public utilities are to develop or utilize rights-of-way that have the least adverse impact on forest resources. Existing rights-of-way are to be utilized wherever possible.

<u>Finding 6:</u> All public utilities are in place.

Continuing with Zoning Ordinance Section 504:

".6 Development within major and peripheral big game ranges shall be sited to minimize the impact on big game habitat. To minimize the impact, structures shall: be located near existing roads; be as close as possible to existing structures on adjoining lots; and be clustered where several structures are proposed."

<u>Finding 7:</u> The area is a big game range, but this site is already developed into an industrial use; the new building will not expand the site and will be clustered with other structures on the site.

Zoning Ordinance Section 1503 requires the following:

"1503 Conditional Uses:

- .5 Granting a Permit: The Commission may grant a Conditional Use Permit after conducting a public hearing, provided the applicant provides evidence substantiating that all the requirements of this ordinance relative to the proposed use are satisfied and demonstrates the proposed use also satisfies the following criteria:
 - A. The use is listed as a Conditional Use in the zone which is currently applied to the site:"

<u>Finding 8:</u> The PF-76 zone lists "Operations conducted for the exploration, mining, and processing of...mineral or subsurface resources not permitted outright" under Conditional Uses.

Continuing with Zoning Ordinance Section 1503.5:

"B. The use meets the specific criteria established in the underlying zone:"

Finding 9: The criteria of the PF-76 zone have been shown to be met in Findings 1 through 7.

Continuing with Zoning Ordinance Section 1503.5:

"C. The characteristics of the site are suitable for the proposed use considering size, shape, location, topography, existence of improvements, and natural features;"

<u>Finding 10:</u> The property is located about 3 miles northwest of Mist and is 12.23 acres. The lot is irregular in shape and the topography is gently sloping. There are many existing improvements on the property, and the new compressor and its building will be amidst the other structures. The property is within the Mist-Birkenfeld Rural Fire Protection District.

These appear to make the site suitable for the proposed new compressor.

Continuing with Zoning Ordinance Section 1503.5:

"D. The site and proposed development is timely, considering the adequacy of transportation systems, public facilities, and services existing or planned for the area affected by the use."

<u>Finding 11:</u> The only transportation system in the area is South Mainline Road, owned by Longview Fibre and used mostly for log trucking. Public facilities are electric power and telephone. These appear to make the proposed use timely, as no new facilities will be required by the new compressor.

Continuing with Zoning Ordinance Section 1503.5:

"E. The proposed use will not alter the character of the surrounding area in a manner which substantially limits, impairs, or precludes the use of surrounding properties for the primary uses listed in the underlying district;"

<u>Finding 12:</u> The surrounding area is in timber production. The proposed replacement compressor will not alter the character of the area, as it will be entirely within the existing plant site.

Continuing with Zoning Ordinance Section 1503.5:

"F. The proposal satisfies the goals and policies of the Comprehensive Plan which apply to the proposed use;"

<u>Finding 13:</u> The Columbia County Comprehensive Plan (CCCP) ENERGY SOURCES section includes these findings (p.224):

"Potential conflicting uses for natural gas wells in the County are minimized by the controls and regulations imposed by ODOGAMI [Oregon Department of Geology and Mineral Industries]. They are also minimized since wells are located in remote forested areas and surrounding property owners share in the profits of producing wells. The county will conserve forest lands for forest uses and allow operations conducted for the exploration, mining, and processing of subsurface resources as a conditional use. The County will rely on ODOGAMI to insure future protection of resources and surrounding lands."

The Energy Sources GOAL is (CCCP p.225):

"To protect deposits of energy materials in the County and prevent injury to surrounding lands and residents."

The new compressor will be regulated by DOGAMI rules, and will be used to pressurize natural gas for piping to and from Miller Station. This operation and the others at Miller Station have been previously approved by the County as a way to prolong the useful life of the gas fields.

Continuing with Zoning Ordinance Section 1503.5:

"G. The proposal will not create any hazardous conditions."

<u>Finding 14:</u> The proposed new compressor will not be hazardous, as suitable precautions have been taken to detect and control fire and to prevent its spread to surrounding forest lands. The new compressor will be housed in a new metal frame, metal clad building and should not be a fire hazard.

Continuing with Zoning Ordinance Section 1503:

".6 <u>Design Review:</u> The Commission may require the Conditional Use be subject to a site design review by the Planning Commission."

Finding 15: A Site Design Review is required for the new building; see DR 21-96.

The following state laws must also be met by this application:

Oregon Revised Statutes: ORS Chapter 527, the Oregon Forest Practices Act, contains no regulations for gas wells or their production facilities.

Oregon Administrative Rules: OAR 660-06-025(4) reads:

"The following uses may be allowed on forest lands subject to the review standards in section (5) of this rule:

(f) Mining and processing of oil, gas or other subsurface resources...not otherwise permitted under section (3)(m) of this rule (e.g., compressors, separators and storage serving multiple wells)..."

OAR 660-06-025(5) sets out the following requirements for non-forest uses in forest lands:

"(a) The proposed use will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agricultural or forest lands;"

<u>Finding 16:</u> The new compressor will be housed in a new building in the midst of existing structures and facilities at Miller Station. There will be no new impacts on adjacent or nearby forest operations.

Continuing with OAR 660-06-025(5):

"(b) The proposed use will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fir suppression personnel; and"

<u>Finding 17:</u> The new building and compressor will include fire detection and suppression equipment integrated with the existing comprehensive equipment on the site. The fire fighting risks and costs should not be greater than the fire fighting risks and costs of the two compressors being replaced.

Continuing with OAR 660-06-025(5):

"(c) A written statement recorded with the deed or written contract with the county or its equivalent is obtained from the land owner which recognizes the rights of adjacent and nearby land owners to conduct forest operations consistent with the Forest Practices Act and Rules..."

<u>Finding 18:</u> The recorded leases between the applicant and adjacent and nearby property owners recognize their rights to conduct forest operations with regard for, and without unnecessary harm to, their forest and agricultural operations. Applicant has offered to enter into a "written contract with the county" if required by the Planning Commission.

COMMENTS:

- Larry Oblack, member of the Mist Birkenfeld CPAC, has no objection to approval of the request as submitted.
- 2. Dan E. Wermiel, Petroleum Geologist; Oil, Gas and Geothermal Regulation; Geologic Services section; DOGAMI, has no objection to approval of the request as submitted.

No other comments have been received from government agencies or nearby property owners as of the date of this staff report (January 22, 1997).

CONCLUSION AND RECOMMENDATION:

Based on the above findings, staff recommends approval of this request, with no conditions.

Note: ORS 671.025 requires that the plans and specifications for certain buildings in Oregon must have the stamp on them of a registered architect or registered professional engineer. Exceptions are (ORS 671.030(2):

- Single family residential buildings.
- Farm buildings.

- 3. Accessory buildings to single family residences and farm buildings.
- 4. Buildings of 4,000 sq.ft. or less ground area.
- 5. Buildings with an interior height of 20' or less (top surface of lowest floor to highest interior overhead finish).
- 6. Non-structural alterations or repairs to a building.

The structure proposed in this application may be subject to ORS 671.025; if so, the plans submitted for a building permit <u>must have the stamp of a registered architect or registered professional engineer</u> on them.

pw

Columbia County Planning Commission STAFF REPORT

Site Design Review - Zone

FILE NUMBER:

DR 21-96

APPLICANT/OWNER:

Northwest Natural Gas Company

220 NW Second Avenue

Portland, OR 97209

AGENTS:

Michael C. Robinson

Peter D. Mostow Stoel Rives LLP

900 SW Fifth Avenue, Ste. 2300

Portland, OR 97204-1268

PROPERTY LOCATION: Miller Station, about 3 miles northwest of Mist.

REQUEST:

To replace two 550-hp compressors with one 3950-hp compressor at a

gas processing facility on a parcel of 12.23 acres in the PF-76 zone, for

which a Site Design Review is required.

TAX ACCT. NUMBER:

6500-000-02501

ZONING:

Primary Forest (PF-76)

APPLIC'N. COMPLETE:

1-6-97

120 DAY DEADLINE:

5-6-97

WAIVER SIGNED?:

No.

BACKGROUND:

The applicants request approval to replace two 550-HP compressors with one 3950-HP compressor at a gas processing facility on a 12.23 acre parcel in the Primary Forest PF-76 zone.

Surrounding properties are in forest use. There are several existing structures on the property, which has access to South Mainline Road about 3 miles northwest of Mist. The topography of the property is fairly gentle, sloping up from the road and then leveling off at the compressor site.

There are no flood plains or wetlands on the property (FEMA map 41009C0125 C)(National Wetlands Inventory, Clatskanie quad map).

The property is within the Mist-Birkenfeld Rural Fire Protection District.

FINDINGS:

The following sections of the Columbia County Zoning Ordinance are pertinent to this application:

"1550 <u>Site Design Review:</u> The Site Design Review process shall apply to all new development, redevelopment, expansion, or improvement of all Community, Governmental, Institutional, commercial and industrial uses in the county..."

Finding 1: The proposed expansion of this industrial facility requires a Site Design Review.

Continuing with Section 1550 of the Zoning Ordinance:

"1550.5 <u>Site Analysis Submittal (Existing Site Plan)</u>: The site analysis will provide the basis for the proper design relationship of the proposed development to the site and to adjacent properties. The degree of detail in the analysis shall be appropriate to the scale of the proposal, or to special site features requiring careful design... A site analysis plan shall include:

- A. A vicinity map showing location of property in relation to adjacent properties, roads, pedestrian and bikeways, and utility access. Site features, manmade or natural, which cross property boundaries are to be shown.
- B. A site description map at a suitable scale (i.e. 1"=100'; 1"=50'; or 1"=20') showing parcel boundaries and gross area, including elements, when applicable:
 - Contour lines at the following minimum intervals:
 - Two (2) foot intervals for slopes 0-20%;
 - Five (5) or ten (10) foot intervals for slopes exceeding 20%;
 - Identification of areas exceeding 35% slope.
 - Slope analysis showing portions of the site according to slope ranges as follows: 0-1-%, 10-20%, 20-35%, 35-50%, and 50%+. Approximate area calculations shall be made for areas more than 20% using the above categories. In special areas, such as Open Space, a more detailed slope analysis may be required. Sources for slope analysis include maps located at the U.S. Soil Conservation Service office.
 - 3. Drainage, including adjacent lands.

- Potential natural hazard areas, including potential flood or high ground water, landslide, erosion, drainageways, and weak foundation soils. An engineering geologic study may be required, pursuant to Section 206.
- 5. Marsh or wetland areas, underground springs, wildlife habitat areas, wooded areas, and surface features, such as mounds, large rock outcroppings.
- Streams and stream corridors.
- Location of wooded areas, significant clumps or groves of trees and specimen conifers, oaks and other large deciduous trees.
- Noise sources.
- Sun and wind exposure.
- Significant views.
- 11. Existing structures, improvements, utilities, and easements, or other development."

<u>Finding 2:</u> Applicants have submitted maps, plans and written materials to satisfy the above requirements.

Continuing with Section 1550 of the Zoning Ordinance:

- "1550.6 <u>Preliminary Site Plan Submittal (Proposed Site Plan)</u>: A complete application for design review shall be submitted. A project summary shall accompany when necessary to describe special circumstances, such as a request for minor exception to a development standard. Preliminary submittal shall include the following plans, which may be combined, as appropriate onto one or more drawings:
- A. <u>Site Plan</u>: The site plan shall be drawn at a suitable scale (i.e. 1"=100', 1"=50', or 1"=20') and shall include the following:
 - The applicant's entire property and the surrounding area to a distance sufficient to determine the relationships between the applicant's property and the proposed development and adjacent property and development;
 - Boundary lines and dimensions for the property and all proposed lot lines.
 Future buildings in phased developments shall be indicated;

- Identification information, including names and addresses of project designers;
- Natural features which will be utilized in the site plan;
- Location, dimensions, and names of all existing or platted streets or other public ways, easements, railroad rights-of-way, on or adjacent to the property, county limits, section lines and corners, and monuments;
- 6. Location and dimensions of all existing structures, improvements, or utilities to remain, and structures to be removed; all drawn to scale.
- Historic structures (County inventory);
- Approximate location and size of storm water retention or detention facilities and storm drains:
- Location and exterior dimensions of all proposed structures, and impervious surfaces;
- Location and dimension of parking and loading areas, pedestrian and bicycle circulation, and related access ways. Individual parking spaces shall be shown;
- 11. Orientation of structures showing windows and doors, entrances and exits;
- Lighting (specify type);
- Service areas for waste disposal, recycling, loading and delivery;
- Location of mail boxes."

<u>Finding 3:</u> Applicants have submitted maps, plans and written materials to satisfy the above requirements.

Continuing with Section 1550.6 of the Zoning Ordinance:

- "B. <u>Grading Plans:</u> A preliminary grading plan indicating where and to what extent grading will take place, including general contour lines, slope ratios, slope stabilization proposals, and natural resource protection proposals."
- Finding 4: Grading plans have not been submitted. The site of the new compressor building will be leveled and a new retaining wall will be built south of the site and new driveway.

Continuing with Section 1550.6 of the Zoning Ordinance:

"C. Architectural Drawings:

- Building elevations and sections;
- Building materials (color and type);
- Floor plan."

<u>Finding 5:</u> All of the above drawings have been submitted. The building will be a steel frame structure with steel panels matching the existing buildings in materials and colors.

Continuing with Section 1550.6 of the Zoning Ordinance:

"D. <u>Landscape Plan</u>: The landscape plan shall be at the same scale as the site plan. All identification information required on the site plan shall be shown on the landscape and open space plan. It shall show:

5

- Property and lot boundaries and rights-of-way;
- 2. Structures and impervious surfaces, including parking lots;
- General landscape development plan, including the location of existing plants and groups of plants proposed;
- 4. Description of soil conditions and plans for soil treatment such as stockpiling of topsoil, addition of soil amendments, and plant selection requirements relating to soil conditions:
- 5. Erosion controls, including plant materials and soil stability, if any;
- 6. Imigation system (underground sprinklers or hose bibs);
- 7. Landscape related structures such as fences, terraces, decks, patios, shelters, play areas, etc.;
- Boundaries of open space, recreation or reserved areas to remain, access to open space and any alterations proposed;
- 9. Location of pedestrian or bikeway circulation with landscaped area."

DR 21-96

<u>Finding 6:</u> There will be no new landscaping.

Continuing with Section 1550.6 of the Zoning Ordinance:

"E. Signs:

- 1. Freestanding sign:
 - Location of sign on site plan;
 - Elevation of sign (indicate size, total height, height between bottom of sign and ground, color, materials, means of illumination;
- 2. <u>On-building sign:</u>
 - a. Building elevation with location of sign (indicating size, color, materials and means of illumination);
 - Plot plan showing location of signs on building in relation to adjoining property."

Finding 7: There will be no new signs.

COMMENTS:

- Larry Oblack, member of the Mist Birkenfeld CPAC, has no objection to approval of the request as submitted.
- Dan E. Wermiel, Petroleum Geologist; Oil, Gas and Geothermal Regulation; Geologic Services section; DOGAMI, has no objection to approval of the request as submitted.

No other comments have been received from government agencies or nearby property owners as of the date of this staff report (January 22, 1997).

CONCLUSION AND RECOMMENDATION:

Based on the above findings, staff recommends approval of this request, with no conditions.

Note: ORS 671.025 requires that the plans and specifications for certain buildings in Oregon must have the stamp on them of a registered architect or registered professional engineer. Exceptions are (ORS 671.030(2):

- 1. Single family residential buildings.
- 2. Farm buildings.
- 3. Accessory buildings to single family residences and farm buildings.
- 4. Buildings of 4,000 sq.ft. or less ground area.
- 5. Buildings with an interior height of 20' or less (top surface of lowest floor to highest interior overhead finish).
- 6. Non-structural alterations or repairs to a building.

The structure proposed in this application may be subject to ORS 671.025; if so, the plans submitted for a building permit <u>must have the stamp of a registered architect or registered professional engineer</u> on them.

pw

COLUMBIA COUNTY LAND DEVELOPMENT SERVICES

COURTHOUSE ST, HELENS, OREGON 97031 PHONE (503) 347-1501

General App'n.

File No. DR 21-96

GENERAL LAND USE PER TYPE OF PERMIT: Zone Change To Site Design Review R	emporary Permit		
Other: Improvements to facilities used in	processing subsu	rface resourc	es.
APPLICANT: Name: Northwest Natural Gas Company	(Attn: Ms. Ca	rla Kelley)	
Mailing address: 220 NW Second Avenue, Port1	and, OR 97209		
Phone No.: Office (503) 721-2441	Home <u>N/A</u>	W- 11	_
Are you the _x _property owner?owner	's agent?		
PROPERTY OWNER: x same as above, OR:			
Name:			·
Mailing Address:			<u>.</u>
PROPERTY ADDRESS (if assigned): Tax Lot 250IN,		, R5W	
TAX ACCOUNT NO.: 2501	Acres: 12.23	Zoning:	P F-76
·	_Acres:	Zoning:	
	_Acres:	Zoning:	
PRESENT USES: (farm, forest, bush, residential, etc.) Use: Natural Gas Processing Facility	•	Approx. Acre	
Total acres (must agre	e with above):	12.23	

COLUMBIA COUNTY LAND DEVELOPMENT SERVICES

COURTHOUSE ST. HELENS, OREGON 97051 (503)397-1501

FINAL ORDER and APPEAL INFORMATION

Applicant: NW Natural Gas File Number: CU 53-96

Planner: Pete Watson Notice Date: February 12, 1997

Appeal Body:

[] Planning Commission, for appeal of an administrative decision; file this appeal in the Land Development Services office, ground floor, Courthouse Annex, St. Helens, OR 97051;

[X] Board of County Commissioners, for appeal of a Planning Commission decision; file this appeal in the Office of the County Clerk, Second Floor, Courthouse Annex, St. Helens, OR 97051.

Attached is the FINAL ORDER on the application listed above. This decision, or any part of it, or any condition attached to it, may be appealed to the **Appeal Body** noted above.

An appeal must be filed within 10 calendar days of the above Notice Date, the date this notice was nailed to the applicant and to other persons entitled to notice.

If an appeal is filed, and after notice is given according to state and county laws, a de novo (new) public hearing will be held by the Appeal Body at their earliest available regular meeting. All interested parties will have an opportunity to appear and be heard.

If an appeal is not filed, this decision will become final 10 days after the above Notice Date.

Until the appeal period expires, the applicant may not take action on the application.

PLEASE NOTE: An appeal may be filed only by persons who have legal "standing". Please see Columbia County Zoning Ordinance Section 1700, ORS §197.763, and/or consult your attorney to be sure you have standing before appealing this decision. We regret we cannot give you a definition of "standing" since it is a legal matter which changes from time to time.

If you wish, you may file an appeal now and determine later if you have standing. However, your appeal fee might not be refunded if it is later determined that you did not have standing and your appeal is denied on those grounds.

If any of the above is not clear, or you have questions or require additional information, please contact the Planner listed above at (503) 397-1501, or FAX to their attention at (503) 366-3902.

BEFORE THE PLANNING COMMISSION COLUMBIA COUNTY, STATE OF OREGON

Conditional Use Permit CU 53-96

In the Matter of the Application of Northwest)
Natural Gas Company for a Conditional Use)
Permit in the Primary Forest Zone

Final Order CU 53-96

This matter came before the Columbia County Planning Commission on the application of Northwest Natural Gas Company for a Conditional Use Permit to allow the company to replace two 550-hp compressors with one 3950-hp compressor in a new metal building, with related machinery, on a 12.23 acre parcel (Miller Station) in the Primary Forest PF-76 Zone.

The subject property is located on S. Mainline Road about 3 miles northwest of Mist and is described on the Assessor's records as Tax Account Number 6500-000-02501.

A public hearing was held on February 3, 1997. The Planning Commission heard testimony from the applicant and all interested parties, and considered all written materials submitted and the Planning Commission staff report.

The Planning Commission hereby adopts the findings and conclusions in the attached Staff Report dated 1-22-97, and orders this application for a Conditional Use Permit APPROVED with no conditions.

COLUMBIA COUNTY PLANNING COMMISSION

EFFREN WANNATTA, CHAIRMAN

DATE

Note: ORS 671.025 requires that the plans and specifications for certain buildings in Oregon must have the stamp on them of a registered architect or registered professional engineer. Exceptions are (ORS 671.030(2):

- Single family residential buildings.
- Farm buildings.
- 3. Accessory buildings to single family residences and farm buildings.
- 4. Buildings of 4,000 sq.ft. or less ground area.
- 5. Buildings with an interior height of 20' or less (top surface of lowest floor to highest interior overhead finish).

COLUMBIA COUNTY LAND DEVELOPMENT SERVICES

COURTHOUSE ST. HELENS, OREGON 97051 (503)397-1501

FINAL ORDER and APPEAL INFORMATION

Applicant: NW Natural Gas File Number: DR 21-96

Planner: Pete Watson Notice Date: February 12, 1997

Appeal Body:

[] Planning Commission, for appeal of an administrative decision; file this appeal in the Land Development Services office, ground floor, Courthouse Annex, St. Helens, OR 97051;

[X] Board of County Commissioners, for appeal of a Planning Commission decision; file this appeal in the Office of the County Clerk, Second Floor, Courthouse Annex, St. Helens, OR 97051.

Attached is the FINAL ORDER on the application listed above. This decision, or any part of it, or any condition attached to it, may be appealed to the **Appeal Body** noted above.

An appeal must be filed within 10 calendar days of the above Notice Date, the date this notice was nailed to the applicant and to other persons entitled to notice.

If an appeal is filed, and after notice is given according to state and county laws, a de novo (new) public hearing will be held by the Appeal Body at their earliest available regular meeting. All interested parties will have an opportunity to appear and be heard.

If an appeal is not filed, this decision will become final 10 days after the above Notice Date.

Until the appeal period expires, the applicant may not take action on the application.

PLEASE NOTE: An appeal may be filed only by persons who have legal "standing". Please see Columbia County Zoning Ordinance Section 1700, ORS §197.763, and/or consult your attorney to be sure you have standing before appealing this decision. We regret we cannot give you a definition of "standing" since it is a legal matter which changes from time to time.

If you wish, you may file an appeal now and determine later if you have standing. However, your appeal fee might not be refunded if it is later determined that you did not have standing and your appeal is denied on those grounds.

If any of the above is not clear, or you have questions or require additional information, please contact the Planner listed above at (503) 397-1501, or FAX to their attention at (503) 366-3902.

BEFORE THE PLANNING COMMISSION COLUMBIA COUNTY, STATE OF OREGON

Site Design Review DR 21-96

In the Matter of the Application of Northw	est)	
Natural Gas Company for a Site Design)	Final Order DR 21-96
Review in the Primary Forest Zone)	

This matter came before the Columbia County Planning Commission on the application of Northwest Natural Gas Company for a Site Design Review to allow the company to replace two 550-hp compressors with one 3950-hp compressor in a new metal building, with related machinery, on a 12.23 acre parcel (Miller Station) in the Primary Forest PF-76 Zone.

The subject property is located on S. Mainline Road about 3 miles northwest of Mist and is described on the Assessor's records as Tax Account Number 6500-000-02501.

A public hearing was held on February 3, 1997. The Planning Commission heard testimony from the applicant and all interested parties, and considered all written materials submitted and the Planning Commission staff report.

✓ he Planning Commission hereby adopts the findings and conclusions in the attached Staff Report dated 1-22-97, and orders this application for a Site Design Review APPROVED with no conditions.

COLUMBIA COUNTY PLANNING COMMISSION

JEPFREYWANNATTA, CHAIRMAN

Note: ORS 671.025 requires that the plans and specifications for certain buildings in Oregon must have the stamp on them of a registered architect or registered professional engineer. Exceptions are (ORS 671.030(2):

2/10/97

- 1. Single family residential buildings.
- Farm buildings.
- 3. Accessory buildings to single family residences and farm buildings.
- 4. Buildings of 4,000 sq.ft. or less ground area.
- 5. Buildings with an interior height of 20' or less (top surface of lowest floor to highest interior overhead finish).
- 6. Non-structural atterations or repairs to a building.

The structure proposed in this application may be subject to ORS 671.025; if so, the plans submitted for a building permit <u>must have the stamp of a registered architect or registered professional engineer</u> on them.

DW

6. Non-structural alterations or repairs to a building.

The structure proposed in this application may be subject to ORS 671.025; if so, the plans submitted for a building permit <u>must have the stamp of a registered architect or registered professional engineer</u> on them.

pw

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Columbia County Planning Commission STAFF REPORT

Conditional Use Permit - PF-76 Zone

FILE NUMBER:

CU 2-97

APPLICANT/OWNER:

Northwest Natural Gas Com-

220 NW Second Avenue Portland, OR 97209

AGENTS:

Michael C. Robinson

Peter D. Mostow Stoel Rives LLP

900 SW Fifth Avenue, Ste. 2300

Portland, OR 97204-1268

PROPERTY LOCATION: Miller Station to Calvin Creek Gas Storage Area, southwest, west, and

northwest of Mist.

REQUEST:

To construct up to 4 injection/withdrawal gas wells in the Calvin Creek

field, and to connect them with the existing gas processing facilities at

Miller Station 3 miles northwest of Mist.

TAX ACCT, NUMBERS:

6500-000-02500, 02501, 02600, 04500, 04600, 04900, 05000;

6514-000-00100, 00900;

6515-000-00100, 00200, 00500;

6523-000-00500.

ZONING:

Primary Forest (PF-76) and Primary Agriculture (PA-38)

APPLIC'N. COMPLETE:

1-31-97

120 DAY DEADLINE:

5-31-97

WAIVER SIGNED?:

No.

BACKGROUND:

The applicants request approval to drill up to 4 new injection/withdrawal gas wells in the existing Calvin Creek gas field in order to store and withdraw natural gas as needed, and to construct In 8" gathering pipeline connected to twin 16" pipelines going north to Miller Station.

The wellsites will be about 200' x 250' in size during the drilling operations, and about 125' x 175' final size. There will be about 3 acres of timberland taken out of production. Two of the 4 wells CU 2-97

are on existing roads, the other 2 will need access roads about 200 to 500' in length.

The 8" gathering pipe will be about 1 mile long, connecting to twin 16" transmission pipelines going about 2.5 miles north to the existing compression and dehydration facilities at Miller Station. The pipelines will need an 80' construction right-of-way and a 40' permanent right-of-way, and will remove about 11 acres of timber land from production.

The 16" lines will cross both the Nehalem River and Highway 202 about 1 mile west of Mist. To avoid disturbing the river, the pipelines will be drilled 20' under the riverbed from points about 400' north and south of the river. The highway crossing will be done in cooperation with the Oregon Department of Transportation.

The twin 16" pipelines will cross two identified wetlands (National Wetlands Inventory, Marshland and Birkenfeld quad maps). The Nehalem River is designated R3UBH (Riverine, Upper Perennial, Unconsolidated Bottom, Permanent), but the pipelines will be drilled under the river and should not disturb it. The other wetland is in the level area north of Highway 202 near the base of the hills, and is designated PSSC (Palustrine, Scrub/Shrub, Seasonal). If this wetland is disturbed during construction of the pipeline, it will need to be restored as before, or a mitigation area will need to be constructed. The wellsites and 8" pipeline are on uplands and have no wetlands nearby.

The Nehalem River has a 100-year flood plain about 650' wide where the 16" pipelines will cross (FEMA maps 41009C0125 C and 41009C0250 C). Drilling the pipelines from points 400' north and south of the river centerline would appear to keep the operation outside the floodplain.

The property is within the Mist-Birkenfeld Rural Fire Protection District.

FINDINGS:

The following sections of the Zoning Ordinance and state laws are pertinent to this application:

Columbia County Zoning Ordinance Section 503 requires the following:

"Section 503 <u>Conditional Uses</u>; In the PF zone the following conditional uses and their accessory uses are permitted subject to the provisions of Sections 504 and 505. A conditional use shall be reviewed according to the procedures provided in Section 1503.

.2 Operations conducted for the exploration, mining, and processing of...mineral or subsurface resources not permitted outright."

<u>Finding 1:</u> In the PF-76 zone, the expansion of mineral resources mining facilities requires a Conditional Use Permit.

Zoning Ordinance Section 504 requires the following:

"Section 504 All Conditional Uses Permitted In The PF Zone Shall Meet The Following Requirements:

CU 2-97

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.1 The use is consistent with forest and farm uses and with the intent and purposes set forth in the Oregon Forest Practices Act."

The Oregon Forest Practices Act (ORS Chapter 527) includes the following:

"527.630 <u>Policy.</u> (1) ...it is declared to be the public policy of the State of Oregon to encourage economically efficient forest practices that assure the continuous growing and harvesting of torest tree species and the maintenance of forest land for such purposes as the leading use on privately owned land, consistent with sound management of soil, air, water and fish and wildlife resources that assures the continuous benefits of those resources for future generations of Oregonians."

<u>Finding 2</u>; The wellsites will remove about 5 acres from timber production during drilling, and about 2-3 acres permanently. The pipelines will theoretically remove about 17 acres from timber production (3.5 miles @ 40" wide = 16.97 acres); however, much of the 16" pipeline will follow an existing road right-of-way and cross pasture lands. The entire project should not remove more than 11 acres from production.

Continuing with Zoning Ordinance Section 504:

".2 The use will not significantly increase the cost, nor interfere with accepted forest management practices or farm uses on adjacent or nearby lands devoted to forest or farm use."

<u>Finding 3:</u> The proposed use will not intertere with farm or forest uses on adjacent lands if appropriate measures are taken to prevent fire from spreading to adjacent forests. Once the pipelines and wells are in place, there should be minimal disturbance of forest or farm activities on nearby and adjacent lands.

Continuing with Zoning Ordinance Section 504:

".3 The use will be limited to a site no larger than necessary to accommodate the activity and, as such will not materially after the stability of the overall land use pattern of the area or substantially limit or impair the permitted uses of surrounding properties. If necessary, measures will be taken to minimize potential negative effects on adjacent forest lands."

Finding 4: The wellsites and pipeline routes have been chosen to cover the minimum area necessary to accomplish their purpose. The overall land use pattern of the area is timber and natural gas production. Appropriate measures will need to be taken to minimize the danger of fire spreading to adjacent forest lands.

2-19-97

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Continuing with Zoning Ordinance Section 504:

".4 The use does not constitute an unnecessary fire hazard, and provides for fire safety measures in planning, design, construction, and operation."

<u>Finding 5:</u> Fire safety measures will need to be strictly enforced in planning, design, construction and occupation of the new wells and pipelines. Miller Station has many established fire detection and prevention facilities, including fire extinguishers, a 20,000 gallon water tank and an onsite fire truck. Applicants have consulted with the Mist-Birkenfeld RFPD, which has submitted a letter in favor of the project, stating that they are confident the project "...presents no unreasonable fire hazards."

Continuing with Zoning Ordinance Section 504:

".5 Public utilities are to develop or utilize rights-of-way that have the least adverse impact on forest resources. Existing rights-of-way are to be utilized wherever possible.

<u>Finding 6:</u> All public utilities are in place. The new 16" pipelines will follow an existing road for over half their length. The new 8" line will follow new routes.

Continuing with Zoning Ordinance Section 504:

".6 Development within major and peripheral big game ranges shall be sited to minimize the impact on big game habitat. To minimize the impact, structures shall: be located near existing roads; be as close as possible to existing structures on adjoining lots; and be clustered where several structures are proposed."

<u>Finding 7:</u> The area is a major big game range. During construction of the wells and pipelines, there will be unavoidable disturbance of big game, but this should be temporary. When completed, the wellsites and pipelines should occupy minimum timber land and should not disturb big game.

Zoning Ordinance Section 1503 requires the following:

"1503 Conditional Uses:

.5 <u>Granting a Permit:</u> The Commission may grant a Conditional Use Permit after conducting a public hearing, provided the applicant provides evidence substantiating that all the requirements of this ordinance relative to the proposed use are satisfied and demonstrates the proposed use also satisfies the following criteria:

CU 2-97

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A. The use is listed as a Conditional Use in the zone which is currently applied to the site:"

<u>Finding 8:</u> The PF-76 zone lists "Operations conducted for the exploration, mining, and processing of...mineral or subsurface resources not permitted outright" under Conditional Uses.

Continuing with Zoning Ordinance Section 1503.5:

"B. The use meets the specific criteria established in the underlying zone:"

<u>Finding 9:</u> The criteria of the PF-76 zone have been shown to be met in Findings 1 through 7.

Continuing with Zoning Ordinance Section 1503.5:

"C. The characteristics of the site are suitable for the proposed use considering size, shape, location, topography, existence of improvements, and natural features;"

<u>Finding 10:</u> The pipelines and wellsites have been located so as to minkrize the impact on wildlife, the Nehalem River, wetlands and timber production. The Mist Storage Area, including the Calvin Creek reservoir, is the only known location in the state that is suitable for natural gas storage.

These appear to make the site suitable for the proposed new wells and pipelines.

Continuing with Zoning Ordinance Section 1503.5:

"D. The site and proposed development is timely, considering the adequacy of transportation systems, public facilities, and services existing or planned for the area affected by the use."

<u>Finding 11:</u> The only transportation systems in the area are South Mainline Road, owned by Longview Fibre and used mostly for log trucking, other logging roads, and State Highway 202. Public facilities are electric power and telephone. These appear to make the proposed use timely, as no additional facilities will be required by the new wells and pipelines.

Continuing with Zoning Ordinance Section 1503.5:

"E. The proposed use will not alter the character of the surrounding area in a manner which substantially limits, impairs, or precludes the use of surrounding properties for the primary uses listed in the underlying district;"

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<u>Finding 12:</u> The surrounding area is in timber production. The proposed wells and pipelines, once constructed, will not alter the character of the area, as it will remain a timber and gas producing region of the county. Timber management operations should not be affected by the new facilities.

Continuing with Zoning Ordinance Section 1503.5:

"F. The proposal satisfies the goals and policies of the Comprehensive Plan which apply to the proposed use;"

<u>Finding 13:</u> The Columbia County Comprehensive Plan (CCCP) ENERGY SOURCES section includes these findings (p.224):

"Potential conflicting uses for natural gas wells in the County are minimized by the controls and regulations imposed by ODOGAMI [Oregon Department of Geology and Mineral Industries]. They are also minimized since wells are located in remote forested areas and surrounding property owners share in the profits of producing wells. The county will conserve forest lands for forest uses and allow operations conducted for the exploration, mining, and processing of subsurface resources as a conditional use. The County will rely on ODOGAMI to insure future protection of resources and surrounding lands."

The Energy Sources GOAL is (CCCP p.225):

"To protect deposits of energy materials in the County and prevent injury to surrounding lands and residents."

The new wells and pipelines will be regulated by DOGAMI rules, and will be used to transport and store natural gas to and from Miller Station. The Miller Station and its related facilities have been previously approved by the County as a way to prolong the useful life of the gas fields.

Continuing with Zoning Ordinance Section 1503.5:

"G. The proposal will not create any hazardous conditions."

<u>Finding 14:</u> The proposed new wells and pipelines should be no more hazardous than the existing facilities in the Mist gas field. Suitable precautions have been taken to detect and control fire and to prevent its spread to surrounding forest lands. Applicants have consulted with the Mist-Birkenfeld RFPD and have its full support.

Continuing with Zoning Ordinance Section 1503:

".6 <u>Design Review:</u> The Commission may require the Conditional Use be subject to a site design review by the Planning Commission."

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Finding 15: A Site Design Review is required for the new facilities; see DR 3-97.

The following state laws must also be met by this application:

Oregon Revised Statutes: ORS Chapter 527, the Oregon Forest Practices Act, contains no regulations for gas wells or their production facilities.

Oregon Administrative Rules: OAR 660-06-025(4) reads:

"The following uses may be allowed on forest lands subject to the review standards in section (5) of this rule:

(f) Mining and processing of oil, gas or other subsurface resources...not otherwise permitted under section (3)(m) of this rule (e.g., compressors, separators and storage serving multiple wells)..."

OAR 660-06-025(5) sets out the following requirements for non-forest uses in forest lands:

"(a) The proposed use will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agricultural or forest lands;"

<u>Finding 16:</u> The new wells and pipelines, once in place, should have minimal impact on farm and forest operations in the area.

Continuing with OAR 660-06-025(5):

"(b) The proposed use will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fir suppression personnel; and"

<u>Finding 17:</u> The new wells and pipelines will not require the Mist-Birkerrfeld RFPD to increase their equipment. Applicants have coordinated their fire fighting facilities with the RFPD and have its full support.

Continuing with OAR 660-06-025(5):

"(c) A written statement recorded with the deed or written contract with the county or its equivalent is obtained from the land owner which recognizes the rights of adjacent and nearby land owners to conduct forest operations consistent with the Forest Practices Act and Rules..." CU 2-97

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<u>Finding 18:</u> Recorded leases between the applicant and property owners recognize the applicant's right to conduct storage and processing operations without unnecessarily harming or limiting adjacent and nearby forest and agricultural operations.

COMMENTS:

- David Hill, County Public Works Director, has no objection to approval of the request as submitted.
- Dennis L. Olmstead, Petroleum Engineer, DOGAMI, has no objection to approval of the request as submitted.
- Jane Estes, Permit Specialist, ODOT District 2A, commented, "NW Natural Gas required to contact this office @ 229-5002 for permit to go under Nehalem Highway..."
- Rich Morse, County Building Official, has no objection to approval of the request as submitted.
- 5. Dave Crawford, Chief, Mist-Birkenfeld Rural Fire Protection District, is "...confident that the project has adequate personal safety features and...presents no unreasonable fire hazards."
- 6. Larry Potter, Natural Resources Coordinator, Clatsop and Columbia Counties, Oregon State Lands, has no objection to approval of the request as submitted, and commented, "I have been working with NW Gas for a year now to help address all their concerns and needs as far as state lands and waters of the state are concerned. As of this date, they have complied with all state rules and guidelines. Their cooperation is admirable. They still will need to acquire a lease from DSL and have submitted needed information to do so."

No other comments have been received from government agencies or nearby property owners as of the date of this staff report (February 19, 1997).

CONCLUSION AND RECOMMENDATION:

Based on the above findings, staff recommends APPROVAL of this request, with the following conditions:

1. Applicants shall provide Land Development Services with drawings showing the final locations of all wells and pipelines as constructed.

CU 2-97

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2. Applicants shall submit plans for avoiding, restoring or mitigating any wetlands crossed by the pipelines, or shall provide a letter from the Oregon Division of State Lands that all DSL's requirements have been met regarding wetlands in the area.

<u>Note</u>: ORS 671.025 requires that the plans and specifications for certain buildings in Oregori must have the stamp on them of a registered architect or registered professional engineer. Exceptions are (ORS 671.030(2):

- Single family residential buildings.
- 2. Farm buildings.
- 3. Accessory buildings to single family residences and farm buildings.
- 4. Buildings of 4,000 sq.ft. or less ground area.
- 5. Buildings with an interior height of 20' or less (top surface of lowest floor to highest interior overhead finish).
- 6. Non-structural alterations or repairs to a building.

The structures proposed in this application do not appear to be subject to ORS 671.025.

pw

Columbia County Planning Commission STAFF REPORT

Site Design Review - PF-76 and PA-38 Zones

FILE NUMBER:

DR 3-97

APPLICANT/OWNER:

Northwest Natural Gas Company

220 NW Second Avenue Portland, OR 97209

AGENTS:

Michael C. Robinson

Peter D. Mostow Stoel Rives LLP

900 SW Fifth Avenue, Ste. 2300

Portland, OR 97204-1268

PROPERTY LOCATION: Miller Station to Calvin Creek Gas Storage Area, southwest, west, and

northwest of Mist.

EQUEST:

(on up to 4 wells, tes) To construct up to Ainjection/withdrawal gas wells)in the Calvin Creek gas

field, and to connect them with the existing processing facilities at Miller

Station 3 miles northwest of Mist.

TAX ACCT. NUMBERS:

6500-000-02500, 02501, 02600, 04500, 04600, 04900, 05000;

6514-000-00100, 00900;

6515-000-00100, 00200, 00500;

6523-000-00500.

ZONING:

Primary Forest (PF-76) and Primary Agriculture (PA-38)

APPLIC'N, COMPLETE:

1-31-97

120 DAY DEADLINE:

5-31-97

WAIVER SIGNED?:

No.

BACKGROUND:

(con up to 4 well sites)

The applicants request approval to drill up to 4 new injection/withdrawal gas wells in the existing Calvin Creek gas field in order to store and withdraw natural gas as needed, and to construct an 8" gathering pipeline connected to twin 16" pipelines going north to Miller Station.

The wellsites will be about 200' x 250' in size during the drilling operations, and about 125' x 175' final size. There will be about 3 acres of timberland taken out of production. Two of the 4 wells are on existing roads, the other 2 will need access roads about 200 to 500' in length.

The 8" gathering pipe will be about 1 mile long, connecting to twin 16" transmission pipelines going about 2.5 miles north to the existing compression and dehydration facilities at Miller Station. The pipelines will need an 80' construction right-of-way and a 40' permanent right-of-way, and will remove about 11 acres of timber land from production.

The 16" lines will cross both the Nehalem River and Highway 202 about 1 mile west of Mist. To avoid disturbing the river, the pipelines will be drilled 20' under the riverbed from points about 400' north and south of the river. The highway crossing will be done in cooperation with the Oregon Department of Transportation.

The twin 16" pipelines will cross two identified wetlands (National Wetlands Inventory, Marshland and Birkenfeld quad maps). The Nehalem River is designated R3UBH (Riverine, Upper Perennial, Unconsolidated Bottom, Permanent), but the pipelines will be drilled under the river and should not disturb it. The other wetland is in the level area north of Highway 202 near the base of the hills, and is designated PSSC (Palustrine, Scrub/Shrub, Seasonal). If this wetland is disturbed during construction of the pipeline, it will need to be restored as before, or a mitigation area will need to be constructed. The wellsites and 8" pipeline are on uplands and have no wetlands nearby.

The Nehalem River has a 100-year flood plain about 650' wide where the 16" pipelines will cross (FEMA maps 41009C0125 C and 41009C0250 C). Drilling the pipelines from points 400' north and south of the river centerline would appear to keep the operation outside the floodplain.

The property is within the Mist-Birkenfeld Rural Fire Protection District.

FINDINGS:

The following sections of the Columbia County Zoning Ordinance are pertinent to this application:

"1550 <u>Site Design Review:</u> The Site Design Review process shall apply to all new development, redevelopment, expansion, or improvement of all Community, Governmental, Institutional, commercial and industrial uses in the county..."

Finding 1: The construction of industrial gas wells and pipelines requires a Site Design Review.

Continuing with Section 1550 of the Zoning Ordinance:

"1550.5 <u>Site Analysis Submittal (Existing Site Plan)</u>: The site analysis will provide the basis for the proper design relationship of the proposed development to the site and to adjacent properties. The degree of detail in the analysis shall be appropriate to the scale of the proposal, or to special site features requiring careful design... A site analysis plan shall include:

A. A vicinity map showing location of property in relation to adjacent properties, roads, pedestrian and bikeways, and utility access. Site features, manmade or natural, which cross property boundaries are to be shown.

- B. A site description map at a suitable scale (i.e. 1"=100'; 1"=50'; or 1"=20') showing parcel boundaries and gross area, including elements, when applicable:
 - 1. Contour lines at the following minimum intervals:
 - Two (2) foot intervals for slopes 0-20%;
 - Five (5) or ten (10) foot intervals for slopes exceeding 20%;
 - Identification of areas exceeding 35% slope.
 - Slope analysis showing portions of the site according to slope ranges as follows: 0-1-%, 10-20%, 20-35%, 35-50%, and 50%+. Approximate area calculations shall be made for areas more than 20% using the above categories. In special areas, such as Open Space, a more detailed slope analysis may be required. Sources for slope analysis include maps located at the U.S. Soil Conservation Service office.
 - Drainage, including adjacent lands.
 - Potential natural hazard areas, including potential flood or high ground water, landslide, erosion, drainageways, and weak foundation soils. An engineering geologic study may be required, pursuant to Section 206.
 - Marsh or wetland areas, underground springs, wildlife habitat areas, wooded areas, and surface features, such as mounds, large rock outcroppings.
 - Streams and stream corridors.
 - Location of wooded areas, significant clumps or groves of trees and specimen conifers, oaks and other large deciduous trees.
 - Noise sources.
 - Sun and wind exposure.
 - Significant views.
 - Existing structures, improvements, utilities, and easements, or other development."

Finding 2: Applicants have submitted maps, plans and written materials to satisfy the above requirements, insofar as they pertain to this application. Detailed site maps have not been provided

for each of the well sites, but Exhibit 6 of the application shows a typical wellsite layout. The pipeline route has not been shown in detail; however, it has been examined by a consulting firm (Dames and Moore) and appears to be the safest route impacting the least amount of timber land and the fewest number of problem areas.

Continuing with Section 1550 of the Zoning Ordinance:

"1550.6 <u>Preliminary Site Plan Submittal (Proposed Site Plan):</u> A complete application for design review shall be submitted. A project summary shall accompany when necessary to describe special circumstances, such as a request for minor exception to a development standard. Preliminary submittal shall include the following plans, which may be combined, as appropriate onto one or more drawings:

- A. <u>Site Plan:</u> The site plan shall be drawn at a suitable scale (i.e. 1"=100', 1"=50', or 1"=20') and shall include the following:
 - The applicant's entire property and the surrounding area to a distance sufficient to determine the relationships between the applicant's property and the proposed development and adjacent property and development;
 - 2. Boundary lines and dimensions for the property and all proposed lot lines. Future buildings in phased developments shall be indicated;
 - 3. Identification information, including names and addresses of project designers;
 - 4. Natural features which will be utilized in the site plan;
 - Location, dimensions, and names of all existing or platted streets or other public ways, easements, railroad rights-of-way, on or adjacent to the property, county limits, section lines and corners, and monuments;
 - Location and dimensions of all existing structures, improvements, or utilities to remain, and structures to be removed; all drawn to scale.
 - 7. Historic structures (County inventory);
 - Approximate location and size of storm water retention or detention facilities and storm drains;
 - Location and exterior dimensions of all proposed structures, and impervious surfaces;

- Location and dimension of parking and loading areas, pedestrian and bicycle circulation, and related access ways. Individual parking spaces shall be shown;
- 11. Orientation of structures showing windows and doors, entrances and exits;
- Lighting (specify type);
- Service areas for waste disposal, recycling, loading and delivery;
- Location of mail boxes."

<u>Finding 3:</u> Applicants have submitted maps, plans and written materials to satisfy the above requirements, insofar as they pertain to this application.

Continuing with Section 1550.6 of the Zoning Ordinance:

*B. <u>Grading Plans:</u> A preliminary grading plan indicating where and to what extent grading will take place, including general contour lines, slope ratios, slope stabilization proposals, and natural resource protection proposals."

<u>Finding 4:</u> Grading plans have not been submitted. The wellsites will have minimal grading to provide a stable area for the equipment. The pipeline route may also have minimal grading, although it has been chosen to require as little grading as possible.

Continuing with Section 1550.6 of the Zoning Ordinance:

- "C. Architectural Drawings:
 - Building elevations and sections;
 - Building materials (color and type);
 - Floor plan."

<u>Finding 5:</u> Architectural drawings have not been submitted. None seem necessary. Engineering drawings have been provided of a typical wellsite.

Continuing with Section 1550.6 of the Zoning Ordinance:

"D. Landscape Plan: The landscape plan shall be at the same scale as the site plan. All

identification information required on the site plan shall be shown on the landscape and open space plan. It shall show:

- Property and lot boundaries and rights-of-way;
- Structures and impervious surfaces, including parking lots;
- General landscape development plan, including the location of existing plants and groups of plants proposed;
- 4 Description of soil conditions and plans for soil treatment such as stockpiling of topsoil, addition of soil amendments, and plant selection requirements relating to soil conditions:
- Erosion controls, including plant materials and soil stability, if any;
- Imigation system (underground sprinklers or hose bibs);
- Landscape related structures such as fences, terraces, decks, patios, shelters, play areas, etc.;
- 8. Boundaries of open space, recreation or reserved areas to remain, access to open space and any alterations proposed;
- Location of pedestrian or bikeway circulation with landscaped area."

Finding 6: There will be no new landscaping.

Continuing with Section 1550.6 of the Zoning Ordinance:

"E. <u>Sians:</u>

- 1. Freestanding sign:
 - a. Location of sign on site plan;
 - b. Elevation of sign (indicate size, total height, height between bottom of sign and ground, color, materials, means of illumination;
- 2. On-building sign:
 - a. Building elevation with location of sign (indicating size, color, materials

and means of illumination);

 Plot plan showing location of signs on building in relation to adjoining property."

<u>Finding 7:</u> There will be no new signs.

COMMENTS:

- David Hill, County Public Works Director, has no objection to approval of the request as submitted.
- Dennis L. Olmstead, Petroleum Engineer, DOGAMI, has no objection to approval of the request as submitted.
- 3. Jane Estes, Permit Specialist, ODOT District 2A, commented, "NW Natural Gas required to contact this office @ 229-5002 for permit to go under Nehalem Highway..."
- Rich Morse, County Building Official, has no objection to approval of the request as submitted.
- Dave Crawford, Chief, Mist-Birkenfeld Rural Fire Protection District, is "...confident that the project has adequate personal safety features and...presents no unreasonable fire hazards."
- 6. Larry Potter, Natural Resources Coordinator, Clatsop and Columbia Counties, Oregon State Lands, has no objection to approval of the request as submitted, and commented, "I have been working with NW Gas for a year now to help address all their concerns and needs as far as state lands and waters of the state are concerned. As of this date, they have complied with all state rules and guidelines. Their cooperation is admirable. They still will need to acquire a lease from DSL and have submitted needed information to do so."

No other comments have been received from government agencies or nearby property owners as of the date of this staff report (February 19, 1997).

CONCLUSION AND RECOMMENDATION:

ased on the above findings, staff recommends APPROVAL of this request, with the following conditions:

Applicants shall provide Land Development Services with drawings showing the final 1. locations of all wells and pipelines as constructed.

Prior to construction,

/ Applicants shall submit plans for avoiding, restoring or mitigating any wetlands crossed 2. by the pipelines, or shall provide a letter from the Oregon Division of State Lands, that all DSL's requirements have been met regarding wetlands in the area.

Facility Siling

Note: ORS 671.025 requires that the plans and specifications for certain buildings in Oregon must have the stamp on them of a registered architect or registered professional engineer. Exceptions are (ORS 671.030(2):

- Single family residential buildings. 1.
- 2. Farm buildings.
- 3. Accessory buildings to single family residences and farm buildings.
- 4. Buildings of 4,000 sq.ft. or less ground area.
- Buildings with an interior height of 20' or less (top surface of lowest floor to highest 5. interior overhead finish).
- Non-structural alterations or repairs to a building. 6.

he structures proposed in this application do not appear to be subject to ORS 671.025.

pw

COLUMBIA COUNTY LAND DEVELOPMENT SERVICES

COUNTHOUSE ST. HELENS, OREGON 97051 AMEDINE (\$03) 347-1501

General App'n.			·	File No:	<u> </u>
	GENERAL LAND USE P	ERMIT APE	LICATI	ON	
TYPE OF PERMIT:	Zone Change	Temporar	y Permit	t	
-	X Site Design Review	Resource	Manage	ement Plan	
Other:					
	Northwest Natural Gas Comp	any (Attn	: Carl	a Kelley)	
Mailing addres	SS: 220 NW Second Avenue, Por	tland OR	97209	- 	
Phone No.: Of	fice (503) 721-2441	_ Home	N/A		
	property owner?own	ier's agenti	<u>x</u>	Permittee of all af	and/or Lesse fected owners
PROPERTY OWNER	Szsame as above, OR:				
Name: Ple	ase see property owned list i authorizing lease language in	n Exhibit	3 of at	tached appli	cation,
44-95 4-33-	in Exhibit 5.	Exhibit 4	i, and :	signed consen	t forms
Mailing Adores	·s:			·····	·····
PROPERTY ADDRE	SS (if assigned):				
	·				
					·
TAX ACCOUNT NO.:	See attached Exhibit 23	Acres:_	1 29 0	Zoning:	PF-76
-	SW/4 Section 14, lot 900	Acres:_	10	Zoning:_	PA-38
		Acres:_	,	Zoning:_	
PRESENT USES: (fai	π, forest, bush, residential, etc.)		•	•
Use:	in total book toneonial, out	•		Approx. Ac	res
Forest	•			1290	<u></u>
Farm			-	10	
			······································		1
<u> </u>					
					<u>. </u>
		• •		-	
	Total acres (must ag	ree with at	oove):		<u> </u>

General App'n.

File	No.	DR	3-97
------	-----	----	------

PROPOSED (JSES:
------------	-------

Underground natural gas	storage reservoir and related wells and pipeline
facilities	
WATER SUPPLY:Private w	reliCommunity systemx _ N/A
Name of community water s	ystem:
	Subsurface SepticCommunity. Is the property disposal system?YesNo _x _Not Applicable
CONTIGUOUS PROPERTY YOU (the property lines of this parcel): Tax Account No. Acres	OWN: (that is, all property you own with property lines touching Co-owners (if any)
2501 N 12.	.23 (Miller Station)
rue to the best of my knowledge ar Date: \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	statements, and all other documents submitted, are accurate and belief. gnature: and detailed plot plan, including property lines, existing and otic tank and drainfield, farm - forest areas, large natural features
	++++++++++++++++++++++++++++++++++++++
Date Rec'd. 1-28-97	P.C. Hearing Date: 3/3/97 Or: Administrative
Receipt No. 19317	
Coning: PF-76/PA-38	Staff Member. Pete Watson

COLUMBIA COUNTY LAND DEVELOPMENT SERVICES

COURTHOUSE ST. HELENS, OREGON 97051 (503)397-1501

FINAL ORDER and APPEAL INFORMATION

Applicant: NW Natural Gas Company File Number: CU 2-97

Planner: Pete Watson Notice Date: March 7, 1997

Appeal Body:

[] Planning Commission, for appeal of an administrative decision; file this appeal in the Land Development Services office, ground floor, Courthouse Annex, St. Helens, OR 97051;

[X] Board of County Commissioners, for appeal of a Planning Commission decision; file this appeal in the Office of the County Clerk, Second Floor, Courthouse Annex, St. Helens, OR 97051.

Attached is the FINAL ORDER on the application listed above. This decision, or any part of it, or any condition attached to it, may be appealed to the **Appeal Body** noted above.

An appeal must be filed within 10 calendar days of the above Notice Date, the date this notice was mailed to the applicant and to other persons entitled to notice.

If an appeal is filed, and after notice is given according to state and county laws, a de novo (new) public hearing will be held by the Appeal Body at their earliest available regular meeting. All interested parties will have an opportunity to appear and be heard.

If an appeal is not filed, this decision will become final 10 days after the above Notice Date.

Until the appeal period expires, the applicant may not take action on the application.

PLEASE NOTE: An appeal may be filed only by persons who have legal "standing". Please see Columbia County Zoning Ordinance Section 1700, ORS §197.763, and/or consult your attorney to be sure you have standing before appealing this decision. We regret we cannot give you a definition of "standing" since it is a legal matter which changes from time to time.

If you wish, you may file an appeal now and determine later if you have standing. However, your appeal fee might not be refunded if it is later determined that you did not have standing and your appeal is denied on those grounds.

If any of the above is not clear, or you have questions or require additional information, please contact the Planner listed above at (503) 397-1501, or FAX to their attention at (503) 366-3902.

BEFORE THE PLANNING COMMISSION COLUMBIA COUNTY, STATE OF OREGON

Conditional Use Permit CU 2-97

In the Matter of the Application of Northwest Natural)	
Gas Company for a Conditional Use Permit in the)	Final Order CU 2-97
Primary Forest and Primary Agriculture Zones)	

This matter came before the Columbia County Planning Commission on the application of Northwest Natural Gas Company for a Conditional Use Permit to allow the construction and operation of an underground storage reservoir and up to 16 gas wells on 4 well sites in the Mist Gas Storage Area, which includes the Calvin Creek Gas Field, and twin 8" and 16" pipelines to the Miller Station, in the PA-38 and PF-76 Zones.

The subject properties are located southwest, west and northwest of Mist and are described on the Assessor's records as Tax Account Numbers 6500-000-02500, 02501, 02600, 04500, 04600, 04900, and 05000; 6514-000-00100 and 00900; 6515-000-00100, 00200, and 00500; and 6523-000-00500.

A public hearing was held on March 3, 1997. The Planning Commission heard testimony from the applicant and all interested parties, and considered all written materials submitted and the Planning Commission staff report.

The Planning Commission hereby adopts the findings and conclusions in the attached Staff Report dated February 19, 1997, and orders this application for a Conditional Use Permit APPROVED with the following conditions:

- Applicants shall provide Land Development Services with drawings showing the final locations of all wells and pipelines as constructed.
- 2. Prior to construction, applicants shall submit plans for avoiding, restoring or mitigating any wetlands crossed by the pipelines, or shall provide documentation from the Oregon Division of State Lands or the Oregon Energy Facility Siting Council that all DSL's requirements have been met regarding wetlands in the area.

COLUMBIA COUNTY PLANNING COMMISSION

JEFFREY VANNATTA, CHAIRMAN

DATE

COLUMBIA COUNTY LAND DEVELOPMENT SERVICES

COURTHOUSE ST. HELENS, OREGON 97051 (503)397-1501

FINAL ORDER and APPEAL INFORMATION

Applicant: NW Natural Gas Company File Number: DR 3-97

Planner: Pete Watson Notice Date: March 7, 1997

Appeal Body:

[] Planning Commission, for appeal of an administrative decision; file this appeal in the Land Development Services office, ground floor, Courthouse Annex, St. Helens, OR 97051;

[X] Board of County Commissioners, for appeal of a Planning Commission decision; file this appeal in the Office of the County Clerk, Second Floor, Courthouse Annex, St. Helens, OR 97051.

Attached is the FINAL ORDER on the application listed above. This decision, or any part of it, or any condition attached to it, may be appealed to the **Appeal Body** noted above.

An appeal must be filed within 10 calendar days of the above Notice Date, the date this notice was ailed to the applicant and to other persons entitled to notice.

If an appeal is filed, and after notice is given according to state and county laws, a de novo (new) public hearing will be held by the Appeal Body at their earliest available regular meeting. All interested parties will have an opportunity to appear and be heard.

If an appeal is not filed, this decision will become final 10 days after the above Notice Date.

Until the appeal period expires, the applicant may not take action on the application.

PLEASE NOTE: An appeal may be filed only by persons who have legal "standing". Please see Columbia County Zoning Ordinance Section 1700, ORS §197.763, and/or consult your attorney to be sure you have standing before appealing this decision. We regret we cannot give you a definition of "standing" since it is a legal matter which changes from time to time.

If you wish, you may file an appeal now and determine later if you have standing. However, your appeal fee might not be refunded if it is later determined that you did not have standing and your appeal is denied on those grounds.

If any of the above is not clear, or you have questions or require additional information, please contact the Planner listed above at (503) 397-1501, or FAX to their attention at (503) 366-3902.

STOEL RIVES LLP
By CAT 3-10-97

BEFORE THE PLANNING COMMISSION COLUMBIA COUNTY, STATE OF OREGON

Site Design Review 3-97

In the Matter of the Application of Northwest Natural)	
Gas Company for a Site Design Review in the)	Final Order DR 3-97
Primary Forest and Primary Agriculture Zones)	

This matter came before the Columbia County Planning Commission on the application of Northwest Natural Gas Company for a Site Design Review to allow the construction and operation of an underground storage reservoir and up to 16 gas wells on 4 well sites in the Mist Gas Storage Area, which includes the Calvin Creek Gas Field, and twin 8" and 16" pipelines to the Miller Station, in the PA-38 and PF-76 Zones.

The subject properties are located southwest, west and northwest of Mist and are described on the Assessor's records as Tax Account Numbers 6500-000-02500, 02501, 02600, 04500, 04600, 04900, and 05000; 6514-000-00100 and 00900; 6515-000-00100, 00200, and 00500; and 6523-000-00500.

A public hearing was held on March 3, 1997. The Planning Commission heard testimony from the applicant and all interested parties, and considered all written materials submitted and the Planning Commission staff report.

The Planning Commission hereby adopts the findings and conclusions in the attached Staff Report dated February 19, 1997, and orders this application for a Site Design Review APPROVED with the following conditions:

- Applicants shall provide Land Development Services with drawings showing the final locations of all wells and pipelines as constructed.
- 2. Prior to construction, applicants shall submit plans for avoiding, restoring or mitigating any wetlands crossed by the pipelines, or shall provide documentation from the Oregon Division of State Lands or the Oregon Energy Facility Siting Council that all DSL's requirements have been met regarding wetlands in the area.

COLUMBIA COUNTY PLANNING COMMISSION

JEFFREY VANNATTA, CHAIRMAN

DATE



Environmental Studies Report Mist Underground Storage Expansion Project Mist, Oregon

for

Northwest Natural Gas February 24, 1997 Job No. 02114-017-020

Seattle, Washington



500 Market Piace Tower 2025 1st Avenue Seattle, Washington 98121 206 728 0744 Tel 206 727 3350 Fax

February 20, 1997

Mr. Michael Hayward Northwest Natural Gas 220 N.W. Second Avenue Portland, OR 97209

> Mist Underground Storage Project Environmental Studies Report

Dear Mr. Hayward:

Transmitted herewith are nine copies of the report covering the environmental studies we were tasked to conduct. The studies provide information and conclusions to be used in the EFSC permit amendment application and may also be useful for other permit or compliance purposes. Please call if there are questions or if additional information is needed.

Sincerely, Dames & Moore

A. David Every Project Manager

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Environmental Studies Report Mist Underground Storage Expansion Project Mist, Oregon

This report is presented in five sections covering: Protected Areas; Fish and Wildlife Habitat; Threatened and Endangered Species; Historical, Cultural, and Archaeological Resources; and Wetlands. Each section is written as a stand-alone document to address different permit issues or permits.

1.0 PROTECTED AREAS

With reference to OAR 345-22-040, the Mist Storage Expansion Project will not be located in or near any of the listed protected areas. (a) National Parks - more than 90 miles to Mt. Rainier. (b) National Monuments - more than 40 miles to Mt. St. Helens. (c) Wilderness Areas (designated or recommended) - more than 90 miles to Goat Rocks Wilderness. (d) National or State wildlife refuge - more than 20 miles to the nearest refuge on the Columbia River. (e) National coordination areas - none in the general area. (f) National and State fish hatcheries - none in the general area. (g) National Recreation and Scenic Areas - more than 50 miles to the Columbia Gorge National Scenic Area. (h) State Parks and Waysides - none in the general area. (i) State Natural Heritage Areas - none in the general area. (j) State Estuarine Sanctuaries - more than 15 miles to the nearest one. (k) Scenic Waterways - none in the general area. (l) Experimental Rangeland Areas - none in the general area. (m) Agricultural Experiment Stations - none in the general area. (n) Research Forests - none in the general area. (o) BLM Areas of Critical Concern - none in the general area. (p) State Wildlife or Management Areas - none in the general area.

The design, construction, and operation of the Mist Storage Expansion Project is not likely to result in any discernible adverse impact to any of the protected areas listed in (a) through (p) above.

2.0 FISH AND WILDLIFE HABITAT

A site-specific biological resource investigation was initiated on February 4, 1997 with a field reconnaissance of the entire proposed pipeline corridor length by Dr. David Every, a Dames & Moore Senior Ecologist. Habitats have been mapped using aerial photographs and described from the field observations during the field visit (See Figure 1).

2.1 MAJOR ECOLOGICAL COMMUNITIES OR HABITATS

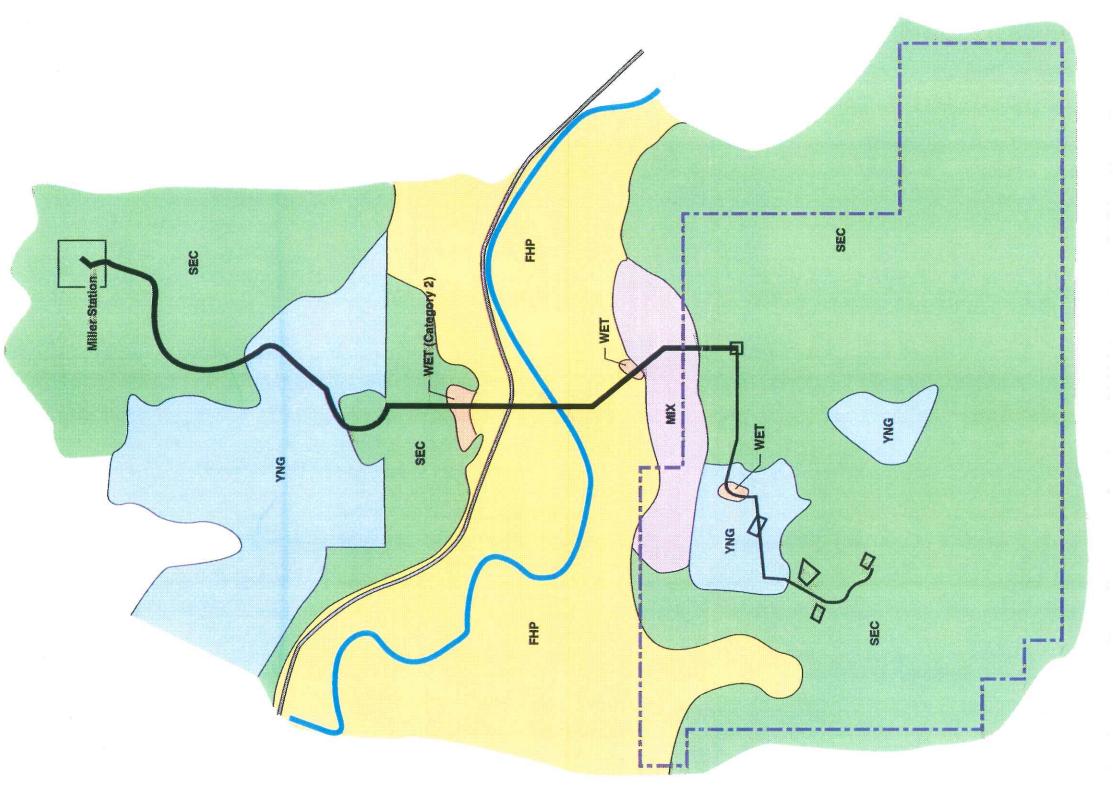
The pipelines of the Mist underground storage expansion project will extend through five major ecological community or habitat types. Both ends of the project are in second growth conifer forest ranging in age from about 20 years to about 50 years. It also will go through two regenerating clearcut areas with trees 5 to 10 years old. On the hill on the south side of the Nehalem Valley, the pipeline will cross a stand of mixed conifer and deciduous forest. Through the Nehalem Valley it will traverse cultivated hay and pasture fields. The crossing of the Nehalem River will be by horizontal directional drilling, so no additional habitats will be affected at that point. On each side of the valley and in two other spots, wetlands will be crossed. Each of these habitat types is described below.

2.1.1 Second Growth Conifer Forest

Some of these forest stands are actually third generation rather than second from the original logging, as they clearly contain two generations of stumps. Douglas fir (Pseudotsuga menziesii) is the dominant tree species, joined in much lower numbers by western red cedar (Thuja plicata), western hemlock (Tsuga heterophylla), and grand fir (Abies grandis). The dominant understory is variable, but includes salmonberry (Rubus spectabilis), salal (Gaultheria shallon), vine maple (Acer circinatum), long-leaved Oregon grape (Berberis nervosa), trailing blackberry (Rubus ursinus), deer fern (Blechnum spicant), and sword fern (Polystichum munitum). The canopy is closed, and the understory is sparse in the younger stands. In the older stands (up to 50 years) it appears that precommercial thinning has opened the canopy slightly, allowing better development of understory shrubs and herbs. The habitat is basically two layered or weakly three layered in structure, and there are very few remnant snags and downed logs as additional habitat structure components.

2.1.2 Mixed Conifer/Deciduous Forest

This stand is also a second-growth stand not more than about 50 years old. The dominant tree species include Douglas fir, bigleaf maple (Acer macrophyllum), western red cedar, red alder (Alnus rubra), and western hemlock. The dominant understory species include the species listed for the second growth conifer stands with the addition of ocean spray (Holodiscus discolor). Many of the cedar and hemlock trees are younger than the overstory, forming a scattered tree layer below the mixed canopy. The understory shrub and herb layer is well developed, but not diverse. There are very few conifer snags, but a few of the deciduous trees are becoming decadent and developing smaller snags.



KEY

Proposed Pipeline Alignment

Proposed Gathering Line Alignment

Proposed Wellsite Locations

Approx. Calvin Ck. Storage Pool Boundary

Nehalem River

VEGETATION TYPES

SEC - Second Growth Conifer Forest - 20-50 Years Old (Category 4)

YNG -Young Conifer Forest (Category 4)

MIX -Mixed Conifer/Deciduous Forest (Category 4)

WET --Wetlands (Category 4, except as indicated) FHP -Farmed Hay & Pasture (Category 4)

1500 Feet

NATIVE VEGETATION MAP

NATIVE VOCATION NATURAL Gas
Northwest Natural Gas
Mist Underground Storage Project
Mist, Oregon February 1997 2114-017-020

2.1.3 Regenerating Clearcuts

The more recent clearcut harvest areas are regenerating a forest cover dominated by Douglas fir with a scattering of other conifer species and deciduous species in places as in the older second growth stands. The trees are mostly 5 to 10 years old, and the understory has more species than the older stands. Additional understory species include Himalayan and evergreen blackberries (Rubus discolor and R. laciniatus), blackcap (Rubus leucodermis), bracken fern (Pteridium aquilinum), fireweed (Epilobium angustifolium), and bleeding heart (Dicentra formosa). The canopy is not closed and the habitat has a rather open appearance. Scattered remnant tall stumps are visible. Logging roads remain as open corridors.

2.1.4 Farmed Hay and Pasture

The farmed areas crossed in the Nehalem Valley are dominated by grasses (mostly introduced species). Species include smooth brome (*Bromus inermis*), tall fescue (*Festuca arundinacea*), Kentucky bluegrass (*Poa pratensis*), perennial rye (*Lolium perenne*), and redtop (*Agrostis alba*). Scattered weeds common to agricultural areas also occur. Fence rows are generally devoid of shrubs and trees, and there is very little habitat diversity.

2.1.5 Nehalem River (Not affected by project)

The river is an undammed anadromous fish stream. At the crossing location, the banks are valley alluvium of a sandy texture, and the stream bottom is bedrock. The shores have willows (Salix sitchensis) as dominants, providing some instream cover.

2.1.6 Small Tributary Streams

One small unnamed tributary of the Nehalem River will be crossed in the valley south of the river. The crossing is in a heavily used pasture, and the stream is severely affected by the cattle. At the crossing point there is no instream cover, the banks and stream substrate are mostly trampled soil with a few blackberry bushes back from the stream edge, and a farm road with a small culvert crosses slightly downstream. A second, smaller tributary is crossed on the plateau south of the river valley. Its channel is one to two feet across, the water depth is up to eight inches, and the substrate is sandy clay soil. The crossing is within 100 yards of the headwaters where the stream seeps from a wetland. A similar sized tributary of Calvin Creek will be crossed just upstream of Barnhardt Road. The culvert where the tributary goes under the road is perched three or four feet above the level of Calvin Creek.

2.1.7 Wetlands

Most of the wetlands crossed by the pipelines are palustrine emergent wetlands that have been severely affected by man's activities. One has a logging road through its length and is dominated by common or soft rush (*Juncus effusus*). Another is in a pasture and is dominated by creeping buttercup (*Ranunculus repens*) and redtop grass.)ne is in a hay field dominated by the hay grass species.

One wetland, located north of the hay field and Highway 202, is part of a larger wetland complex with at least three types of cover. At the location of the crossing, the wetland is dominated by slough sedge (Carex obnupta) and has standing water seasonally. One edge is shrub dominated, the main shrub species being ninebark (Physocarpus capitatus). Elsewhere in the wetland complex (outside the construction corridor) parts are dominated by willows (Salix lasiandra and S. sitchensis). This wetland is already crossed by one gas pipeline at the proposed crossing location, which was installed about 10 years or more ago. The vegetative cover has completely recovered, leaving no sign of the earlier disturbance. There is also an adjacent access road that crosses the wetland using a culvert to pass the water flow in the wetland. This wetland appears to be excellent habitat for amphibians and birds.

2.2 HABITAT CATEGORIES

The habitat categories assigned here are based on professional judgement considering the common wildlife and fish species likely to use those habitats. Evaluation species have not been formally selected. The habitat categories for each of the described habitats are:

- Second growth conifer forest These areas would be Category 4, low value, because they are on private timber land as tree farms. They have had and will continue to have the habitat value severely affected by timber harvest activities.
- Second growth mixed conifer/deciduous forest These areas would be the same category as the second growth conifer forest for the same reasons.
- Regenerating clearcuts These areas would be the same category as the second growth conifer forest for the same reasons.
- Farmed hay and pasture These areas would clearly be Category 4, low habitat value.

- Nehalem River This habitat would be Category 2 or Category 1 (if the coho salmon or steelhead become listed as threatened).
- Small tributaries These habitats would be Category 4 because of the degraded nature and/or blockage to fish passage.
- Wetlands All of the affected wetlands except the large one north of Highway 202 and the hay field are degraded and would be Category 4. The large wetland would be a Category 2 habitat.

2.3 POTENTIALLY AFFECTED FISH AND WILDLIFE SPECIES

The wildlife species that use the habitats that will be affected are the common species of the coastal region of Oregon. Large mammals include elk and black-tailed deer. Coyotes are a common predator, joined by weasels and mink. River otters may occur in the vicinity. The small mammal compliment includes red squirrels, deer mice, jumping mice, shrews, moles, voles and other small rodents. Birds include red-tailed hawks, crows, robins, song sparrows, chickadees, and a wide assortment of species that occupy forest habitats.

Fish species in the Nehalem River and its tributaries include coho salmon, steelhead, searun cutthroat trout, and likely several less notable species, such as sculpins, suckers, and brook lamprey.

2.4 POTENTIAL IMPACTS

Impacts to upland forested habitats will include the removal of vegetative cover and temporary disturbance of the soil in the trench and of the adjacent surface from movement of construction equipment. The vegetation cover will be allowed/encouraged to grow back in all of the construction corridor except the area directly over the pipes, which must be kept open for visual inspections. Thus the impact to forested habitat in the part of the corridor not containing the pipes will be temporary, and the habitat value would be gradually restored over time to the level allowed in a tree farm operation. In the area directly over the pipes (e.g. up to 30 feet) trees will be discouraged, but other vegetation will be encouraged to prevent erosion and provide some habitat value.

In farmed areas, the surface will be restored, and the land will be allowed to be farmed as before. In this case, the impacts are small and very short term.

No impacts will occur to the Nehalem River because the crossing will be by horizontal directional drilling. The impacts to tributaries will be very small because crossings will be done during the low flow period, and the stream bed and banks will be restored quickly. None of the tributaries are particularly sensitive at the crossing locations.

Impacts to wetlands will be short term because the wetlands will be restored soon after construction is complete. Best management practices will be used during construction to minimize impacts, including separating the upper 6 to 12 inches of topsoil from the rest of the trench spoils and putting it back in the top of the trench, using filtering materials to remove sediment from any water pumped from the trench during construction before returning it to the wetland, and minimizing the amount of time and area that equipment is in the wetland.

2.5 MITIGATION MEASURES AND COMPLIANCE WITH GOALS AND STANDARDS

Category 2 or 1 habitat at the Nehalem River will have impacts avoided by directionally drilling for the crossing. This is in compliance with the goal of no loss of either habitat units or habitat value.

Category 2 habitat at the largest wetland will have impacts minimized during construction by placing the pipes as close together as possible, constructing during the driest time of year, separating and returning topsoil to the trench backfill surface, being careful not to change the hydrology of the wetland, and staying out of the rest of the wetland. The habitat will be restored as construction is completed. Within one or two growing seasons the wetland should be functionally the same as before construction. This also complies with the mitigation goals of no loss of either habitat units or habitat value.

The remaining affected habitats are Category 4. The losses will be minimized and the habitats restored to the extent possible. This complies with the mitigation goals and standards for the category.

3.0 THREATENED AND ENDANGERED SPECIES

In addition to fulfilling the requirements of the EFSC permit amendment application, this report can serve as a Biological Evaluation for the purposes of consultation under Section 7 of the Endangered Species Act.

3.1 THE PROPOSED ACTIONS

The 1997 Mist Storage Expansion Project will construct about 2.5 miles of double 16-inch high pressure gas pipelines extending generally south from the Miller Station in Section 11, Township 6 North, Range 5 West going through Sections 11, 14, 15, and into 23. The two 16-inch pipes will be installed in separate trenches 10 feet apart or in a common trench about seven feet wide. The crossing of the Nehalem River will be by horizontal directional drilling under the river. From the southern terminus of the 16-inch lines, 8-inch gathering lines will extend about a mile west and south in Section 22 to connect with the wells. Where two 8-inch lines are together, they will also be 10 feet apart in separate trenches or in a common trench to the point where they diverge to different wells. The construction corridor will be 80 feet wide to accommodate the construction equipment, pipe stringing, spoil piles and other trench materials, and access. Two to four new well pads will also be constructed.

3.2 ENVIRONMENTAL SETTING

The route goes through conifer regrowth areas with trees from 5 to 25 years old, through two stands of 40 to 50 year old conifers, and one stand of 40 to 50 year old mixed conifer and deciduous forest. The area is privately owned forest land that has evidence (stumps) of being harvested twice. The route also crosses agricultural lands (hay and pasture) in the Nehalem valley on each side of the Nehalem River. The directionally drilled crossing of the river will be from a pasture on one side of the river to a pasture on the other side. One small unnamed tributary of the Nehalem River will be crossed in the valley south of the river. The crossing is in a heavily used pasture, and the stream is severely affected by the cattle. At the crossing point there is no instream cover, the banks and stream substrate are mostly trampled soil, and a farm road with a small culvert crosses slightly downstream. A second, smaller tributary is crossed on the plateau south of the river valley. Its channel is one to two feet across, the water depth is up to eight inches, and the substrate is sandy clay soil. The crossing is within 100 yards of the headwaters where the stream seeps from a wetland. A similar sized tributary of Calvin Creek will be crossed just upstream of Barnhardt Road. The culvert where the tributary goes under the road is perched three or four feet above the level of Calvin Creek. Five wetlands are crossed, three of which have been substantially affected by agriculture or logging roads. One of the others is very small and adjacent to Barnhardt Road. The fifth is part of a larger system, but the crossing will be adjacent to an existing gas pipeline through a narrow part of the wetland that is primarily dominated by slough sedge (the vegetation completely recovered from the earlier pipeline installation).

3.3 AGENCY CONTACTS

Information concerning threatened and endangered species and habitats was requested and received from the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Oregon Natural Heritage Program. Their letters of response are enclosed in Appendix A.

3.4 SPECIES ADDRESSED

3.4.1 Listed Species

Birds

Aleutian Canada goose (Branta canadensis leucopareia) Threatened
peregrine falcon (Falco peregrinus) Endangered
bald eagle (Haliaeetus leucocephalus) Threatened
northern spotted owl (Strix occidentalis caurina) Threatened, with critical habitat
designated

Plants

Nelson's checker-mallow (Sidalcea nelsoniana) Threatened

3.4.2 Proposed Species

Fish

coho salmon (coastal) (Oncorhynchus kisutch) Proposed Threatened steelhead (Oregon coast) (Oncorhynchus mykiss) Proposed Threatened

3.4.3 Species of Concern Also Considered

Mammals

white-footed vole (Arborimus albipes)
Pacific fisher (Martes pennanti pacifica)
long-eared myotis (Myotis evotis)
fringed myotis (Myotis thysanodes)
long-legged myotis (Myotis volans)
Yuma myotis (Myotis yumanensis)
Pacific western big-eared bat (Plecotus townsendii townsendii)

Birds

little willow flycatcher (Empidonax traillii brewsteri)

Amphibians and Reptiles

tailed frog (Ascaphus truei)
northwestern pond turtle (Clemmys marmorata marmorata)
northern red-legged frog (Rana aurora aurora)

Fish

Pacific lamprey (Lampreta tridentata)

Plants

tall bugbane (Cimicifuga elata)

3.4.4 Species Accounts from the Literature

Aleutian Canada Goose (Branta canadensis leucopareia)

Status: The Aleutian Canada goose is federally listed as threatened. It was downlisted from endangered to threatened status in 1990.

Background Information: Aleutian Canada geese breed exclusively on a small number of the Aleutian Islands. They leave the breeding grounds in September to migrate to the west coast of the U.S. and south to California for wintering. During migration and on wintering grounds, the geese are commonly found in marshes, harvested agricultural fields, and on flood-irrigated and nonirrigated farm lands. They leave the wintering areas in April and migrate along the coast going north.

Populations in Project area: The only likely habitat for the Aleutian Canada goose in the project area would be in the hay and pasture areas in the Nehalem valley bottom. These habitats are not ideal, and the likelihood of their being used by the geese is small.

Peregrine Falcon (Falco peregrinus)

Status: The American peregrine falcon is federally listed as endangered.

Background Information: The peregrine falcon is found across North America from northern Alaska and Canada south to southern Baja California, the coast of Sonora, and into Central and South America (AOU 1983). This species is an uncommon permanent resident in the state of Oregon and is generally seen as a migrant and winter visitor. It is more common along the Pacific Ocean and less common east of the Cascade Mountains (Larrison and Sonnenberg 1968).

The peregrine falcon is found in a variety of open habitats including, tundra, steppe, high mountainous areas, and open forested regions. They nest on cliffs and forage on birds which are caught on wing generally in open areas. Nesting normally occurs from March to June when 3-4 eggs are laid in a nest the birds do not build (Terres 1991). Cliff ledges, tree branches, or other species' nests serve as nest sites.

The reason for this species' decline is reproductive failure due to pesticide contamination. Nationwide population declines in the 1950's and 1960's appear to have been reversed in recent years due to a ban on DDT and related pesticides and reintroduction efforts including hacking programs in many major cities.

Populations in Project area: Peregrine falcons could be brief visitors to the project area as they fly past during migration. There are no known nesting areas in the general area.

Bald Eagle (Haliaeetus leucocephalus)

Status: The bald eagle is listed as threatened by the FWS.

Background Information: The bald eagle is found breeding from central Alaska south through Canada and in the United States from the west coast to the Florida Keys, south to Texas, Arizona, New Mexico and into Baja California (AOU 1983). Bald eagles occur in Oregon as residents near large waters west of the Cascade Mountains. (Rodrick and Milner 1991). Birds wintering in Oregon are found along the major rivers.

Habitat is primarily near seacoasts and rivers and lakes. The breeding habitats of this species include nest sites in large trees within a kilometer of water and free from disturbances (Johnsgard 1990). Perching habitat for wintering and nesting bald eagles consists of large trees and snags along rivers and streams which provide food stocks for eagles, primarily in the form of anadromous and resident fish. Other important food items include waterfowl, rabbits, and carrion (FWS 1986).

Nesting birds build their large stick nest in mature or old growth trees, which may be used in successive years. Courtship and nesting in Oregon start around January or February. Eggs are laid in March or April with young hatching in April or May. The young fledge by mid-July but remain in the nest area for another month (Rodrick and Milner 1991).

Threats to bald eagles include human encroachment, shooting, lead poisoning, and general habitat alteration.

Populations in Project area: No bald eagle nests are known in the vicinity of the project. This heavily harvested timber area has few suitable nest trees. Wintering eagles are more likely along the Nehalem River.

Northern Spotted Owl (Strix occidentalis caurina)

Status: The northern spotted owl is federally listed as threatened with designated critical habitat.

Background Information: Spotted owls occur in mountainous and humid coastal forests from southwestern British Columbia, south through western Washington and western Oregon, to southern California and possibly northern Baja California; and in the Rocky Mountains from southern Utah and southwestern Colorado, south to the mountains of Arizona, New Mexico, and western Texas, and south into northern and central Mexico (AOU 1983).

This species is dependent on stands of mature and old-growth forest with a multi-layered canopy (Johnsgard 1988). Spotted owls occupy northern interior forests with a moderate to high canopy closure, a multi-layered multi-species canopy with large trees, a high degree of deformities in large trees, large snags, fallen trees and other debris on the ground, and open space below the canopy (Jackson et al. 1995). Spotted owls prey on forest species such as flying squirrels, wood rats, hares or rabbits, other small mammals, birds, and some reptiles and invertebrates (Johnsgard 1988).

Spotted owls generally nest in tree cavities or on stick platforms or other debris in old growth conifer trees. Resident owls start roosting near nesting territories in February or early March with actual egg laying occurring March to May (Terres 1991). Generally two eggs are laid and hatch about a month after being laid.

The primary threat to this species is the loss of habitat from forest management practices (Johnsgard 1988).

Critical Habitat Units: Critical habitat units have been designated in Columbia County, but not in the immediate vicinity or the proposed project.

Populations in Project area: Fewer than 50 pairs of spotted owls are known from western Oregon between Corvallis and the Columbia River. None are known from the vicinity and none are likely to occupy the project area because there is a complete lack of mature or old-growth forest stands with the habitat characteristics needed by the species.

Nelson's checker-mallow (Sidalcea nelsoniana)

Status: Nelson's checker-mallow is federally listed as threatened.

Background Information: The Nelson's checker-mallow is typically found in the grasslands of the northern Willamette Valley. One population was recently reported from southwestern Washington. It is found growing among tall grasses. Flowering occurs from late May through June. In 1979, only two small populations were known, but more and more have been discovered. Four to five new locations have been found each year for the last five years.

Populations in Project area: No grassland habitats occur in the project area. Therefore, it is extremely unlikely that this species occurs there.

Coho Salmon (coastal) (Oncorhynchus kisutch)

Status: The coast coho salmon is proposed for federal listing as threatened.

Background Information: Oregon coastal coho spawn primarily in November or December. The eggs incubate through the winter in the gravel of the stream and hatch in 1.5 to 4 months, depending on stream temperature. The young emerge in 2 to 10 weeks after hatching and spend usually about one year in fresh water, seeking small tributaries and backwaters with good cover and food availability. The spring following their emergence from the gravel, they make the transition to salt water where they spend usually two years before returning to spawn. These stocks of coho have been declining in numbers for several years.

Populations in Project area: Coho occurrence is expected in Calvin Creek and Lindgren Creek, and has been confirmed in Messing Creek and Lundgren. These tributaries of the Nehalem River bracket and include the project area.

Steelhead (Oregon coast) (Oncorhynchus mykiss)

Status: The Oregon coast steelhead is proposed for federal listing as threatened.

Background Information: Steelhead typically migrate to marine waters after spending 2 years in fresh water. They reside in marine waters for typically 2 or 3 years before returning to their natal stream to spawn as 4- or 5-year olds. Steelhead are capable of spawning more than once before they die, but it is rare for them to spawn more than twice. Spawning typically occurs between December and June. Eggs incubate for 1.5 to 4 months and the young emerge within a few weeks after hatching.

Populations in Project area: Winter run steelhead occur in the Nehalem River in the area of the project.

3.5 FIELD RECONNAISSANCE

On February 4, 1997, the entire route was walked by Dr. David Every to look for evidence of use of the area by any of the species addressed in this report or any other species of note. Habitats were observed and compared with the habitat types expected to be used by the subject species. No evidence was found of any of the bird, mammal, or plant species or habitat suitable for them that would be affected by the Mist Storage project. Incidental visits to the project area by migratory species can not be ruled out, but such use of the area would not be affected by the project.

3.6 CONCLUSIONS

Listed Species:

Birds

Aleutian Canada goose (Branta canadensis leucopareia) Threatened

Very unlikely to be affected. The Aleutian Canada goose passes through this area during spring and fall migration (generally April and October), and may use fields and wetlands as resting and feeding areas. The fields and wetlands in the project area that will be affected by construction of the pipeline and facilities are small and either near houses and farm buildings or near cover for potential predators, therefore, not likely to be attractive to the geese. Thus, pipeline construction, even if it occurs during migration time, would only make an already unattractive site less inviting to the geese. There are plenty of more attractive sites in the valley and elsewhere, so pipeline construction would not restrict the use of habitat in limited supply.

peregrine falcon (Falco peregrinus) Endangered

Very unlikely to be affected. It uses this area only in passing during migration if at all. No affected habitat offers either prey items in abundance or other habitat features of importance to migrating peregrine falcons.

bald eagle (Haliaeetus leucocephalus) Threatened

Very unlikely to be affected. No nests are in the near area, and migrating birds would not be there during construction.

northern spotted owl (Strix occidentalis caurina) Threatened, with critical habitat designated

Very unlikely to be affected. The forests in this area are young and not suitable for spotted owl nesting. The small amount of forest removed will not affect the spotted owl.

Plants

Nelson's checker-mallow (Sidalcea nelsoniana) Threatened

Very unlikely to be affected. No suitable habitat occurs in the corridor.

Proposed Species:

Fish

coho salmon (coastal) (Oncorhynchus kisutch) Proposed Threatened

Very unlikely to be affected. The Nehalem River will be crossed by directional drilling, and the small tributaries will be crossed during low flow and restored. One of the unnamed tributaries goes through an active cow pasture, and the stream has no instream cover for fish. The other tributaries are very small and have steep approaches to their confluence with the Nehalem River. They will probably be dry during the period of construction, and since the stream bed will be restored and protected from erosion, there will be very small or no effect on aquatic resources in the streams.

steelhead (Oregon coast) (Oncorhynchus mykiss) Proposed Threatened

Very unlikely to be affected. The Nehalem River will be crossed by directional drilling, and the small tributaries will be crossed during low flow and restored. One of the unnamed tributaries goes through an active cow pasture, and the stream has no instream cover for fish. The other tributaries are very small and have steep approaches to their confluence with the Nehalem River. They will probably be dry during the period of construction, and since the stream bed will be restored and protected from erosion, there will be very small or no effect on aquatic resources in the streams.

Species of Concern Also Considered

Mammals

white-footed vole (Arborimus albipes)

Very unlikely to be affected. In this already disturbed series of habitats, the temporary effects of the pipeline construction will be imperceptible.

Pacific fisher (Martes pennanti pacifica)

Very unlikely to be affected. In this already disturbed series of habitats, the temporary effects of the pipeline construction will be imperceptible.

long-eared myotis (Myotis evotis) fringed myotis (Myotis thysanodes) long-legged myotis (Myotis volans) Yuma myotis (Myotis yumanensis) Pacific western big-eared bat (Plecotus townsendii townsendii)

None of these bat species are likely to be affected. There is no ideal roosting habitat to be disturbed, and any incidental use of the existing habitats by bats will be unaffected by the project.

Birds

little willow flycatcher (Empidonax traillii brewsteri)

Not likely to be affected if it occurs in the project area. The most likely habitat is along the river where directional drilling will avoid impacts. Construction would occur in late summer to fall, so no nesting activity would be disrupted.

Amphibians and Reptiles

tailed frog (Ascaphus truei)

Will not be affected. No suitable habitat for this species will be affected by the project.

northwestern pond turtle (Clemmys marmorata marmorata)

Will not be affected. No suitable habitat for this species will be affected by the project.

northern red-legged frog (Rana aurora aurora)

Suitable habitat for this species occurs along the Nehalem River and in one wetland complex that will be crossed by the pipeline. It is unlikely that any population of the species will be affected, since construction will occur in late summer to fall and reproduction will not be affected.

Fish

Pacific lamprey (Lampreta tridentata)

Will not be affected. The Nehalem River will be crossed by directional drilling, and the small tributaries will be crossed during low flow and restored.

Plants

tall bugbane (Cimicifuga elata)

Not likely to be affected. Habitat in the corridor is generally suitable, but has

undergone logging more than once. No indication of the species was found during field reconnaissance by a competent botanist in February, 1997.

4.0 HISTORICAL, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

4.1 PREHISTORY

The proposed pipeline lies within the ethnographic territory of the Clatskanie, an Athapaskan speaking group which occupied the region of the upper Nehalem River. Relatively little is known of the prehistory of this region, a result of the complete lack of archaeological investigations in this territory (Leland Gilsen, State Historic Preservation Office, personal Communication 1997). This is in contrast to surrounding regions, including the Lower Columbia, Willamette Valley, and Oregon Coast, where significant numbers of investigations have been undertaken. While differences in environment and resource availability presumably resulted in some distinctions in prehistoric adaptations to these areas, given the proximity of the region to the Lower Columbia and Willamette Valley, as well as similarities in ethnographic use of the areas, prehistoric development of the project area likely has some parallels with the upland portions of these regions.

Evidence of early occupation in northwestern Oregon is relatively scarce. Human use of the region likely dates to the paleoindian period of about 11,500 years ago, indicated by the presence of a small number of fluted projectile points found in western Oregon and Washington (Aikens 1993:144). This point style is broadly interpreted to represent a widely dispersed hunting orientation present throughout western North America. Early sites that have been identified in the Lower Columbia River drainage and Willamette Valley appear to reflect such a hunting emphasis, which characterized the ancestral cultures of the southern Northwest Coast prior to about 6000 B.C. By 6000 B.C., however, diverging developmental trends become apparent (Pettigrew 1990:518).

In the Lower Columbia region, signs of prehistoric human occupation are found primarily in a narrow lowland belt along the river. Because sea level rose between 8000 and 3000 B.C., sites located on the floodplain prior to about 3000 B.C. have likely been flooded and covered with alluvium. As a result, the earliest known sites are located well above the floodplain, in upland areas. In the Portland Basin, a well-documented cultural sequence does not begin until about 600 B.C., while in the vicinity of the Columbia Estuary the sequence has been pushed back to 6000 B.C. These chronologies document stylistic and functional changes in artifacts, but indicate that no fundamental changes in lifeways occurred during the final 3000 years of prehistory. Characteristic sites contain a wide variety of faunal remains, including salmon, as well as many kinds of bone and antler tools and specialized fishing implements. Large riverside settlements appear to have already been established by 4000 B.C., and a strong riverine orientation is indicated throughout this period (Pettigrew 1990:518-523). At what point Lower Columbia culture evolved to a pattern similar to that recorded at contact remains unknown, but the most basic, nonstylistic attributes, including a strong woodworking technology and a salmon-based economy, were in place by 1000 B.C., if not earlier (Pettigrew 1990:523).

Early sites in the Willamette area are even rarer than on the Lower Columbia, with few

sites dated earlier than 5000-6000 B.C. After this time, however, the prehistoric record is fairly well dated. This evidence suggests that the basic economic patterns documented for ethnographic inhabitants was in place by about 1280 B.C. At least in the southern Willamette Valley, sites post-dating 1000 B.C. are commonly scattered across bottomlands, evidencing a dispersed settlement pattern in which small family groups used one or more base camps to take advantage of resources available in certain areas at certain times of the year. Excavated sites reveal a diversity of tools and features indicating a variety of economic activities, including the collection and processing of vegetable foods, and the hunting of birds and mammals. While this subsistence pattern appears to have remained relatively consistent over the past 3000 years, there is some evidence that in the protohistoric period, some groups became heavily oriented toward accumulation of wealth, a trait apparently derived from the cultures of the lower Columbia and Lower Klamath River areas (Pettigrew 1990:527-528).

It is apparent, based on available archaeological evidence, that while the prehistoric cultures of the Lower Columbia and Willamette Valley descended from a common, huntingbased culture, the two areas eventually diverged as a result of differing economic opportunities. Immense salmon runs in the Columbia allowed the development of riverside nucleation and intensification of fishing activities, while the abundant but dispersed resources of the Willamette Basin encouraged a dispersed pattern of base camps or small villages and a more diverse array of economic activities (Pettigrew 1990:529). Prehistoric inhabitants of the upper Nehalem River drainage, however, would have been uniquely situated to take advantage of both of these resource bases, a pattern that characterized the ethnographic Clatskanie people. ethnohistoric period, however, the dispersed, upland resources were more commonly exploited, as access to the Columbia River was less certain. Such a pattern may also have characterized the prehistoric period. While the prehistory of the area has not been fully investigated, prehistoric adaptations were likely in place for the past several thousand years, as evident in surrounding areas. Aboriginal peoples likely followed a seasonal subsistence cycle as was present throughout the Northwest (Aikens 1993:140-141). From early spring through fall, village members would disperse to small temporary camps near resource areas to obtain and process stores for winter. It was at this time that fishing sites on the Columbia and other rivers and streams would have been visited, access permitting. Hunting and gathering of roots, berries, and other vegetable products would have occurred in the uplands. In late fall through winter, populations reassembled at the village sites, with limited hunting, fishing and collecting practiced to supplement stored foods. Village sites were likely located in Nehalem Valley and other protected areas of the upland territory.

4.2 ETHNOGRAPHY

Early in the nineteenth century, this region of Oregon was occupied by the Clatskanie, members of the Athapaskan language family. The Clatskanie lived south of the Columbia River and occupied a territory that included the extensive upper Nehalem River drainage and the headwaters of the Klaskanine and Clatskanie rivers. They may have occasionally occupied the shore of the Columbia River at the mouth of the Clatskanie River, and may have seasonally visited the Portland Basin at Scappoose Creek. Except for this small foothold on the Columbia, the Clatskanie primarily lived in the upland valleys, where salmon runs were fewer. Their

territory consisted of dense forest with small, scattered praries, where deer, elk, and edible roots and berries were abundant (Krauss 1990:530).

The name of the Clatskanie, also Tlatskanai, originates from a Chinookan term for "those of the region of small oaks", in reference to a location in the Nehalem Valley. Due to early contact and rapid decimation, no detailed information is available for the Clatskanie. It is known that they followed a hunting and gathering way of life, primarily centered in the uplands of their territory although the lower reaches of the Clatskanie River were seasonally fished for salmon. They subsisted on game, berries, and roots, and lived in lodges constructed of split cedar poles covered with bark and furnished with rush mats; spears, traps, and weirs were used for fishing (Krauss 1990:530-531). Differences in resources availability between the uplands and the Columbia River lowlands promoted trade, primarily with the Chinookans living along the river. The Clatskanie also occasionally intermarried with the Chinook, as well as with Salishans farther to the north. Trade did not preclude conflict, however, as there are some stories of raids between these groups as well (Krause 1990:530-531).

Early relations between the Clatskanie and Euroamericans are also marked by conflict. Accounts of violence begin immediately after the establishment of Fort Astoria in 1811, leading to a rapid decline in the population of the Clatskanie. Although early population estimates are not available, an estimate of 175 persons was produced in 1825. The group was further weakened by the epidemics that ravaged the area in the 1830s. By 1841, available records indicate that fewer than 100 Clatskanie remained. In 1851, only eight adults of this group participated in the signing of a treaty at Tansy Point, Oregon, and in 1857 an Indian agent reported a total population of eight individuals. After this date, the Clatskanie largely disappear from recorded history (Krauss 1990:531).

4.3 HISTORY

Initial contact between the Indian inhabitants and Euroamericans came as a result of exploration by sea. The Spanish were the first to arrive in the early 1770s, exploring the lands north of her California colonies. The first significant landfall, however, occurred in 1775, during James Cook's third voyage to the Pacific. Cook landed on the central coast of Oregon and his crew acquired a number of furs in exchange got buttons, kettles, files, and other goods. They later learned that these furs were worth a fortune in the Orient, establishing the basis for the maritime fur trade. Tales of the wealth of available furs spread through Europe and launched an intense competition that would bring dozens of ships to the Northwest (Beckham et al. 1981:188-189).

Initiation of the maritime trade to the Northwest had a direct and immediate effect on the aboriginal peoples of the area. Traders introduced a wealth of trade goods, including metal tools, cotton and wool, glass beads, liquor, and eventually firearms, resulting in major impacts on technology and the distribution of wealth. In addition, the traders introduced virulent new diseases, such as smallpox, tuberculosis, and measles. Between the 1780s and the 1810s, virtually all of the inhabitants of the coastal zone of the Pacific Northwest were effected by these changes (Beckham et al. 1981:189-190).

During this same period, the United States grew increasingly interested in the Northwest, particularly following the 1803 purchase of the Louisiana Territory from France. thereafter, Jefferson dispatched the Lewis and Clark expedition to find a route across the Rocky Mountains to the Pacific coast. In November, 1805, the party passed the mouth of the Willamette River on their way down the Columbia, wintering in the vicinity of Astoria. The reports of Lewis and Clark, together with the discoveries of the maritime explorers and fur traders, attracted the interest of a number of east coast investors. In 1810, Nathan Winship of Boston attempted to establish a trading post and fort near Oak Point, on the lower Columbia estuary, but was forced out by flooding and hostile Indians. John Jacob Astor was more successful the following year, when Astoria was founded. Within a year, parties from this settlement were sent out to begin exploration of the inland Northwest. Competition arrived in January, 1813, when representatives of a rival Canadian firm, the Northwest Company, arrived in Astoria with news of war between the United States and Great Britain. The Astorians sold out to the Northwest Company, leading to several decades of dominance by the British in the Northwest. Over the next several years, members of the Northwest Company trapped and traded throughout the Willamette Valley and adjacent regions, activities which were continued after merging with the Hudson's Bay Company in 1821 (Beckham et al. 1981:191-193).

During the 1820s, retired members of the fur trading companies began to take up subsistence living in the northern Willamette Valley, often settling down with their Indian wives and children. Settlements began to spread to adjacent regions in the 1830s and early 1840s, augmented by the arrival of groups of Methodist missionaries. Rumors of fertile land quickly spread to the United States and a tide of overland immigration soon began.

Settlers arriving in the Northwest primarily settled in the lower grasslands and prairies. Forested lands and higher elevations, such as the project area, were often not inhabited until the 1870s or later, largely due to the availability of thousands of acres of unclaimed prairie which made forest clearing unnecessary (Beckham et al. 1981:224-225). As populations grew, however, the need for timber and other resources increased, spurred by the discovery of gold in southern Oregon in 1852. Settlements, mills, and other establishments began spreading to areas previously unoccupied by Euroamericans, and remaining Native populations were rapidly displaced to reservations (Beckham 1991:182; Beckham et al. 1981:224-227).

Within the next two to three decades, northwestern Oregon underwent constant change. The 1870s saw development of efficient transportation routes over rail and water, marked by the beginnings of construction of a railroad connection to California, the Oregon and California Railroad; and both rail and steamship traffic on the Columbia River, under the Oregon Steam Navigation Company (Winther 1950:293-300).

Agricultural and timber interests profited handsomely from these improvements, as transporting goods to distant markets became feasible. By the turn of the twentieth century, logging and lumbering were firmly established as major elements of the area's economy. Local logging railroads were established to haul logs to sawmills, enabling timber companies to tap areas which were previously not readily accessible, as well as providing essential links tying local economies to world markets. By the 1930s, however, these systems had largely been

replaced by the availability of heavy trucks and an expanding system of logging roads. The network of roads that surrounds the current project area, as well as the presence of small, relatively isolated communities like Mist, Swedetown, Vernonia, and Birkenfeld, attest to the importance of the timber industry in this area. Lifeways resulting from this industry remained important for decades and continue to dominate this and similar rural areas of northwestern Oregon.

4.4 PREVIOUS RESEARCH IN THE PROJECT VICINITY

To determine the extent of previous research in the project area, a record search was conducted at the State Historic Preservation Office, Salem, Oregon, on January 29, 1997. This search indicated that no extensive archaeological investigations have been conducted in this region of Oregon. More specifically, no archaeological inventories have been conducted within a one-half mile radius of the project area. As a result, no previously recorded archaeological sites are known in the immediate area. In general, given the terrain and environment of the project area, overall archaeological sensitivity appears low. Three archaeological sites, however, were recorded approximately one mile east of the project, in conjunction with a survey conducted for the Mist pipeline. These sites, all consisting of prehistoric artifact scatters, lie east of and adjacent to the Nehalem River. No subsurface testing was conducted at these sites, so the extent of the cultural deposits remains unknown. The presence of these sites, however, suggests that the lands adjacent to the Nehalem River should be considered sensitive.

4.5 METHODOLOGY

Archaeological inventory of the proposed pipeline routes was completed on February 4, 1997, in conjunction with a wetlands survey of the route. Inventory was conducted by a single archaeologist walking the approximate center of the proposed pipeline corridors. Vegetation along much of the route consists of dense forest, resulting in poor ground visibility. To enhance visibility, trowel scrapings were conducted in areas of higher potential sensitivity, particularly close to the Nehalem River crossing. In addition, cut banks, tree falls, and other areas of exposed soil were closely examined. With the exception of numerous springboard-cut tree stumps (observed in the eastern half of section 22 and the western half of section 23, T6N, R5W), indicative of early twentieth century logging, no cultural resources were identified within the project area.

4.6 RESULTS AND RECOMMENDATIONS

As noted above, no significant cultural resources were identified during an inventory of the proposed pipeline corridors. Although ground visibility was generally poor, most of the proposed pipeline routes lie within an area of low archaeological sensitivity. Exceptions to this are the terraces north and south of the Nehalem River, where grading and excavation are proposed to facilitate boring under the river for the pipeline crossing. No archaeological resources were observed in these areas, currently consisting of pastureland, but sensitivity should be considered moderate to high. Archaeological sites have been recorded in similar settings upriver from Mist, just west of the project area. To allow for the potential for undiscovered

resources in this area, it is recommended that all grading and excavating activities associated with the boring operation be monitored by a qualified archaeologist. Should any artifacts or other cultural materials be identified during monitoring, all ground-disturbing activities should cease until the archaeologist can evaluate their potential significance. If determined significant, recommendations for mitigation would be made. Mitigation measures could include avoidance or data recovery.

5.0 WETLANDS

5.1 THE PROPOSED ACTIONS

The 1997 Mist Storage Expansion Project will construct about 2.5 miles of double 16-inch high pressure gas pipelines extending generally south from the Miller Station in Section 11, Township 6 North, Range 5 West going through Sections 11, 14, 15, and into 23. The two 16-inch pipes will be installed in separate trenches 10 feet apart or in a common trench about seven feet wide. The crossing of the Nehalem River will be by horizontal directional drilling under the river. From the southern terminus of the 16-inch lines, 8-inch gathering lines will extend about a mile west and south in Section 22 to connect with the wells. Where two 8-inch lines are together, they will also be 10 feet apart in separate trenches or in a common trench to the point where they diverge to different wells. The construction corridor will be 80 feet wide to accommodate the construction equipment, pipe stringing, spoil piles and other trench materials, and access. Two to four new well pads will also be constructed.

The pipelines of the Mist underground storage expansion project will extend through five major ecological community types. Both ends of the project are in second growth conifer forest ranging in age from about 20 years to about 50 years. It also will go through two regenerating clearcut areas with trees 5 to 10 years old. On the hill on the south side of the Nehalem Valley, the pipeline will cross a stand of mixed conifer and deciduous forest. Through the Nehalem Valley it will traverse cultivated hay and pasture fields. On each side of the valley and in two other spots, wetlands will be crossed.

5.2 WETLAND INVENTORY

On February 4, 1997, a wetland biologist (David Every) walked the entire length of the route to identify all wetlands and streams that would be affected by the pipeline. A 200-foot wide corridor was checked in case small route adjustments are needed before construction. Areas were recognized as wetlands if they contained evidence of hydrophytic vegetation, hydric soils, and wetland hydrology. Any watercourse with a defined channel was recognized as a stream.

Five areas of wetland were found in the corridor. One is adjacent to Burkhardt Road and was probably created or enlarged when the road was built. It is about 0.05 acre in size and dominated by small willows. It may or may not be filled by a well pad that is being considered for that general location.

The second wetland encountered is a soft rush dominated swale with a logging road through it. There is no defined channel in this part of the swale, but farther down the drainage there probably is. If the pipeline goes in the logging road as planned, there should be only a few hundred square feet of degraded wetland affected.

A small sloping wetland in a pasture at the bottom of the slope will have to be crossed by the 16 inch pipelines. It is dominated by pasture grasses and weedy species such as creeping buttercup. The crossing width would be less than 100 feet. Near there is an upslope spring or pump house that supplies a neighboring house(s). There may be associated water pipes to be crossed.

A finger of wetland extends into the hay field north of the paved road. It is occupied by grass hay species and creeping buttercups. The 16-inch pipelines would cross it where it is about 20 feet wide.

The most significant wetland on the pipeline route is at the base of the hill north of the hay field and Highway 202. This wetland is part of a larger wetland complex with at least three types of cover. At the location of the crossing, the wetland is dominated by slough sedge and has standing water seasonally. One edge is shrub dominated, the main shrub species being ninebark. Elsewhere in the wetland complex (outside the construction corridor) parts are dominated by willows. This wetland is already crossed by one gas pipeline at the proposed crossing location, which was installed about 10 years or more ago. The vegetative cover has completely recovered, leaving no sign of the earlier disturbance. There is also an adjacent access road that crosses the wetland using a culvert to pass the water flow in the wetland. This wetland appears to be excellent habitat for amphibians and birds. The crossing length will be 100 to 150 feet.

5.2.1 Wetland Impacts and Mitigation

Trenching through the wetlands will entail removing the topsoil (upper 6" to 12") and saving it separate from the rest of the trench contents. Trenching will probably be done with a trackhoe. The bottom six inches of the trench backfill will be free of rocks (native backfill crushed by a "padding" machine or imported fill). After the pipe section is welded, inspected, and tested, it will be placed on the trench padding and covered by about 12 inches of padding material, then backfilled to fill the trench to the level where the topsoil will be replaced. The total amount of backfill for all wetlands combined is expected to be about 900 cubic yards. Excess material will be removed from the wetland so as to maintain the original contours and the hydrologic regime. With the topsoil put back in place, the vegetation is expected to restore itself in one or two growing seasons.

5.2.2 Wetland Permits

The wetland fill will be permitted under the Oregon Removal-Fill Law administered by the Division of State Lands and under the federal Clean Water Act, Section 404, Nationwide Permit 12, administered by the Corps of Engineers. These permits are expected to be approved within 21 days from submittal of a complete application.

5.2.3 Wetland Delineation

A formal delineation of the affected wetlands' boundaries will be done as part of the wetland permit application process.

• • •

6.0 REFERENCES

- Aikens, C. Melvin 1993 Archaeology of Oregon. U.S.D.I. Bureau of Land Management, Oregon State Office, Portland.
- Beckham, Stephen D. 1990 History of Western Oregon Since 1846. Handbook of North American Indians, Volume 7: Northwest Coast, edited by Wayne Suttles. Smithsonian Institution, Washington D.C.
- Beckham, Stephen D., Rick Minor, and Kathryn A. Toepel 1981 Prehistory and History of BLM Lands in West-Central Oregon: A Cultural Resource Overview. University of Oregon Anthropological Papers No. 25, Eugene.
- Krauss, Michael E. 1990 Kwalhioqua and Clatskanie. Handbook of North American Indians, Volume 7: Northwest Coast, edited by Wayne Suttles. Smithsonian Institution, Washington D.C.
- Pettigrew, Richard M. 1990 Prehistory of the Lower Columbia and Willamette Valley. Handbook of North American Indians, Volume 7: Northwest Coast, edited by Wayne Suttles. Smithsonian Institution, Washington D.C.
- Winther, Oscar O. 1950 The Old Oregon Country: A History of Frontier Trade, Transportation, and Travel. University of Nebraska Press, Lincoln.

APPENDIX



United States Department of the Interior

FISH AND WILDLIFE SERVICE Oregon State Office 2600 S.E. 98th Avenue, Suite 100 Portland, Oregon 97266 (503) 231-6179 FAX: (503) 231-6195

November 14, 1996

In reply refer to: 1-7-97-SP-025

Michael Hayward Northwest Natural Gas Company 220 NW Second Avenue Portland, OR 97209-3991

Dear Mr. Hayward:

This is in response to your letter, dated 16 October 1996, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Mist Gas Storage Project in Columbia County. The U.S. Fish and Wildlife Service (Service) received your letter on 17 October 1996.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Mist Gas Storage Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Corps of Engineers (COE) requirements under the Act are outlined in Attachment B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 et seq., COE is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in NEPA (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 401.12.

If COE determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, COE is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

Attachment A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published February 28, 1996, in the Federal Register (Vol. 61, No. 40, 7596) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect candidate species or species of concern, COE is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, COE may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages COE to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Laura Todd at (503) 231-6179. For questions regarding anadromous fish, please contact National Marine Fisheries Service, 525 NE Oregon St., Suite 500, Portland, Oregon 97232, (503) 230-5400. All correspondence should include the above referenced file number.

Sincerely

Russell D. Peterson State Supervisor

Attachments SP 025

cc:

PFO-ES

ODFW (nongame)

COE

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR IN THE AREA OF THE PROPOSED MIST GAS STORAGE PROJECT 1-7-97-025

LISTED SPECIES1/

Birds

Aleutian Canada goose	Branta canadensis leucopareia	T			
Peregrine falcon	Falco peregrinus	E			
Bald eagle	Haliaeetus leucocephalus	T			
Northern spotted owl ²	Strix occidentalis caurina	CH T			
Plants					
Nelson's checker-mallow	Sidalcea nelsoniana	Т			
PROPOSED SPECIES'					
<u>Fish</u>					
Coho saimon (coastal) ^{3/} Documented Messing Creek Documented Lundgren Creek	Oncorhynchus kisutch	**PT			
Steelhead (Oregon Coast)4	Oncorhynchus mykiss	**PT			

CANDIDATE SPECIES

None

SPECIES OF CONCERN

Mammals

White-footed vole

Pacific fisher

Long-eared myotis (bat)

Fringed myotis (bat)

Long-legged myotis (bat)

Yuma myotis (bat)

Pacific western big-eared bat

Arborimus albipes

Martes pennanti pacifica

Myotis evotis

Myotis thysanodes

Myotis volans

Myotis yumanensis

Plecotus townsendii townsendii

Birds

Little willow flycatcher

Empidonax traillii brewsteri

Amphibians and Reptiles

Tailed frog

Northwestern pond turtle

Northern red-legged frog

Ascaphus truei

Clemmys marmorata marmorata

Rana aurora aurora

Fish

Pacific lamprey

Lampetra tridentata

Plants

Tall bugbane

Cimicifuga elata

(E) - Listed Endangered (PE) - Proposed Endangered (T) - Listed Threatened

(PT) - Proposed Threasened

(CH) - Critical Habitat has been designated for this species (PCH) - Critical Habitat has been proposed for this species

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

- (CF) Candidate: National Marine Fisheries Service designation for any species being considered by the Secretary for listing for endangered or threatened species, but not yet the subject of a proposed rule.
- ** Consultation with National Marine Fisheries Service required.
- U. S. Department of Interior, Fish and Wildlife Service, August 20, 1994, <u>Endangered and Threatened Wildlife and Plants</u>, 50 CFR 17.11 and 17.12.
- Federal Register Vol. 57, No. 10, January 15, 1992, Final Rule-Critical Habitat for the Northern Spotted Owl
- Federal Register Vol. 60, No. 142, July 25, 1995, Proposed Rule-Coho salmon
- Federal Register Vol. 61, No. 155, August 9, 1996, Proposed Rule-West Coast steelhead

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTIONS 7(a) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a) - Consultation/Conference

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

- 2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and
- 3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c) — Biological Assessment for Major Construction Projects 1/
Requires Federal agencies or their designees to prepare a Biological
Assessment (BA) for construction projects only. The purpose of the BA is to
identify any proposed and/or listed species which are/is likely to be affected
by a construction project. The process is initiated by a Federal agency in
requesting a list of proposed and listed threatened and endangered species
(list attached). The BA should be completed within 180 days after its
initiation (or within such a time period as is mutually agreeable). If the BA
is not initiated within 90 days of receipt of the species list, the accuracy
of the species list should be informally verified with our Service. No
irreversible commitment of resources is to be made during the BA process which
would foreclose reasonable and prudent alternatives to protect endangered
species. Planning, design, and administrative actions may be taken; however,
no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on- site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6). prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

A construction project (or other undertaking having similar physical impacts) which is a major federal action significantly affecting the quality of the human environment as referred to in NEPA-(42 U.S.C. 4332.(2)c). On projects other than construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.



August 5, 1996

Michael Hayward Northwest Natural Gas Co. 220 NW Second Ave. Portland, OR 97209-3991 NATURAL HERITAGE PROGRAM

Dear Mr. Hayward:

We have conducted a data system search for rare, threatened and endangered plant and animal records for your project near Mist (T6N, R5W, Sections 10, 11, 14, 15, 22-24, 26 and 27.

Six records were noted within a two-mile radius of your project and are included on the enclosed computer printout. A key to the fields is also included. In addition to the coho salmon listed on the printout, the National Marine Fisheries Service recently designated the steelhead (Oregon Coast) as proposed threatened. The range for this population includes the Nehalem River and its tributaries.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

This data is confidential and for the specific purposes of your project and is not to be distributed.

Please call if you should have any questions.

Sincerely,

Connie Levesque

Data Services Assistant

Conne duesque

encl: invoice

A COOPERATIVE PROJECT OF:





821 SE 14th Avenue Portland, Oregon 97214 (503) 731-3070 FAX (503) 230-9639



KEY TO PRINTOUT

NAME AND COMMON NAME: The scientific and common name of the species.

EO-CODE (element occurrence code): Unique Heritage Program code for this occurrence. The first 10 characters are the code for the species, and the last 3 are the occurrence number.

COUNTY(S): County name(s)

QUAD NAMES: Name of the USGS topographic quadrangle map(s) where the record is mapped.

PHYSIOGRAPHIC PROVINCE: Code for physiographic province. CR=Coast Range, WV=Willamette Valley, KM=Klamath Mountains, WC=West slope and crest of the Cascades, EC=East slope of the Cascades, BM=Ochoco, Blue and Wallowa Mts., BR=Basin and Range, HP=High Lava Plains, OU=Owyhee uplands, CB=Columbia Basin.

T-R-S: Township, Range and Section, with township first, range second and section third (a space appears between range and section). 004S029E 32 = Township 4S, Range 29E, Section 32. Fractional townships and ranges are further defined in the T-R COMMENTS field.

T-R COMMENTS: Fractional townships and ranges, listed in decimal form

T-R-S COMMENTS: Comments relating to township, range or section(s), e.g. SEANE4 or SENE=SE 1/4 of the NE 1/4.

LASTOBS: Last reported sighting date, in the form YYYY-MM-DD

FIRSTOBS: First reported sighting date for this occurrence in the form YYYY-MM-DD

LAT: latitude, North LONG: longitude, West

QUADCODE: Heritage Program code for the USGS topo map

FED STATUS: US Fish and Wildlife Service status. LE=listed endangered, LT=listed threatened, PE or PT=proposed endangered or threatened, C=candidate for listing with enough information available for listing, SOC=species of concern.

STATE STATUS: For animals, Oregon Department of Fish and Wildlife status; LE=listed endangered, PE=proposed endangered, PT=proposed threatened, SC or C=sensitive-critical, SV or V=sensitive-vulnerable, SP or P=sensitive peripheral or naturally rare, SU or U=sensitive-undetermined. For plants, Oregon Department of Agriculture status; LE=listed endangered, LT=listed threatened, C=candidate.

SIZE: in acres, whole numbers. 0=unknown

MINELEV: Minimum elevation, in feet. MAXELEV: Maximum elevation in feet.

SURVEYSITE: Landmark name or field survey name

DIRECTIONS: Site name and direction to site

DESCRIPTION: Habitat information, e.g. aspect, slope, soils, associated species, community type, etc.

EO-DATA: Species and population biology - numbers, age, nesting success, vigor, phenology, disease, pollinators, etc.

EOTYPE: For animals, type of occurrence, e.g. roost, nest, etc.

COMMENTS: Miscellaneous comments

ANNUAL OBSERVATIONS: Summary of yearly observations

OWNER: federal, state, private, etc.

MANAGED AREA: BLM district, USFS Forest, Private Preserve, etc.

MANAGE COMM: Comments on how the site is managed.

PROT COMM (Protection Comments): Comments regarding protectibility and threats.

BEST SOURCE: Best source of information for this occurrence.

```
NAME: RANA AURORA AURORA
      COMMON NAME: NORTHERN RED-LEGGED FROG
                                                                                    FED STATUS: SOC
                                               LAST 08S: 1993
          EO-CODE: AAABH01021*170
                                                                                 STATE STATUS: SU
        COUNTY(s): COLUMBIA
                                               FIRST 085: 1976-08
                                                                                          SIZE:
       QUAD NAMES: MARSHLAND
                                                    LAT: 460130N
PHYSIOGRAPHIC PROV: CR
                                                    LONG: 1231545V
                                                                               MINELEV (feet): 650
            T-R-S: 006N005W 11
                                               QUADCODE: 4612313
                                                                                MAXELEV (Feet):
     T-R COMMENTS:
   T-R-S COMMENTS:
                                                                                      PRECISION: H
       SURVEYSITE:
       DIRECTIONS: TRIBUTARY TO MEMALEM RIVER MEAR VERNONIA
      DESCRIPTION: SMALL, COLD CLEAR STREAM WEAR ALDER WITH SWORD AND LADT FERM
          EO-DATA: 1993: SPECIES OBSERVED DURING SPOTTED FROG SURVEY. 1976: 1 FROG OBSERVED (ORIGINALLY IDENTIFIED AS R.
                   PRETIOSA)
           EOTYPE:
         COMMENTS: OBSERVER: J. MERZANICH: N. MAYES
ANNUAL OBSERVATION:
            CLINER -
     MANAGED AREA:
      MANAGE COMM:
        PROT COMM:
      BEST SOURCE: HAYES, MARC P. 1994. CURRENT STATUS OF THE SPOTTED FROG IN WESTERN OR, FINAL REPORT TO COPFU
             NAME: ONCORNITHICKUS KISUTCH
      COMMON NAME: COHO SALMON (OREGON COASTAL RUNS)
          EO-CODE: AFCHA02033*757
                                      LAST OBS:
                                                                                    FED STATUS: PT
        COUNTY(s): CLATSOP
                                               FIRST OBS:
                                                                                  STATE STATUS: SC
                  TILLAMOOK
                   COLUMBIA
       QUAD NAMES: NEHALEM
                                                      LAT:
                                                                                           SIZE:
                   FOLEY PEAK
                   COOK CREEK
                   ROGERS PEAK
                   ELS1E
                   VINEMADLE
                   SAGER CREEK
                   BIRKENFELD
                   MANSHLAND
                   PITTSBURG
                   BAKER POINT
                   VERNONIA
                   SCAPSTONE LAKE
                   HAMLET
PHYSIOGRAPHIC PROV: CR
                                                     LONG:
                                                                                 MINELEY (Feet):
                                                 QUADCODE: 4512368
           T-R-5:
                                                                                 MAXELEY (Feet):
                                                          4512367
                                                           4512366
                                                           4512365
                                                           4512375
                                                           4512385
                                                           4512384
                                                           4512383
                                                           4612313
                                                           4512382
                                                           4512381
                                                           4512372
                                                           4512377
                                                           4512376
```

PRECISION:

SURVEYSITE: MEMALEM RIVER

T-R COMMENTS:

T-R-S COMMENTS:

DIRECTIONS: NEHALEM RIVER. FROM ITS CONLUENCE WITH THE PACIFIC UPSTREAM TO ITS CONFLUENCE WITH ROCK CREEK NEAR THE TOWN OF VERNONIA. INCLUDES THE N. FORK MENALEM UPSTREAM TO ITS CONFLUENCE WITH FALL CREEK AND THE LOWER SALMONBERRY RIVER. DESCRIPTION: FO-DATA -ECTYPE: REARING - fish COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM DRAFT COFW MAPS GENERATED AND DISTRIBUTED IN 1995. UNLESS SPECIFIC DATA EXISTS IN THE ECDATA FIELD, THE INFORMATION PROVIDED REPRESENTS THE "BEST PROFESSIONAL JUDGEMENT" ON BEHALF OF COFW'S DISTRICT FISHERIES BIOLOGIST. THE PRESENCE OF COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS NAVING A POTENTIAL OF BEING PRESENT. ANNUAL OBSERVATION: CLINER: PRIVATE; STATE MANAGED AREA: TILLAMOOK STATE FOREST CLATSOP STATE FOREST MANAGE COMM: PROT COMM: BEST SOURCE: WEBER, WALT. ODFW DISTRICT FISHERIES BIOLOGIST, COLUMBIA REGION. MAME: ONCORHYNCHUS KISUTCK COMMON NAME: COHO SALMON (OREGON COASTAL RUNS) EO-CODE: AFCHA02033*792 LAST OBS: FED STATUS: PT STATE STATUS: SC COUNTY(s): COLUMBIA FIRST DBS: QUAD NAMES: MARSHLAND LAT: SIZE: LONG: PHYSIOGRAPHIC PROV: CR MINELEV (Feet): QUAD CODE: 4612313 T-R-5: MAXELEV (Feet): T-R COMMENTS: T-R-S COMMENTS: PRECISION: SURVEYSITE: BEAVER CREEK DIRECTIONS: BEAVER CREEK. FROM ITS CONFLUENCE WITH THE NEWALEN RIVER AT MILE 66, UPSTREAM TO THE SW4 OF SEC 34, T7N, R5W. DESCRIPTION: EO-DATA: ECTYPE: SPAUNING & REARING - fish COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM DRAFT COOFW MAPS GENERATED AND DISTRIBUTED IN 1995. UNLESS SPECIFIC DATA EXISTS IN THE ECDATA FIELD. THE INFORMATION PROVIDED REPRESENTS THE "BEST PROFESSIONAL JUDGEMENT" ON BEHALF OF COPY'S DISTRICT FISHERIES BIOLOGIST. THE PRESENCE OF CONO IN DESCRIBED AREAS SHOULD BE CONSIDERED LINDOCLMENTED BUT AS NAVING A POTENTIAL OF BEING PRESENT. ANNUAL DESERVATION: CHNER: PRIVATE MANAGED AREA: MANAGE COMM: PROT COMM: BEST SOURCE: WEBER, WALT. COFW DISTRICT FISHERIES BIOLOGIST. COLUMBIA REGION. NAME: ONCORNYNCHUS KISUTCH COMMON NAME: CONO SALMON (OREGON COASTAL RUNS) EO-CODE: AFCMA02033*793 LAST OBS: FED STATUS: PT STATE STATUS: SC COUNTY(s): COLUMBIA FIRST OBS: QUAD MAMES: BIRKEWFELD SIZE: I AT: MARSHLAND PHYSIOGRAPHIC PROV: CR LONG: MINELEV (Feet): QUADCODE: 4512383 T-R-S: MAXELEV (Feet): 4612313 T-R COMMENTS: T-R-S COMMENTS: PRECISION: SURVEYSITE: CALVIN CREEK DIRECTIONS: CALVIN CREEK. FROM ITS CONFLUENCE WITH THE NEMALEM RIVER NEAR RIVERMILE 70.5, UPSTREAM TO THE NEMALEM OF

ECTYPE: SPANNING & REARING - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM DRAFT COFFU MAPS GENERATED AND DISTRIBUTED IN

SEC 3, T5N, R5W.

DESCRIPTION:

1995. UNLESS SPECIFIC DATA EXISTS IN THE ECOATA FIELD, THE INFORMATION PROVIDED REPRESENTS THE "BEST PROFESSIONAL JUDGEMENT" ON BEHALF OF COFU'S DISTRICT FISHERIES BIOLOGIST. THE PRESENCE OF COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

ANNUAL OBSERVATION:

OWNER: PRIVATE

MANAGED AREA: MANAGE COMM:

PROT COMM:

BEST SOURCE: WEBER, WALT. COFW DISTRICT FISHERIES BIOLOGIST. COLUMBIA REGION.

NAME: ONCORHYNCHUS KISUTCH

COMMON NAME: CONO SALMON (OREGON COASTAL RUNS)

EO-CODE: AFCHA02033*794 LAST ORS: FED STATUS: PT
COUNTY(s): COLUMBIA FIRST ORS: STATE STATUS: SC
QUAD NAMES: MARSHLAND LAT: SIZE:

PHYSIOGRAPHIC PROV: CR LONG: MINELEY (Feet):

T-R-S: QUADCODE: 4612313 MAXELEV (Feet):

T-R COMMENTS: T-R-S COMMENTS:

SURVEYSITE: LINDGREN CREEK

DIRECTIONS: LINDGREN CREEK. FROM ITS CONFLUENCE WITH THE MEMALEM RIVER MEAR RIVERMILE 71.5, UPSTREAM TO THE MW4 OF

SEC 35, T7N, RSW.

DESCRIPTION:

EO-DATA:

EOTYPE: SPAUNING & REARING - fish

COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM DRAFT COFW MAPS GENERATED AND DISTRIBUTED IN

1995. UNLESS SPECIFIC DATA EXISTS IN THE ECOATA FIELD, THE INFORMATION PROVIDED REPRESENTS THE "BEST PROFESSIONAL JUDGEMENT" ON BEHALF OF COPY'S DISTRICT FISHERIES BIOLOGIST. THE PRESENCE OF COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS MAYING A POTENTIAL OF BEING PRESENT. LINDGREN

PRECISION:

CREEK IS INCLUDED IN ODFW'S STRATIFIED RANDOM SPANNING SURVEY PROGRAM.

ANNUAL DESERVATION:

OWNER: PRIVATE

HANAGED AREA:

MANAGE COMM:

PROT COMM:

BEST SOURCE: WEBER, WALT. ODFW DISTRICT FISHERIES BIOLOGIST. COLUMBIA REGION.

NAME: ONCORNYNCHUS KISUTCH

COMMON NAME: CONO SALMON (OREGON COASTAL RUNS)

EO-CODE: AFCHA02033*795 LAST ORS: 1993 FED STATUS: PT
COUNTY(8): COLUMBIA FIRST ORS: STATE STATUS: SC
QUAD NAMES: BIRKENFELD LAT: SIZE:

PITTSBURG

CLATSKANLE

PHYSIOGRAPHIC PROV: CR LONG: MINELEV (Feet):

T-R-S: QUADCODE: 4512383 MAXELEV (Feet):

4512382 4612312

T-R COMMENTS:

T-R-S COMMENTS: PRECISION:

SURVEYSITE: MESSING CREEK

DIRECTIONS: MESSING CREEK. FROM ITS CONFLUENCE WITH THE NEWALEM RIVER NEAR THE TOWN OF MIST, UPSTREAM TO MEADWATERS IN THE NEW SEC 6, TOW. RSW. INCLUDES LUNDGREN CREEK.

DESCRIPTION:

EO-DATA: 1993: ODFW SURVETED 0.8 WILES OF MESSING CREEK AND OBSERVED A PEAK OF 6 FISH ON 12-07. 1993: ODFW SURVEYED 0.9 MILES OF LUNDGREN AND GENERATED AN EST!MATED SPANNING DENSITY OF D.82 FISH/MILE.

EOTYPE: SPAUNING & REARING - fish

COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM DRAFT COFW MAPS GENERATED AND DISTRIBUTED IN

1995. UNLESS SPECIFIC DATA EXISTS IN THE ECOATA FIELD, THE INFORMATION PROVIDED REPRESENTS THE "BEST PROFESSIONAL JUDGEMENT" ON BEHALF OF ODFW'S DISTRICT FISHERIES BIOLOGIST. THE PRESENCE OF CONO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT. MESSING

CREEK IS INCLUDED IN ODFW'S STANDARD ANNUAL SPAWNING SURVEY PROGRAM.

ANNUAL OBSERVATION:

OWNER: PRIVATE

MANAGED AREA: MANAGE COMM: PROT COMM:

BEST SOURCE: WEBER, WALT. ODFW DISTRICT FISHERIES BIOLOGIST. COLUMBIA REGION.

6 Records listed.



Northwest Natural Gas Company

1994 Annual Report

Our partnership with shareholders has enabled people like Dottie Etzel and Bill Jaynes to enjoy their hobby of traveling.

Corporate Profile

Northwest Natural Gas serves more than 390,000 customers in northwest Oregon and southwest Washington. The service territory includes the Portland-Vancouver metropolitan area, the Willamette Valley, the northern Oregon coast and the Columbia River Gorge. More than 100,000 customers have been added to the Company's distribution system in the last six years.

Dividends paid by Northwest Natural Gas have increased every year for 39 consecutive years.

The Company has three active subsidiaries:

- Oregon Natural Gas Development Corporation is engaged in natural gas exploration, development and production of natural gas and oil.
- Canor Energy Ltd. owns oil and gas properties in Alberta and Saskatchewan.
- NNG Financial Corporation provides short-term financing for Company subsidiaries.

Mission Statement

Northwest Natural Gas Company is a diversified energy company consisting of a major investor-owned and regulated public utility, whose mainstream business is to provide sales and transportation service to natural gas customers. The Company seeks to enhance profitability through investment in non-regulated activities, including: (1) the production, gathering and marketing of natural gas, and (2) the development of other energy-related business.

Partnerships.

Northwest Natural Gas is a partner with the communities in which we serve, some of our industrial customers and Local 11 of the Office and Professional Employees International Union. For shareholders Bill Jaynes and Dorothea Etzel, pictured on the cover of the 1994 annual report, our relationship is in many ways a partnership. They invest in Northwest Natural Gas and are repaid in dividends and growth.



GOALS FOR 1995

The company will take advantage of opportunities for growth and address competition in the marketplace.



COMPETITION

Customers with energy choices favor natural gas for heating, water heating and cooking.

10



JOINT ACCORD

The Company's labormanagement contract is a partnership with our employees.



SOCIAL RESPONSIBILITY 12

Employees volunteer and contribute to the cities and towns where they live and work.



GAS SUPPLY

Partnerships with industrial customers allow the Company to recall pipeline capacity and gas supplies.

Financial Briefs	
President's Letter	
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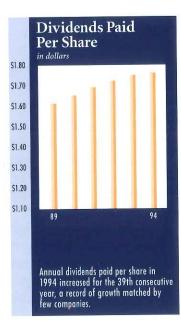
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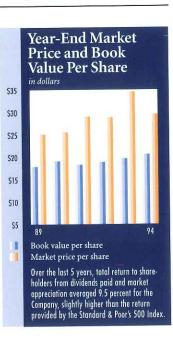
	1994	1993	Percent Increase (Decrease)
arnings			
Financial facts (\$000):	205 453	210.004	(7)
Net operating revenues	205,473	219,884 37,647	(6)
Net income	35,461 32,478	34,159	(5)
Earnings applicable to common stock	32,470	34,139	(3)
Financial ratios (%):	12.2	12.7	(11)
Return on average common equity	12.2	13.7	(11)
Capital structure at year-end:	47.9	47.5	
Long-term debt	6.9	7.6	
Preferred and preference stock	45.2	44.9	
Common stock equity	45.2	11.7	
Common stock			
Shareholder data:	12 205	12.074	2
Average shares outstanding (000)	13,295	13,074	2
Per share data (\$):		2.52	771
Earnings	2.44	2.61	(7)
Dividends	1.76	1.75	1
Book value at year-end	20.45	19.62	(14)
Market value at year-end	291/2	341/4	(14)
Operating highlights	1 24.8	. 0.40 < 20	(5)
Gas sales and transportation deliveries (000 therms)	990,332	1,043,629	(5)
Degree days (20-year average 4,324)	4,020	4,452	(10)
Customers at year-end	391,638	372,427	5 3
Number of utility employees	1,338	1,293	3

Dividends paid on common stock

Dividends paid on common Stock		(per	share)
Payment date	1	1994		1993
February 15	\$	0.44	\$	0.43
May 16		0.44		0.44
August 15		0.44		0.44
November 15		0.44	-	0.44
Total dividends paid	\$	1.76	\$	1.75







To Our

Shareholders

The Company earned \$2.44 a share in 1994. That was the second highest earnings level in history, in a year when the weather was seven percent warmer than average. The good result was in large part due to a strong financial

performance by our subsidiaries, a firming of industrial sales and continued customer growth in the residential and commercial core business.

Financial results

Earnings of \$2.44 a share included \$2.08 a share from utility operations and \$0.36 a share from subsidiaries. The increase in subsidiary earnings came from the successful sale of our real estate investments and from unusually strong electric production from wind generation.

The Company's consolidated earnings applicable to common stock for 1994 were \$32.5 million compared to \$34.2 million in 1993, a year in which the weather was modestly colder than average. The warmer weather in 1994 had a

major negative impact on earnings during the spring months, but the year ended on a high note with a strong last quarter.

Profitable growth

We have been adding customers at a rate of 5.2 percent per year compounded over the last five years. That growth rate is nearly twice that of the average gas distribution utility in the United States.

One of the reasons for this rapid growth is the large number—7,983 in 1994—of households converting to gas from other energy sources. As we make these conversions, we are increasingly looking behind

the customer growth numbers to measure profitability.

In 1994 we took a major step in this direction, as we requested new authority from the Oregon Public Utility Commission to require certain prospective customers to contribute to the capital costs of connection to the gas distribution system. A contribution is required if the projected gas usage would otherwise be insufficient to justify the investment.

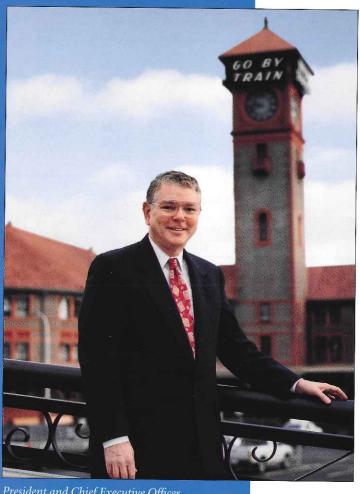
This new main extension policy applies primarily to customers who cannot be readily served from existing underground piping. If we have to build a new main line to reach a customer, we first estimate carefully the cost of the main extension which will be needed. Then we determine how much margin will be earned based on the type of house and the number of gas appliances to be installed. If the return is insufficient, we ask the customer to improve the profitability of the installation by either increasing the number of appliances, finding others in the neighborhood who will also convert to gas, or bearing some of the construction costs.

In most of our service territory, new customers who plan to use natural gas spaceheating and water heating will receive a free hookup if their house is located within 100 feet of a gas line. The new main extension policy remains generous by industry standards, but is fairer to existing customers by relieving them of the costs to subsidize the rates of a few customers with unusually expensive installations.

Productivity

As we strive to improve profitability, we focus on specific productivity goals designed to make our costs of customer service reasonable. That effort, recognized in the annual incentive bonus program for all employees, has enabled us to avoid having to initiate a general rate case during the past six years.

One measure of increased productivity is the number of customers served by each operating employee. Over the last ten years



President and Chief Executive Officer Robert L. Ridgley is pictured with Portland's Union Station in the background. Portland Mayor Vera Katz has appointed Ridgley chair of the Central City 2000 Task Force, which will advise the Portland City Council on how the city's central core should be structured by the end of the century.

that ratio has increased by 49 percent with 478 customers served by each operating employee in 1994.

The employee key goal program for 1995 offers a maximum five percent bonus if the employees succeed in five targeted areas:

- Increasing the number of "excellent" ratings from customer satisfaction surveys;
- Improving the profitability of new residential customers by increasing the ratio of margin revenue to cost;
- Obtaining more electric to gas water heater conversions;
- Reducing total operating expense per customer; and
- Increasing the contribution to corporate profits from utility operations.

Total quality initiatives, reengineering and continuous improvement of business processes are all facets of employee involvement and empowerment which improve productivity. But most important is our unique labor-management partnership.

This joint commitment to making the Company competitive has produced the full support of our union leadership for the productivity agenda. During 1994, that commitment was exhibited in the decision of the Labor Relations Team, composed of union stewards and managers, to take over the leadership and implementation of our Total Quality Service programs. In response, we have broadened our governance structures throughout the corporation to engage fully the views of our union members and front line supervisors.

Conservation

We have long advocated the wise use of energy. As part of that commitment to energy efficiency, we have supported conservation measures which make economic sense to our customers and our investors.

As part of the public policy position taken by the Company in support of efficiency and conservation, we have filed and obtained regulatory approval of a number of energy services programs. The first to be implemented was the free distribution of shower heads to save both energy and water. More than 130,000 "care packages" were liven to customers who desired to install the high-performance shower heads. From a customer viewpoint the program received a

very positive response. The key issue from an investor perspective is that we recover the full costs of the program *and* a replacement of lost margin through deferred accounting adjustments to rates.

In addition, the Oregon Public Utility Commission approved a proposal by Northwest Natural for a water heater conservation program. Included in the program was a \$25 dealer incentive to offset the installation costs of high-efficiency water heaters, a convenient easy-payment plan to those installing efficient gas water heaters and a lost-margin recovery tariff. The program encourages fuel choice—switching to a readily available, inexpensive resource such as natural gas. This will require electric utilities to meet the same standards for any competing water heater marketing programs they may initiate.

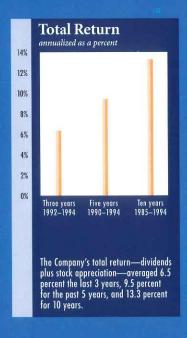
Industrial customers and gas supply

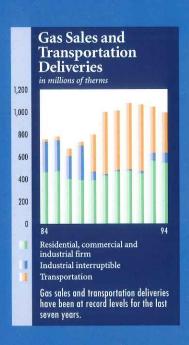
Industrial gas usage is important for several reasons. It provides about \$44 million of margin which, unlike the core residential and commercial markets, is not especially sensitive to weather variations. With most industrial customers utilizing gas on a year-round basis, they contribute to a higher load factor for our gas supply. As a general rule, a high load factor allows you to purchase gas at a low commodity price compared to winter-only use.

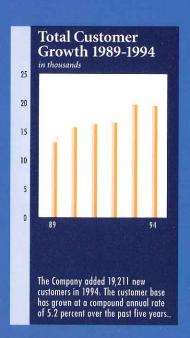
We have been able to hold industrial margins relatively stable for the last few years, despite the challenges of open access and bypass resulting from the deregulation of interstate pipeline transportation by the Federal Energy Regulatory Commission.

Last year we realized the benefit of new sales initiatives with our industrial customers undertaken by the restructured Industrial and Business Development Department (IBD). Teams from the IBD focus on specific customer needs within industry segments. The overall goal is always to "help make the *customer* successful."

The response in 1994 was gratifying. During a year in which residential and commercial margins were off more than \$11 million due to warmer-than-average weather, industrial margins exceeded expectations, offsetting \$4.2 million of the weather impact. Market segments show-







ing significant growth included electronics, food processing, specialty wood products and metals.

During the past two years 41 industrial customers who had previously left our sales service to purchase their own gas through independent marketers returned to Northwest Natural Gas sales service. One important incentive has been our success in keeping our gas costs (commodity plus pipeline demand charges) flat for three years during a time of extreme volatility in the gas spot market.

The combination of low gas costs and an excellent record of reliability has prompted many existing firms to opt for high-margin firm service. As Oregon increasingly attracts new high tech investments (including several billion dollars of new electronics manufacturing plants) natural gas is playing an expanded role in new industrial processes.

Challenge

One reason why Oregon has been a national leader in population growth and job development is its livability. A strong land use policy, enforced through urban growth boundaries, has provided the impetus for in-migration.

As population density increases, the pressure for down zoning and infill construction grow. Northwest Natural Gas has prospered during several decades of growth based on ample land for subdivisions featuring single-family residences.

Looking ahead to the 21st Century, it is clear that the housing markets will have to change to reflect the increased costs of urban land. As a gas company we have done very well with the single-family residence as our core customer. We have not done so well in serving the multifamily market, particularly apartment rentals. There are key issues of access and affordability which have impeded our efforts to penetrate the multifamily segment.

We now are reviewing all of our business processes and builder partnerships to see how we can profitably serve the infill market which will consist of more row houses, condominiums and apartments. As our markets change, so shall we.

Partnerships

This year's annual report salutes our partners. Northwest Natural Gas is fortunate to work in many different partnership For shareholders Bill Jaynes and Dorothea Etzel, pictured on our annual report cover, their dividends from stock in Northwest Natural allow them to travel. While Bill and Dottie are two of our owners, the relationship with the Company is in many ways a partnership. They invest in Northwest Natural and we repay them with consistent dividend growth. Dividends paid by Northwest Natural Gas have increased every year for 39 years—a level of financial reliability that only a few U. S. companies have attained.

Another partnership is with Local 11 of the Office and Professional Employees International Union. This partnership is in the form of the Joint Accord, our labormanagement contract. The Company and union work together to reach common goals through cooperation, not confrontation. Our new South Center experiment is described on page 6. Our Joint Accord has allowed the reorganization of work teams at South Center to see how we can accomplishwork more efficiently.

Our partnership with industrial customers like Georgia-Pacific Corporation is highlighted on page 8. Georgia-Pacific utilizes Northwest Natural's upstream pipeline capacity, but we can recall that capacity and utilize our customer's firm gas supplies during peak gas periods.

We also have significant partnerships with each of the communities in which we do business. We want to improve the economic and environmental quality of life where our employees and customers live and work. That is best achieved by a Company attuned to the needs of the communities it serves.

Sincerely,

Robert L. Ridgley

President and Chief Executive Officer
March 1, 1995

Goals

Key Goals align employees' interests with shareholders

Key Goals in 1995:

- Increase earnings.
- Improve customer satisfaction.
- Improve new customer profitability.
- Convert electric water heaters.
- Increase productivity.

For employees, the Company's strategic plan is embodied in its Key Goals. A portion of employees' compensation is linked to how well the Company performs in achieving its Key Goals. In 1995, employees can earn up to 5 percent of their total compensation as a Key Goal award. In 1994, they earned 2.49 percent of their pay by meeting part of the goals. The power of the Key Goals program is that it aligns the interests of the employees with the priorities of the Company and the expectations of the shareholders of Northwest Natural Gas.



The service territory of Northwest Natural Gas includes Clark County, Washington; the Portland metropolitan area; the Willamette Valley; portions of the Oregon coast; and the Columbia River Gorge.

for 1995

The Company will take advantage of opportunities to increase market share while improving service and controlling costs through increased productivity.

Futurists like to gaze into a crystal ball and predict the future of almost anything—the economy, workplace, people, politics, energy. One consistent prediction related to future energy consumption is that natural gas use will increase in North America. Why? Because it's clean, reliable and a good value.

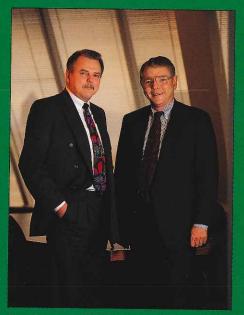
How does Northwest Natural Gas intend to take advantage of this window of opportunity? By planning for the future, by taking the initiative to address external threats and by seizing opportunities.

The theme of the Company's 1995 strategic plan is "Profiting through Growth, Service and Productivity." The term profiting is used in the broad context of "gaining" or "benefiting from" an action. Benefits, or profit, from actions that the Company takes are tied to corporate strategies that may be measured in terms of shareholder return, employee job satisfaction or customer satisfaction.

Northwest Natural's strategic planning process customarily identifies significant issues that face the Company and specifies strategies and goals for meeting them. Some of the main strategies and goals for 1995:

- Increase profitability by acquiring only profitable new business and by realizing profits from new services and markets.
- Improve the profitability of new residential customers.
- Develop a business plan to increase the number of profitable multifamily customers.
- Increase market penetration of natural gas ranges, dryers and hearth products.
- Develop new commercial natural gas markets.
- Increase customer satisfaction and improve productivity.
- Improve "excellent" ratings in the Company's customer satisfaction survey.
- Maintain Company's long-term debt ratings and improve Company's short-term ratings.
- Develop industrial products, services, and partnerships that meet customer needs, complement core markets and contribute to corporate earnings.
- Complete the installation of three Company-owned compressed natural gas (CNG) fueling facilities and operate 25 percent of the Company fleet vehicles on CNG.
- Achieve firm industrial margins at 1994 levels or higher.
- Increase upstream services (interstate pipeline capacity and gas supplies) to capture additional revenue.
- Control costs, secure productivity gains and optimize the balance sheet.
- Increase the ratio of customers per employee by 20 percent over three years.
- Reduce total expenses per customer.
- Utilize provisions of the Company's five-year labor contract, the Joint Accord, to increase productivity and assure job security.
- Provide a safe, reliable, cost-effective gas service and delivery system.
- Earn more than budgeted earnings from utility operations.

Working



President and CEO Robert L. Ridgley (right), meets with Gary D. Kirkland, executive officer/secretary-treasurer of Local 11 of the Office and Professional Employees International Union. Northwest Natural and the union have been engaged in a labormanagement partnership since 1989. The partnership works to reach common goals through cooperative, participative management without the adversarial relationship that often accompanies labor-management issues. Kirkland sits as a member of the Company's Executive Staff Committee.

More Efficiently

A Joint Accord with Local 11 of the Office and Professional Employees International Union allows innovative work assignments and more decision making by employees in the field.

Can work be done more efficiently and lead to more customer satisfaction? The Company hopes the South Center facility will provide some new answers.

Work teams function differently these days at South Center, the experimental customer service center in the populous suburban area south of Portland. Employees are more involved in decision making. Jobs have been restructured. Management and employees have gained more flexibility over how work is scheduled.

Innovation sought

At South Center, work has been organized around the needs of the customer. The intent has been to create an environment under which employees can work together across departmental lines to improve business processes.

South Center focuses on the residential and commercial markets, the traditional core market of Northwest Natural Gas. Employees are empowered to make changes and are encouraged to experiment with new and innovative ways to work. David Williams, South Center coordinator, describes three main goals: "Are we satisfying the customer? Are our employees satisfied with the work they are doing? And is all this happening in a profitable manner?"

The experiment in breaking down departmental barriers has the support of Local 11 of the Office and Professional Employees International Union, which represents bargaining employees at Northwest Natural Gas. Work rules of a decade ago would not have allowed such an extensive experiment to occur. The current labor contract, called the Joint Accord, provides safeguards and allows employees to try essentially whatever is needed to meet the three goals. This flexibility is critical for the development of South Center. As an example,

converting customers to natural gas from other fuels has been simplified by giving distribution crew leaders more authority. Providing crew leaders with cellular telephones allows for better planning and communication with the customer to confirm arrival times or make scheduling changes.

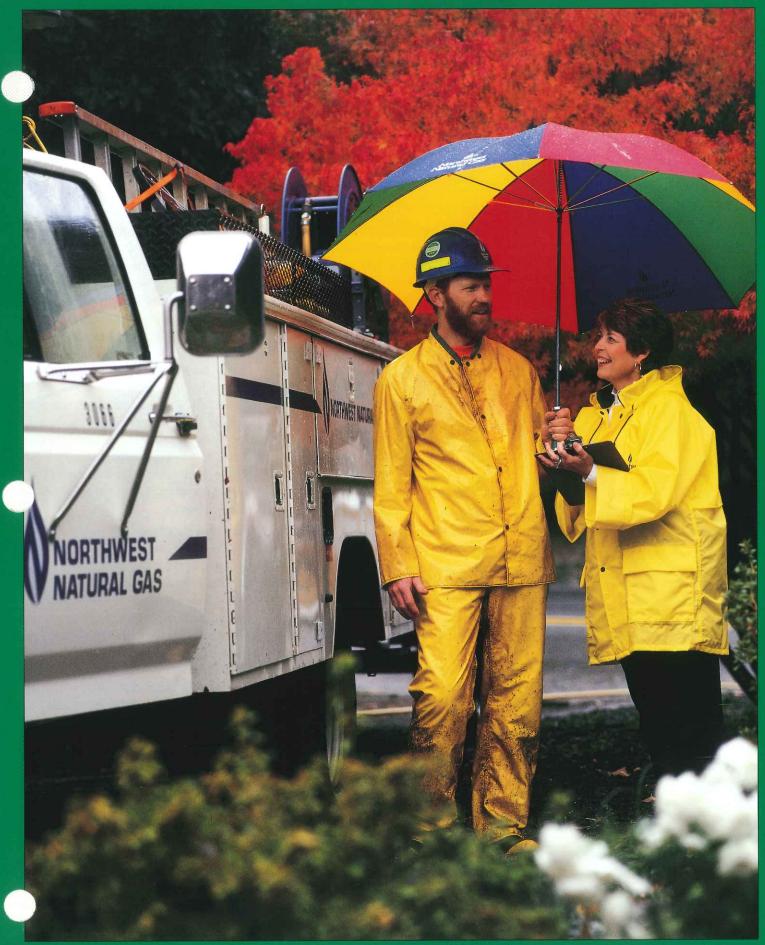
Mission outlined

South Center's mission statement fits in a sentence. "South Center is an organization built around business processes, applying Total Quality Service to continuously improve productivity and profitability while achieving customer and employee satisfaction."

What role will South Center have in how the rest of Northwest Natural Gas should organized? Should similar changes be madeat other Portland-area service centers?

Answering those questions is the next step for the Company. Total Quality Service surveys are used to measure employee and customer satisfaction. The Company's 1995 strategic plan calls for determining whether the changes that have been made at South Center can be replicated elsewhere.

The Labor Relations Team, which consists of bargaining unit stewards and Company managers, has assumed leadership for the Company's Total Quality Service (TOS) effort. In a nutshell, TQS means increasing customer satisfaction profitably by involving employees in a continuous improvement process. The team will examine procedures that support TQS and those that don't. To provide a better communication link among all levels of employees, the Company's Executive Staff, which sets policy, and Joint Staff, which communicates it, were reconstituted in 1994 to include repr sentatives from union members and from line supervisors. The primary goal will be to achieve two-way communication at all levels of the organization.



Distribution Crew Leader Brian Konrad works with Marcia Betts of Market Services at a job site in Lake Oswego, Oregon. Both employees coordinate work from the South Center customer facility. "The phone, other than the shovel, is my most used tool," said Konrad.

Reliable



The industrial partnership shared by Georgia-Pacific and Northwest Natural Gas is represented by Sid C. Riggins, (left) controller of G-P's Toledo pulp and paper operations, and Rick Harper, general manager of Northwest Natural's Industrial and Business Development Department. G-P has announced plans to invest more than \$100 million to modernize its Toledo plant, which uses 200,000 tons of waste paper each year.

Gas Supply

A diverse gas supply has benefited all customers. Industrial customers have more options because of the ample pipeline capacity of Northwest Natural Gas.

An abundant supply of natural gas has kept prices low and allowed industrial customers to choose from a wide range of service. Industrial customers, after several years of buying and shipping their own natural gas, began selecting Northwest Natural's more reliable sales service in 1993. The trend continued in 1994. New customers to Northwest Natural's system are placing a premium on reliability, and they want reasonable costs and a high level of service from their local gas distribution company. They have found that Northwest Natural Gas provides that reliability.

Canada key source

Northwest Natural has been able to take advantage of supplies from a stable Canadian gas market. About 63 percent of the Company's gas supplies during the winter of 1994-95 came from British Columbia, 17 percent from Alberta and 20 percent from western U.S. gas fields. More than three-quarters of Northwest Natural's gas supply will come next year from more than a dozen Canadian and U.S. suppliers whose contracts extend up to 10 years.

Northwest Natural's main winter storage is at the Company's Mist underground facility in Columbia County, Oregon, which has 70 million therms of gas available for winter use. Northwest Natural has two liquefied natural gas facilities at Newport on the Oregon Coast and in Portland. All three can provide a total of 2.8 million therms a day for peaking needs. In addition, the Company has three storage contracts with Northwest Pipeline Corporation that provide more than 925,000 therms a day of offsystem storage at an underground facility near Centralia, Washington, and Northwest Pipeline's Plymouth liquefied natural gas facility, also in Washington.

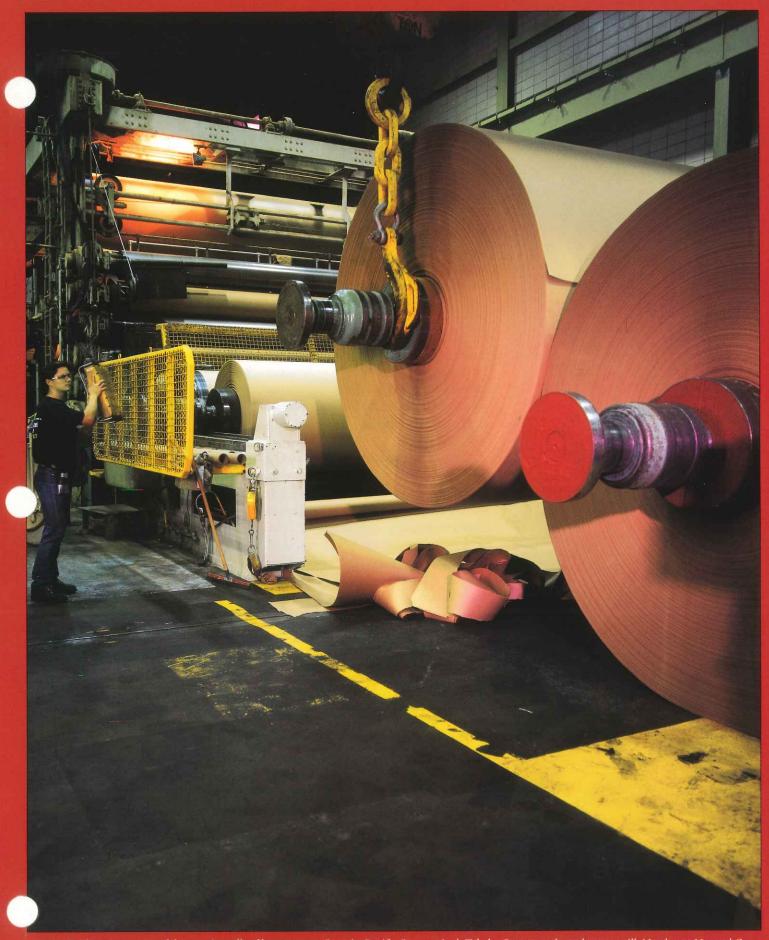
In addition, the Company has adopted innovative interruptible gas sales and capacity agreements that may be curtailed during cold weather. Agreements with large end users such as Georgia-Pacific Corporation and Portland General Electric Company (PGE) permit the Company limited recall rights to meet Company peak needs. For example, the agreement with PGE permits recall rights of 300,000 therms per day of Northwest Natural's firm pipeline capacity and gas for limited periods during the winter. These agreements allow the Company and large industrial users to utilize the Company's pipeline capacity, which has acquired greater importance as deregulation of the i dustry proceeds.

Gas price drops

Three-year gas prices negotiated in 1991 insulated 60 percent of our gas costs against price volatility in 1992 and 1993. The expiration of those prices has coincided with a general decline in market prices so that, with the remaining 40 percent of the Company's gas supplies, gas costs for 1995 have dropped. The reduction has been passed through to the Company's sales customers.

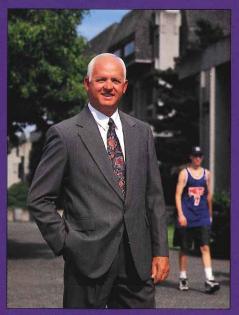
Customers of Northwest Natural Gas also have benefited from low prices, which have meant:

- A reduction in gas rates in December 1994 that averaged 5.6 percent in Oregon and 7 percent in Washington state. The residential rate in both states is less than the rate in December 1984—a decade earlier. This does not include any adjustments for inflation.
- Rate stability has been advantageous in marketing to spaceheating and waterheating customers and in gaining new customer Electricity, the Company's main competition the Pacific Northwest, has continued to increase in cost, leaving the Company in an advantageous competitive situation.



Darrin Purdom moves one of the massive rolls of box paper at Georgia-Pacific Corporation's Toledo, Oregon, pulp and paper mill. Northwest Natural Gas has developed an innovative partnership with Georgia-Pacific and two other industrial customers. Northwest Natural's pipeline capacity is utilized by Georgia-Pacific during low-peak periods but may be returned to the Company when gas needs are highest.

Leading



Eugene District Manager Udo Lindikoff stands at the west entrance of Lane Community College. Lindikoff is a member of the college's foundation board. Each year he and Northwest Natural Gas sponsor the Lane Community College golf tournament at Eugene Country Club, which in 1994 raised more than \$14,000 for scholarships. The Eugene District is one of the fastest growing areas of the Company.

The Competition

Price and customer choice favor natural gas. Growth has been strong in medium-sized cities in the Company's service territory as well as the Portland-Vancouver metropolitan area.

Northwest Natural Gas dominates the new home construction market and converts almost 8,000 homes from oil or electricity to natural gas each year. In 1994, the Company added 19,211 new customers. More than 100,000 new customers have been connected to natural gas in our service territory during the last six years, when the Pacific Northwest economy has been as robust as any area of the United States. Growth has been particularly strong in medium-sized cities outside the Portland-Vancouver metropolitan area.

The past year's growth occurred while a significant change was being made in the Company's main extension policy. The new policy requires some new customers to make a cash contribution to offset the cost of extending a new line to their premises. This assures that existing customers will not subsidize new customers and that new business will be profitable. The size of the customer contribution is load-sensitive so that a customer with multiple gas appliances would pay less than a customer with a single appliance. The result has been a reduction of unprofitable connections—perhaps as many as 700 potential customers—during a year in which the Company continued its rapid customer growth.

Gas preferred

The reasons for the strong growth have been preference for gas by those moving to Oregon, often from areas where they were accustomed to the benefits of gas heating and cooking, and price and environmental advantages of gas compared to other fuels. Residential gas prices were lower in 1994 than in 1984, and this does not consider inflation. Electric prices have continued to rise because of new generation costs. Fuel oil, while being competitive in price, has not gained a share of the new home construction market and

sometimes loses customers worried about the environmental and political disadvantages of oil or removal of old oil tanks.

Competition to natural gas comes from sellers of electricity. Two electric investor-owned utilities—Pacific Power and Light Company and Portland General Electric Company—and 24 public utility districts, municipals and cooperatives serve electric customers in the Company's service territory.

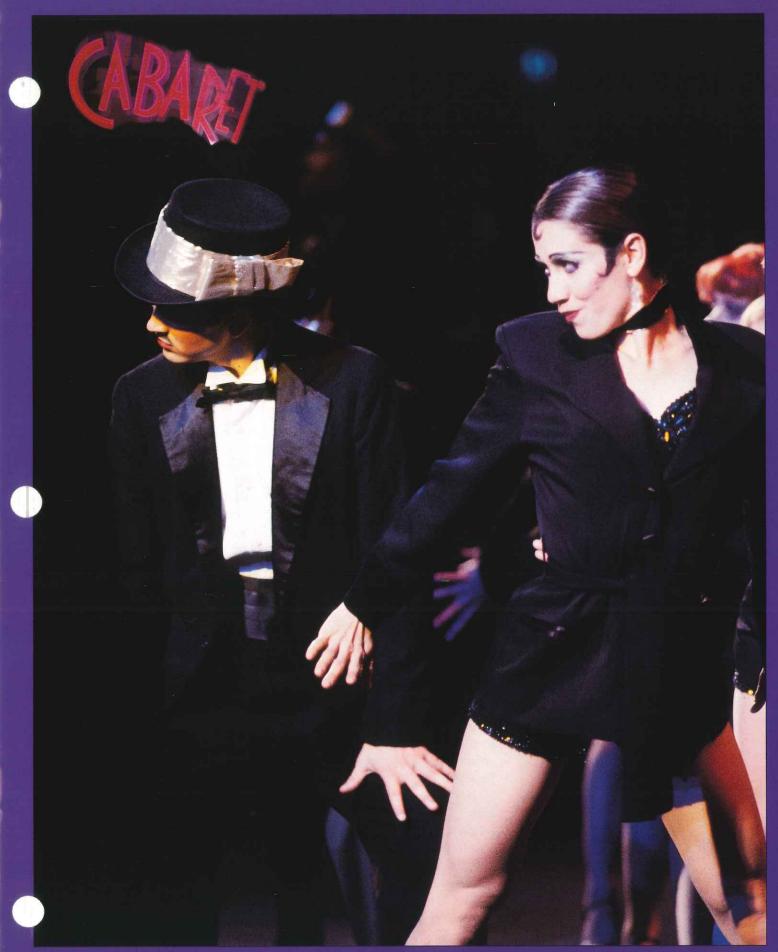
The potential for growth is high. Only about one-third of the potential customers have connected to natural gas. Strong land use ordinances and laws in Oregon and Clark County, Washington, are designed to concentrate growth in urban areas, where higher densities are easier and more probable to serve.

Multifamily market has potential

One market with low natural gas penetration is multifamily housing. That market is a future focus for the Company.

Another is the gas fireplace market. Hearth products represent the fastest selling product category in the natural gas industry today. Gas fireplaces offer the beauty and comfort of a wood fire without the environmental disadvantages and inconveniences of wood. Marketing research indicates that even customers who use wood as a secondary source of heating are profitable markets for gas fireplaces.

The natural gas vehicle market continues to develop slowly to serve a large potential market of fleet vehicles. Many of the Company's vehicles will be converted to compressed natural gas. Other customer fleets will convert more vehicles as more fueling facilities become available. Natural gas vehicles will become increasingly popular because of environmental mandates for cleaner air and as new technology moves a larger share of the market toward natural gas.



Northwest Natural Gas again was one of the corporate sponsors of the Eugene Festival of Music's 1994 summer production of Cabaret. The Company, its competitiveness sharpened by maintaining high visibility in its service territory, actively supports community projects such as Cabaret.

Social



Vancouver District Manager Paul Corso prepares and serves a hamburger to a young attendee at the 1994 Vancouver Neighborhoods Conference. Northwest Natural Gas is one of the sponsors of the conference.

Responsibility

The employees have a responsibility to their communities. They volunteer and contribute money in a partnership with the cities and towns where they live and work.

Northwest Natural Gas is a socially responsible corporation dedicated to supporting its community and meeting environmental, educational, economic and social goals.

Each year the Company and its employees contribute to a wide range of social causes. While the Company has a long record of making contributions to charitable groups, the amount fluctuates depending upon the financial strength of earnings. In 1994 the Company's contributions budget was \$500,000.

The foremost recipient has been United Way, the umbrella organization that distributes contributions to a wide range of agencies. Northwest Natural contributed \$170,000 to 14 United Way organizations in the Company's service territory during 1994. In addition, Company employees gave \$86,000 more to United Way.

Voluntarism key

Employee voluntarism is a key part of the Company's community activism. The Company encourages employees to volunteer time and energy to community needs, and they participate in a wide range of civic and community activities.

The second largest recipient of Company contributions was the Gas Assistance Program (GAP), which assists low-income customers in paying their natural gas bills during winter.

Frequently agencies receive contributions spread over several years. The I Have A Dream Foundation will receive a total of \$20,000 from the Company between 1994 and 1998. The Oregon Community Foundation received \$28,500. Educational institutions are frequent recipients. The Oregon Independent College Foundation receives \$32,000 each year. Independent Colleges of Washington, the Clark College Foundation, Pacific University, Marylhurst

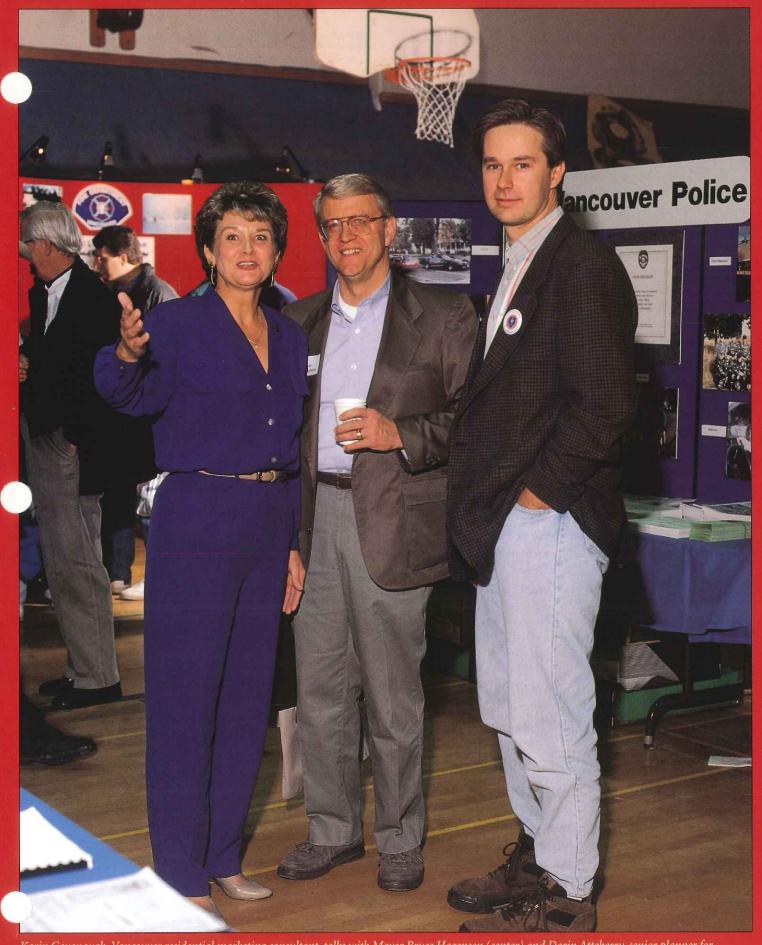
College and the United Negro College Fund also received contributions from the Company in 1994.

Northwest Natural Gas is dedicated to protecting the natural environment. The Company's Board of Directors adopted an Environmental Policy Statement in 1993 that pledged Northwest Natural will "conduct its business consistent with this philosophy and in a manner which will reflect this dedication to our customers, employees, investors and the public." In line with this policy, the Company in January 1994 submitted a notice that it would participate in the Oregon Department of Environmental Quality's Voluntary Cleanup Program of Company owned property at Linnton, Oregon. The property is the site of a former gas manufacturing plant that was closed in 1956. A predecessor of Northwest Natural operated the plant from 1913 to 1956 to manufacture gas from oil. A comprehensive environmental investigation will be conducted to determine what, if any, remedial measures are appropriate for oil gasification residues.

Memorandum signed

Northwest Natural Gas also signed a memorandum of understanding in November 1994 in support of the city of Portland joining the federal "Clean City" program to expand the use of fuels other than gasoline in fleet vehicles. The Company, as one of 16 "partners," pledged to do its part to encourage a wider availability of alternative fuels such as compressed natural gas for government and commercial fleets.

Whether it's the arts, cultural, economic, educational or social causes, employees and the Company constitute a partnership it serving organizations in the cities and town served by Northwest Natural. The result is better communities and a higher quality of life for those living there.



Karin Cavanaugh, Vancouver residential marketing consultant, talks with Mayor Bruce Hagensen (center) and Darin Atteberry, senior planner for the city of Vancouver. Cavanaugh and Atteberry are active in Leadership Clark County, a program for new community leaders. The three participated at the 1994 Vancouver Neighborhoods Conference, which is designed to create neighborhood partnerships.

Northwest Natural Gas Company's (Northwest Natural) consolidated wholly-owned subsidiaries consist of Oregon Natural Gas Development Corporation (Oregon Natural); NNG Energy Systems, Inc. (Energy Systems); NNG Financial Corporation (Financial Corporation); and Pacific Square Corporation (Pacific Square) (see "Subsidiary Operations" below and Note 2 to the Consolidated Financial Statements). Together, Northwest Natural and these subsidiaries are referred to herein as the "Company."

The following is management's assessment of the Company's financial condition including the principal factors that affect results of operations. The discussion refers to the consolidated activities of the Company for the three years ended December 31, 1994.

Earnings and dividends

The Company earned \$2.44 per share in 1994, compared to \$2.61 per share in 1993 and \$1.11 per share in 1992. The results for 1994 were affected by warmer weather which was partially offset by improved subsidiary results. Higher earnings in 1993 were due to cooler weather. The Company's earnings for 1992 were depressed by the effects of record-setting warm weather and a loss related to Agrico Cogeneration Corporation (Agrico), a subsidiary of Energy Systems.

The Company earned \$2.08 per share from utility operations in 1994, compared to \$2.72 per share and \$1.41 per share in 1993 and 1992, respectively. Weather conditions in the Company's service territory in 1994 were seven percent warmer than normal and 10 percent warmer than in 1993. The Company estimates that the weather-related reduction in margin during 1994 was equivalent to about \$0.51 per share compared to a similar period with normal weather, and \$1.06 per share compared to actual conditions during 1993. These estimates are derived from the Company's internal planning model. The model calculates expected sales to, and revenues from, residential and commercial customers for "base usage," representing gas use for water heaters, ranges, and other appliances not sensitive to outside temperatures. The model also calculates expected sales to, and revenues from, these customers for "heat sensitive" usage, primarily furnaces, as a function of heating degree days (the difference between 65 degrees Fahrenheit and the average of a day's high and low temperatures). The model then estimates the earnings effect of the difference between expected sales and revenues under actual temperature conditions, and expected sales and revenues under average weather conditions.

Subsidiary earnings for 1994 were equivalent to \$0.36 per share, compared to losses equivalent to \$0.11 per share and \$0.30 per share in 1993 and 1992, respectively. Improved subsidiary performance in 1994 resulted primarily from a one-time gain from the sale of Pacific Square's investments, equivalent to \$0.14 per share, and improved operating performance of Financial Corporation's investments in windpower electric generating projects in California equivalent to \$0.12 per share in 1994, compared to a loss equivalent to \$0.06 per share in 1993.

1994 was the 39th consecutive year in which the Company's dividends paid have increased. In 1994, dividends paid on common stock were \$1.76 per share compared with \$1.75 in 1993 and \$1.72 in 1992.

Results of operations

Regulatory matters

Northwest Natural provides utility gas service in Oregon ap 'Washington, with Oregon representing approximately 95 percent its revenues. Future earnings and cash flows from utility operations will be determined for the most part by continued growth in the residential and commercial markets, by Northwest Natural's ability to remain price competitive in the large industrial market, and by the ability of management to control expenses.

In 1994, the Oregon Public Utility Commission (OPUC) approved new tariffs for recovery of Demand Side Management (DSM) programs to encourage energy conservation. Also, the OPUC approved a new service line and main extension policy which supports Northwest Natural's strategy of promoting profitable growth. Prospective customers are required by this policy to contribute the amount which exceeds a construction allowance based upon estimated annual margin revenue.

In 1994, Northwest Natural redesigned certain non-traditional industrial services to meet the changing demands of the industrial market. The result was OPUC and Washington Utilities and Transportation Commission (WUTC) approval for a new service to industrial customers combining natural gas from Northwest Natural's supply contracts with pipeline transmission capacity released from Northwest Natural's firm transportation contract with Northwest Pipeline Corporation (NPC). These new industrial services were made possible by the Federal Energy Regulatory Commission's (FERC) Order No. 636, which completed a restructuring of the interstate natural gas pipeli industry, and Northwest Natural's revision of its own gas procuremental policies and practices.

Effective April 15, 1994, the OPUC approved rate decreases averaging 1.1 percent for Northwest Natural's residential, commercial and industrial rate schedules. The rate decreases pass through Northwest Natural's lower property tax expenses due to Oregon Ballot Measure 5, an initiative measure adopted in Oregon which reduced property tax expenses. Effective December 1, 1994, the OPUC and WUTC approved rate decreases averaging 5.6 percent and 7.0 percent, respectively. These rate decreases pass through reductions in gas costs and remove temporary adjustments to rates which were put into effect on December 1, 1993, for the amortization of prior gas cost savings. None of the above rate decreases has a material effect on net income.

Comparison of gas operations

The following table summarizes the composition of utility gas volumes and revenues for the three years ended December 31:

1994		1993		1992		= 0
es (therms)	• 6					
462,143		477,460		375,537		
(7,519))	3,844		4,163		
454,624	46%	481,304	46%	379,700	36%	
81,348	8%	80,588	8%	67,847	6%	
89,899	9%	66,370	6%	22,399	2%	
625,871		628,262		469,946		
364,461	37%	415,367	40%	595,397	56°	
990,332	100%	1,043,629	100%	1,065,343	100%	
	es (therms) 462,143 (7,519) 454,624 81,348 89,899 625,871 364,461	es (therms): 462,143 (7,519) 454,624 46% 81,348 8% 89,899 9% 625,871	es (therms): 462,143	es (therms): 462,143	es (therms): 462,143	es (therms): 462,143

Thousands	1994		1993		1992	
Utility operating revenues: Residential and commercial						
venues	\$ 284,962		\$ 271,693		\$ 203,448	
ibilled revenues	(5,571))	5,153		2,603	
Weather-sensitive revenues	279,391	78%	276,846	80%	206,051	77%
Industrial firm sales revenues Industrial interruptible sales	34,443	10%	31,340	9%	24,867	9%
revenues	27,361	8%	18,884	5%	6,920	3%
Total gas sales revenues	341,195		327,070		237,838	
Transportation revenues	14,702	4%	17,892	5%	25,564	10%
Other revenues	829		2,890	1%	2,781	1%
Total utility operating revenues	\$ 356,726	100%	\$ 347,852	100%	\$ 266,183	100%
Cost of gas	\$ 163,026		\$ 138,833		\$ 101,733	
Total number of customers (end of period)	391,600		372,400		353,000	
Actual degree days	4,020		4,452		3,662	
20-year average degree days	4,324		4,313		4,354	

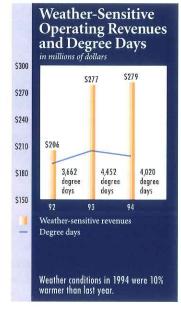
Residential and commercial

Typically, 75 percent or more of the Company's annual utility operating revenues are derived from gas sales to weather-sensitive residential and commercial customers. Accordingly, shifts in temperatures

from one period to the next can significantly affect volumes of gas sold to these customers. Normal weather conditions are based upon a 20 year average measured by degree days. Weather condi-

ms were seven percent warmer an normal in 1994, three percent cooler than normal in 1993, and 16 percent warmer than normal in 1992. Weather was 10 percent warmer in 1994 compared to 1993, and 22 percent cooler in 1993 compared to 1992.

Higher rates in effect during most of the year and the addition of 19,200 customers, offset by the effects of warmer weather, combined to produce a one



percent increase in revenues from residential and commercial customers in 1994 compared to 1993. Therm deliveries to these customers were six percent lower than in 1993. Cooler weather in 1993, combined with 19,400 customer additions and OPUC and WUTC approved rate increases, produced a 34 percent increase in residential and commercial revenues compared to 1992, on 27 percent higher therm deliveries.

Northwest Natural's residential and commercial customer growth has continued at a steady pace. In the last three years, over 55,000 of these customers have been added to the system, representing an average growth rate of 5.2 percent.

Industrial, transportation and other

The combined net operating revenues (margin) from industrial firm and interruptible sales and transportation customers remained relatively stable at \$44.0 million in 1994 compared to \$44.4 million in 1993. Since other revenues are primarily regulatory adjustments to industrial sales amounts (see Note 1 to the Consolidated Financial Statements), they are treated in this discussion as a component of industrial revenue. Total volumes delivered to these customers were 26.6 million therms lower in 1994 than in 1993, while corresponding revenues and related adjustments from such deliveries were \$6.3 million higher. Contributing to the lower volumes was a 28 million therm reduction in transportation deliveries to the James River Corporation's paper mill in Camas, Washington, which placed a direct (bypass) connection to NPC's system into operation in October 1993. Northwest Natural does not expect a significant number of its other large customers to bypass its system in the foreseeable future, since these customers are served under tariffs which are designed to be competitive with the capital and operating costs of direct connections to NPC's system.

Although volumes decreased, Northwest Natural's revenues and related adjustments from industrial firm sales and industrial interruptible sales and transportation deliveries were 9 percent higher in 1994 compared to 1993, and 29 percent higher than in 1992. The revenue increase was primarily due to a higher level of industrial interruptible sales and a correspondingly lower level of transportation deliveries for these same periods. Since 1992, over half of Northwest Natural's transportation customers have switched to sales service. These customers, which have the option of purchasing gas directly from suppliers and shipping it on the systems of Northwest Natural and its pipeline suppliers for a fee, select the option which, from time to time, provides the lowest cost. The migration from transportation to sales tariffs by these customers reflects the fact that Northwest Natural's industrial sales tariffs were lower than the cost to these customers of purchasing and shipping their own gas. Since transportation charges typically are the same as the margin on an equivalent sale of gas, the increase in revenue attributable to the migration from transportation to sales tariffs was substantially offset by an increase in Northwest Natural's cost of gas.

Cost of gas

Northwest Natural has a Purchased Gas Cost Adjustment (PGA) tariff under which its net income from Oregon operations is affected only within defined limits by changes in purchased gas costs. The cost of gas sold during 1994 was 17 percent greater than in 1993. Total gas volumes delivered to sales customers in 1994 were equivalent to 1993. However, there was an 18 percent increase in the cost of gas per therm, which includes purchased gas costs, related tariff adjustments, and line loss. Increased gas costs resulted from higher commodity prices, as well as higher demand charges placed into effect in April 1993 by NPC, Northwest Natural's primary pipeline supplier, pursuant to FERC Order No. 636.

The cost of gas sold during 1993 was 36 percent greater than in 1992. The primary contributing factors were a 34 percent increase in total volumes sold and a 2 percent increase in the cost of gas per therm.

Subsidiary operations

Consolidated subsidiary earnings for 1994 were equivalent to \$0.36 per share, compared to losses equivalent to \$0.11 per share and \$0.30 per share for the years 1993 and 1992, respectively. The improved subsidiary results for 1994 resulted primarily from three factors. First, Pacific Square sold its partnership interests in two office buildings, including the Company's headquarters building. The Company's gain on the sale was equivalent to \$0.14 per share. As a result of the sale of these investments, Pacific Square no longer has any operating activities. Second, Financial Corporation's investments in windpower electric generating projects in California (see Note 10 to the Consolidated Financial Statements) benefitted from favorable wind conditions which improved net income. As a result, Financial Corporation's net income increased \$2.2 million compared to 1993 and \$1.7 million compared to 1992. Third, the Company realized a gain equivalent to \$0.03 per share on the sale of Agrico's assets pursuant to its bankruptcy reorganization plan.

Results of operations for the individual subsidiaries for 1994 were net income of: \$0.3 million for Energy Systems; \$0.4 million for Oregon Natural; \$1.8 million for Financial Corporation; and \$2.2 million for Pacific Square.

The subsidiaries' results for 1993 reflect a fourth quarter write-down in the value of unproven gas and oil reserves equivalent to \$0.11 per share and increased federal income tax expense equivalent to \$0.05 per share (see "Depreciation, Depletion and Amortization" and "Income Taxes" below). The 1992 loss resulted primarily from charges equivalent to \$0.24 per share related to Agrico (see Note 2 to the Consolidated Financial Statements).

The following discussion summarizes operating expenses, other income, interest charges, income taxes, and preferred and preference stock dividend requirements.

Operating expenses

Operations and maintenance

Northwest Natural's operations and maintenance expenses were \$0.5 million lower for 1994 compared to 1993, while subsidiary operations and maintenance expense increased \$0.7 million. The reduction in utility operations and maintenance expense was primarily due to a \$0.6 million decrease in accruals for estimated employee bonuses. Increased subsidiary operations and maintenance expense was primarily due to increased production expenses related to Oregon Natural's Canadian operations.

The Company's operations and maintenance expenses were \$6.5 million, or 10 percent, higher in 1993 than in 1992. Northwest Natural's expenses constituted \$6.2 million of this increase including a \$3.1 million, or 10 percent, increase in payroll expenses; a \$1.3 million increase in employee benefit costs, including an increase of \$0.7 million resulting from the adoption of Statement of Financial Accounting Standards (SFAS) No. 106, "Employers' Accounting for Postretirement Benefits Other than Pensions;" a \$1.2 million increase in the allowance for uncollectible accounts primarily due to higher residential and commercial gas sales; and a \$0.5 million accrual for estimated environmental investigation costs (see Note 12 to the Consolidated Financial Statements).

Taxes other than income

Northwest Natural's property taxes were \$1.9 million lower in 1994 compared to 1993 but were \$0.6 million higher in 1994 compared to 1992. The increasing trend in property taxes has resulted planarily from increased plant additions to serve new customers. Between these same years, property taxes fluctuated due to a non-recurring accrual of \$0.9 million in 1993 related to a dispute with the OPUC over the amount of prior-year savings on property taxes, which must be refunded to Oregon customers, resulting from voter approval of Oregon Ballot Measure 5.

Partially offsetting the decline in property taxes in 1994 was an increase in franchise taxes based on higher utility operating revenues. Franchise taxes increased \$0.6 million in 1994 compared to 1993 and \$1.8 million in 1993 compared to 1992.

Depreciation, depletion and amortization

Northwest Natural's depreciation expense increased \$1.9 million, or six percent, in 1994 and \$1.9 million, or seven percent, in 1993, primarily due to additional utility plant in service. A program for the removal of all of its underground gasoline tanks accounted for \$0.4 million of the increased 1993 expense.

Subsidiary depreciation expense decreased \$3.5 million in 1994 compared to 1993, and increased \$4.7 million in 1993 compared to 1992. The 1993 increase resulted primarily from charges totalling \$3.5 million from the write-downs of Oregon Natural's unproven gas and oil properties (see Note 2 to the Consolidated Financial Statements).

Other income

The increase in other income for 1994 compared to 1993 and 19 resulted primarily from a \$3.2 million pre-tax gain related to the sale of Pacific Square's investments and a \$2.5 million increase due to improved operating results from Financial Corporation's investments.

Interest charges

Interest charges remained stable in 1994 compared to 1993 on equivalent total debt balances. Higher short term rates in 1994 offset lower long term rates resulting from 1993 debt refinancings (see "Financing Activities" below).

Northwest Natural's interest expense for 1993 decreased \$1.3 million compared to 1992. The decrease was a result of debt refinancings which reduced interest expense by \$0.6 million; \$11.5 million lower average outstanding commercial paper balances; and a decrease in average interest rates for utility commercial paper from 3.9 percent in 1992 to 3.3 percent in 1993.

Subsidiary interest expense for 1993 decreased \$0.3 million compared to 1992 due to a decrease in interest expense under Financial Corporation's commercial paper program. Financial Corporation's average outstanding commercial paper balances decreased \$4.4 million from 1992 to 1993. In addition, Financial Corporation's average interest rates for commercial paper decreased from 4.1 percent in 1992 to 3.3 percent in 1993.

Income taxes

The effective corporate income tax rates for 1994, 1993, and 1992 were 37 percent, 37 percent, and 31 percent, respectively, compared to Company's statutory tax rates for these periods of 39 percent, 39 percent, and 38 percent, respectively. Effective January 1, 1993, the federal income tax rate for corporations increased from 34 to 35 percent. The cumulative effect of the tax rate increase was recorded in the third quarter of 1993 and resulted in additional income tax expense of \$0.6 million, an increase in deferred tax liabilities of \$3.0 million, and an increase in regulatory assets of \$2.6 million.

Preferred and preference stock dividend requirements

Preferred and preference stock dividend requirements for 1994 were lower by \$0.5 million, or 14 percent, compared to 1993, due to redemptions and refundings of preferred stock in 1993. The principal amount of preferred and preference stock outstanding was \$1.5 million, or three percent, lower at December 31, 1994, than at December 31, 1993. Also, effective December 1, 1993, the Company cancelled the \$8.75 Series of Preferred Stock in exchange for issuance of the \$7.125 Series of Preferred Stock (see "Financing Activities" below).

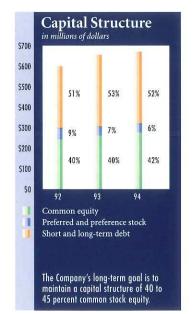
Financial condition

Capital structure

Northwest Natural's capital expenditures are required for utility construction resulting from customer growth and system improvements. Northwest Natural finances these expenditures from cash provided by operations, and short-term borrowings which are periodi-

ally refinanced through the sale long-term debt or equity securities. In addition to its capital expenditures, the weather-sensitive nature of gas usage by Northwest Natural's residential and commercial customers influences the Company's financing requirements. Short-term liquidity is satisfied primarily through the sale of commercial paper, which is supported by commercial bank lines of credit (see Note 6 to the Consolidated Financial Statements).

The Company's long-term goal is to maintain a capital structure comprised of 40 to 45 percent common stock equity, 5



to 10 percent preferred and preference stock and 45 to 50 percent short-term and long-term debt. When additional capital is required, this target structure is managed by issuing new debt or equity depending upon market conditions. The Company also uses these sources to meet long-term debt and preferred stock redemption requirements ee Notes 3 and 5 to the Consolidated Financial Statements).

Cash flows

Operating activities

Cash provided from operating activities was 91 percent higher in 1994 compared to 1993 primarily due to rate increases in late 1993 reflecting completion of amortizations of credit balances in regulatory accounts. Also contributing was the effect of weather conditions from year to year on accounts receivable, unbilled revenue, and accounts payable.

Northwest Natural has lease and purchase commitments related to its operating activities which are financed with cash flows from operations (see Note 12 to the Consolidated Financial Statements).

Investing activities

Cash requirements for utility construction, primarily related to system improvements and customer growth, totalled \$77.7 million, up \$7.3 million, or 10 percent, from 1993. 1993 expenditures were up \$9.7 million, or 16 percent, from 1992. The 1994 and 1993 increases include \$8.5 million and \$6.3 million, respectively, for the replacement of Northwest Natural's customer information system. The total cost of the new system, scheduled for completion in 1997, is estimated at \$25 million.

Northwest Natural's construction expenditures are estimated at \$76 million for 1995. Over the five year period 1995 through 1999, these expenditures are estimated at between \$350 and \$375 million. It is anticipated that approximately 60 percent of the funds required for these expenditures will be internally generated, and that the remainder will be funded through short-term borrowings which will be refinanced periodically through the sale of long-term debt and equity securities.

In 1994, subsidiary capital expenditures were primarily for Oregon Natural's Canadian gas exploration and production program. In 1993, Oregon Natural received \$2.3 million from sales and exchanges of gas producing properties. Oregon Natural anticipates investing up to \$10 million, in addition to internally generated cash, in its Canadian gas exploration and production program during the three years 1995 through 1997.

Investments shown on the Consolidated Balance Sheets under "Investments and Other" for 1992 included a \$5.5 million restricted cash deposit with a commercial bank which related to Pacific Square. This deposit was reclassified as a current asset in 1993 due to the pending sale of Pacific Square's primary real estate investments. Upon the sale of Pacific Square's investments in 1994, \$4.0 million was collected while the remaining \$1.5 million was secured by a note receivable due no later than December 1, 1999.

Financing activities

During 1994, Northwest Natural sold \$20 million of its Medium-Term Notes, the proceeds of which were used to repay short term debt incurred to fund Northwest Natural's construction program.

During 1993 and 1992, Northwest Natural sold \$100 million and \$45 million, respectively, of its Medium-Term Notes. Of the proceeds from the 1993 sales, \$82.6 million was used to redeem higher-cost

long-term debt, and the remainder was used to pay the cost of Northwest Natural's construction program and to reduce short-term borrowing incurred for such purpose. Of the proceeds from the 1992 sales, \$30.2 million was used to redeem higher-cost long-term debt and \$15 million was used to reduce short-term borrowing. As a result of these transactions, the average interest rate on long-term debt declined from 9.7 percent at December 31, 1991 to 8.3 percent at December 31, 1993.

In order to pay the cost of Northwest Natural's construction program, to refund higher-cost Preferred Stock, and to increase its equity ratios, Northwest Natural sold \$25 million of Preference Stock and \$28.5 million, or 990,000 shares, of Common Stock during the fourth quarter of 1992. In January 1993, approximately \$9 million of the proceeds from the sale of Preference Stock was used to redeem all of the outstanding shares of Northwest Natural's \$8.00 and \$2.42 Series of Preferred Stock. In 1993, Northwest Natural also redeemed all of the outstanding shares of its \$6.875 Series of Preferred Stock.

In 1993, Northwest Natural refinanced \$15 million of its \$8.75 Series of Preferred Stock with an equivalent amount of the \$7.125 Series of Preferred Stock.

In the first quarter of 1995, Northwest Natural sold 1.15 million shares of its Common Stock. The net proceeds of \$33.0 million received from the offering were added to the general funds of the Company and used for corporate purposes, primarily to fund, in part, Northwest Natural's construction program, and to repay short-term debt incurred for such purpose. The projected dilution of earnings per share resulting from this sale is estimated at five percent.

Ratios of earnings to fixed charges

For the years ended December 31, 1994, 1993, and 1992, the Company's ratios of earnings to fixed charges, computed by the Securities and Exchange Commission method, were 3.08, 3.22, and 1.81, respectively. Earnings consist of net income to which has been added taxes on income and fixed charges. Fixed charges consist of interest on all indebtedness, amortization of debt expense and discount or premium, and the estimated interest portion of rentals charged to income.

Environmental matters

In June 1992, the City of Salem, Oregon, requested Northwest Natural's participation in its review of an environmental assessment riverfront property in Salem that is the proposed site for a park a other public developments. Within the property is a block previously owned by Northwest Natural which was the site of a former manufactured gas plant. Northwest Natural's corporate predecessor owned the plant for less than four months in 1929. The City has determined that there is environmental contamination on the site, and that a remediation process involving Northwest Natural and at least two other prior owners of the block will be required. To date Northwest Natural has not obtained sufficient information to determine the extent of its responsibility for any such remediation.

Northwest Natural owns property in Linnton, Oregon, that is the site of a former gas manufacturing plant that was closed in 1956. Although limited testing for environmental contamination has been undertaken by other parties on portions of the site, no comprehensive studies have been performed. Northwest Natural submitted a work plan for the site to the Oregon Department of Environmental Quality (ODEQ) in 1987, but further efforts were suspended at ODEQ's request while Northwest Natural and other parties participated in a joint hydrogeologic study of an area adjacent to the site. In September 1993, pursuant to ODEQ procedures, Northwest Natural submitted a notice of intent to participate in the ODEQ's Voluntary Cleanup Program and, in April 1994, the site was listed on ODEQ's Confirmed Release List and Inventory. It is anticipated that the site investigation will commence during 1995.

In September 1993, Northwest Natural recorded an expense of \$0.5 million for the estimated costs of consultants' fees, ODEQ oversight cost reimbursements, and legal fees in connection with the voluntary investigation at the Linnton site. To date, Northwest Natural has not obtained sufficient information to determine whether any remediation will be required at this site or, if so, the extent of its responsibility for any such remediation. Northwest Natural expects that its costs of investigation and any remediation for which it may be responsible should be recoverable, in large part, from insurance or through future rates.

The financial statements in this report were prepared by management, which is responsible for their objectivity and integrity. The statements have been prepared in conformity with generally accepted ccounting principles and, where appropriate, reflect informed estimates based on judgments of management. The responsibility of the Company's independent auditors is to render an independent report on the financial statements.

The Company's system of internal accounting controls is designed to provide reasonable assurance that assets are safeguarded and transactions are executed in accordance with management's authorizations, that transactions are recorded to permit the preparation of financial statements in conformity with orders of regulatory authorities and generally accepted accounting principles and that accountability for assets is maintained. The Company's system of internal controls has provided such reasonable assurances during the periods reported herein. The system includes written policies, procedures and guidelines, an organization structure that segregates duties and an established program for monitoring the system by internal auditors. In addition, Northwest Natural Gas Company has prepared and annually distributes to its management employees a Code of Ethics covering its policies for conducting business affairs in a lawful and ethical manner. Ongoing review programs are carried out to ensure compliance with these policies.

The Board of Directors, through its Audit Committee, oversees management's financial reporting responsibilities. The committee meets regularly with management, the internal auditors, and representatives of Deloitte & Touche LLP, the Company's independent auditors. Both internal and external auditors have free and independent access to the committee and the Board of Directors. No member of the committee is an employee of the Company. The committee reports the results of its activities to the full Board of Directors. Annually, the Audit Committee recommends the nomination of independent auditors to the Board of Directors for shareholder approval.

Robert L. Ridgley

President and Chief Executive Officer

Bruce ROMBAIN

Bruce R. DeBolt

Senior Vice President, Finance, and Chief Financial Officer

INDEPENDENT AUDITORS' REPORT

Northwest Natural Gas Company Portland, Oregon

We have audited the accompanying consolidated balance sheets and statements of capitalization of Northwest Natural Gas Company and subsidiaries, as of December 31, 1994 and 1993, and the related consolidated statements of income, earnings invested in the business, and cash flows for each of the three years in the period ended December 31, 1994. These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the consolidated financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, such consolidated financial statements present fairly, in all material respects, the consolidated financial position of Northwest Natural Gas Company and subsidiaries at December 31, 1994 and 1993, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 1994, in conformity with generally accepted accounting principles.

As discussed in notes 7 and 9 to the consolidated financial statements, the Company changed its method of accounting for income taxes and postretirement benefits in the year ended December 31, 1993.

the Taude cup Portland, Oregon

February 22, 1995

CONSOLIDATED STATEMENTS OF INCOME

Thousands, except per share amounts (year ended December 31)	1994	1993	1992
Net operating revenues:			
Operating revenues	\$ 368,261	\$ 358,717	\$ 274,366
Cost of sales	162,788	138,833	101,916
Net operating revenues	205,473	219,884	172,450
Operating expenses:			
Operations and maintenance	70,881	70,723	64,249
Taxes other than income taxes	24,263	25,561	20,865
Depreciation, depletion and amortization	38,058	39,683	33,035
Loss on cogeneration facility		-	4,575
Total operating expenses	133,202	135,967	122,724
Income from operations	72,271	83,917	49,726
Other income (expense)	8,582	933	(267)
Interest charges:			
Interest on long-term debt	21,921	22,578	23,001
Other interest	2,473	1,906	3,223
Amortization of debt discount and expense	850	775	511
Total interest charges	25,244	25,259	26,735
Allowance for funds used during construction	(325)	(152)	(2)
Total interest charges – net	24,919	25,107	26,733
Income before income taxes	55,934	59,743	22,726
Income taxes	20,473	22,096	6,951
Net income	35,461	37,647	15,775
Preferred and preference stock dividend requirements	2,983	3,488	2,560
Earnings applicable to common stock	\$ 32,478	\$ 34,159	\$ 13,215
Average common shares outstanding	13,295	13,074	11,909
Earnings per share of common stock	\$ 2.44	\$ 2.61	\$ 1.11
Dividends per share of common stock	\$ 1.76	\$ 1.75	\$ 1.72

See Notes to Consolidated Financial Statements.

CONSOLIDATED STATEMENTS OF EARNINGS INVESTED IN THE BUSINESS

Thousands of dollars	1994	1993	1992
Balance at beginning of year	\$ 88,497	\$ 77,690	\$ 86,361
Net income	35,461	37,647	15,775
Cash dividends:			
Preferred and preference stock	(3,041)	(3,401)	(2,525)
Common stock	(23,365)	(22,853)	(20,406)
Capital stock expense and other	(277)	(586)	(1,515)
Balance at end of year	<u>\$ 97,275</u>	\$ 88,497	\$ 77,690

housands (December 31)	1994	1993
ssets:		
lant and property in service:	\$ 908,238	\$ 840,030
Utility plant in service	279,112	255,282
Less accumulated depreciation		-
Utility plant – net	629,126	584,748
Non-utility property	49,586	42,764
Less accumulated depreciation and depletion	24,456	20,646
Non-utility property – net	25,130	22,118
Total plant and property in service	654,256	606,866
nvestments and other:	24 102	22 010
Investments	34,183 2,914	32,818 1,756
Long-term notes receivable	-	
Total investments and other	37,097	34,574
current assets:	8,068	4,198
Cash and cash equivalents	43,016	45,340
Accounts receivable – customers	(864)	(1,368
Allowance for uncollectible accounts	20,320	25,890
Accrued unbilled revenue Inventories of gas, materials and supplies	14,958	16,838
Inventories of gas, materials and supplies	10,041	16,412
Prepayments and other current assets Total current assets	95,539	107,310
Regulatory tax assets	60,430	62,130
Deferred debits and other	41,982	38,156
Total assets	\$ 889,304	\$ 849,036
Capitalization and liabilities:		
Capitalization (see Consolidated Statements of Capitalization):	\$ 42,492	\$ 41,728
Common stock	134,641	128,340
Premium on common stock	97,275	88,49
Earnings invested in the business	274,408	258,56
Total common stock equity	274,400	236,30.
Preference stock	26,252	26,63
Redeemable preferred stock	15,950	17,04
Long-term debt	291,076	272,93
Total capitalization	607,686	575,17
Current liabilities:	53,654	72,54
Notes payable	48,517	44,31
Accounts payable	1,000	11,01
Long-term debt due within one year	6,584	6,75
Taxes accrued	4,570	4,43
Interest accrued Other current and accrued liabilities	11,757	10,18
Total current liabilities	126,082	138,24
Deferred investment tax credits	13,530	14,56
Deferred income taxes	112,433	104,30
DCICTICU INCUINC LANCS	29,573	16,75
		10,70
Regulatory balancing accounts and other	27,373	
Regulatory balancing accounts and other Commitments and contingencies (Note 12)	\$ 889,304	\$ 849,03

Net income	Thousands (year ended December 31)	1994	1993	1992
Adjustments to reconcile net income to net cash provided by (used for) operations: Depreciation, depletion and amortization Sample Sa	Operating activities:			
Adjustments to reconcile net income to net cash provided by (used for) operations: Depreciation, depletion and amoritzation Loss on cogeneration facility Fully in (caurings) losses of investment tax credits Equity in (caurings) losses of investments Allowance for funds used during construction Regulatory balancing accounts and other – net Cash from operations before working capital changes Regulatory balancing accounts and other – net Cash from operations before working capital changes Regulatory balancing accounts and other – net Cash from operations before working capital changes Recurrent operations before working capital changes Recurrent operations before working capital changes Recurrent assets and liabilities: Record unbilled revenue Accounts receivable		\$ 35,461	\$ 37,647	\$ 15,775
Depreciation, depletein and amoritzation \$0,000 \$0,	Adjustments to reconcile net income to net cash provided by (used for) operations:	00/14 STACONOR NOT STANDARD	Andrew Street Co.	
Deferent floor f	Depreciation, depletion and amortization	38,058	39,683	33,035
Peterter Income taxes and investment ax credits 8,796 6,205 1,150 1,	Loss on cogeneration facility	=	-	
Equity in (earnings) losses of investments		8,796	6,205	
Allowance for funds used during construction 8,989 10,754 10,777	Equity in (earnings) losses of investments			
Regulatory balancing accounts and other – net 8,989 (10,754) (10,776) Cash from operating assets and liabilities: 88,648 7,291 4,298 Changes in operating assets and liabilities: 1,820 (10,964) (5,821) Accrued unbilled revenue 5,570 (5,152) (2,606) Inventories of gas, materials and supplies 1,880 (1,041) 1,032 Accrued interest and taxes (41) 4,337 8,813 Other current assets and liabilities 7,948 (1,899) 2,638 Cash provided by operating activities 110,024 57,524 35,636 Newstrien (7,7,668) (70,404) (60,709 Investment in non-utility plant assets (77,668) (70,404) (60,709 Investment in non-utility plant assets (7,455) (955) (11,907) Investment in non-utility plant assets (85,315) (71,399) (81,313) Investment in non-utility plant assets (85,315) (71,399) (81,313) Investment in non-utility plant assets (85,315) (71,399) (81,313)	Allowance for funds used during construction			
Cash from operations before working capital changes 85,648 72,931 42,998 Changes in operating assets and liabilities: 1,820 (10,964) (5,821) Accounts receivable 1,880 (10,41) 1,052 Accrued unbilled revenue 5,570 (5,152) (2,600) Inventories of gas, materials and supplies 1,880 (10,41) 1,032 Accounts payable 4,199 4,036 (3,507) Accounted interest and taxes (41) (3,87) 881 Other current assets and liabilities 7,948 (1,899) 2,636 Cash provided by operating activities 110,024 57,524 35,636 Investing activities (77,668) (70,404) (60,709) Investing activities (77,668) (70,404) (60,709) Investing activities (85,315) (71,399) (81,313) Investing activities (85,315) (73,399) (81,313) Investing activities (85,315) (73,400) (60,709) Investing activities (85,315) (71,307) <td>Regulatory balancing accounts and other – net</td> <td></td> <td></td> <td></td>	Regulatory balancing accounts and other – net			
Accounts receivable 1,820				No. of the second
Accounts receivable Accounts receivable Accounts payable	Changes in operating assets and liabilities:	00,040	72,931	42,998
Accrued unbilled revenue		1 000	(10.064)	/= 00-1
Inventories of gas, materials and supplies				
Accounts payable				
Accrued interest and taxes Other current assets and liabilities Cash provided by operating activities Newsting activities Acquisition and construction of utility plant assets Acquisition and	Accounts perable			
Other current assets and liabilities 7,948 (1,899) 2,656 Cash provided by operating activities 110,024 57,524 36,636 New string activities: Acquisition and construction of utility plant assets (77,668) (70,404) (60,709) Investment in non-utility plant (192) (40) (86,97) Investments and other (192) (40) (86,97) Cash used in investing activities (85,315) (71,399) (81,313) Common stock issued 5,847 5,720 33,826 Preference stock issued 9 - - - 2,500 Preference stock issued 20,000 101,177 (930) Long-term debt (1,091) (11,177) (930) Retired 20,000 100,000 45,000 Retired 3,001 (3,041) 5,243 (4,510) Cash dividend payments: 3,001 (3,041) 5,245 (2,525) (2,040) Cash provided by (used for) financing activities 3,001 <th< td=""><td>Accounts payable</td><td></td><td></td><td></td></th<>	Accounts payable			
Cash provided by operating activities 110,024 57,524 35,636 Investing activities: 110,024 57,524 35,636 Acquisition and construction of utility plant assets (77,668) (70,404) (60,709 Investment in non-utility plant (74,55) (955) (11,907 Cash used in investing activities (85,315) (71,399) (81,313) Inancing activities: 5,847 5,720 33,826 Preference stock issued 5,847 5,720 33,826 Preference stock issued - - - 25,000 Issued 20,000 100,000 45,000 Issued 20,000 100,000 45,000 Retired (18,894) 25,439 (41,510 Cash dividend payments: (18,894) 25,439 (41,510 Cash dividend payments: (23,365) (22,853) (20,406 Capital stock expense and other (23,365) (22,853) (20,406 Capital stock expense and other (20,375) (586) (1,515)				881
Acquisition and construction of utility plant assets	Other current assets and liabilities	7,948	(1,899)	2,636
Acquisition and construction of utility plant assets	Cash provided by operating activities	110,024	57,524	35,636
Acquisition and construction of utility plant assets	nvesting activities:			
Investment in non-utility plant		(77 668)	(70.404)	(60.700
Investments and other	Investment in non-utility plant	(50)		
Cash used in investing activities (85,315) (71,399) (81,313) Inancing activities: (85,315) (71,399) (81,313) Common stock issued 5,847 5,720 33,826 Preference stock issued - - - 25,000 Preferred stock retired (1,091) (11,177) (930 Long-term debt: 1880 (82,606) (30,191) Long-term debt (18,894) 25,439 (41,510) Retired (18,894) 25,439 (41,510) Change in short-term debt (18,894) 25,439 (41,510) Cash dividend payments: (18,894) 25,439 (41,510) Cash dividend payments: (23,365) (22,853) (20,406) Capital stock expense and other (23,365) (22,853) (20,406) Capital stock expense and other (20,839) 10,536 6,749 Increase (decrease) in cash and cash equivalents 3,870 (3,339) (38,928) ash and cash equivalents – beginning of year 4,198 7,537 4				
Inancing activities: Common stock issued				9455
Common stock issued 5,847 5,720 33,826 Preference stock issued - - - 25,000 Preferred stock retired (1,091) (11,177) (930 Long-term debt: 1 (18) (82,606) (30,191) Change in short-term debt (18,894) 25,439 (41,510) Cash dividend payments: (18,894) 25,439 (41,510) Cash dividend payments: (3,041) (3,401) (2,525) Common stock (33,365) (22,853) (20,406) Capital stock expense and other (277) (586) (1,515) Cash provided by (used for) financing activities (3,839) 10,536 6,749 Increase (decrease) in cash and cash equivalents 3,870 (3,339) (38,928) Cash and cash equivalents — beginning of year 4,198 7,537 46,465 Cash paid during the year for: 1 24,262 \$26,838 \$26,502 Increese \$24,262 \$26,838 \$26,502 Increese \$24,262 \$26,	₩ 16 JFTC ACCESS (2004)	(83,313)	(71,399)	(81,313)
Preference stock issued Preferred stock retired Unong-term debt: Issued Retired Preferred with the stock of the stoc				
Preferred stock retired		5,847	5,720	
Long-term debt: Issued 20,000 100,000 45,000 Retired (18,894 25,439 (41,510 (25,25 (23,365 (22,853) (24,406 (23,365 (23,865 (23,854 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365 (23,365		Appeal Contract to Carbon	3 0	25,000
Issued Retired 20,000 100,000 45,000 Retired (18) (82,606) (30,191) Change in short-term debt (18,894) 25,439 (41,510) Cash dividend payments: (3,041) (3,401) (2,525) Cammon stock (23,365) (22,853) (20,406) Capital stock expense and other (277) (586) (1,515) Cash provided by (used for) financing activities (20,839) 10,536 (7,490) Cash provided by (used for) financing activities (20,839) 10,536 (3,339) (38,928) Cash and cash equivalents — beginning of year 4,198 7,537 46,465 ash and cash equivalents — end of year \$8,068 \$4,198 \$7,537 Upplemental disclosure of cash flow information: (20,839) (20,838) (20,838) (20,838) Cash paid during the year for: (20,839) (20,838) (20,838) (20,838) (20,838) (20,839) Cash paid during the year for: (20,839) (20,839		(1,091)	(11,177)	(930
Retired (18) (82,606) (30,191) Change in short-term debt (18,894) 25,439 (41,510) Cash dividend payments: Preferred and preference stock (3,041) (3,401) (2,525) Common stock (23,365) (22,853) (20,406) Capital stock expense and other (277) (586) (1,515) Cash provided by (used for) financing activities (20,839) 10,536 6,749 Increase (decrease) in cash and cash equivalents 3,870 (3,339) (38,928) ash and cash equivalents — beginning of year 4,198 7,537 46,465 ash and cash equivalents — end of year \$8,068 \$4,198 7,537 upplemental disclosure of cash flow information: 12,4262 \$26,838 \$26,502 Income taxes \$12,054 \$11,103 \$10,411 upplemental disclosure of noncash financing activities: Conversion to common stock: \$23,375 Series of Convertible Preference Stock \$381 \$133 \$103 7, 1/4 property stories of Convertible Preference Stock \$381 \$133 \$103			Ħ	
Change in short-term debt (18,894) 25,439 (41,510 Cash dividend payments: Preferred and preference stock (3,041) (3,401) (2,525 Common stock (23,365) (22,853) (20,406 Capital stock expense and other (277) (586) (1,515) Cash provided by (used for) financing activities (20,839) 10,536 6,749 Increase (decrease) in cash and cash equivalents 3,870 (3,339) (38,928) Is ash and cash equivalents — beginning of year 4,198 7,537 46,465 Is ash and cash equivalents — end of year \$8,068 \$4,198 7,537 upplemental disclosure of cash flow information: Cash paid during the year for: 11,103 \$10,141 upplemental disclosure of noncash financing activities: Conversion to common stock: \$24,262 \$26,838 \$26,502 Conversion to common stock: \$23,375 Series of Convertible Preference Stock \$381 \$133 \$103 7. 140 percent Stories of Convertible Preference Stock \$381 \$133 \$103		20,000	100,000	45,000
Cash dividend payments: Preferred and preference stock		(18)	(82,606)	
Cash dividend payments: Preferred and preference stock	Change in short-term debt	(18,894)		
Common stock	Cash dividend payments:	14 1 m 2014 2000 1 1 1 1 1 1 1 1	H 100 C € 100 M 1	,
Common stock		(3.041)	(3,401)	(2.525)
Capital stock expense and other (277) (586) (1,515) Cash provided by (used for) financing activities (20,839) 10,536 6,749 Increase (decrease) in cash and cash equivalents 3,870 (3,339) (38,928) ash and cash equivalents — beginning of year 4,198 7,537 46,465 ash and cash equivalents — end of year \$8,068 \$4,198 7,537 Upplemental disclosure of cash flow information: Cash paid during the year for: 11,103 \$10,141 Upplemental disclosure of noncash financing activities: Conversion to common stock: \$381 \$133 \$103 \$2,375 Series of Convertible Delegation of	Common stock	20.00		
Cash provided by (used for) financing activities (20,839) 10,536 6,749 Increase (decrease) in cash and cash equivalents 3,870 (3,339) (38,928) ash and cash equivalents — beginning of year 4,198 7,537 46,465 ash and cash equivalents — end of year Upplemental disclosure of cash flow information: Cash paid during the year for: Interest Income taxes 124,262 126,838 126,502 Income taxes \$ 24,262 \$ 26,838 \$ 26,502 Income taxes \$ 12,054 \$ 11,103 \$ 10,141	Capital stock expense and other			
ash and cash equivalents — beginning of year 4,198 7,537 46,465 ash and cash equivalents — end of year \$8,068 \$4,198 \$7,537 upplemental disclosure of cash flow information: Cash paid during the year for: Interest \$24,262 \$26,838 \$26,502 Income taxes \$12,054 \$11,103 \$10,141 upplemental disclosure of noncash financing activities: Conversion to common stock: \$2.375 Series of Convertible Preference Stock \$381 \$133 \$103	Cash provided by (used for) financing activities	\$	00	
ash and cash equivalents — beginning of year ash and cash equivalents — end of year s 8,068 4,198 7,537 46,465 8 8,068 4,198 7,537 46,465 8 8,068 4,198 7,537 46,465 8 8,068 4,198 7,537 46,465 8 8,068 4,198 7,537 46,465 8 8,068 1,198 1,108 1,103 1,103 1,101 1,103 1,103 1,103 1,103	nergaes (decreases) in each and each aurillants	* 5 5	=======================================	* **
ash and cash equivalents — end of year \$8,068 \$4,198 \$7,537		3,870	(3,339)	(38,928)
Tupplemental disclosure of cash flow information: Cash paid during the year for: Interest Income taxes \$ 24,262 \$ 26,838 \$ 26,502 Income taxes \$ 12,054 \$ 11,103 \$ 10,141 Upplemental disclosure of noncash financing activities: Conversion to common stock: \$ 2.375 Series of Convertible Preference Stock \$ 381 \$ 133 \$ 103		4,198	7,537	46,465
Cash paid during the year for: Interest Income taxes \$ 24,262 \$ 26,838 \$ 26,502 \$ 12,054 \$ 11,103 \$ 10,141 Upplemental disclosure of noncash financing activities: Conversion to common stock: \$2.375 Series of Convertible Preference Stock \$7,1/4 percent Series of Convertible Debands \$ 103	ash and cash equivalents — end of year	\$ 8,068	\$ 4,198	
Cash paid during the year for: Interest Income taxes \$ 24,262 \$ 26,838 \$ 26,502 \$ 12,054 \$ 11,103 \$ 10,141 Upplemental disclosure of noncash financing activities: Conversion to common stock: \$2.375 Series of Convertible Preference Stock \$7,1/4 parcent Series of Convertible Delevators \$ 103	upplemental disclosure of cash flow information.			
Interest \$ 24,262 \$ 26,838 \$ 26,502	Cash naid during the year for:			
Income taxes \$ 22,202 \$ 20,638 \$ 20,502 \$ 12,054 \$ 11,103 \$ 10,141 \$ 10,141 \$ Conversion to common stock: \$ 23,75 Series of Convertible Preference Stock \$ 381 \$ 133 \$ 103		2 2222	¥	W.
upplemental disclosure of noncash financing activities: Conversion to common stock: \$2.375 Series of Convertible Preference Stock \$7.1/4 parcent Series of Convertible Debutture \$381 \$ 133 \$ 103				
Conversion to common stock: \$2.375 Series of Convertible Preference Stock 7.1/4 percent Series of Convertible Debutters \$ 381 \$ 133 \$ 103	Income taxes	\$ 12,054	\$ 11,103	\$ 10,141
\$2.375 Series of Convertible Preference Stock \$ 381 \$ 133 \$ 103				
7 1/4 percent Series of Convertible Delantons				
7 1/4 percent Series of Convertible D.L.		\$ 381	\$ 133	\$ 103
	7-1/4 percent Series of Convertible Debentures			

### Professional Sciences Pr	Common stock – par value \$3½ per share; authorized 1994, 60,000,000 shares; 1993, 30,000,000 shares: outstanding – 1994, 13,418,685 shares; 1993, 13,177,256 shares Premium on common stock Earnings invested in business Total common stock equity Preference stock, authorized 2,000,000 shares: \$2.375 Series, convertible, stated value \$25 per share; outstanding – 1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	134,641 97,275 274,408 1,252 25,000 26,252 732 968 14,250		128,340 88,497 258,565 1,633 25,000 26,633	45% 5%
1994, 60,000,000 shares; 1993, 30,000,000 shares; outstanding	1994, 60,000,000 shares; 1993, 30,000,000 shares: outstanding – 1994, 13,418,685 shares; 1993, 13,177,256 shares Premium on common stock Earnings invested in business Total common stock equity Preference stock, authorized 2,000,000 shares: \$2.375 Series, convertible, stated value \$25 per share; outstanding – 1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	134,641 97,275 274,408 1,252 25,000 26,252 732 968 14,250		128,340 88,497 258,565 1,633 25,000 26,633	
Page 13,418,685 shares; 1993, 13,177,256 shares 5 42,492 5 41,728 Premium on common stock 134,641 128,340 238,565 88,497 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408 45% 238,565 45% 274,408	1994, 13,418,685 shares; 1993, 13,177,256 shares Premium on common stock Earnings invested in business Total common stock equity Preference stock, authorized 2,000,000 shares: \$2.375 Series, convertible, stated value \$25 per share; outstanding – 1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	134,641 97,275 274,408 1,252 25,000 26,252 732 968 14,250		128,340 88,497 258,565 1,633 25,000 26,633	
Permium on common stock Earnings invested in business 92,275 88,497 7 7 7 7 7 7 7 7 7	Premium on common stock Earnings invested in business Total common stock equity Preference stock, authorized 2,000,000 shares: \$2.375 Series, convertible, stated value \$25 per share; outstanding – 1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	134,641 97,275 274,408 1,252 25,000 26,252 732 968 14,250		128,340 88,497 258,565 1,633 25,000 26,633	
Earnings Invested in business 92,225 88,497 724,408 45% 258,565 45% 7274,408 45% 258,565 45% 7274,408 45% 258,565 45% 7274,408 45% 258,565 45% 7274,408 45% 258,565 45% 7274,408 45% 258,565 45% 7274,408 45% 258,565 45% 7274,408 45% 258,565 45% 728,500 7	Earnings invested in business Total common stock equity Preference stock, authorized 2,000,000 shares: \$2.375 Series, convertible, stated value \$25 per share; outstanding – 1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	97,275 274,408 1,252 25,000 26,252 732 968 14,250		88,497 258,565 1,633 25,000 26,633	
Total common stock equity 274,408 45% 258,365 45%	Total common stock equity Preference stock, authorized 2,000,000 shares: \$2.375 Series, convertible, stated value \$25 per share; outstanding – 1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	274,408 1,252 25,000 26,252 732 968 14,250		258,565 1,633 25,000 26,633	
Preference stock, authorized 2,000,000 shares \$2,375 Series, convertible, stated value \$15 per share; outstanding 1,252 1,633 \$5.95 Series, stated value \$100 per share; outstanding 1994, 250,000 shares; 1995, 250,000 shares 25,000 25,000 26,000	Preference stock, authorized 2,000,000 shares: \$2.375 Series, convertible, stated value \$25 per share; outstanding – 1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	1,252 25,000 26,252 732 968 14,250		1,633 	
\$2.375 Series, convertible, stated value \$100 per share; outstanding—1994, 5007 shares; 1993, 50,000 shares; stated value \$100 per share; outstanding—1994, 250,000 shares; stated value \$100 per share; outstanding—1994, 260,000 shares; stated value of \$100 per share; share stated value of \$100 per share; share stated value of \$100 per share; shares stated value of \$100 per share; shares shares; shares stated value of \$100 per share; shares; shares; shares, outstanding—1994, 5085 shares; 1993, 30.01 shares and \$4.68 Series, outstanding—1994, 91685 shares; 1993, 11,105 shares and \$4.68 Series, outstanding—1994, 1968 shares; 1993, 11,105 shares and \$4.68 Series, outstanding—1994, 1968 shares; 1993, 11,105 shares and \$4.68 Series, outstanding—1994, 1968 shares; 1993, 11,105 shares and \$4.68 Series, outstanding—1994, 1968 shares; 1993, 110,000 shares and \$4.69 Series due 2015 and \$4.69 Series due 2019 and \$4.69 Series due 2019 and \$4.69 Series due 1997 and \$4.69 Series due 1990 and \$4.69 Series due 2000 and \$4.69 Series du	\$2.375 Series, convertible, stated value \$25 per share; outstanding – 1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	25,000 26,252 732 968 14,250	4%	25,000 26,633	5%
1994, 50,079 shares; 1993, 65,323 shares 1,252 1,633 1994, 250,000 shares; 1993, 250,000 shares 25,000 25,000 1994, 250,000 shares; 1993, 250,000 shares 26,252 4% 26,633 5% Redoemable preference stock 26,252 4% 26,633 5% Redoemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share; 39,50 34,75 5cries, outstanding = 1994, 1,645 shares; 1995, 1,110 shares 968 1,111 5,125 Series, outstanding = 1994, 1,645 shares; 1993, 1,110 shares 968 1,111 5,125 Series, outstanding = 1994, 1,645 shares; 1993, 1,105 shares 968 1,111 5,125 Series, outstanding = 1994, 1,645 shares; 1993, 1,105 shares 15,950 3% 17,041 3% Long-term debti First Mortgage Bonds 1,111 1,115 shares 1,111 1,115 shares 1,111 1,115 shares 1,111 1,115 shares 1,111 1,1	1994, 50,079 shares; 1993, 65,323 shares \$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	25,000 26,252 732 968 14,250	4%	25,000 26,633	5%
September Sept	\$6.95 Series, stated value \$100 per share; outstanding – 1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	25,000 26,252 732 968 14,250	4%	25,000 26,633	5%
1994, 250,000 shares; 1993, 250,000 shares 25,000 25,000 26,633 5%	1994, 250,000 shares; 1993, 250,000 shares Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	732 968 14,250	4%	26,633	5%
Total preference stock 26,252 4% 26,633 5%	Total preference stock Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	732 968 14,250	4%	26,633	5%
### Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share: \$4.68 Series, outstanding = 1994, 9,685 shares; 1993, 1,1105 shares \$4.75 Series, outstanding = 1994, 142,500 shares; 1993, 150,000 shares ### Total redeemable preferred stock 15,950 3% 17,041 3%	Redeemable preferred stock, authorized 1,500,000 shares; all outstanding series have a stated value of \$100 per share:	732 968 14,250	4%	930	5%
all outstanding series have a stated value of \$100 per share: \$4.68 Series, outstanding = 1994, 319 shares; \$193, \$1,105 shares \$7.12 Series, outstanding = 1994, 9,685 shares; \$193, \$1,105 shares \$14,250 \$15,000 Total redeemable preferred stock 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$3% \$17,041 \$3% 15,950 \$5,000 \$5,000 \$5,000 \$9.1/8% Series due 2015 \$5,000 \$5,000 \$9.1/8% Series due 2015 \$5,000 \$5,000 \$9.1/8% Series due 2019 \$5,000 \$5,000 \$1,00	all outstanding series have a stated value of \$100 per share:	968 14,250			
S4.68 Series, outstanding = 1994, 73.19 shares; 1993, 9.30 shares 968		968 14,250			
\$4.75 Series, outstanding—1994, 9,685 shares; 1993, 11,105 shares \$7.125 Series, outstanding—1994, 142,500 shares; 1993, 150,000 shares \$7.125 Series, outstanding—1994, 142,500 shares; 1993, 150,000 shares \$7.125 Series, outstanding—1994, 142,500 shares; 1993, 150,000 shares \$7.125 Series dealth \$7.125	04.60 C : 1.1 1 1004 7.210 1 1002 0.201 abanca	968 14,250			
State Stat		14,250		1,111	
Total redeemable preferred stock 15,950 3% 17,041 3%					
First Mortgage Bonds 50,000 50,00		15,950	20/-		204
First Mortgage Bonds 9-3/49% Series due 2015 9-1/89% Series due 2019 Medium-Term Notes First Mortgage Bonds: 4.80% Series A due 1996 7.38% Series A due 1997 7.69% Series A due 1997 10,000 10,000 10,000 5.96% Series B due 2000 5.96% Series B due 2000 5.96% Series B due 2000 6.40% Series A due 2002 6.40% Series B due 2002 6.43% Series B due 2003 6.34% Series B due 2005 6.38% Series B due 2005 6.45% Series B due 2005 6.50% Series B due 2008 8.26% Series B due 2014 10,000 8.31% Series B due 2014 10,000 8.31% Series B due 2014 10,000 8.35% Series A due 2021 10,000 10,000 7.50% Series B due 2023 10,000 10,000 7.50% Series B due 2023 11,000 11,000 10,000 7.50% Series B due 2023 11,000 11,000 10,00	Total redeemable preferred stock		3%	17,041	3%0
9-3/4% Series due 2015 9-1/8% Series due 2019 8-1/8% Series due 2019 9-1/8% Series due 2011 10,000					
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	Total canitalization	\$ 607.686	100%	\$ 575,170	100%

1. Summary of significant

accounting policies:

Organization and principles of consolidation

The consolidated financial statements include:

Regulated utility:

- Northwest Natural Gas Company (Northwest Natural)
- Non-regulated wholly-owned businesses:

 Oregon Natural Gas Development Corporation (Oregon Natural)
- NNG Financial Corporation (Financial Corporation)
- Pacific Square Corporation (Pacific Square)
- NNG Energy Systems, Inc. (Energy Systems)

Together these businesses are referred to herein as the "Company." Intercompany accounts and transactions have been eliminated.

Investments in corporate joint ventures and partnerships in which the Company's ownership is 50 percent or less are accounted for by the equity method or the cost method (see Note 10).

Certain amounts from prior years have been reclassified to conform with the 1994 presentation.

Industry regulation

The Company's principal business is the distribution of natural gas which is regulated by the Oregon Public Utility Commission (OPUC) and the Washington Utilities and Transportation Commission (WUTC). Accounting records and practices conform to the requirements and uniform system of accounts prescribed by these regulatory authorities.

Utility plant

Utility plant for Northwest Natural is stated at original cost (see table in Note 10). When a depreciable unit of property is retired, the cost is credited to utility plant and debited to the accumulated provision for depreciation together with the cost of removal, less any salvage. No gain or loss is recognized upon normal retirement.

Northwest Natural's provision for depreciation of utility property, which is computed under the straight-line, age-life method in accordance with independent engineering studies and as approved by regulatory authorities, approximated 4.1 percent of average depreciable plant in 1994 and 1993, and 4.0 percent for 1992.

Allowance for Funds Used During Construction (AFUDC), a non-cash item, is calculated using actual commercial paper interest rates. If commercial paper balances are insufficient to finance the amount of work in progress, a composite of interest costs of debt, shown as a reduction to interest charges, and a return on equity funds, shown as other income, is used to compute AFUDC. This amount is added to utility plant which is a component of rate base. While cash is not realized currently from AFUDC, it is realized in the ratemaking process over the service life of the related property through increased revenues resulting from higher rate base and higher depreciation expense. The Company's weighted average AFUDC rates were 3.4 percent for 1994, 3.5 percent for 1993, and 4.5 percent for 1992.

Regulatory balancing accounts

Regulatory balancing accounts are established pursuant to orders of the state utility regulatory commissions, in general rate proceedings or expense deferral proceedings, in order to provide for recovery of revenues or expenses from, or refunds to, Northwest Natural's utility customers.

Cash and cash equivalents

For purposes of reporting cash flows, cash and cash equivalents in clude cash on hand and highly liquid temporary investments with original maturity dates of three months or less.

Unbilled revenue

Northwest Natural accrues for gas deliveries not billed to customers from the meter reading dates to month end.

Inventories

Northwest Natural's inventories of gas in storage and materials and supplies are stated at the lower of average cost or net realizable value.

Foreign currency fluctuation hedges

Northwest Natural uses foreign currency hedge transactions to reduce its exposure to currency fluctuations on firm Canadian gas purchase commitments by entering into foreign currency forward contracts with concurrent maturities. Northwest Natural does not engage in currency speculation. The forward contracts generally have terms ranging from one to 12 months. All contracts are specifically purchased for firm commitments and are physically delivered to satisfy those commitments. Changes in market values of foreign currency contracts are deferred and recognized as adjustments to gas purchase costs upon concurrent settlement of these contracts (see Note 11).

Income taxes

The Company adopted Statement of Financial Accounting Standards (SFAS) No. 109, "Accounting for Income Taxes," on January 1993. SFAS No. 109, among other things, (i) requires the liability, method be used in computing deferred taxes on all temporary differences between book and tax basis of assets and liabilities; (ii) requires that deferred tax liabilities and assets be adjusted for an enacted change in tax laws or rates; and (iii) prohibits net-of-tax accounting and reporting. Regulated enterprises are required to recognize such adjustments as regulatory assets or liabilities if it is probable that such amounts will be recovered from or returned to customers in future rates. As of December 31, 1994, the Company had regulatory assets of \$60.4 million, an amount which is primarily derived from differences between the book and tax basis of the utility plant in service and the accumulated reserve for depreciation.

The Company provides deferred federal income tax for the timing differences between book depreciation and tax depreciation under the Accelerated Cost Recovery System (ACRS) for 1981-1985 property additions and Modified Accelerated Cost Recovery System (MACRS) for post-1985 property additions. Consistent with rate and accounting instructions of regulatory authorities, deferred income taxes are not currently collected for those income tax temporary differences where the prescribed regulatory accounting methods do not provide for current recovery in rates.

Investment tax credits on utility property additions which reduce income taxes payable are deferred for financial statement purposes and are amortized over the life of the related property. Investment and e ergy tax credits generated by non-regulated subsidiaries are amortized over a period of two to five years.

Earnings per share

Primary earnings per share are computed based on the weighted average number of common shares outstanding each year. Outstand3 stock options are common stock equivalents but are excluded from primary earnings per share computations due to immateriality. The Company reports fully-diluted earnings per share when dilution is three percent or greater. This calculation reflects the potential effects of the conversion of the \$2.375 Series of Convertible Preference Stock and the 7-1/4 percent Series of Convertible Debentures and the exercise of stock options.

2. Consolidated subsidiary operations:

Oregon Natural Gas Development Corporation

Oregon Natural is a natural gas exploration and production subsidiary of the Company. Approximately \$22.5 million of Oregon Natural's total assets of \$40.7 million at year-end 1994 are invested in its wholly-owned subsidiary, Canor Energy Ltd., which manages and develops natural gas and oil properties in Canada.

Oregon Natural accounts for its exploration costs under the successful-efforts method. Costs to acquire and develop oil and gas properties are capitalized until the volume of proved gas reserves is determined. If there are inadequate gas reserves, the related deferred costs are expensed. Capitalized costs associated with properties under development were \$4.4 million at December 31, 1994 and \$1.4 million at December 31, 1993.

NNG Financial Corporation

Financial Corporation provides short-term financing for Oregon tural and Energy Systems and has several financial investments, including investments as a limited partner in four solar electric generating systems, four windpower electric generating projects, a hydroelectric facility and a low-income housing project (see Note 10).

Pacific Square Corporation

Pacific Square was a real estate management subsidiary of the Company. During 1994, Pacific Square sold its partnership interests in two commercial office buildings, including the Company's headquarters building. As a result of the sale of these investments, Pacific Square no longer has any operating activities.

NNG Energy Systems, Inc.

Energy Systems was formed to design, construct, own and operate cogeneration facilities. Agrico Cogeneration Corporation (Agrico) is a wholly-owned subsidiary of Energy Systems. In December 1991, Agrico filed with the United States Bankruptcy Court for the Eastern District of California a voluntary petition for reorganization under Chapter 11 of the U.S. Bankruptcy Code. The U.S. Bankruptcy Court confirmed Agrico's reorganization plan in January 1994. The sale of Agrico's assets closed in February 1994. Based upon the estimated costs to the Company under related settlements, the estimated net proceeds to be received from the sale of Agrico's assets, and other elements of a Chapter 11 reorganization plan, the Company recorded a charge of \$4.6 million in 1992, resulting in an after-tax charge of \$2.8 illion, equivalent to 24 cents per share.

Summarized financial information for the consolidated subsidiaries follows:

Thousands		1994		1993		1992
Statements of income for the year ended Dece	mbe	31:				
Net operating revenues	\$	11,773	\$	10,865	\$	8,000
Operating expenses	-	11,253	1	14,168	-	13,635
Income (loss) from operations		520		(3,303)		(5,635)
Income (loss) from financial investments		2,115		(388)		(28)
Other income (expense) and interest charges		4,092		14	,	(1,642)
Income (loss) before income taxes	1	6,727	5000	(3,677)		(7,305)
Income tax expense (benefit)		1,986		(2,188)		(3,682)
Net income (loss)	\$	4,741	\$	(1,489)	\$	(3,623)
Balance sheets as of December 31:						
Assets:						
Non-utility property – net	\$	24,212	\$	21,040	\$	27,911
Investments and other		41,419		34,731		39,781
Current assets		27,541	-	34,028		16,001
Total assets	\$	93,172	\$	89,799	\$	83,693
Capitalization and liabilities:						
Capitalization	\$	26,562	\$	21,843	\$	24,189
Current liabilities		42,164		42,538		33,940
Other liabilities		24,446		25,418	_	25,564
Total capitalization and liabilities	\$	93,172	\$	89,799	\$	83,693

3. Capital stock:

Common stock

At December 31, 1994, Northwest Natural had reserved 87,864 shares of common stock for issuance under the Employee Stock Purchase Plan, 449,209 shares under its Dividend Reinvestment and Stock Purchase Plan, 147,504 shares under its 1985 Stock Option Plan (see Note 4), 82,719 shares for future conversions of its convertible preference stock and 444,396 shares for future conversions of its 7-1/4 percent Convertible Debentures.

In the first quarter of 1995, Northwest Natural sold 1.15 million shares of its Common Stock. The net proceeds of \$33.0 million will be used for corporate purposes, primarily to fund, in part, Northwest Natural's construction program, and to repay short-term debt incurred for such purpose. The projected dilution of earnings per share resulting from this sale is estimated at five percent.

Preference stock

The \$2.375 Series of Convertible Preference Stock is convertible into shares of common stock at a conversion rate of 1.6502 shares of common stock for each share of preference stock. Subject to certain restrictions, it is callable at stipulated prices, plus accrued dividends. The \$6.95 Series of Preference Stock is not redeemable prior to December 31, 2002, but is subject to mandatory redemption on that date.

Redeemable preferred stock

The mandatory preferred stock redemption requirements aggregate \$1.1 million in 1995, 1996, 1997 and 1998 and \$1.0 million in 1999. These requirements are noncumulative. At any time Northwest Natural is in default on any of its obligations to make the prescribed sinking fund payments, it may not pay cash dividends on common stock or preference stock. Upon involuntary liquidation, all series of redeemable preferred stock are entitled to their stated value.

The redeemable preferred stock is callable at stipulated prices, plus accrued dividends. At December 31, 1994, redemption prices were \$100 per share for the \$4.68 and \$4.75 Series. Shares of the \$7.125 Series are redeemable on or after May 1, 1998 at a price of \$104.75 per share decreasing each year thereafter to \$100 per share on or after May 1, 2008.

The following table shows the changes in the number of shares of Northwest Natural's capital stock and the premium on common stock for the years 1994, 1993 and 1992:

		— Shares —		Premium
		Redeemable		common
	Common stock	Preference stock	preferred stock	stock (thousands)
Balance, December 31, 1991	11,785,177	74,771	465,454	\$ 92,599
Sales to the public	990,000	250,000	=	25,327
Sales to employees	9,350	-	1-1	222
Sales to stockholders	157,046	_	_	4,228
Exercise of stock options – net Conversion of preference stock	19,918	8±0	-	183
to common Conversion of convertible debentur	6,846 es	(4,150)	-	82
to common	4,388	-	_	117
Sinking fund purchases		-	(23,859)	-
Other	-		-	10
Balance, December 31, 1992	12,972,725	320,621	441,595	122,768
Sales to employees	9,542	s and the world	-	249
Sales to stockholders	154,850	=	150,000	4,724
Exercise of stock options - net	19,110		-	172
Conversion of preference stock to common	8,740	(5,298)		105
Conversion of convertible debenture	es	(3,290)	-	
to common	12,289	-	_	328
Redemptions	5 2		(416,873)	=
Sinking fund purchases	-	-	(4,316)	-
Other	<u></u>			(6)
Balance, December 31, 1993	13,177,256	315,323	170,406	128,340
Sales to employees	10,856	-	-	290
Sales to stockholders	173,994	-	221	4,958
Exercise of stock options - net	3,401	-	500	2
Conversion of preference stock to common	25,147	(15,244)		301
Conversion of convertible debenture		(13,411)	_	301
to common	28,031	_		748
Sinking fund purchases	20,031	_	(10,902)	740
Other	=		(10,702)	2
Balance, December 31, 1994	13,418,685	300,079	159,504	\$ 134,641

4. Stock option and purchase plans:

Northwest Natural's 1985 Stock Option Plan (Plan) authorizes an aggregate of 300,000 shares of common stock for issuance as incentive or non-statutory stock options. These options may be granted only to officers and key employees of the Company designated by its Board of Directors.

All options granted are at an option price not less than market value at the date of grant and may be exercised for a period not exceeding 10 years from the date of grant. Option holders may exchange shares owned by them for at least one year, at the current market price, to purchase shares at the option price.

During 1985, 1990 and 1994, 150,000, 86,500 and 75,182 options were granted under the Plan at option prices of \$17.625, \$24.875 and \$36.00, respectively. Since inception of the Plan, 20,182 options have expired.

Information regarding the Plan is summarized below:

Options				
1994	1993	1992		
71,303	101,326	138,40		
(3,080)	(6,184)	(7,673)		
(3,401)	(9,334)	(13,440)		
S-3	(4,729)	(6,017)		
% _ .	(9,776)	(6,652)		
75,182	_			
747	-	-		
20 20	-	()		
(1,000)		(3,300)		
139,004	71,303	101,326		
8,500	82,682	82,682		
	71,303 (3,080) (3,401) 75,182 (1,000) 139,004	1994 1993 71,303 101,326 (3,080) (6,184) (9,334) - (4,729) - (9,776) 75,182 (1,000) - 139,004 71,303		

Northwest Natural has an employee stock purchase plan whereby employees may purchase common stock at 92 percent of average bid and ask market price on the subscription date. The subscription date is set annually, and each employee may purchase up to 600 shares payable through payroll deduction over a six to 12 month period.

5. Long term debt:

The issuance of first mortgage bonds under the Mortgage and Deed of Trust is limited by property, earnings and other provisions of the mortgage. Northwest Natural's Mortgage and Deed of Trust constitutes a first mortgage lien on substantially all of its utility property.

The 7-1/4 percent Series of Convertible Debentures may be converted at any time for 33-1/2 shares of common stock for each \$1,00 face value (\$29.85 per share).

The sinking fund requirements and maturities for the five years ending December 31, 1999, on the long-term debt outstanding at December 31, 1994, amount to: \$1.0 million in 1995; \$21.0 million in 1996; \$26.0 million in 1997; \$16.0 million in 1998; and \$11.0 million in 1999.

6. Notes payable and lines of credit:

Northwest Natural has available through September 30, 1995, committed lines of credit totalling \$80 million consisting of a primary fixed amount of \$40 million plus an excess amount of up to \$40 million available as needed, at Northwest Natural's option, on a monthly basis. Financial Corporation has available through September 30, 1995, committed lines of credit with two commercial banks totalling \$20 million, consisting of a primary fixed amount of \$15 million plus an excess amount of up to \$5 million available as needed, at Financial Corporation's option, on a monthly basis. Financial Corporation's lines are supported by the guaranty of Northwest Natural.

Under the terms of these lines of credit, Northwest Natural and Financial Corporation pay commitment fees but are not required to maintain compensating bank balances. The interest rates on borrowings under these lines of credit are based on current market rates as negotiated. There were no outstanding balances on either the Northwest Natural or Financial Corporation lines of credit as of December 3*, 1994 or December 31, 1993.

Northwest Natural and Financial Corporation issue domestic commercial paper, which is supported by the committed bank lines, under agency agreements with a commercial bank. Additionally, Financial Corporation's commercial paper is supported by the guaranty of Northwest Natural. The amounts and average interest rates of mmercial paper outstanding were as follows at December 31:

	·	1994	8=	199	93 ———
Thousands	Amour	Average nt rate		Amount	Average rate
Northwest Natural	\$ 35,39	3 5.8%	\$	53,446	3.4%
Financial Corporation	18,26	1 6.0%		19,102	3.4%
Total	\$ 53,65	4	\$	72,548	

7. Income taxes:

The Company adopted SFAS No. 109, "Accounting for Income Taxes," effective January 1, 1993. The adoption of the new standard resulted in an increase of net deferred tax liabilities of \$62.1 million to reflect deferred taxes on differences previously flowed-through and to adjust existing deferred taxes to the level required at the current statuatory rate. An offsetting regulatory asset of \$62.1 million was also recorded. This regulatory tax asset has decreased to \$60.4 million at December 31, 1994. The regulatory asset is primarily based upon differences between the book and tax basis of utility plant in service and the accumulated provision for depreciation. It is expected that the regulatory asset will be recovered in future rates. The implementation of SFAS No. 109 did not significantly impact results of operations.

A reconciliation between income taxes calculated at the statutory federal tax rate and the tax provision reflected in the financial statements is as follows:

pusands	1994	1993	1992
computed income taxes based on statutory			
federal income tax rate (1994 and 1993-35%;			
1992–34%) \$	19,577	\$ 20,910	\$ 7,727
Increase (reduction) in taxes resulting from:			
Differences between book and tax depreciation	1,575	1,561	1,233
Current state income tax, net of federal			
tax benefit	2,189	2,525	711
Federal income tax credits	(338)	(348)	1200
Restoration of investment tax credit	(1,077)	(1,064)	(1,124)
Elimination of amounts previously provided	(588)	(1,059)	(1,229)
Real and personal property taxes	(123)	113	144
Removal costs	(556)	(320)	(335)
Unconsolidated foreign subsidiary income	(172)	(496)	-
Other – net	(14)	274	(32)
Total provision for income taxes \$	20,473	\$ 22,096	\$ 6,951

The provision for income taxes consists of the following:

Thousands		1994		1993		1992
Income taxes currently payable:						
Federal	\$	10,441	\$	13,368	\$	7,577
State		2,375		2,166		375
Foreign		21	86	30		13
Total		12,837		15,564		7,965
Deferred taxes – net:						
Federal		7,720		5,896		(676)
State	-	993		1,718		616
Total		8,713		7,614		(60)
Investment and energy tax credits restored:						
From utility operations		(800)		(800)		(800)
From subsidiary operations		(277)		(282)		(154)
Total		(1,077)		(1,082)	72	(954)
Total provision for income taxes	\$	20,473	\$	22,096	\$	6,951
Percentage of pretax income		36.60%	99	36.99%		30.59%

The annual provision for deferred income taxes is comprised of the following:

Thousands	1994		1993		1992
ACRS and MACRS deductions in excess of	*****	1042			0.000
related book depreciation	\$ 6,086	\$	5,925	\$	8,661
Revenues and costs deferred for tax purposes	(5,885)		1,528		2,600
Sale of Pacific Square investments	(2,395)		-		
Agrico book loss	6,999		22-2		(1,374)
Real and personal property taxes	=		2,329		(2,328)
Alternative minimum tax credits	4,000		7-5		(6,866)
Elimination of amounts previously provided	336		(2,216)		(1,025)
Other	(428)		48	-	272
Total	\$ 8,713	\$	7,614	\$	(60)

8. Employee retirement plans:

The Company has two non-contributory defined benefit retirement plans covering all regular, full-time employees with more than one year of service. The benefits under the plans are based upon years of service and the employee's average compensation during the final years of service. The Company's funding policy is to make the annual contribution required by applicable regulations and recommended by its actuary. Plan assets consist primarily of marketable securities, corporate obligations, U.S. government obligations, real estate and cash equivalents.

The following table sets forth the amounts recognized in the Company's financial statements and the combined funded status of the retirement plans:

Thousands		1994		1993	1992
Service cost	\$	2,952	\$	2,587	\$ 2,528
Interest cost		6,264		6,024	5,688
Return on assets		4,056		(17,762)	(8,797)
Net amortization and deferral		(12,804)		9,526	 1,215
Annual pension cost (benefit)	\$	468	\$	375	\$ 634
Vested benefit obligation	\$	68,628	\$	69,859	\$ 62,152
Total accumulated benefit obligation	\$	70,186	\$	70,618	\$ 62,971
Funded status as of December 31:					
Plan assets at fair value	\$	100,077	\$	108,579	\$ 94,595
Projected benefit obligation for					
service rendered to date	33	85,206	_	86,814	77,278
Funded status		14,871		21,765	17,317
Unrecognized net gain		(15,992)		(21,417)	(15,895)
Unrecognized net asset at transition		(1,914)		(2,310)	(2,706)
Unrecognized prior service costs		5,028		4,413	3,531
Prepaid pension cost	\$	1,993	\$	2,451	\$ 2,247
Total cash contribution	\$	10	\$	579	\$ 1,496
Discount rate:					
Funded status	200	8.00%		7.50%	8.00%
Pension cost		7.50%	=	8.00%	8.00%
Expected long-term rate of return on plan assets		9.00%		9.00%	9.00%
Rate for compensation increases		5.00%		5.13%	5.13%

Effective January 1, 1995, the Company changed the assumed discount rate used in determining the funded status of the plans from 7.50 percent to 8.00 percent. The new discount rate was used in determining the funded status of the plans at year-end 1994 and will be used to determine annual pension cost in 1995.

The Company has a qualified "Retirement K Savings Plan" under Internal Revenue Code Section 401(k) and a non-qualified "Executive Deferred Compensation Plan," for eligible employees. These plans are

designed to enhance the existing retirement program of employees and to assist them in strengthening their financial security by providing an incentive to save and invest regularly. Contributions to these plans in 1994, 1993 and 1992 were \$0.7 million, \$0.5 million and \$0.3 million, respectively.

The Company has a non-qualified supplemental retirement plan for eligible executive officers which it is funding with trust-owned life insurance. The amount of coverage is designed to provide sufficient returns to recover all costs of the plan if assumptions made as to mortality experience, policy earnings, and other factors are realized. Expenses related to the plan were \$1.0 million in 1994, \$0.8 million in 1993 and \$0.9 million in 1992.

9. Postretirement health care and life insurance benefits:

The Company provides continued health care and life insurance coverage after retirement for exempt employees. These benefits and similar benefits for active employees are provided by insurance companies and related premiums are based on the amount of benefits paid during the year.

Effective January 1, 1993, the Company adopted SFAS No. 106, "Employers' Accounting for Postretirement Benefits Other than Pensions." The Company elected to recognize the cumulative effect of approximately \$11.3 million over a period of 20 years.

The incremental costs of approximately \$1.1 million per year (pre-tax) relating to SFAS No. 106 are not included in Northwest Natural's rates. The staff of the OPUC has recommended that Northwest Natural's portion of these costs allocated to Oregon (approximately 87 percent) be authorized for recovery in rates only pursuant to a general rate case filing, and has recommended against the use of deferred accounting treatment for their recovery. Northwest Natural is charging the Oregon portion of these costs to expense. The WUTC has approved deferred accounting treatment for the portion of these costs allocated to Washington (approximately five percent), pending final approval for recovery in a general rate case filing. Northwest Natural monitors its need for general rate cases covering these and other expenses but has no present plans to file a general rate case in Oregon or Washington.

The following table sets forth the postretirement health care and life insurance plan's status at December 31:

Thousands		1994		1993
Retirees	\$	5,768	\$	6,675
Fully eligible active plan participants		834		260
Other active plan participants		3,792		4,815
Total accumulated postretirement benefit obligation	-	10,394	-	11,750
Fair value of plan assets	_			_
Accumulated postretirement benefit obligation in				
excess of plan assets		10,394		11,750
Unrecognized transition obligation		(10,152)		(10,716)
Unrecognized gain		1,942	And an art	76
Accrued postretirement benefit cost	\$	2,184	\$	1,110
Service cost – benefits earned during the period	\$	314	\$	255
Return on plan assets (if any)		11-02		-
Interest cost on accumulated postretirement benefit obligation		859		932
Amortization of transition obligation		564		564
Net postretirement benefit cost	\$	1,737	\$	1,751

The assumed health care cost trend rate used in measuring the accumulated postretirement benefit obligation for pre-Medicare eligibility is nine percent for 1995 and 1996; eight percent for 1997; then decreasing over the next seven years to 4.5 percent. The assumed rate I HMO plan and post-Medicare eligibility is eight percent for 1995 and 1996, then decreasing over the next seven years to 4.5 percent. A one-percentage-point change in the assumed health care cost trend rate for each year would adjust the accumulated postretirement benefit obligation as of December 31, 1994 and net postretirement health care cost by approximately 13.5 percent. The assumed discount rate used in determining the accumulated postretirement benefit obligation was 8.5 percent at December 31, 1994 and 7.5 percent at December 31, 1993.

10. Property and investments:

The following table sets forth the major classifications of Northwest Natural's utility plant and accumulated provisions for depreciation at December 31:

	1	994 ———				
Thousands	De Amount	Average epreciation Rate	Avera Depreciati Amount R			
Transmission and distribution	\$ 758,093	3.8%	\$ 704,195	3.8%		
Storage	58,971	3.9%	58,120	3.9%		
General	60,675	6.4%	53,888	7.0%		
Intangible and other	10,313	13.6%	10,537	14.2%		
Utility plant in service	888,052	4.1%	826,740	4.1%		
Gas stored long-term	6,738		5,027			
Work in progress	13,448		8,263			
Total utility plant	908,238		840,030			
Less accumulated provision			500.00.V2			
for depreciation	279,112		255,282			
Utility plant – net	\$ 629,126		\$ 584,748			

The following table summarizes the Company's investments in affiliated entities accounted for under the equity and cost methods, and its investment in a leveraged lease at December 31:

1994	1993
\$ 21,622	\$ 21,043
9,171	9,079
3,390	2,696
\$ 34,183	\$ 32,818
	\$ 21,622 9,171 3,390

Financial Corporation has invested in four solar electric generation plants located near Barstow, California. Power generated by these stations is sold to Southern California Edison Company under long-term contracts. Financial Corporation's ownership interests in these projects range from 4.0 percent to 5.3 percent.

Financial Corporation also has invested in four U. S. Windpower Partners electric generating projects, with facilities located near Livermore and Palm Springs, California. The wind-generated power is sold to Pacific Gas and Electric Company and Southern California Edison Company under long-term contracts. Financial Corporation's ownership interests in these projects range from 8.5 percent to 41 percent.

In 1987, Oregon Natural purchased a Boeing 737-300 aircraft which was leased to Continental Airlines for 20 years under a leveraged lease agreement.

11. Fair value of financial

instruments:

The estimated fair values of Northwest Natural's financial instruents have been determined using available market information and appropriate valuation methodologies. The following is a list of financial instruments whose carrying values are sensitive to market conditions:

	—Decemb	er 31, 1994—	 —Decemb 	er 31, 1993—
Thousands		Estimated fair value		Estimated fair value
Preference stock	\$ 26,252	\$ 22,841	\$ 26,633	\$ 26,698
Redeemable preferred stock	\$ 15,950	\$ 15,417	\$ 17,041	\$ 16,573
Long-term debt including amount due within one year	\$ 292,076	\$283,732	\$272,931	\$301,358

Fair value of preference stock and redeemable preferred stock was estimated using quoted market prices. Interest rates that are currently available to the Company for issuance of debt with similar terms and remaining maturities were used to estimate fair value for debt issues.

In connection with its Canadian gas purchase commitments, Northwest Natural uses foreign currency forward contracts to hedge against currency fluctuations. At December 31, 1994, these contracts totalled \$13.6 million, with a market value of \$13.4 million.

12. Commitments and contingencies:

Lease commitments

Future lease commitments are: \$4.9 million in 1995; \$4.2 million in 1996; \$4.0 million in 1997; and \$1.8 million in 1998 and 1999. Thereafter, total commitments amount to \$10.2 million. These commitments principally relate to the lease of the Company's office head-arters and computer systems.

Total rental expense for 1994, 1993, and 1992 was \$5.1 million, \$5.2 million and \$4.4 million, respectively.

Purchase commitments

Northwest Natural has signed agreements providing for the availability of firm pipeline capacity. Under these agreements, Northwest Natural must make fixed monthly payments for contracted capacity. The pricing component of the monthly payment is established, subject to change, by U.S. or Canadian regulatory bodies. In addition, Northwest Natural has entered into long-term agreements which release capacity. The aggregate amounts of these agreements were as follows at December 31, 1994:

Thousands	Capacity purchase agreements	Capacity release agreements		
1995	\$ 65,894	\$ 3,984		
1996	80,335	8,039		
1997	77,692	8,039		
1998	77,467	8,039		
1999	77,467	8,039		
Thereafter	736,528	87,085		
Total	1,115,383	123,225		
Less: Amount representing interest	480,735	54,543		
Total at present value	\$ 634,648	\$ 68,682		

Northwest Natural's total payments of fixed charges under capacy purchase agreements in 1994, 1993 and 1992 were \$50.0 million, 5.7 million and \$34.7 million, respectively. Included in the amounts for 1994 and 1993 were reductions for capacity release sales totalling \$3.7 million and \$1.7 million, respectively. In addition, Northwest

Natural is required to pay per-unit charges based on the actual quantities shipped under the agreements. In certain of Northwest Natural's take-or-pay purchase commitments, annual deficiencies may be offset by prepayments subject to recovery over a longer term if future purchases exceed the minimum annual requirements.

Northwest Natural has contracted with an external vendor for the development of a customer information system with remaining commitments of \$0.8 million in 1995 and \$3.8 million in 1996.

Environmental matters

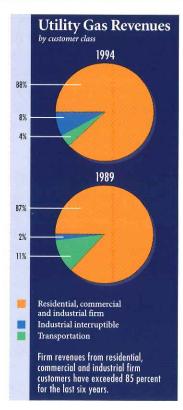
In June 1992, the City of Salem, Oregon, requested Northwest Natural's participation in its review of an environmental assessment of riverfront property in Salem that is the proposed site for a park and other public developments. Within the property is a block previously owned by Northwest Natural which was the site of a former manufactured gas plant. Northwest Natural's corporate predecessor owned the plant for less than four months in 1929. The City has determined that there is environmental contamination on the site, and that a remediation process involving Northwest Natural and at least two other prior owners of the block will be required. To date Northwest Natural has not obtained sufficient information to determine the extent of its responsibility for any such remediation.

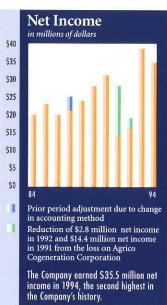
Northwest Natural owns property in Linnton, Oregon, that is the site of a former gas manufacturing plant that was closed in 1956. Although limited testing for environmental contamination has been undertaken by other parties on portions of the site, no comprehensive studies have been performed. Northwest Natural submitted a work plan for the site to the Oregon Department of Environmental Quality (ODEQ) in 1987, but further efforts were suspended at ODEQ's request while Northwest Natural and other parties participated in a joint hydrogeologic study of an area adjacent to the site. In September 1993, pursuant to ODEQ procedures, Northwest Natural submitted a notice of intent to participate in the ODEQ's Voluntary Cleanup Program and, in April 1994, the site was listed on ODEQ's Confirmed Release List and Inventory. It is anticipated that the site investigation will commence during 1995.

In September 1993, Northwest Natural recorded an expense of \$0.5 million for the estimated costs of consultants' fees, ODEQ oversight cost reimbursements, and legal fees in connection with the voluntary investigation at the Linnton site. To date, Northwest Natural has not obtained sufficient information to determine whether any remediation will be required at this site or, if so, the extent of its responsibility for any such remediation. Northwest Natural expects that its costs of investigation and any remediation for which it may be responsible should be recoverable, in large part, from insurance or through future rates.

Litigation

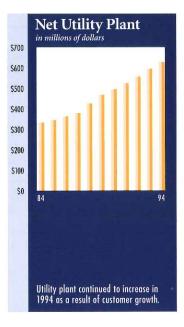
The Company is party to certain legal actions in which claimants seek material amounts. Although it is impossible to predict the outcome with certainty, based upon the opinions of legal counsel, management does not expect disposition of these matters to have a materially adverse effect on the Company's financial position or results of operations.

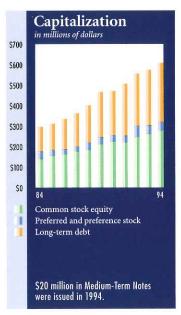




Thousands, except per share amounts (year ended December 31)		1994		1993
Net operating revenues:				20
Operating revenues	\$	368,261	\$	358,71
Cost of sales		162,788		138,8
Net operating revenues		205,473		219,884
Operating expenses:				
Operations and maintenance		70,881		70,723
Taxes other than income taxes		24,263		25,561
Depreciation, depletion and amortization		38,058		39,683
Loss on cogeneration facility	_	-	2 <u></u>	
Total operating expenses		133,202		135,967
Income from operations		72,271		83,917
Other income (expense)		8,582	-	933
Interest charges:				
Interest on long-term debt		21,921		22,578
Other interest		2,473		1,906
Amortization of debt discount and expense		850		775
Total interest charges	8	25,244		25,259
Allowance for funds used during construction		1000 Maria (1000)		
and capitalized interest		(325)		(152)
Total interest charges – net		24,919		25,107
Income before income taxes		55,934		59,743
Income taxes		20,473		22,096
Earnings before cumulative effect				
of accounting change		35,461		37,647
Cumulative effect of accounting change on prior years	_	_		
Net income		35,461		37,6
Preferred and preference stock dividend requirements		2,983	<u> </u>	3,488
Earnings applicable to common stock	\$	32,478	\$	34,159
Average common shares outstanding		13,295		13,074
Earnings per share of common stock before cumulative effect of accounting change	\$	2.44	\$	2.61
Cumulative effect of accounting change on prior years	_		1	
Earnings per share of common stock	\$	2.44	\$	2.61
Dividends per share of common stock	\$	1.76	\$	1.75

_	1992		1991		1990		1989		1988		1987		1986		1985		1984
ф	274,366 101,916 172,450	\$	295,938 110,599 185,339	\$	296,281 114,055 182,226	\$	260,924 103,306 157,618	\$	277,564 133,012 144,552	\$	309,710 170,241 139,469	\$	315,260 176,986 138,274	\$	412,462 268,751 143,711	\$	417,504 284,761 132,743
-	64,249 20,865 33,035 4,575		65,529 21,104 33,623 23,200		64,746 21,288 27,967		53,557 19,108 23,193	·	48,619 19,700 23,336		49,163 18,315 20,040		47,499 17,286 18,979		50,484 18,780 17,523		49,988 17,232 15,107
-	122,724 49,726	2	143,456 41,883	23	114,001 68,225	-	95,858 61,760	8	91,655 52,897	÷	87,518 51,951	S	83,764 54,510	-	86,787 56,924	-	82,327 50,416
-	(267)		1,406		461	<u> </u>	1,199	-	178		(479)		(1,564)		(1,031)		(724)
	23,001 3,223 511 26,735		21,977 4,266 348 26,591		22,244 2,853 363 25,460	-	19,344 4,011 401 23,756		17,106 1,599 362 19,067	·	16,863 1,114 358 18,335	-	15,851 1,103 <u>277</u> 17,231	_	15,035 1,416 229 16,680	_	15,316 729 226 16,271
_	(2)	¥		===	(1,127)	-	(4,986)	-	(2,716)	·	(857)	-	(401)	-	(206)		(36)
-	26,733 22,726 6,951		26,591 16,698 2,321	, ,	24,333 44,353 13,629	-	18,770 44,189 15,769	ŝa -	16,351 36,724 13,004	-	17,478 33,994 13,473	_	16,830 36,116 16,487		16,474 39,419 16,713		16,235 33,457 13,700
	15,775 —	-	14,377	Pol.	30,724	161-	28,420	<u> </u>	23,720		20,521 4,195	5	19,629	8	22,706		19,757
<u>_</u>	15,775 2,560		14,377 2,593		30,724 2,729	<u> Victoria in c</u>	28,420 2,814	-	23,720 2,573	_	24,716 1,873	<i>z</i>	19,629 2,107		22,706 2,566		19,757 3,138
\$	13,215	\$	11,784	\$	27,995	\$	25,606	\$	21,147	\$	22,843	\$	17,522	\$	20,140	\$	16,619
<u> </u>	11,909		11,698		11,522		10,799		10,553		10,329		10,059		9,597		9,032
\$	1.11	\$	1.01	\$	2.43	\$	2.37	\$	2.00	\$	1.80 0.41	\$	1.74	\$	2.10	\$	1.84
\$ \$	1.11 1.72	\$ \$	1.01 1.69	\$ \$	2.43 1.65	\$ \$	2.37 1.61	\$ \$	2.00 1.57	\$	2.21 1.56	\$	1.74 1.53	\$ \$	2.10 1.46	\$	1.84 1.38

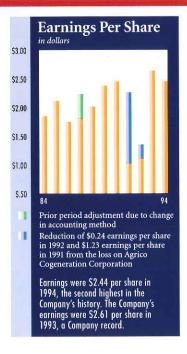


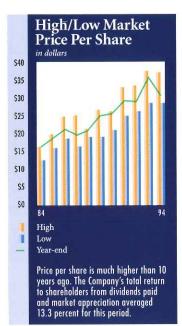


Thousands of dollars (December 31)	1994	1993
Assets:		
Plant and property in service:		
Utility plant in service	\$ 908,238	\$ 840,01
Less accumulated depreciation	279,112	255,282
Utility plant – net	629,126	584,748
Non-utility property	49,586	42,764
Less accumulated depreciation and depletion	24,456	20,646
Non-utility property – net	25,130	22,118
Total plant and property in service	654,256	606,866
Investments and other:	· ******** ****************************	**************************************
Investments	34,183	32,818
Long-term notes receivable	2,914	1,756
Total investments and other	37,097	34,574
Current assets:	57,077	0 1,0 7 1
Cash and cash equivalents	8,068	4,198
Accounts receivable – customers	43,016	45,340
Allowance for uncollectible accounts	(864)	(1,368)
Accrued unbilled revenue	20,320	25,890
Inventories of gas, materials and supplies	14,958	16,838
Prepayments and other current assets	10,041	16,412
Total current assets	95,539	107,310
Regulatory tax assets	60,430	62,130
Deferred debits and other	41,982	38,156
Total assets	\$ 889,304	\$ 849,036
Capitalization and liabilities:		
Capitalization:	¢ 274 400	¢ 250.54
Common stock equity	\$ 274,408	\$ 258,50
Preference stock	26,252 15,950	26,63 17,041
Redeemable preferred stock		STATE OF THE PARTY
Total capital stock	316,610	302,239 215,000
First mortgage bonds Unsecured debt	234,000 57,076	57,931
Secured debt	57,070	57,551
Total long-term debt	291,076	272,931
Total capitalization	607,686	575,170
Current liabilities:	E2 (E4	70 540
Notes payable	53,654	72,548
Accounts payable	48,517 1,000	44,318
Debt maturities and current sinking fund requirements Taxes accrued	6,584	6,757
Interest accrued	4,570	4,438
Other current and accrued liabilities	11,757	10,180
Total current liabilities	126,082	138,241
Deferred investment tax credits	13,530	14,567
	112,433	104,300
Deferred income taxes	59 69 NASC-8959	
Regulatory balancing accounts and other	29,573	16,758
Total capitalization and liabilities	\$ 889,304	<u>\$ 849,036</u>

1992	1991	1990	1989	1988	1987	1986	1985	1984
779,274	\$ 722,069	\$ 668,664	\$ 623,114	\$ 567,489	\$ 504,407	¢ 475 220	¢ 445.404	ф 427.2 <i>С</i> 4
233,385	207,165	183,404	163,678	147,923	132,149	\$ 475,329 119,626	\$ 445,484 106,949	\$ 427,264 99,374
545,889	514,904	485,260	459,436	419,566	372,258	355,703	338,535	327,890
44,629	51,265	70,316	53,651	27,373	32,955	29,311		
15,480	13,161	10,023	7,718	7,650	7,299	5,767	26,343 3,987	15,065 2,332
29,149	38,104	60,293	45,933	19,723	25,656	23,544	22,356	12,733
575,038	553,008	545,553	505,369	439,289	397,914	379,247	360,891	340,623
32,818 7,518	33,145	30,286	19,525	18,922	13,860	3,904	2,563	3,061
40,336	33,145	30,286	19,525	18,922	13,860	3,904	2,563	3,061
7,537	46,465	2,797	1,923	2,738	4,021	2,569	3,681	7,591
33,956	31,364	33,507	26,299	26,527	33,467	29,392	48,251	43,054
(948)	(3,612)	(1,811)	(1,531)	(1,316)	(1,270)	(1,096)	(1,466)	(1,068)
20,738	18,135	27,497	18,228	17,906	19,587	<u> </u>		
15,797	17,294	16,875	16,752	14,984	14,874	10,442	12,569	13,127
8,220	8,248	9,553	7,791	5,859	4,688	4,171	3,072	3,273
85,300	117,894	88,418	69,462	66,698	75,367	45,478	66,107	65,977
_	_	===	₫ ,	-	-	-	-	_
31,160	27,447	23,578	17,030	17,221	17,687	28,690	24,832	24,151
\$ 731,834	\$ 731,494	\$ 687,835	\$ 611,386	\$ 542,130	\$ 504,828	\$ 457,319	\$ 454,393	\$ 433,812

241,538	\$ 216,280	\$ 219,446	\$ 206,424	\$ 179,573	\$ 171,386	\$ 159,597	\$ 151,201	\$ 135,845
26,766	1,869	2,025	2,320	2,855	3,219	4,589	7,080	12,242
28,218	29,148	30,102	31,539	33,263	19,718	21,289	22,249	23,579
296,522	247,297	251,573	240,283	215,691	194,323	185,475	180,530	171,666
205,458	197,596	187,606	149,175	127,569	107,086	107,795	87,960	82,180
48,308	43,499	14,024	54,328	54,721	54,933	40,000	40,000	40,000
	11,900	13,600	17,000		-	_		
253,766	252,995	215,230	220,503	182,290	162,019	147,795	127,960	122,180
550,288	500,292	466,803	460,786	397,981	356,342	333,270	308,490	293,846
47,109	88,619	74,408	23,322	10,230	39,849	26,779	36,276	29,500
40,282	43,789	38,074	29,873	43,968	30,837	29,457	45,765	49,063
2,138	2,125	11,068		4,200	2000 F-2000 (2000)	(-	3,898	2,995
4,790	3,631	5,570	7,229	8,540	3,768	4,108	1,449	4,086
6,792	7,070	6,897 5,546	8,528	7,842	7,544	7,202	7,169	7,873
9,387	6,742	5,546	3,474	3,375	2,578	2,257	2,014	1,296
110,498	151,976	141,563	72,426	78,155	84,576	69,803	96,571	94,813
15,603	16,658	18,648	19,047	21,099	21,518	19,885	20,572	19,286
34,929	34,989	38,783	39,514	33,084	31,269	25,186	16,791	12,916
20,516	27,579	22,038	19,613	11,811	11,123	9,175	11,969	12,951
\$ 731,834	\$ 731,494	\$ 687,835	\$ 611,386	\$ 542,130	\$ 504,828	\$ 457,319	\$ 454,393	\$ 433,812

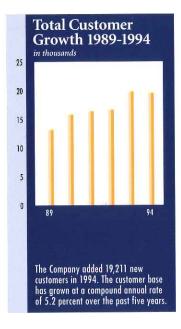


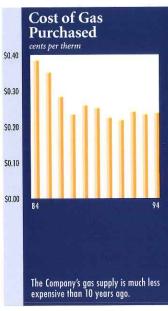


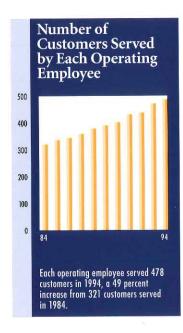
		1994		1993
Common stock				
Ratios — year-end:				
Price/earnings ratio		12.1		13.
Dividend yield at year-end rate – %		6.0		5.1
Dividend payout – %		72.1		67.0
Return on average common equity – %		12.2		13.7
Per share data — (\$):				
Earnings		2.44		2.61
Dividends paid		1.76		1.75
Dividend rate at year-end		1.76		1.76
Book value at year-end		20.45		19.62
Market price:				
High		36 1/2		38
Low		28 1/2		$28\frac{1}{2}$
Year-end		291/2		34 1/4
Average		$31\frac{7}{8}$		33 1/4
Number of shares of common stock (000):				
Year-end		13,419		13,177
Average		13,295		13,074
Coverage data — times earned Fixed charges — Securities and Exchange Commission Fixed charges — Standard & Poor's		3.08 2.98		3.22 3.47
Utility plant		FF 660	ф	70.404
Capital expenditures	\$	77,668	\$	70,404
Depreciation – % of average depreciable		4.1		4.1
utility plant		4.1		4.1
Accumulated depreciation – % of depreciable		21.7		31
utility plant		31.7		31
Capital structure — year-end (%)				
(Exclusive of current portion of long-term debt)		38.5		37.4
First mortgage bonds				10.1
Unsecured debt		9.4		10.1
Secured debt	-		_	
Total long-term debt	-	47.9	_	47.5
Redeemable preferred stock		2.6		3.0
Preference stock		4.3		4.6
Common stock equity	_	45.2	_	44.9
Total capital stock		52.1		52. <u>5</u>
Total capital structure	_	100.0	=	100.0
Effective tax rate Effective tax rate – % of pretax income		37		37
Effective tax rate = 70 of pretax meonic		31		27

^{*}Includes \$0.24 per share in 1992 and \$1.23 per share in 1991 loss on Agrico Cogeneration Corporation. †Includes \$0.41 per share attributable to cumulative effect of accounting change on prior years.

0	1992		1991		1990		1989		1988		1987		1986		1985		1984
	25.7*		28.5*		10.6		10.5		10.6		8.7†		12.4		8.9		8.9
	6.0		6.0		6.5		6.6		7.6		8.1		7.2		8.1		8.8
	155.0*		167.3*		67.9		67.9		78.5		70.6†		87.9		69.5		75.0
	5.8*		5.4*		13.1		13.3		12.1		13.8 [†]		11.3		14.0		12.8
	1.11*		1.01*		2.43		2.37		2.00		2.21†		1.74		2.10		1.84
	1.72		1.69		1.65		1.61		1.57		1.56		1.53		1.46		1.38
	1.72		1.72		1.68		1.64		1.60		1.56		1.56		1.52		1.44
	18.62*		18.35*		18.91		18.06		16.87		16.38		15.65		15.34		14.62
	$33\frac{3}{4}$		33 1/4		$26\frac{1}{2}$		$26\frac{3}{4}$		21 5/8		25 1/4		25		20		$16\frac{1}{2}$
	$26\frac{1}{2}$		25 1/4		21 1/8		$19\frac{1}{8}$		$19\frac{1}{4}$		$16\frac{7}{8}$		$18\frac{3}{4}$		$16\frac{1}{8}$		$12\frac{7}{8}$
	$28\frac{1}{2}$		$28\frac{3}{4}$		$25\frac{3}{4}$		25		$21\frac{1}{8}$		$19\frac{1}{4}$		$21\frac{5}{8}$		$18\frac{3}{4}$		$16\frac{3}{8}$
	30		$28\frac{3}{8}$		$24\frac{5}{8}$		$23\frac{1}{4}$		201/2		$21\frac{1}{4}$		$21\frac{1}{2}$		$18\frac{1}{4}$		14
	12,973		11,785		11,604		11,430		10,641		10,460		10,195		9,858		9,294
	11,909		11,698		11,522		10,799		10,553		10,329		10,059		9,597		9,032
*	1.81*		1.59*		2.64		2.75		2.82		2.96 [†]		2.94		2.10		2.01
	2.08		2.51		2.88		2.72		2.83		2.84		3.11		3.19 3.38		2.91 3.08
\$	60,709	\$	58,362	\$	50,529	\$	57,587	\$	44,954	\$	34,112	\$	33,479	\$	37,550	\$	34,331
	4.0		4.2		3.9		3.9		4.0		4.0	1200	3.9		3.9	*:	3.8
															3.9		3.0
	30.4		29.3		28.1		26.9		28.1		26.7		25.3		24.3		23.5
	37.3		39.5		40.2		32.4		32.1		30.1		32.3		28.5		28.0
	8.8		8.7		3.0		11.8		13.7		15.4		12.0		13.0		13.6
_	No.		2.4	-	2.9		3.7			_						,	
_	46.1	_	50.6		46.1		47.9		45.8		45.5		44.3	***************************************	41.5		41.6
	5.1		5.8		6.5		6.8		8.4		5.5		6.4		7.2		8.0
	4.9		0.4		0.4		0.5		0.7		0.9		1.4		2.3		4.2
	43.9		43.2		47.0	()	44.8	-	45.1	_	48.1		47.9		49.0	_	46.2
	53.9		49.4		53.9	_	52.1		54.2		54.5	-	55.7		58.5		58.4
	100.0	-	100.0	_	100.0	_	100.0	_	100.0	_	100.0		100.0		100.0		100.0
-																	
_	31		14		31		36		35		40		46		42		41







The first and the second of th	1994	1993
Customers at year-end	to Some sweets	0.0000000000000000000000000000000000000
Residential	346,950	329,157
Commercial	44,078 401	42,6 ^r 39
Industrial – firm – interruptible	142	153
- interruptible	391,571	372,363
Transportation customers	67	64
Total customers	391,638	372,427
Gas sales and transportation deliveries (000 t Residential	260,218	267,818
Commercial	201,925	209,642
Industrial – firm	81,348	80,588
– interruptible	89,899	66,370
Total gas sales	633,390	624,418
Transportation	364,461	415,367
Unbilled therms	(7,519)	3,844
Total volumes delivered	990,332	1,043,629
	-	
Operating revenues and cost of sales (000) Sales revenues:		
Residential	\$ 176,510	\$ 168,217
Commercial	108,452	103,476
Industrial – firm	34,443	31,340
– interruptible	27,361	18,884
Total gas revenues	346,766	321,917
Transportation	14,702	17,892
Unbilled revenues	(5,571)	5,153
Other	829	2,890
Total utility operating revenues	356,726	347,8
Cost of gas	163,026	138,85
	193,700	209,019
Net utility operating revenues Non-utility net operating revenues	11,773	10,865
Net operating revenues	\$ 205,473	\$ 219,884
Customer data		
Heat requirements:	4,020	4,452
Actual degree days	4,324	4,313
20-year average degree days Average use per customer in therms:	4,324	4,515
Residential	776	844
Commercial	4,680	5,029
Average rate per therm (cents):	2,000	-,
Residential	67.8	62.8
Commercial	53.7	49.4
Industrial – firm	42.3	38.9
– interruptible	30.4	28.5
Total sales	54.7	51.6
Gas purchases (000 therms)	642,607	628,172
Gas purchased cost per therm (cents)	23.44	23.11
Maximum day firm sendout (000 therms)	3,913	4,047
Maximum day total sendout (000 therms)	5,285	5,479
		17.
	A 22.000	\$ 33,539
Payroll (000)	\$ 33,888	
	\$ 33,888 20,795	
Payroll (000) Operating Construction and other	20,795	21,056
Payroll (000) Operating Construction and other Total	\$ 54,683	\$ 54,5°
Payroll (000) Operating Construction and other	20,795	21,056

^{*}Transportation customers are included in industrial customer counts.

1992		1991		1990		1989		1000		1007		1006		1005		
1992		1991		1990		1989		1988		1987		1986		1985		1984
311,216	29.	5,955		281,265		266,872		255,542		246,921		239,546		234,564		227,257
41,156		9,805		38,102		36,469		34,608		33,298		32,055		31,155		29,912
381		367		364		337		329		357		358		376		373
90		60		54		128		156		199		203		202		
352,843	33	6,187	_	319,785	-	and the second of the	15		(0)		-		8		-	201
135	33	171				303,806		290,635		280,775		272,162		266,297		257,743
	- 22	See Street West	-	177	-	177	-		89		-		1		-	ж
352,978		6,358	=	319,962	E	303,983	=	290,635	8=	280,775	=	272,162	=	266,297	=	257,743
207 121	227	2.070		200.040		201111				Sc *ASkrayen on che consc		Endmission Commission		-analogy objects		
206,131		3,079		208,940		201,144		188,906		165,638		172,002		195,497		177,441
169,406		9,384		173,508		170,143		156,143		137,513		140,892		158,845		141,860
67,847		5,535		62,252		54,761		51,449		81,711		86,833		116,069		141,018
22,399	12	3,155		13,554	-	14,816	-	73,439		304,169		205,757		276,895		269,436
465,783		1,153		458,254		440,864		469,937		689,031		605,484		747,306		729,755
595,397	59.	1,171		532,703		556,713		333,859		38,906		66,990		37,327		26,049
4,163	$\underline{\hspace{1cm}}$ (16	5,943)		18,774		3,950		(5,023)		6,357				3 <u>—</u>		_
1,065,343	1,075	5,381	_	1,009,731		1,001,527		798,773	_	734,294		672,474		784,633		755,804
\$ 124,834	\$ 142	2,056	\$	129,830	\$	121,938	\$	125,446	\$	107,770	\$	111,993	\$	130,897	\$	122,179
78,614),263	- 30	84,463	4	81,710	Ψ	85,262	Ψ	73,079	Ψ	79,099	φ	98,171	Φ	
24,867		5,222		24,603		21,502		23,739		35,740		40,229				90,794
6,920		3,352		5,273		5,352		24,499		86,777				62,452		79,727
235,235	2),893	-	75 W 6 3 3	()				_			64,404	-	115,711	-	124,050
				244,169		230,502		258,946		303,366		295,725		407,231		416,750
25,564		9,424		30,423		29,143		24,159		1,800		4,903		1,038		604
2,603	(5	9,362)		9,268		322		(1,681)		3,817				<u></u>		=
2,781		118		66		(905)	-	(3,685)	-	(66)		14,224		3,889		150
266,183		,073		283,926		259,062		277,739		308,917		314,852		412,158		417,504
101,733	107	7,398		110,605	8	103,306		133,012	-	170,241		176,986		268,751		284,761
164,450	173	3,675		173,321		155,756		144,727		138,676		137,866	200	143,407	-	132,743
8,000	11	,664		8,905		1,862		(175)		793		408		304		102,710
\$ 172,450	\$ 185	5,339	\$	182,226	\$	157,618	\$	144,552	4	139,469	\$	138,274	\$	-	d	122.742
	<u> </u>		=	102,020	<u> </u>	137,010	<u> </u>	111,332	Ψ	137,407	<u>Ψ</u>	130,274	Φ_	143,711	<u> </u>	132,743
3,662		,248		4,208		4,310		4,257		3,941		4,138		5,059		4,314
4,354	4	,379		4,391		4,409		4,430		4,451		4,458		4,445		4,524
685		812		769		777		759		690		737		861		804
4,214	4	,874		4,670		4,813		4,624		4,236		4,517		5,271		4,888
60.6		60.9		62.1		60.6		66.4		65.1		65.1		67.0		68.9
46.4		47.7		48.7		48.0		54.6		53.1		56.1		61.8		64.0
36.7		38.5		39.5		39.3		46.1		43.7		46.3		53.8		56.5
30.9		25.5		38.9		36.1		33.4		28.5		31.3		41.8		46.0
50.5		52.1		53.3		52.3		55.1	*2	44.0		48.8		54.5		57.1
455,343		,916		489,768		484,265		478,595		746,128		605,473		767,926		737,695
23.76		1.91		22.67		25.25		26.07		23.47		28.46		35.26		38.78
3,432		,390		5,019		4,732		2,920		2,716		2,438		3,456		3,471
5,300	4	,696		6,154		5,302		4,007		3,760		3,417		4,761		4,303
\$ 30,398	\$ 28	,898	\$	26,929	ø	25 001	ф	24.057	6	25.022	4	24.050	1344	00.00	igan.	
19,802			Ф		\$	25,991	\$	24,957	\$	25,039	\$	24,879	\$	23,995	\$	23,090
	S	,392	2	15,881	-	13,968	-	12,833		12,246		12,525		13,529	8	12,602
50,200		,290	\$	42,810	\$	39,959	\$	37,790	\$	37,285	\$	37,404	\$	37,524	\$	35,692
1,328	1	,276		1,261		1,190		1,161		1,165		1,194		1,234		1,238
437		431		403		391		379		360		344		337		321
										> M80		1 (2018) T87800		-2004-9876		



Robert L. Ridgley, 61, president and chief executive officer, Northwest Natural Gas Company.

Mr. Ridgley completed a term in October as chairman of the American Gas Association. He presently is chair of Portland's Central City 2000 Task Force and the Oregon Business Council. He is a director of Kaiser Foundation Hospitals and Kaiser Foundation Health, a

trustee and vice chairman of the Oregon chapter of The Nature Conservancy and a director of the Oregon Independent College Foundation. Mr. Ridgley was a senior partner in a large Portland law firm with a business and utility law practice before joining Northwest Natural. (1984)



Mary Arnstad, 46, president, The Heathman Management Group, Inc., Portland, Oregon.

Since 1992 Ms. Arnstad has served as president of The Heathman Management Group, Inc., which operates The Heathman Hotel, the Airport Inn and B. Moloch/Heathman Bakery and Pub, all located in Portland, and The Greenwood Inn, Beaverton, Oregon. From 1986 until

January 1995 Ms. Arnstad served as president and general manager of The Heathman Hotel. (1992) (2) (8)



Thomas E. Dewey, Jr., 62, partner, McFarland Dewey & Company, New York City.

Mr. Dewey is a general partner in the investment banking firm of McFarland Dewey & Co., which provides clients with independent financial advice on matters such as corporate financial strategies and recapitalization proposals. He is a director of InPhyNet Medical Man-

agement and serves on the board of trustees and is chairman emeritus of Lenox Hill Hospital. Mr. Dewey formerly was vice chairman and a member of the board of the New York City Housing Development Corporation. (1986) (2) (8)



Tod R. Hamachek, 49, president and chief executive officer, Penwest, Ltd., Bellevue, Washington.

Mr. Hamachek has been president and chief executive officer of Penwest, Ltd., a diversified producer of specialty chemicals and food and pharmaceutical ingredients, since 1985. He is a director of Penwest, The Seattle Times, The Blethen Corporation and DEKALB Genetics

Corporation. He is a trustee of the Virginia Mason Medical Center, the Pacific Science Center, the Seattle Foundation, The Washington Roundtable and Lakeside School. He chairs the advisory board of the University of Washington Graduate School of Business. (1986) (3) (4) (5)



Richard B. Keller, 66, president, Keller Enterprises Inc.,

Portland, Oregon.

Mr. Keller has served as president of Kel Enterprises Inc., a holding company, since 1975. For many years Keller Enterprises owned Western Paper Company, a major independent distributor of paper and packaging. Mr. Keller is a member of the board of the managing gen-

eral partner of Crown Pacific Partners, L.P. He is a life trustee of both the Oregon Graduate Institute and Lewis & Clark College. (1983) (1) (3) (4) (5) (6)



Wayne D. Kuni, 64, president, Kuni Enterprises, Beaverton, Oregon.

Mr. Kuni is the founder, president and principal shareholder of Kuni Enterprises, which owns Cadillac, Lexus and B.M.W. and other automobile dealerships in Oregon, Colorado and California. He is past president of the Portland Metropolitan Automobile Dealers Association,

the Oregon Automobile Dealers Association, the Portland Chamber of Commerce and the Arlington Club. He is a member of the Board of Trustees of Linfield College and chairman emeritus of the Board of Governors of the Portland Shriners Hospital. (1980) (1) (2) (3) (8)



Dwight A. Sangrey, 54,

former president and chief executive officer, Oregon Graduate Institute of Science & Technology, Portland, Oregon.

Mr. Sangrey served as president of the Oregon Graduate Institute of Science & Technology from September 1988 to October 1994. He continues to be a professor of environmental science and engineering at OGI. He previously

was dean of engineering at Rensselaer Polytechnic Institute. He is a board member of Precision Castparts, Pacific University and Oregon Ed-Net and serves on several national education and science policy committees. (1992) (4) (5) (7)



Melody C. Teppola, 52,

managing partner,

National Builders Hardware Company,

Portland, Oregon.

Since 1965 Ms. Teppola has been associated with National Builders Hardware, a regional and national distributor of builders' hardware, woodworking machinery and decorative plumbing. She is a director of the YWCA of

Portland, the Bonnie Bronson Fund of the Oregon Community Found tion and the Bosco-Milligan Foundation for Historic Preservation. (1987) (4) (5) (6) (7)



Russell F. Tromley, 55, president and chief executive officer, Tromley Industrial Holdings, Inc., Tualatin, Oregon.

Mr. Tromley is the founder and sole shareholder of Tromley Industrial Holdings, which is involved in nonferrous metals alloying and distribution, manufacturing and marketing equipment for the foundry and steel industry,

industrial equipment leasing and retail business property investments. Mr. Tromley is past president of the Casting Industry Suppliers Association and serves as a director of the Evans Scholars Foundation. He also serves as a non-lawyer arbitrator for the Oregon State Bar Association. (1994) (2) (8)



Benjamin R. Whiteley, 65, chairman of the board, Standard Insurance Company, Portland, Oregon.

Mr. Whiteley was appointed chairman of the board and chief executive officer of Standard Insurance Company in 1993 after having served as president and chief executive officer since 1983. He retired as chief executive officer

of Standard in 1994. He also serves as lead director of Northwest Natural Gas Company. Mr. Whiteley is a director of Standard Insurance; Inderson, Inc.; U.S. Bancorp; The Greenbrier Companies; and Willamette Industries, Inc. (1989) (1) (3) (6)



William R. Wiley, 63, director, Battelle's Pacific Northwest Laboratories, and senior vice president, Battelle Memorial Institute, Richland, Washington.

Dr. Wiley has been associated with Battelle Memorial Institute since 1965. He is president of the Board of Regents of Washington State University, a foundation associate of Seattle's

Pacific Science Center and a member of the board of directors of Safeco Corporation, Forward Washington, The Washington Roundtable and Oregon Graduate Institute. (1994) (7) (8)



Carlton Woodard, 71, retired chairman of the board, South Lane Investment Corporation, Cottage Grove, Oregon.

Mr. Woodard is the retired chairman of the board of South Lane Investment Corporation, which owns Kimwood Corporation, a woodworking machine manufacturer; the Valley River Inn, Eugene, Oregon; and other real es-

tate and financial interests. He is a retired director of the United States National Bank of Oregon, a board member of the University of Oregon Foundation and a trustee of Lewis & Clark College. (1976) (1) (6) (7)

RETIRED DIRECTORS

Coburn L. Grabenhorst, Sr., senior partner, Grabenhorst Bros. Realtors, Salem, Oregon. (1969)

Ronald T. Miller, retired chairman of the board, Northwest Natural Gas Company, Portland, Oregon. (1974)

Alfred J. Rawlinson, partner, New System Laundry, Portland, Oregon. (1951) L. Sanford Reis, president, Reis & Chandler, New York City. (1957)

Ralph J. Voss, retired chairman of the board, First Interstate Bancorp, Portland, Oregon. (1969)

IN MEMORIAM

Francis F. Hill 1908 -1994

President 1961-75 Director 1961-81

(Year elected to the board) (1) Executive Committee (2) Audit Committee (3) Organization and Executive Compensation Committee (4) Pension Committee (5) Retirement Committee (6) Nominating Committee (7) Environmental Policy Committee (8) Finance Committee

Robert L. Ridgley, 61,

president and

chief executive officer (1983).

Mr. Ridgley has been president and CEO of Northwest Natural Gas since 1985. He joined Northwest Natural Gas after 23 years of private law practice. He served as chairman of the American Gas Association in 1994, and he continues to serve as chairman of the Oregon Business Council.

Bruce R. DeBolt, 47,

senior vice president,

finance, and chief financial officer (1980).

Mr. DeBolt holds a master's degree in business administration and a law degree. He previously served as the Company's general counsel. Mr. DeBolt also served as an assistant Oregon attorney general before joining the Company.

Dwayne L. Foley, 49,

senior vice president,

gas operations and information services (1967).

Mr. Foley also serves as president and CEO of Oregon Natural Gas Development Corporation. From 1990 to 1994, he was CEO of Canor Energy Ltd. Both are subsidiaries. A professional engineer, he formerly was manager of Gas Supply at Northwest Natural Gas.

Paul L. Hathaway, 60,

senior vice president,

districts and administrative services (1977).

Mr. Hathaway has served as president of Pacific Square Corporation, a subsidiary of Northwest Natural Gas. A graduate of the U.S. Naval Academy, Mr. Hathaway is a former vice president of San Diego Gas & Electric Company and Consolidated Edison Company.

Michael S. McCoy, 51,

senior vice president,

customer services (1969).

Mr. McCoy, a civil engineer, formerly was vice president, operations, districts and administrative services and industrial relations and manager of the Customer Service Department. He also served as district manager in Albany.

Bruce B. Samson, 60,

senior vice president,

public affairs, and general counsel (1990).

Mr. Samson, a former Navy pilot, was president of public policy for U S West Communications, Seattle, Washington, and vice president and general counsel of Pacific Northwest Bell, Seattle, before joining Northwest Natural Gas.

Diana J. Johnston, 50,

vice president,

human resources (1966).

Ms. Johnston has served as manager of Customers Office, superinted dent of stores and supervisor of general maintenance for Northwest Natural Gas. She is a graduate of the Human Resources Executive Program at the University of Michigan School of Business Administration.

C. J. Rue, 49,

secretary and

assistant treasurer (1974).

An attorney, Mr. Rue served previously as supervisor of the Investor Relations Department and assistant secretary of Northwest Natural Gas. He is a member of the board of the American Society of Corporate Secretaries.

D. James Wilson, 55,

treasurer and

controller (1979).

A certified public accountant, Mr. Wilson is a former manager of Internal Auditing of Northwest Natural Gas.

Virginia V. Burgess, 56,

director of investor relations

and assistant secretary (1981).

Ms. Burgess is an attorney who also holds a master's degree in management. She is president of the Pacific Northwest chapter of the American Society of Corporate Secretaries.

Notice of annual meeting

The 1995 Annual Meeting will be held at 2 m. Thursday, May 25, in the State Ballm of the Hilton Hotel, 921 S.W. Sixth Avenue, Portland, Oregon. A meeting notice and proxy statement will be sent to all shareholders in mid-April.

Form 10-K

The Company will provide its shareholders, without charge, a copy of its 1994 Annual Report on Form 10-K to the Securities and Exchange Commission. Requests should be directed to the Corporate Secretary.

Dividend reinvestment plan

Common shareholders of record may reinvest all or a part of their dividends in additional shares under the Company's plan. Cash purchases also may be made at the current market price under this plan, and no brokerage fees will be charged. A prospectus will be sent to any registered shareholder on request.

Stock transfer agent

all Preferred, Preference and Common Stock Issues: Northwest Natural Gas Company 220 N. W. Second Avenue Portland, Oregon 97209 Attention: Shareholder Services

Trustee, conversion and interest paying agent

For Convertible Debentures: Boatmen's Trust Company 510 Locust Street St. Louis, Missouri 63178 Attention: Corporate Trust Division

Trustee and bond paying agent

For all bond issues: Bankers Trust Company Securities Services Division P.O. Box 9006 Church Street Station New York, New York 10249 1-800-735-7777

Common stock prices

1994

NASDAQ National Market System Closing Trades

Quarter	High	Low
1	36 ½	33¾
2	34¾	293/
3	32	29
4	32	28½
1993 Quarter	High	Low
	31 ½	28 ½
2	34	30 %
3	38	34
4	363/	32

Quarterly Financial Information

	A	— Quarte	r ended —		
Dollars (thousands except per share amounts)	Mar. 31,	June 30,	Sept. 30,	Dec. 31,	Total
1994					
Operating revenues	128,534	66,505	48,474	124,748	368,261
Net operating revenues	72,325	37,219	26,922	69,007	205,473
Net income (loss)	18,780	2,465	(3,774)	17,990	35,461
Earnings (loss) per share	1.37	0.13	(0.34)	1.29	2.44*
1993					
Operating revenues	128,714	61,789	47,451	120,763	358,717
Net operating revenues	82,116	40,141	30,805	66,822	219,884
Net income (loss)	24,653	2,767	(4,423)	14,650	37,647
Earnings (loss) per share	1.82	0.15	(0.40)	1.05	2.61*

Quarterly earnings per share are based upon the average number of common shares outstanding during each quarter. Because the average number of shares outstanding has increased in each quarter shown, the sum of quarterly earnings does not equal earnings per share for the year.

Variations in earnings between quarterly periods are due primarily to the seasonal nature of the Company's business.

For further information contact:



Virginia V. Burgess Investor Relations (503) 220-2583



Linda R. Williams Shareholder Services (503) 220-2591

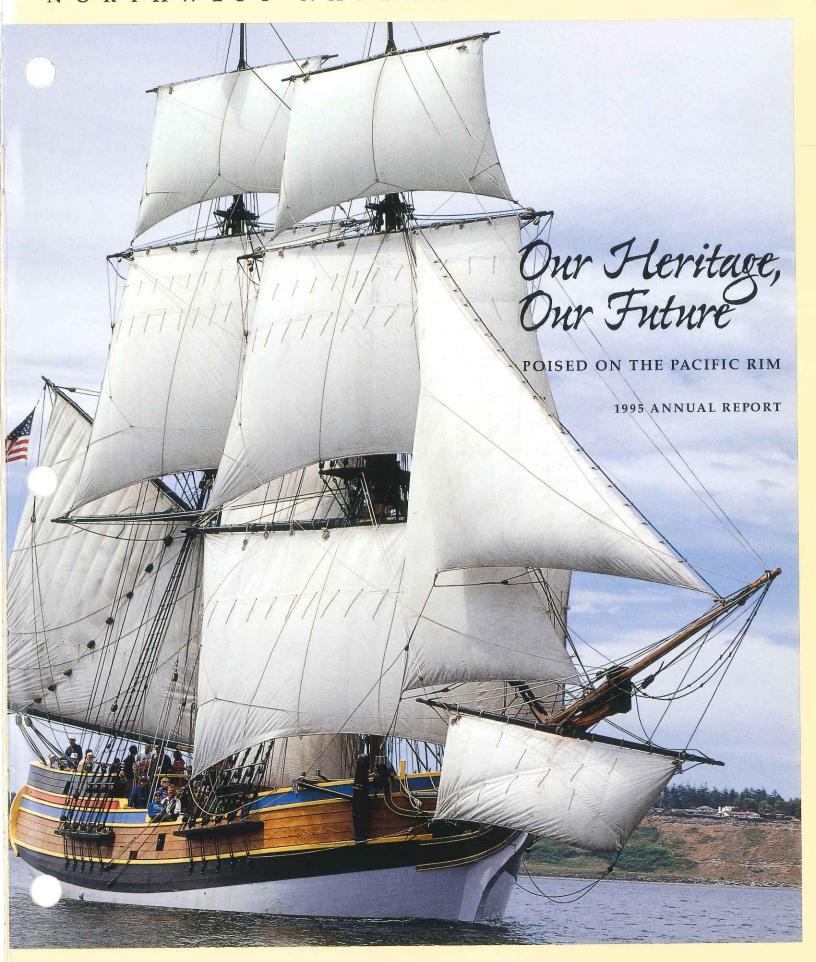
Northwest Natural Gas Company 220 N.W. Second Avenue Portland, Oregon 97209



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Northwest Natural Gas Company 220 N.W. Second Avenue Portland, Oregon 97209



Corporate Profile

Northwest Natural Gas serves almost 410,000 customers in northwest Oregon and southwest Washington. The service territory includes the Portland-Vancouver metropolitan area, the Willamette Valley, the northern Oregon coast and the Columbia River Gorge. More than 119,000 customers have been added to the Company's distribution system in the last seven years.

Dividends paid by Northwest Natural Gas have increased for 40 consecutive years.

The Company has three active subsidiaries:

- Oregon Natural Gas Development Corporation is engaged in natural gas exploration, development, storage and production of natural gas and oil.
- Canor Energy Ltd. owns oil and gas properties in Alberta and Saskatchewan.
- NNG Financial Corporation provides short-term financing for Company subsidiaries.

Mission Statement

Northwest Natural Gas Company is a diversified energy company consisting of a major investor-owned and regulated public utility, whose mainstream business is to provide sales and transportation service to natural gas customers. The Company seeks to enhance profitability through investment in non-regulated activities, including: (1) the production, gathering and marketing of natural gas, and (2) the development of other energy-related business.

Our Heritage, Our Future

Our Heritage: In 1788, the original Lady Washington and the Columbia Rediviva sailed from Boston to explore the Pacific Northwest and to open a trade route between the Northwest and the Orient. The voyages gave the United States a basis for establishing a territorial claim to what would become the Oregon Territory.

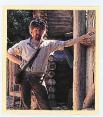
Our Future: The recently built replica of the Lady Washington pictured on the cover is symbolic of the region's new economic base: trade with the Pacific Rim and the growth of \$9 billion in new semiconductor plants. The plants are stimulating new construction and jobs that will continue growth into the 21st Century.



The Ridgley Legacy 5 As he heads for retirement, our CEO reflects on 12 years of growth and what lies ahead for the Company.



Profitable Growth 1: Dramatic growth is driving the Company, but growth makes sense only when it's profitable.



Customer Service Empowered employees are improving customer service, which translates into improved profitability.



New Customers 14 High-tech growth is bringing \$9 billion in new investment to Northwest Natural's service territory.

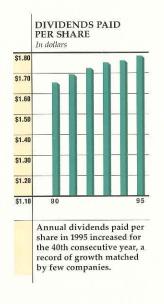


Preparing for the Future 11 Joint trenching, cost sharing and expansion of underground storage are priority projects.

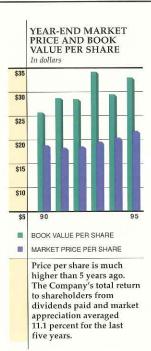
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and Analysis	18	Corporate Information	7

	1995	1994	Percent Increase (Decrease)
arnings			
rinancial facts (\$000):			
Net operating revenues	212,225	205,473	3
Net income	38,065	35,461	7
Earnings applicable to common stock	35,259	32,478	9
Financial ratios (%):			
Return on average common equity	11.8	12.2	(3)
Capital structure at year-end:			
Long-term debt	43.5	47.9	
Preferred and preference stock	6.2	6.9	
Common stock equity	50.3	45.2	
Common stock			
Shareholder data:			
Average shares outstanding (000)	14,545	13,295	9
Per share data (\$):			
Earnings	2.42	2.44	(1)
Dividends	1.77	1.76	1
Book value at year-end	21.82	20.45	7
Market value at year-end	33	$29^{1/2}$	12
Operating highlights			
Gas sales and transportation deliveries (000 therms)	1,004,378	990,332	1
Degree days (20-year average 4,306)	3,779	4,020	(6)
Customers at year-end	409,949	391,638	5
Number of utility employees	1,288	1,338	(4)

Dividends paid on common stock			(per share)		
Payment date			1995		1994
February 15		\$	0.44	\$	0.44
May 15			0.44		0.44
August 15			0.44		0.44
November 15		-	0.45		0.44
Total dividends paid		\$	1.77	\$	1.76







To Our Shareholders



Richard G. Reiten (left) joins Robert L. Ridgley in the executive boardroom. On March 1, 1996, Dick Reiten became president and chief operating officer, and Bob Ridgley was appointed chairman of the board. Mr. Ridgley will continue as chief executive officer until his retirement at the end of 1996.

s my 12 years as your chief executive officer draw to a close in 1996, it is time to take stock of where we've been and where we're headed. For much of the 1980s we were focused on changing the Company's culture and business skills to meet the challenges of deregulation. For the first half of the 1990s, we capitalized on those changes to propel the Company on a path of unprecedented growth in customers and net operating revenues.

As we look forward to the second half of the 1990s, we see an opportunity to grow earnings as the result of a continuing rapid increase in the number of residential and commercial customers, strengthened margins from our industrial business, and more profit per customer due to productivity improvements, appliance saturation and new market niches such as multifamily residences and manufactured housing.

A Look Backward

Until the Federal Energy Regulatory Commission (FERC) launched its effort to deregulate the production

and interstate transportation of natural gas in the mid-1980s, the business of the Company was fairly simple and quite constrained by regulation. Since Northwest Natural Gas operated only in the states of Oregon and Washington, it had no direct access to the gas producing regions in the Rocky Mountain states and the provinces of British Columbia and Alberta in Canada. Interstate pipelines not only transported gas, they were for many customers like Northwest Natural Gas the principal source of purchased gas. Their success or failure in aggregating gas supplies determined the reliability and cost of the local gas distributors' commodity.

Although Northwest Natural Gas was subjected to this intensified competition . . . our business survived and prospered in the deregulated environment.

With open access to interstate transportation mandated by FERC, the world became much more complex. Local gas distributors and their larger customers could now contract directly with producers and pay only transportation fee to the interstate pipelines to move the gas to the city gate. Unbundling of commodity and transportation beyond the city gate meant that the industrial customers could buy their own gas and have it moved by the pipeline and local gas distributor to the burner tip.

Finally, competition for industrial business was intensified by FERC's acceptance of physical bypass of the local distribution system. This meant that a large industrial customer could eliminate the local gas company completely from the transportation chain by building its own connecting line to the interstate pipeline. The threat of bypass drove transportation prices down as distributors moved to reduce tariffs to levels that were close to the cost of bypass.

Although Northwest Natural Gas was subjected to this intensified competition, and did lose seven customers to bypass in cases where there were no real economic alternatives to direct connection of the customer to the pipeline, our business survived and prospered in the deregulated environment.

There were many reasons why that was the result, but most significant were the following:

- Rates were redesigned, with the cooperation of state regulators, to more closely reflect the actual cost (service. This reduced the Company's dependence on high industrial margins.
- Producers lowered wellhead prices in response to market forces and to the "gas supply bubble."

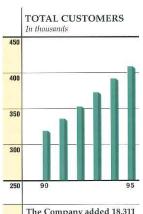
Northwest Natural Gas was able to lower its average cost for a therm of gas from 39 cents in 1984 to 23 cents in 1990. It has remained close to that level ever since. In fact, in 1995 it reached a record low of under 21 cents a therm.

- As the Company's focus shifted to enhancing customer service and productivity instead of annual rate cases, our tariff rates stabilized and natural gas became even more competitive in the energy markets.
- Annual deliveries of gas by the Company increased from a low of 672 million therms in 1986 to more than a billion therms in the 1990s.
- The combination of stable prices, abundant supply and good environmental qualities made natural gas the fuel of choice in the 1990s.
- During the six years ending with 1995, Northwest Natural Gas added 105,966 customers. New home construction and conversions from other fuels produced an annual growth rate of about 5 percent. That was more than twice the customer growth rate of the average local gas distribution company.
- Rapid customer growth produced higher margins that helped to overcome a string of very warm years. Net operating revenues grew from \$138 million in 1986 to more than \$200 million in each of the last three years.

A Look at 1995

While the Company has survived the deregulation of interstate gas transportation in excellent shape, it is not content with its market performance.

Northwest Natural Gas had record net earnings



The Company added 18,311 new customers in 1995, expanding our customer base by 4.7 percent. In the last six years, the Company has added more than 105,000 new customers.

applicable to common stock of \$35.3 million in 1995. With an increase of 1,250,000 average shares of common stock during the year, earnings per share were \$2.42, compared to \$2.44 in 1994. 1995 was the ninth of the last 10 years in which the number of heating degree days (a measure of cold weather) fell below the rolling 20-year average. In fact, 1995 was the second warmest in the last 45 years, and overall was 12 percent warmer than the 20-year average.

We made considerable

progress in 1995 toward our vision of profitable growth. A new main extension policy in Oregon allowed us to ask

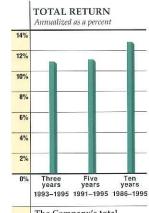
customers, for whom the cost of connection to our distribution system is high, to share in those construction costs. Many did, and those who declined would not have been profitable had we made the investment alone.

Northwest Natural Gas had record net earnings applicable to common stock of \$35.3 million in 1995.

Our construction crews increased their productivity to reduce the cost of customer installations. The new techniques of joint and unity trenching, as discussed in this report, were important breakthroughs. We intend to find additional ways to cooperate with other utilities (electric, water and telephone) to share costs and help us maintain our low customer rates.

We also made good progress in 1995 in promoting gas water heaters and gas fireplaces as additional appliances for our existing customers. We counted 6,511 electric water heaters that were converted to gas during the year, also a new record.

Our industrial margins were 13 percent higher in 1995, due in part to the strong growth in the economies of Oregon and southwestern Washington. There were no new bypasses of our system; our second largest customer, the Weyerhaeuser Company's container board plant in Springfield, Oregon, signed a five-year service extension, including a no-bypass commitment.



The Company's total return—dividends plus stock appreciation— averaged 10.9 percent the last 3 years, 11.1 percent for the past 5 years, and 12.8 percent for 10 years.

This agreement has a special provision under which we are entitled to call upon Weyerhaeuser's pipeline capacity when we need it for up to 10 days a month to meet peak demand for gas. This peaking resource postpones the time when we will need more physical storage capability or increased pipeline capacity of our own. In Weyerhaeuser's case, the plant can easily shift operations to oil temporarily while we utilize its 80,000 therms per day of peaking capacity. We anticipate more such agreements with other dual-fuel industrial customers.

The most encouraging development in our industrial markets is the rapid growth of the computer and high-technology industry in our service territory. Among the new manufacturing plants and plant expansions announced during 1995 are several from

trading partners in Japan, Taiwan and Korea. These plants are large users of natural gas, and the \$9 billion of investment in the region creates jobs that also contribute to the growth of our residential and commercial customer bases.

Our industrial margins were 13 percent higher in 1995, due in part to the strong growth in the economies of Oregon and southwestern Washington.

Oregon's position as a major player in international trade with Pacific Rim countries has made such investments attractive to foreign investors as well as to leading U.S. companies such as Intel, LSI Logic and Integrated Device Technology. As the microchip revolution changes the way we live, it will also have a profound impact on our natural gas business in the Willamette Valley in Oregon and Clark County in Washington.

A Look Ahead

GAS SALES AND TRANSPORTATION

RESIDENTIAL, COMMERCIAL AND

Gas sales and transportation

deliveries have been at record

levels for the last seven years.

INDUSTRIAL INTERRUPTIBLE

INDUSTRIAL FIRM

TRANSPORTATION

DELIVERIES

1,000

400

In millions of therms

Our Integrated Resource Plan, revised in 1995, spells out the most cost-effective way of meeting the substantial load growth we anticipate in the next decade. This strategic road map suggests that we can

best meet our rapidly growing winterpeak heating demand, which reached a record 7.4 million therms a day in January 1996, through the construction of underground storage.

We are fortunate in having already developed two gas storage fields near Mist, Oregon, in Columbia County, 60 miles northwest of Portland. With the addition of the Mist project in the 1980s, we can now meet about 50 percent of our winter-peak gas needs from underground storage and liquefied natural gas plants.

A major transaction late in 1995 set the stage for a phased expansion of this storage capability and, with it, our gas distribution system. Our subsidiary, Oregon Natural Gas

Development Corporation, traded its interests in producing properties and a gathering system near Mist for storage rights in existing wells and all future wells that may be drilled in the Mist area by Enerfin Resources Company of Houston, Texas.

The strategic value of underground storage is twofold. We can keep our gas costs down by using our

storage to hold gas acquired at low prices in the summer for withdrawal during the heavy heating period. Second, we have a competitive advantage over contract storage from outside Oregon, because we can transmit gas when needed directly from storage to our customers without paying any charges for interstate pipeline transportation.

Another 1995 transaction laid the groundwork for future growth. Our Canadian subsidiary, Canor Energy, Ltd., has developed about 56 billion cubic feet of natural gas equivalents in the provinces of Alberta and Saskatchewan, Canada. We have entered into a joint venture with NIPSCO Industries, Inc., a gas and electric utility in northern Indiana, to make future investments in Canadian gas and oil exploration. After a two-year period during which Canor will manage the joint venture investments, the parties expect to combine their interests into a new company.

This strategic road map suggests that we can best meet our rapidly growing winter-peak heating demand, which reached a record 7.4 million therms a day in January 1996, through the construction of underground storage.

These opportunities, as well as those in our mainstream gas distribution business, promise a prosperous future. To lead Northwest Natural Gas toward that future, the Board of Directors has selected Richard G. Reiten to succeed me as your chief executive officer, effective January 1, 1997. Dick Reiten joined the Company on March 1, 1996 as president and chief operating officer. He comes to us with an outstanding record of success at Portland General Corporation and several forest products companies. He also served the state of Oregon with distinction as director of the Economic Development Department.

It is with great anticipation of Dick Reiten's leadership that I look forward to continuing to serve the shareholders of Northwest Natural Gas as chairman of the Board of Directors following my retirement. I thank you for the privilege of serving as your chief executive officer for the past 12 years. Sincerely,

Robert L. Ridgley
Chairman and Chief Executive Officer

March 1, 1996



The Ridoley Legacy

sy Stuart Weiss

Robert L. Ridgley is completing a 12-year tenure as chief executive officer of Northwest Natural Gas Company, successfully steering the Company through an era of unprecedented deregulation in the natural gas industry.

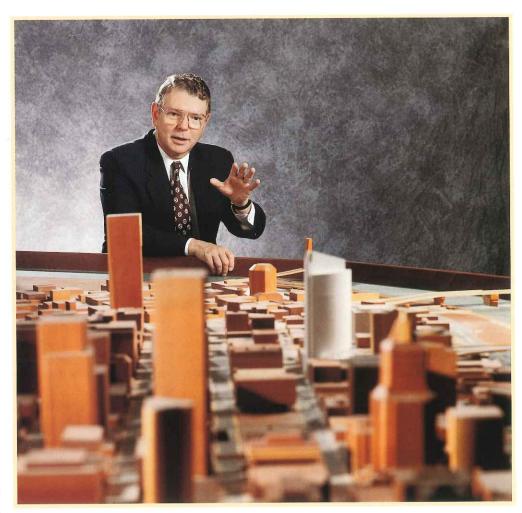
For shareholders, the most visible proof of this success has been the uninterrupted annual growth in the dividend, rising from \$1.38 per share in 1984 to \$1.77 in 1995. This continues a legacy of dividend growth that goes back to the 1950s. Indeed, 1995 marks the 40th consecutive year that Northwest Natural Gas Company has boosted its annual dividend payout. Few companies in the United States can make such a statement.

Of course, dividends couldn't increase unless the Company was profitble. And the challenge to achieve profitability when prices have been falling has been great. As gas prices fell, industrial margins also dropped as industrial gas users sought and found less expensive gas. At the same time, rates to residential and commercial customers also declined because of a large supply of low-cost natural gas. In addition, warmer weather and conservation has meant lower demand per household.

Fortunately, the Portland-Vancouver metropolitan area and the rest of the Company's service territory has grown faster—both in terms of population and economic vitality—than the national average over the past several years. As a result, the Company was able to earn a good return on value-added services to customers as well as benefit from productivity enhancements. The hallmarks of the Ridgley years have been a sharper focus on profitable rowth and an insistence on efficiency to keep customer rates low.

A major achievement has been the development of a new era of labor/management relations. A fiveyear Joint Accord with Local 11 of the Office and Professional Employees International Union encourages employees to accept more decision-making responsibility in return for more flexibility over how work is scheduled. "I want to give all the credit in the world to the leadership

security, we have the flexibility to assign the right number of people on a crew instead of extra people, to not so narrowly define jobs so that one person says 'maybe that would help the customer but I can't do it because it's not my function.'" One output of better employee relations is produc-



As chairman of the Central City 2000 Task Force, Mr. Ridgley is leading the development of housing for 10,000 people in the heart of Portland.

of our union," says Mr. Ridgley, "because they have seized upon this vision that if we do something that improves service to the customer, and which makes this Company more profitable, then that will enable us to treat our employees better.

"In return for providing our bargaining employees with greater job

tivity: Since 1984, the number of customers served by each operating employee has risen 66 percent, from 321 to 533.

Deregulation: A New Era for Natural Gas

Today's environment of deregulation in the natural gas industry is far different from the world Mr. Ridgley inherited in 1983 when he joined the Company. In the early 1980s, there was regulation at all levels—not only at the retail commercial and residential level—but detailed government regulation at all levels of the distribution channel. Some of this regulation created the very problem that it was intended to solve: keeping the supply of gas adequate. At the well-head level, regulations fixed the price that the producers could charge for gas when it was removed from the ground. Government concerns that

the United States was going to run out of natural gas Critics of deregulabefore 1990 led to tion claimed that natadditional restricural gas prices would tions—such as in rise as a result. The 1978 when Congress passed a law opposite occurred. In that limited its fact, as deregulation industrial usage. took place throughout the industry, and as restrictions on

wellhead prices were

completely removed,

prices actually fell.

By 1985, deregulation of American industry was moving forward throughout the economy and finally was beginning to emerge in the

utility sector. The Federal Energy Regulatory Commission began to recognize that it was necessary to open up the distribution channel. FERC asked the pipelines to offer voluntarily to take other people's gas on their own systems rather than gas that they purchased and then resold. It was clear that the natural gas market was going to open up and create new ways to compete and prosper. There would also be challenges, which became apparent in the industrial market, where competition drove down gas prices and margins. The Company's big customers would be free to leave Northwest Natural's



As chairman of the American Gas Association, Mr. Ridgley (left) stressed reliability of the nation's natural gas network. He and A.G.A. President Michael Baly III are pictured in front of the new Oregon Convention Center. Mr. Ridgley chaired the committee responsible for building the center.

system. That threat of "bypass" was such that the Company was forced to lower interruptible rates to hold those customers on the system. As a result, the Company's strategy was to reduce the dependency on the large margins that had been earned in the strictly regulated industrial markets.

Prices Dropped

Critics of deregulation claimed that natural gas prices would rise as a result. The opposite occurred. In fact, as deregulation took place throughout the industry, and as restrictions on wellhead prices were completely removed, prices actually fell. Although the price ceilings had been put in place to protect the consumer, they had discouraged producers from investing

because the return was inadequate. When price ceilings were removed, production money came in, new exploratory techniques were developed and new wells were drilled. Money was drawn into the production business once it was deregulated, creating a so-called "gas bubble" or plentiful supply that's been there for more than a decade and is expected to remain until well into the next century.

It was during this time that Mr. Ridgley was chairman of the American Gas Association. Because the technology to find natural gas was advancing almost miraculously, th cost that it took to produce a given quantity of gas became much lower through better seismic techniques and horizontal drilling.

The slogan during his tenure was: "Clean, reliable natural gas, America's best energy value." But, could a deregulated industry respond in a crunch? "We had a good test in January of my year as A.G.A. chairman when we had the coldest weather in recent history, and the system performed admirably," he says. "That reassured our own customers and public policymakers that this industry was up to the challenge."

At the same time, the public was learning that natural gas possessed environmental advantages over other fossil fuels. There's a general recognition by government policymakers now that natural gas is the cleanest of the fossil fuels, and that it can be utilized more effectively without concerns about environmental degradation.

The falling price of natural gas has been a great boon to the U.S. economy. The cost of energy is one of the major factors that determines whether the U.S. is going to be competitive in an international market. The billions of dollars saved by industry due to the deregulation of natural gas is a little known fact. Many companies are paying only a third of what they used to pay in a regulated environment. "If you totaled that up across our automotive industry and other manufacturers, there has been a tremendous reduction in costs, which has given the U.S. an advantage, even though we had higher wages than less developed countries," notes Mr. Ridgley.

A Community Leader

In addition to running Northwest Natural Gas Company, Mr. Ridgley has played a major leadership role in he Portland community. He was a leading force behind the development of the Oregon Convention Center and the Rose Garden, the new home of the Portland Trail Blazers. As chair-

man of the Central City 2000 Task Force, he is leading the development of a strategy to attract housing, jobs and public improvements in the heart of Portland.

A utility's financial performance depends in large measure on the growth of the community that it serves. Today, Portland has a first class convention center and arena that have generated nationwide attention. "Anything that I could do to promote the attractiveness of Oregon and Portland as a place to live, to build homes and to form businesses, has been a benefit to this Company," says Mr. Ridgley.

Bob Ridgley's new responsibilities at Northwest Natural Gas Company will continue that quest. He plans to continue to work on strategic issues as chairman of the board until age 65. Here in Portland, he continues to work on a new phase for the Oregon Convention Center, which has generated three times its projected sales estimates.

His goal: nearly doubling its capacity—and creating a partnership with the local hotel industry so that larger national conventions will want to come to Oregon. "It wasn't so much what we built. It was the bringing together of the community, and proving that if you really work on a project that makes sense, then it can happen," he says.

Another major assignment in retirement will be the chairmanship of The Oregon Nature Conservancy, with its 22,000 local members. It's Mr. Ridgley's strong belief that "livability and a healthy environment encourage business growth. All of these things have led to a view of Oregon as an excellent place to live and do business, and that's led to a well-educated population that has attracted all of this international investment we are now getting in high technology."

New Leadership, Same Strategy

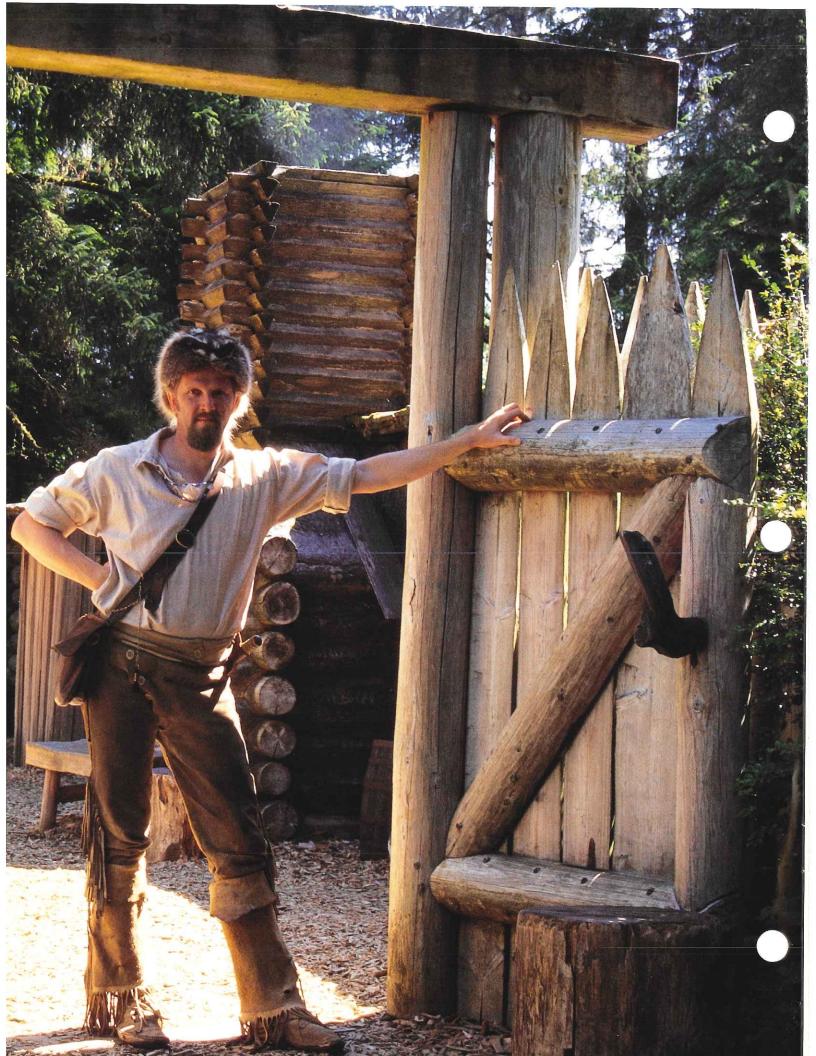
Of course, a booming Oregon is great for Northwest Natural Gas Company shareholders and its employees. So is strong leadership. But Bob Ridgley says he is leaving the day-to-day management of the Company in excellent hands. Richard G. Reiten was hired recently to become president and chief operating officer of Northwest Natural Gas. Mr. Ridgley will remain as chief executive officer until his retirement on January 1, 1997. Ridgley is optimistic about the future under Reiten's leadership.

"Our momentum is such that we're now reaching the point where the payoff is going to be enormous, and I think the board is convinced that the heart of this Company-its labor management partnership, its emphasis on customer satisfaction and customer service, and its commitment productivity, flexi-

"All of these things have led to a view of Oregon as an excellent place to live and do business, and that's led to a well-educated population that has attracted all of this international investment we are now getting in high technology."

bility and profitable growth—will make it successful in the future. They want somebody who will carry on that tradition. I'm confident that Dick Reiten will do that. I've known him for more than 25 years and worked closely with him on many projects and also been a director on one of the companies in which he was CEO in the past. I know he has the same set of values that we share at Northwest Natural Gas, and that he is a man of great loyalty and principle."

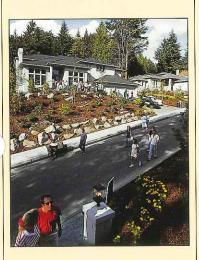
Stuart Weiss is a former Business Week writer and Wall Street analyst.



Our Heritage, Our Future

Settling the Pacific Northwest

First came the fur traders, then the pioneers, seeking land and a future for their families. Early pioneer settlements were at Astoria, Oregon City and Vancouver, Washington. Matt Hensley, a seasonal park ranger with the National Park Service at Fort Clatsop near Astoria, reenacts the story of Lewis and Clark's winter of 1805-06 at Astoria (left photo).



Oregon's North Coast, with a district office at Astoria, and the southwest Washington district headquartered at Vancouver, Washington, today are two of the fast-growing areas in Northwest Natural Gas' service territory. Construction of new residences and businesses has kept a rapid pace in the last few years, bringing jobs to support a growing work force. Portland's widely attended 1995 home show was the Northwest Natural Gas Street of Dreams (pictured above).

Customer Service

TOS AIMS TO AID THE BOTTOM LINE

eaders of Local 11 of the Office and Professional Employees International Union, which represents the Company's union employees, became partners with Company managers in implementing Total Quality Service (TQS), the system of continuously improving customer service. The Labor Relations Team, consisting of 20 bargaining stewards and Company managers, has developed a labor contract that supports flexibility. The Joint Accord, as the contract is called, promotes win-win solutions that result in "doing what's right" for the customers, the employees and the Company.

In 1994, the Labor Relations Team, at the request of the chief stewards and the union leadership, assumed responsibility for implementation of TQS. The team developed its own definition of TQS at Northwest Natural Gas:

"TQS is continuously improving our work processes to increase customer satisfaction and improve profitability by empowering employees and using systematic measurement."

Empowerment means providing employees with "three A's"—the ability, authority and accountability—to get the job done. For more than a year the team has worked to create additional tools that employees need to improve their work processes. TQS scorecards were developed to assist departments and districts in charting their improvements in customer satisfaction, productivity, service quality and profitability.

The Labor Relations Team's leadership has helped integrate TQS into the daily work of more employees to produce real improvements and savings. An example is the results of emphasizing TQS in the Company's Risk and Land Management Department.

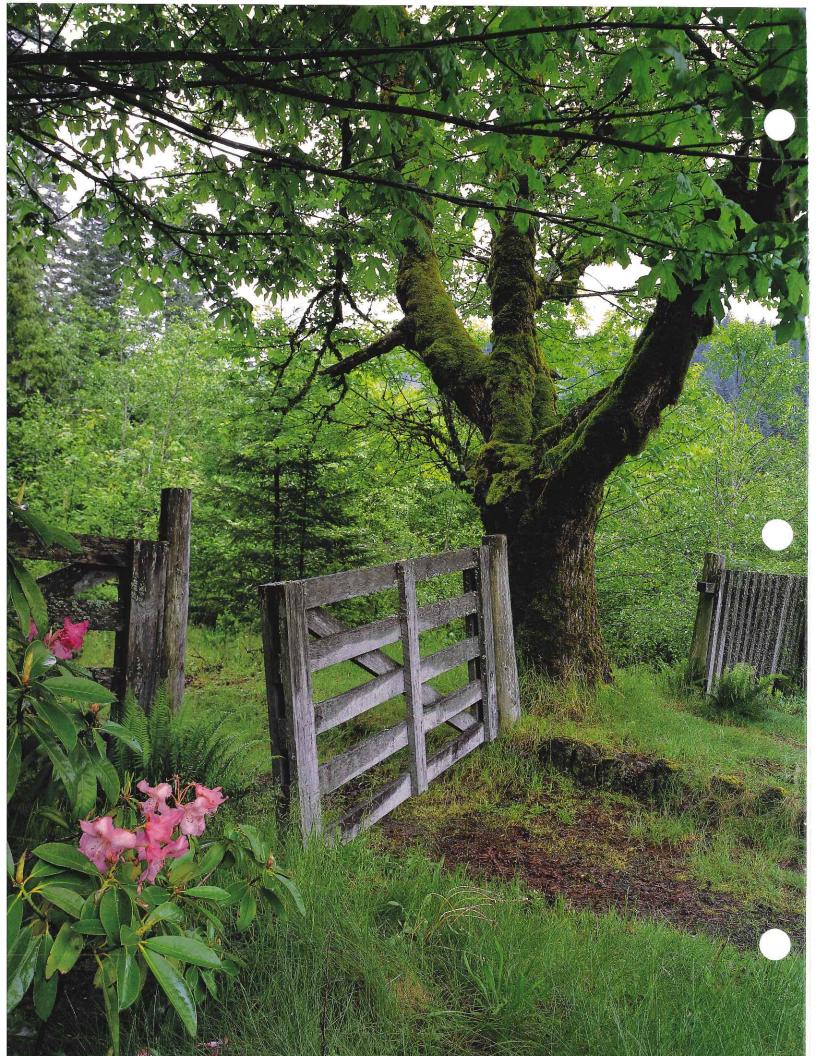
One of the department's responsibilities is to collect revenues because of damages to the Company's gas distribution system. Most of the damages are caused by contractors who fail to ask Northwest Natural Gas to mark gas lines before they dig into the ground.

Risk and Land Management found a correlation between the amount of money collected and the timeliness in billing: The sooner the bill was sent, the more revenue was collected. By reducing the time between the incident and when the bill was sent, the department has increased the amount received by the Company from \$194,000 in 1988 to \$689,000 in 1994. By sending a bill within days instead of months of the incident, the Company saved almost \$2 million over a six-year period.

Whether it is a philosophy, a business strategy or just the way we do the work—TQS impacts the bottom line at Northwest Natural Gas.



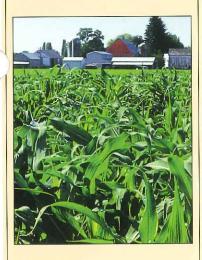
Members of the Labor Relations Team: Diana Johnston, vice president for human resources and administrative services; Rich Oare, labor relations specialist for Local 11 of the Office and Professional Employees International Union; Mark Lilly, Mount Scott Customer Equipment Services; and Sherry Schafer, Salem Market Services, are key employees involved in Total Quality Service.



Our Heritage, Our Future

Tollgate to Eden

One hundred fifty years ago Samuel Barlow cleared a route across forested Mount Hood to Oregon's Willamette Valley. He asked the provincial government in 1845 for a franchise to open a toll road between The Dalles and Oregon City, promising that he would maintain a route if he could collect a toll. The Legislature approved the franchise, and in 1846 Barlow opened his road near where U.S. Highway 26 today crosses Mount Hood (left photo). His toll was \$5 per wagon and 10 cents a head for livestock.



The road made access easier to the fabled "Land of Eden"—the lush, fertile Willamette Valley (pictured above). Today the valley, part of the service territory of Northwest Natural Gas, produces a variety of vegetables and fruits that feed millions of Americans. The frozen and canned fruit and vegetable industry provides growing margin to Northwest Natural Gas.

Preparing for the Future

JOINT TRENCHING AND COST SHARING WITH OTHER UTILITIES LIE AHEAD

he future of Northwest Natural Gas is entwined in cooperation with other utilities, sharing costs through joint and unity trenching and expanding underground gas storage, which reduces the Company's reliance on wintertime purchases of more expensive pipeline gas supplies.

Joint and unity trenching: The Company has found that joint and unity trenching create significant savings in laying distribution lines to new residences and commercial businesses. When possible, Northwest Natural looks

to greater use of both methods. Joint trenching occurs when different utilities—usually gas, electric and telecommunications—use the same trench to lay their lines. Unity trenching involves a single contractor, often the builder, laying service lines to new customers in one trench for several utilities. Northwest Natural Gas benefits when joint or unity trenching is used, which is currently about 80 percent of the time when new customers are connected.

Cost sharing with other utilities: The Company believes savings can be attained in greater cooperation with other utilities. Joint meter reading has been tried successfully with Portland General Electric Company in Northwest Portland. Other experiments are anticipated. Joint billing has been considered and will be studied.

Mist underground storage expansion: In December 1995 a subsidiary, Oregon Natural Gas Development Corporation, acquired additional underground storage for eventual transfer to Northwest Natural. The new



Randy Friedman, manager of Gas Supply, says additional storage will reduce reliance on purchasing gas during winter months.

reservoirs are in Oregon's only commercially producing natural gas field, located near Mist, Oregon. That storage is the strategic key to reducing winter gas costs and assuring a reliable supply of gas during high-demand periods. Half of Northwest Natural's winter-peak gas needs currently are provided by storage at two reservoirs at Mist, from the Company's two liquefied natural gas plants and under long-term firm contracts from two off-system storage facilities located near the Company's service territory. Randy Friedman, manager of Gas Supply, said the strategy is to buy and store additional low-cost gas supplies during summer months. "The result will be reduced reliance on high-priced winter supplies and interstate pipeline capacity for that service," Friedman said. Development of the storage will occur over the next five years and will require additions to the Company's pipeline system from Mist to Portland and the Willamette Valley.

Canadian energy market: Northwest Natural and NIPSCO Energy Services Inc. (NESI), a wholly owned subsidiary of NIPSCO Industries, have formed a joint venture to develop gas and oil properties in western Canada. The properties will be managed by Canor Energy Ltd., a Calgary, Alberta-based Oregon Natural subsidiary that has approximately 56 billion cubic feet of natural gas-equivalent reserves. Both companies will invest additional capital in exploration and development during the next two years. The goal is to combine the Canadian subsidiary operations into a new company by December 31, 1997.

Profitable Growth

INNOVATIVE STRATEGIES DRIVE MARKET PROGRAMS AND ARE PRODUCING RESULTS

orthwest Natural Gas, in its strategy of pursuing profitable new business, has continued its recent dramatic growth. The Company passed another plateau late in 1995 when the 400,000th customer was connected to its distribution system. The Company is in the midst of the greatest surge of growth in its history. A total of 18,311 new customers were added in 1995, bringing to almost 410,000 the number of the Company's residential, commercial and industrial customers.



Richard L. Krebs, assistant to the president, and Saundra M. Japely, director of strategic planning during 1995, gauge how Northwest Natural Gas meets its strategic planning goals.

The rapid growth seems far from over. High-technology industries are creating increased jobs (see article on page 14) that will drive additional growth for years to come.

"In addition to adding our 400,000th customer in 1995, the Company has reduced its total expense per customer to below the level it was in 1989, when there were only 300,000 customers," said Richard L. Krebs, assistant to the president. "A key to competitiveness is staying ahead of changes in the marketplace with rigorous focus and discipline."

Saundra M. Japely, director of strategic planning during 1995, added: "The power of planning is seen in our results. While managing this tremendous growth, we have been able to increase customer satisfaction ratings and improve productivity by 25 percent in the last three years."

Developing industrial products, services and partnerships is a competitive strategy that also has produced results. One example of how working with industrial customers has resulted in innovative partnerships is an agreement signed in 1995 with Weyerhaeuser Company of Springfield, Oregon, Northwest Natural's second largest

industrial customer.

The four-part, multi-year agreement contains a no-bypass commitment from Weyerhaeuser in exchange for market-priced, utility distribution services at Weyerhaeuser's Springfield mill. Northwest Natural receives short-notice, peaking gas supply services from Weyerhaeuser to support winter peak-day deliveries to firm customers. Under severe weather conditions, Weyerhaeuser would divert its own gas supplies to Northwest Natural's benefit and switch to oil. Weyerhaeuser gains by having a partner share in the cost of maintaining this operating flexibility.

Northwest Natural also acquires some valuable interstate pipeline capacity from Weyerhaeuser for an interim period of time to support core market growth while preserving Weyerhaeuser's ability to use the capacity at a later date.

The partnership with Weyerhaeuser shows how sharing resources can be an economic and strategic benefit to both parties. It has been the next step from the long-term capacity agreements Northwest Natural previously signed with Georgia-Pacific Corporation and Portland General Electric Company.

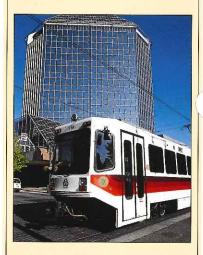
The innovative industrial contracts have helped Northwest Natural improve profitability from industrial customers. Industrial margins have increased significantly—13 percent—from 1994. Both firm and interruptible customers contributed to improved margins.

Our Heritage, Our Future

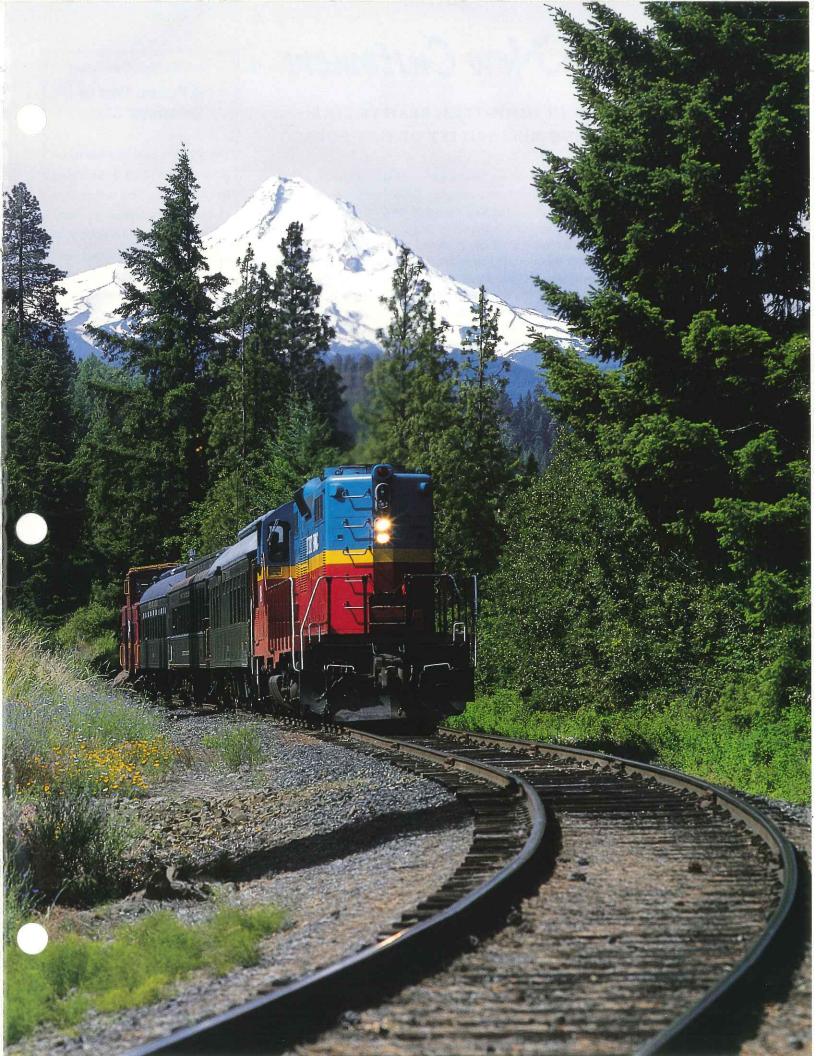
The Era of the Railroad

The Pacific Northwest changed greatly in the 1880s as transcontinental railroads arrived, as did a north-south rail line to San Francisco. The Willamette Valley and the Oregon Coast were populated as branch and local lines brought families to formerly isolated areas.

The Mount Hood Scenic Railroad (photo at right) carries passengers in refurbished rail cars through the Hood River Valley in the Columbia River Gorge.



Rail transportation also is returning as a mode of transportation in Portland. A light rail line connecting downtown Portland with eastside residential areas runs in front of the Portland headquarters of Northwest Natural Gas. Another light rail line is being built between Portland and Hillsboro in Washington County, and a north-south line is planned.



Valuable New Customers

NEW \$9 BILLION IN HIGH-TECH PLANTS LIKE AVAILABILITY AND RELIABILITY OF GAS SUPPLY

he Company's service territory has been undergoing an economic transformation as technology has overtaken timber as the region's top manufacturing employer. At the beginning of 1996, \$9 billion in new semiconductor plants were under construction or planned in areas served by Northwest Natural Gas, mostly in the Portland metropolitan area. The plants will employ more than 10,000 new workers directly and provide additional jobs for thousands of other workers.



Grant Yoshihara, market development director, says the region's new semiconductor plants require a reliable supply of natural gas.

Many of the high-tech plants are foreign technology companies that have been lured to the United States by the low U.S. Dollar and the proximity to U.S. markets. The semiconductor industry is attracted to the Pacific Northwest because of the availability of labor, water, land and energy. Oregon does not have a sales tax, and the state provides tax incentives for new plants. The Company's service territory in Washington state is attractive because it also provides tax incentives for new plants, and Washington state does not impose income taxes.

The new plants are seen as the bedrock that will support a growing economy in the Portland metropolitan area and the Willamette Valley—where most of Northwest Natural's customers live. Urban planners expect the Portland area to add about 500,000 more people during the next 20 years. Most of the anticipated high-tech growth will be in the suburbs where large industrial tracts are still available.

One of the reasons for the growth is the availability and reliability of energy. Low-cost energy long has been one of the region's assets. A plentiful supply of electricity is provided by a network of hydroelectric dams and the Bonneville Power Administration. Natural gas is available from the Rocky Mountain region of the United States, and British Columbia and Alberta, Canada.

Northwest Natural Gas is the gas-provider that will provide much of the energy to power this growth. Grant Yoshihara, market development director for Northwest Natural's Industrial and Business Development Department, coordinates energy needs for these valuable new customers. Yoshihara said the high tech plants need the support services and reliability of gas supply that Northwest Natural provides.

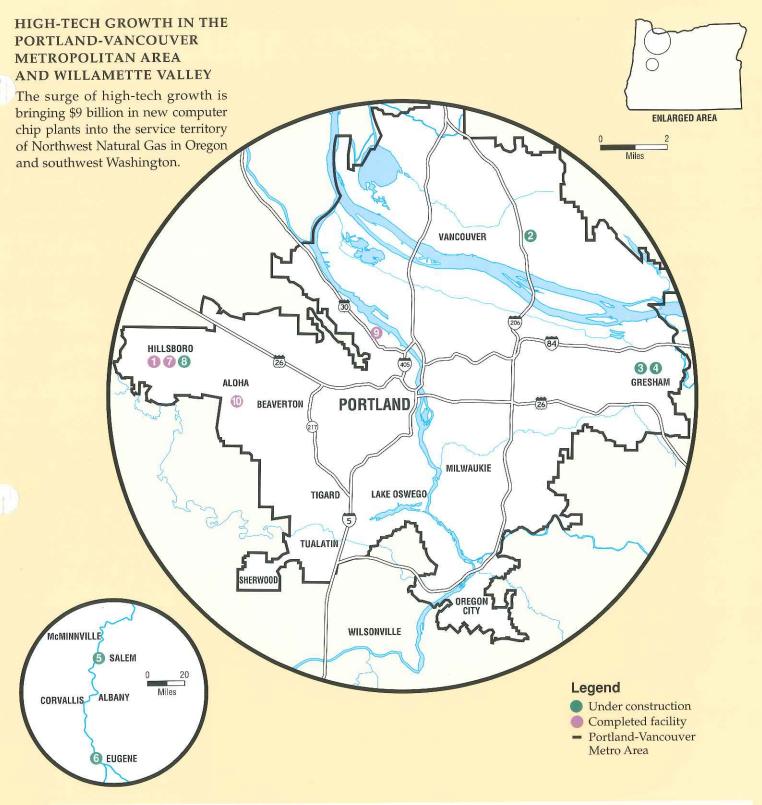
"These manufacturing plants create products that have enormous market value," said Yoshihara. "They require a highly reliable supply of natural gas. Northwest Natural is able to offer a bundled package of resources that provides even greater reliability than the interstate pipelines that serve us. The additional supplies of gas stored at the Company's Mist underground storage and two liquefied natural gas plants combine with pipeline supplies to meet the reliability requirements necessary to serve this industry. In addition, we offer start-up and field services that provide on-going support for their operation," Yoshihara said.

Our Heritage, Our Future

A Future Tied to Computer Chips

The Oregon economy has taken giant steps toward diversifying in the 1990s. The microchip plants are in addition to about 20,000 jobs that existed by 1993 in Oregon's electronics and electrical equipment industry. Most of those electronics jobs— 70 percent of the employment, according to the Oregon Department of Economic Development-are in the Portland-Vancouver metropolitan area. Another 20 percent is in the Willamette Valley, which also is in Northwest Natural's service territory.

Why the surge of microchip plants into Oregon? "The 1996 Portrait, Regional Economic Review and Outlook," published by U. S. Bancorp and the Northwest Policy Center, says the plants "resulted from the worldwide chip boom, and the state's water availability, lowcost power, educated workforce and tax breaks under Oregon's Strategic Investments Program." The portrait adds, "Oregon's economic structure and its connections to the rest of the nation and the world are being altered as a rapidly declining timber harvest is replaced by a surging production of chips and other accoutrements of modern technology. This period of rapid growth in Oregon has yet to run its course."



	Company	Investment	Location	Status		
0	Intel Corp.	\$2.9 billion	Hillsboro	Phase 1 of 4 completed		
2	SEH America	\$710 million	Vancouver, Wa.	Phase 1 of 2 under construction		
3	Fujitsu Microelectronics	\$1.03 billion	Gresham	Phase 1 of 3 under construction		
	LSI Logic Corp.	\$600 million	Gresham	Phase 1 of 4 under construction		
6	Siltec Corp.	\$250 million	Salem	Phase 1 of 2 under construction		
6	Hyundai Electronics	\$1.3 billion	Eugene	Phase 1 of 3 under construction		
7	Integrated Device Technology	\$800 million	Hillsboro	Phase 1 of 2 construction complete		
8	Komatsu Electronic Metals Co.	\$450 million	Hillsboro	Phase 1 of 4 under construction		
9	Wacker Siltronic Corp.	\$240 million	Portland	Phase 1 of 2 construction completed		
	Intel Corp.	\$705 million	Aloha	Construction completed		



The service territory of Northwest Natural Gas includes Clark County, Washington; Portland and the Willamette Valley in northwest Oregon; portions of the Oregon Coast; and the Columbia River Gorge. About three-quarters of Oregon's population lives in Portland and the Willamette Valley.

- Northwest Natural Gas Transmission Line
- Kelso Beaver (KB) Pipeline

- ▲ Mist Underground Storage
- O Propane System

Alternate fuels

Other fuels that can be substituted for the fuel in use. In the case of natural gas, the most common alternates are fuel oils, electricity, propane, coal and wood.

Balancing

Equalizing receipts and deliveries of gas to a customer or company. Balancing may be accomplished daily, monthly or seasonally with penalties generally assessed for excessive positive or negative imbalances.

Bcf

Billion cubic feet.

Book value

The recorded plant cost less accumulated depreciation.

Btu

British thermal unit, a measure of energy. One MMBtu equals one million Btus or 10 therms.

Bypass

Obtaining service from a new supplier without utilizing the facility of the former supplier.

Capacity release

The practice of subletting or "renting" gas transportation capacity held under contract with an interstate pipeline company to users other than the party holding the contract.

Carbon monoxide

A poisonous gas formed by incomplete combustion of carbon fuels.

Cogeneration

The simultaneous production of electrical and thermal (heat) energy from a single energy source, such as a natural gaspowered turbine or engine.

Commodity charge

A per unit or therm charge for gas delivered to the buyer.

Conversions

Changing consumers' fuel source. Conversions in Northwest Natural's service territory usually are from electricity, fuel oil or wood to natural gas.

Cost of service

A term used in public utility regulation to mean the total dollars, or revenue requirements, required to provide utility service. Includes operation and maintenance expense, taxes, depreciation, amortization of property and allowable return for the utility.

Cryogenics

The science of producing very low temperatures as in natural gas liquefaction. Northwest Natural liquefies natural gas at its Portland and Newport storage plants at -258 degrees Fahrenheit. Liquefied natural gas occupies approximately 1/600 of the space of natural gas in a gaseous state.

Degree day

A measure in degrees Fahrenheit of the difference between the laily mean temperature and 65 degrees Fahrenheit.

Demand charge

The portion of a rate for gas service that is billed to the customer to reserve the capacity regardless of whether it uses the service.

FERC

Federal Energy Regulatory Commission, the regulatory agency with jurisdiction over interstate natural gas, oil and electric power transmission.

Firm service

Service offered under schedules or contracts that anticipate no interruptions.

Gas day

The 24-hour period of time beginning at 8 a.m. Pacific Standard Time

Gate station

A point where custody of natural gas is transferred from one entity, such as a pipeline, to another, such as an LDC. Northwest Natural has 39 gate stations.

Interruptible customers

Customers receiving gas deliveries under contracts that allow for interruptions under certain conditions.

LDC

Local distribution company, such as Northwest Natural. LDCs obtain the major portion of gas operating revenues from the operation of a retail gas distribution system.

Margin

The difference between the cost of gas and its sales price.

Mercaptans

A group of organic chemical compounds with distinctive odors that are added to natural gas to make it detectable.

Mcf

One thousand standard cubic feet.

Natural gas

A naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found beneath the earth's surface. The principal constituent is methane.

Therm

One hundred thousand Btus; the amount of heat energy in approximately 100 cubic feet of natural gas. One therm equals 29.3 kilowatt hours.

Total system sendout

The estimated total volume of natural gas consumed by customers on the gas system. This is a sum of the firm sales, interruptible sales and end-user transportation volumes.

Transportation

Refers to moving gas on a contract basis for others.

Unbundling

Subdividing and charging separately for various components of utility service.

Willamette Valley Lateral

The pipeline owned by Northwest Pipeline Corporation that transports natural gas south to the Grants Pass area.

The consolidated financial statements include: Regulated utility:

- Northwest Natural Gas Company (Northwest Natural) Non-regulated wholly-owned businesses:
- Oregon Natural Gas Development Corporation (Oregon Natural) and its wholly-owned Canadian subsidiary Canor Energy Ltd. (Canor)
- NNG Financial Corporation (Financial Corporation)

Two other subsidiaries, Pacific Square Corporation (Pacific Square) and NNG Energy Systems, Inc. (Energy Systems), were dissolved during 1995.

Together these businesses are referred to herein as the "Company" (see "Subsidiary Operations" below and Note 2 to the Consolidated Financial Statements).

The following is management's assessment of the Company's financial condition including the principal factors that affect results of operations. The discussion refers to the consolidated activities of the Company for the three years ended December 31, 1995.

Earnings and dividends

The Company achieved record earnings applicable to common stock of \$35.3 million for 1995, up nine percent from \$32.5 million in 1994, and up three percent from \$34.2 million in 1993. Earnings for both 1995 and 1994 were reduced by warmer than average weather which was partially offset by additional sales from customer growth and improved subsidiary earnings. Earnings in 1993 were increased by cooler than average weather.

Earnings per share from consolidated operations were \$2.42 in 1995, down from \$2.44 per share in 1994 and \$2.61 per share in 1993 due, in part, to the sale of 1.15 million shares of common stock in a public offering in February 1995. Earnings per share in 1995 were reduced by an estimated four percent, or \$0.10 per share, as a result of the dilutive effect of this offering.

Northwest Natural earned \$2.14 per share from gas utility operations in 1995, compared to \$2.08 per share in 1994, and \$2.72 per share in 1993. Weather conditions in the Company's service territory in 1995 were 12 percent warmer than the 20-year average, six percent warmer than 1994 and 15 percent warmer than 1993. The warmer than average weather resulted in significant reductions in gas deliveries to, and related margin from, weather-sensitive customers. The Company estimates the weather-related reduction in margin during 1995 was equivalent to about \$0.76 per share compared to a similar period with average weather, and \$0.23 per share compared to actual conditions during 1994.

The effects of warmer weather were partially offset by a 4.7 percent increase in customers during 1995. The Company estimates that customer growth since 1994 contributed \$9.7 million to margin revenues in 1995.

The estimates of weather and growth effects are derived from the Company's internal planning model. The model calculates expected sales to, and revenues from, residential and commercial customers for "base usage," representing gas use for water heaters, ranges, and other appliances not sensitive to outside temperatures. The model also calculates expected sales to, and revenues from, these customers for "heat sensitive" usage, primarily furnaces, as a function of heating degree days (the difference between 65 degrees Fahrenheit and the average of a day's high and low temperatures). The model then estimates the earnings effect of the difference between expected sales and revenues under actual temperature conditions, and expected sales and revenues under average temperature conditions.

Subsidiary results for 1995 were equivalent to earnings of \$0.28 per share, compared to earnings of \$0.36 per share in 1994 and a loss equivalent to \$0.11 per share in 1993. Oregon Natural realized a one-time gain of \$3.8 million, equivalent to \$0.16 per share, in the fourth quarter of 1995 from the sale of production and related gathering system assets. The 1994 subsidiary results included a one-time gain of \$3.2 million, equivalent to \$0.14 per share, resulting from the sale of Pacific Square's partnership interest in two commercial office buildings. In addition, 1995 and 1994 subsidiary results both reflect a \$2.5 million improvement in revenue from financial investments compared to those in 1993 due to the improved operating performance of Financial Corporation's investments in electric generating projects in California.

1995 was the 40th consecutive year in which the Company's dividends paid have increased. In 1995, dividends paid on common stock were \$1.77 per share compared with \$1.76 in 1994 and \$1.75 in 1993.

Results of operations

Regulatory matters

Northwest Natural provides utility gas service in Oregon and Washington, with Oregon representing approximately 95 percent of its revenues. Future earnings and cash flows from utility operations will be determined for the most part by continued growth in the residential and commercial markets, by Northwest Natural's ability to remain price competitive in the large industrial market, and by the ability of management to control expenses.

Effective December 1, 1995, the Oregon Public Utility Commission (OPUC) and the Washington Utilities and Transportation Commission (WUTC) approved rate decreases averaging 6.7 percent and 8.0 percent, respectively, for Northwest Natural's residential, commercial and industrial rate schedules. Effective December 1, 1994, the OPUC and WUTC approved rate decreases averaging 5.6 percent and 7.0 percent, respectively. These rate reductions were to pass through changes in Northwest Natural's purchased gas costs, to apply temporary rate adjustments for the amortization of regulatory balancing accounts and to remove temporary rate adjustments effective the previous year.

Effective December 1, 1994, Northwest Natural terminated its Interruptible Sales Adjustment (ISA) tariff schedule in Oregon. This tariff had provided a mechanism to level margin fluctuations which resulted from the volatility of sales to large industrial interruptible customers caused by price competition between natural gas and residual fuel oil and the migration of such customers from one rate schedule to another. The OPUC and Northwest Natural agreed to a permanent resetting of core market rates to reflect the ISA tariff's experience during the most recent two-year period.

Effective April 15, 1994, the OPUC approved rate decreases averaging 1.1 percent for Northwest Natural's residential, commercial and industrial rate schedules. These rate decreases passed through Northwest Natural's lower property tax expenses due to Oregon Ballot Measure 5, an initiative measure which reduced property tax expenses.

None of the rate decreases discussed above had a material effect on net income.

Comparison of gas operations

The following table summarizes the composition of gas utility volumes and revenues for the three years ended December 31:

Thousands	1995		1994		1993	
Gas sales and transportation volu	mes (theri	ns):				
Residential and commercial sales	453,185		462,143		477,460	
Unbilled volumes	4,946		(7,519)		3,844	
Weather-sensitive volumes	458,131	46%	454,624	46%	481,304	46%
Industrial firm sales	82,958	8%	81,348	8%	80,588	8%
Industrial interruptible sales	84,173	8%	89,899	9%	66,370	6%
Total gas sales	625,262		625,871		628,262	
Transportation deliveries	379,116	38%	364,461	37%	415,367	40%
Total volumes sold and delivered	1,004,378	100%	990,332	100%	1,043,629	100%
Utility operating revenues:					-	
Residential and commercial revenues	\$ 264,741		\$ 284,962		\$271,693	
Unbilled revenues	1,173		(5,571)		5,153	
Weather-sensitive revenues	265,914	76%	279,391	78%	276,846	80%
Industrial firm sales revenues	31,268	9%	34,443	10%	31,340	9%
Industrial interruptible						
sales revenues	24,113	7%	27,361	8%	18,884	5%
Total gas sales revenues	321,295		341,195		327,070	
Transportation revenues	16,650	5%	14,702	4%	17,892	5%
Other revenues	10,060	3%	829	2	2,890	1%
Total utility operating revenues	\$ 348,005	100%	\$ 356,726	100%	\$347,852	100%
Cost of gas	\$ 144,051		\$ 163,026		\$138,833	
Total number of customers						
(end of period)	409,900		391,600		372,400	
Actual degree days	3,779		4,020		4,452	
20-year average degree days	4,306		4,324		4,313	
20-year average degree days	4,300		4,024			

Residential and commercial

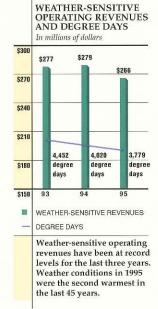
Typically, 75 percent or more of Northwest Natural's annual operating revenues are derived from gas sales to weather-sensitive residential and commercial customers. Accordingly, variations in temperatures between periods will affect volumes of gas sold to these customers. Average weather conditions are calculated from the most recent 20 years of temperature data measured by heating degree days.

Customer growth continues at a rapid rate relative to others in the industry. The 18,300 customers added since December 31, 1994 represent a growth rate of 4.7 percent. In the three years ended

December 31, 1995, almost 57,000 customers were added to the system, representing an average growth rate of 5.1 percent.

Weather conditions were 12 percent warmer than average in 1995, seven percent warmer than average in 1994, and three percent cooler than average in 1993. Weather in 1995 was six percent warmer than in 1994 and 15 percent warmer than in 1993.

The one percent increase in volumes of gas sold to residential and commercial customers during 1995 compared to 1994 reflects both customer growth and the offsetting effect of warmer weather. Related revenues declined five percent due to rate decreases. Higher rates in effect during most of 1994 and the addition of 19,200 customers, offset by the effects of warmer weather, combined



to produce a one percent increase in revenues from residential and commercial customers in 1994 compared to 1993. Therm deliveries to these customers were six percent lower than in 1993.

Unbilled revenues are a recognition of revenues for all gas consumption by customers through the end of the period, regardless of the meter reading date, in order to better match revenues with related purchased gas costs.

Industrial, transportation and other

The combined net operating revenues (margin) from industrial firm and interruptible sales and transportation customers increased \$5.6 million, or 13 percent, to \$49.6 million in 1995 compared to \$44.0 million in 1994. Margin from these customers in 1994 was unchanged from 1993. The 1995 increase was primarily due to the termination of the ISA tariff schedule in Oregon effective December 1, 1994.

Total volumes delivered to these customers were 10.5 million therms, or two percent, higher in 1995 than in 1994 and 16.1 million therms, or three percent, lower in 1995 than in 1993. Contributing to the lower volumes in 1995 and 1994 was a 28 million therm reduction in transportation deliveries to the James River Corporation's paper mill in Camas, Washington, which placed a direct (bypass) connection to Northwest Pipeline Corporation's (NPC) system, Northwest Natural's primary pipeline supplier, into operation in October 1993. Northwest Natural does not expect a significant number of its other large customers to bypass its system in the foreseeable future, since these customers are served under tariffs which are designed to be competitive with the capital and operating costs of direct connections to NPC's system.

Although volumes decreased, Northwest Natural's revenues and related adjustments from industrial firm sales and industrial interruptible sales and transportation deliveries were 9 percent higher in 1994 compared to 1993. This revenue increase was primarily due to a higher level of industrial interruptible sales and a correspondingly lower level of transportation deliveries for these same periods.

Since 1992, over half of Northwest Natural's transportation customers have switched to sales service. These customers, which have the option of purchasing gas directly from suppliers and shipping it on the systems of Northwest Natural and its pipeline suppliers for a fee, select the option which, from time to time, provides the lowest cost. The migration from transportation to sales tariffs by these customers reflects the fact that Northwest Natural's industrial sales tariffs were lower than the cost to these customers of purchasing and shipping their own gas. Since transportation charges typically are the same as the margin on an equivalent sale of gas, the increase in revenue attributable to the migration from transportation to sales tariffs was substantially offset by an increase in Northwest Natural's cost of gas.

Since other revenues are primarily regulatory adjustments to industrial sales amounts (see Note 1 to the Consolidated Financial Statements), they are treated in this discussion as a component of industrial revenue. Included in this category in 1995 is a one-time \$3.0 million payment, equivalent to \$0.12 per share, under a contract with Portland General Electric Company (PGE), an electric utility based in Portland. This contract gave PGE the option to request gas transportation service for electric generation at one or more sites in Northwest Natural's service territory. The primary additional components of other revenues in 1995 were \$2.3 million relating to amortizations of the ISA account and \$3.1 million resulting from other amortizations.

Cost of gas

Northwest Natural has a Purchased Gas Cost Adjustment (PGA) tariff under which its net income from Oregon operations is affected only within defined limits by changes in purchased gas costs. The cost per therm of gas sold during 1995 was 12 percent lower than in 1994 and four percent higher than in 1993. The cost per therm of gas includes purchased gas costs, related tariff adjustments (deferrals or amortizations), net gas storage activity, and line loss.

During 1994, when the average cost per therm of gas was the highest for the three years presented, increased gas costs resulted from higher commodity prices and from an increase in demand charges placed into effect in April 1993 by NPC.

Subsidiary operations

Consolidated subsidiary earnings for 1995 were equivalent to \$0.28 per share, compared to earnings equivalent to \$0.36 per share in 1994 and a loss equivalent to \$0.11 per share in 1993 (see Note 2 to the Consolidated Financial Statements). The improved subsidiary results for 1995 and 1994 resulted from a combination of factors.

First, Oregon Natural realized a \$3.8 million gain, equivalent to \$0.16 per share, in the fourth quarter of 1995 from the sale of its gathering system and its interest in gas producing properties in the Mist gas field in Oregon. In connection with that sale, Oregon Natural purchased the remaining interest in four areas within the Mist field which have potential for gas storage plus an option to purchase any future storage prospects at the site. Second, Financial Corporation's investments in electric generating projects in California (see Note 10 to the Consolidated Financial Statements) benefitted from favorable weather conditions which improved revenue from these investments by \$2.5 million in 1995 and 1994 compared to 1993 results. Third, Energy Systems realized a \$2.0 million gain, equivalent to \$0.08 per share, in the second quarter of 1995 due to a final distribution under the bankruptcy reorganization plan of its former California cogeneration subsidiary.

The improved subsidiary results for 1994 resulted primarily from two additional factors. First, Pacific Square sold its partnership interests in two office buildings, including the Company's headquarters building, for a gain equivalent to \$0.14 per share. Second, Energy Systems realized a gain equivalent to \$0.03 per share on the sale of its subsidiary's assets pursuant to the bankruptcy reorganization plan.

Upon completion of the transactions involving Pacific Square and Energy Systems, neither subsidiary had any significant remaining operating activities. Both were dissolved in 1995.

The subsidiaries' results for 1993 reflect a fourth quarter write-down in the value of unproven gas and oil reserves equivalent to \$0.11 per share and increased federal income tax expense equivalent to \$0.05 per share (see "Depreciation, Depletion and Amortization" below).

Results of operations for the individual subsidiaries for 1995 were net income of: \$1.8 million for Oregon Natural; \$1.3 million for Financial Corporation; \$0.9 million for Energy Systems; and \$0.1 million for Pacific Square.

The following discussion summarizes operating expenses, other income, interest charges, income taxes, and preferred and preference stock dividend requirements.

Operating expenses

Operations and maintenance

Operations and maintenance expenses were \$1.1 million, or two percent, higher in 1995 compared to 1994, and \$1.3 million, or two percent, higher in 1995 compared to 1993. Northwest Natural's expenses increased \$2.2 million, or four percent, compared to 1994 primarily due to increased outside services (\$0.5 million), computer network expenses (\$0.4 million), operating claims (\$0.4 million), bad debt expenses (\$0.3 million), environmental management expenses (\$0.2 million), and advertising expenses (\$0.2 million). Subsidiary expenses decreased \$1.1 million, or 17 percent, in 1995 compared to 1994 primarily due to a decline in Oregon Natural's production costs.

Northwest Natural's operations and maintenance expenses were \$0.5 million lower for 1994 compared to 1993, while subsidiary operations and maintenance expenses increased \$0.7 million. The reduction in utility operations and maintenance expenses was primarily due to a \$0.6 million decrease in accruals for estimated employee bonuses. Higher subsidiary operations and maintenance expenses were primarily due to increased 1994 production expenses related to Canor's operations.

Taxes other than income

Taxes other than income are comprised of property, franchise, payroll and other taxes. During 1995, Northwest Natural's franchise taxes decreased \$0.5 million, or six percent, from \$8.1 million in 1994 to \$7.6 million in 1995. These taxes are incurred as a percentage of revenue, and the decline paralleled the percentage decrease in gas sales revenues from 1994 to 1995. This reduction in franchise taxes was offset by increased taxes in the other categories.

Northwest Natural's property taxes were \$1.9 million lower in 1994 compared to 1993 primarily due to a non-recurring accrual of \$0.9 million in 1993 related to a dispute with the OPUC over the amount of prior-year savings on property taxes which must be refunded to Oregon customers. Partially offsetting the decline in property taxes in 1994 was a \$0.6 million increase in franchise taxes based on higher utility operating revenues than in 1993.

Depreciation, depletion and amortization

Northwest Natural's depreciation expense increased \$2.9 million, or nine percent, in 1995 compared to 1994 and \$1.9 million, or six percent, in 1994 compared to 1993. The increases were due to additional utility plant in service as depreciation rates have remained the same since July 1, 1987.

Subsidiary depreciation expense decreased \$0.4 million, or nine percent, in 1995 compared to 1994 and \$3.5 million, or 44 percent, in 1994 compared to 1993. The 1993 subsidiary depreciation expense included charges totaling \$3.5 million from the writedowns of Oregon Natural's unproven gas and oil properties.

Other income

The fluctuations in other income during the last three years primarily resulted from Oregon Natural's 1995 gain on the sale of its gathering system and interests in production assets in Oregon; Energy Systems' 1995 and 1994 gains under the reorganization plan of its California cogeneration subsidiary; and Pacific Square's 1994 gain from the sale of its investments (see "Subsidiary Operations").

Interest charges

Interest charges increased \$0.8 million, or three percent, in 1995 compared to 1994 primarily due to the sale of \$10 million and \$20 million of Northwest Natural's Medium-Term Notes in December 1995 and September 1994, respectively. This increase was partially offset by lower interest on short-term notes as the average balance of commercial paper issued by Northwest Natural declined from \$25.2 million in 1994 to \$7.4 million in 1995. The lower commercial paper balances were due to the availability of funds generated by the sale of \$33.0 million of Northwest Natural's Common Stock in February 1995.

Interest charges remained stable in 1994 compared to 1993 on equivalent total debt balances. Higher short-term rates in 1994 offset lower long-term rates resulting from 1993 debt refinancings (see "Financing Activities" below).

Income taxes

The effective corporate income tax rate for the last three years was 37 percent which approximates the Company's statutory tax rate for these periods (see Note 7 to the Consolidated Financial Statements).

Preferred and preference stock dividend requirements

Preferred and preference stock dividend requirements for 1995 were lower by \$0.2 million, or six percent, compared to 1994, due to sinking fund redemptions of preferred stock, and the conversion or redemption of all remaining shares of the \$2.375 Series of Convertible Preference Stock. Stated value of preferred and preference stock outstanding was \$2.4 million, or six percent, lower at December 31, 1995, than at December 31, 1994.

Also, effective December 1, 1993, the Company canceled the \$8.75 Series of Preferred Stock in exchange for the issuance of the \$7.125 Series of Preferred Stock.

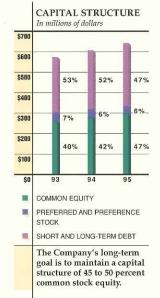
Financial condition

Capital structure

Northwest Natural's capital expenditures are required for utility construction resulting from customer growth and system improvements. Northwest Natural finances these expenditures from cash provided by operations, and from short-term borrowings which are periodically refinanced through the sale of long-term debt or equity securities. In addition to its capital expenditures,

the weather-sensitive nature of gas usage by Northwest Natural's residential and commercial customers influences the Company's financing requirements. Short-term liquidity is satisfied primarily through the sale of commercial paper, which is supported by commercial bank lines of credit (see Note 6 to the Consolidated Financial Statements).

The Company's long-term goal is to maintain a capital structure comprised of 45 to 50 percent common stock equity, 5 to 10 percent preferred and preference stock and 45 to 50 percent short-term and long-term debt. When additional capital is required, the Company issues debt or equity securities depending upon both the target capital structure and market conditions. The Company



also uses these sources to meet long-term debt and preferred stock redemption requirements (see Notes 3 and 5 to the Consolidated Financial Statements).

Cash flows

Operating activities

Cash provided from operating activities in 1995 was \$26.2 million, or 24 percent, lower than in 1994. The reduction was primarily due to rate changes effective in December 1994 to amortize credit balances in regulatory balancing accounts and the effects of weather, in combination with customer growth, on accounts receivable, unbilled revenue, inventories of gas, and accounts payable balances.

Cash provided by operating activities was 91 percent higher in 1994 compared to 1993 primarily due to rate increases in late 1993 reflecting completion of amortizations of credit balances in regulatory accounts and the effect of weather conditions from year to year as noted above.

The Company has lease and purchase commitments related to its operating activities which are financed with cash flows from operations (see Note 12 to the Consolidated Financial Statements).

Investing activities

Cash requirements for utility construction, primarily related to system improvements and customer growth, totaled \$67.2 million, down \$10.5 million, or 14 percent, from 1994. The decrease resulted largely from a \$5.5 million reduction in expenditures related to a replacement project for the customer information system (CIS) and a \$3.2 million reduction in costs to construct new mains and services. The CIS project was temporarily delayed pending the selection of a software system which would support Northwest Natural's requirements. In 1994, expenditures were up \$7.3 million, or 10 percent, from 1993. The 1994 increase included \$8.5 million for the CIS project. The total cost of the new system, scheduled for completion in 1998, is estimated at \$35 million.

Northwest Natural's construction expenditures are estimated at \$80 million for 1996. Over the five year period 1996 through 2000, these expenditures are estimated to be \$450 million. The increased level of capital expenditures during the next five years reflects projected customer growth plus a major system reinforcement project and the development of additional underground storage facilities. It is anticipated that approximately 50 percent of the funds required for these expenditures will be internally generated, and that the remainder will be funded through short-term borrowings which will be refinanced periodically through the sale of long-term debt and equity securities.

In 1995 and 1994, Oregon Natural invested a net amount of \$5.1 million and \$4.8 million, respectively, in Canor's gas and oil properties. Additionally, in 1995, Oregon Natural invested \$6.5 million in underground natural gas storage properties. Oregon Natural anticipates investing \$6 million, in addition to internally generated funds, in Canor's exploration and production program during the next two years.

Financing activities

Cash used for financing activities during 1995 totaled \$7.2 million, down \$13.6 million from 1994. Primary financing activity in 1995 consisted of the sale of \$33.0 million of Northwest Natural's Common Stock in February 1995, the sale of \$10 million of its Medium-Term Notes, and the related net redemption of \$24.8 million of commercial paper. In 1994, financing activity principally consisted of the sale of \$20 million of Northwest Natural's Medium-Term Notes and the related net redemption of \$18.9 million of commercial paper. The proceeds, after redemptions, from these stock and Medium-Term Note offerings were added to the general funds of the Company and were used for corporate purposes, primarily to fund, in part, Northwest Natural's construction program.

During 1993, Northwest Natural sold \$100 million of its Medium-Term Notes. Of the proceeds from the 1993 sales, \$82.6 million was used to redeem higher-cost long-term debt, and the remainder was used to fund Northwest Natural's construction program and to reduce short-term borrowing incurred for that purpose.

In 1995, Northwest Natural redeemed the remaining shares of its \$2.375 Series of Convertible Preference Stock. In 1993, Northwest Natural redeemed all of the outstanding shares of its \$8.00, \$6.875, and \$2.42 Series of Preferred Stock, and it refinanced \$15 million of its \$8.75 Series of Preferred Stock with an equivalent amount of the \$7.125 Series of Preferred Stock.

Ratios of earnings to fixed charges

For the years ended December 31, 1995, 1994, and 1993, the Company's ratios of earnings to fixed charges, computed by the Securities and Exchange Commission method, were 3.15, 3.08, and 3.22, respectively. Earnings consist of net income to which has

been added taxes on income and fixed charges. Fixed charges consist of interest on all indebtedness, amortization of debt expense and discount or premium, and the estimated interest portion of rentals charged to income.

Contingent liabilities

On July 21, 1995, a jury in an Oregon state court returned a verdict against Northwest Natural in the case of *Northwest Natural Gas Company v. Chase Gardens, Inc.* (Lane County Circuit Court Case No. 16-91-01370). The case commenced with a crop lien foreclosure action by Northwest Natural for recovery of past-due gas service charges. The defendant, Chase Gardens, Inc., counterclaimed for breach of contract and intentional interference with its business relationship with a bank, based upon an allegation that the filing of the crop liens caused its nursery business to fail.

The jury returned a verdict against Northwest Natural on the breach of contract counter-claim for actual damages of \$1.9 million. Alternatively, the jury brought a verdict on the intentional interference counter-claim for actual damages of \$2.1 million, plus punitive damages of \$3.0 million. The jury also allowed Northwest Natural's offsetting claim for past-due gas service charges in the amount of about \$0.2 million. It is unclear how much, if any, of the verdict for either counter-claim would be covered by liability insurance.

The trial court denied a motion by Northwest Natural for entry of a judgment for Northwest Natural, notwithstanding the verdict, on both of Chase Gardens' counter-claims. Northwest Natural has appealed the decision to the Oregon Court of Appeals, which is expected to reach a decision in late 1996, or 1997.

There are ample legal precedents to support a ruling by the Court of Appeals in Northwest Natural's favor. However, should Northwest Natural be unsuccessful in overturning or reducing the damage award in this case on appeal, or in recovering any portion of the loss through insurance, the maximum amount payable (not including legal fees, costs and post-judgment interest) would be about \$5.0 million. The payment of such amount would reduce earnings by about \$0.20 per share.

Environmental matters

Northwest Natural owns property in Linnton, Oregon, that is the site of a former gas manufacturing plant that was closed in 1956. Although limited testing for environmental contamination has been undertaken by other parties on portions of the site, no comprehensive studies have been performed. In 1993, pursuant to Oregon Department of Environmental Quality (ODEQ) procedures, Northwest Natural submitted a notice of intent to participate in the ODEQ's Voluntary Cleanup Program and, in 1994, the site was listed on ODEQ's Confirmed Release List and Inventory. During 1995, initial tests revealed environmental contamination, but the extent or the estimated cost of remediation cannot yet be determined.

In September 1993, Northwest Natural recorded an expense of \$0.5 million for the estimated costs of consultants' fees, ODEQ oversight cost reimbursements, and legal fees in connection with the voluntary investigation at the Linnton site. Northwest Natural expects that its costs of investigation and any remediation for which it may be responsible should be recoverable, in large part, from insurance or through future rates.

In 1992, the City of Salem, Oregon, requested Northwest Natural's participation in its review of an environmental assessment of riverfront property in Salem that is the proposed site for a park and other public developments. Within the property is a block previously owned by Northwest Natural which was the site of a former manufactured gas plant. Northwest Natural's corporate predecessor operated the plant, if at all, for less than four months in 1929. The City has determined that there is environmental contamination on the site, and that a remediation process involving Northwest Natural and at least two other prior owners of the block will be required. To date, Northwest Natural has not obtained sufficient information to determine the extent of its responsibility for any such remediation.

Accounting pronouncements

In March 1995, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards (SFAS) No. 121, "Accounting for the Impairment of Long-Lived Assets and for Long-Lived Assets to Be Disposed Of." SFAS No. 121 requires that long-lived assets and certain identifiable intangibles to be held and used by an entity be reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. If the sum of the expected future cash flows (undiscounted and without interest charges) is less than the carrying amount of the asset, an impairment loss is recognized. Otherwise, an impairment loss is not recognized. SFAS No. 121 requires that long-lived assets to be disposed of be reported at the lower of carrying amount or fair value less cost to sell. The initial application of SFAS No. 121 to assets that are being held for disposal at the date of adoption should be reported as the cumulative effect of a change in accounting principle. SFAS No. 121 also requires that a rate-regulated enterprise recognize an impairment for the amount of costs excluded when a regulator excludes all or part of a cost from an enterprise's rate base. The Company estimates that SFAS No. 121 will not have a material effect on its financial position or results of operations when it is adopted in 1996, as required.

In October 1995, SFAS No. 123, "Accounting for Stock-Based Compensation," was issued which encourages, but does not require, companies to account for stock compensation awards based on their estimated fair value on the grant date. The Company has not yet adopted SFAS No. 123. Due to the limited number of options granted on an annual basis, the amount of compensation expense which would be required to be expensed or disclosed is not material.

MANAGEMENT'S RESPONSIBILITY FOR FINANCIAL STATEMENTS

The financial statements in this report were prepared by management, which is responsible for their objectivity and integrity. The statements have been prepared in conformity with generally accepted accounting principles and, where appropriate, reflect informed estimates based on judgments of management. The responsibility of the Company's independent auditors is to render an independent report on the financial statements.

The Company's system of internal accounting controls is designed to provide reasonable assurance that assets are safeguarded and transactions are executed in accordance with management's authorizations, that transactions are recorded to permit the preparation of financial statements in conformity with orders of regulatory authorities and generally accepted accounting principles and that accountability for assets is maintained. The Company's system of internal controls has provided such reasonable assurances during the periods reported herein. The system includes written policies, procedures and guidelines, an organization structure that segregates duties and an established program for monitoring the system by internal auditors. In addition, Northwest Natural Gas Company has prepared and annually distributes to its management employees a Code of Ethics covering its policies for conducting business affairs in a lawful and ethical manner. Ongoing review programs are carried out to ensure compliance with these policies.

The Board of Directors, through its Audit Committee, oversees management's financial reporting responsibilities. The committee meets regularly with management, the internal auditors, and representatives of Deloitte & Touche LLP, the Company's independent auditors. Both internal and external auditors have free and independent access to the committee and the Board of Directors. No member of the committee is an employee of the Company. The committee reports the results of its activities to the full Board of Directors. Annually, the Audit Committee recommends the nomination of independent auditors to the Board of Directors for shareholder approval.

Robert L. Ridgley

Chairman and Chief Executive Officer

Price RdOlBall

Bruce R. DeBolt

Senior Vice President, Finance, and Chief Financial Officer

INDEPENDENT AUDITORS' REPORT

Northwest Natural Gas Company Portland, Oregon

We have audited the accompanying consolidated balance sheets and statements of capitalization of Northwest Natural Gas Company and subsidiaries, as of December 31, 1995 and 1994, and the related consolidated statements of income, earnings invested in the business, and cash flows for each of the three years in the period ended December 31, 1995. These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the consolidated financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, such consolidated financial statements present fairly, in all material respects, the consolidated financial position of Northwest Natural Gas Company and subsidiaries at December 31, 1995 and 1994, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 1995, in conformity with generally accepted accounting principles.

As discussed in notes 7 and 9 to the consolidated financial statements, the Company changed its method of accounting for income taxes and postretirement benefits in the year ended December 31, 1993.

Portland, Oregon February 20, 1996

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CONSOLIDATED STATEMENTS OF INCOME

Thousands, except per share amounts (year ended December 31)	1995	1994	1993
Net operating revenues:			
Operating revenues	\$ 356,276	\$ 368,261	\$ 358,717
Cost of sales	144,051	162,788	138,833
Net operating revenues	212,225	205,473	219,884
Operating expenses:		1 1/3	
Operations and maintenance	72,018	70,881	70,723
Taxes other than income taxes	24,181	24,263	25,561
Depreciation, depletion and amortization	40,594	38,058	39,683
Total operating expenses	136,793	_133,202	135,967
Income from operations	75,432	72,271	83,917
Other income	10,432	8,582	933
Interest charges:			
Interest on long-term debt	23,141	21,921	22,578
Other interest	2,252	2,473	1,906
Amortization of debt discount and expense	882	850	775
Total interest charges	26,275	25,244	25,259
Allowance for funds used during construction	(596)	(325)	(152
Total interest charges – net	25,679	24,919	25,107
Income before income taxes	60,185	55,934	59,743
Income taxes	22,120	20,473	22,096
Net income	38,065	35,461	37,647
Preferred and preference stock dividend requirements	2,806	2,983	3,488
Earnings applicable to common stock	<u>\$ 35,259</u>	\$ 32,478	\$ 34,159
Average common shares outstanding	14,545	13,295	13,074
Earnings per share of common stock	\$ 2.42	\$ 2.44	\$ 2.61
Dividends per share of common stock	<u>\$ 1.77</u>	\$ 1.76	\$ 1.75

See Notes to Consolidated Financial Statements.

CONSOLIDATED STATEMENTS OF EARNINGS INVESTED IN THE BUSINESS

Thousands	1995	1994	1993
Balance at beginning of year	\$ 97,275	\$ 88,497	\$ 77,690
Net income	38,065	35,461	37,647
Cash dividends:			
Preferred and preference stock	(2,836)	(3,041)	(3,401)
Common stock	(25,517)	(23,365)	(22,853)
Capital stock expense and other	(1,336)	(277)	(586)
Balance at end of year	<u>\$ 105,651</u>	\$ 97,275	\$ 88,497

See Notes to Consolidated Financial Statements.

CONSOLIDATED BALANCE SHEETS

Thousands (December 31)	1995	1994
Assets:		
Plant and property in service:		
Utility plant in service	\$ 969,075	\$ 908,238
Less accumulated depreciation	_308,702	279,112
Utility plant – net	660,373	629,126
Non-utility property	53,807	49,586
Less accumulated depreciation and depletion	16,997	24,456
Non-utility property – net	36,810	25,130
Total plant and property in service	697,183	654,256
nvestments and other:		
Investments	34,126	34,183
Long-term notes receivable	3,756	2,914
Total investments and other	37,882	37,097
Current assets:		
Cash and cash equivalents Accounts receivable – customers	7,782	8,068
Accounts receivable – customers Allowance for uncollectible accounts	35,175 (790)	43,016
Accrued unbilled revenue	21,493	(864) 20,320
Inventories of gas, materials and supplies	14,254	14,958
Prepayments and other current assets	12,396	10,041
Total current assets	90,310	95,539
Regulatory tax assets	60,430	60,430
Deferred debits and other	43,472	41,982
Total assets	\$ 929,277	\$ 889,304
Capitalization and liabilities:		
Capitalization (see Consolidated Statements of Capitalization):	Mo. Street, Street,	
Common stock	\$ 46,958	\$ 42,492
Premium on common stock Earnings invested in the business	170,943	134,641
	105,651	97,275
Total common stock equity		274,408
	323,552	
Preference stock	25,000	26,252
Redeemable preferred stock	25,000 14,840	15,950
Redeemable preferred stock Long-term debt	25,000 14,840 279,945	15,950 291,076
Redeemable preferred stock	25,000 14,840	15,950 291,076
Redeemable preferred stock Long-term debt Total capitalization Current liabilities:	25,000 14,840 <u>279,945</u> 643,337	15,950 <u>291,076</u> 607,686
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable	25,000 14,840 279,945 643,337	15,950 291,076 607,686 53,654
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable	25,000 14,840 279,945 643,337 28,832 41,784	15,950 291,076 607,686 53,654 48,517
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year	25,000 14,840 279,945 643,337 28,832 41,784 21,000	15,950 291,076 607,686 53,654 48,517 1,000
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year Taxes accrued	25,000 14,840 279,945 643,337 28,832 41,784 21,000 10,281	15,950 291,076 607,686 53,654 48,517 1,000 6,584
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year Taxes accrued Interest accrued	25,000 14,840 279,945 643,337 28,832 41,784 21,000 10,281 4,617	15,950 291,076 607,686 53,654 48,517 1,000 6,584 4,570
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year Taxes accrued	25,000 14,840 279,945 643,337 28,832 41,784 21,000 10,281	26,252 15,950 291,076 607,686 53,654 48,517 1,000 6,584 4,570 11,757 126,082
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year Taxes accrued Interest accrued Other current and accrued liabilities Total current liabilities	25,000 14,840 279,945 643,337 28,832 41,784 21,000 10,281 4,617 13,204	15,950 291,076 607,686 53,654 48,517 1,000 6,584 4,570 11,757
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year Taxes accrued Interest accrued Other current and accrued liabilities Total current liabilities Deferred investment tax credits	25,000 14,840 279,945 643,337 28,832 41,784 21,000 10,281 4,617 13,204 119,718	15,950 291,076 607,686 53,654 48,517 1,000 6,584 4,570 11,757 126,082
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year Taxes accrued Interest accrued Other current and accrued liabilities Total current liabilities Deferred investment tax credits Deferred income taxes	25,000 14,840 279,945 643,337 28,832 41,784 21,000 10,281 4,617 13,204 119,718	15,950 291,076 607,686 53,654 48,517 1,000 6,584 4,570 11,757 126,082 13,530 112,433
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year Taxes accrued Interest accrued Other current and accrued liabilities Total current liabilities Deferred investment tax credits Deferred income taxes Regulatory balancing accounts and other	25,000 14,840 279,945 643,337 28,832 41,784 21,000 10,281 4,617 13,204 119,718	15,950 291,076 607,686 53,654 48,517 1,000 6,584 4,570 11,757 126,082 13,530 112,433
Redeemable preferred stock Long-term debt Total capitalization Current liabilities: Notes payable Accounts payable Long-term debt due within one year Taxes accrued Interest accrued Other current and accrued liabilities	25,000 14,840 279,945 643,337 28,832 41,784 21,000 10,281 4,617 13,204 119,718	15,950 291,076 607,686 53,654 48,517 1,000 6,584 4,570 11,757 126,082

See Notes to Consolidated Financial Statements.

Thousands (year ended December 31)	1995	1994	1993
Operating activities:	å	d 05 464	ф 25.4
Net income	\$ 38,065	\$ 35,461	\$ 37,647
Adjustments to reconcile net income to net cash provided by operations:			
Depreciation, depletion and amortization	40,594	38,058	39,68
Gain on sale of assets	(4,636)	2.00	35
Deferred income taxes and investment tax credits	5,222	8,796	6,20
Equity in (earnings) losses of investments	(2,141)	(2,331)	30.
Allowance for funds used during construction	(620)	(325)	(15
Regulatory balancing accounts and other – net	3,974	8,989	(10,75
Cash from operations before working capital changes	80,458	88,648	72,93
Changes in operating assets and liabilities:	00/200	/	3.5526.55
Accounts receivable	7,767	1,820	(10,96
	(1,173)	5,570	(5,15
Accrued unbilled revenue	704	1,880	(1,04
Inventories of gas, materials and supplies			
Accounts payable	(6,733)	4,199	4,03
Accrued interest and taxes	3,744	(41)	(38
Other current assets and liabilities	(908)	7,948	(1,89
Cash provided by operating activities	83,859	110,024	57,52
nvesting activities:			
Acquisition and construction of utility plant assets	(67,163)	(77,668)	(70,40
	(18,964)	(7,455)	(95
Investment in non-utility plant	7,862	(7,433)	(20
Proceeds from sale of non-utility assets		(102)	11
Investments and other	1,356	(192)	(71.20
Cash used in investing activities	(76,909)	(85,315)	(71,39
Financing activities:		E 0.4E	F F0
Common stock issued	39,569	5,847	5,72
Preference stock retired	(174)		
Preferred stock retired	(989)	(1,091)	(11,17)
Long-term debt:			
Issued	10,000	20,000	100,00
Retired	(1,131)	(18)	(82,60
Change in short-term debt	(24,822)	(18,894)	25,43
Cash dividend payments:	2 % 3		*
Preferred and preference stock	(2,836)	(3,041)	(3,40
Common stock	(25,517)	(23,365)	(22,85
Capital stock expense and other	(1,336)	(277)	(58
Cash provided by (used for) financing activities	(7,236)	(20,839)	10,53
Cash provided by (used for) infancing activities	(7,250)	(20,000)	10,50
ncrease (decrease) in cash and cash equivalents	(286)	3,870	(3,33
Cash and cash equivalents — beginning of year	8,068	4,198	7,53
Cash and cash equivalents — end of year	\$ 7,782	\$ 8,068	\$ 4,19
sasii alia sasii sqairaisiits — siia si ysai	- 11.0		
Supplemental disclosure of cash flow information:			
Cash paid during the year for:			
Interest	\$ 25,346	\$ 24,262	\$ 26,83
Income taxes	\$ 15,819	\$ 12,054	\$ 11,10
Supplemental disclosure of noncash financing activities:			
Conversion to common stock:			
COLL SIGNAL TO COMMITTEE TO COLUMN T	Φ 4.050	\$ 381	\$ 13
\$2,375 Series of Convertible Preference Stock	5 1.078		10
\$2.375 Series of Convertible Preference Stock 7 ½ percent Series of Convertible Debentures	\$ 1,078 \$ 121	\$ 837	\$ 30

See Notes to Consolidated Financial Statements.

Thousands, except share amounts (December 31)	1995		1994	
Common stock equity:				
Common stock – par value \$31/6 per share; authorized				
1995, 60,000,000 shares; 1994, 60,000,000 shares: outstanding —				
1995, 14,828,834 shares; 1994, 13,418,685 shares	\$ 46,958		\$ 42,492	
Premium on common stock	170,943		134,641	
Earnings invested in business	105,651		97,275	
Total common stock equity	323,552	50%	274,408	45%
Preference stock, authorized 2,000,000 shares:			,	20.70
\$2.375 Series, convertible, stated value \$25 per share; outstanding —				
1995, no shares; 1994, 50,079 shares			1.050	
\$6.95 Series, stated value \$100 per share; outstanding —	_		1,252	
1995, 250,000 shares; 1994, 250,000 shares	25 000		25 000	
	25,000	40/	25,000	407
Total preference stock	25,000	4%	26,252	4%
Redeemable preferred stock, authorized 1,500,000 shares;				
all outstanding series have a stated value of \$100 per share:				
\$4.68 Series, outstanding — 1995, 5,519 shares; 1994, 7,319 shares	552		732	
\$4.75 Series, outstanding — 1995, 7,885 shares; 1994, 9,685 shares	788		968	
\$7.125 Series, outstanding — 1995, 135,000 shares; 1994, 142,500 shares	13,500		14,250	
Total redeemable preferred stock	14,840	2%	15,950	3%
ong-term debt:			A	
First Mortgage Bonds				
9 ³ / ₄ % Series due 2015	50,000		50,000	
9 ½% Series due 2019	24,000		25,000	
Medium-Term Notes			1,500	
First Mortgage Bonds:				
4.80% Series A due 1996	5,000		5,000	
7.38% Series A due 1997	20,000		20,000	
7.69% Series A due 1999	10,000		10,000	
5.96% Series B due 2000	5,000		5,000	
5.98% Series B due 2000	5,000		5,000	
8.05% Series A due 2002	10,000		10,000	
6.40% Series B due 2003	20,000		20,000	
6.34% Series B due 2005	5,000		5,000	
6.38% Series B due 2005	5,000		5,000	
6.45% Series B due 2005				
6.50% Series B due 2008	5,000		5,000	
8.26% Series B due 2014	5,000		5,000	
8.31% Series B due 2019	10,000		10,000	
9.05% Series A due 2019	10,000		10,000	
	10,000		10,000	
7.25% Series B due 2023	20,000		20,000	
7.50% Series B due 2023	4,000		4,000	
7.52% Series B due 2023	11,000		11,000	
6.52% Series B due 2025	10,000		<u>200</u>	
Unsecured:				
4.90% Series A due 1996	10,000		10,000	
8.69% Series A due 1996	5,000		5,000	
7.40% Series A due 1997	5,000		5,000	
8.93% Series A due 1998	5,000		5,000	
8.95% Series A due 1998	10,000		10,000	
8.47% Series A due 2001	10,000		10,000	
Convertible Debentures	20,000		10,000	
7 1/4% Series due 2012	11,945		12,076	
	300,945		292,076	
ess long-term debt due within one-year	21,000		1,000	
Total long-term debt	279,945	44%	291,076	48%

1. Summary of significant accounting policies:

Organization and principles of consolidation

The consolidated financial statements include: Regulated utility:

- Northwest Natural Gas Company (Northwest Natural) Non-regulated wholly-owned businesses:
- Oregon Natural Gas Development Corporation (Oregon Natural) and its wholly-owned Canadian subsidiary Canor Energy Ltd. (Canor)
- NNG Financial Corporation (Financial Corporation)

Two other subsidiaries, Pacific Square Corporation (Pacific Square) and NNG Energy Systems, Inc. (Energy Systems), were dissolved during 1995.

Together these businesses are referred to herein as the "Company." Intercompany accounts and transactions have been eliminated

Investments in corporate joint ventures and partnerships in which the Company's ownership is 50 percent or less are accounted for by the equity method or the cost method (see Note 10).

Certain amounts from prior years have been reclassified to conform with the 1995 presentation.

Industry regulation

The Company's principal business is the distribution of natural gas which is regulated by the Oregon Public Utility Commission (OPUC) and the Washington Utilities and Transportation Commission (WUTC). Accounting records and practices conform to the requirements and uniform system of accounts prescribed by these regulatory authorities.

Utility plant

Utility plant for Northwest Natural is stated at original cost (see table in Note 10). When a depreciable unit of property is retired, the cost is credited to utility plant and debited to the accumulated provision for depreciation together with the cost of removal, less any salvage. No gain or loss is recognized upon normal retirement.

Northwest Natural's provision for depreciation of utility property, which is computed under the straight-line, age life method in accordance with independent engineering studies and as approved by regulatory authorities, approximated 4.2 percent of average depreciable plant in 1995 and 4.1 percent in 1994 and 1993.

Allowance for Funds Used During Construction (AFUDC), a non-cash item, is calculated using actual commercial paper interest rates. If commercial paper balances are insufficient to finance the amount of work in progress, a composite of interest costs of debt, shown as a reduction to interest charges, and a return on equity funds, shown as other income, is used to compute AFUDC. This amount is added to utility plant which is a component of rate base. While cash is not realized currently from AFUDC, it is realized in the ratemaking process over the service life of the related property through increased revenues resulting from higher rate base and higher depreciation expense. Northwest Natural's weighted average AFUDC rates were 5.3 percent for 1995, 3.4 percent for 1994, and 3.5 percent for 1993.

Regulatory balancing accounts

Regulatory balancing accounts are established pursuant to orders of the state utility regulatory commissions, in general rate proceedings or expense deferral proceedings, in order to provide for recovery of revenues or expenses from, or refunds to, Northwest Natural's utility customers.

Cash and cash equivalents

For purposes of reporting cash flows, cash and cash equivalents include cash on hand and highly liquid temporary investments with original maturity dates of three months or less.

Unbilled revenue

Northwest Natural accrues for gas deliveries not billed to customers from the meter reading dates to month end.

Inventories

Northwest Natural's inventories of gas in storage and materials and supplies are stated at the lower of average cost or net realizable value.

Derivatives policy

Northwest Natural has a "Derivatives Policy" which allows up to a 100 percent hedge position in currency derivatives to match and lock-in prices on individual Canadian natural gas purchase transactions, and interest rate derivatives to match specific outstanding debt instruments maturing in less than five years. Northwest Natural uses foreign currency hedges to reduce its exposure to currency fluctuations on firm Canadian gas purchase commitments by entering into foreign currency forward contracts with concurrent maturities. The forward contracts have terms ranging up to 12 months. All contracts are specifically purchased in Canadian currency in an amount up to 100 percent but not less than 80 percent of estimated daily purchase requirements for commodity gas from Canada. Changes in market values of foreign currency contracts are deferred and recognized as adjustments to gas purchase costs upon concurrent settlement of these contracts (see Note 11).

Income taxes

In accordance with Statement of Financial Accounting Standards (SFAS) No. 109, "Accounting for Income Taxes," Northwest Natural has recorded a regulatory tax asset for amounts pending recovery from customers in future rates which are primarily derived from differences between the book and tax basis of utility plant in service and the accumulated reserve for depreciation. At both December 31, 1995 and 1994, this asset was \$60.4 million (see Note 7).

The Company provides deferred federal income tax for the timing differences between book depreciation and tax depreciation under the Accelerated Cost Recovery System (ACRS) for 1981–1985 property additions and Modified Accelerated Cost Recovery System (MACRS) for post-1985 property additions. Consistent with rate and accounting instructions of regulatory authorities, deferred income taxes are not currently collected for those income tax temporary differences where the prescribed regulatory accounting methods do not provide for current recovery in rates.

Investment tax credits on utility property additions and leveraged leases which reduce income taxes payable are deferred for financial statement purposes and are amortized over the life of the related property or lease. Investment and energy tax credits generated by non-regulated subsidiaries are amortized over a period of one to five years.

Earnings per share

Primary earnings per share are computed based on the weighted average number of common shares outstanding each year. Outstanding stock options are common stock equivalents but are excluded from primary earnings per share computations due to immateriality. The Company reports fully-diluted earnings per share when dilution is three percent or greater. This calculation reflects the potential effects of the conversion of any outstand-

ing convertible stock and convertible debentures and the exercise of outstanding stock options.

New accounting pronouncements

In March 1995, the Financial Accounting Standards Board issued SFAS No. 121, "Accounting for the Impairment of Long-Lived Assets and for Long-Lived Assets to Be Disposed Of." SFAS No. 121 requires that long-lived assets and certain identifiable intangibles to be held and used by an entity be reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. If the sum of the expected future cash flows (undiscounted and without interest charges) is less than the carrying amount of the asset, an impairment loss is recognized. Otherwise, an impairment loss is not recognized. SFAS No. 121 requires that long-lived assets to be disposed of be reported at the lower of carrying amount or fair value less cost to sell. The initial application of SFAS No. 121 to assets that are being held for disposal at the date of adoption should be reported as the cumulative effect of a change in accounting principle. SFAS No. 121 also requires that a rate-regulated enterprise recognize an impairment for the amount of costs excluded when a regulator excludes all or part of a cost from an enterprise's rate base. The Company estimates that SFAS No. 121 will not have a material effect on its financial position or results of operations when it is adopted in 1996, as required.

In October 1995, SFAS No. 123, "Accounting for Stock-Based Compensation," was issued which encourages, but does not require, companies to account for stock compensation awards based on their estimated fair value on the grant date. The Company has not yet adopted SFAS No. 123. Due to the limited number of options granted on an annual basis, the amount of compensation expense which would be required to be expensed or disclosed is not material.

2. Consolidated subsidiary operations:

Oregon Natural Gas Development Corporation

Oregon Natural's primary activities include oil and gas exploration and production and underground gas storage development. At December 31, 1995, approximately \$29.3 million of Oregon Natural's total assets of \$50.5 million were invested in Canor, compared with \$22.5 million of its total assets of \$40.7 million at December 31, 1994. Canor manages and develops natural gas and oil properties in Canada.

Oregon Natural accounts for its exploration costs under the successful-efforts method. Costs to acquire and develop oil and gas properties are capitalized until the volume of proved gas reserves is determined. If there are inadequate gas reserves, the related deferred costs are expensed. Capitalized costs associated with properties under development were \$3.4 million at December 31, 1995 and \$4.4 million at December 31, 1994.

NNG Financial Corporation

Financial Corporation provides short-term financing for Oregon Natural and has several financial investments, including investments as a limited partner in four solar electric generating systems, four windpower electric generating projects, a hydroelectric facility and a low-income housing project (see Note 10).

Pacific Square Corporation

Pacific Square, a real estate management subsidiary of the Company, was dissolved during the second quarter of 1995. In 1994, upon the sale of its partnership interests in two commercial office buildings, including the Company's headquarters building, Pacific Square no longer had any operating activities.

NNG Energy Systems, Inc.

Energy Systems was formed to design, construct, own and operate cogeneration facilities. Agrico Cogeneration Corporation (Agrico), a wholly-owned subsidiary of Energy Systems, filed a voluntary petition for reorganization under Chapter 11 of the U.S. Bankruptcy Code in December 1991. The U.S. Bankruptcy Court confirmed Agrico's reorganization plan in January 1994, and the sale of Agrico's assets closed in February 1994. Upon the transfer of its residual assets to Financial Corporation in the fourth quarter of 1995, Energy Systems was dissolved.

Summarized financial information for the consolidated subsidiaries follows:

Thousands	1995	1994	1993
Statements of income for the year ended Dec	cember 31:		
Net operating revenues	\$ 8,271	\$ 11,773	\$ 10,865
Operating expenses	9,727	11,253	14,168
Income (loss) from operations	(1,456)	520	(3,303)
Income (loss) from financial investments	2,063	2,115	(388)
Other income and interest charges	5,991	4,092	14
Income (loss) before income taxes	6,598	6,727	(3,677)
Income tax expense (benefit)	2,497	1,986	(2,188)
Net income (loss)	\$ 4,101	\$ 4,741	\$ (1,489)
Balance sheets as of December 31:	-		
Assets:			
Non-utility property – net	\$ 36,053	\$ 24,212	\$ 21,040
Investments and other	37,364	41,419	34,731
Current assets	20,750	27,541	34,028
Total assets	\$ 94,167	\$ 93,172	\$ 89,799
Capitalization and liabilities:		===	<u> </u>
Capitalization	\$ 30,392	\$ 26,562	\$ 21,843
Current liabilities	37,459	42,164	42,538
Other liabilities	26,316	24,446	25,418
Total capitalization and liabilities	\$ 94,167	\$ 93,172	\$ 89,799

3. Capital stock:

Common stock

At December 31, 1995, Northwest Natural had reserved 73,833 shares of common stock for issuance under the Employee Stock Purchase Plan, 290,552 shares under its Dividend Reinvestment and Stock Purchase Plan, 618,897 shares under its 1985 Stock Option Plan (see Note 4), and 440,344 shares for future conversions of its 7½ percent Convertible Debentures.

In the first quarter of 1995, Northwest Natural sold 1.15 million shares of its Common Stock. The net proceeds of \$33.0 million were used for corporate purposes, primarily to fund, in part, Northwest Natural's construction program, and to repay short-term debt incurred for such purpose. The estimated dilution of earnings per share in 1995 resulting from this sale was four percent.

Preference stock

The remaining shares of the \$2.375 Series of Convertible Preference Stock were redeemed May 15, 1995. The \$6.95 Series of Preference Stock is not redeemable prior to December 31, 2002, but is subject to mandatory redemption on that date.

Redeemable preferred stock

The mandatory preferred stock redemption requirements aggregate \$1.1 million in 1996, 1997 and 1998, \$1.0 million in 1999 and \$0.8 million in 2000. These requirements are noncumulative. At any time Northwest Natural is in default on any of its obligations to make the prescribed sinking fund payments, it may not pay cash dividends on common stock or preference stock. Upon involuntary liquidation, all series of redeemable preferred stock are entitled to their stated value.

The redeemable preferred stock is callable at stipulated prices, plus accrued dividends. At December 31, 1995, redemption prices were \$100 per share for the \$4.68 and \$4.75 Series. Shares of the \$7.125 Series are redeemable on or after May 1, 1998 at a price of \$104.75 per share decreasing each year thereafter to \$100 per share on or after May 1, 2008.

The following table shows the changes in the number of shares of Northwest Natural's capital stock and the premium on common

stock for the years 1995, 1994, and 1993:

otoer for the years is so, ass		— Shares -		Premium on
			Redeemable	common
	Common stock	Preference stock	preferred	stock (thousands)
Balance, December 31, 1992	12,972,725	320,621	441,595	\$ 122,768
Sales to employees	9,542	=	=	249
Sales to stockholders	154,850	-	150,000	4,724
Exercise of stock options – net Conversion of preference	19,110	=	***	172
stock to common Conversion of convertible	8,740	(5,298)		105
debentures to common	12,289		- 	328
Redemptions	· · · · · · · · · · · · · · · · · · ·	-	(416,873)	
Sinking fund purchases	=	=	(4,316)	
Other	=			(6)
Balance, December 31, 1993	13,177,256	315,323	170,406	128,340
Sales to employees	10,856	_	· ·	290
Sales to stockholders	173,994	-	i.—	4,958
Exercise of stock options – net Conversion of preference	3,401	-	-	2
stock to common Conversion of convertible	25,147	(15,244)) –	301
debentures to common	28,031		-	748
Sinking fund purchases	20,001	_	(10,902)	
Other	_			2
Balance, December 31, 1994	13,418,685	300,079	159,504	134,641
Sales to the public	1,150,000			30,571
Sales to the public	14,031		_	346
Sales to stockholders	158,657		_	4,376
Exercise of stock options – net Conversion of preference	12,239			45
stock to common Conversion of convertible	71,170	(43,137) –	853
debentures to common	4,052			108
Sinking fund purchases	**************************************		(11,100) -
Redemptions Other		(6,942) -	-
Balance, December 31, 1995	14,828,834	250,000	148,404	

4. Stock option and purchase plans:

Northwest Natural's 1985 Stock Option Plan (Plan) authorizes an aggregate of 800,000 shares of common stock for issuance as incentive or non-statutory stock options. These options may be granted only to officers and key employees of the Company designated by a committee of its Board of Directors.

All options granted are at an option price not less than market value at the date of grant and may be exercised for a period not exceeding 10 years from the date of grant. Option holders may exchange shares owned by them for at least one year, at the current market price, to purchase shares at the option price.

During 1985, 1990, 1994, and 1995, 150,000, 86,500, 75,182, and 7,500 options were granted under the Plan at option prices of \$17.625, \$24.875, \$36.00, and \$30.25, respectively. Since inception of the Plan, 26,182 options have expired.

Information regarding the Plan is summarized as follows:

	1995	- Options - 1994	1993
Outstanding, beginning of year	139,004	71,303	101,326
\$17.625 options:			
Exchanged by holders	(6,856)	(3,080)	(6,184)
Exercised	(9,540)	(3,401)	(9,334)
\$24.875 options:			
Exchanged by holders	(9,512)	-	(4,729)
Exercised	(2,699)		(9,776)
\$36.00 options:			
Granted	-	75,182	1
\$30.25 options:			
Granted	7,500	\$ - \$	=
Expired	(6,000)	(1,000)	
Outstanding, end of year	111,897	139,004	71,303
Available for grant, end of year	507,000	8,500	82,682

Northwest Natural has an employee stock purchase plan whereby employees may purchase common stock at 92 percent of average bid and ask market price on the subscription date. The subscription date is set annually, and each employee may purchase up to 600 shares payable through payroll deduction over a six to 12 month period.

5. Long-term debt:

The issuance of first mortgage bonds under the Mortgage and Deed of Trust is limited by property, earnings and other provisions of the mortgage. Northwest Natural's Mortgage and Deed of Trust constitutes a first mortgage lien on substantially all of its utility property.

The 7 1/4 percent Series of Convertible Debentures may be converted at any time for 33 1/2 shares of common stock for each \$1,000

face value (\$29.85 per share).

The sinking fund requirements and maturities for the five years ending December 31, 2000, on the long-term debt outstand ing at December 31, 1995, amount to: \$21.0 million in 1996; \$26.0 million in 1997; \$16.0 million in 1998; and \$11.0 million in 1999 and 2000.

6. Notes payable and lines of credit:

Northwest Natural has available through September 30, 1996, committed lines of credit with five commercial banks totalling \$80 million, consisting of a primary fixed amount of \$40 million plus an excess amount of up to \$40 million available as needed, at Northwest Natural's option, on a monthly basis. Financial Corporation has available through September 30, 1996, committed lines of credit with two commercial banks totalling \$20 million, consisting of a primary fixed amount of \$15 million plus an excess amount of up to \$5 million available as needed, at Financial Corporation's option, on a monthly basis. Financial Corporation's lines are supported by the guaranty of Northwest Natural.

Under the terms of these lines of credit, which are used as backup lines for commercial paper programs, Northwest Natural and Financial Corporation pay commitment fees but are not required to maintain compensating bank balances. The interest rates on borrowings under these lines of credit are based on current market rates as negotiated. There were no outstanding balances on either the Northwest Natural or Financial Corporation lines of credit as of December 31, 1995 or December 31, 1994.

Northwest Natural and Financial Corporation issue domestic commercial paper, which is supported by the committed bank lines, under agency agreements with a commercial bank. Additionally, Financial Corporation's commercial paper is supported by the guaranty of Northwest Natural. The amounts and average interest rates of commercial paper outstanding were as follows at December 31:

	199	5 ——	199 ₄	4
Thousands	Amount	Rate	Amount	Rate
Northwest Natural	\$ 13,041	5.9%	\$ 35,393	5.8%
Financial Corporation	15,791	6.0%	18,261	6.0%
Total	\$ 28,832		\$ 53,654	

7. Income taxes:

The Company adopted SFAS No. 109, "Accounting for Income Taxes," effective January 1, 1993. The adoption of the new standard resulted in an increase in net deferred tax liabilities of \$62.1 million to reflect deferred taxes on differences previously flowed-through and to adjust existing deferred taxes to the level required at the current statutory rate. An offsetting regulatory asset of \$62.1 million was also recorded. This regulatory tax asset was \$60.4 million at December 31, 1995 and December 31, 1994. The regulatory asset is primarily based upon differences between the book and tax basis of utility plant in service and the accumulated provision for depreciation. It is expected that the regulatory asset will be recovered in future rates. The implementation of SFAS No. 109 did not significantly impact results of operations.

A reconciliation between income taxes calculated at the statutory federal tax rate and the tax provision reflected in the financial statements is as follows:

Thousands	1995	1994	1993
Computed income taxes based on statutory federal income tax rate of 35%	\$ 21,065	\$ 19,577	\$ 20,910
Increase (reduction) in taxes resulting from:			7100000000000000000
Differences between book and tax			
depreciation	1,575	1,575	1,561
Current state income tax, net of federal			
tax benefit	2,051	2,189	2,525
Federal income tax credits	(384)	(338)	(348)
Restoration of investment tax credit	(1,088)	(1,077)	(1,064)
Removal costs	(552)	(556)	(320)
Unconsolidated foreign subsidiary income	266	(172)	(496)
Other – net	(812)	(725)	(672)
Total provision for income taxes	\$ 22,121	\$ 20,473	\$ 22,096

The provision for income taxes consists of the following:

Thousands	1995	1994	1993
Income taxes currently payable:		37.000	(4-1,0,00)
Federal	\$ 16,104	\$ 10,441	\$ 13,368
State	1,052	2,375	2,166
Foreign	284	21	30
Total	17,440	12,837	15,564
Deferred taxes - net:	-		
Federal	4,086	7,720	5,896
State	1,683	993	1,718
Total	5,769	8.713	7,614
Investment and energy tax credits restored:			
From utility operations	(800)	(800)	(800)
From subsidiary operations	(288)	(277)	(282)
Total	(1,088)	(1,077)	(1,082)
Total provision for income taxes	\$ 22,121	\$ 20,473	\$ 22,096
Percentage of pretax income	36.76%	36.60%	36.99%

Deferred tax assets and liabilities are comprised of the following:

Thousands		1995		1994	
Deferred tax assets:				250380.00	_
Regulatory asset	\$	9,099	\$	8,162	
Other deferred assets		5,842		5,029	
Alternative minimum tax credits		479		2,069	
Total	15,420				
Deferred tax liabilities:	-				
Property, plant and equipment		73,682		67,263	
Regulatory liability		60,430		60,430	
Total		134,112	1	127,693	
Net accumulated deferred income tax liability	\$:	118,692	\$ 1	112,433	

8. Employee retirement plans:

The Company has two non-contributory defined benefit retirement plans covering all regular, full-time employees with more than one year of service. The benefits under the plans are based upon years of service and the employee's average compensation during the final years of service. The Company's funding policy is to make the annual contribution required by applicable regulations and recommended by its actuary. Plan assets consist primarily of marketable foreign and domestic securities, corporate obligations, U.S. government obligations and cash equivalents.

The following table sets forth the amounts recognized in the Company's financial statements and the combined funded status of the retirement plans:

Thousands		1995		1994		1993
Service cost	\$	2,819	\$	2,952	\$	2,587
Interest cost		6,843	20.50	6,264	270	6,024
Return on assets		(29, 291)		4,056		(17,762)
Net amortization and deferral		19,927		(12,804)		9,526
Annual pension cost	\$	298	\$	468	\$	375
Vested benefit obligation	\$	79,805	\$	68,628	\$	69,859
Total accumulated benefit obligation	\$	80,079	\$	70,186	\$	70,618
Funded status as of December 31:						
Plan assets at fair value	\$	124,748	\$	100,077	\$	108,579
Projected benefit obligation for service				0.00000000	78.	110000000000000000000000000000000000000
rendered to date		96,999		85,206		86,814
Funded status		27,749		14,871		21,765
Unrecognized net gain		(30,185)		(15,992)		(21,417)
Unrecognized net asset at transition		(1,518)		(1,914)		(2,310)
Unrecognized prior service costs		5,650		5,028		4,413
Prepaid pension cost	\$	1,696	\$	1,993	\$	2,451
Total cash contribution	\$	0	\$	10	\$	579
Discount rate:						
Funded status	-	7.50%		8.00%		7.50%
Pension cost	- 10	8.00%		7.50%		8.00%
Expected long-term rate of return on		1000 North Co. 1000				
plan assets		9.00%		9.00%	_	9.00%
Rate for compensation increases		5.00%		5.00%		5.13%

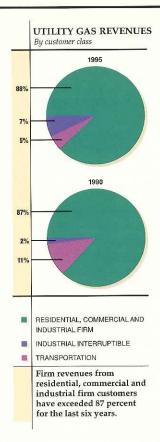
Effective December 31, 1995, the Company changed the assumed discount rate used in determining the funded status of the plans from 8.00 percent to 7.50 percent. The new discount rate was used in determining the funded status of the plans at year-end 1995 and will be used to determine annual pension cost in 1996.

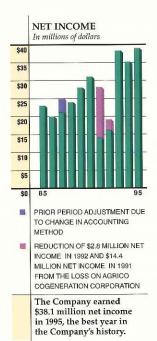
The Company has a qualified "Retirement K Savings Plan" under Internal Revenue Code Section 401(k) and a non-qualified "Executive Deferred Compensation Plan," for eligible employees. These plans are designed to enhance the existing retirement program of employees and to assist them in strengthening their financial security by providing an incentive to save and invest regularly. Contributions to these plans in 1995, 1994, and 1993 were \$0.8 million, \$0.7 million, and \$0.5 million, respectively.

The Company has a non-qualified supplemental retirement plan for eligible executive officers which it is funding with trust-owned life insurance. The amount of coverage is designed to provide sufficient returns to recover all costs of the plan if assumptions made as to mortality experience, policy earnings, and other factors are realized. Expenses related to the plan were \$1.0 million in 1995 and 1994, and \$0.8 million in 1993.

Postretirement health care and life insurance benefits:

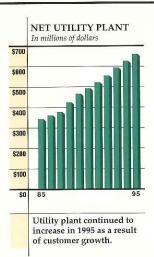
The Company provides continued health care and life insurance coverage after retirement for exempt employees. These benefits and similar benefits for active employees are provided by insurance

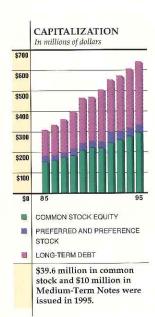




Thousands, except per share amounts (year ended December 31)	1995		1994
Net operating revenues:			
Operating revenues	\$ 356,276	\$:	368,261
Cost of sales	144,051		162,788
Net operating revenues	212,225		205,473
Operating expenses:			
Operations and maintenance	72,018		70,881
Taxes other than income taxes	24,181		24,263
Depreciation, depletion and amortization	40,594		38,058
Loss on cogeneration facility		-	
Total operating expenses	136,793		133,202
Income from operations	75,432		72,271
Other income (expense)	10,432		8,582
Interest charges:			
Interest on long-term debt	23,141		21,921
Other interest	2,252		2,473
Amortization of debt discount and expense	882		850
Total interest charges	26,275	12-	25,244
Allowance for funds used during construction			130 800 000 000 00000
and capitalized interest	(596)		(325)
Total interest charges – net	25,679		24,919
Income before income taxes	60,185		55,934
Income taxes	22,120		20,473
Earnings before cumulative effect			
of accounting change	38,065		35,461
Cumulative effect of accounting change on prior years		_	
Net income	38,065		35,461
Preferred and preference stock dividend requirements	2,806		2,983
Earnings applicable to common stock	\$ 35,259	\$	32,478
Average common shares outstanding	14,545		13,295
Earnings per share of common stock before	14,010		10,20
cumulative effect of accounting change	\$ 2.42	\$	2.44
Cumulative effect of accounting change on prior years			
Earnings per share of common stock	\$ 2.42	\$	2.44
Dividends per share of common stock	\$ 1.77	\$	1.76

100				_													
	1993		1992		1991		1990		1989		1988		1987		1986		1985
\$	358,717 138,833	\$	274,366 101,916	\$	295,938 110,599	\$	296,281 114,055	\$	260,924 103,306	\$	277,564 133,012	\$	309,710 170,241	\$	315,260 176,986	\$	412,462 268,751
	219,884		172,450		185,339		182,226		157,618		144,552		139,469		138,274	0	143,711
	70,723 25,561 39,683		64,249 20,865 33,035		65,529 21,104 33,623		64,746 21,288 27,967		53,557 19,108 23,193		48,619 19,700 23,336		49,163 18,315 20,040		47,499 17,286 18,979		50,484 18,780 17,523
-	125.07	-	4,575	11	23,200	_		-				_		_		-	
7	135,967	-	122,724	3-	143,456	8=-	114,001	-	95,858	9 5	91,655	_	87,518	_	83,764	((86,787
85	83,917		49,726		41,883		68,225		61,760		52,897		51,951		54,510		56,924
-	933	-	(267)		1,406	8)	461		1,199	8	178		(479)		(1,564)		(1,031)
	22,578 1,906		23,001 3,223		21,977 4,266		22,244 2,853		19,344 4,011		17,106 1,599		16,863 1,114		15,851 1,103		15,035 1,416
-	775 25,259		511 26,735		348 26,591	1/1	363 25,460	-	401 23,756	-	362 19,067	-	358 18,335		277 17,231	-	229 16,680
	(152)		(2)		_		(1,127)		(4,986)		(2,716)		(857)		(401)		(206)
	25,107		26,733		26,591		24,333		18,770		16,351		17,478		16,830		16,474
	59,743		22,726		16,698		44,353		44,189		36,724		33,994		36,116	-	39,419
	22,096		6,951		2,321		13,629		15,769		13,004		13,473		16,487		16,713
	37,647 -		15,775 –		14,377	80	30,724		28,420		23,720		20,521 4,195		19,629		22,706
)	37,647 3,488	là-	15,775 2,560		14,377 2,593		30,724 2,729	No.	28,420 2,814		23,720 2,573		24,716 1,873		19,629 2,107		22,706 2,566
\$	34,159	\$	13,215	\$	11,784	\$	27,995	\$	25,606	\$	21,147	\$	22,843	\$	17,522	\$	20,140
	13,074		11,909		11,698		11,522		10,799		10,553		10,329		10,059		9,597
\$	2.61	\$	1.11	\$	1.01	\$	2.43	\$	2.37	\$	2.00	\$	1.80 0.41	\$	1.74 -	\$	2.10
\$	2.61	\$	1.11	\$	1.01	\$	2.43	\$	2.37	\$	2.00	\$	2.21	\$	1.74	\$	2.10
\$	1.75	\$	1.72	\$	1.69	\$	1.65	\$	1.61	\$	1.57	\$	1.56	\$	1.53	\$	1.46

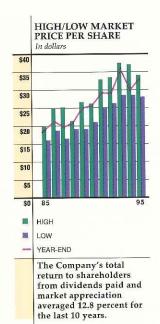




Thousands of dollars (December 31)	1995	1994
Assets:		
Plant and property in service:		
Utility plant in service	\$ 969,075	\$ 908,23
Less accumulated depreciation	308,702	279,112
Utility plant – net	660,373	629,126
Non-utility property	53,807	49,586
Less accumulated depreciation and depletion	16,997	24,456
Non-utility property – net	36,810	25,130
Total plant and property in service	697,183	654,256
Investments and other:		
Investments	34,126	34,183
Long-term notes receivable	3,756	2,914
Total investments and other	37,882	37,097
Current assets:		
Cash and cash equivalents	7,782	8,068
Accounts receivable – customers	35,175	43,016
Allowance for uncollectible accounts	(790)	(864)
Accrued unbilled revenue	21,493	20,320 14,958
Inventories of gas, materials and supplies	14,254 12,396	10,041
Prepayments and other current assets	90,310	95,539
Total current assets		
Regulatory tax assets	60,430	60,430
Deferred debits and other	43,472	41,982
Total assets	\$ 929,277	\$ 889,304
Capitalization and liabilities:		*
Capitalization:		
Common stock equity	\$ 323,552	\$ 274,40
Preference stock	25,000	26,252
Redeemable preferred stock	14,840	15,950
Total capital stock	363,392	316,610
First mortgage bonds	238,000	234,000
Unsecured debt	41,945	57,076 –
Secured debt	270 045	201.076
Total long-term debt	279,945	<u>291,076</u>
Total capitalization	643,337	607,686
Current liabilities:	20.022	E2 (E4
Notes payable	28,832 41,784	53,654 48,517
Accounts payable	21,000	1,000
Debt maturities and current sinking fund requirements Taxes accrued	10,281	6,584
Interest accrued	4,617	4,570
Other current and accrued liabilities	13,204	11,757
Total current liabilities	119,718	126,082
Deferred investment tax credits	12,493	13,530
Deferred income taxes	118,692	112,433
Regulatory balancing accounts and other	35,037	29,573
Total capitalization and liabilities	\$ 929,277	\$ 889,304
Total Capitalization and habilities	Ψ 1611	Ψ 007,001

1985	1986	1987	1988	1989	1990	1991	1992	1993
\$ 445,484	\$ 475,329	\$ 504,407	\$ 567,489	\$ 623,114	\$ 668,664	\$ 722,069	\$ 779,274	840,030
106,949	119,626	132,149	147,923	163,678	183,404	207,165	233,385	255,282
338,535	355,703	372,258	419,566	459,436	485,260	514,904	545,889	584,748
26,343	29,311	32,955	27,373	53,651	70,316	51,265	44,629	42,764
3,987	5,767	7,299	7,650	7,718	10,023	13,161	15,480	20,646
22,356	23,544	25,656	19,723	45,933	60,293	38,104	29,149	22,118
360,891	379,247	397,914	439,289	505,369	545,553	553,008	575,038	606,866
2,563	3,904	13,860	18,922	19,525	30,286	33,145	32,818	32,818
-	-	_				**************************************	7,518	1,756
2,563	3,904	13,860	18,922	19,525	30,286	33,145	40,336	34,574
3,681	2,569	4,021	2,738	1,923	2,797	46,465	7,537	4,198
48,251	29,392	33,467	26,527	26,299	33,507	31,364	33,956	45,340
(1,466	(1,096)	(1,270)	(1,316)	(1,531)	(1,811)	(3,612)	(948)	(1,368)
-	-	19,587	17,906	18,228	27,497	18,135	20,738	25,890
12,569	10,442	14,874	14,984	16,752	16,875	17,294	15,797	16,838
3,072	4,171	4,688	5,859	<i>7,</i> 791	9,553	8,248	8,220	16,412
66,107	45,478	75,367	66,698	69,462	88,418	117,894	85,300	107,310
120		·—	-	3 -	-	_	79—3	62,130
24,832	28,690	17,687	17,221	17,030	23,578	27,447	31,160	38,156
\$ 454,393	\$ 457,319	\$ 504,828	\$ 542,130	\$ 611,386	\$ 687,835	\$ 731,494	<u>\$ 731,834</u>	\$ 849,036
					\$ 219,446	\$ 216,280	\$ 241,538	258,565 26,633
\$ 151,201	\$ 159,597	\$ 171,386	\$ 179,573	\$ 206,424		1 000	26766	70.00
7,080	4,589	3,219	2,855	2,320	2,025	1,869 29 148	26,766 28.218	
7,080 22,249	4,589 21,289	3,219 19,718	2,855 33,263	2,320 31,539	2,025 30,102	29,148	28,218	17,041
7,080 22,249 180,530	4,589 21,289 185,475	3,219 19,718 194,323	2,855 33,263 215,691	2,320 31,539 240,283	2,025 30,102 251,573	29,148 247,297	28,218 296,522	17,041 302,239
7,080 22,249 180,530 87,960	4,589 21,289 185,475 107,795	3,219 19,718 194,323 107,086	2,855 33,263 215,691 127,569	2,320 31,539 240,283 149,175	2,025 30,102 251,573 187,606	29,148 247,297 197,596	28,218 296,522 205,458	17,041 302,239 215,000
7,080 22,249 180,530	4,589 21,289 185,475	3,219 19,718 194,323	2,855 33,263 215,691	2,320 31,539 240,283 149,175 54,328	2,025 30,102 251,573 187,606 14,024	29,148 247,297	28,218 296,522	17,041 302,239
7,080 22,249 180,530 87,960 40,000	4,589 21,289 185,475 107,795 40,000	3,219 19,718 194,323 107,086 54,933	2,855 33,263 215,691 127,569 54,721	2,320 31,539 240,283 149,175 54,328 17,000	2,025 30,102 251,573 187,606 14,024 13,600	29,148 247,297 197,596 43,499	28,218 296,522 205,458	17,041 302,239 215,000
7,080 22,249 180,530 87,960	4,589 21,289 185,475 107,795	3,219 19,718 194,323 107,086	2,855 33,263 215,691 127,569	2,320 31,539 240,283 149,175 54,328	2,025 30,102 251,573 187,606 14,024	29,148 247,297 197,596 43,499 11,900	28,218 296,522 205,458 48,308	17,041 302,239 215,000 57,931
7,080 22,249 180,530 87,960 40,000 ———————————————————————————————	4,589 21,289 185,475 107,795 40,000 ————————————————————————————————	3,219 19,718 194,323 107,086 54,933 ———————————————————————————————————	2,855 33,263 215,691 127,569 54,721 ————————————————————————————————————	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803	29,148 247,297 197,596 43,499 11,900 252,995 500,292	28,218 296,522 205,458 48,308 253,766 550,288	17,041 302,239 215,000 57,931 - 272,931
7,080 22,249 180,530 87,960 40,000 	4,589 21,289 185,475 107,795 40,000 ————————————————————————————————	3,219 19,718 194,323 107,086 54,933 ———————————————————————————————————	2,855 33,263 215,691 127,569 54,721 	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803	29,148 247,297 197,596 43,499 11,900 252,995 500,292	28,218 296,522 205,458 48,308 253,766 550,288 47,109	17,041 302,239 215,000 57,931
7,080 22,249 180,530 87,960 40,000 127,960 308,490 36,276 45,765	4,589 21,289 185,475 107,795 40,000 ————————————————————————————————	3,219 19,718 194,323 107,086 54,933 ———————————————————————————————————	2,855 33,263 215,691 127,569 54,721 ————————————————————————————————————	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803	29,148 247,297 197,596 43,499 11,900 252,995 500,292	28,218 296,522 205,458 48,308 ————————————————————————————————————	17,041 302,239 215,000 57,931 — 272,931 575,170 72,548 44,318
7,080 22,249 180,530 87,960 40,000 127,960 308,490 36,276 45,765 3,898	4,589 21,289 185,475 107,795 40,000 ————————————————————————————————	3,219 19,718 194,323 107,086 54,933 ———————————————————————————————————	2,855 33,263 215,691 127,569 54,721 	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803 74,408 38,074 11,068 5,570	29,148 247,297 197,596 43,499 11,900 252,995 500,292 88,619 43,789 2,125 3,631	28,218 296,522 205,458 48,308 ————————————————————————————————————	17,041 302,239 215,000 57,931 — 272,931 575,170 72,548 44,318 — 6,757
7,080 22,249 180,530 87,960 40,000 ———————————————————————————————	4,589 21,289 185,475 107,795 40,000 ————————————————————————————————	3,219 19,718 194,323 107,086 54,933 ———————————————————————————————————	2,855 33,263 215,691 127,569 54,721 ————————————————————————————————————	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786 23,322 29,873 - 7,229 8,528	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803 74,408 38,074 11,068 5,570 6,897	29,148 247,297 197,596 43,499 11,900 252,995 500,292 88,619 43,789 2,125 3,631 7,070	28,218 296,522 205,458 48,308 ————————————————————————————————————	17,041 302,239 215,000 57,931 — 272,931 575,170 72,548 44,318 — 6,757 4,438
7,080 22,249 180,530 87,960 40,000 127,960 308,490 36,276 45,765 3,898	4,589 21,289 185,475 107,795 40,000 ————————————————————————————————	3,219 19,718 194,323 107,086 54,933 ———————————————————————————————————	2,855 33,263 215,691 127,569 54,721 ————————————————————————————————————	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786 23,322 29,873 - 7,229 8,528 3,474	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803 74,408 38,074 11,068 5,570 6,897 5,546	29,148 247,297 197,596 43,499 11,900 252,995 500,292 88,619 43,789 2,125 3,631 7,070 6,742	28,218 296,522 205,458 48,308 ————————————————————————————————————	17,041 302,239 215,000 57,931 ————————————————————————————————————
7,080 22,249 180,530 87,960 40,000 ———————————————————————————————	4,589 21,289 185,475 107,795 40,000 —— 147,795 333,270 26,779 29,457 — 4,108 7,202	3,219 19,718 194,323 107,086 54,933 ———————————————————————————————————	2,855 33,263 215,691 127,569 54,721 ————————————————————————————————————	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786 23,322 29,873 - 7,229 8,528	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803 74,408 38,074 11,068 5,570 6,897	29,148 247,297 197,596 43,499 11,900 252,995 500,292 88,619 43,789 2,125 3,631 7,070	28,218 296,522 205,458 48,308 ————————————————————————————————————	17,041 302,239 215,000 57,931 — 272,931 575,170 72,548 44,318 — 6,757 4,438 10,180 138,241
7,080 22,249 180,530 87,960 40,000 ———————————————————————————————	4,589 21,289 185,475 107,795 40,000 147,795 333,270 26,779 29,457 4,108 7,202 2,257	3,219 19,718 194,323 107,086 54,933 ——— 162,019 356,342 39,849 30,837 —— 3,768 7,544 2,578	2,855 33,263 215,691 127,569 54,721 ————————————————————————————————————	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786 23,322 29,873 - 7,229 8,528 3,474	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803 74,408 38,074 11,068 5,570 6,897 5,546	29,148 247,297 197,596 43,499 11,900 252,995 500,292 88,619 43,789 2,125 3,631 7,070 6,742	28,218 296,522 205,458 48,308 ————————————————————————————————————	17,041 302,239 215,000 57,931 — 272,931 575,170 72,548 44,318 — 6,757 4,438 10,180 138,241 14,567
7,080 22,249 180,530 87,960 40,000 127,960 308,490 36,276 45,765 3,898 1,449 7,169 2,014 96,571 20,572	4,589 21,289 185,475 107,795 40,000 ————————————————————————————————	3,219 19,718 194,323 107,086 54,933 ———————————————————————————————————	2,855 33,263 215,691 127,569 54,721 182,290 397,981 10,230 43,968 4,200 8,540 7,842 3,375 78,155	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786 23,322 29,873 - 7,229 8,528 3,474 72,426	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803 74,408 38,074 11,068 5,570 6,897 5,546 141,563	29,148 247,297 197,596 43,499 11,900 252,995 500,292 88,619 43,789 2,125 3,631 7,070 6,742 151,976	28,218 296,522 205,458 48,308 ————————————————————————————————————	17,041 302,239 215,000 57,931 ————————————————————————————————————
7,080 22,249 180,530 87,960 40,000 ———————————————————————————————	4,589 21,289 185,475 107,795 40,000 147,795 333,270 26,779 29,457 4,108 7,202 2,257 69,803 19,885	3,219 19,718 194,323 107,086 54,933 —— 162,019 356,342 39,849 30,837 —— 3,768 7,544 2,578 84,576 21,518	2,855 33,263 215,691 127,569 54,721	2,320 31,539 240,283 149,175 54,328 17,000 220,503 460,786 23,322 29,873 - 7,229 8,528 3,474 72,426 19,047	2,025 30,102 251,573 187,606 14,024 13,600 215,230 466,803 74,408 38,074 11,068 5,570 6,897 5,546 141,563 18,648	29,148 247,297 197,596 43,499 11,900 252,995 500,292 88,619 43,789 2,125 3,631 7,070 6,742 151,976 16,658	28,218 296,522 205,458 48,308 ————————————————————————————————————	17,041 302,239 215,000 57,931 — 272,931 575,170 72,548 44,318 — 6,757 4,438 10,180 138,241 14,567



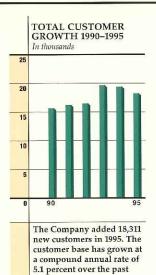


	1995	1994
Common stock		
Ratios – year-end:		
Price/earnings ratio	13.6	12.
Dividend yield at year-end rate - %	5.5	6.0
Dividend payout – %	73.1	72.1
Return on average common equity - %	11.8	12.2
Per share data – (\$):		
Earnings	2.42	2.44
Dividends paid	1.77	1.76
Dividend rate at year-end	1.80	1.76
Book value at year-end	21.82	20.45
Market price:		
High	34	361/2
Low	28	281/2
Year-end	33	291/2
Average	31 ½8	317/8
Number of shares of common stock (000):		
Year-end	14,829	13,419
Average	14,545	13,295
Coverage data – times earned		
Fixed charges - Securities and Exchange Commission	3.15	3.08
Fixed charges – Standard & Poor's	2.87	2.98
Utility plant		400 -400 SECONOM
Capital expenditures	\$ 67,163	\$ 77,668
Depreciation – % of average depreciable		
utility plant	4.2	4.1
Accumulated depreciation – % of depreciable		1800
utility plant	32.8	31.
Capital structure – year-end (%)		
(Exclusive of current portion of long-term debt)		20.5
First mortgage bonds	37.0	38.5
Unsecured debt	6.5	9.4
Secured debt	-	
Total long-term debt	43.5	47.9
Redeemable preferred stock	2.3	2.6
Preference stock	3.9	4.3
Common stock equity	50.3	45.2
Total capital stock	56.5	52.1
Total capital structure	100.0	100.0
Effective tax rate		
Effective tax rate – % of pretax income	37	37

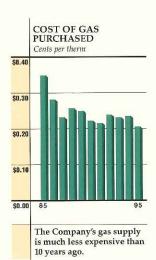
^{*} Includes \$0.24 per share in 1992 and \$1.23 per share in 1991 loss on Agrico Cogeneration Corporation.

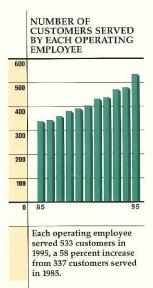
 $^{^\}dagger$ Includes \$0.41 per share attributable to cumulative effect of accounting change on prior years.

13.1	198	1986		1987		1988		1989		1990		1991		1992		1993	
5.1 6.0 6.0 6.5 6.6 7.6 81 7.2 67.0 155.0* 167.3* 67.9 67.9 78.5 70.6* 87.9 13.7 5.8* 5.4* 13.1 13.3 12.1 13.8* 11.3 2.61 1.11* 1.01* 2.43 2.37 2.00 2.21* 1.74 1.75 1.72 1.69 1.65 1.61 1.57 1.56 1.53 1.76 1.72 1.72 1.68 1.64 1.60 1.56 1.56 19.62 18.62* 18.35* 18.91 18.06 16.87 16.38 15.65 38 334* 331/4 26½ 26* 21* 25* 24 25* 28½ 26½ 25* 13* 19* 19* 19* 19* 21* 21* 21* 21* 21* 21* 21* 21* 21* 21* 21* 21* 21* <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>																	
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67.0 155.0° 167.3° 67.9 67.9 78.5 70.6° 87.9° 13.7 5.8° 5.4° 13.1 13.3 12.1 13.8° 11.3 2.61 1.11° 1.01° 2.43 2.37 2.00 2.21° 1.74 1.75 1.72 1.69 1.65 1.61 1.57 1.56 1.53 1.76 1.72 1.72 1.69 1.65 1.61 1.57 1.56 1.53 1.76 1.72 1.72 1.68 1.64 1.60 1.56 1.56 19.62 18.62° 18.35° 18.91 18.06 16.87 16.38 15.65 38 33¾ 33¼ 26½ 26¾ 21½ 25¼ 25 28½ 26½ 25¼ 21½ 19¼ 16% 18¾ 34¼ 28½ 28¾ 25¾ 25 21½ 19¼ 21½ 13,77 12,973 11,785 11,604 </td <td>8.</td> <td></td>	8.																
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3.0 5.1 5.8 6.5 6.8 8.4 5.5 6.4 4.6 4.9 0.4 0.4 0.5 0.7 0.9 1.4 44.9 43.9 43.2 47.0 44.8 45.1 48.1 47.9 52.5 53.9 49.4 53.9 52.1 54.2 54.5 55.7	41.			45.5	2		-			46.1		50.6		46.1			
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five years.





Customers at year-end Residential Commercial Industrial – firm Industrial – interruptible Transportation customers Total customers Gas sales and transportation deliveries (000 therms) Residential Commercial Industrial – firm Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – firm Industrial – interruptible Total gas revenues	363,903 45,402 410 143 409,858 91 409,949 256,462 196,723 82,958 84,173 620,316 379,116 4,946 1,004,378 \$165,662 99,079 31,268 24,113	346,950 44,07 401 142 391,571 67 391,638 260,218 201,925 81,348 89,899 633,390 364,461 (7,519) 990,332
Residential Commercial Industrial – firm Industrial – interruptible Transportation customers Total customers Gas sales and transportation deliveries (000 therms) Residential Commercial Industrial – firm Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – firm Industrial – interruptible	45,402 410 143 409,858 91 409,949 256,462 196,723 82,958 84,173 620,316 379,116 4,946 1,004,378 \$165,662 99,079 31,268	44,07 401 142 391,571 67 391,638 260,218 201,925 81,348 89,899 633,390 364,461 (7,519) 990,332 \$\$176,510 108,452
Industrial – firm Industrial – interruptible Transportation customers Total customers Gas sales and transportation deliveries (000 therms) Residential Commercial Industrial – firm Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	410 143 409,858 91 409,949 256,462 196,723 82,958 84,173 620,316 379,116 4,946 1,004,378 \$165,662 99,079 31,268	401 142 391,571 67 391,638 260,218 201,925 81,348 89,899 633,390 364,461 (7,519) 990,332 \$176,510 108,452
Industrial – interruptible Transportation customers Total customers Gas sales and transportation deliveries (000 therms) Residential Commercial Industrial – firm Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	143 409,858 91 409,949 256,462 196,723 82,958 84,173 620,316 379,116 4,946 1,004,378 \$\$165,662 99,079 31,268	142 391,571 67 391,638 260,218 201,925 81,348 89,899 633,390 364,461 (7,519) 990,332 \$\frac{176,510}{108,452}
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Total customers Gas sales and transportation deliveries (000 therms) Residential Commercial Industrial – firm Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	91 409,949 256,462 196,723 82,958 84,173 620,316 379,116 4,946 1,004,378 \$\$165,662 99,079 31,268	67 391,638 260,218 201,925 81,348 89,899 633,390 364,461 (7,519) 990,332 \$ 176,510 108,452
Total customers Gas sales and transportation deliveries (000 therms) Residential Commercial Industrial – firm Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	256,462 196,723 82,958 84,173 620,316 379,116 4,946 1,004,378 \$ 165,662 99,079 31,268	391,638 260,218 201,925 81,348 89,899 633,390 364,461 (7,519) 990,332 \$ 176,510 108,452
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Residential Commercial Industrial – firm Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	196,723 82,958 84,173 620,316 379,116 4,946 1,004,378 \$ 165,662 99,079 31,268	201,925 81,348 89,899 633,390 364,461 (7,519) 990,332 \$ 176,510 108,452
Industrial – firm Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	82,958 84,173 620,316 379,116 4,946 1,004,378 \$ 165,662 99,079 31,268	81,348 89,899 633,390 364,461 (7,519) 990,332 \$ 176,510 108,452
Industrial – interruptible Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	84,173 620,316 379,116 4,946 1,004,378 \$ 165,662 99,079 31,268	89,899 633,390 364,461 (7,519) 990,332 \$ 176,510 108,452
Total gas sales Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	620,316 379,116 4,946 1,004,378 \$ 165,662 99,079 31,268	633,390 364,461 (7,519) 990,332 \$ 176,510 108,452
Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	379,116 4,946 1,004,378 \$ 165,662 99,079 31,268	364,461 (7,519) 990,332 \$ 176,510 108,452
Transportation Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	379,116 4,946 1,004,378 \$ 165,662 99,079 31,268	\$ 176,510 108,452
Unbilled therms Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	\$ 165,662 99,079 31,268	(7,519) 990,332 \$ 176,510 108,452
Total volumes delivered Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	\$ 165,662 99,079 31,268	990,332 \$ 176,510 108,452
Operating revenues and cost of sales (000) Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	\$ 165,662 99,079 31,268	\$ 176,510 108,452
Sales revenues: Residential Commercial Industrial – firm Industrial – interruptible	99,079 31,268	108,452
Residential Commercial Industrial – firm Industrial – interruptible	99,079 31,268	108,452
Commercial Industrial – firm Industrial – interruptible	99,079 31,268	108,452
Industrial – firm Industrial – interruptible	31,268	
Industrial – interruptible		34,443
		27,361
Total gas revenues		Name of the second
	320,122	346,766
Transportation	16,650	14,702
Unbilled revenues	1,173	(5,571)
Other	10,060	829
Total utility operating revenues	348,005	356,72
Cost of gas	144,051	163,026
Net utility operating revenues	203,954	193,700
Non-utility net operating revenues	8,271	11,773
	\$ 212,225	\$ 205,473
Customer data		
Heat requirements:		
Actual degree days	3,779	4,020
20-year average degree days	4,306	4,324
Average use per customer in therms:		
Residential	726	776
Commercial	4,420	4,680
Average rate per therm (cents):		
Residential	64.6	67.8
Commercial	50.4	53.7
Industrial – firm	37.7	42.3
Industrial – interruptible	28.6	30.4
Total sales	51.6	54.7
Gas purchases (000 therms)	640,976	642,607
Gas purchased cost per therm - net (cents)	20.67	23.44
Average sendout cost of gas (cents)	23.04	26.05
Maximum day firm sendout (000 therms)	4,359	3,913
Maximum day total sendout (000 therms)	5,701	5,285
Payroll (000)		
Operating	\$ 33,669	\$ 33,888
Construction and other	22,074	20,79「
Total	\$ 55,743	\$ 54,68
Employees	1,288	1,338
Number of customers served by each operating employee	533	478

^{*}Transportation customers are included in industrial customer counts.

1993	1992	1991	1990	1989	1988	1987	1986	1985
329,157	311,216	295,955	281,265	266,872	255,542	246,921	239,546	234,564
42,657	41,156	39,805	38,102	36,469	34,608	33,298	32,055	31,155
396	381	367	364	337	329	357	358	37,6
153	90	60	54	128	156	199	203	202
372,363	352,843	336,187	319,785	303,806	290,635	280,775	272,162	266,297
64	135	171	177	177	*	*	*	
372,427	352,978	336,358	<u>319,962</u>	303,983	290,635	280,775	272,162	266,297
267,818	206,131	233,079	208,940	201,144	188,906	165,638	172,002	195,497
209,642	169,406	189,384	173,508	170,143	156,143	137,513	140,892	158,845
80,588	67,847	65,535	62,252	54,761	51,449	81,711	86,833	116,069
66,370	22,399	13,155	13,554	14,816	73,439	304,169	205,757	276,895
624,418	465,783	501,153	458,254	440,864	469,937	689,031	605,484	747,306
415,367	595,397	591,171	532,703	556,713	333,859	38,906	66,990	37,327
3,844	4,163	(16,943)	18,774	3,950	(5,023)	6,357	-	01,021
1,043,629	1,065,343	1,075,381	1,009,731	1,001,527	798,773	734,294	672,474	784,633
\$ 168,217	\$ 124,834	\$ 142,056	\$ 129,830	\$ 121,938	\$ 125,446	\$ 107,770	\$ 111,993	\$ 130,897
103,476	78,614	90,263	84,463	81,710	85,262	73,079	79,099	98,17
31,340	24,867	25,222	24,603	21,502	23,739	35,740	40,229	62,452
18,884	6,920	3,352	5,273	5,352	24,499	86,777	64,404	115,71
321,917	235,235	260,893	244,169	230,502	258,946	303,366	295,725	407,23
17,892	25,564	29,424	30,423	29,143	24,159	1,800		and Mariana
5,153	2,603	(9,362)	9,268	322	(1,681)		4,903	1,038
2,890	2,781	Control of the Contro		(905)	STORY AND DESCRIPTION	3,817	14.224	2.000
		118	66		(3,685)	(66)	14,224	3,889
347,852	266,183	281,073	283,926	259,062	277,739	308,917	314,852	412,158
138,833	101,733	107,398	110,605	103,306	133,012	170,241	176,986	268,751
209,019	164,450	173,675	173,321	155,756	144,727	138,676	137,866	143,407
10,865	8,000	11,664	8,905	1,862	(175)	793	408	304
\$ 219,884	\$ 172,450	\$ 185,339	\$ 182,226	\$ 157,618	\$ 144,552	\$ 139,469	\$ 138,274	\$ 143,711
4,452	3,662	4,248	4,208	4,310	4,257	3,941	4,138	5,059
4,313	4,354	4,379	4,391	4,409	4,430	4,451	4,458	4,445
844	685	812	769	777	759	690	737	861
5,029	4,214	4,874	4,670	4,813	4,624	4,236	4,517	5,271
62.8	60.6	60.9	62.1	60.6	66.4	65.1	65.1	67.0
49.4	46.4	47.7	48.7	48.0	54.6	53.1	56.1	61.8
38.9	36.7	38.5	39.5	39.3	46.1	43.7	46.3	53.8
28.5	30.9	25.5	38.9	36.1	33.4	28.5	31.3	41.8
51.6	50.5	52.1	53.3	52.3	55.1	44.0	48.8	54.5
628,172	455,343	498,916	489,768	484,265	478,595	746,128	605,473	767,926
23.11	23.76	21.91	22.67	25.25	26.07	23.47	28.46	35.26
22.10	21.65	22.18	23.19	23.22	28.61	24.48	29.23	35.96
4,047	3,432	3,390	5,019	4,732	2,920	2,716	2,438	3,456
5,479	5,300	4,696	6,154	5,302	4,007	3,760	3,417	4,761
\$ 33,539	\$ 30,398	\$ 28,898	\$ 26,929	\$ 25,991	\$ 24,957	\$ 25,039	\$ 24,879	\$ 23,995
21,056	19,802	18,392	15,881	13,968	12,833	12,246	12,525	13,529
54,595	\$ 50,200	\$ 47,290	\$ 42,810	\$ 39,959	\$ 37,790	\$ 37,285	\$ 37,404	\$ 37,524
1,293	1,328	1,276	1,261	1,190	1,161	1,165	1,194	1,234
469	437	431	403	391	379	360	344	337
					0.0	500		



Robert L. Ridgley, 62

chairman of the board and chief executive officer, Northwest Natural Gas Company. Mr. Ridgley became chairman of the board on March 1, 1996. He will continue serving as chief executive officer until his retirement from that position at the end of 1996. He remains active as chair of Portland's Central City 2000

Task Force, a trustee of the Oregon Health Sciences Foundation, trustee and vice chairman of The Oregon Nature Conservancy and a director of the Oregon Independent College Foundation and Kaiser Foundation Hospitals & Kaiser Foundation Health Plan, Inc. He is a former chairman of the American Gas Association and the Pacific Coast Gas Association. (1984)



Richard G. Reiten, 56

president and chief operating officer, Northwest Natural Gas Company. Mr. Reiten joined the Company as pres-

ident and chief operating officer and was elected to the board effective March 1, 1996. From 1992 through 1995 he served as president and chief operating officer of Portland General Electric

Company after having served as president of PGE's parent company, Portland General Corporation, since 1989. Mr. Reiten is a former director of the Oregon Economic Development Department. He is a director of Blue Cross and Blue Shield of Oregon and The Benchmark Group and formerly was a director of West One Bank, Oregon. He is past chair and continues as a director of both the Portland Chamber of Commerce and Association for Portland Progress. He serves on the advisory board of the University of Washington Graduate School of Business. (1996)



Mary Arnstad, 47

president, The Heathman Management Group, Inc., Portland, Oregon.

Since 1992 Ms. Arnstad has served as president of The Heathman Management Group, Inc., which operates The Heathman Hotel, and the B. Moloch/Heathman Bakery and Pub, both located in Portland, and The Greenwood

Inn, Beaverton, Oregon. Ms. Arnstad also serves as president and general manager of The Heathman Hotel. (1992) (2) (8)



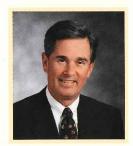
Thomas E. Dewey, Jr., 63

general partner, McFarland Dewey & Co., New York City.

Mr. Dewey is a general partner in the investment banking firm of McFarland Dewey & Co., which provides independent financial advice on matters such as corporate financial strategies and recapitalization proposals. He currently

is a director of InPhyNet Medical Management Inc., and chairman emeritus of the Board of Trustees, Lenox Hill Hospital.

He formerly was a general partner with Kuhn, Loeb & Co. and president of Thomas E. Dewey Jr. & Co. Mr. Dewey was a member and vice chairman of the New York Housing Development Corporation, one of the country's largest housing finance agencies. (1986) (2) (8)



Tod R. Hamachek, 50

president and chief executive officer, Penwest, Ltd., Bellevue, Washington.

Mr. Hamachek has served as president and chief executive officer of Penwest, Ltd., a diversified producer of specialty chemicals and food and pharmaceutical ingredients, since 1985. He is a director of Penwest, DEKALB Genetics Corpor-

ation, The Seattle Times Co., and The Blethen Corporation. He is a trustee and/or director of Virginia Mason Medical Center, the Seattle Foundation, The Washington Roundtable, Lewis & Clark College, Lakeside School, Pacific Science Center and Corporate Council for the Arts. He is a past director of First Interstate Bank of Washington and past trustee of The Nature Conservancy-Washington Chapter. (1986) (3) (4) (5)

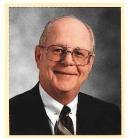


Richard B. Keller, 67

president, Keller Enterprises Inc., Portland, Oregon.

Since 1975 Mr. Keller has served as president of Keller Enterprises, a holding company. For many years Kelle Enterprises owned Western Paper Company, a major independent distributor of paper and packaging. Mr. Keller is a

member of the board of the managing general partner of Crown Pacific Partners, L.P. He is a life trustee of both the Oregon Graduate Institute and Lewis & Clark College. (1983) (1) (3) (4) (5) (6)



Wayne D. Kuni, 65

president, Kuni Enterprises, Beaverton, Oregon.

Mr. Kuni is the founder, president and principal shareholder of Kuni Enterprises, which owns Cadillac, Lexus, BMW and other automobile dealerships in Oregon, Colorado and California. He is past president of the Oregon Auto-

mobile Dealers Association, the Portland Chamber of Commerce and the Arlington Club. Mr. Kuni is a trustee and/or director of the board of Linfield College, the Oregon Health Sciences Foundation and Keller Enterprises. He is chairman emeritus of the Board of Governors of the Portland Shriners Hospital. (1980) (1) (2) (3) (8)



Dwight A. Sangrey, 55
president and chief executive officer,
Fraction Biologics, LLC, Tualatin, Oregon.
In 1995, Mr. Sangrey was appointed president and chief executive officer of Fraction Biologics, LLC, an advanced biotechnology firm that produces and markets pharmaceutical products. The firm has businesses in the United States

and China. Mr. Sangrey served as president of the Oregon Graduate Institute of Science & Technology from 1988 to 1994. He presently is a senior associate on the American Council on Education's South Africa Project. He previously was dean of engineering, Rensselaer Polytechnic Institute (1985-88), professor and head, Department of Civil Engineering, Carnegie Mellon University (1979-85), and associate professor and professor, School of Civil and Environmental Engineering, Cornell University (1970-79). (1992) (4) (5) (7)



Melody C. Teppola, 53
managing partner, National Builders
Hardware Company, Portland, Oregon.
Ms. Teppola has been associated with
National Builders Hardware Company,
a regional and national distributor

of builders' hardware, woodworking machinery and decorative plumbing, since 1965. Her community activities ave focused on art, education and advocacy for women and

Advisory Council and is a director of the Salvation Army Advisory Council and is a director of the Bonnie Bronson Fund of the Oregon Community Foundation and the Bosco-Milligan Foundation for Historic Preservation. (1987) (4) (5) (6) (7)



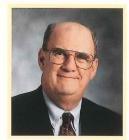
Russell F. Tromley, 56 president and chief executive officer, Tromley Industrial Holdings, Inc. Tualatin, Oregon.

Since 1978 Mr. Tromley has acquired and operated several companies that are engaged in manufacturing and distributing equipment for steel mills and foundries. In 1990 he formed Tromley

Industrial Holdings, Inc., and has served as its president and chief executive officer since that time. His firm is involved in nonferrous metals alloying and distribution, the manufacture and sale of equipment for the foundry and steel industry, industrial equipment leasing and industrial and retail business property investments. Mr. Tromley is a past president of the Casting Industry Suppliers Association and the Arlington Club. He is a non-lawyer arbitrator for the Oregon State Bar Association. (1994) (2) (8)



Coburn L. Grabenhorst, Sr. Ronald T. Miller Alfred J. Rawlinson L. Sanford Reis Ralph J. Voss



Benjamin R. Whiteley, 66 chairman of the board, Standard Insurance

Company, Portland, Oregon.

Mr. Whiteley is chairman of the board of Standard Insurance Company. He formerly served as its president and chief executive officer from 1983 until 1994. He serves as lead director of the Company's board and is a director of

Standard Insurance, Gunderson, Inc., U.S. Bancorp, The Greenbrier Companies, and Willamette Industries. Mr. Whiteley is a trustee and/or board member of the Oregon Business Council, Oregon Health Sciences Foundation, Oregon Independent College Foundation, Oregon State University Foundation, Pacific University and St. Vincent Medical Foundation. (1989) (1) (3) (6)

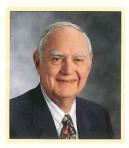


William R. Wiley, 64

senior vice president for science and technology policy, Battelle Memorial Institute, Richland, Washington.

Dr. Wiley is senior vice president for science and technology policy of Battelle Memorial Institute, an independent, science-based organization with a worldwide staff of more than 8,000 and annu-

al revenues of \$950 million. He was director of research of Battelle's Pacific Northwest Laboratories from 1984 to 1994 and was the director of the Pacific Northwest Laboratory, a multi-program national laboratory operated by Battelle for the U.S. Department of Energy. Dr. Wiley is a member and past president of the Washington State University Board of Regents and a member of the Whitman College Board of Overseers. He serves on the board of SAFECO Corporation and the Seattle Branch of the Federal Reserve Bank of San Francisco. (1994) (7) (8)



Carlton Woodard, 72

retired chairman of the board, South Lane Investment Corporation,

Cottage Grove, Oregon.

Mr. Woodard retires May 23, 1996, after 20 years of service on the Board of Directors of Northwest Natural Gas. The South Lane Investment Corporation owns Kimwood Corporation, a wood-

working machine manufacturer, and the Valley River Inn in Eugene, Oregon, and has other real estate and financial interests. He is a retired director of the United States National Bank of Oregon. (1976) (1) (6) (7)

(Year elected to the board)

(1) Executive Committee (2) Audit Committee (3) Organization and Executive Compensation Committee (4) Pension Committee

(5) Retirement Committee (6) Nominating Committee

(7) Environmental Policy Committee (8) Finance Committee

Robert L. Ridgley, 62

chairman and

chief executive officer (1983).

Mr. Ridgley has been president and chief executive officer of Northwest Natural Gas since 1985. Effective March 1, 1996, he became chairman and chief executive officer. Mr. Ridgley joined Northwest Natural Gas after 23 years of private law practice. He served as chairman of the American Gas Association in 1994 and chairman of the Oregon Business Council in 1995.

Richard G. Reiten, 56

president and

chief operating officer (1995).

Mr. Reiten joined Northwest Natural Gas at the end of 1995 and became president and chief operating officer on March 1, 1996. He served as president of Portland General Corporation from 1989 to 1992 and as president of Portland General Electric from 1992 to 1995. He was a director of both Portland General Corporation and Portland General Electric from 1990 to 1995. He was the director of the Oregon Economic Development Department in 1987-88. From 1980 until 1987, he was president, chief executive officer and director of Nicolai Company, a Portland-based manufacturer. He served as president of the Building Materials Group and director of DiGiorgio Corporation in San Francisco from 1971 until 1979. In 1966 Mr. Reiten became vice president of Hearin Products, a building materials distributor, and became president in 1971, the year it was acquired by the DiGiorgio Corporation. Mr. Reiten is a member of the board of directors of Blue Cross and Blue Shield of Oregon and The Benchmark Group. He formerly was chairman of the Portland Chamber of Commerce and Association for Portland Progress.

Bruce R. DeBolt, 48

senior vice president,

finance, and chief financial officer (1980).

Mr. DeBolt holds a master's degree in business administration and a law degree. He previously served as the Company's general counsel. Mr. DeBolt also served as an assistant Oregon attorney general before joining the Company.

Dwayne L. Foley, 50

senior vice president,

gas operations and

information services (1967).

Mr. Foley also serves as president and CEO of Oregon Natural Gas Development Corporation. From 1990 to 1994, he was CEO of Canor Energy Ltd. Both are subsidiaries of Northwest Natural Gas. A professional engineer, he formerly was manager of Gas Supply at Northwest Natural Gas.

Paul L. Hathaway, 61

Mr. Hathaway retired March 1, 1996, after 18 years as a senior vice president of Northwest Natural Gas and president of Pacific Square Corporation, a subsidiary. A graduate of the U.S. Naval Academy, Mr. Hathaway is a former vice president of San Diego Gas & Electric Company and Consolidated Edison Company. (1977)

Michael S. McCoy, 52

senior vice president,

customer services (1969).

Mr. McCoy, a civil engineer, formerly was vice presider operations, districts and administrative services, and industrial relations. He served as manager of the Customer Service Department and as district manager in Albany.

Bruce B. Samson, 61

senior vice president,

public affairs, and general counsel (1990).

Mr. Samson, a former Navy pilot, was president of public policy for U S West Communications, Seattle, Washington, and vice president and general counsel of Pacific Northwest Bell, Seattle, before joining Northwest Natural Gas. He currently is board chair of the Portland Chamber of Commerce and president, board of directors, of William Temple House.

William R. Harper, Jr., 42

vice president,

industrial and district operations (1992).

Mr. Harper also is CEO of Canor Energy Ltd. He served as president and chief operating officer, ARCO Natural Gas Marketing, Inc., and assistant to the president, United Gas Pipeline Company, before coming to Northwest Natural Gas.

Diana J. Johnston, 51

vice president,

human resources and

administrative services (1966).

Ms. Johnston has served as manager of Customers Office, superintendent of stores and supervisor of general maintenance for Northwest Natural Gas. She is a graduate of the Human Resources Executive Program at the University of Michigan School of Business Administration.

C. J. Rue, 50

secretary and

assistant treasurer (1974).

An attorney, Mr. Rue served previously as supervisor of the Investor Relations Department and assistant secretary of Northwest Natural Gas.

D. James Wilson, 56

treasurer and

controller (1979).

A certified public accountant, Mr. Wilson is a former manager of Internal Auditing of Northwest Natural Gas. He is a member of the American Institute of Certified Public Accountants.

Virginia V. Burgess, 57

director of investor relations

and assistant secretary (1981).

Ms. Burgess is an attorney who also holds a master's degree in management. She is president of the Pacific Northwe chapter of the American Society of Corporate Secretaries.

(Date joined Northwest Natural Gas)

Notice of annual meeting

The 1996 Annual Meeting will be held at 2 p.m. Thursday, May 23, in the State Illroom of the Hilton Hotel, 921 S.W. Sixth Avenue, Portland, Oregon. A meeting notice and proxy statement will be sent to all shareholders in mid-April.

Form 10-K

The Company will provide its share-holders, without charge, a copy of the 1995 Annual Report on Form 10-K to the Securities and Exchange Commission. Requests should be made to the Corporate Secretary.

Dividend reinvestment plan

Common shareholders of record may reinvest all or a part of their dividends in additional shares under the Company's plan. Cash purchases also may be made at the current market price under this plan, and no brokerage fees will be charged. A prospectus will be sent to any registered shareholder on request.

Stock transfer agent and registrar

r all Preferred, Preference and Common Stock Issues:

Northwest Natural Gas Company

220 N.W. Second Avenue Portland, Oregon 97209

Attention: Shareholder Services

Trustee, conversion and interest paying agent

For Convertible Debentures: Boatmen's Trust Company Attention: Corporate Trust Division 510 Locust Street St. Louis, Missouri 63101 (800) 456-9852

Trustee and bond paying agent

For all bond issues: Bankers Trust Company Security Holder Relations P.O. Box 305050 Nashville, Tennessee 37230 (800) 735-7777

Common stock prices

1995

NASDAQ National Market System closing trades

1775		
Quarter	High	Low
1	31 1/2	28
2	31 1/2	29
3	32 1/4	295/8
3 4	34	30 3/4
1994 Ouarter	High	Low
1	36 1/2	333/4
2	343/4	293/4
2 3 4	32	29
4	32	28 1/2

Quarterly financial information

Dollars (thousands except	A 1	— Quarter ended — —								
per share amounts)	Mar. 31	June 30	Sept. 30	Dec. 31	Total					
1995										
Operating revenues	125,389	71,029	48,644	111,214	356,276					
Net operating revenues	73,845	41,805	28,031	68,544	212,225					
Net income (loss)	19,052	3,508	(4,348)	19,853	38,065					
Earnings (loss) per share	1.32	0.19	(0.34)	1.29	2.42*					
1994		1								
Operating revenues	128,534	66,505	48,474	124,748	368,261					
Net operating revenues	72,325	37,219	26,922	69,007	205,473					
Net income (loss)	18,780	2,465	(3,774)	17,990	35,461					
Earnings (loss) per share	1.37	0.13	(0.34)	1.29	2.44*					

Quarterly earnings per share are based upon the average number of common shares outstanding auring each quarter. Because the average number of shares outstanding has increased in each quarter shown, the sum of quarterly earnings does not equal earnings per share for the year.

Variations in earnings between quarterly periods are due primarily to the seasonal nature of the Company's business.

For further information contact:



Virginia V. Burgess Investor Relations (503) 220-2583



Linda R.Williams Shareholder Services (503) 220-2591

Report available on Equal Employment and Affirmative Action Policies

The Company has prepared a "Report on Equal Employment and Affirmative Action Policies (September 1995)" which is available, on request, to shareholders interested in these issues. To request a copy of the Report, please write to Diana J. Johnston, Vice President, Human Resources and Administrative Services, Northwest Natural Gas Company, 220 N.W. Second Avenue, Portland, Oregon 97209.



Recycled Stock: Ikonofix Gloss Design: Graphic Solutions Cover Photo: Ted Parrish Location Photography: Craig Tuttle, Kristin Finnegan Portraits: Bruce Beaton Printer: Graphic Arts Center

Northwest Natural Gas Company 220 NW Second Avenue Portland, Oregon 97209

MIST STORAGE EXPANSION PROJECT

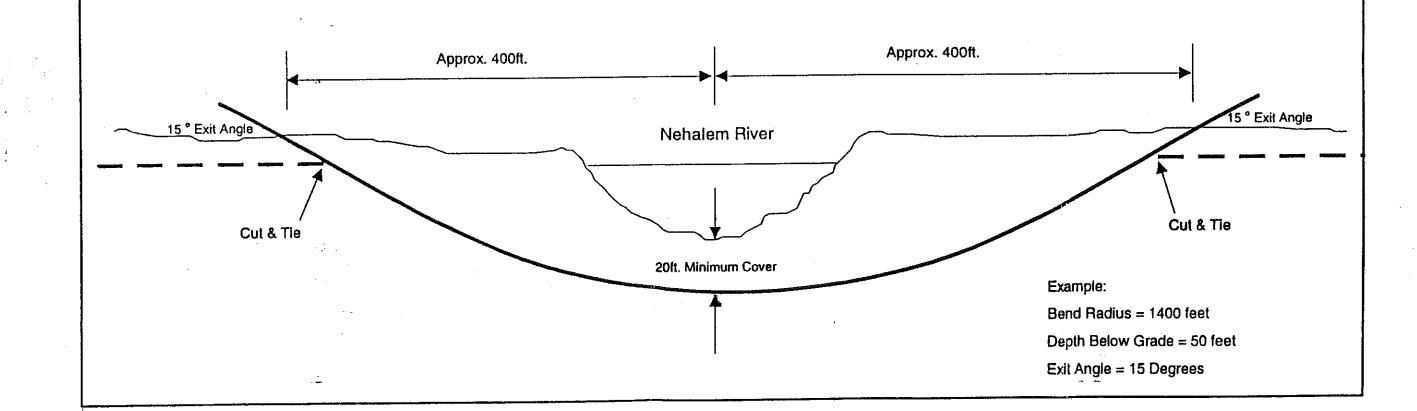
ATTACHMENT 2

NEHALEM RIVER CROSSING

South of Hwy. 202 near Mist, Oregon 2 - 16" Parallel Transmission Lines

Proposed Directional Drill Configuration

January 20, 1997 No Scale



SENT BY:

3-13-97; 1:06PM; DAMES & MOORE SEA-9168#086830200000#00;# 2/ 4



UNITED STATES DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration NATIONAL MARINE FISHERIES SERVICE ENVIRONMENTAL & TECHNICAL SERVICES DIVISION 525 NE Oregon Street POXILAND, OREGON 97232-2737



ing a second second

Mr. Dave Every Dames & Moore 500 Market Place Tower 2025 First Avenue Seattle, Washington 98121

Species List Request for a Pipeline Crossing over the Re: Nehalem River

Dear Mr. Every:

The National Marine Fisheries Service (NMFS) has reviewed your February 19, 1997, facsimile to Ben Meyer requesting a list of threatened and endangered species for a pipeline crossing over the Nehalem River.

We have enclosed lists of those anadromous fish species that are listed as endangered or threatened under the Endangered Species Act (ESA), those that are proposed for listing, and those that are candidates for listing. This inventory includes only anadromous species under NMFS' jurisdiction that occur in the Pacific Northwest. The U.S. Fish and Wildlife Service should be contacted regarding the presence of species falling under its jurisdiction.

Available information indicates that no listed species or their designated critical habitat occur in the project area. In addition, there are two species proposed for listing present in the proposed action area, the Oregon Coast coho salmon (Oncorhynchus kisutch) and the Oregon Coast steelhead (O. mykiss).

Three of the seven anadromous fish species that are presently candidates for listing under the ESA are known to be present in the proposed action area; these species are the chinook salmon (O. tshawytscha), chum salmon (O. keta) and the sea-run cutthroat trout (O. clarki clarki). It is important to note that candidates for listing have no status under the ESA.

Once a candidate is proposed for listing, or is listed, a conference or consultation may be required. Please refer to the ESA section 7 implementing regulations, 50 CFR Part 402, for information on the conference and consultation process.



2

This letter constitutes the required notification of the presence of any Federally listed threatened or endangered species or critical habitat under NMFS' jurisdiction in the permit area that may be affected by the proposed project (Appendix A to Part 330, Section C.13(5)(i)). If you have further questions, please contact Ben Meyer of my staff at (503) 230-5506.

Sincerely,

Elizabeth Holmes Gaar Habitat Program Director

Enclosure

ENDANGERED, THREATENED, PROPOSED, AND CANDIDATE SPECIES UNDER NATIONAL MARINE FISHERIES SERVICE JURISDICTION THAT OCCUR IN OREGON, WASHINGTON AND IDAHO

Listed Species

Snake River Sockeye Salmon Snake River Fall Chinook Salmon

Snake River Spring/Summer

Chinook Salmon

Umpqua River Cutthroat Trout

Oncorhynchus nerka

O. tshawytscha

O. tshawytscha

O. clarki clarki

Proposed for Listing

(The following ESUs) - -

Steelhead;

Klamath Mountains Province

Lower Columbia River Upper Columbia River

Oregon Coast Snake River Basin O. mykiss

Coho Salmon

O. kisutch

S. Oregon/N. California Coast Oregon Coast

Candidates for Listing

(all Northwest stocks of the following)

Chinook Salmon

Chum Salmon

Sockeye Sálmon O. nerka

Sea-run Cutthroat Trout O. clarki clarki

(the following ESUs)

Middle Columbia River Steelhead

Lower Columbia River/SW Washington Coast Coho Salmon

Puget Sound/Strait of Georgia

Coast Coho Salmon

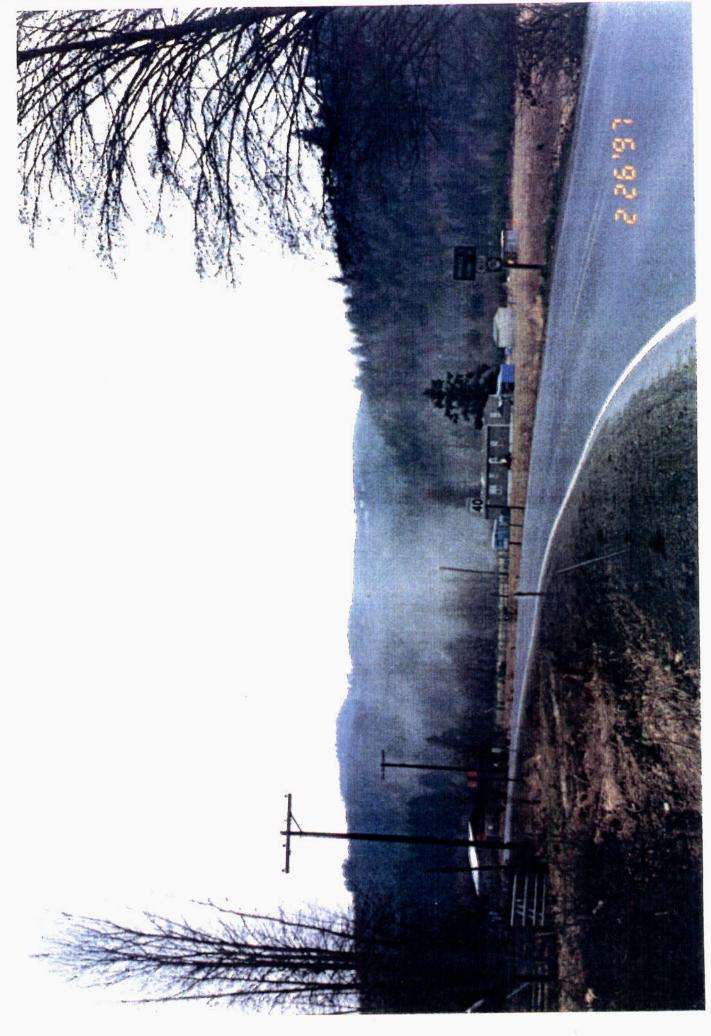
O. mykiss

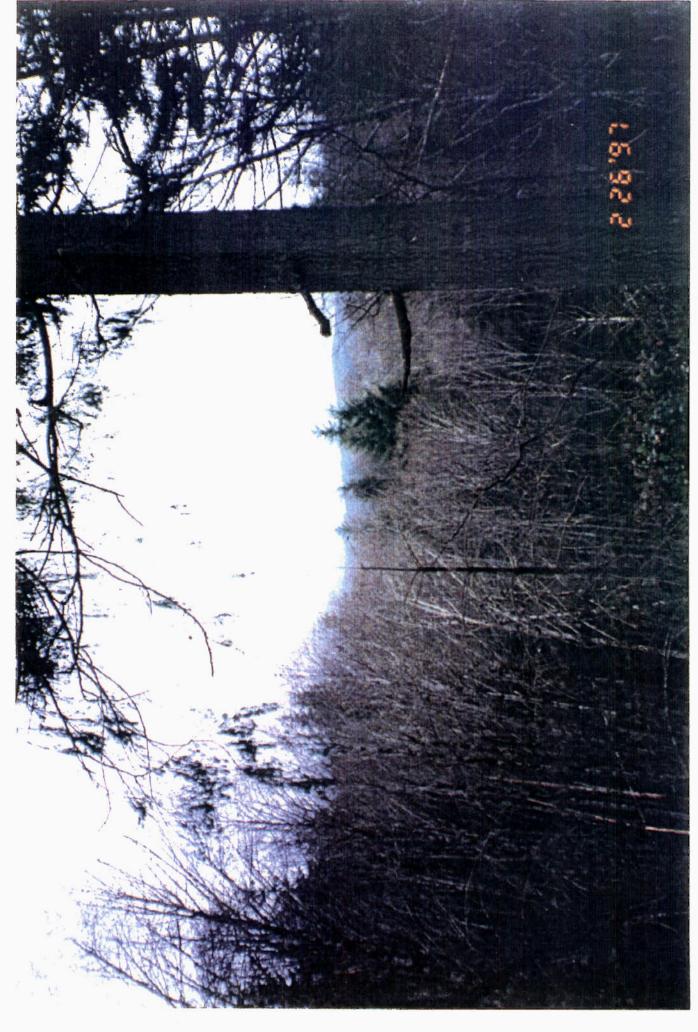
O. keta

O. tshawytscha

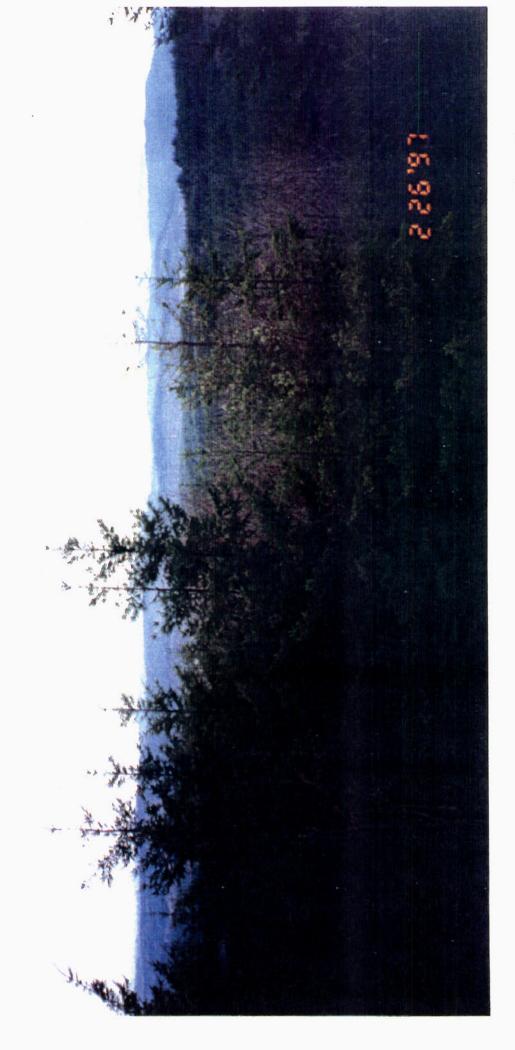
O. kisutch !

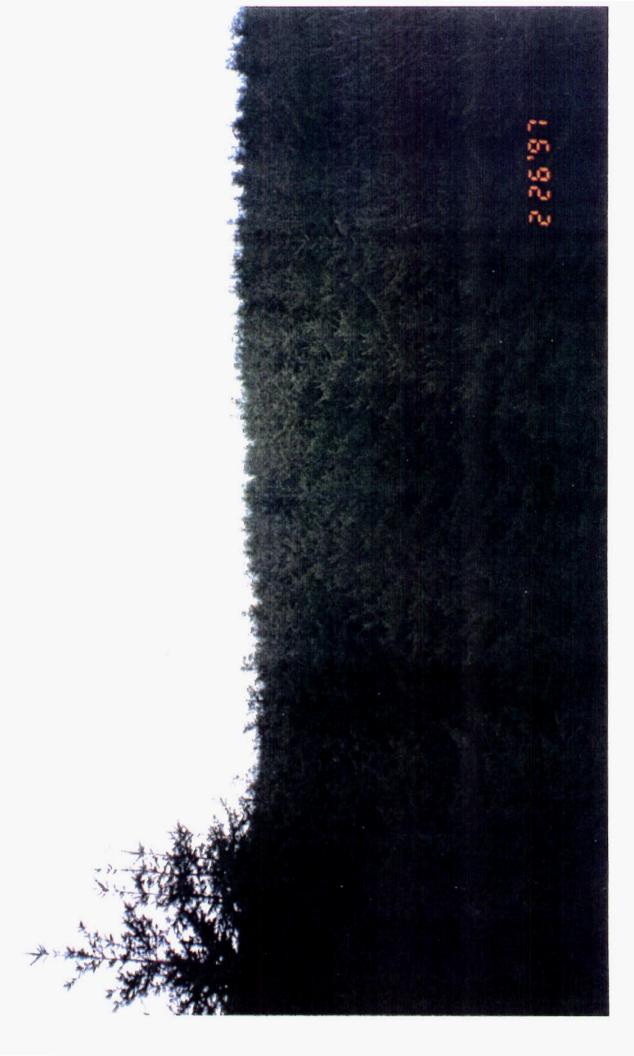
O. kisutch











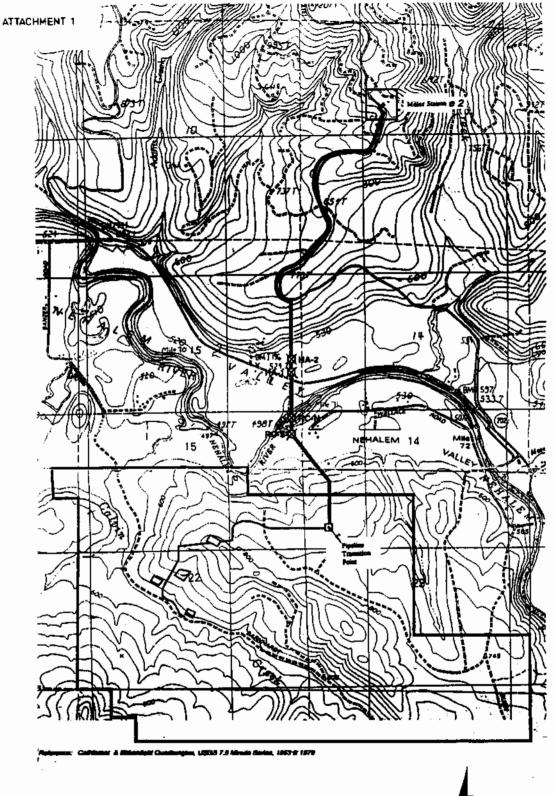












Proposed Gathering Line Alignment
Proposed Gathering Line Alignment
Proposed Wellsite Location
RC-N Approximate Boring Location
HA-2 Approximate Handauger Location

Approx. Calvin Creek Storage Pool Boundary

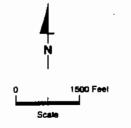


Exhibit 2

VICINITY MAP

January 1997 Mist Underground Storage Project 2[14-016-016 Mist, Oregon

COLUMBIA COUNTY

COMPREHENSIVE PLAN

JULY 1984

AMENDED

MARCH 1985

JULY 1985

RECEIVED STOEL RIVES BOLEY JONES & GREY By

SCENIC RESOURCES

DEFINITION:

Scenic areas are defined in the Statewide Goals and Guidelines as "lands that are valued for their aesthetic appearance". However, this is a very broad definition which could be applied to many resources in the County. These resources include: lands used for agricultural or forest use that are defined as open space; ecologically or scientifically significant natural areas; water areas and wetlands; historic structures; potential and approved federal wild and scenic waterways and State scenic waterways; and certain fish and wildlife areas and habitat. Many community recreational facilities in the County could also qualify as scenic areas under this definition. Therefore, the sites inventoried here are only those whose value is derived primarily from their aesthetic features rather than sites where scenic quality may only be part of its overall value.

LOCATION:

Generally, the open rural character of the land is of scenic value in Columbia County. Peaks, river valleys, falls, tidal flats, and other features form a diverse scenic landscape. Over eighty percent of the land is timbered. Farmland stretch through these forested areas along the river valleys and create patches of pleasant pastoral settings. Centers of rural activity, which have remained for the most part unchanged in recent history, dot the County. Shallow lakes, marshes, and sloughs remain in the ancient floodplain of the Columbia River. Like a mosaic, these features contrast and compliment each other, creating a varied landscape which is visually attractive.

COUNTY SCENIC RESOURCES:

SCENIC SITES

BEAVER CREEK FALLS

Location: T7N, R4W, S12, SE1/4

Quality: Beautiful natural falls in narrow creek valley

Quantity: 1 acre

Plan Designation: Forest-conservation

2. CARCUS CREEK FALLS

Location: T6N, R3W, S20, SW1/4

Quality: A scenic 105 foot falls in a wild stream surrounded by privately owned timber lands of second growth alder, fir, cedar, and maple.

1 2

Quantity: 1 acre

Plan Designation: Forest-conservation

LAVA CREEK FALLS

Location: T6N, R4W, S24, NE1/4

Quality: Falls on Lava Creek over 100 feet high, this site is surrounded by privately owned timber lands. No road access is presently available to the falls.

Quantity: 1 acre

Plan Designation: Forest-conservation

- 4. CLATSKANIE RIVER APIARY FALLS TO CARCUS CREEK

 Location: T6N, R3W, S4, 5, and 9 and T7N, R3W, S32

 Quality: A wild, deep gorge on the Clatskanie River winding through a large second growth Douglas Fir forest. This is one of the few remaining roadless river segments in the northern coast range. The Plan Designation: Forest-conservation
- SCAPPONIA RECREATION SITE

Location: T4N, R3W, S18 SE1/4

Quality: Classified and managed by the Bureau of Land Management as a Class I Visual Resource Management (VRM) area. Only natural ecological changes and very limited management activities are allowed in Class I areas.

Quantity: 20 acres includes a buffer zone around the 2 acre site. Plan Designation: Forest Conservation

STATE DESIGNATED SCENIC HIGHWAYS

- 6. Hwy. 30 between Deer Island and Rainier
- 7. Hwy. 47 between the Washington County Line and Treharme and between Pittsburg and Clatskanie.

SCENIC VIEWS

- Wayside north of Rainier on Hwy. 30
- 9. Wayside north of Rainier on Old Columbia River Highway

POTENTIAL CONFLICTING USES:

Potential conflicts for these resources are activities which degrade their aesthetic appearance. These activities include: clear-cutting, road building, and the conversion of large amounts of agricultural, forest, and other resource lands to high density residential development.

ECONOMIC, SOCIAL, ENVIRONMENTAL, AND ENERGY CONSEQUENCES:

Visually, the blanket of green forestland stretching over the hills of the region is a valuable social resource for the County. However, timber resources are also economically valuable. They provide jobs, contribute tax dollars, and support local service industries. Curtailment of timber activities to retain the aesthetic quality of the resource could decrease the income received by the County from this resource. Presently, small acreages

of timber are being retained along State scenic highways to preserve visual appearances.

The County has taken a number of "built and committed" exceptions to the density level in certain areas, some of which fall along the identified scenic highways. The exceptions will allow a higher rural density in these areas than allowed on surrounding lands. While it is possible that this density increase may change the general scenic quality of the area, it is unlikely that it will degrade it. The areas are small in comparison to the large acreages of surrounding resource land which are zoned Primary Agriculture (PA-38), Primary Forest (PF-76), and Forest Agriculture (FA-19). If higher density development were not allowed in the areas, landowners may experience extreme economic and social hardships because of lost opportunities.

Most of the areas inventoried are on public property but Carcus Creek Falls, Lava Creek Falls, and the Clatskanie River-Apiary Falls to Carcus Creek are presently undeveloped privately held scenic resources. There is no present public access to these areas. Consequently, their social value is limited. However, these scenic sites could potentially be made more accessible to the public in the future. For example, a trail system could be developed up Carcus Creek to Carcus Creek Falls and Lava Creek Falls, assuming an easement along the creeks can first be obtained from the landowners. Potential also exists to connect these scenic sites with a 280 acre tract of County-owned land situated within 1/2 mile of both falls. The falls are rare features whose value lies primarily in their aesthetic appearance. Allowing conflicting uses could have serious social and environmental consequences. However, negative economic consequences will be felt if current timber operations are severely restricted. In order to encourage private landowners to allow access to these sites, the County has chosen to place relatively few limits on conflicting uses. Thus, while the County has restricted residential development on these sites, it has not prohibited commercial forestry. Commercial forestry would impact the land surrounding the falls and river, but would not eliminate the scenic values of the falls and river themselves. impact of commercial forestry will also be short term because of reforestation requirements.

FINDINGS:

These scenic features have been identified and presented to alert citizens and officials of their significance. Protecting this view quality in the County is socially and possibly environmentally beneficial. However, views often encompass large amounts of land and general restrictions placed to preserve a certain view could have both negative economic and social consequences for the citizens of Columbia County. Therefore, measures need to address and protect certain qualities of the area. Scenic features in Columbia County generally lie within areas zoned for agricultural and forest uses. Scenic quality will be protected by retaining the general low density of the area. In addition, land use activities along Class I streams, including those identified as scenic sites, are restricted by the Riparian Area overlay zone and the Forest Practices Act. Additional restrictions are unneeded and would be counterproductive because the landowner might react by further limiting public access or refusing to grant public access.

SCENIC SITES, VIEWS, AND HIGHWAYS

GOAL:

To protect and enhance the aesthetic value of scenic resources in Columbia County.

POLICIES: It is the policy of the County to:

1. Protect and enhance the aesthetic appearance of scenic areas in the County through the use of low density residential standards, natural resource related overlay zones, and County encouragement.

· TXX

- Examine and encourage the use of voluntary tools and techniques to make Carcus Creek, Lava Creek, and Beaver Creek Falls accessible to the public. Avoid additional mandatory restrictions on private property to encourage landowners' cooperation.
- 3. Support the designation of scenic corridors by Federal and State land management agencies for land under their jurisdiction.

SCENIC WATERWAYS

There are no designated scenic waterways in Columbia County. The Nehalem River has been identified by the federal government and the Oregon State Parks Division as a potential scenic waterway. While the County recognizes the Federal and State designation, we do not endorse or adopt the Nehalem River as a potential scenic waterway.

POLICIES: It is the policy of the County to:

1. Participate in the Federal and State scenic waterways designation process and to apply the Goal 5 rule if, and when, the Nahalem River is designated as a scenic waterway.

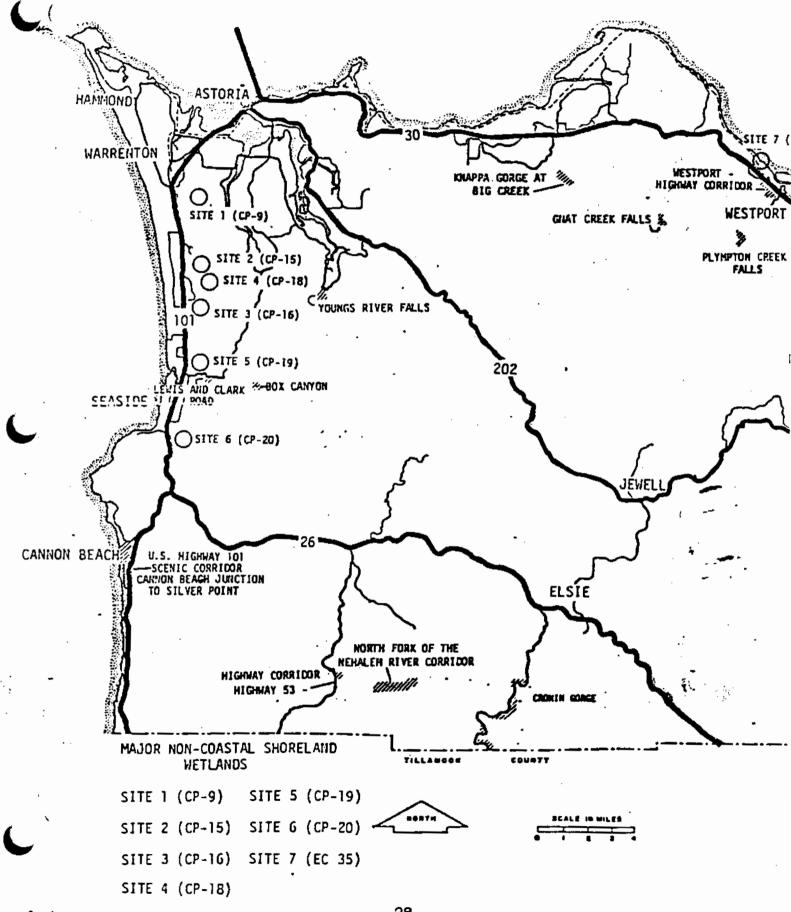
Clatsop County Comprehensive Plan Goals and Policies

June 1994

Prepared by Clatsop County Department of Planning and Development

Asterisks * and ** will be seen throughout this document. These represent where amendments were made by *Ordinance 83-17, dated September 30, 1983 and by **Ordinance 84-9, dated May 23, 1984. For full review of these Ordinances contact the Clatsop County Department of Planning and Development.

Scenic Conservancy Areas and Wetlands



Goal 5 - Open Spaces, Scenic & Historic Areas and Natural Resources

<u>Goal</u>

To conserve open space and protect natural and scenic resources.

Mineral and Aggregate Resources*

Goal

To protect and ensure appropriate use of mineral and aggregate resources of the county, while minimizing any adverse effects of mining and processing upon surrounding land uses.

Policies

- The County shall protect significant mineral and aggregate resources consistent with Statewide Planning Goal 5 and the process for complying with the Goal specified in Oregon Administrative Rules Chapter 660, Division 16.
- In making a decision whether to protect a significant mineral or aggregate site from conflicting uses, the County shall recognize that Goal 5 requires the protection of natural resources for future generations, and that the requirements of other applicable Statewide Planning Goals must be considered in any analysis of conflicting uses.
- 3. The County shall maintain an inventory of mineral and aggregate resources sites. The Comprehensive Plan inventory shall consist of three parts:
 - a. An inventory of "significant sites" identified through the Goal 5 process as important resources that will be protected from conflicting uses;
 - An inventory of "potential sites" for which sufficient information concerning the location, quality, and quantity of a resource site is not adequate so as to allow the County to make a determination of significance;
 - c. An inventory of "other sites" for which available information demonstrates that the site is not a significant resource to be protected.
- 4. The location of a mineral or aggregate resource shall be identified as the site of a recoverable source of material. A resource site may consist of all or portions of a parcel, and may comprise contiguous parcels in different ownerships. Identification of a resource site need not include mineral and aggregate reserves that are irrevocable committed to other land uses which are incompatible with surface mining.

- 5. For an aggregate site to be determined significant, the resource must meet Oregon Department of Transportation specifications for concrete aggregate rock. It is the County's policy to protect the highest quality rock for future use.
- 6. For an aggregate site to be determined significant, the site must possess a minimum of 250K cubic yards of minable reserves. It is the policy of the County to protect a variety of large reserves in order to serve the regional market.
- 7. The significance of non-aggregate mineral resources shall be judged on a case-by-case basis, taking into account information concerning the commercial or industrial use of the resource, as well as the relative quality and relative abundance of the resource within at least the County.
- 8. Because material source sites owned or controlled by municipal, County or state government agencies have been acquired for the purpose of maintaining the public road system, and collectively form a network of great importance, the County shall deem such sites presumptively significant. Such sites shall be analyzed along with other significant sites to establish the appropriate level of protection from conflicting uses.
- 9. The County shall recognize existing surface mining operations as significant resources pursuant to Goal 5, and shall allow existing operations to continue for two (2) years without conforming to the performance standards in the zoning ordinance. Expansion beyond the limits of an existing site shall be in accordance with County zoning regulations.
- 10. The scope of an existing or "grandfathered" aggregate operations shall be established by:
 - a. Authorization by a County land use approval; or
 - b. The extent of the area disturbed by mining on the effective date of this ordinance; or
 - c. The continuous pursuit of a specific mining plan by an operator for not less than five years.
- 11. In order to maintain the right to continue an existing surface mining operation and bring the County's inventory of mineral and aggregate resources into compliance with Goal 5, an analysis of economic, social, environmental and energy (ESEE) consequences performed for an existing site shall only consider the consequences of potential conflicting uses upon current or future operations, and the consequences of mine expansion on existing or potential conflicting uses.
- 12. Sites on the "other sites" inventory shall not be protected pursuant to Goal 5.

- 13. For sites on the "potential sites" inventory, the County shall review available information about mineral and aggregate resources, and if the information is sufficient, determine the site to be significant when one of the following conditions exists:
 - a. As part of the next scheduled periodic review;
 - b. When a landowner or operator submits information concerning the potential significance of a resource site and requests a Comprehensive Plan amendment:
 - c. When resolution of the status of a potential resource is necessary to advance another planning objective.
- 14. For each site determined to be significant, the County shall complete the remainder of the Goal 5 process of identifying conflicting uses, analyzing the ESEE consequences of the conflicting use(s), and designating a level of protection from conflicting uses. If the final decision concerning the site is to fully preserve or partially protect the resource from conflicting uses, the site shall be zoned with the Mineral and Aggregate Resources Overlay.
- 15. When analyzing the ESEE consequences of potential conflicts between a significant mineral or aggregate resource and another significant Goal 5 resource, the County shall consider the protection program adopted for the conflicting resource. Conflicts with other natural resources shall not be the basis for mining restrictions unless the County has included the conflicting resource on the inventory of significant Goal 5 resources, and adopted a resource protection program.
- 16. The County may consider the effects of surface mining operations on public roads and traffic. Consideration may include review of proposed routes, site distances at access points, roadway width and alignment, and level of service. The County may impose conditions or restrictions directly related to the impact created by surface mining; however, any conditions or restrictions shall not be approval criteria, and shall be applied uniformly to all road users in a manner consistent with the County's transportation plan.
- 17. In order to approve surface mining at a site zoned for exclusive farm or forestry use, the County shall find, as part of the ESEE analysis, that the proposed activity will not: (1) force a significant change in, or significantly increase the cost of, accepted farming or forestry practices on surrounding lands, and (2) will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fire suppression personnel.
- 18. The County shall not independently apply the Mineral and Aggregate Resources Overlay to land within another County, or within a city or its urban growth boundary. The County shall seek to ensure protection of significant sites where the impact area

- surrounding the resource extends across jurisdictional boundaries through cooperative agreements with another County or a city.
- 19. The County shall require increased setbacks, insulation, screening, or similar measures as conditions of approval for any new conflicting use within an impact area surrounding a mineral or aggregate resource site when such measures are deemed necessary to resolve conflicts identified in a site-specific Goal 5 analysis.
- 20. The County may establish and impose conditions on operation of a surface mine when deemed necessary as a result of a site-specific Goal 5 analysis. Where such conditions conflict with criteria and standards in the Mineral and Aggregate Resources Overlay, the conditions developed through the Goal 6 analysis shall control.
- 21. As part of the ESEE analysis and decision on the level of protection to be afforded significant mineral and aggregate resource sites, the County shall determine the appropriate post-mining use of the site.
- 22. The County recognizes the jurisdiction of the Department of Geology and Mineral Industries for the purpose of the mined land reclamation pursuant to ORS 517:750 to 517.900 and the rules adopted thereunder.
- 23. Unless specifically determined on a case-by-case basis, it shall be the policy of the County, pursuant to ORS 517.830(3), that DOGAMI delay its final decision on approval of a reclamation plan and issuance of an operating permit, as those terms are defined by statute and administrative rule, until all issues concerning local land use approval have been adjudicated by the County.
- 24. No surface mining or processing activity, as defined by the zoning ordinance, shall commence without land use approval from the County, and approval of a reclamation plan and issuance of an operating permit by DOGAMI.
- 25. Land shall not be rezoned to remove the Mineral and Aggregate Resources Overlay until the mineral or aggregate resource is depleted, and the site has been reclaimed.

Energy Sources

- Development shall not be allowed to impair the feasibility of potential wind generating facilities at sites identified as appropriate for such generation.
- The County will rely on state and federal permitting processes to govern the location of low-head hydro projects and to resolve any conflicts that may result from such projects.

- Clatsop County shall apply the Goal 5 Administrative Rule to oil, gas, nuclear, and large-scale hydro that are proposed in the future.*
- 4. If and when the City of Astoria intends on constructing a hydroelectric facility at the Youngs River Falls site, Clatsop County shall, in cooperation with the City of Astoria, apply the Goal 5 Administrative Rule.*

Scenic Sites

- Should the Knappa Gorge at Big Creek site be placed on Boise Cascade's five year timber management plan, the County and Boise Cascade will develop a program to resolve the conflicts between timber harvesting and the site's scenic values.
- 2. The State Department of Forestry shall notify the County of any proposal to change a scenic conservancy designation for sites listed in the Comprehensive Plan as having scenic values. Any designation change by the Department of Forestry shall be preceded by a full evaluation under the Goal #5 Administrative Rule.

Fish and Wildlife Areas and Habitats

- 1. To ensure that future development does not unduly conflict with Major Big Game Range, the County shall:
 - a. designate the majority of its timber lands F-80;
 - require that review and conditional uses in the F-38 and AF-20 zone be allowed only if they are found to be consistent with the maintenance of big game range;
 - c. require that review and conditional uses in the F-38 and AF-201 zone be subject to clustering and siting criteria;
 - d. submit proposed review and conditional use applications to the Oregon Department of Fish and Wildlife for their comments on consistency with Major Big Game habitat and recommendations on appropriate siting criteria to minimize any conflicts; and
 - e. submit all proposed Plan and zone changes of land zoned F-80, F-38, and AF-20 to a more intensive use zone to the Oregon Department of Fish and Wildlife for a determination of possible conflicts with big game habitat requirements. If the Department identified conflicts, the County will consider recommendations for resolving these conflicts.
- To ensure that future development does not unduly conflict with Peripheral Big Game Range, the County shall:
 - require that review and conditional uses in the AF-20 zone be allowed only if they are found to be consistent with the maintenance of big game range;

- b. require that review of conditional uses in the AF-20 zone be subject to clustering and siting criteria;
- c. submit proposed review and conditional use applications to the Oregon Department of Fish and Wildlife for their comments on consistency with Peripheral Big Game Range and recommendations on appropriate siting criteria to minimize any conflict; and
- d. submit all proposed plan and zone changes of land zoned AF-20 to the Oregon department of Fish and Wildlife for a determination of possible conflicts with big game habitat requirements. If the Department identifies conflicts, the County will consider recommendations for resolving these conflicts.
- 3. The County shall rely on strict enforcement of the Oregon Forest Practices Act to protect riparian vegetation along Class I streams and lakes, and Class II streams affecting Class I streams, from potential adverse affects of forest practices.
- 4. To protect riparian vegetation along streams and lakes not covered by the Forest Practices Act, the County shall require a setback for non-water dependent uses.
- The County shall rely on the State Department of Water Resources to insure that minimum stream flow standards required for the maintenance of fish habitat are developed and implemented.
- Building permit applications, where a stream is proposed as the water source, shall be accompanied by a water right permit.
- 7. The County shall rely on the Division of State Lands' permit process, under the Fill and Removal Law, to insure that proposed stream alterations such as bridges, channelization, or filling do not adversely affect the stream's integrity or its value as fish habitat.
- 8. New developments shall not restrict existing public access to rivers, streams, or lakes. New developments are encouraged to provide additional public access to rivers, streams and lakes where such access is consistent with the area's environmental characteristics.
- 9. The County shall submit all proposals with a potential for substantial impact on identified Columbian White-tail deer habitat (e.g. subdivision, dredge material disposal, industrial development, and land clearing of more than one acre) to the Oregon Department of Fish and Wildlife and the U.S. Fish & Wildlife for their determination of conflicts. If either agency identifies conflicts and makes recommendations for resolving these conflicts, the County shall implement those recommendations to the maximum extent feasible, consistent with other land use planning requirements. If in the future subpopulation of the Columbia White-tailed

deer are located which are not within identified essential habitat, the County will consider recommendations for protection of these areas to the extent feasible consistent with other land use planning requirements including but not limited to the Goal 5 Administrative Rule.*

- 10. The County will establish a procedure for protecting sensitive nesting sites from incompatible uses and activities.
- 11. The County will require that any additional rural residential development at River Ranch be clustered on the more northerly portion of the site. The County will implement other measures recommended to it, by the Oregon Department of Fish and Wildlife and the U.S. Fish & Wildlife Service, for minimizing the impact of additional rural residential development on Columbian White-tail deer.*
- 12. Clatsop County shall rely upon the Forest Practices Act and any supplemental agreements between the Fish and Wildlife Commission and the Board of Forestry to protect critical wildlife habitat sites.*

Wetlands

- 1. The County will protect identified significant freshwater wetlands, for which no conflicting uses have been identified, from incompatible uses.
- 2. A ten acre site within Wetland Site 6 shall be provided for gravel extraction.
- 3. The following requirements shall apply to Wetland Site 7 (which also contains white-tail deer habitat).
 - a. All industrial development shall be located north of the railroad right-of-way. The area between the railroad right-of-way and U.S. Highway 30 shall be designated for protection of its wetland characteristics.
 - b. Development of land adjacent to Driscoll Slough shall be carried out in a way that will minimize the alteration of riparian vegetation, degradation of water quality and stream sedimentation. Proposed development will be evaluated against the Department of Fish and Wildlife's management objectives of maintaining vegetative cover, particularly riparian vegetation, and the maintenance of corridors that provide for deer movement between habitat areas. Construction of a bridge or other transportation access across the slough shall be the minimum necessary to accomplish the project. Piling is preferred to filling for any access corridor across Driscoll Slough.
 - c. Industrial development on the eastern portion of the site shall be designed to minimize or avoid the removal of riparian vegetation along Westport Slough. Riparian vegetation removal shall be permitted where direct access to the water is required.

d. Filling of the site shall not be permitted until a specific development proposal has been reviewed and approved by the County.

Natural Areas

- Significant natural and scientific areas and scenic sites should be set aside for preservation and managed so as to protect the unique characteristics of the area.
- The County will cooperate with appropriate State and Federal agencies and private groups to ensure that examples of the full range of Oregon's natural ecosystem are preserved for future study and enjoyment.
- A 1/4 acre site, located on the portion of Onion Peak designated Natural, shall be reserved for a potential radio transmission facility. The siting and placement of such a facility shall minimize impacts on the area's natural qualities.
- 4. The Natural designation for Sugar Loaf Mountain shall not affect the continued operating and maintenance of the radio transmitter facility located there.

Water Resources and Watersheds

- 1. The County will cooperate and coordinate with State and Federal agencies in assuring the maximum beneficial use of all water areas in the County.
- 2. The County will coordinate its actions with water quality planning and implementation activities carried out by such state agencies as the Department of Environmental Quality, the Soil and Water Conservation Commission, the Department of Forestry, and the Department of Water Resources.
- 3. Where municipalities or water districts have identified possible conflicts between forest management practices and the maintenance of the integrity of their watershed, the County encourages these to work with the Northwest Region Forest Practices Committee in the development of amendments to the Oregon Forest Practices Act that will provide needed modification and protection of state licensed water supply systems.
- 4. The County encourages the development of community dock facilities rather than individual piers or docks.
- As information becomes available, Clatsop County shall apply Goal 5 Administrative Rules to the 14 identified watersheds and the small or minor watersheds identified in this element.*

COLUMBIA COUNTY FOREST, PARKS AND RECREATION MASTER PLAN

Columbia County Forest,
Parks and Recreation Department
1054 Oregon Street
St. Helens, Oregon 97051
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> Gleuda Williams, Member Columbia County Park Advisory Commission

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GOAL

The Columbia County Parks will provide the citizens of Columbia County and its visitors, with safe, desirable settings for outdoor recreation. We further strive to promote a positive community image, solicit community involvement and ensure operational effectiveness and efficiency.

POLICIES

It shall be the policy of the Columbia County Parks to:

- Establish and maintain the Park Advisory Commission, in addition to regular advisory duties, draft public parks plans to aid in meeting the recreational needs of the people of Columbia County and its visitors.
- Recognize hunting and fishing as recreational activities which should be maintained and supported.
- 3. Develop regional parks, in conjunction with the cities and local civic groups.
- 4. Designate county parks as a "County Park", "County Forest", or "County Forest-Park".

Property designated as a County Park shall be managed for recreational use, and subject to the use of the Community Service-Recreational Zoning Designation.

Property designated as a County Forest shall be managed for production of forest products subject to PF-76 Zoning Designation, with all proceeds of the sale to go to the Forest Parks & Recreation Department for operation, maintenance and or acquisition of park property.

Property designated as a County Forest-Park shall be managed for combined recreational use, and forest products with all proceeds of the sale to go to the Forest Parks & Recreation Department for operation, maintenance and or acquisition of park property.

- Recognize that Columbia County Parks have the potential to play a valuable role in county economic development.
- 6. Encourage and aid increased use of parks by nearby metropolitan populations.
- 7. Continue to seek funding, development and expansion for existing parks, as well as the creation of new parks and pedestrian/bicycle trails.
- 8. Maintain, operate and develop county parks in compliance with the Americans with Disabilities Act, county and state health guidelines.
- 9. Plan and establish a Parks Information Plan. Activities such as wind surfing, canoeing, boating, fishing and bird watching, as well as camping and day-use, should be included in local and regional maps and informational brochures or other media.
- 10. Inventory and list potential recreation sites within the county to determine future recreational opportunities. Included in this would be the development of hiking/equestrian overland trails, bike/pedestrian trails or lanes, and a Columbia River canoe trail within Columbia County.
- Acknowledge the need for a major state park along the Columbia River, in Columbia County, and offer support and cooperation in making a state park a reality.
- 12. Encourage communities within the county and the County Planning Commission, to plan for long term recreation and open spaces in future developments. (Columbia County Subdivision and Partitioning Ordinance, Section 914 B)
- 13. Recognize existing songbird, game and non-game bird watching areas and strive to preserve and enhance wet lands within present and future park lands.
- 14. Locate and identify areas of historic significance.

LIST OF COUNTY PARKS, FORESTS, FORESTS/PARKS & BOAT DOCK FACILITIES

BEAVER BOAT RAMP BEAVER FALLS PARK BIG EDDY PARK CAMP WILKERSON FOREST-PARK CARCUS CREEK FOREST CARCUS CREEK PARK FISHER PARK GILBERT RIVER BOAT RAMP GILBERT RIVER DOCKS HUDSON-PARCHER PARK J.I. COLLINS MEMORIAL PARK LAUREL BEACH PARK NEHALEM RIVER WAYSIDE PARK PRESCOTT BEACH PARK SCAPONIA PARK SCAPPOOSE AIRPORT PARK

COUNTY PARKS, FORESTS, FORESTS/PARKS & BOAT DOCK FACILITIES

The County operates and maintains sixteen (16) parks, forests, forest-parks and boat dock facilities. Five of the County parks have resident managers who collect fees, maintain facilities and patrol the parks to insure safe, comfortable conditions for park users. Reservations during summer months at these parks are encouraged due to increased seasonal use. Reservations can be made with park managers.

RESIDENT MANAGED COUNTY PARKS

1. Big Eddy Park

Located on Nehalem Highway 47 in the Vernonia area, this nine acre park has large, grassy lawn areas bordered by groves of Douglas Fir, Western Red Cedar and Alder trees on two sides. The rest of the park is bordered by the Nehalem River, a swift flowing waterway that allows fishing and boating activities for park users.

In addition, this park offers picnic tables and cooking grills, parking, a hard surface boat ramp, restroom facilities, tent camping, recreational vehicle sites with water and electrical hook-ups, firewood, playground equipment, and a sanitary dump station. Big Eddy serves local, metro and interstate travelers.

2. Camp Wilkerson Park

This 280 acre park is located on Apiary Road. A small amount of old-growth forest as well as large second growth Douglas Fir, Western Red Cedar, Grand Fir and Alder trees grow in a deep forest setting. The park has a log lodge with kitchen facilities, restroom/shower building and Adirondack camp shelters scattered throughout the woods. Trails, a recreation field, parking and a small rustic building suitable for meetings, make Wilkerson a popular park for large groups.

The park serves local and metro users as well as Southwest Washington groups. Tent camping or camping in the camp shelters throughout the year is encouraged.

3. Hudson-Parcher Park

The park consists of 27 acres with wooded picnic and camping areas, and open playing fields for baseball and other field games. It is situated on Larson Road, across from Rainier High School and grade school complex. It serves local residents and interstate travelers.

Restrooms/showers, a log building with cooking facilities, tent and recreational vehicle camping with electric, sewer and water hook-ups, parking, firewood and playground equipment are available.

4. Prescott Beach Park

A large sandy beach near the town of Prescott, adjacent to Trojan Power Plant, the park accommodates the physically disabled by providing handicapped access to restrooms, picnic shelter, tables and grills, parking and fishing access to the Columbia River. Twenty day-use sites with tables and grills and parking areas make public access to the shore convenient for all users.

5. Scappoose Airport Park

Located near the city of Scappoose and adjacent to the Scappoose Airport, this two-acre park offers recreational vehicle hook-ups with electric, water, sewer, sanitary dump station, cooking grills, a small playground area, tent spaces, picnic area and restroom/shower facilities. Fire wood is available.

Airport Park serves a population of highway recreational vehicle users and bicyclists. Local residents use the picnic and playground area.

NON-RESIDENT COUNTY PARKS

1. Laurel Beach Park

A day-use picnic and parking area near the Columbia River, the park is used by fishermen and families.

Scaponia Park

A roadside park located five miles Southeast of Highway 47 on the Scappoose-Vernonia Road. Water and restrooms, campsites with picnic tables and grills are available. It serves metro, local and interstate travelers and hunters.

COUNTY BOAT DOCK FACILITIES

1. Beaver Boat Ramp

Located on Highway 30 on the west side of the city of Clatskanie, the park has restrooms, picnic tables, cooking grills, boat ramp and boat docks and a landscaped parking area.

2. J.J. Collins Memorial Marine Park

The park is located on "Coon Island", a 23 acre island in Multnomah Channel, near Scappoose. A 1-1/2 mile hiking trail winds about the perimeter of the island allowing access to campsites complete with picnic tables and grills for picnicking or camping. A covered picnic shelter, restroom facilities and memorial site are situated near the east float facility. Transient floats for boating use are located on both the eastern and western shores of the park.

The park remains in natural state with native cottonwood and willow trees, grasses and blackberries in abundance. Deer, raccoon, beaver, ducks, Canadian geese, and the rare Purple Martin can be seen on the island. The park can be reached by boat only.

3. Courthouse Docks

This facility provides moorage for Columbia river boaters access to the City of St. Helens.

4. Gilbert River Boat Ramp

Located on Sauvie Island, the facility has restrooms, boat ramp, boarding floats and parking available. One-fourth (1/4) of a mile south, on the Gilbert River, is the Gilbert River transient docks, which accommodate boaters needing tie-up space.

UNDEVELOPED COUNTY PARKS

Park designated properties, owned by Columbia County, which are undeveloped:

1. Beaver Falls Park

Approximately 30 acres on Beaver Creek on Beaver Falls Road in the Clatskanie-Delena area.

2. Carcus Creek Park

52.9 acres of timber land, located in Section 20, on a tributary of Carcus Creek, in the hills Southwest of Swede Town Road near Clatskanie. There is no public access.

3. Fisher Park

Nine undeveloped acres near Scappoose on Fisher Creek near Airport Park.

4. Nehalem River Wayside

One-half acre along Highway 47 and the Nehalem River approximately one mile North of Big Eddy Park.

COUNTY FOREST

1. Carcus Creek Forest

240 acres located in Section 19, Township 6 North, Range 3 West, WM, Columbia County, Oregon.

2. Apply Valley Forest

71 acres located in N1/2 NE 1/4, Section 3, Township 3 North, Range 2 West, WM, Columbia County, Oregon.

COUNTY FOREST-PARK

1. No listings under the Forest-Park designation at this time.

OTHER COUNTY FACILITIES

- 1. Goble Boat Ramp Goble. Access to the Columbia River
- 2. Johnson's Boat Ramp Scappoose. Access to Multnomah Channel

PUBLIC & PRIVATE RECREATIONAL FACILITIES

(Recreational facilities owned and operated either privately or by different agencies in Columbia County.)

- 1. Airport Park Vernonia (City)
- 2. Anderson Park Vernonia (City)
- 3. Banks-Vernonia Linear Park (Oregon State Parks)
- 4. Bay Port Marina St. Helens (Port of St. Helens)
- Boise-Cascade Park St. Helens (private)
- Clatskanie City Park Clatskanie (Clatskanie Park and Recreation District)
- 7. Dibblee Point Beach Rainier (State)
- Gunners Lake Chapman (Cavenham)
- 9. Hawkins Park Vernonia (City)
- 10. Jones Beach Clatskanie (Port of St. Helens)
- 11. Vernonia Lake Park Vernonia (City)
- 12. Mayger Boat Ramp Mayger (State Game Commission)
- 13. Oak Island Ramp Sauvie Island (State Game Commission)
- 14. Rainier City Park Rainier (City)
- 15. St. Helens City Parks St. Helens (City
- 16. St. Helens Golf Course Warren (private)
- 17. Sunset Wayside area (State owned and operated)
- 18. Vernonia Golf Course Vernonia (private)
- 19. Willow Bar (State Game Commission)
- 20. Trojan Nuclear Power Plant Park (private)

RECREATIONAL VEHICLE AND CAMPING FACILITIES OWNED AND OPERATED BY CITIES WITHIN COLUMBIA COUNTY:

OVERNIGHT USE

Clatskanie

Clatskanie City Park offers four, full-service RV sites, with additional water and electric sites available. Restrooms, with showers for campers at the swimming pool nearby, picnic areas with grills, a gazebo with electrical outlets, picnic shelters, and covered barbecue pit, playing fields, swimming pool open only during summer vacation, fishing in the Clatskanie River, a horse arena, playground equipment and tennis courts are available.

City of St. Helens

McCormick Park has 50 acres developed and 22 1/2 acres undeveloped. A playground, picnic area with grills, two baseball diamonds, restroom and 1.1 mile of developed workout trail with exercise stations are available. Tent camping is allowed, but the park is not equipped to supply water to the campsites.

Sand Island Marine Park is a 28 acre park located in the Columbia River across the channel from the Columbia County Courthouse. Transient moorage is available for boaters, tent camping, picnic tables, grills, restrooms and a lawn area is available.

. Vernonia

Airport Park, located two-and-one-half miles out of town, adjacent to the Vernonia Airport, offers camping for tents and self-contained RV's on the banks of the Nehalem River.

Anderson Park, in downtown Vernonia, has a resident manager. The park is equipped with 20 sewer, electric and water hook-up sites for RV camping. The park offers tent camping, fishing in nearby Nehalem River, horseshoe pits, restrooms, a horse arena, cook building, and picnic and playground facilities and

a sanitary dump station. The Banks-Vernonia Linear trail system uses Anderson Park as a trailhead.

Lake Park has a paved 1.8 mile trail which borders the 54 acre fishing lake. Tent camping is allowed presently, with plans for development of two more acres for picnic shelter, rest-rooms and camping sites.

DAY USE

City of St. Helens

Campbell Park consists of 6 1/2 acres with playground equipment, two baseball diamonds, restrooms, picnic shelters, four tennis courts, cooking grills and three horse-shoe pits.

Civic Pride is a 2 acre park near Condon Elementary School. Playground equipment, picnic area with cooking grills, rest-room and water available.

Columbia Botanical Gardens is 8.36 acres of natural area located in a former gravel quarry. One-half mile of forest trails are maintained by the City.

Columbia View Park consists of 2 acres on the bank of the Columbia River by the County Courthouse. A gazebo, play-ground, picnic tables, restrooms with showers, and water are available.

Godfrey Park consists of 2 acres, a playground, picnic shelter, tables, grills, water, horse-shoe pits and portable restrooms during summer use.

Heinie Heumann Memorial Park consists of 2.12 acres with playground equipment, picnic tables and portable restrooms during summer use.

Little League Park has 2.69 acres on 6th Street, in two baseball diamonds.

Trojan Nuclear Power Plant Park, six miles South of Rainier, consists of 75 acres with two clusters of six outdoor cooking shelters equipped with electric stove tops, electrical outlets, sinks and cutting boards. Restrooms, playing fields

with two backstops, four sand-volleyball courts, with nets and eight horse-shoe pits, with horse shoes, are available.

Vernonia

Ora Bolmeier Park is located on Louisiana Street near the Columbia County Museum in downtown Vernonia, with playground equipment and picnic tables.

Hawkins Park, in downtown Vernonia, is the site of the Rock Creek Swimming hole. During summer vacation a portable dam is put across Rock Creek and the City furnishes a lifeguard. The dam is removed when school starts in the fall.

Clatskanie

Jones Beach is located on the Columbia River shoreline on land owned jointly by the Department of Fish and Wildlife and the Port of St. Helens. The Port Commission is actively engaged in development of the site, with parking, sanitation and picnic facilities planned. The property borders farm lands and is accessible by narrow county roads. Wind surfers and fishermen use the area heavily and attempts are being made to provide equal use areas for the groups. The economic impact in nearby Clatskanie and Westport has been noted, as well as possible traffic and environmental problems that may occur.

Rainier

Rainier City Park is located on the Columbia River. The park has a large sandy beach, landscaped lawn area with picnic tables, tennis courts, restrooms, playground equipment, paved walking paths, and parking lot.

Rainier City Dock, boat ramp and restrooms near the center of the town, on the Columbia River.

OREGON RECREATION TRAILS

The National Trails System Act of 1968 gave national recognition to the growing demand for recreation trails, denoting three types of trails. The <u>natural recreation trails</u> are those located in and near urban areas where there is the greatest need. The <u>national scenic trails</u> are long distance trails with significant scenic, historic, natural and cultural features. These two types of trails are joined by connecting or side trails. The Appalachian and the Pacific Crest Trails were both designated as National Scenic Trails in 1968. The Continental Divide National Scenic Trail was added by Congress in November 1978.

In 1971, Oregon passed the State's Recreation Trails System Act. The purpose of the Act was to establish a system of trails for hiking, horseback riding and bicycling.

Additional emphasis is to be placed upon developing trails in and connecting, highly scenic areas. Trails are to be located with the following priorities:

- 1. on state land;
- 2. on other public land (with permission); and
- 3. on private land (subject to permission and restrictions).

House Bill 1700, the "Bicycle Bill" was passed by the Legislature in 1971. This bill requires that not less than one percent of the funds received each year by the commission, or by any City or County from the State Highway Fund, shall be expended as necessary to establish footpaths and bicycle trails along newly constructed, reconstructed or relocated highways.

Funds received from the State Highway Fund may also be expended to maintain such footpaths and trails and to establish footpaths and trails along other highways, roads and streets and in parks and recreation areas. Administration of this Act is carried out by the Location Unit of the Highway Division, separate from the administration of the Recreations Trails System Act.

A Bicycle Advisory Committee composed of eight members, appointed by the Governor advises the Oregon State Highway Division in carrying out the provisions of the Bicycle Act.

Four (4) recreational trail systems exist in Columbia County:

- 1. Northwest Oregon Bicycle Loop
- 2. St. Helens to Columbia City bicycle and footpath which follows Highway 30 route is a black-topped path about 2.6 miles long.
- 1.8 mile loop trail at Lake Park, Vernonia.
- 4. Banks Vernonia Linear State Park extends 21 miles from the Washington County town of Banks to the Columbia County city of Vernonia. The property is the former Burlington Northern Railroad grade which has been abandoned. The park provides trails for horseback riding, bicycling and hiking.

Public access is allowed only at developed trailheads. Neighbors can access the trail directly from their property.

A six-mile section within Columbia County, beginning at the trailhead, Anderson City Park, leads generally south and east to the second trailhead in the county, at Beaver Creek. Beaver Creek is 4 miles south of Vernonia on Highway 47. It has vault toilets and parking. A pedestrian bridge leads to the 15 foot-wide gravel trail.

In Washington County, Top Hill is another trailhead located at Horseshoe Trestle on Highway 47.

WILDLIFE HABITAT

SAUVIE ISLAND

Sauvie Island Wildlife Management Area is a non-game wildlife habitat which provides recreational opportunities for Columbia, Multnomah, Washington and Clackamas Counties. Sauvie Island lies between heavily commercial Willamette River and Multnomah Channel, on the South, and is bordered otherwise by the Columbia River and Multnomah Channel on the western end.

The Wildlife Management Area provides public duck, goose, and pheasant hunting. Private duck clubs area also located near the area. The island has beaches, boat ramps and recreational vehicle facilities. A variety of ducks, geese, herons, eagles, tundra and trumpeter swans, more than 100 species of songbirds and migratory Sandhill cranes can be seen as well as the federally listed endangered Columbia White-tailed deer and black-tailed deer. The Department of Fish and Wildlife is active in promoting and managing Sauvie Island fish and wildlife.

Nature Conservancy, a private non-profit group has announced plans to establish a 428 acre wetlands area near Sauvie Island in Multnomah County. Located one mile north of the Sauvie Island Bridge on Highway 30, the site is home for a variety of wildlife species, including the endangered White-tailed deer. The agency plans to establish "an urban wildlife refuge, with emphasis on wildlife protection, outdoor education and wildlife viewing for the benefit of people of all ages."

TROJAN NUCLEAR POWER PLANT

The Trojan Nuclear Power Plant on Highway 30, near Prescott, is owned and operated by Portland General Electric. The company has attempted to alleviate the shortage of parks and ball fields in the county through construction of a 75 acre day-use wilderness park with a 29 acre lake. In addition, public access to fish-stocked lakes and ponds that surround the facility is provided by a one-mile loop paved trail, which also features interpretive nature study posts along the trail. A bird viewing center, handicapped accessible from the main parking lot near the office complex, allows public viewing of migrating swans, geese, ducks, eagles and other bird populations, Other animals to be seen there include otters, beaver, nutria, raccoons and deer.

JONES BEACH

The beach recreation area borders nearby protected habitat for Columbia White-tailed deer. Possible future expansion of the preserve could allow the deer access to Columbia River Islands by traversing Jones Beach. This is not expected to cause a disruption to present plans for recreational uses of the area, but instead, could allow for viewing of the protected species by the public.

ASSESSING DEVELOPMENT

In assessing the development of recreational sites and facilities four major problems arise:

- a) lack of financial resources;
- b) private ownership of vital and popular public use areas;
- c) conflicts between public access and industrial sites; and
- d) poor access to potential or existing sites (i.e. Carcus Creek Park has no public access).

Three techniques useful for improving the recreational development in Columbia County include coordination between agencies, legal and administrative actions and specialized financing opportunities.

AGENCY COORDINATION

One technique for improving the recreational development is the coordination of all agencies engaged in recreation in the county. These agencies include the Columbia County Parks Commission, the State Parks Department, State Fish and Wildlife Commission, U.S. Soil Conservation Service, St. Helens Parks Department, Clatskanie Parks Board, the Army Corps of Engineers, the Bureau of Land Management and the State Marine Board, as well as private industries and school districts.

Coordination with private enterprise is especially vital, considering the amount and location of private lands. When private facilities answer a public need, the county should encourage and supplement these efforts.

Multiple use of lands and resources is an important factor to consider when determining potential recreation sites. Multiple uses of forest lands, in residential areas and in school systems, are ways to create or extend recreational opportunities.

Some of the multiple use benefits of forest lands include open space, recreation areas, watershed protection, wildlife and fisheries habitat and soil protection from erosion. Ninety-three (93%) percent of Columbia County's forest lands are privately owned. However, these private forests are not being managed for the benefit of recreational activities such as campgrounds, trails and points of interest.

The development of privately held resource lands for recreational use can lead to conflicts. This possibility is especially evident regarding the sale of these lands for recreational homesites. The development of these lands can create a serious threat to the natural resources of the county and the local economy.

A section in Columbia County Subdivision and Partition Ordinance, Section 914 B, for inclusion of parks and/or open areas in subdivisions or major partitions, states the following:

"Parks, Recreation and Open Space Provisions. The Director or Commission may require a maximum of 5% of the gross area of such subdivision or major partition, to be set aside by the subdivider, for either dedication to the public for parks and recreation purposes or for open space for the common use of the owners of properties within such subdivision or major partition. In the event open space is required by the Director or Commission, its' common use will be governed by a homeowners association. The association's principal source of funds shall be an assessment levied against each dwelling unit or other property which assessment shall be enforceable as a lien against the property."

Industrial sites should be developed in a manner that is compatible with adjacent recreational opportunities. Industrial development does not mean recreational sites must be eliminated or destroyed. This fact is especially important in relation to the Columbia River, a resource that is coveted by both industry and recreation enthusiasts. Recreation agencies and individual enterprises can minimize the loss of recreation opportunities if they can understand each other's needs.

There are twenty-six (26) schools in Columbia County. Many have playgrounds and school buildings (auditoriums, gymnasiums, swimming pools, etc.) which are or should be available for community use after school hours. In this way, the schools play valuable secondary roles as indoor recreation centers.

Civic groups have made and can continue to make, valuable contributions to recreation opportunities. Volunteers help construct, maintain and furnish materials for needed park improvements. With involvement in constructing and maintaining these facilities, pride of ownership and involvement may foster respect for the parks and facilities throughout the county.

LEGAL AND ADMINISTRATIVE TECHNIQUES

- 1. Leasing easements. Access to recreation resources may be achieved through easements of leases for public entrance or use. Access easements or leases benefit the landowner by lowering the taxable value of this property or by providing direct income.
- 2. Acquiring easements. Recreation agencies may acquire easements for scenic or recreational development.
- 3. Purchase of rights. Recreation agencies may purchase the developmental rights of a property. The owner may continue to use the land for its customary purposes but it may not be developed for a new, more intensive use.
- 4. Property exchange. It is sometimes possible to take advantage of a situation where an individual, company, or public agency, accepts property owned by the county in exchange for land needed for a park.
- 5. Donations. Individuals, groups and corporations may donate easements of land to the county. These gifts, whether motivated by tax advantages, public relations or philanthropy should be encouraged by publicizing both individual and public benefits.
- 6. Tax-foreclosed lands. Before any tax-foreclosed or other surplus lands are placed back on the market, they should be examined for their potential as a recreation

facility. If not of direct value, they may be used for exchange purposes and tax policies; the maintenance of open space lands may be encouraged through these policies. Under Oregon law, real estate values must be assessed by a method which takes into consideration land use plans, including current zoning.

FINANCING TECHNIQUES

Federal Aid Highway Amendments of 1974

Authorize the Secretary of Transportation to make grants for the construction of bikeways in conjunction with highway projects. The grants are provided on an 80% to 20% basis.

Federal Highway Administration

Financial Aid, administered through State Highway Departments, can be used for landscaping and roadside development. These funds can be used for rest and recreation areas for travelers.

Intermodal Surface Transportation Efficiency Act (ISTEA)

Provides funding for transportation enhancement projects which go beyond normal or customary transportation project activities and fall into one or more of the following ten categories:

- * Provision of facilities for pedestrians and hicycles;
- * Acquisition of scenic easements and scenic or historic sites;
- Scenic or historic highway programs;
- * Landscaping and other scenic beautification;
- Historic preservation;
- * Rehabilitation and operation of historic transportation buildings, structures, or facilities (including historic railroad facilities and canals);

- * Preservation of abandoned railway corridors (including the conversion and use thereof for pedestrian or bicycle trails);
- Control and removal of outdoor advertising;
- * Archaeological planning and research; and
- * Mitigation of water pollution due to highway runoff.

Land and Water Conservation Fund

Federal grants are available for up to 50% of the cost of planning, acquisition and development of outdoor recreation. The fund is administered by the Oregon State Parks and Recreation Department.

Symms National Recreational Trails Act (NRTA) Trust Fund

Federally funded program administered by Oregon State Parks. Funds are to be used for the development and maintenance of recreational trails and trailrelated projects.

The program defines recreational trails as thoroughfares or tracks that are used for recreational purposes, such as bicycling, cross country skiing, hiking, equestrian activities, jogging, backpacking and vehicular travel by motorcycle, four-wheeled drive or all-terrain off-road vehicles.

Campground Grant Program

Available only in odd years, this program is funded by recreation vehicle registration fee revenues to provide 50% match grants for acquisition, development and rehabilitation of county park and recreation sites that provide camping facilities.

Maintenance Assistance Program

Provides funds for maintenance of boating facilities. Local governments are encouraged to use these funds to enhance their existing level of maintenance and to improve the quality of maintenance provided. Funds may be used for routine and ordinary maintenance of boating facilities, including minor repairs.

Marine Facility Grant Program

Provides funds for construction, rehabilitation and replacement of boating facilities. Can provide for acquisition of property and related projects such as ramps, parking, potable water, sanitation, docks and other facilities for the convenience of the public using those boating facilities. Grants are available on a full grant or matching basis.

Northwest Oregon Resource Conservation and Development (R C & D)

A locally sponsored program serving Clatsop, Columbia, Tillamook, Washington and Yamhill Counties. R C & D takes problems or ideas concerning conservation of natural resources, economic development, development of human resources and environmental quality and becomes a consulting staff.

This may include people throughout the community who share their skills and who may know of other experts to contact. The staff varies from providing a sounding board for ideas developing a step-by-step plans to reach goals, or obtaining actual grants for loans for various projects.

RC&D can identify agencies, organizations and individuals who can assist in completing each step of a plan, outline sources of technical assistance, and list possible financial sources.

Oregon Community Development Block Grant Program

Provides assistance to cities and counties to enhance the quality of life in Oregon. To increase business and employment opportunities, conserve existing housing supply and improve housing conditions, improve availability and adequacy of public facilities and to resolve situations which pose a serious and imminent threat to community health or welfare.

Oregon Special Public Works Fund Program

Designed to support economic development with funds from the Oregon Lottery. The program provides grant and loan assistance to eligible municipalities primarily for construction, improvement and repair of facilities essential for supporting continuing and expanding economic activity, thereby providing jobs and economic opportunities.

Oregon State Highway Division All Terrain Vehicle Grant Program
Funded by non-refunded fuel taxes and registration fees from Class I, II and III
vehicles. The purpose of the program is for acquisition, development,
rehabilitation, maintenance, education and safety of Class I, II and III all
terrain vehicle facilities.

Oregon Tourism Alliance

Oregon Lottery dollars used to promote and enhance tourism throughout the State of Oregon with a match of one-third to one-half. The grants are available for development of new or improvements of, existing tourism, parks, and recreation facilities every-other year, when the Legislature is in session.

Systems Development Charges

Fees authorized by ORS 223.297-223.314 which may be imposed by local governments on new development for the purpose of fully or partially funding certain capital facilities, including parks and recreation facilities. SDC's revenues are restricted to use for activities related to the acquisition and/or construction of capacity increasing capital facilities, and may not be used to fund operations or maintenance functions.

The Capital Improvement Plan for Columbia County Parks includes both long-term and short-term projects to provide recreation services for Columbia County residents and visitors, and to provide for the increase in county population. The Capital Improvement Plan will be up-dated every two years. A broad goal system, which will benefit Parks now and in the future is considered in the following listing:

Developed Parks

1. Asburry Park

a) Work with City of St. Helens the Columbia County Fair Board, and other interested parties to develop a plan for a multi-purpose park to meet current and future demands for outdoor recreation.

Estimated cost: \$25,000.

Financial plan: A grant from Northwest Oregon Economic Alliance has been obtained.

Scheduled date of project: Fiscal year 1995-96.

Beaver Boat Ramp

a) New restroom facilities to replace the antiquated restroom located at the park. The current restroom no longer meets public health requirements.

Estimated cost: \$95,955.

Financial plan: A grant with the State Marine Board will be submitted February, 1996.

Scheduled date of project: May, 1996.

3. Big Eddy Park

a) Electric and water hook-ups to sites 10 and 14 through 23. This improvement will provide electric and water hook-ups to all 34 campsites.

Estimated cost: \$7,700.

Four of the sites will be converted to meet ADA requirements.

Financial plan: Financing for this project will come from State or Federal Grants and County Parks Budget.

Scheduled date of project: Fiscal Year 1995-96.

b) Development of restroom/shower facilities. There is currently no shower facilities provided. A survey of park visitors, conducted over the past two years, has indicated a high demand for showers.

Estimated cost: \$135,000.

The estimated cost includes labor and material needed to construct a restroom/shower facility that will meet ADA requirements.

Financial plan: Financing for this project will come from State or Federal Grants, System Development Charges and County Parks Budget.

Scheduled date of project: Fiscal Year 1995-96.

4. Camp Wilkerson Park

a) Frost free valves to eliminate turning water off during freezing weather thereby virtually shutting the park down to visitors.

Estimated cost: \$1,120.

Financial plan: Financing for this project will come from the County Park Budget.

Scheduled date of project: Fiscal Year 1995-96.

b) Paved access to area #1 to meet ADA requirements.

Estimated cost: \$8,000.

Financial plan: Financing for this project will come from the County Park Budget.

Scheduled date of project: Fiscal Year 1996-97.

c) Tree Management Program for managing diseased trees in undeveloped area.

Estimated cost: \$5,000.

Financial plan: Financing for this project will come from the County Park Budget.

Scheduled date of project: Fiscal Year 1995-96.

5. Hudson/Parcher Park

a) Develop seven (7) additional full hook-up RV sites to meet ADA requirements. This project will meet the demand for additional RV sites and would help to generate additional funds.

Estimated cost: \$14,300.

Financial plan: Financing for this project will come from State or Federal Grants and County Parks Budget.

Scheduled date of project: Fiscal Year 1996-97.

b) Development of restroom/shower facilities to meet ADA requirements. The new restroom will serve the north end of the park and within close approximity to the seven (7) new RV sites.

Estimated cost: \$85,000.

Financial plan: Financing for this project will come from State or Federal Grants and County Parks Budget.

Scheduled date of project: Fiscal year 1996-97.

6. J.J. Collins Marine Park

a) Replace old transient float on Northeast side of island with new float.

Estimated cost: \$110,953.

Financial plan: A grant from the State Marine Board will be submitted April 1996.

Scheduled date of project: 1996-97.

7. Prescott Beach Park

a) Pedestrian/bike path

Estimated cost: \$28,000.

Financial plan: Financing for this project will come from State or Federal Grants and County Parks Budget.

Scheduled date for project: Fiscal Year 1995-96.

b) Develop 30 full hook-up campsites Overnight camping would enhance the park significantly and answer the demand for overnight camping along the Columbia River in Columbia County.

Estimated cost: \$196,000.

Financial plan: Financing for this project will come from State or Federal Grants and County Parks Budget.

Scheduled date for project: The project is contingent on purchase of 61 acres leased from PGE.

c) Handicapped fishing pier would enhance the accessibility for fishing for people with disabilities.

Estimated cost: \$35,000.

Financial plan: A grant from Oregon Department of Fish and Wildlife, Restoration and Enhancement Program and County Parks Budget.

Scheduled date of project: The project is contingent on purchase of 61 acres leased from PGE.

Undeveloped Parks

1. Apiary Road Bike Path

a) A feasibility study for development of a bike path linking the Banks-Vernonia Linear Trail with Highway 30 in Rainier.

Estimated cost: \$50,000.

Financial plan: A joint grant application with Oregon State Parks will be submitted for ISTEA Funds.

Scheduled date of project: On going.

2. Fisher Park

a) Improve Scappoose Creek bank to stop erosion and develop a parking area.

Estimated cost: \$2,000.

Financial plan: Financing for this project will come from state or federal grant and Parks Budget.

Scheduled date of project: Summer, 1995-96.

3. Bike Paths

a) Develop pedestrian/bike paths along the following roads to enhance the recreation opportunities of the County.

- 1) Westlane from Hwy. 30 to Airport Park.
- 2) Larson Rd. north from Hwy. 30 to Hudson/Parcher Park.
- 4. Work with the Pacific Greenway in developing trails through Columbia County that will connect with existing trails to Mt. Hood and the Pacific Ocean. i.e.: hiking/equestrian trails, bike/pedestrian trails and canoe trails.

Future Needs

- 1. Beaver Falls Park
 - a) Feasibility study.
- 2. Big Eddy Park
 - a) Acquire additional land for expansion.
 - b) More campsites.
 - c) More day use areas.
- 3. Camp Wilkerson Park
 - a) Hiking trails.
 - b) Development of plant and animal identification and viewing system.
 - c) Obtain water rights and plan and install a new water control structure for existing creek.
- 4. Carcus Creek Park
 - a) Feasibility study.
- 5. Fisher Park
 - a) Feasibility study.
- 6. Youth Centers
 - a) Explore funding resources and needs for County Youth Centers.

- 7. Prescott Beach Park
 - a) Possible acquisition of adjoining 87 acres of wetlands for wildlife viewing, canoeing and recreation. Contingent on getting land from PGE.
- 8. Scappoose Airport Park
 - a) Improve existing water system with a connection to city water system.
- 9. Wallace Island Boat Dock Facility
 - a) Development of a boat dock facility at Wallace Island (transient float and gangway). This project is identified in the State Marine Board's Six-Year Plan for 1995-97.

CLOSING STATEMENT

Columbia County is ideally situated in a "Park Belt" with a burgeoning population of out-of-county users nearby, that can provide an important economic impact to logging and farming communities. According to a 1988 economic impact study, travel within Oregon represented \$58.8 million in travel expenditures.

Besides preserving rapidly disappearing recreational areas and wildlife habitat, Columbia County parks can help to provide a clean, environmentally sound industry to Columbia County citizens.

INVENTORY

Developed Parks

BEAVER BOAT RAMP 1.

Boarding floats - 720 sq. ft.

Restrooms 10 ft. x 26 ft. = 160 sq. ft.

2 picnic tables

2 barbecues

2. BIG EDDY PARK

Restrooms 268 sq. ft.

Nine acres

Shop 144 sq. ft.

Wood shed 200 sq. ft.

45 Picnic tables

1 Park bench

5 signs

18 Electric hookups

Two bedroom, One bath mobile home 980 sq. ft.

10 Frost free valves

9 Standard hose bib

34 Fire rings

34 Campsites

5 Barbecues

3 dumpsters (1.5 yds. each)

Boat ramp (Concrete) 3,780 sq. ft.

Hard surface road and parking (2,335 linear ft.

192 Posts

Equipment

Pickup 1/2 Ton 1978 Chevrolet

212 John Deere tractor w/mower

2-wheel trailer

20" rotary mower

Stihl weed eater

Grinder

Wheelbarrow

90 ft. hose

Playground

1 extra baby swing seat

2 baby swings

2 regular swings

1 sandbox

2 horseshoe pits

6 garbage cans

Tools

1 garden rake

1 plastic grass rake

5 metal grass rake

1 flat nose shovel

2 round nose shovel

2 axe (1 large, 1 youth)

1 hoe

1 splitting maul

16" rake for fire pits

2 fire extinguisher

1back/pack fire extinguisher

l pole pruner

1 wire broom

gas barrel w/pump-16

2 extra reg. swing seats

1 first aid kit-office	1 broom (rest room)
1 first aid kit-pickup	1 pitchfork
1 portable 2/way radio Yaesu VHF w/ante	enna & coax cable twine
5-gal. gas plastic can	2 hand brush cutters
3 sizes belts, J.D. mower	extra mower blades
2 pr. protective glasses	1 bench vise
2 sets horseshoes	l gas lantern (no glass)
l grease gun	2 waste paper containers
1 pruning lopper	1 tire pump
1 propane tank with burner	1 soda machine (coke)
1 16 ft. aluminum extension ladder	1 come-along
1 chain binder	1 wrecking bar
2 rival-titan electric heaters	1 electric calculator with tape
I bow saw	1 telephone with recorder
1 set wood chisels - 1/2", 3/4", 1"	l grass sling
1 hacksaw	1 12" file
l 12" stanley carpenters square	l set volleyball net, poles & ball
1 sledge hammer	2 1/2 gal gas can (plastic)
1 contico 26" tool box	1 primus adjustable propane heater
1 premier model TT-371 air compressor	2 20 lb. tanks

3. CAMP WILKERSON PARK

Lodge building 4,450 sq. ft.

Adirondack camp shelters 25 @ 272 sq. ft. each

Ahlborn Hall 864 sq. ft.

Picnic shelters 5 @ 520 sq. ft.

Shop 350 sq. ft. Two bedroom 1 bath Broadmore mobile home 980 sq. ft.

Fire tank truck shelter 272 sq. ft.

280 acres

Equipment

1984 Ford 4X4 pickup Kubota Diesel G5200 tractor Kubota mower deck utility trailer 1 home-made harrow 1 pitchfork 2 draw-knife 1 push mower 20" Snapper

0	1
2 grease guns	l pruner
4 garden rakes	6 3900 locks
4 lawn rakes	2 tables (Lodge)
6 shovels	35 picnic tables
4 flat shovel	1 GE refrigerator with top freezer (lodge)
2 hand saws	1 large cooler (Lodge)
2 extension cord	1 small green refrigerator used for storage
1 trouble light	1 grub hoe
6 straw brooms	5 fire extinguishers
4 push brooms	25 fire rings
1 step ladders (8 ft.)	1 first aid kit
2 step ladders (10 ft.)	l wet vac
2 double bitted axes	2 squeegees
3 lengths hoses, 50 ft. each	1 telephone recorder
2 тор	1 electric stove commercial (Vulcan-Hart)
30 garbage cans	5 harricades
2 Pulaski	1 pressure washer
2 Handie-talkie radios (2 chargers	s) 1 25 ft. hose & wand
I Stihl FS86 weed eater	2 portable heaters
2 pairs safety glasses	1 generator (120 volt)
2 stretchers	1 post hole digger
1 electric screw driver (1 charger)	1 chain saw (Husqavarna 51)
4 sprinklers	1 hand pressure pump
1 halogen flash light	l electric chain saw
Broadmore house trailer 14X60 (1989) parking lot
sanitary facilities	Post 70
,	
GILBERT RIVER BOAT RAM	P
Restroom 160 sq. ft.	Floats 1,530 sq. ft.
Parking	Hard surface boat ramp
	•
HUDSON/PARCHER PARK	
	2 bedroom 1 bath mobile home 980 sq. ft.
1 Wood shed 143 sq. ft.	Cabin 960 sq. ft.
Main restrooms 513 sq. ft.	Upper restrooms 308 sq. ft.
Shop 1,152 sq. ft.	Day use sites 9
A	

4.

5.

120 seat bleachers

Equipment	
1 snow shovel	1 gas welder
l propane torch	l goggles
4 round shovels	l striker
2 square shovels	2 diesel jerry cans 5 gal.
2 mauls	1 8200 Kubota tractor
2 wedges	l grease gun
8 rakes, leaf	I 212 J.D. lawn cutter
l garden rake	1 handsaw
I hoe	1 tree pruner
1 hand sickle	1 axe double blade
l wheel barrow	1 wrench, open boxed 1"
1 hand sickle, full size	1 wrench, open boxed 3/4"
l leaf remover	1 machine gas (?)
2 safety glasses	1 bench vise
I utility trailers	1 bench grinder
4 electric heaters	2 pitchforks
1 Chevrolet pickup 1974	7 barricades
32 picnic tables	13 permanent picnic tables
15 fire rings	l wire connection crimp
1 shop broom	2 asphalt broom
l water scraper	1 50 ft. water hose
11 barbecues	5 benches
18'X31' picnic shelter	2 garden hoses - 60 ft.
2 brooms	1 MTD lawnmower serial #1A204C10450
1 Polaroid camera (one step)	l electric calculator with tape
I telephone	1 picnic shelter 240 sq. ft.
I answer phone	I black and decker quick finish sander serial #4402-F

6. LAUREL BEACH PARK Parking lot

7. J.J. COLLINS MARINE PARK

Restroom 96 sq. ft. floats 5,640 sq. ft. 12 picnic tables 7 tent camping sites

picnic shelter 576 sq. ft. gangways 240 sq. ft. 8 barbecue grills

8. PRESCOTT BEACH PARK

Acreage 71 Shop 640 sq. ft. Restrooms 350 sq. ft. Horseshoe court 1 Playground equipment teeters climbing toys 3 park benches I frost free valve 9 campfire rings 8 trash cans 2 hoses, 50 ft. 2 plastic rakes 2 first aid kits 2 sets horseshoes 1 4' carpenter's level 2 shovels, one round, one flat Kubota 2150 tractor/forkloader Picnic shelter 962 sq. ft. Parking lot Mobile home 980 sq. ft. swings 4 spring animals 24 picnic tables 44 park signs 4 standard hose bib 13 barbeques 229 posts 2 leaf rakes 1 small step ladder (8 step) 1 fire extinguisher 2 Volleyballs 2 Volleyball nets

9. SCAPONIA PARK

7 acres
Restrooms 70 sq. ft.
Parking lot
picnic tables
RV sites
tent camp sites

10. SCAPPOOSE AIRPORT PARK

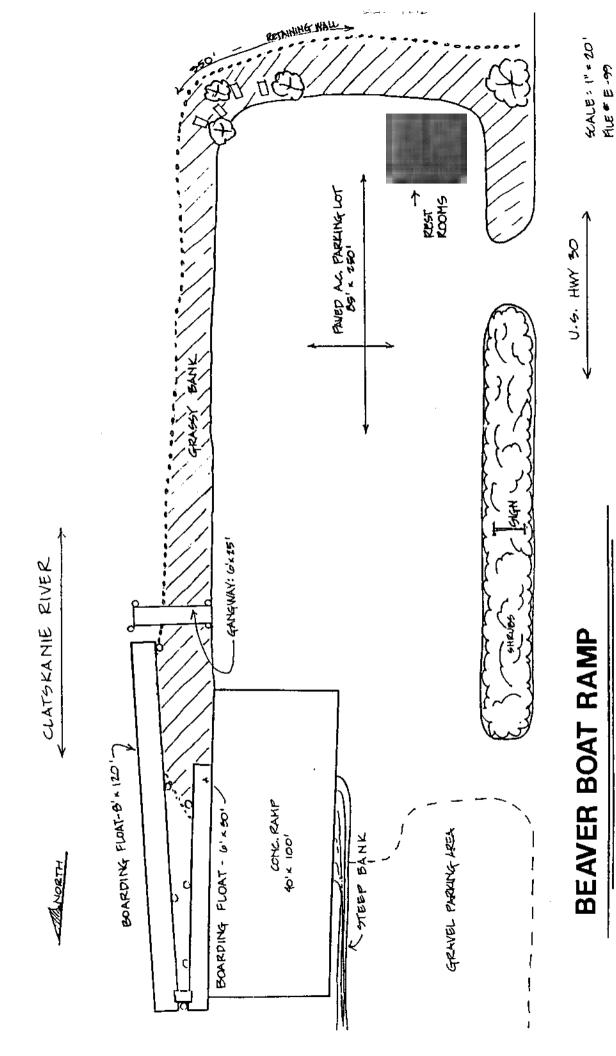
2 acres shop 300 sq. ft. Parking lot 3 barbecue grills 7 RV sites, full hookup tent camp sites Playground equipment 2 swingsets 6 park signs 1 park bench 1 pruner I leaf rake, metal l push mower 5 garbage cans 2 fire extinguishers 2 shovels

Restroom/shower 558 sq. ft. Mobile home 980 sq. ft. 6 fire rings 10 picnic tables sanitary dump station 1 utility trailer 2 horseshoe court 2 teeter-totters 90 posts 2 hoses, 50 ft. 1 hedge trimmer 4 plastic rakes 1 step ladder (4 step) 1 first aid kit 1 weed eater 2 heaters

LIST OF MAPS

COLUMBIA COUNTY MASTER PARK PLAN MAPS ARE INCLUDED IN THE FOLLOWING ORDER:

BEAVER BOAT RAMP BEAVER FALLS PARK **BIG EDDY PARK** CAMP WILKERSON PARK CARCUS CREEK FOREST CARCUS CREEK PARK FISHER PARK GILBERT RIVER BOAT RAMP GILBERT RIVER DOCKS HUDSON-PARCHER PARK J.J. COLLINS MEMORIAL PARK LAUREL BEACH PARK NEHALEM RIVER WAYSIDE PARK PRESCOTT BEACH PARK SCAPONIA PARK SCAPPOOSE AIRPORT PARK



TRUSTELL +
GRAPHICS +
SHEET 1 OF 2

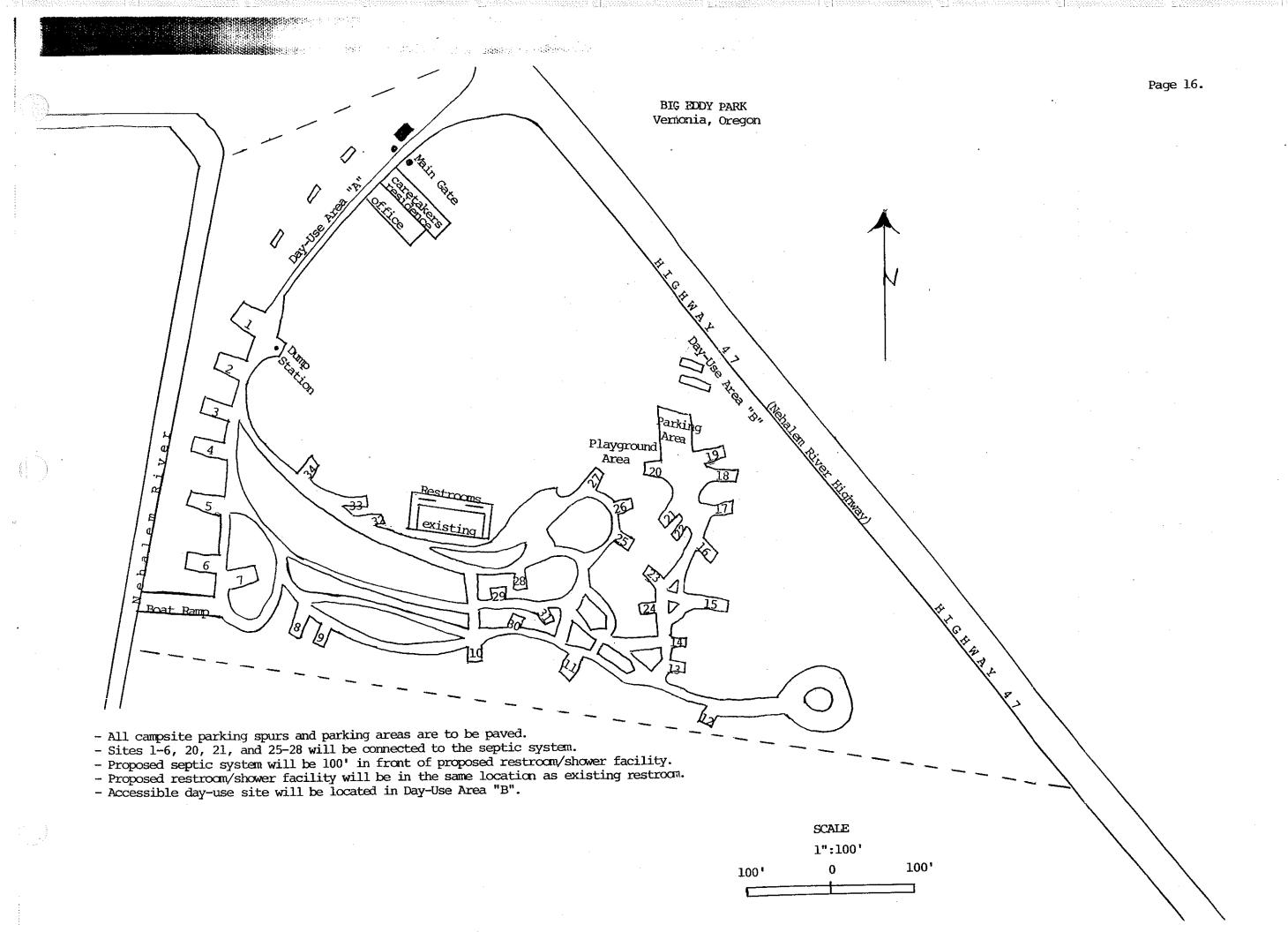
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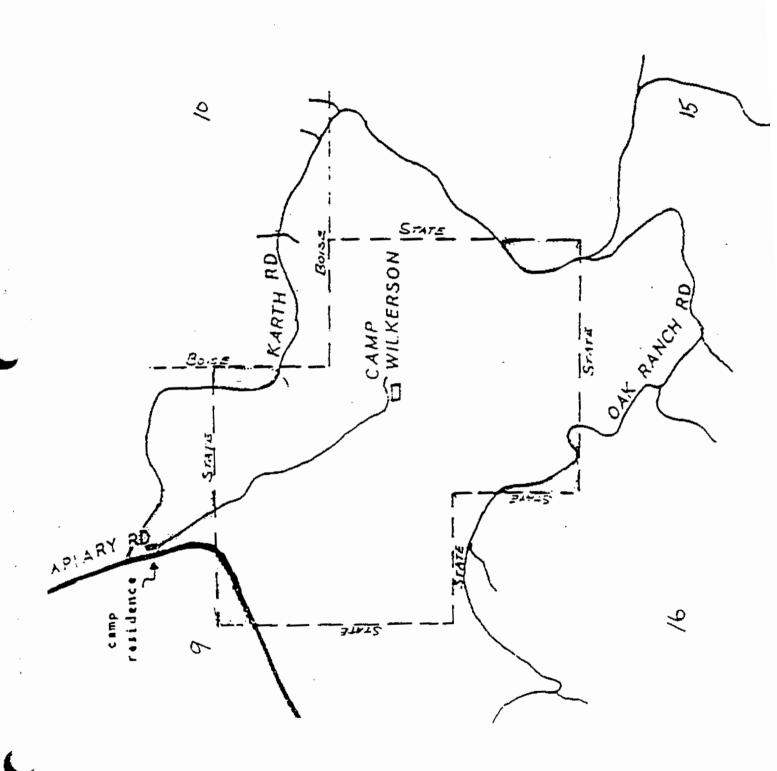
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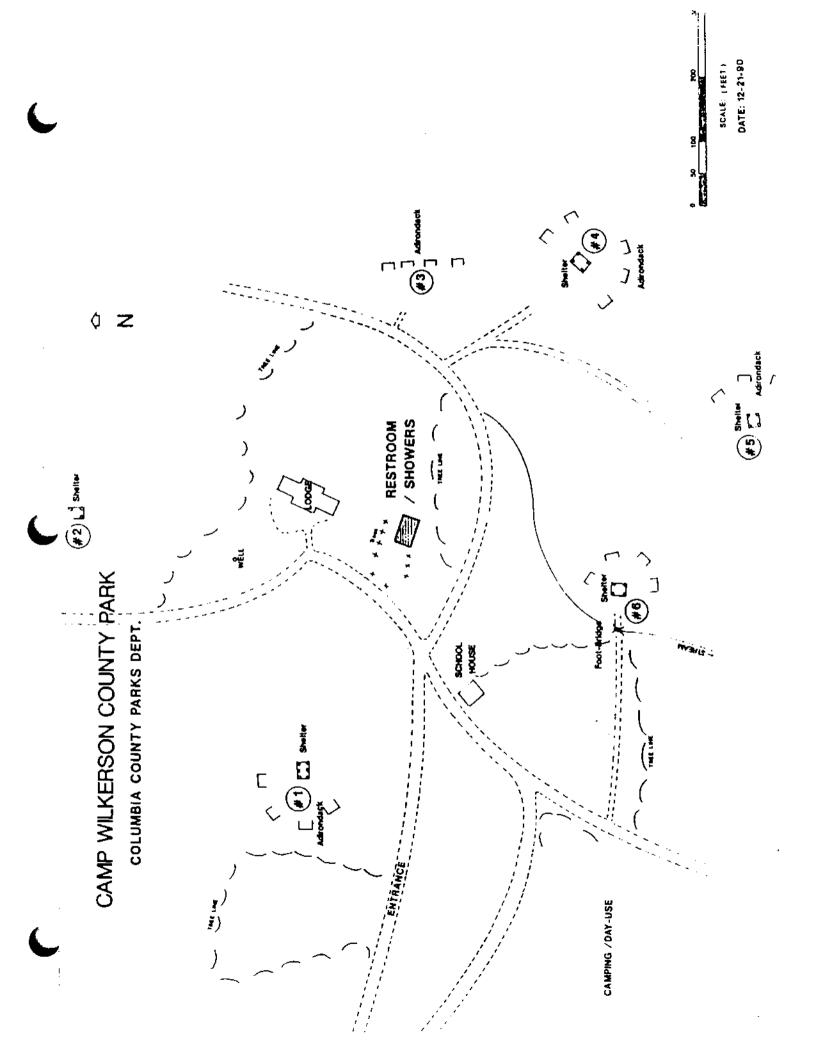
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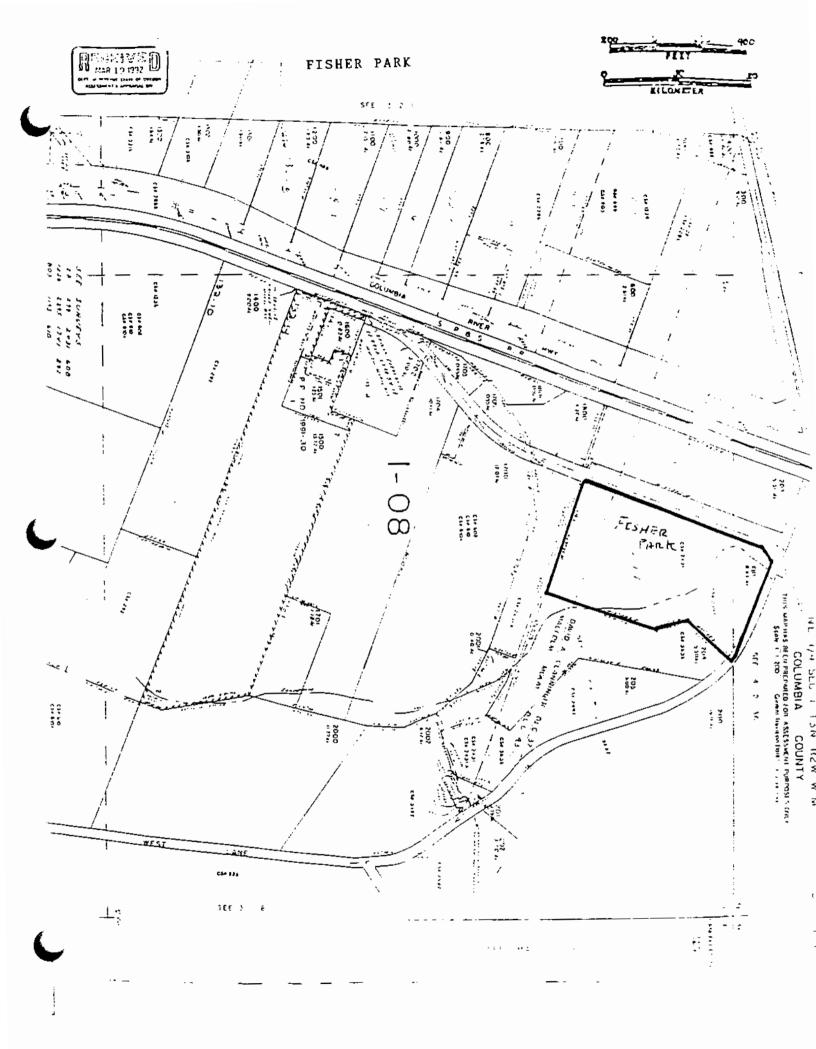
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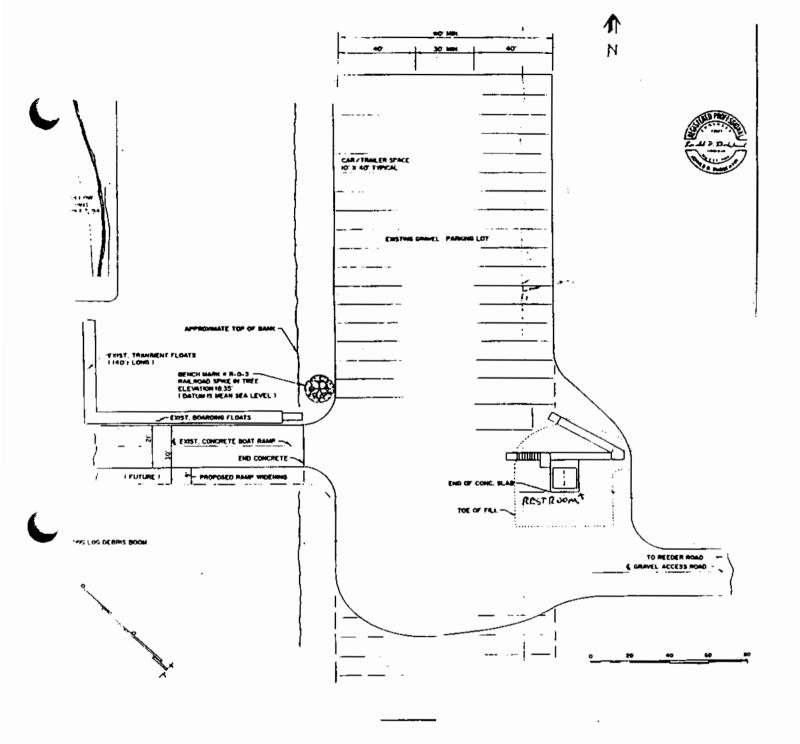
UMBIA COUNTY



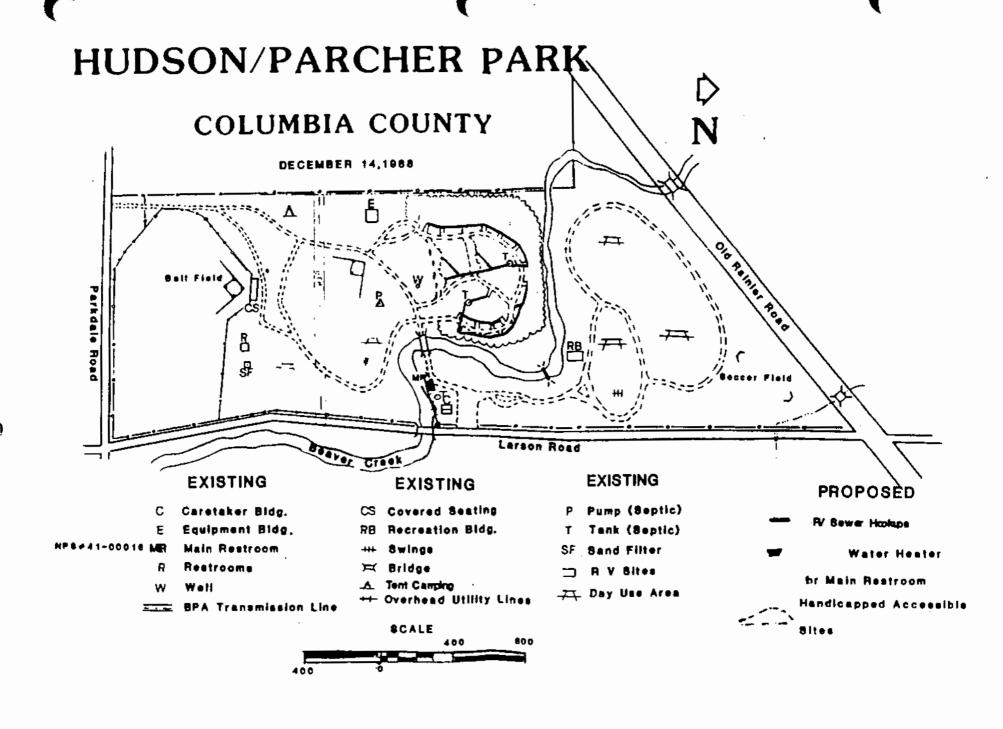








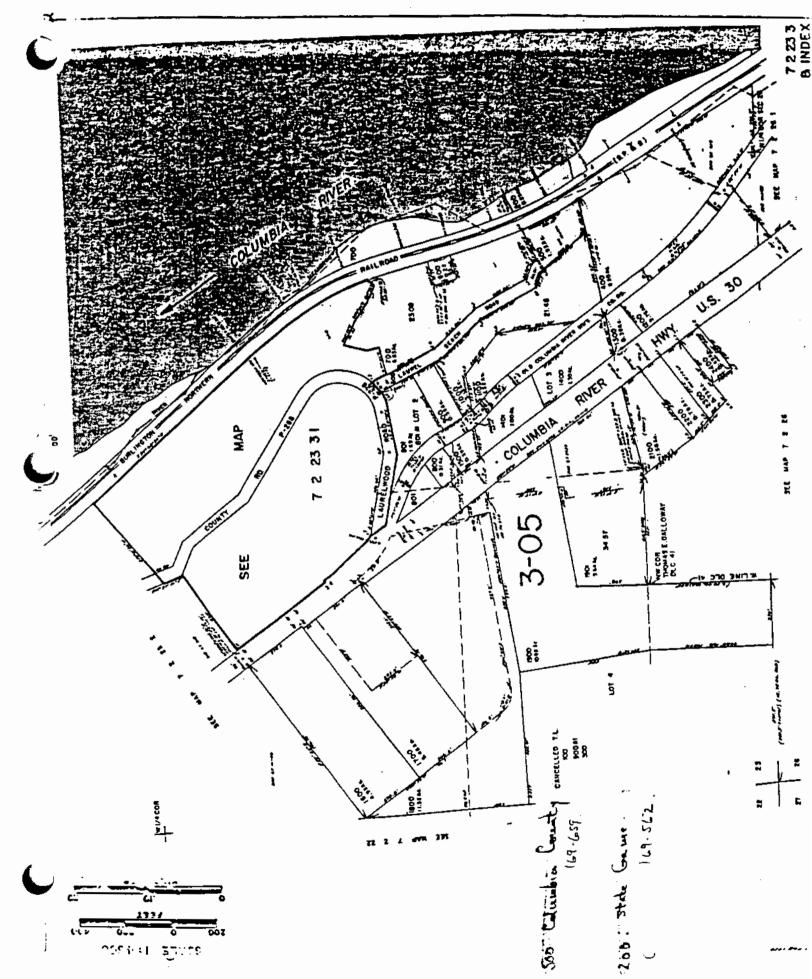
GILBERT RIVER BOAT RAMP

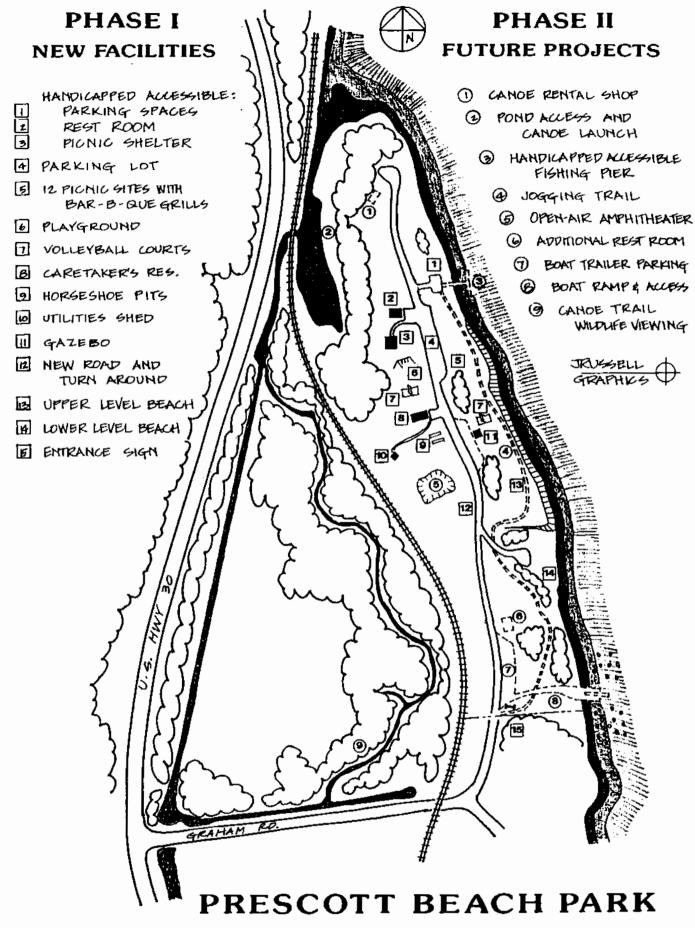


J.J.COLLINS MEMORIAL MARINE PARK

OREGON STATE MARINE BOARD

COLUMBIA COUNTY PARKS WILL AMETE GLOUGH PHASE I NEW FACILITIES HTROM # MEMORIAL LANDING DOCK . COMPOSTING TOILET COMPLETED SPRING, 1989 PHASE II **CURRENT PROJECTS** 4 NEW PICHIC SITES -TABLES & GRILLS - TRAIL CLEARING COON * SIGNAGE ISLAND DO RESTORE EXISTING -TENT & PICNIC SITES TO COMPLETE BY FALL, 1989 PHASE III **FUTURE PROJECTS** O PICNIC SHELTER [] VOLLEYBALL AREA --- COMPLETE TRAIL == REBUILD HORSESHOE PIT : ADDITIONAL PICNIC SITES PREPARED BY TRANSLES-(1) 6.23.89 DWG. NO. E-67 SCALE : 1" = 200' @ 11" +17" HISTORIC BARGE WRECK

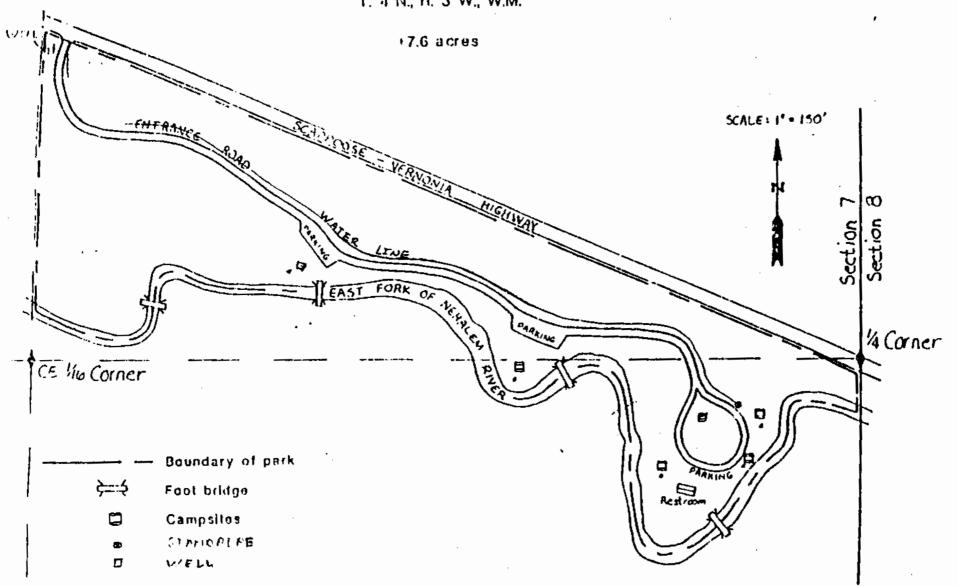


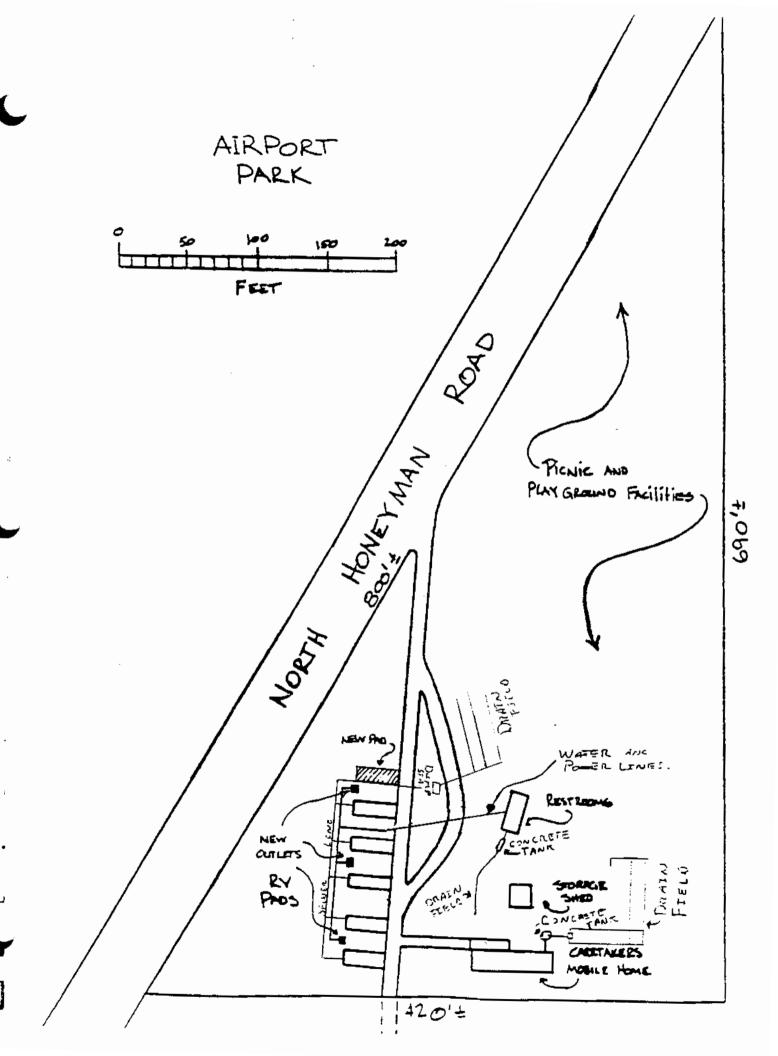


5-8-92 DEDICATION CEREMONY

COLUMBIA COUNTY PARK DEPT

SE 1/4 NE 1/4, NE 1/4 SE 1/4 Section 7 F. 4 N., R. 3 W., W.M.





COLUMBIA COUNTY RECREATIONAL NEEDS

Facility	<u>Unit</u>	Supply	Gross Need	Net Need	
				<u>1990</u>	<u>2000</u>
Population				38,800	43,327 *
Camp Sites	Site	94	1,106	1,200	1,340
Picnic Tables	Table	196	654	458	512
Swimming Pools	Pool	3	4	2	2
Boat Ramps	Ramp	23	9	(13)	(12)
Walk/Hike Trails	Mile	18	148	166	178
Biking Trails	Mile	6	2	(4)	(4)
Bridle Trails	Mile	2	18	18	19
Ball Fields	Field	7	30	27	31
Tennis Courts	Court	2	14	14	16
All Purpose Courts	Court	1	14	15	17
Golf	Holes	18	26	11	15
Neighborhood Parks	Acres	48	180.	157	1 7 7
Community Parks	Acres	150	210	260	300
District Parks	Acres	599	540	16	76

Figures in Parentheses () Indicate an Oversupply.

* Projected Figure

announge

COLUMBIA COUNTY, OREGON

Forests, Parks and Recreation Department
Charles J. "Chuck" Asheroft, Director

Maling Address Columbia County Courthouse
Physical Address 1054 Oragon Street
St. Halans, Oragon 97051
Telephane Number (503) 397-2353
Faceiralle Number (503) 397-7257

March 10, 1997

Energy Facility Siting Council c/o Mr. Adam Bless Oregon Office of Energy 625 Maria Street NE Salem, OR 97310

RE: Northwest Natural Gas Company

Calvin Creek Underground Gas Storage Project

Dear Council Members:

I understand that Northwest Natural Gas Company (NNG) proposes to expand its current underground gas storage facility in the Mist Field by using pools in the Calvin Creek area for gas storage. The project will be located in Township 6 North, Range 5 West, in parts of Sections 11, 14, 15, 21, 22, 23, 26 and 27.

A representative for NNG has contacted the Columbia County Forests, Parks and Recreation Department to determine whether the proposed storage facility will have adverse impacts on any "important" recreational opportunities within five (5) miles of the site boundary for the project. I understand that the importance of the recreational opportunity is determined under your rules by considering the following factors: (1) special designation or management of the location; (2) the degree of demand; (3) uniqueness; (4) outstanding or unusual qualities; (5) availability or rareness; and (6) irreplaceability or irretrievability of the opportunity. (OAR 345-22-100)

Based on these factors, to my knowledge, there are no important recreational opportunities within five (5) miles of the site boundary for the project.

STOEL RIVES LLP
By CAT 3-12-97

Energy Facility Siting Council March 10, 1997 Page 2.

1. Existing Facilities

In 1993, Columbia County adopted the Columbia County Forests, Parks and Recreation Master Plan ("Plan"). The Plan was updated in 1995. The Plan identifies sixteen (16) county parks, forests, forest/parks and boat dock facilities, and another twenty (20) public and private recreational facilities that now provide recreational opportunities to Columbia County residents and visitors. Plan pp. 3 and 9. None of the identified facilities are within five (5) miles of the project site.

2. Proposed Facilities

Columbia County plans to develop bike trails at some point in the future. Preliminary plans call for a bike trail to be located along Highway 202 in the vicinity of the project, including the portion of Highway 202 that the twin 16-inch transmission lines will cross.

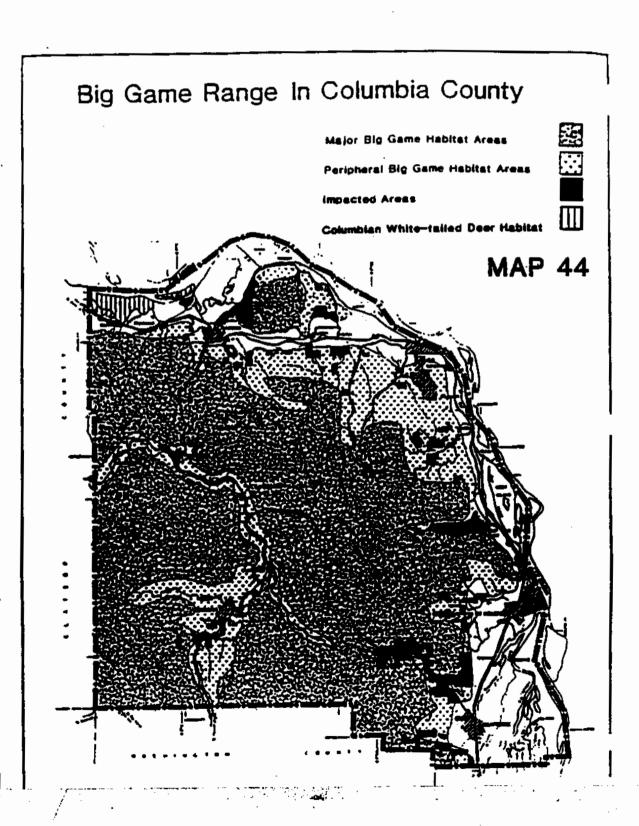
However, the development of bicycle trails in this area is at least five (5) years in the future. According to NNG, construction of the pipeline will be concluded before the end of next year. Accordingly, construction activities will not have any impact on the proposed bike trail. Because the pipelines will be buried, they will not affect the bike trail once it is developed.

There are no other proposed County recreational facilities within five (5) miles of the project site.

Sincerely.

Charles J. "Chuck" Ashcroft, Director County Forests, Parks and Recreation

CJA/cm



Calvin Creek Underground Storage Project PROPOSED CONSTRUCTION SCHEDULE

				87	Qt	3, 11	197	9	14,1	907	Qt	1, 1	#1	Qt	2, 1	61	Q	r 5, 11	108	Qtr	4, 11	191
ID	Task Norm	Plan Start		Jun	Jul	Aug	Sep	Odl	Nov	Dec	Jan	Feb	Mer	Apr	May	Jun	Jut	Aug	Sep	Oct	Nov	Dex
1	CALVIN CREEK CONSTRUCTION SCHEDULE	6/2/07	11/20/98																			
2	RESERVOIR DEVELOPMENT	6/2/97	12/22/97		-				-				-				<u> </u>					
3	Build NV Well Locations	8/2/97	6/27/97																			
4	Build OM Well Location	6/30/97	6/8/97																		•••••	
•	Drill IW Wells	9/1/97	11/10/97	1																		
6	Drift Observation Wells	11/10/97	12/22/97		1	<u>.</u>				, i	1			1	-		1					
7	Reservoir Development Complete	12/22/97	12/22/97							•				i					:			
1	GATHERING SYSTEM	7/28/97	1/5/98			30	30	34	16	10		ļ									•	
•	Construct Gethering Line	7/28/97	11/7/97								-			-	!	!		:				
10	Mobilize Crews & Equipment	7/28/97	8/15/97	ļ						1		-		1			1					
11	Construct Gathering Line	8/18/97	10/10/97																:			
12	Complete River Crossing	8/18/97	9/12/97	1	İ			· · · · · · · · · · · · · · · · · · ·		ļ			-				Ī			-		
13	Cleanup & Replant ROW	10/13/97	11/7/97							1					•							
14	Weithead Production Equipment	11/10/97	1/5/98	1						1		1		ļ	:				-			. "
16	Install Equipment	11/10/97	12/22/97	1						٠												
16	Tie-in to Gathering	12/22/97	1/5/98	ļ	-	-	: · · · · · · · · · · · · · · · · · · ·	•			· <u>!</u>			:		<u>.</u> :	•			Ĭ		
17	Gathering Systems Complete	1/5/98	1/5/98								•											
10	MILLER STATION RETROFIT	8/4/97	3/27/98	1		45	45	45	4	46	صر	30	45				•					
19	Silework	8/4/97	8/29/97																			-
20	Concrete	9/1/97	10/10/97						<u>-</u>	1				İ			<u> </u>					
21	Structural Steel	10/13/97	11/7/97	1	:													:				
22	Equipment Erection	11/10/97	12/5/97	†		· · · · ·					:	i			-	• • • • • • • • • • • • • • • • • • • •	7.	Ī				

Total Personnel 75 75 75 55 50 30 4

Families 3 3 3 3 3 - -

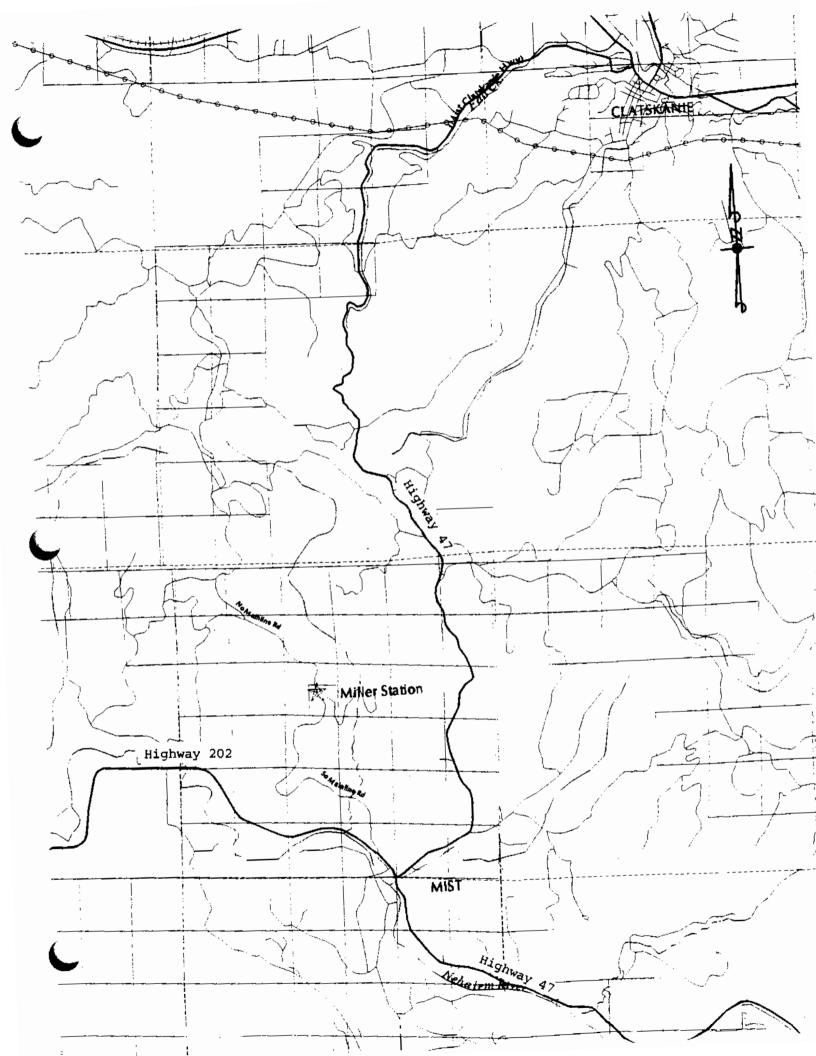
(Mon-Locals) " Out of State

50 50 50 30 30 10 20 30

3/10/97

Calvin Creek Underground Storage Project PROPOSED CONSTRUCTION SCHEDULE

					C CH	r 3.	1997	Q	lī 4, 1	907	Q	I 1.	1995	0	Ŕr Z.	1996	1 04	r S, 1	901	Q	r 4, 1	m
ID.	Task Name	Plan Start	Plan Finish	JUD	Jul	AU	g Sep	Oct	No	Dec	Jan	Fe	Me	1/40	M	y Ju	Jul	Aug	Sep	Oct	Nov	De
23	Buildings	12/8/97	1/2/98								į											
24	Piping Erection	12/8/97	1/16/98									1	1	İ	1		1	Ī				
26	Electrica/Instrumentation	1/5/98	2/13/98							1												-
26	Insulation/Paint	2/16/98	3/27/98					1	1	Ī	-	1	***************************************			-	- 	-		1		Ī
27	Compressor Plent Complete	3/27/98	3/27/98						:					•								
28	COMMISSIONING & START UP	3/30/98	11/20/98			-	1	1	1	†	-	1	1	1	Ī		1		1	1	1	-
29	Tie in Gathering	3/30/96	4/10/98	1				; ;														1
30	Test Facilities	3/30/96	5/8/98	-	ļ			1		1	†	-			1		<u> </u>		1	-		Ť
3 t	Train Operators	3/30/98	5/8/98	1						1												
32	Facilities Test	4/13/98	5/8/98			<u>.</u>	···†···	Ì	<u> </u>	T		-	1	İ			1	†	ĺ	Ì	÷	
33	Inject Worlding Ges	5/11/96	11/20/96						:					:					:			
34	Working Gas Injection Complete	11/20/98	11/20/98				· <u>-</u> · ·	-			İ			1				1		-	4	
36	CALVIN CREEK READY FOR WITHDRAWAL	11/20/96	11/20/98	1														!			1	



LONGVIEW FIBRE COMPANY





P. O. Box 667

January 21, 1997

Columbia County
Land Development Services
Courthouse
St. Helens, OR 97051

Re: Northwest Natural Gas Company Conditional Use Application Calvin Creek Gas Storage Development Project

Dear Sir or Madam:

As part of the development of the Calvin Creek gas storage project, Northwest Natural Gas Company is proposing to construct and operate gas pipelines and storage wellsites upon timberlands owned and operated by Longview Fibre Company. We have a long history of working with Northwest to successfully integrate natural gas exploration, storage and pipeline projects with our forestry operations.

All existing and future leases, easements, and other agreements, which grant or will grant Northwest Natural Gas Company the rights for construction and operation of the project, have been or will be written so as to protect Longview Fibre Company's interests in its land, timber, and forestry operations.

Construction of this project will be coordinated with any Longview Fibre Company forestry operations. We do not expect any problems. Please contact me if you have any questions or wish to discuss this matter further.

Very truly yours,

Blake S. Rowe

Asst. to Sr. V.P.-Timber

bb

cc: R. L. Hordichok, Northwest Natural Gas Company

VERNONIA POLICE DEPARTMENT 919 BRIDGE STREET VERNONIA, OREGON 97054



503-429-7335 OFFICE 1-800-596-7795 DISPATCH 503-429-5141 FAX

FMG 91

February 27, 1997

Northwest Natural Gas Co. Attn: Tim Williamson

Dear Mr. Williamson,

You have informed our department of the up-coming influx of N. W. Natural Gas Company employees that will be in our area from July, 1997, through February, 1998. Your company is concerned with the impact of these additional people to our community and to our local law enforcement. We feel that this will not create any problems for our department. If problems do arise we would appreciate N.W. Natural Gas cooperation with resolving any issues.

We look forward to serving you and your employees.

Sincerely,

James L. Walters Chief of Police

COLUMBIA COUNTY SHERIFF

PHILIP W. DERBY

March 7, 1997

Northwest Natural Gas Co. 221 NW 2nd Avenue Portland, Or. 97209

Attention:

Charlie Stinson

In regards to the construction in the Mist area of Columbia County which will be from July 1, 1997 to February, 1998. This construction will involve 20 people from out of state and 30 people from here in the state.

I can see no reason why this project will create any adverse problems for local law enforcement in Columbia County.

Sincerely

Philip W. Derby

Columbia County Sheriff Courthouse Building

St Helens, Or. 97051

MIST-BIRRENFELD RURAL FIRE PROTECTION DISTRICT 69500 Banzer Road Mist, OR 97016 (503) 755-2710 or (503) 755-0510

February 3, 1997

Columbia County Planning Commission Courthouse St. Helens, Oregon 97051

RE: NNG Calvin Creek Underground Storage Project

Dear Commissioners,

Mist-Birkenfeld RFPD has reviewed a proposal by Northwest Natural Gas Company to construct a new underground natural gas storage project at the Calvin Creek Storage Area in the Mist field. The Calvin Creek Project, and its sister project to increase the capacity at miller Station, will involve several injection/extraction wells in the district, about 4 miles of additional buried distribution pipeline, and addition of a large capacity turbine compressor at Miller Station.

We have discussed the project with NNG representatives and are confident that the project has adequate personal safety features and, as planned, presents no unreasonable fire hazards. Fire prevention and detection equipment has been augmented by new fire suppression equipment which should control a fire incident until the fire department can arrive. Agreements between NNG and our district have helped to insure that adequate personnel and apparatus are available for an emergency such as might occur in the field or at he plant.

Past experience has shown NNG a responsible and proactive member of the community. We are satisfied that effective emergency service can be provided under the conditions outlined in the proposed project.

Please feel free to contact me at (503)755-2710 with any questions which you may have.

Thank you.

AN (I) (I) AN (I) Chief Dave Crawkovc

MIST-BIRRENFELD RURAL FIRE PROTECTION DISTRICT 69500 Banzer Road Mist, OR 97016 (503)755-2710 or (503)755-0510

March 10,1997

North West Natural Gas Portland, Oregon

Dear Mr. Stinson,

We have been requested by Northwest Natural Gas, Miller Station to delineate our existing plan for multiple patient care and evacuation in the event of an incident during the expansion at Miller Station.

We have a Multiple Casualty Incident Plan in place, with supplies and materials to support the plan. In addition to the two ambulances we field, we have mutual aid agreements with all the ambulance services in this county and Clatsop County. We

have direct access to Life Flight and as necessary can request ambulances and personnel from Washington and Multnomah County agencies. In cases of extreme need, the Coast Guard will also transport for us. Patients transported under our MCI plan would go to hospitals in the Portland area, in Astoria, and in Longview, Washington (St. Johns in Longview is part of the Oregon ATAB program.).

In brief, we have preplanned levels of response that depend upon the number of patients and the severity of their injuries. A copy of our Multiple Casualty Plan Grid is available upon request.

Sincerely

David Crawford

Fire Chief

MASS CASUALTY INCIDENT

Resource Requirement Grid

The purpose of this grid is to provide guidelines for required resources under various conditions. Resource are grouped as: Resource A; Resource B; Resource C; and Resource D, respectively. These resource categories are detailed below.

Number of Patients:	Patient Conditions: Multiple Patients	Multiple Patients, 1 Patient Critical	Multiple Patients, 2 or more Patients Critical
3 to 4 Patients			Resource Category "A"
5 Patients	La company		Resource Category "B"
6 Patients		Resource Category "A"	Resource Category "C"
7 Patients		Resource Category "B"	Resource Category "D"
8 to 14 Patients	Resource Level "C"	Resource Category "C"	Resource Category "D"
15 or more Patients	Resource Level "D"	Resource Category "D"	Resource Category "D"

RESOURCE CATEGORY "A":

Number of Additional Medic Units:	Available From:	Other Resources to consider:	Command Structure:			
2	Life Flight(s), Vernonia, Clatskanie	Law Enforcement Haz-Mat Team	Incident Commander Triage/Medical Officer Landing Zone Officer			

RESOURCE CATEGORY "B":

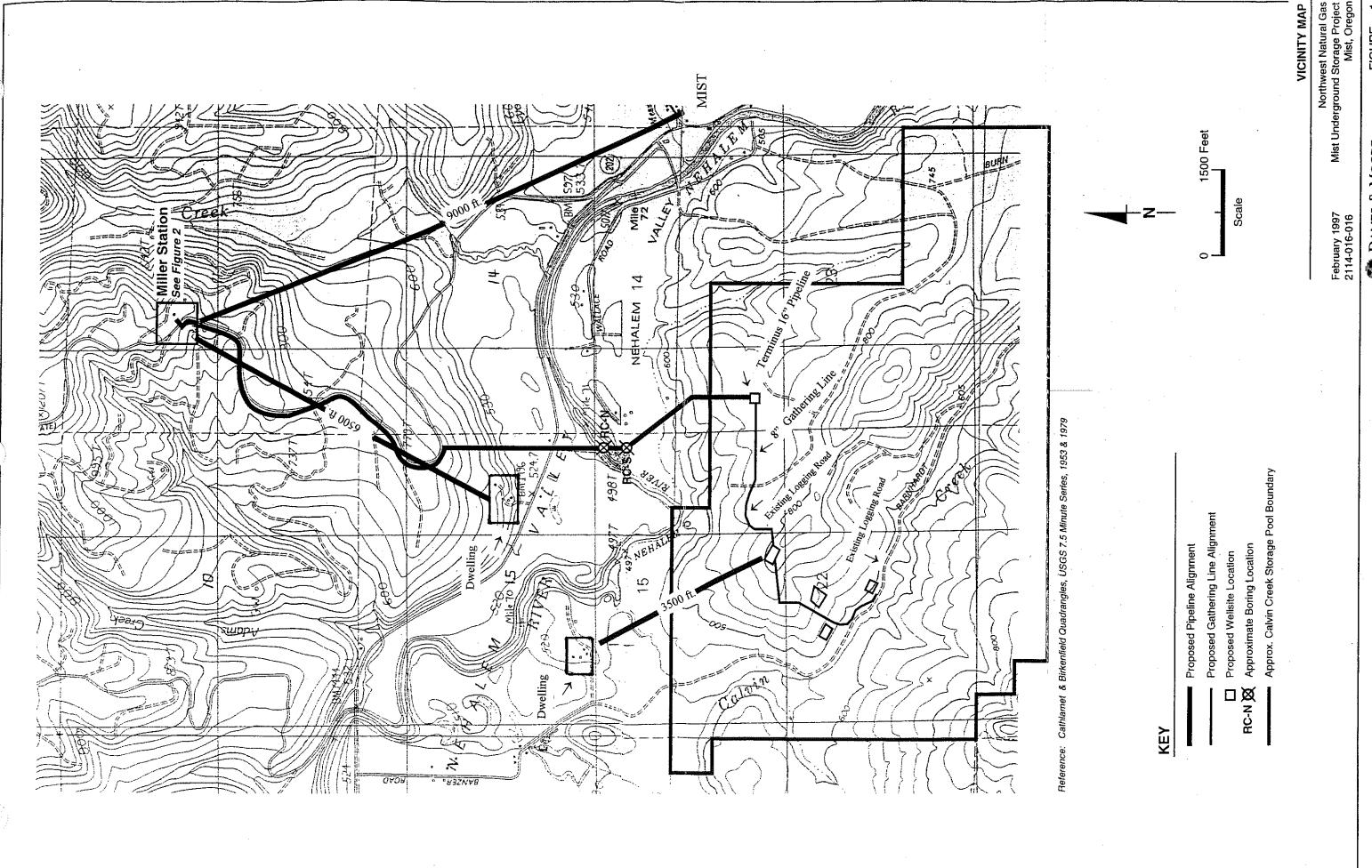
Number of Additional Medic Units:	Available From:	Other Resources to consider:	Command Structure:			
3	Life Flight(s), Vernonia, Clatskanie	Law Enforcement Haz-Mat Team	Incident Commander Triage/Medical Officer Landing Zone Officer			

RESOURCE CATEGORY "C":

Number of Additional Medic Units:	Available From:	Other Resources to consider:	Command Structure:
4	Life Flight(s), Vernonia, Clatskanie, Rainier	Law Enforcement Haz-Mat Team	Incident Commander Triage Officer Medical Officer Landing Zone Officer Transport Officer

RESOURCE CATEGORY "D":

Number of Additional Medic Units:	Available From:	Other Resources to consider:	Command Structure:
All Available Medic Units	Life Flight(s) and all available Emergency Medical Resources.	Law Enforcement Haz-Mat Team County Emergency	Incident Commander Triage Officer Medical Officer
Notify County Fire Chief through C-Comm		Operations Center	Landing Zone Officer Transport Officer Communications Officer



DAMES & MOORE

FIGURE