NAME:	Oromite Company	Deschutes County

OWNERS: The Oromite Company, Terrebone, Oregon
McKinley Stockton, Supt.

LOCATION: Sec. 9, 15, and 16, T 12 S, R 14 E. The property is just south of Lower Bridge on the Deschutes River about 6 miles west of Terrebonne on U.S. Highway 97. A good dirt road leads from the highway to the property.

AREA: About 762 acres.

HISTORY: Formerly the deposit was owned and exploited by the Alomite Corporation. Present production by the Oromite is at the rate of approximately 20 tons a day.

TOPOGRAPHY: The area is of rolling lava fields which are here cut by the Deschutes River forming a canyon about 100 ft. below the surrounding plateau.

GEOLOGY: The diatiomite occurs in a flat, lenticular shayed bed in the upper part of the Deschutes formation and has a maximum thickness of 67 ft. with a mean thickness of 36.7 feet. It lies under a cover of sand and gravel. The deposit is but loosely consolidated, giving in places an appearance of bedding, but generally the material is massive. The diatomite ranges from fair to excellent in quality with considerable variation in weight and color in the different beds.

An analysis by the U.S.G.S. Chemical Corporation of a sample representing the highest quality of material collected is follows:

SiO_2	83.18%
TiO_2	0.16
Fe_2O_3	1.46
Ae_2O_3	2.66
CaO	0.80
MaO	0.35
Na_2O	0.48
K_2O	0.14
SO_3	0.10
Cl	0.02
CO_2	0.08
	88.43

The processed material at the screen weighs from 9½ to 10½ lbs. to the cubic ft.

DEVELOPMENT: The material is quarried after the overburden has been stripped. Exploratory work by the Atomite Corporation included the sinking of 83 test pits which showed that the deposit underlay nearly 830 acres. Dr. R. C. Doyle, reporting to the Union Pacific R.R. Co., estimated in 1921 that there were 9,000,000 cubic yards of recoverable diatomite in the main body of the deposit. There are camp buildings, a processing plant, office building, etc., at the property.

REMARKS: The powdered diatomite is marketed under the trade name of "Dicalite" and has a wide variety of uses among which are as a filtering medium, for insulating purposes, as an admixture in concretes, as an abrasive, and for different fillers.

SOURCE OF INFORMATION: U.S.G.S. Bulletin 875
U.S.G.S. Water Supply Paper 637.

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

Deschutes County

NAME: Oromite Company

OWNERS: The Oromite Company, Terrebonne, Oregon
McKinley Stockton, Supt.

LOCATION: Sec.9, 15 and 16, T.12 S., R.14 E. The property is just south of Lower Bridge on the Deschutes River about 6 miles west of Terrebonne on U.S. Highway 97. A good dirt road leads from the highway to the property.

AREA: About 762 acres.

HISTORY: Formerly the deposit was owned and exploited by the Atomite Corporation. Present production by the Oromite is at the rate of approximately 20 tons a day.

TOPOGRAPHY: The area is of rolling lava fields which are here cut by the Deschutes River forming a canyon about 100 ft. below the surrounding plateau.

GEOLOGY: The diatomite occurs in a flat, lenticular shaped bed in the upper part of the Deschutes formation, and has a maximum thickness of 67 ft. with a mean thickness of 36.7 feet. It lies under a cover of sand and gravel. The deposit is but loosely consolidated, giving in places an appearance of bedding, but generally the material is massive. The diatomite ranges from fair to excellent in quality with considerable variation in weight and color in the different beds.

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Na_2O	0.48
K_2O	0.14
SO_3	0.10
Cl	0.02
CO_2	0.08
	88.43

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

The processed material at the screen weighs from 9½ to 10½ lbs. to the cubic foot.

DEVELOPMENT: The material is quarried after the overburden has been stripped. Exploratory work by the Atomite Corporation included the sinking of 85 test pits which showed that the deposit underlay nearly 830 acres. Dr R. C. Doyle, reporting to the Union Pacific R.R. Co., estimated in 1921 that the main body of the deposit contained 9,000,000 cubic yards of recoverable diatomite. There are camp buildings, a processing plant, office building, etc., at the property.

REMARKS: The powdered diatomite is marketed under the trade name of "dicalite" and has a wide variety of uses among which are as a filtering medium, for insulating purposes, as an admixture in concretes, as an abrasive, and for different fillers.

SOURCE OF INFORMATION: U.S.G.S. Bulletin 875
U.S.G.S. Water Supply Paper 637.

6/46

Bend Pumice

NAME

OLD NAMES

Pumice

PRINCIPAL ORE

MINOR MINERALS

18S T

12E R

NE¼ 7 S

PUBLISHED REFERENCES

Deschutes .... COUNTY

.... AREA

.... ELEVATION

MISCELLANEOUS RECORDS

.... ROAD OR HIGHWAY

.... DISTANCE TO SHIPPING POINT

PRESENT LEGAL OWNER (S) ....

Address ....

OPERATOR ....

Name of claims	Area	Pat.	Unpat.

Name of claims	Area	Pat.	Unpat.

EQUIPMENT ON PROPERTY

MI-21

What this boils down to is that while the lopsided nature of the available data will enable us to abundantly describe manifest short-comings in the instance of many non-commercial occurrences, the lack of equivalent detail for various of the better deposits will prevent us from being equally informative concerning the favorable aspects of most of the potentially interesting properties. This -- when it should by all that is holy be the other way around with the best deposits documented the most abundantly.

Enough for why I feel it would be premature to force a master publication at this time on the basis of the presently available data without first putting in the effort needed to appreciably up-grade the reports for certain key occurrences. I will now be more specific as to which occurrences do, and do not, need re-examination in my estimation.

On this score it seems best to clear the air by first listing the commercially negative occurrences concerning which the negative aspects are already impressively well documented. These occurrences are --

(1) The extensively prospected occurrences in the Trout Creek area of southeastern Harney County where potentially good-appearing diatomite is rendered utterly unminable by such a widespread abundance of closely spaced interbeds of volcanic ash that it would still rate as commercially unattractive even if accessibly located with reference to service and distribution facilities.

(2) The ideally located Telocaset showings which our drilling (Baggs, 1971) indicated simply do not exist at depth in the amounts anticipated and on the level of purity that had been originally reported as being present.

(3) Those of the Klamath area occurrences concerning which documented high and undrainable water table conditions combine variously with ash interbeds and overburden disposal problems to create mining complications which substantially negate overall commercial attractiveness.

(4) The Terrebonne deposit which can only be described today as an historically significant "has been" on which Great Lakes Carbon saw fit to close down a long-established operation because of the depletion of minable reserves.

(5) A host of verified but randomly located occurrences such as at Austin, Durkee, Elgin, Richland, etc. which are either flatly described as "small" or concerning which the general geologic setting rather effectively indicates a probable lack of any truly significant-sized tonnage occurring under circumstances that could be recommended as worth industrial-level prospect attention.

Concerning the occurrences for which I feel that a major up-date in mapping is particularly desirable, the list is as follows:

(1) The Otis Basin area because of the Joe Altnow and Bill Miller properties which I regard as being especially logical targets for

exploration in light of the inferences as to commercial suitability deriving from the history of the investigation conducted by Great Lakes on the Altnow property during the 1950's (see file report of August 28, 1973). Additionally, I suspect that these properties may well prove to be two of the largest, cleanest and most minably situated deposits in all of eastern Oregon.

(2-3) The Harper-Westfall and Klamath areas because in each there are two or three places where sizable tonnages of massively bedded diatomite obviously exist with comparitively fewer and thinner ash partings, lesser overburden problems, etc. than is generally the rule throughout said areas as a whole. The problem with these areas will be to first map each with sufficient objectivity to separate the dogs from the gems. Then, when this is done, the problem will be to generate enough meaningful new data concerning the gems to permit the presentation of truly informative descriptions on levels, and along lines, that are impossible to make authoritatively at the present time with the generally vague and ambiguous data now at hand.

(4) Finally there is the Christmas Valley diatomite which that guy in Eugene is using for cat litter, and a few other occurrences like it, which never have been the subject of any special reporting at all over and beyond incidental reference to their existence in geologic map legends. These all need critical firsthand examination before much of anything can be offered concerning them one way or another.

All told, there are three reasons why up-date mapping is needed in connection with the above-listed deposits. One is to capitalize on the level of accuracy that can be achieved by taking advantage of the high-quality topographic base maps which are now available for most of said areas in contrast to the dubiously accurate planimetric maps which Moore had to use in 1930 and on which he had to superimpose recon-level topography as best he could before he could attempt his mapping. Therefore because Moore's base maps had rather generous amounts of built-in distortions to begin with in many instances, all new mapping that we do will be bound to contribute much in the way of clarity and precision to any report we might turn out.

Another reason why Moore's 1930 maps would be inappropriate for use today stems from the rather appreciable amount of new stratigraphic nomenclature that is in use today in comparison to what existed in 1930. For example, what Moore shows simply as "Payette" on his maps may now sometimes include two or more of the formations recognized by different names and pegged at different ages today. Add to this the fact that the associated volcanics are also known by different names and it should be obvious why fresh and precise mapping is virtually essential since it would be messy on all counts to try to doctor Moore's generally obsolete reconnaissance mapping to harmonize with present-day usage.

The third reason why fresh mapping would be desirable as I see it is that in any master summary we publish at this point in time it seems logical to not give map space to every dog of a showing there is just because it exists, but instead to concentrate our maps exclusively on only those occurrences which appear to have a reasonably balanced combination of minability potentials. Occurrences which it can be deemed industry might appreciate being alerted to, that is, as against the dogs they would appreciate being steered away from. In other words, I feel that at this point in time there is a certain amount of discrimination that it would well behoove the Department to make before any contemplated new publication is issued; hence utilization of Moore's old area-wide maps is no longer pertinent because of the very fact they are area-wide in their coverage rather than selective.

Please understand that I think a report featuring diatomite is something the Department would do well to issue. After all, Oregon does have extensive occurrences concerning which it seems reasonable to conclude that some have what it takes to be acceptable for development purposes. Additionally, such a report would seem to be more than ordinarily timely since the national demand for diatomite is likely to increase materially in the future as a result of the trends now underway for water purification on a nation-wide scale. Besides, with luck, Lompoc might eventually slide into the ocean or be zoned against further development because of ecologic and kindred envioronmental considerations, in which case Oregon and Nevada occurrences would be logical alternatives for development just as our lowgrade copper is now regarded as a respectable target for exploration since import from South American no longer exists. In fact, in my own mind I am confident that we would even now have a going operation underway in the Otis Basin had it not been for the technicality of Great Lakes having had a foot-hold at Lompoc at the same time they conducted their Otis Basin investigation. Which is to say that the Otis Basin material probably rates as industrially acceptable from a grade standpoint despite the negative inference that can be construed from the Great Lakes' action in dropping their options.

Be this as it may, my suggestion is that if you elect to follow-through with the publishing of a special diatomite pamphlet, then by all means give the undertaking full project status with the objective of generating fresh new data for those deposits which deserve to be featured rather than attempting to base it on the presently available conglomeration of information which is for the most part merely obsolescent reconnaissance in the instance of the deposits that deserve to be featured the most. In fact, I would go so far as to suggest that in addition to making new geologic maps on the available topo bases for the major districts-at-large such as Harper, Otis, etc, you would do well to make individual larger scale plane table maps for the especially notable deposits within the districts in order to document the specifics for said deposits to the most impressive extent possible.

One final topic. My comments so far have had to do only with possibly minable deposits from the standpoint of size, accessibility and the lack of obvious physical contaminants and not from the standpoint of <u>quality</u> in the sense of material suitability for various end-product uses. And this matter of quality, or grade, is an entirely different ball game because as you know what constitutes commercially acceptable diatomite from an end-product standpoint has always been treated as a trade secret of the primest order.

Whether we, or any other agency like us, can ever crack this barrier is something I can't predict. However, I do think it would be a step in the right direction to search the literature comprehensively for every description ever published concerning the identities of the different kinds of diatoms present at Lompoc and at other occurrences where diatomite is being processed and marketed for filtering purposes. Then with the list thus documented for deposits now being worked it would be a relatively simple matter to sample the Oregon occurrences which rate as potentially minable from a physical standpoint and compare the findings.

Doing this would probably require some sort of co-operative agreement with the USGS in order to get the diatomite assembleges in our deposits identified and evaluated by accredited specialists. However, co-operation on this level shouldn't be difficult to arrange and it is the only procedure I can see open to us if we are to ever crack the mystery of this all-important quality, or grade, question. But the mystery should be crackable because before Lompoc and certain of the other producing occurrences were operated very extensively, and before this trade secret racket became popular, some aspiring paleontologists must certainly have studied and published choice tid-bits concerning the identity of the diatom species present in said deposits. And the percentages of one kind to another, etc.

All we would have to do as I see it is to ferret out these published descriptions and then use them as standards to compare our Oregon material against. And while this still wouldn't prove that some our diatomite was unconditionally suitable for some of the highest class end-product uses there are, it would sure go a long way towards clearing the air if we could demonstrate some of our material was essentially comparable in make-up to what is being used elsewhere.

Since it is to be remembered that the material from Terrebonne was used over a span of a couple decades for the highest class end-products known to the industry, and since Great Lakes came within an ace of starting an operation in the Otis Basin for the same type of product when Terrebonne gave out, it seems logical to suspect that at least some of Oregon's minable-sized occurrences may well be developable from a grade standpoint also. Hence tackling this grade question head-on by sampling the better Oregon occurrences comprehensively and comparing the diatom assemblages with those reported for the deposits now under operation could well result in rich dividends in the long run even if it doesn't accomplish anything more at the outset than to take some of the mystery out of this trade secret jazz. So therefore my suggestion is that this grade question should be incorporated into any project the department undertakes to make in connection with diatomite.

And just for the hell of it my predictions are as follows:

(1) That significant amounts of some of the bigger Otis Basin deposits will be found to be in the ball park for use on at least some filtering levels.

(2) The Harper Basin material will turn out to be mostly filler and carrier grade material.

(3) The Klamath area will fall into a bracket between the above with some deposits being filter grade and some not.

(4) That other geologically semi-recent deposits comparable to Terrebonne, but as poorly exposed now as Terrebonne was before it was developed, do exist and will someday be recognized as being developable.

Well, so much for my analysis of the existing diatomite data and my suggestions as to what should consitute a proper solution for resolving the dilemma. The fact is that I almost wish I could be around for another year to personally follow through on the project along the lines indicated since doing so would be a truly constructive task and gratifying experience.

Sincerely,

N. S. WAGNER

NSW/aw

P.S: File reports brought to date during the year in connection with the review of this subject include:

(1) Diatomite in the Telocaset area, Union County (Supplemental Report #1), April 5, 1973

(2) Otis Basin Diatomite, August 28, 1973, this being a historical documentation of the Great Lakes' explorations almost exclusively.

Terrebonne Diatomite | Oromite Co. | Diatomite |
--- | --- | --- | ---
NAME | OLD NAMES | PRINCIPAL ORE | MINOR MINERALS

14S (T) 12E (R) 16 (S)

Deschutes COUNTY

AREA

97 ELEVATION

ROAD OR HIGHWAY

6 miles to Terrebonne DISTANCE TO SHIPPING POINT

PUBLISHED REFERENCES

USGS Bull 875

" Water Supply Paper 637

MISCELLANEOUS RECORDS

PRESENT LEGAL OWNER (S) Dicalite Company

Mc Kenly Stocton, supt

Address

OPERATOR

Name of claims	Area	Pat.	Unpat.

Name of claims	Area	Pat.	Unpat.

EQUIPMENT ON PROPERTY

MI-21

Operations ceased about 1963

DIATOMITE OPERATIONS AT TERREBONNE, OREGON

D. F. Dyrsmid (Member A.I.M.E.)
Chief Engineer
Dicalite and Perlite Divisions
Great Lakes Carbon Corporation
Walteria, California

American Institute of Mining and Metallurgical Engineers
1954 Pacific Northwest Metals and Minerals Conference
Industrial Minerals Division
May 1, 1954
Portland, Oregon

DIATOMITE OPERATIONS AT TERREBONNE, OREGON

INDEX

DIATOMITE OPERATIONS AT TERREBONNE, OREGON.

LOCATION:

The Terrebonne diatomite deposit and processing plant of the Great Lakes Carbon Corporation are located in Central Oregon at an elevation of 2550 ft. above sea level on the west bank of the Deschutes River. The nearest town, Terrebonne, is six miles north of the city of Redmond and seven miles east of the plant and is the rail shipping point for the finished products from the plant.

HISTORY:

Our first known reference to diatomite in the Terrebonne area is by the U. S. Surveyor General's Office on the original township plat which states, "On the west side and adjacent the river in Sec. 16 is a hill composed of white marble. This substance is somewhat of the same nature and makes a very good substitute for white chalk." Certainly the formation was known even before that time since the old Willamette Valley and Cascade Mountain Military Wagon Road, shown on the original plat, crossed the Deschutes River exactly where the present County Road and Bridge which we now use is located. This old military road, sections of which are still visible, crossed through Sec. 16 right over the area which we have been mining for the past eighteen years.

Some natural products were shipped from this deposit even prior to 1921 when the Western Diatomite Company operated the property. In 1930 the Atomite Corporation took over, their rated capacity being approximately 25 tons per day, and the operation still being limited to the production of natural materials. A rotary kiln had been partially installed by the Atomite people but their operation was spasmodic and the installation of this unit was never completed.

In 1935 the deposit and plant facilities were acquired by The Dicalite Company. That company had carried on laboratory scale processing of the Terrebonne diatomite at their Walteria Plant and very shortly after taking over the property undertook a complete rebuilding of the existing facilities so they would more nearly correspond to the flowsheet of the Walteria operation. The first runs on natural products were in May, 1936, the first flux calcined material was produced in the newly completed rotary kiln the following month and the operation was off to an immediate success. Except for a period required for the complete rebuilding of the plant necessitated by a disastrous fire in May, 1939, operation has been continuous since 1935. In 1944 Great Lakes Carbon Corporation purchased The Dicalite Company which shortly thereafter was designated as the Dicalite Division.

Great Lakes Carbon Corporation owns and operates diatomite properties at Walteria, Calif.; Lompoc, Calif.; Basalt, Nev.; and Terrebonne, Ore. In addition, the company controls additional extensive reserves in the Lompoc area; near Bradley, Calif.; near Burney, Calif. along the Pit River; and in the Otis Creek Basin about 50 miles northeasterly from the town of Burns, Oregon.

ORIGIN:

Diatomite, or diatomaceous earth, is a light-weight sedimentary rock varying in color from light brown to grayish or white, it is the siliceous remains of microscopic aquatic plants called diatoms. In nature this low form of plant life occurs in almost all waters and under a wide range of conditions throughout the world. These minute plants are unicellular and during their growth and formation, secrete for themselves siliceous encasing frustules, the remains of which build up on the bottoms of inland bays or lakes later to be uplifted to form diatomite deposits. Diatoms, by the process of photosynthesis, are able to convert chemicals contained in the water in which they live directly into food. Diatoms are very prolific and when temperature and other environmental conditions are favorable, their numerical rate of increase can be astronomical as they propagate by division and therefore increase according to a geometric progression. Silica is the predominent factor in the make-up of the diatom frustules. For this reason waters in areas where considerable volcanic activity has taken place are especially favorable to their growth because of the relatively high dissolved silica content. Very often layers or streaks of fine volcanic ash, known as silver sand, are found in diatomite deposits. The presence of this fine sand is a major nuisance as it presents a difficult classification problem.

Diatoms are found in fresh, brackish, or sea waters; the Terrebonne deposit being of the fresh water variety. Different degrees of salinity produce different species of diatoms and an experienced person can often determine at a glance through a microscope whether a diatomite sample came from a marine or a fresh water formation.

Through a microscope diatoms present thousands of shapes and configurations each with its own characteristic markings. Their surfaces present complicated and beautiful patterns and markings in the form of holes, spines, ridges and dimples. The predominant diatoms from Terrebonne are banana shaped; boat-like; chain or ladder-like forms and discs.

PROPERTIES:

The value of diatomite, often referred to as D. E., lies chiefly in its high porosity and its chemical inertness, chemical purity being of less importance. Usable material at Terrebonne runs from 18 to 32 pounds per cubic foot, dry block weight. The lace-like structure of the diatoms gives the rock its high porosity. The high porosity, however, makes possible the exceedingly high and objectionable moisture contents which must be removed in processing. Bank moistures in this deposit run from 40 to 65% depending on the exposure and depth in the formation.

Chemical Analysis (dry basis)
Terrebonne Diatomite

SiO_2	81.1% *
Al_2O_3	5.1
Fe_2O_3	2.8
CaO	0.7
MgO	0.7
TiO_2	0.3
Alkalis	2.3
Loss on Ignition	7.0
	100.0%

*After processing the SiO_2 content in the finished product is about 90%.

GEOLOGICAL FORMATION:

The Terrebonne Diatomite Deposit has been identified as late Pliocene or early Pleistocene and is considered to be about one million years of age. There is abundant evidence at hand to warrant one in associating the age of the formation with that of one of the great outpourings of lava that occurred in the Pacific Northwest as the deposit is wholly encased in volcanic products. The main part of the deposit is an extremely flat formation which extends overall about one mile east and west and 3/4 mile in the north and south direction. It is overlaid with 20 to 30 feet of sand and gravel with a few stones up to 8 or 10" in diameter. This overburden weighs about 2900 lbs. per cubic yard and has one layer about four feet thick that is quite firmly cemented. Another layer in the sand and gravel is about 3-1/2 feet thick and is very homogenous, it contains pebbles up to 3". This otherwise waste material has very satisfactorily furnished practically all the concrete aggregate used over the years for our construction requirements.

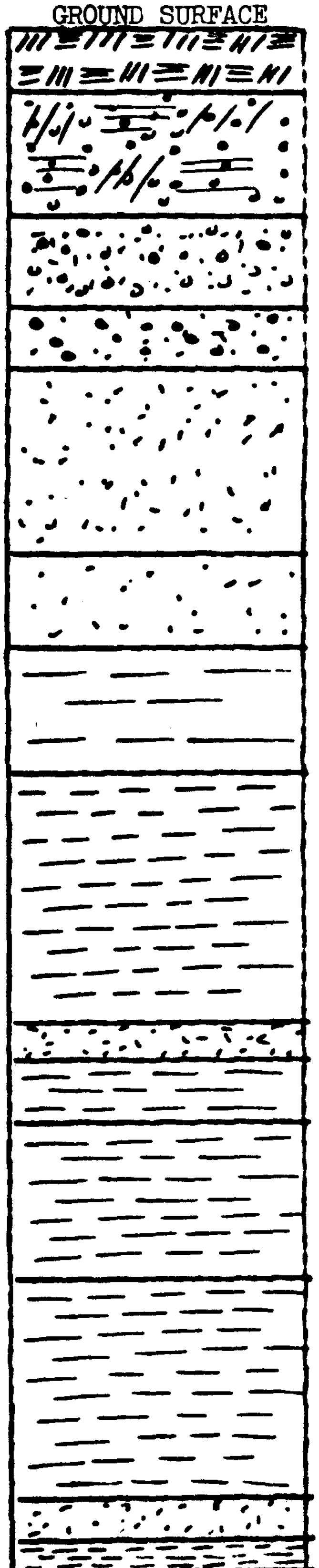
The diatomite lies in undisturbed beds varying from 2 to 8 feet thick and makes up a total maximum thickness of 38 feet. The rock is quite soft and breaks with a concoidal fracture. Characteristically, fresh water formations such as Terrebonne, are free of the laminations that are invariably found in marine earth. The diatomite beds have trace markings which help us in lifting the various strata at desired levels; several streaks of volcanic ash finely interspersed through the deposit help some in this respect but as pointed out before, constitute a separation problem in the milling and classification process. Strata in the deposit are arbitrarily numbered from top to bottom for ready identification, these strata are lifted singly or in some cases together so as to fit in with our processing requirements, being used singly or as blends. The Typical Stratigraph shown on Page 6 better outlines the structure of the Terrebonne Formation.

A considerable amount of exploration work had been done before Great Lakes Carbon Corporation took over the Terrebonne deposit, we made use of some of the hand dug test holes which remained. We also, in our

TERREBONNE DIATOMITE FORMATION
Typical Stratigraph

FORMATION TO APPROX. SCALE

GROUND SURFACE



BOTTOM OF DEPOSIT
25-30 ft. Red Conglomerate below

DESCRIPTION	STRATA THICKNESS	
Alluvial Soil	2'	Overburden 20 to 30 ft.
Soil and Gravel	4'	
Cemented Sand and Gravel	3'	
Sand and Gravel	2'	
Sand	10'-12'	
Sand, Pumice, and D. E.	3'	
*No. 1 D. E. High Quality	4'	Diatomite 22 to 38 ft.
*No. 2 D. E. Good Blending Quality	8'-10'	
*No. 3 D.E. and Silver Sand	2"-6"	
*No. 4 D.E. Good Blending Quality	2'	
*No. 5 D. E. High Quality	5'	
*No. 6 D. E. quite variable in thickness, not being worked at present.	4'-12'	
*No. 7, Yellow Sand	3"-4"	
*No. 8 D. E. Contaminated	1'	

*Stratum Number
D.E. abbr. for diatomite

first exploration, put down a few additional test holes by hand digging. In cases where the deposit outcropped such as along Buckhorn Canyon and Deep Canyon which cut through the deposit, the edges of the diatomite strata were adequately exposed by the use of a bulldozer running down the canyon slopes.

Later on we mechanized our exploration system, making use of a truck mounted earth boring machine which puts down holes at a rapid rate and which has proved highly satisfactory in all respects. We standardized on the use of 30" diameter holes as this permits rapid drilling and is sufficiently large to allow the geologist to readily descend down into the hole for taking samples and complete underground information. The geologist descends into the hole on a winch lowered bosun's chair and carries a sampling hammer, sample bags, tape line, Brunton, notebook, portable light and other necessary items. An independent safety rope is fastened securely at the surface and hangs to the bottom of the hole, it is tied to the working chair by the man in the hole to forestall any trouble in case of failure of the main winch line. A hard hat is, of course, standard equipment. At first we lowered the bosun's chair by means of a small hand winch carried by a steel pipe tripod set up above the hole, but later on we mounted the winch, with a short boom, on a Willys 4-wheel drive pick-up truck. The final improvement was to power the winch by means of a couple 6 volt storage batteries carried along in the truck. The earth boring machine is used at any deposit which we actively consider, also where we are now operating. It is a rather ingenious but simplified piece of equipment; it has a collapsible self-raising mast 34' high and is equipped with 20 foot drill stems. The first two stems are telescopic and permit drilling down to 40' depth without the necessity of detaching stems. For holes deeper than 40' it is necessary to separate the succeeding 20' stems and set them on the ground alongside of the rig or lower them into a small "rat tail hole" which is drilled alongside of the rig. In good drilling where no hard material or large rocks are encountered a 40' hole can be put down in approximately two hours excluding the time of set up which is variable depending on the nature of the terrain. The deepest hole that we have drilled with our machine to date is about 90' but on account of the additional work of changing stems in and out each time a bucket load of material is dumped, the production rate diminishes very rapidly. A 90' deep hole, even under good conditions, requires about sixteen hours to drill.

MINING:

When The Dicalite Company took over this operation in 1935 mining had been carried on strictly as a hand operation. There was a considerable area of diatomite which had been uncovered by mechanical stripping methods but the breaking out of the rock was accomplished strictly by the use of picks and toothed bars similar to ice breakers. The rock was taken out in lumps as large as possible as it was the practice at that time to do a considerable amount of field piling for the purpose of natural drying. This was accomplished by hand piling the lump crude in rows on a flat expanse exposed to the wind and sun. Some of these piles were made under drying sheds in order to circumvent moisture build-ups in case of undesirable weather conditions. The dried rock, after six months or more in the field piles, was transported to the plant by the former operators in take-apart bottom wagons drawn by teams. The lumps were unloaded by hand, being thrown directly into a double spike roll crusher, the fine material being unloaded by separating the wagon bottom boards.

In making our first inspection and survey of the mill and mining operation in 1935, we noted a 2-1/2 yard Bucyrus railroad type steam shovel setting on a short section of standard gauge railroad track. There also were two 36" gauge saddle tank steam locomotives as well as 25 or 30 four-yard side dump cars. The remnants of this old set-up intrigued us, especially the shovel. We understand that this ponderous shovel once upon a time was used at the Panama Canal. It had been brought over the seven miles of rough terrain between the rail siding at Terrebonne and the mine over less than 100 foot of track. The rails were in eleven foot sections so by repeated eleven foot move-ups bringing around from rear to front the short sections of rail, the whole move, including crossing the Deschutes River, was finally accomplished.

For our first year of operation mining was still by hand, then by a small gasoline shovel under contract. In 1937 we put into operation a 1-1/2 yard Lima shovel which because of the severe winter conditions we had electrified, serving the shovel by 3 phase 440 volt pole line and 1000 feet of three conductor cable. We found that a good ground conductor and connection was an absolute must, as under certain conditions, due to the characteristics of the diatomite formatiom, a heavy shock was experienced when a person simply walked around near the shovel when the power was on. Our triple ground wire cable, with completing ground conductor carried back on the pole line to the power source about 1000 feet away corrected this unusual condition.

Originally we used 5-yard Ford Dump Trucks built up with side boards to 7-1/2 yards when the lightweight diatomite was being carried. These units proved unsatisfactory as the overloading by overzealous operators when hauling the heavy overburden caused excessive maintenance.

In 1938 we supplanted the Fords with three 12-yard, two axle, 25 ton gross, GMC trucks which were equipped with 11:00 x 24 dual tires on the rear, same size single on front. The large tires give us excellent flotation especially on the soft dumps and under wet freezing and thawing conditions when the surface of the deposit becomes almost like grease. These sturdy units immediately proved their worth, a fourth unit was purchased later, and this fleet has been in continuous service to date with a high degree of operational and economic satisfaction.

On several occasions when we were unable to keep up with advance stripping we contracted D-8 Caterpillar drawn scrapers. Of late we have contracted Euclid Scrapers which have proved out exceedingly well for this accelerated stripping. We have found double pusher cats to be more than justified because of the additional yardage lifted especially in the sandy or loose type overburden or in lifting crude when high moisture conditions prevail. The double pushers increase tonnage moved per scraper unit by as much as 35%.

Our plant superintendent several years ago became interested in a Euclid Belt Loader; after considerable study and observing the performance of these machines elsewhere we purchased one of these units. It is a spectacular machine to watch, as under favorable conditions, it will load out a 12-yard truck, with either the light diatomite or the heavy gravel overburden, in 12 to 14 seconds. We have been very well pleased with this unit but have found, with a sometimes limited length of quarry face, that it is just about a stand off as compared to the rubber mounted wheel tractors such as a Caterpillar DW-20 or Euclid Tractor pulling 18-yard scrapers.

In the mining operation we take advantage of as much natural drying in the pit as is possible. This is accomplished by opening fairly large areas, turning over the material once or twice while letting it lay for a couple months or more before picking it up for transport to stock-piles which total around 15,000 tons.

The mill crude bins are serviced by an 8- yard dump truck which is loaded out by means of a Haiss continuous bucket loader, also equipped with electric power. The truck driver operates the bucket loader and can bring in a 24 hour supply of crude, approximately 300 wet tons, to the crushing plant in the day shift.

An air view of plant and quarries on Page 12 shows many of the features so far mentioned.

PRODUCTS:

The finished products are powders having a particle size of 90% less than 40 microns, a loose weight of 12 lbs./C.F. and a tamped weight around 19 lbs./C.F. The products fall under three general classifications; NATURAL, CALCINED and FLUX CALCINED. All of these materials are dried, milled, classified for removal of grit, and sized by additional milling and air classification. NATURAL is a grayish to white material; CALCINED grades are pink or buff, having in addition to the above been subjected to calcination in the rotary kiln; FLUX CALCINED products are snow white, in the calcination stage having additionally been treated in the presence of a flux. The last mentioned products predominate by a considerable majority.

PROCESSING:

A schematic Flow Diagram is shown on Page 14; it has been simplified for clarity but shows all the key elements in the operation.

Great Lakes Carbon Corporation
DICALITE DIVISION
Air View TERREBONNE PLANT looking in a Westerly Direction

Processing Plant in center adjacent to Buckhorn Canyon Road.
100,000 gallon fire protection tank on tower just to south of plant area.
Several stockpiles visible northwesterly from plant area.
20Q,000 gallon fuel oil tank westerly from mill area.
Laboratory Hill section of quarry visible in foreground.
Top west bank of Deschutes River visible in immediate foreground.
Old cut in lower right hand corner exposes edge of diatomite formation.
Typical section of quarry westerly from water tank and plant area.
Euclid Loader directly above water tank on diatomite bench.
Overburden dumps visible at left of mined area.
Dump along east side of Deep Canyon in right background.
Old drying sheds visible along west edge of Buckhorn Canyon.
Several family dwellings northeasterly from plant area.
Typical Juniper covered Central Oregon "High Desert" in the distance.

The milling operation is carried on 24 hours per day 5 to 6-2/3 days per week, sixty-five to seventy-five men being employed. The process includes the following stages in the order shown:

CRUSHING - By spike roll crusher, fed by apron feeder.

DRYING - Flash drying in transport piping and cyclone system.

SAND TRAPPING - A multiple series of air classification units for the rejection of sand.

CALCINATION - Burning in the range of 1700° to 2200° F. in the rotary kiln. Fluxing of white products is accomplished by addition of soda ash with the raw diatomite.

COOLING - By radiation in the Finish End Milling System. Additional cooling is accomplished in summer by a water cooled heat exchanger in the transport piping system.

FINISH END MILLING - By Milling blower in conjunction with air classification units. Grit is also removed at this point by additional classifiers.

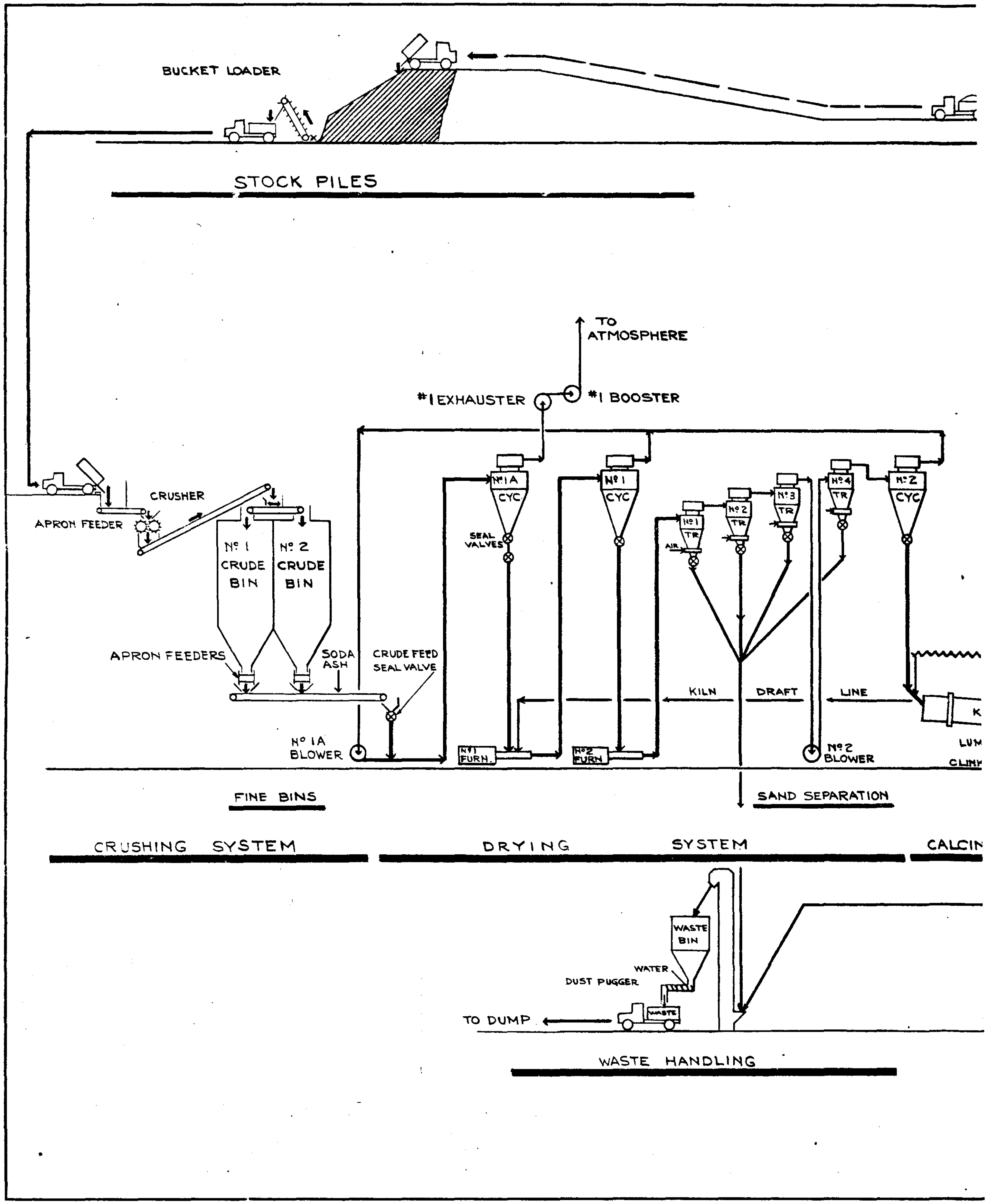
PRODUCT COLLECTION - By cyclones in air series; main product goes to the packing bin and overhead fines are collected in an automatic baghouse dust arrestor for packing off as fines or for recycling back to the rotary kiln.

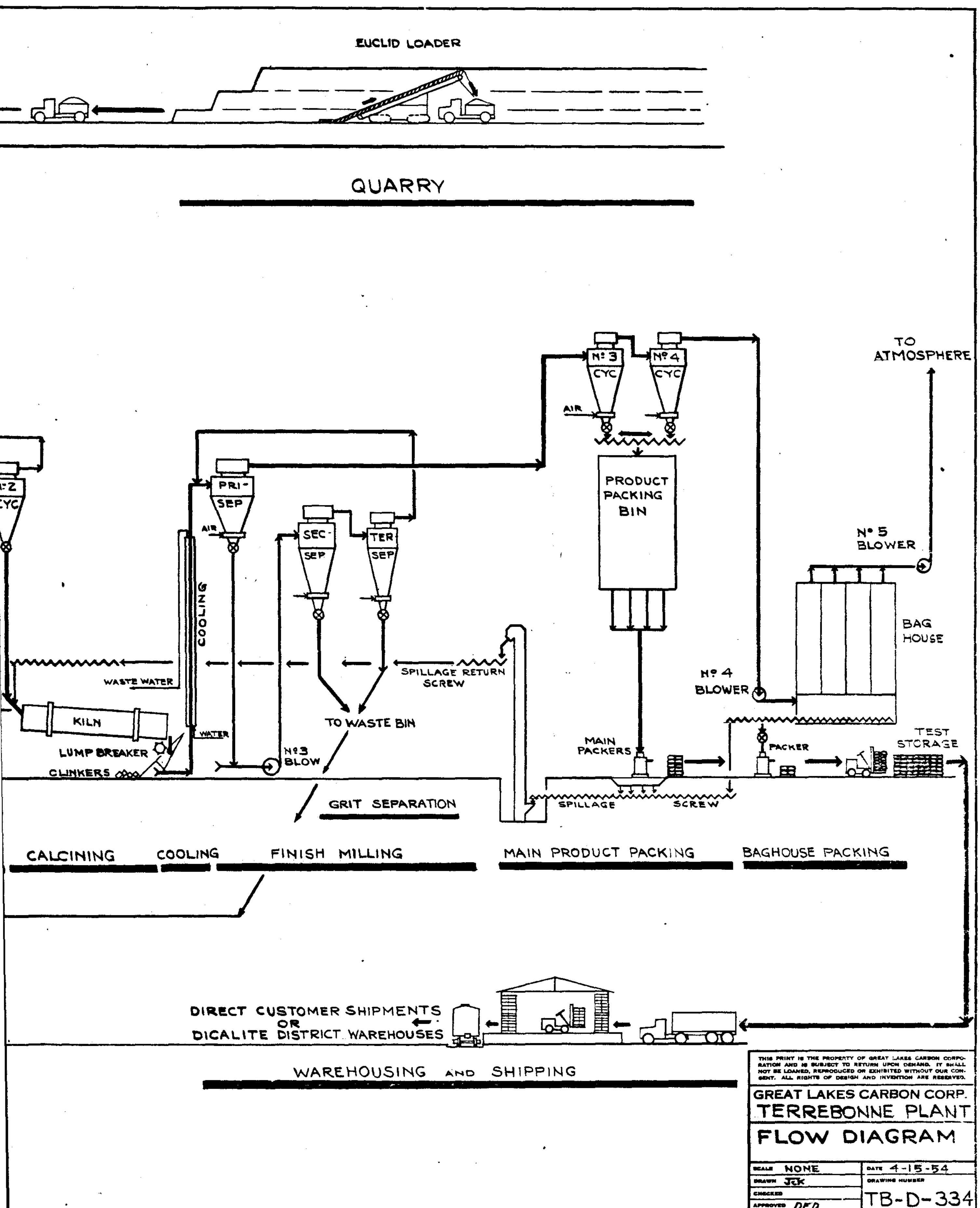
PACKING - By St. Regis Valve Bag Packers.

MATERIAL HANDLING - Palletized loads handled by Hyster Half Ton Fork Trucks.

LABORATORY CONTROL:-

Rigorous control of the product is maintained at all times by continuous testing of the finished material. Samples are taken of each two hour production period as the product is being made and the product must be approved for uniformity as to specification before it may be loaded out. The Plant Chemist approves all production, he is not responsible to the Superintendent but reports directly to Division headquarters so as to assure unbiased product control at all times.


BUCKET LOADER
STOCK PILES
TO ATMOSPHERE
#1 EXHAUSTER
#1 BOOSTER
CRUSHER
APRON FEEDER
Nº 1 CRUDE BIN
Nº 2 CRUDE BIN
APRON FEEDERS
SODA ASH
CRUDE FEED SEAL VALVE
SEAL VALVES
Nº 1A CYC
Nº 1 CYC
Nº 1 TR
Nº 2 TR
Nº 3 TR
Nº 4 TR
Nº 2 CYC
AIR
KILN DRAFT LINE
Nº 1A BLOWER
Nº 1 FURN.
Nº 2 FURN.
Nº 2 BLOWER
FINE BINS
SAND SEPARATION
CRUSHING SYSTEM
DRYING SYSTEM
WASTE BIN
WATER
DUST PUGGER
WASTE
TO DUMP
WASTE HANDLING


EUCLID LOADER
QUARRY
TO ATMOSPHERE
Nº 3 CYC
Nº 4 CYC
AIR
PRODUCT PACKING BIN
Nº 5 BLOWER
BAG HOUSE
Nº 4 BLOWER
Nº 2 CYC
PRI-SEP
AIR
SEC-SEP
TER SEP
COOLING
WASTE WATER
SPILLAGE RETURN SCREW
KILN
WATER
TO WASTE BIN
LUMP BREAKER
CLINKERS
Nº 3 BLOW
MAIN PACKERS
PACKER
TEST STORAGE
SPILLAGE
SCREW
GRIT SEPARATION
CALCINING
COOLING
FINISH MILLING
MAIN PRODUCT PACKING
BAGHOUSE PACKING
DIRECT CUSTOMER SHIPMENTS
OR
DICALITE DISTRICT WAREHOUSES
WAREHOUSING AND SHIPPING
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GREAT LAKES CARBON CORP.
TERREBONNE PLANT
FLOW DIAGRAM
SCALE NONE
DATE 4-15-54
DRAWN JCK
DRAWING NUMBER
CHECKED
APPROVED DFD
TB-D-334

WAREHOUSING AND SHIPPING:

The finished product is packed 50 pounds net in multiwall valve bags which are 21" wide x 5" gusset x 40" long. As the bags are filled they are placed on 36" square pallets, two bags per layer, eleven layers high, or 1100 lbs. per pallet. Hyster three wheel pneumatic tired gasoline driven fork trucks are used for all pallet load handling both at the plant and at the warehouse. The pallet loads are held on the plant floor until tests are completed and the product is approved, after which these unit loads are moved into 35 foot semi-trailer vans for transport to Terrebonne. Three transport vans and two gasoline tractors are used on this haul, one driver makes seven or eight round trips per eight-hour shift. Pallet loads are removed from the vans to be stored in the warehouse or carried into box cars where the bags are hand stacked to "full visible capacity," usually 30 tons per carload. Practically all product goes out by rail via Union Pacific or Oregon Trunk Railway, the cars, before loading, are paper lined to protect shipments against damage by abrasion in transit.

USAGE:

Finished DICALITE products find their way into an extremely wide cross section of industry. Basically the finished materials fall into three general classifications, each in itself being very wide in scope of usage.

FILLERS are used in connection with paint, paper, plastics, asphalt and concrete; with chemical fertilizers, as an anti-caking agent; with polishes as a mild abrasive; as insecticide diluents or carriers and many other specialty lines.

INSULATION is used directly as an aggregate or powder and as more often is the case, in conjunction with other materials such as asbestos or with lime to form a calcium silicate.

FILTERAIDS are the foremost in importance and find their greatest usage in the filtration of anti-biotics and sugar; other typical and important uses are with pectin, edible oils and fats, beer, paper mill white water, boiler condensate, metallurgical filtration and many other applications.

Because of the highly diversified usage of these products as well as the ever expanding number of new applications, the continuous and increasing growth of this important industry in non-metallics is assured.

Deschutes County

Iron, Copper and Gold Peacock Claim

Location: Deschutes County, SE ¼ Sec. 1, T. 14 S., R. 13 E. Peacock Lode Claim No. 1.

Claim notice dated November 1, 1934, signed by D. S. Knowles; Ernest, W.A., and A. D. Russell; H. W. Johnson; Arthur ________; B. C. Duling. The prospect is reached from The Dalles-California highway, turning east at Terrabonne on the old military road and up Lone Pine Flat to the NW corner of Sec. 8, T. 14 S., R. 14 E.; thence up a narrow gulch to the saddle and thence down the west slope to a point about 1/8 of a mile SW of the saddle. This locality is covered by the Bend Quadrangle.

Geologic Relations: The rocks of this area are reported to be Clarno. Clarno series is apparently pyro-clastic, rhyolitic tuff which is well consolidated, and portions of it are characterized by large bubble holes and solution pits up to 4 and 5 feet in diameter. In some places the rock has a decided honey-comb appearance, and outcrops at some distance from the road ~~river~~ appear to be swallows' nests or honeycomb pits. This Clarno tuff is supposed to be Upper Eocene in age. The tuff at the claim discovery notice appears to have been hydro-thermally altered. The characteristic buff color has been changed to white or greenish white with small masses of silica scattered throughout the mass.

Ore Deposits: Apparently the Peacock Lode Claim No. 1 is the principal location. At this point the "ore body" appears to be a half inch to three inch~~es~~ seam in which ironoxide has been concentrated to a degree varying from hematite to heavily iron stained tuff. The "ore body" stands almost vertically, having a high angle dip to the north and northeast. Scattered over the surface of the hole are numerous prospect pits and "scratch gravel" excavations which expose altered tuff, some of which is heavily iron stain. The only minerals which could be identified were ironoxide, probably of a hematitic variety.

"Ore" deposition is inferred to relate to work of descending meteoric water which has carried iron in solution and deposited where conditions are favorable.

Development: Aside from the small prospect pits, the only evidence of development is an open cut about 5' long, which opens up the "ore body" along that distance.

History: It is claimed by informants in Madras that ore from the prospect was shipped to the Tacoma smelter, and the owners received in return a small bar of copper. The ore is reported to contain iron, copper and a small amount of gold. Unless additional evidence of ore is found, this prospect is probably one of many which exist in name only.

Ray C. Treasher
Nov. 12, 1939