STATE OF OREGON

INTEROFFICE MEMO

TO: John B., Jerry G., Ron G.

DATE: August 10, 1987

FROM: Don Hull

SUBJECT: Hanna smelter alternate use study

The attached information has some interesting insights regarding industrial minerals.

DAH:rm
attachment

STATE OF OREGON INTEROFFICE MEMO

TO: Don Hull

DATE: August 3, 1987

FROM: Len Ramp

SUBJECT: Hanna Smelter Facility Study
Douglas County Industrial Development Board Meeting, 7-30-87, 3:00 p.m.

The Group, including two representatives of Hatch Associates (the Spokesman's name - Paul O'Shaughnessy), Peter Graff, Secretary of the Douglas County Industrial Development Board, three members of the board, Herb Wedge, Lynn Youngbar of EDD, a TV reporter with his camera and recorder and me.
The meeting went into "executive session" excluding the media so the TV cameraman folded his camera and left.
Paul O'Shaughnessy summarized the preliminary investigations they have done (see enclosed summary sheets) and handed out a few copies of the "background data" consisting of about 400 pages of everything from some of my inter office memos to you (that I sent copies of to Herb Wedge), newspaper clippings and numerous calculation sheets with hand written figures related to production costs and various other costs and values to products, as well as numerous telephone memorandum from various contacts in industry on numerous subjects related to processes of interest.
At the end of the presentation, Herb Wedge and I were asked to comment. Herb wanted time to digest the data. He was concerned that possibly some things were being overlooked. We agreed and a second meeting is to be held August 4th at 3 P.M. in Roseburg.
Following the meeting I inquired as to the status of the proposed Coos Bay Ferro-Chrome plant. Peter Graff indicated that it was shelved temporarily for lack of funding but that the latest information he had was that funding would soon be, or was now available; but didn't relate the source.
I also asked Lynn Youngbar about EDD funding for the Hanna feasibility study and she indicated that there was a good possibility that they would be funding 75 percent of the cost.
I'll attend the meeting August 4th and report to you on it.

Len

LR:rep
Encl: Preliminary investigations of Hatch Associates

RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

DEVELOPED PROCESS

-- HORSEHEAD RESOURCE DEVELOPMENT

PROCESSES NEEDING DEVELOPMENT

-- SCRAP CATALYST PROCESSING WITH CHEVRON.

-- METALS FROM FLY ASH WITH POZZOLANIC, EPRI AND FLORIDA PROGRESS.

-- NICKEL SLAG PRODUCTS (COLORED GRANULES) WITH GAF OR 3M.

NICKEL SLAG PRODUCTS

-- NICKEL SLAG IS CURRENTLY BEING USED AS AN ABRASIVE FOR SANDBLASTING AND AS THE BACKING GRANULES ON SHINGLES.

-- NICKEL SLAG HAS BEEN FOUND UNSATISFACTORY FOR HEAD LAP GRANULES ON SHINGLES; QUARRIED MATERIAL IS PREFERRED.

-- THERE IS A LIMITED MARKET FOR COLORED GRANULES IN THE NORTHWEST WITH COMPETITION IN CORONA (NEAR L.A.) AND RANCHO CORDOBA (SACRAMENTO).

-- UP TO 18 COLORS ARE CURRENTLY BEING MARKETED.

-- CAPITAL COST FOR COLORING PLANT COULD BE SEVERAL MILLION DOLLARS.

FERROCHROMIUM

-- THE "WOODING" DEVELOPMENT REQUIRES A DEEP WATER PORT BECAUSE RAW MATERIALS MAY BE FROM OFF-SHORE AND MARKETS WILL BE WORLDWIDE.

-- OREGON BEACH SANDS COULD BE A SOURCE OF CHROMITE CONCENTRATES AND AN EXPLORATION PROGRAM IS BEING PLANNED BUT FINANCING HAS NOT BEEN SECURED.

-- THE "PROCESS" IDENTIFIED BY DR. SMILEY MAY BE BETTER LOCATED AT COOS BAY RATHER THAN RIDDLE.

CENTRAL HAZARDOUS WASTE PROCESSING FACILITY

-- EPA HAS MADE DATA AVAILABLE ON 226 IDENTIFIED SITES IN OREGON.

-- THE LIST INCLUDES LANDFILLS AS WELL AS GENERATORS.

-- PLATING OPERATORS ARE NOW PROCESSING THEIR WASTES ON-SITE.

-- A CENTRALIZED INCINERATOR ~~[illegible]~~ CAN ONLY PROCESS WASTES GENERATED IN OREGON AND ADJACENT STATES

-- A NEW PROCESS WOULD TAKE EXTENSIVE STUDY AND REVIEW TIME, PARTICULARLY FOR UNDEMONSTRATED TECHNOLOGIES.

PREVIOUSLY

FERROSILICON

-- THE HANNA FESI FURNACE IS SUITABLE FOR FESI50% PRODUCTION BUT MODIFICATIONS FOR FESI75% PRODUCTION MAY EXCLUDE THIS ALTERNATIVE PRODUCT.

-- UNITED STATES FESI FURNACE CAPACITY IS UNDERUTILIZED.

-- THE UNITED STATES IMPORTS 20% OF FESI50% REQUIREMENTS AND 70% OF FESI75% REQUIREMENTS, AND EXPORTS ARE SMALL.

-- HANNA'S PROJECTED PRODUCTION COSTS FOR FESI50% ARE GREATER THAN PREVAILING MARKET PRICES AND THERE IS LITTLE OPTIMISM FOR SIGNIFICANT UPWARD PRICE MOVEMENT BECAUSE OF WORLDWIDE OVERCAPACITY.

SCRAP CATALYST PROCESSING

-- TOTAL AVAILABILITY IS 50,000 TPA MAX.

-- GULF CHEMICAL & METALLURGICAL AND CRI-MET ARE LOCATED ON THE GULF COAST AND HAVE COMBINED CAPACITY OF 70,000 TPA.

-- NI/CO RESIDUE FROM GULF COAST PLANTS IS SHIPPED TO EUROPE AS WELL AS CANADA, AUSTRALIA AND JAPAN.

-- CATALYST SCRAP GENERATION ON WEST COAST IS SMALL COMPARED WITH GULF COAST.

-- CHEVRON IS LANDFILLING Ni/W AND Ni/Sn SCRAP BECAUSE THERE IS NO ECONOMIC PROCESS AVAILABLE TO RECOVER THE METALS.

-- TRANSITION METALS TECHNOLOGY'S PROPOSAL SEEMS TO ASSUME A LARGER SCRAP CATALYST AVAILABILITY.

METALS FROM FLY ASH

-- EPRI HAS DEVELOPED A DIRECT ACID LEACH (DAL) PROCESS ON A BENCH SCALE TO RECOVER:

- ALUMINA
- IRON PRODUCTS
- GYPSUM
- ALKALI SALTS

AND THE RESIDUE HAS APPLICATIONS AS A FILLER IN PLASTICS.

-- FLORIDA PROGRESS CORP. DEVELOPED THEIR OWN DAL PROCESS ON A PILOT SCALE AND PATENTED SOME ASPECTS NOT COVERED BY EPRI.

-- POZZOLANIC NORTHWEST HANDLES 3 MILLION TPA FLY ASH FROM SOURCES IN WASHINGTON, OREGON, WYOMING, COLORADO, NEVADA AND ALASKA AND SELLS MATERIAL AS A CEMENT SUBSTITUTE WITH SHIPPING DISTANCES UP TO 1,500 MILES.

ZINC RECOVERY FROM EAF STEELMAKING DUST

-- EAF DUST HAS BEEN RECLASSIFIED BY EPA AS HAZARDOUS AND LANDFILLING WILL BE BANNED AS OF 8/8/88.

-- SEVERAL PROCESSES HAVE BEEN DEVELOPED TO PROCESS DUST TO RECOVER THE VALUES (WHICH ARE THE HAZARDOUS COMPONENTS) AND DISCARD AN INERT PRODUCT.

-- DISCUSSIONS WITH NINE (9) STEEL PLANTS HIGHLIGHTED THEIR CONCERNS ABOUT THE EPA REGULATIONS AND THE HIGH COST OF DISPOSAL.

-- OF 500,000 TPA DUST GENERATED IN THE UNITED STATES, ONLY 35,000 TPA COMES FROM PLANTS FROM COLORADO WESTWARD.

-- HORSEHEAD RESOURCE DEVELOPMENT (HRD) IS THE ONLY FULLY COMMERCIAL OPERATOR RECOVERING ZINC FROM EAF DUST, HAS ONE OPERATING PLANT IN PENNSYLVANIA, ONE DUE TO START IN CHICAGO, AND IS LOOKING FOR OTHER SITES.

-- HRD MAY BE ABLE TO USE SOME EXISTING EQUIPMENT; EXPRESSED CONCERNS RELATIVE TO ASSUMING EXISTING ENVIRONMENTAL LIABILITY.

STAINLESS STEEL

-- COMPETITIVE HOT METAL COSTS AT 50,000 TPA INGOTS.

-- PROCESS UTILIZES HANNA FACILITY AND ASSUMES ZERO COST FOR REJECT NICKEL ORE.

-- WEST COAST STAINLESS IMPORTS TOTAL APPROXIMATELY 50,000 TPA BUT THERE ARE MANY PRODUCT TYPES.

-- ONLY ONE EXISTING STAINLESS PRODUCER ON WEST COAST-JORGENSEN IN SEATTLE.

- STAINLESS POWDER MARKET IS 5,000 TPA AND COMPETITIVE.

LIST OF ALTERNATIVES

1) STAINLESS STEEL

2) ZINC RECOVERY FROM EAF STEELMAKING DUST

3) METALS FROM FLY ASH

4) SCRAP CATALYST PROCESSING Handbook

5) FERROSILICON

6) CENTRAL HAZARDOUS WASTE PROCESSING FACILITY

7) FERROCHROMIUM

8) NICKEL SLAG PRODUCTS

CCD BUSINESS DEVELOPMENT CORPORATION

JULY 30, 1987

MEETING

ALTERNATIVE USE STUDY-NICKEL MOUNTAIN SMELTER FACILITY

1.0 INTRODUCTION

2.0 ALTERNATIVE PROCESSES

3.0 RECOMMENDATIONS FOR FURTHER INVESTIGATION

	MAJOR FEED MATERIAL				SALEABLE PRODUCTS			
Process	Type	Quantity	Operating Costs ($/yr)	Capital Cost	Types	Revenues ($)	Demand Power (MW)	Employment (No.)
(1) DAL Leach	Fly Ash	540,000 TPA	11 Million	$162 Million	Magnetic Ash Alumina Gypsum Plastic Fillers	41 Million	6	200
(2) Elkem Dust	EAF Dust	30,000 TPA	3 Million	$ 2 Million	Zinc Lead	5 Million	4	40
(3) Horsehead Resource Development (N.J. Zinc)	EAF Dust	25,000 TPA	4 Million	$ 15 Million (Max.)	Zinc Concentrates Aggregate	5 Million	<1	25
(4) Stainless Slab	Reject Nickel Ore Domestic Chromite	520,000 TPA 45,000 TPA	40 Million	$ 5 Million	300 Series Stainless Ingot	50 Million	25	130
(5) Metal Recovery from Scrap Catalyst	Ni/W and Ni/Sn Catalyst	10,000 TPA	Not Known	Not Known	W and Sn Alloys with Ni Residue	2 Million	<1	20
(6) Slag Recovery Process	Nickel Slag	75,000 TPA	2 Million	$ 0.5 Million plus for coloring plant	Colored Granules	3 Million	<1	20

Oregonian 2/29/88

Buyer of Riddle nickel mine to tap it for construction stone

An Ohio-based company that recently purchased the former Hanna Nickel Smelting Co. mine and plant near Riddle has auctioned off its mining and rock-processing equipment, company officials said Monday.

The new owner, Universal Consolidated Cos. of Fremont, Ohio, does not plan to resume nickel mining at the site in Douglas County, about 15 miles south of Roseburg, said Bill Niggemyer, the company's president.

"It's not a terribly economic mine. It never was," Niggemyer said of the nickel-recovery operation conducted by Hanna off and on since 1954.

Niggemyer said his company's subsidiary, Nickel Mountain Resources Co., would operate the plant instead as a producer of construction stone and sandblasting abrasives, using materials left over from the nickel mining. Those two operations would employ up to 27 people, he said.

He also said the company wished to process ferrosilicon, another material available from the mining wastes, but that he had not been able to reach an agreement with the Bonneville Power Administration on necessary electricity costs.

The operation involving ferrosilicon, used in nickel refining, would employ "50 to 75" people, Niggemyer said.

Niggemyer said that although worldwide nickel prices have soared in recent days to $23,900 per metric ton, "nobody expects that to be the long-term case".

Ladd Sutton, Bonneville Power's district manager in Eugene, said Nickel Mountain Resources had sought continuation of a special 1.2-cent-per-kilowatt-hour electricity price that had been charged to Hanna. That rate had been written into the Northwest Power Act of 1980 for the former mine and smelter operator, Sutton said.

STATE OF OREGON

INTEROFFICE MEMO

TO: **LEN RAMP,** 312 S.E. "H" St.
P.O. Box 417
Grants Pass, OR 975226

DATE: **AUGUST 11, 1988**

FROM: **DON HULL**

SUBJECT: **HANNAH NICKEL SMELTER SLAG AT RIDDLE, OREGON**

I am attempting to locate analytical information on the chemistry of the slag piles at the Hannah nickel smelter near Riddle. Could you please send any file information that you may have directly to Barry Harrington, Division Manager, Cojon Corporation, 11917 N.E. 95th Street, Vancouver, WA 98685 (206-892-8988). Please treat his interest in this matter as confidential.

cc: Barry Harrington

hull1/ramp8-11
81188/ch

bcc: Ron Geitgey
Jerry Gray

Riddle vows to survive mine's closure

By DANA TIMS
Correspondent, The Oregonian

RIDDLE — There is sadness, just as there is anytime an old friend dies, say longtime employees of the Hanna Nickel Smelting Co., which has closed permanently after 32 years of operation.

But old-timers and civic leaders alike are adamant in vowing that rather than curling up and dying with the nickel operation, the town of Riddle, about 15 miles south of Roseburg, will survive and prosper.

Officials of M.A. Hanna Co., the parent company, announced the closure without warning Wednesday. The move followed several temporary shutdowns in the last few years, the most recent of which had left the rugged, 4,000-acre site largely idle. The last refined liquid was poured Oct. 7.

During a closure in 1985, the company invested $13 million in the plant to modernize operations and lower costs. The revamping included introduction of an entirely new technology in nickel processing and installation of nearly three miles of special pipe running from the huge smelting operation to the mine site.

Workers and townspeople held out hope that a miracle would occur, that the mine would somehow remain open.

But nickel prices had plummeted — from a high of $3.40 per pound in 1980 to the current rate of $1.58 — largely due to the dumping of less expensive foreign nickel onto the fragile international market. The mine's fate was sealed.

Closure letters dated Jan. 7 were sent to the 270 workers who had survived earlier layoffs due to seniority. Of those receiving the letters, at least a dozen were just shy of the 30 years necessary to qualify for a company pension, union leaders said.

At its peak in 1980, the world's only integrated nickel mining and smelting operation employed nearly 650 people.

"We always felt it would reopen for good if the prices could have just stayed high enough for the company to make a profit," said Jack Garren, 58. "But the way things were going, we could see this happening. I wasn't surprised at all."

Garren, a lifelong Riddle resident, worked more than 23 years at the mine as a millwright.

"I know it's going to hurt a lot of people around here," said John Wagoner, who was a crane operator for 32 years. "I think the town itself will be fine, but things are just tough all over for the working man."

Some employees conceded that the company had done all it could to keep the operation afloat as long as possible. Bill Morris, a 30-year warehouseman, disagreed.

"A lot of us felt they brought in nothing but junk machinery when they changed their production process in 1985 just to get some use out of the stuff," Morris said. "But I'll tell you, the men busted their butts out there to make it work. We just had too much rotten luck."

John Davenport, president of United Steel Workers of America Local 5074, was philosophical.

"We all made some mistakes and things just didn't turn out liked we hoped they would," Davenport said. "We wished they would have held off awhile to see what happened to prices, but given the trends, no one can say the company didn't do everything in its power to remain operating."

A special contract with the Bonneville Power Administration in 1985, for example, required the company — the largest single consumer of power betwen Eugene and San Francisco — to operate at "off-peak hours" in exchange for low power rates.

"But prices just refused to cooperate," said Marvin Johnson, Hanna Nickel engineering manager. "I find it difficult to believe there is anyone in the world who can produce nickel for a profit as a main line of business."

He and others recall the early

See RIDDLE, Page B2

Historical dates of Riddle

Here is a time line of significant events regarding operation of Hanna Mining Company and Hanna Nickel Smelting Co.'s mine at Riddle. It was announced Wednesday that the nickel mine and smelter would close permanently, leaving about 270 people out of work.

1864 — First ore deposits are discovered on Nickel Mountain by settlers, who, due to unusual green tint of ore, believe they have found major copper deposits.

1881 — Discovery that ore contains nickel, not copper, triggers prospecting and preliminary development work on the mountain.

1920 — Efforts to mine ore for shipment to Eastern processing plants proves too costly and is abandoned after several years.

1952 — Smelting operation is built by the federal government for strategic stockpiling and for use in building Korean War-bound jet engines.

1954 — Hanna buys smelting operation for $53 million; first refined liquid is poured July 12. Ferronickel, a combination of iron and nickel, is the first to be produced in the nation from domestic ores.

1980 — Employment hits an all-time peak of nearly 650 workers.

1982 — The first long-term closure takes place, due to falling nickel prices. Operation remains closed from April 1982 through December 1983. Nearly 400 jobs are trimmed by the time the mine reopens 19 months later.

1985 — Second major shutdown in August occurs; 200 workers lose jobs. Company invests $13 million to revamp processing method.

1986 — Third closure, in August, idles the plant. The last metal is poured Oct. 7. Remaining nickel stockpiles are loaded and shipped in mid-December.

1987 — Hanna's parent company, M.A. Hanna Co. of Cleveland, announces permanent closure of the plant Jan. 7. Termination notices are sent to 270 employees.

The Oregonian

SOURCE: THE (PORTLAND) OREGONIAN

DATE: JANUARY 11, 1987

COMMODITY SECTION: FERROUS (MORE)

STATE ARTICLE CONCERNS: OREGON

Mine reclamation work lies ahead

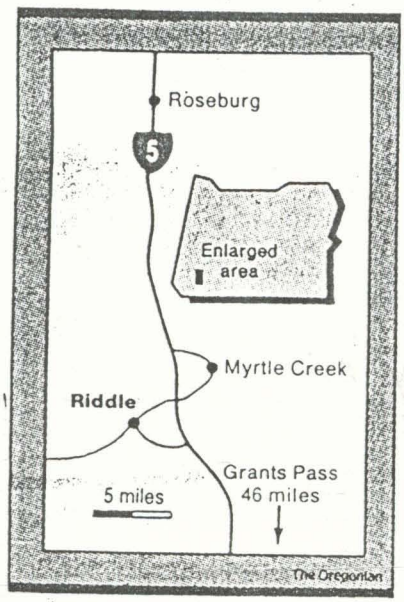
■RIDDLE, from Page B1.

1950s, when the U.S. government wanted so badly to stockpile nickel for use in building jet airplane engines for the Korean War that it built what was at that time the only nickel smelter in the world. After the war, the government sold the operation to Hanna for about $53 million. The first metal for entirely domestic purposes was poured July 12, 1954.

"It's tragic, certainly, but it's also the economic facts of life," said state Rep. Bill Markham, R-Riddle, who has a view of the scalped Nickel Mountain from the back of his house. "We are not going to dry up and die, but this obviously hurts anyone involved in the nickel business around here."

Markham said that several lumber mills, including the 650-employee Roseburg Lumber Company plant, already had absorbed many former Hanna workers.

"We've got at least 1,000 production jobs in the immediate Riddle vicinity alone," Markham said. "I'll bet that is a figure that would surprise many people."



Riddle Mayor Paul Parret also was optimistic.

"It won't really affect us in the long run because of the shutdowns and layoffs we have already experienced," he said. "The latest announcement will definitely hurt workers who are just short of their pensions, but I feel the community will get together and move forward. We'll come out of this just fine, but it may take awhile."

The job of reclaiming the 600-acre nickel mine still lies ahead. Yet because state reclamation laws weren't passed until 1972, Hanna is legally liable only for about 5 percent of the land, or some 34 acres.

"We don't know exactly what will be done up there," said Johnson, the company's engineering manager. "It's amazing what has already grown back without any help. But I'm sure something will be done."

Markham said the company would have to spend at least $75,000 on reclamation efforts.

"Those skinned-off areas will pretty well be put back in order," he said.

SOURCE: THE (PORTLAND) OREGONIAN

DATE: JANUARY 11, 1987

(END)

Ferronickel Production Reduced By 3 Firms; Strike Closes 4th

By TRICIA CRISAFULLI

NEW YORK—Three major ferronickel producers are operating at reduced levels and a fourth is shut by a strike, giving some indication that supplies will tighten.

Falconbridge Dominicana C. por A. in the Dominican Republic was closed by a strike April 1, while three other producers—Cerro Matoso SA in Colombia; SLN/Eramet in New Caledonia; and M.A. Hanna Co.'s Riddle, Ore., plant—are operating at reduced levels.

All of the production cutbacks come at a time when demand has been improving. The ferronickel market has continued to suffer from low prices, which are just a few cents per pound over nickel quotes on the London Metal Exchange.

Cerro Matoso, which has been beset by production problems for more than a year, is operating at about 88 percent of its rated capacity of 50 million pounds per year, according to company officials.

SLN/Eramet has reduced its planned production for the year by 7 percent to between 43,000 and 44,000 metric tons per year. SLN's planned production is believed to be well below its total capacity, but exact figures are not available, according to industry observers.

Hanna's Oregon ferronickel plant, which was supposed to be back on line in January, is still in the "start-up phase" and is not selling material. Because of current low ferronickel prices the company is building inventory, according to a company spokesman, but expects to be in full production at the end of the month.

Although Hanna has not been selling ferronickel at current prices, the company is "not out of the market," a spokesman said. "We are still quoting material. We just aren't willing to sell at these prices."

For the past few months ferronickel has been selling at the same pricing level as nickel briquettes, which are quoted by merchants in the U.S. at about $1.85 per pound. Normally, ferronickel carries a slight premium because of its iron content.

SOURCE: AMERICAN METAL MARKET

DATE: APRIL 11, 1986

COMMODITY SECTION: FERROUS

STATE ARTICLE CONCERNS: OREGON

4/8

Nickel mine squeezes each dime to stay in business

By JIM KADERA
of The Oregonian staff

RIDDLE — Technology, compromise and dedication are the keys in a long fight to keep the only nickel mine and smelter in the United States in business.

Hanna Nickel Smelting Co. is operating again in the hills four miles west of Riddle after a four-month shutdown to install $13 million in new equipment to improve efficiency and possibly restore profitability.

The reopening is a triumph, but does not assure long-term survival. Producing a small amount of the world nickel supply, Hanna is vulnerable to future curtailments or shutdowns if it cannot hold operating costs below prices.

"What is my biggest challenge? To return Hanna Nickel Smelting Co. to profitability," Joe Vaccari, plant manager, said in his office last week. "There is no deadline. We speak in terms of constant progress."

"I think it will work," said Charles McFarland, of Myrtle Creek, a furnace tapper helper who has worked at Hanna for about 10 years.

"Hanna has been good to my family. There isn't much else to do down here," added Donald Luft of Roseburg, a smelter controls operator and 12-year plant veteran.

Hanna and five wood products mills are the major employers in this part of Douglas County. All have suffered through market problems in the last five years, but the Hanna situation is one of a kind.

Discovered by settlers in 1864, the mineral deposits on Nickel Mountain initially were thought to contain copper. Not until 1881 did they realize it was nickel, iron and other minerals, but the first commercial mining waited until Hanna opened a smelter at the base of the mountain in 1954.

For years, the plant operated around the clock with about 600 employees to make ferronickel — half iron and half nickel — sold primarily to other companies that manufacture stainless steel.

However, problems developed. The deposits have less nickel than most of the nickel mines in the world. After the highest grade nickel was removed, it became increasingly difficult to make a profit. Each nickel market slump drove another nail in the coffin.

Hanna Mining Co., of Cleveland, owns the Riddle operations and closed the mine and smelter in April 1982 for 18 months. A reopening was ordered only after the company won concessions in electricity rates and reduced wage and benefits for employees who are members of the United Steelworkers of America union.

A provision of the 1980 Northwest Power Planning Act allowed the Bonneville Power Administration to give Hanna a special discounted power rate. Unlike the Northwest's aluminum smelters, Hanna utilizes minerals mined within the United States.

By limiting smelting to night and weekend hours when power demand is less, Hanna pays only 0.7 cents per kilowatt hour, compared with an industrial rate of 1.9 cents. That cut annual power costs from $9 million to about $3.5 million.

The annual labor costs were slashed from $18 million to less than $9 million by reducing the number of employees, trimming wages by $1.10 an hour, and cutting holidays and vacations.

Employment last week totaled 235 and will increase to about 250 later this month as new equipment is fine-tuned and full production resumes, Vacarri said.

New technology allows Hanna to begin smelting with ore that is more than 2 percent nickel, compared with less than 1 percent in the old "dry" system. A wet screening plant built last summer on the side of Nickel Mountain reduces the amount of impurities that must be eliminated in the smelter furnaces.

The aerial tram cars that carried dry ore have been idled in favor of a pipeline taking ore in a slurry down to the smelter.

The higher grade of ore fed to the plant will allow annual production of ferronickel "pigs" and small "nuggets" to increase to about 23.5 million pounds from the 1984 level of 17.6 million pounds, Vacarri said.

Smelter workers McFarland and Luft said they hoped the layoffs have ended. McFarland said he and his family lived off savings through part of the layoffs and he worked part of the time as a timber faller.

"My wife and I watched our money more closely," said Luft.

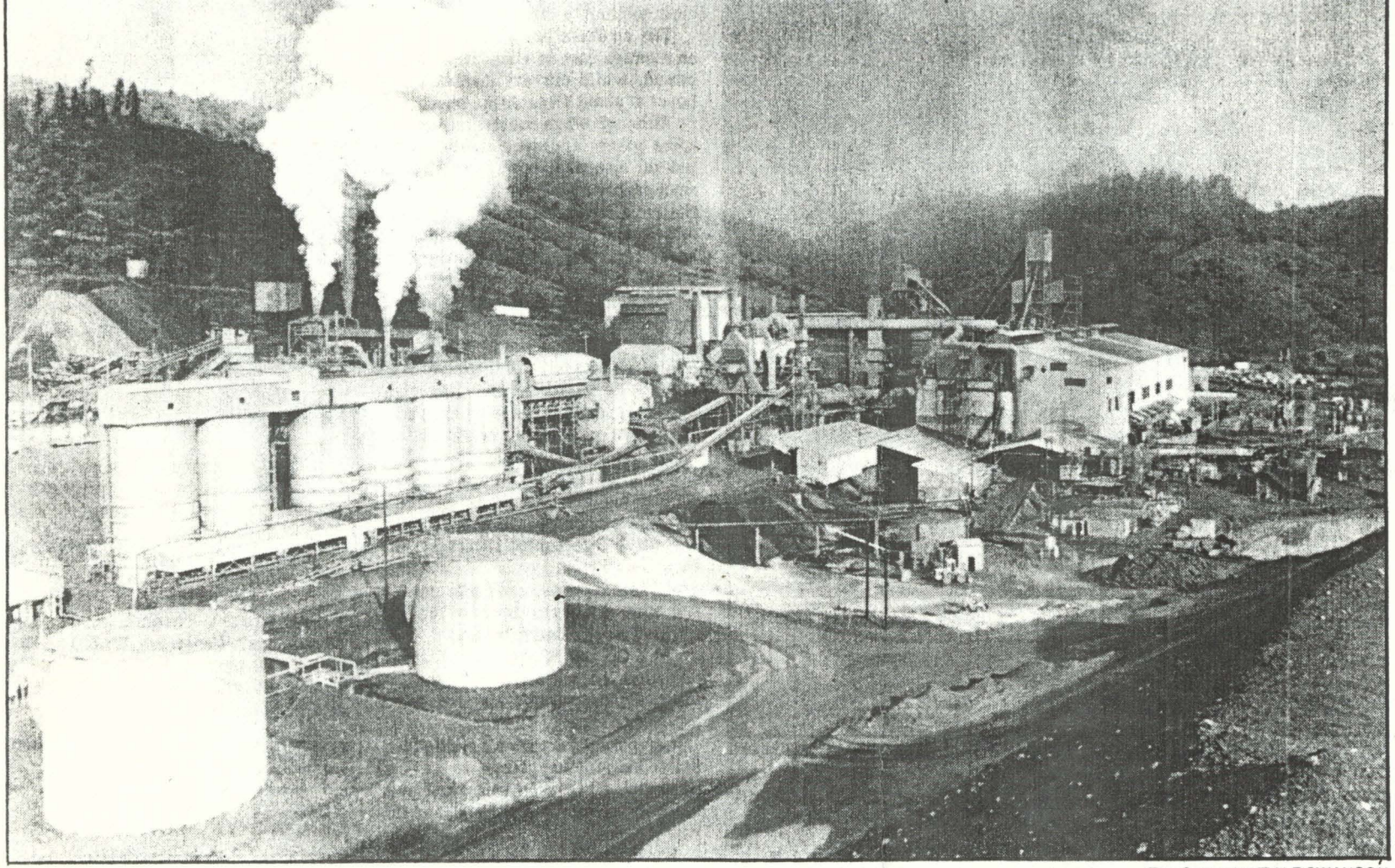
SOURCE: THE (PORTLAND) OREGONIAN

DATE: DECEMBER 9, 1985

COMMODITY SECTION: [redacted] FERROUS

STATE ARTICLE CONCERNS: OREGON

(MORE)



The Oregonian/DALE SWANSON

Steam rises from the Hanna nickel smelter west of Riddle. It has just reopened after a four-month shutdown for improvements.

"The concessions we made in our contract cost us about $6,000 a year. I've been working more overtime to make up for some of it," McFarland said.

The revised labor contract "put more burden on each employee to do more. We absorbed other people's jobs," McFarland said.

Employment declined also through automation. Two persons operate computers in the ore preparation room, compared with six workers in the past, he said.

Vacarri said the efficiency mode would suffer if there was excessive overtime when employees get 50 percent more pay per hour. "The management goal is to use the cheapest way to get the work done," the manager said.

Vacarri, who formerly worked in Hanna iron operations in northern Minnesota, said profit sharing instituted in 1983 allowed the employees to benefit from increased productivity. "I feel very good about it, but we are still subject to the sales price."

He pointed to a chart on his office wall. The price of nickel listed by a London exchange had dropped from $2.53 cents a pound in June to $1.81 on Dec. 3. The price includes 10 cents a pound for shipping that Hanna does not receive.

"It's a constant struggle for survival," Vacarri said. "You either fold up or you find another way to do it."

Business people in Riddle "feel a little better about the economy going smoother," Lorraine Gross said from her desk in the local branch of First Interstate Bank. "The forest industry also is doing better than some past Decembers. It all is uplifting the community," said Gross, who manages the branch.

"A lot of PMA is floating around. That's positive mental attitude," said Larry Linton, who recently opened a new hardware store. Linton and his wife Carol also have a grocery store that survived the recession.

"Anyone who can do business in Douglas County and survive is a wizard," he quipped.

(END)

SOURCE: THE (PORTLAND) OREGONIAN

DECEMBER 9, 1985

DATE

Another nickel operation closure frustrates area

he Oregon State Fair.

the mine and laid off 500 people.

Cutting both power and labor costs, the company rehired about 260 people when it resumed production in November 1983.

The Bonneville Power Administration agreed to give Hanna bargain electric rates if the company would run the smelters during off-peak periods at night and on weekends. The company estimated the savings at $5.5 million a year.

Cuts in the labor force, a wage rollback of $1.23 per hour and limited production brought the annual payroll down from $18 million before the 1982 shutdown to $6 million when the mine reopened.

After negotiating a new five-year labor contract and securing continued low electric rates, the company shut down the mine in June 1985 to install a new $13 million ore-screening process that was supposed to get a higher yield from the low-grade ore remaining on the mountain.

Operations resumed last October, but production has been spotty as the company worked to fine-tune the new ore-screening process.

"I know everybody thought this time we were going to go back for at least five years," said Page, who works on the refining furnace.

The one consolation was that the economic impact on southern Douglas County wouldn't be as bad as when the mine shut down four years ago, said Wally Farmer, senior vice president of the South Umpqua State Bank.

"Timber is in pretty good shape right now, so that should lessen the impact," said Farmer.

This time the four wood products mills in town are turning out lumber, plywood and laminated beams.

The last time, the mine shutdown hit when the region was reeling from a deep recession in the timber industry, the lifeblood of Oregon.

SOURCE: THE (PORTLAND) OREGONIAN

DATE: AUGUST 19, 1986

COMMODITY SECTION: FERROUS

STATE ARTICLE CONCERNS: OREGON

(MORE)

915

Many Hanna workers left the state to find work and some of those who remained had trouble finding jobs because companies were wary of hiring someone who would go back to Hanna as soon as the mine reopened.

"If I got a job now with a future and it was steady, I wouldn't go back," said Page. "It was a wonderful place to work when I first started. Now it's just up and down. By the looks of things it's not going to get any better."

There is lingering resentment in town over this latest shutdown. People grumble about decisions made by people from Hanna headquarters "back East."

Though there is talk in town that the mine could reopen after the first of the year, there also are indications Hanna may be de-emphasizing its nickel and silicon division, which reported a $2 million operating loss in the first six months of this year, compared with a $1 million profit for 1985.

With the appointment of former Rockwell International Corp. director Martin D. Walker as chief executive officer and chairman of M.A. Hanna, the company proclaimed it is embarking on a new phase of diversification.

"We are certainly not abandoning our traditional products and markets, but given the extraordinary difficulties facing the steel and energy industries, it is essential that we broaden our base of activity," outgoing chairman Robert F. Anderson said.

Larry Linton, who owns the local hardware store and the Riddle Grocery, remains optimistic.

"When they opened in 1951, they said it would only run for 20 years," he said of the mine. "If the price of nickel goes up, I'm sure it will be back open again and the frowns will turn to grins.

"People around here are pioneers," he added.

SOURCE: THE (PORTLAND) OREGONIAN

DATE: AUGUST 17, 1986

(END)

Nickel prices cause Hanna to shut down

M.A. Hanna Company has announced that Hanna Nickel Smelting Company in Riddle will be indefinitely shut down approximately Aug. 15, primarily due to slumping nickel sales prices.

Prices have dropped more than 20 percent since last summer when Hanna Nickel began construction of an innovative wet screening system that was hoped to make ferronickel produced at the nation's only integrated nickel mining and smelting operation competitive worldwide.

In July, nickel prices on the London Metal Exchange averaged only $1.77 per pound, with little hope for significant improvement in the near future.

"Although depressed nickel prices have indefinitely shut down Hanna Nickel, company management continues to evaluate results of the wet screening tests conducted over the past few months," General Manager Herbert D. Wedge said in a letter to employees.

"We expect our studies to be concluded this fall, at which time we hope to have better information for employees concerning the outlook for the operation," Wedge said.

"We are extremely disappointed that nickel market conditions have deteriorated to this point, particularly after the exceptional efforts displayed by employees as we have worked to implement the wet screening process over the past year," Wedge added.

The nickel mine and smelter, which opened in 1954, employed as many as 600 during peak operations in the 1970's. Because of declining nickel prices and high power costs, the mine and smleter were shut down for 18 months starting in May 1982, reopening after lower off-peak power rates were negotiated with the Bonneville Power Administration.

The operation was shut down again last June to install a new wet screening process for handling ore, which company officials hoped would lower costs and improve efficiency. According to company officials, the new process and other improvements represent an investment of about $13 million.

After a short start-up test period, both the mine and smelter were shut down two days before Christmas eve to correct problems with the new process.

Since early this year, maintenance personnel have worked to correct the problems and some mine workers were called back. The mine was shut down again three months ago and two of the four smelter furnaces were started up to produce nickel from the wet-screened ore.

The results were successful, but nickel prices have not hit the $1.90 to $2 a pound which company officials estimated would be necessary to operate at a profit.

The operation has employed about 180 to 190 and would employ 250 to 270 if operation can be resumed.

M.A. Hanna Company is an international natural resources concern engaged in five principal business areas: iron ore, oil and gas, nickel and silicon, coal, and management services.

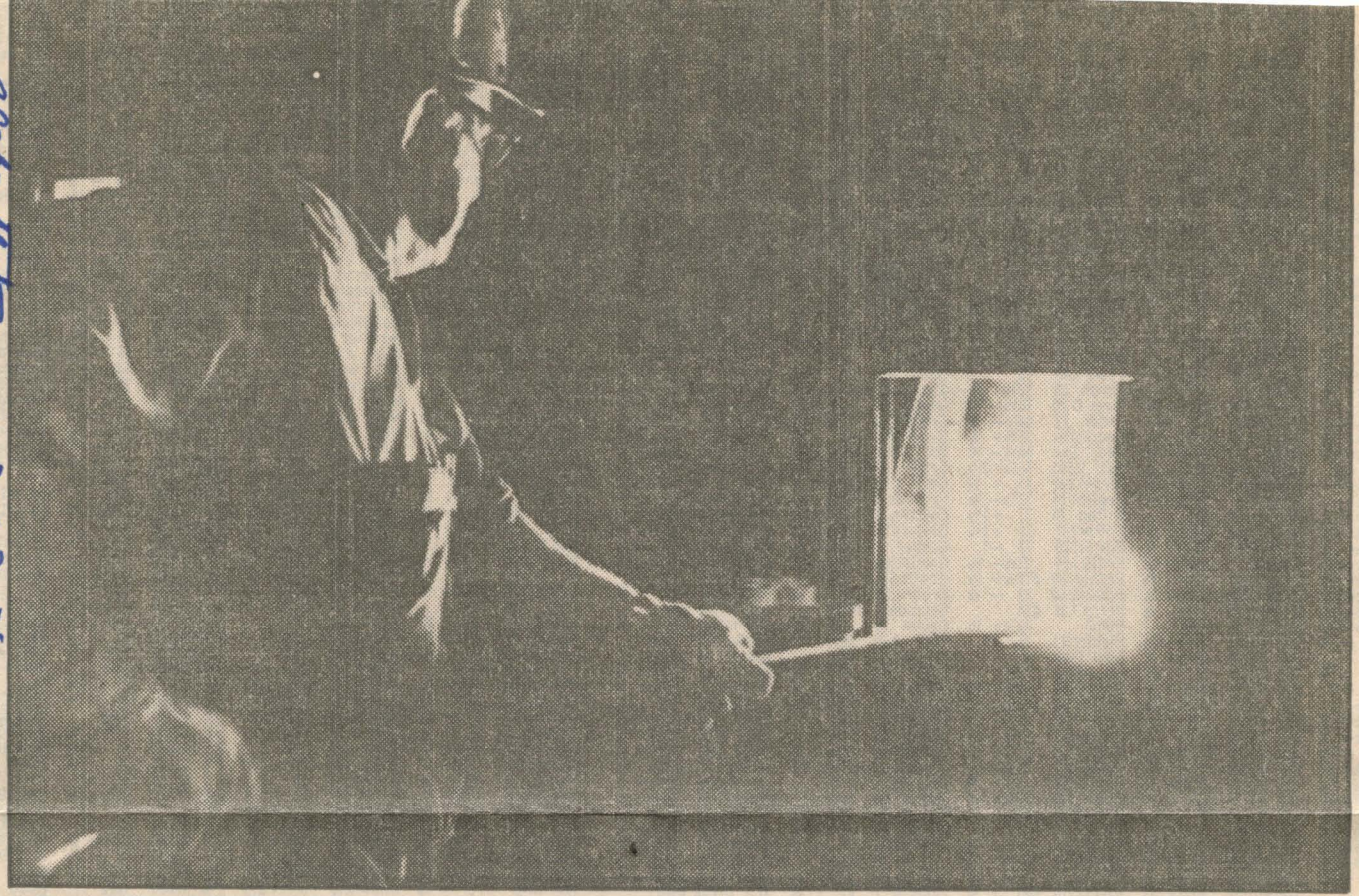
SOURCE: UMPQUA (OR.) FREE PRESS

DATE: AUGUST 14, 1986

COMMODITY SECTION: FERROUS

STATE ARTICLE CONCERNS: OREGON

Idaho Statesman F-23-86



The Associated Press

Mike Schauer samples 3,000-degree molten nickel with a ladle at Hanna Nickel.

Mine, smelter to close in Oregon

By JEFF BARNARD
The Associated Press

RIDDLE, Ore. — The sign on the road to Nickel Mountain has a line that reads, "Permission to pass revokable at any time."

That sign has taken on new meaning in this town of 1,115 people in southern Oregon.

For the third time in four years, M.A. Hanna Co. of Cleveland, Ohio, has announced it is shutting down the nation's only combined nickel mine and smelter.

"I don't know if I'll go back," said Hanna worker Gerald Page, sitting in the shade of his front lawn. "I've been out there 21 years. I'd like to get my 30 in, but it's tough six months at a time."

Hanna announced last week it was shutting down the Hanna Nickel Smelting Co. indefinitely because of falling nickel prices, putting about 180 people out of work.

Nickel is used as a hardening agent in steel production. The combination of increased competition from foreign suppliers and reduced steel production in the United States have combined to drop nickel prices from $2.52 a pound to $1.77 in the past year, said Hanna spokeswoman Mary Jackson.

The decision was frustrating for both the company and workers, since steps had been taken to make Nickel Mountain more efficient after the plant was first shutdown four years ago.

Falling prices were blamed in April 1982 when Hanna shut down the mine and laid off 500 people.

Cutting both power and labor costs, the company rehired about 260 people when it resumed production in November 1983.

After negotiating a new five-year labor contract and securing continued low electric rates, the company shut down the mine in June 1985 to install a new $13 million ore-screening process that was supposed to get a higher yield from the low-grade ore remaining on the mountain.

Operations resumed last October, but production has been spotty as the company worked to fine-tune the new ore-screening process.

Small Oregon Town Sees Nickel Mine Closed for Th

By Jeff Barnard
Associated Press Writer

RIDDLE, Ore. — The sign on the road to Nickel Mountain has a line that reads, "Permission to pass revokable at any time."

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The Bonneville Power Administration agreed to give Hanna bargain electric rates if the company would run the smelters during off-peak periods at night and on weekends. The company estimated the savings at $5.5 million a year.

Cuts in the labor force, a wage rollback of $1.23 per hour and limited production brought the annual payroll down from $18 million before the 1982 shutdown to $6 million when the mine reopened.

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"I know everybody thought this time we were going to go back for at least five years," said Page, who works on the refining furnace.

The one consolation was that the economic impact on southern Douglas County wouldn't be as bad as when the mine shut down four years ago, said Wally Farmer, senior vice president of the South Umpqua State Bank.

"Timber is in pretty good shape right now, so that should lessen the impact," said Farmer.

This time the four wood products mills in town are turning out lumber, plywood and laminated beams.

The last time, the mine shutdown hit when the region was reeling from a deep recession in the timber industry, the lifeblood of Oregon.

Many Hanna workers left the state to find work and some of those who remained had trouble finding jobs because companies were wary of hiring someone who would go back to Hanna as soon as the mine reopened.

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Though there is talk in town that the mine could reopen after the first of the year, there also are indications Hanna may be de-emphasizing its nickel and silicon division, which reported a $2 million operating loss in the first six months of this year, compared with a $1 million profit for 1985.

—Associated Press Laserphoto

Employees of Hanna Nickel Smelting, like Mike Schauer, above, may not come back to work after only nickel mine and smelter in U.S. closed for third time in 4 years.

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"People around here are pioneer he added. "They'll tough it out."

Smelters started at Hanna

Two smelting furnaces were started up at Hanna Nickel's mine and smelter in Riddle last weekend and about 30 smelter employees have been called back to work.

The smelters were shut down on Dec. 23, after problems developed during a test operation of a new "wet screening" process intended to move ore more efficiently from the nickel mine on top of Nickel Mountain to the smelter at the bottom of the mountain.

According to Mary Jackson, who handles Hanna's public relations out of the corporation's Cleveland headquarters, enough ore has been stockpiled to operate the two smelters for about three months.

The company shut down its mining operation at the end of May for a test to determine how ore from the wet screening process goes through the smelters, she said.

"Nothing's really changed," Jackson said in a telephone interview. "We want to test the ore from the wet screening process."

With the shut-down of the mine, Jackson said, about 30 mine workers have been laid off and the smelter start-up has not resulted in an increase in the employed work force at the Riddle operation.

Different workers were called back to replace those laid off because of the different skills required, she said.

The nickel operation in Riddle now employs a total of about 180, down from about 270 before the plant shut down one year ago this month to install a $13-million wet screening process.

"Wet screening" involves running the ore through a crusher, then mixes it with water into a slurry that flows down the mountain from the mine to the smelter, where the ore is dried before going into the furnaces.

Under the old process, the ore was moved in an aerial tramway from the mine to the smelter.

The new process and heavy capital investment were intended to make it possible to produce nickel at a profit with nickel prices just under $2 a pound, according to General Manager Herb Wedge.

However, after the new equipment was installed and started up last fall, problems developed, and both the mine and smelter were shut down on Dec. 23.

In addition to working to correct the problems with the wet screening process, after the shutdown maintenance crews installed a conveyor system to move ore to the ore crusher.

Jackson said that Hanna hopes to re-open the mine if the smelter test run goes well, but no date has been set.

Much depends on the price of nickel getting back up to about $2 a pound.

"Nickel prices haven't improved," Jackson said. Nickel closed recently at $1.83 on the London Metal Exchange, down from $2.54 a year ago when work began installing the wet screening process.

The smelter has four furnaces, only two of which are being used for the test period.

Hanna, which opened the Riddle mine and smelter in 1954, employed between 500 and 600 workers and office personnel in 1980, before nickel prices began to drop.

The Riddle operation is the only integrated nickel mine and smelter in the country.

SOURCE: UMPQUA (OR) FREE PRESS

DATE: JUNE 12, 1986

COMMODITY SECTION: FERROUS

STATE ARTICLE CONCERNS: OREGON

6/20

Albany, OR
Oregon Herald
(Cir. W. 864)

NOV 29 1978

Geologist reports on nickel

5018

PORTLAND (AP) — Nearly half of twenty-five deposits of nickel in Oregon are located partly or entirely in wilderness areas or areas under consideration for wilderness designation, a state geologist says.

Len Ramp of the Grants Pass field office of the Oregon Department of Geology and Mineral Industries said most of the deposits have been known of and prospected for years. But he foresees increased interest in the mineral.

The only producing nickel mine and smelter in the nation is at Riddle in Douglas County. Hanna Mining Co. produced nearly $50 million worth of nickel at the complex last year.

Nickel first was discovered in southwest Oregon in 1864, and except for the Riddle site all the deposits listed in Ramp's recently published report are in Josephine and Curry counties.

"I found only a few new ones," Ramp said, "but the most important part of the work was mapping the extent of known deposits and testing the ores at some sites."

Donald Hull, director of the geology department, said the timing of the report is important because of the pending land use planning decisions.

Hull said southern Oregon will have to diversify its economy because of the region's declining timber harvest.

"Mineral development is one of the available options," Hull said.

The report identifies the Illinois Valley between Cave Junction and the Oregon-California border and the Red Flats area southeast of Gold Beach as the main areas of future nickel production.

Hull said nickel exploration is at a peak in the ore belt extending from Grants Pass south to Del Norte County, Calif.

The report, financed in part by grants from the U.S. Bureau of Mines, does not estimated overall reserves of Oregon nickel or reserves of chromium and cobalt, which often are found in the same ore bodies as nickel.

Ontario, OR
Argus-Observer
(Cir. D. 6,528)

NOV 29 1978

Allen's P. C. B Est. 1888

Nickel ore valuable

GRANTS PASS, Ore. (UPI) — Two dozen unmined nickel deposits in Josephine and Curry counties may be Oregon's most valuable untapped commercial ore resource, a state geologist said.

The state's other nickel deposit, at Riddle in Douglas County, is being mined by Hanna Mining Co. and is the nation's only operating nickel mine.

Len Ramp, resident geologist at Grants Pass for the state Department of Geology and Mineral Industries, said in a report prepared for the department there are two main areas of potential nickel development — in the Illinois Valley between Cave Junction and the California border and at Red Flats southeast of Gold Beach.

Ramp said he found only a few previously unknown deposits "but the most important part of the work was mapping the extent of known deposits and testing the ores at some sites."

Broken Top geologic data may aid land-use planners

By PHIL F. BROGAN
of The Oregonian staff

Volcanoes of the Broken Top cluster in the high Central Cascades, immediately southeast of the Three Sisters in an area of spectacular scenery, glaciation and recurring volcanic activity over the ages, receive detailed geologic attention in a paper issued by the Oregon Department of Geology and Mineral Industries.

The paper, "Field Geology of S.W. Broken Top," touches on the violent volcanic activity in that part of the high Cascades west of Bend ranging from a few thousand years ago to millions of years. It was compiled by Edward M. Taylor, associate professor of geology at Oregon State University. The paper represents the author's research over a period of several years.

"The Broken Top area is currently the topic of continuing debate regarding future land use," state Geologist Donald A. Hull notes in a foreword. "Based on geologic factors, considerable interest has been shown in the potential geothermal energy resources adjacent to these volcanic centers."

Intelligent land use planning must be based upon sound geologic data, and Dr. Taylor's report will be of immediate value for both public decision-making and the scientific community."

Ash and cinders from eruptions of Rock Mesa at the southwest base of the South Sister fell over the entire Broken Top area 2,300 years ago. Crater Lake pumice spread over the region when giant Mazama blasted its top into the heavens.

Alpine glaciers and fiery lava had parts in shaping ancient Broken Top, named nearly a century ago by range riders trailing cattle to the Farewell Bend Ranch and other ranches on the Deschutes River.

It was glaciation, extensive in the fading Ice Age, not a terrific volcanic blast, that gave Broken Top its jagged summit. In the previous epoch, the Pliocene, massive faulting, intensive volcanic activity and glaciers slipping from peaks now buried, had roles in shaping the land. After the retreat of Pleistocene (Ice Age) glaciers, there was some intense volcanic activity in the Todd Lake area.

Shortly before the appearance of Mazama ash from Crater Lake about 6,000 years ago, lava erupted to form a small cone on the north side of 9,165-foot Bachelor Butte.

Late Ice Age glaciers covered all of the southwest Broken Top area except the summit of Tumalo Mountain.

Ice formed imposing cirque basins in various parts of the area. The best known is that on the north slope of Broken Top over which McArthur Rim, a conspicuous feature of the area, pushes its cliffs into the Cascade sky.

The Broken Top country has been a land of intense volcanic activity for millions of years. "There is abundant evidence that a great volume of volcanic material was delivered to the eastern slope of the central Cascades during an interval that began some 12 million years ago," Taylor writes. "Much of this was piled over the Deschutes formation along the Metolius River."

Volcanic activity continued into recent geologic time, Taylor says, adding that "future eruptions in this area are not unlikely."

Half of state's nickel in wilderness areas

PORTLAND (AP) — Nearly half of 25 deposits of nickel in Oregon are located partly or entirely in wilderness areas or areas under consideration for wilderness designation, a state geologist says.

Len Ramp, of the Grants Pass field office of the state Department of Geology and Mineral Industries, said most of the deposits have been known of and prospected for years. But he forsees increased interest in the mineral.

The only producing nickel mine and smelter in the nation is at Riddle in Douglas County. Hanna Mining Co. produced nearly $50 million worth of nickel at the complex last year.

Nickel was first discovered in Southwest Oregon in 1864 and except for the Riddle site all the deposits listed in Ramp's recently published report are in Josephine and Curry counties.

"I found only a few new ones," Ramp said, "but the most important part of the work was mapping the extent of known deposits and testing the ores at some sites."

Donald Hull, director of the geology department, said the timing of the report is important because of the pending land use planning decisions.

Hull said Southern Oregon will have to diversify its economy because of the region's declining timber harvest.

"Mineral development is one of the available options," Hull said.

The report identifies the Illinois Valley between Cave Junction and the Oregon-California border and the Red Flats area southeast of Gold Beach as the main areas of future nickel production.

Hull said nickel exploration is at a peak in the ore belt extending from Grants Pass south to Del Norte County, Calif.

The report, financed in part by grants from the U.S. Bureau of Mines, does not estimated overall reserves of Oregon nickel or reserves of chromium and cobalt, which are often found in the same ore bodies as nickel.

Portland, OR
Oregonian
(Cir. D. 236,720)

NOV 28 1978

State pinpoints nickel deposits; study quickens mining interest

By TOM BRENNAN
of The Oregonian staff

Twenty-five deposits of nickel, perhaps Oregon's most valuable commmercial ore resource, have been identified in a study recently published by the state Department of Geology and Mineral Industries.

Publication of the inventory is expected to quicken interest in mining and processing of the mineral, first found in Southwest Oregon in 1864.

The only producing nickel mine and smelter in the nation is at Riddle in Douglas County. Hanna Mining Co. produced nearly $50 million worth of nickel at the Nickel Mountain complex last year.

The report was prepared by Len Ramp, resident geologist at the Grants Pass field office of the department. The work was financed in part by grants of $35,652 from the U.S. Bureau of Mines.

Ramp said in a telephone interview Monday the nickel deposits (all but the Hanna deposit are in Curry and Jospephine counties) have in most cases been known of and prospected for years.

"I found only a few new ones," he said, "but the most important part of the work was mapping the extent of known deposits and testing the ores at some sites."

Ramp said the report does not estimate over-all reserves of Oregon nickel or companion reserves of chromium and cobalt, which are often found in the same ore bodies as nickel.

No total estimate was drawn because of the preliminary nature of much of the data and because the department shies away from such estimates, he said.

But any trained geologist could prepare such an estimate by calculating tonnage from the geological data cited by Ramp, according to several persons who already have read the report.

Ramp identified two main areas of future nickel production. One is in the Illinois Valley between Cave Junction and the Oregon-California border and the other is Red Flats area southeast of Gold Beach in Curry County. Northeastern Oregon deposits are not considered commercially important.

Donald Hull, director of the geology department, called the report timely bscause of land-use planning decisions pending in Southwest Oregon. Also, exploration for nickel "is at a peak" in the ore belt extending from Grants Pass south to Del Norte County, Calif., Hull said.

Nearly one-half of the 24 deposits are located partly or entirely in wilderness areas or areas under consideration for wilderness, according to Ramp.

Even where mining development is precluded, as in wilderness areas, it is important to know and consider all types of resources for good land-use planning, Hull pointed out. And several of the nickel sites are in areas involved in RARE II studies.

RARE II (Roadless Area Review and Evaluation) sites are being studied for designation as wilderness areas, with the issue to come before Congress in 1979.

Hull said Southern Oregon will have to diversify its economy in the future because of the region's declining timber harvest.

Ramp listed several factors that will govern the state's future mineral development: world supply and demand for nickel, chromium and cobalt; national policy on strategic mineral production; availability of satisfactory and inexpensive methods of reclamation; and progress in developing more efficient ways to refine low-grade ores such as found in Oregon.

Nickel prices are depressed the world over at $2 a pound now. But a doubling to $4 a pound by 1981, as seen by one geologist, could justify a major investment in Oregon-Northern California production.

Cobalt prices soared from $4-$5 a pound to a peak of $30 after the 1977 invasion of Zaire shut down one of the free world's most productive mines. The price has settled down to about $17 but supply uncertainties and high prices could help spur Oregon development projects.

A process developed at the Bureau of Mines research unit at Albany holds promise of greater yields and energy-efficiency than existing refining methods. The process will be further tested next year at a pilot smelter at Tucson, Ariz., rather than at Albany as earlier planned.

Richard Siemens., Albany project leader, said modifying the Tucson facility to handle the new eletrochemical process will be less costly than building a new plant at Albany.

Grants Pass, OR
Courier
(Cir. D. 14,921)

NOV 30 1978

Allen's P. C. B Est. 1888

A Future Bonanza?

5018

A report from local geologist Len Ramp, of the state Department of Geology and Mineral Industries, says that nearly half of the 25 deposits of nickel in Oregon are located partly or entirely in wilderness areas or in areas under consideration for wilderness designation.

Ramp also notes in his report that the nation's only producing nickel mine and smelter is in Riddle, Ore., in Douglas County. Hanna Mining Co. produced nearly $50 million worth of nickel at the complex last year.

Nickel is a metal used in various alloys, and is of strategic importance both to the nation's defense and to its economy. Thus Ramp's report takes on a special significance, particularly since there is a continuing pressure on the Congress to lump yet more of Josephine and Curry Counties' land into the wilderness, locking away the mineral resources from future utilization.

Nickel can, of course, be gotten from other nations, and possibly still cheaper than mining the Southwestern Oregon deposits. But the day could come when the deposits in our own back yard could be of crucial importance to our continued prosperity. We would be wise to study very hard the damage we could do by locking up so much in our wildernesses that we hamper our future unjustly and prevent the orderly development of these resources.

H.L.E.

Allen's P. C. B. Est. 1888

New nickel deposits are inventoried

5018

The Oregon department of geology and mineral industries recently completed a statewide assessment of nickel deposits in Oregon in cooperation with the United States Bureau of Mines. Results of the study are summarized in Miscellaneous Paper 20, "Investigations of Nickel in Oregon". The 67-page report contains numerous figures and maps.

The report is designed to supply basic resource data to various groups, policy formulators, agencies, and land use planners needing information on the nickel potential of the state.

During the period 1966-77, the entire United States primary mine production of nickel was from the Hanna Mine near Riddle, Ore., in Douglas county.

The report describes 24 deposits, in addition to the Hanna mine. These deposits lie in the southwest corner of the state in Curry and Josephine counties. Future development of one or more of the nickel areas could make a major economic impact in this part of Oregon.

Two other main areas of future nickel production potential lie in Oregon. One is in the Illinois Valley, in which a centrally located plant could draw from the larger, better grade, and more accessible deposits in the Josephine peridotite sheet; the other is in the Red Flat area southeast of Gold Beach in Curry county.

Several factors will affect possible expansion of Oregon's nickel industry - future supply of and demand for nickel, chromium, and cobalt; national and local political policy regarding domestic production of these strategic minerals; the ability to develop energy efficient, inexpensive, and nonpolluting metallurgical processes; and the ability to develop satisfactory and inexpensive reclamation procedures for mined lands.

Miscellaneous Paper 20 is available from the offices of the State of Oregon Department of Geology and Mineral Industries in Portland, Grants Pass and Baker. The price is $5.00.

Nickel deposit value cited

GRANTS PASS (UPI) — Two dozen unmined nickel deposits in Josephine and Curry counties may be Oregon's most valuable untapped commercial ore resource, a state geologist said Monday.

Len Ramp, resident geologist at Grants Pass for the state Department of Geology and Mineral Industries, said in a report prepared for the department there are two main areas of potential nickel development — in the Illinois Valley between Cave Junction and the California border and at Red Flats southeast of Gold Beach.

Nickel deposits may be valuable untapped commercial resource

5018

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Ramp said he found only a few previously unknown deposits "but the most important part of the work was mapping the extent of known deposits and testing the ores at some sites."

His report does not estimate overall reserves of nickel or of chromium and cobalt, which are often found with nickel. Ramp said his data was too preliminary for such estimates.

Nearly half the deposits are in areas which are either wilderness or under study for possible wilderness designation, Ramp said.

He said Southern Oregon must diversify its economy because of a declining timber harvest.

Development of the minerals, he said, will be depend on world supply and demand, national policy on strategic minerals, and availability of efficient means of mining and processing, especially of lower grade ores.

Nickel prices are now considered depressed at $2 a pound but geologists say the price is expected to double by 1981 and that level could justify development of the Southwestern Oregon ore.

A process developed by the U.S. Bureau of Mines at Albany will be tested next year in a pilot smelter at Tucson, Ariz., and holds promise of greater yields and energy efficiency than current methods, the bureau said. The bureau helped finance Ramp's study with grants totaling $35,652.

Mineral in Wilderness Areas

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Hull said Southern Oregon will have to diversify its economy because of the region's declining timber harvest.

"Mineral development is one of the available options," Hull said.

The report identifies the Illinois Valley between Cave Junction and the Oregon-California border and the Red Flats area southeast of Gold Beach as the main areas of future nickel production.

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Nickel May Be Best Resource

5018

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The state's other nickel deposit, at Riddle in Douglas County, is being mined by Hanna Mining Co. and is the nation's only operating nickel mine.

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Ramp said he found only a few previously unknown deposits "but the most important part of the work was mapping the extent of known deposits and testing the ores at some sites."

His report does not estimate overall reserves of nickel or of chromium and cobalt, which are often found with nickel. Ramp said his data was too preliminary for such estimates.

Nearly half the deposits are in areas which are either wilderness or under study for possible wilderness designation, Ramp said.

He said Southern Oregon must diversify its economy because of a declining timber harvest.

Development of the minerals, he said, will depend on world supply and demand, national policy on strategic minerals, and availability of efficient means of mining and processing, especially of lower grade ores.

Nickel prices are now considered depressed at $2 a pound but geologists say the price is expected to double by 1981 and that level could justify development of the Southwestern Oregon ore.

Unmined nickel valuable

5013

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24 in southwest Oregon

Nickel sites inventoried here

Potential commercial nickel deposits at 24 sites in southwest Oregon have been inventoried by the Oregon Department of Geology and Mineral Industries in cooperation with the U.S. Bureau of Mines.

The result of the project is summarized in a new 60-page publication just released by the ODGMI titled "Investigations of Nickel in Oregon" (Miscellaneous Page 20).

The report is available to the public at ODGMI offices in Portland, Baker and Grants Pass for a cost of $5. The Grants Pass office is located at 521 N.E. E St.

From 1966 to 1977 the only source of primary commercial nickel ore in the U.S. was the Hanna Mine near Riddle in Douglas County.

The 13,000-plus tons of nickel produced annually at Hanna in recent years represents 4 to 8 percent of total U.S. consumption of the metal. Imports and secondary production along with other minerals make up the remainder.

More than 62 percent of current annual U.S. nickel consumption is provided by imports from Canada, the world's largest producer of nickel.

But state and federal geologists indicate that there are more than 20 additional sites with a potential capacity to produce commercial quantities of nickel in Oregon, all of them located in Josephine and Curry counties.

"Future development of one or more of the nickel areas could make a major economic impact in this part of Oregon," said ODGMI spokesman Len Ramp in Grants Pass.

Ramp said development of nickel resources in the Illinois River Valley by means of a centrally located production plant "could draw from the larger, better grade, and more accessible deposits in the Josephine peridotite sheet."

Ramp added that "several factors will affect possible expansion of Oregon's nickel industry — future supply of and demand for nickel, chromium, and cobalt; national and local political policy regarding domestic production of those strategic minerals; the ability to develop energy-efficient, inexpensive and nonpolluting metallurgical processes; and the abliity to develop satisfactory and inexpensive reclamation procedures for mined lands."

Miscellaneous Paper 20 contains numerous figures and detailed maps, and summaries of nickel potential on each of the identified sites in southwest Oregon.

Grants Pass, OR
Courier
(Cir. D. 14,921)

NOV 29 1978

5018

Most State Nickel Near Wilderness

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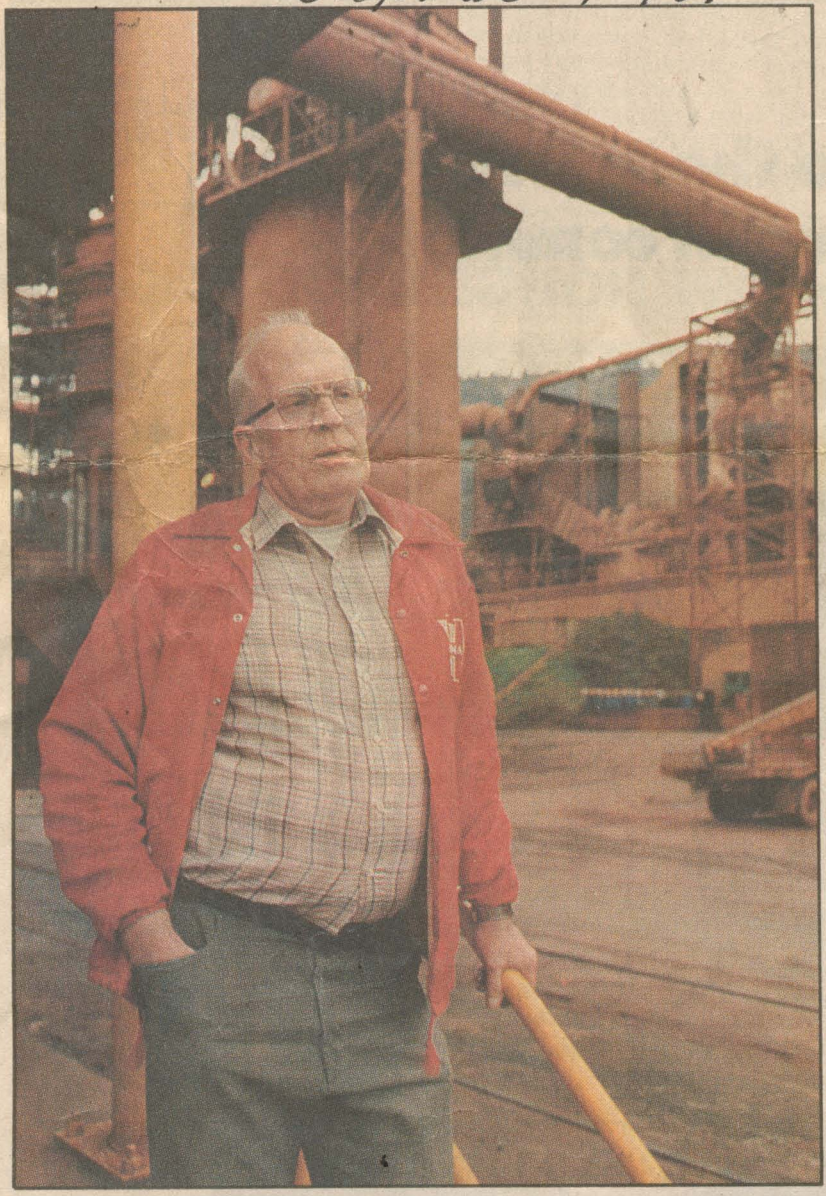
The report, financed in part by grants from the U.S. Bureau of Mines, does not estimated overall reserves of Oregon nickel or reserves of chromium and cobalt, which are often found in the same ore bodies as nickel.

Oregonian 1/11/87



PEGGY SHEKELL

Marvin Johnson, engineering manager for the Hanna Nickel Smelting Co., discusses the closure of the mining operation in Riddle.

Riddle vows to survive mine's closure

By DANA TIMS
Correspondent, The Oregonian

RIDDLE — There is sadness, just as there is anytime an old friend dies, say longtime employees of the Hanna Nickel Smelting Co., which has closed permanently after 32 years of operation.

But old-timers and civic leaders alike are adamant in vowing that rather than curling up and dying with the nickel operation, the town of Riddle, about 15 miles south of Roseburg, will survive and prosper.

Officials of M.A. Hanna Co., the parent company, announced the closure without warning Wednesday. The move followed several temporary shutdowns in the last few years, the most recent of which had left the rugged, 4,000-acre site largely idle. The last refined liquid was poured Oct. 7.

During a closure in 1985, the company invested $13 million in the plant to modernize operations and lower costs. The revamping included introduction of an entirely new technology in nickel processing and installation of nearly three miles of special pipe running from the huge smelting operation to the mine site.

Workers and townspeople held out hope that a miracle would occur, that the mine would somehow remain open.

But nickel prices had plummeted — from a high of $3.40 per pound in 1980 to the current rate of $1.58 — largely due to the dumping of less expensive foreign nickel onto the fragile international market. The mine's fate was sealed.

Closure letters dated Jan. 7 were sent to the 270 workers who had survived earlier layoffs due to seniority. Of those receiving the letters, at least a dozen were just shy of the 30 years necessary to qualify for a company pension, union leaders said.

At its peak in 1980, the world's only integrated nickel mining and smelting operation employed nearly 650 people.

"We always felt it would reopen for good if the prices could have just stayed high enough for the company to make a profit," said Jack Garren, 58. "But the way things were going, we could see this happening. I wasn't surprised at all."

Garren, a lifelong Riddle resident, worked more than 23 years at the mine as a millwright.

"I know it's going to hurt a lot of people around here," said John Wagoner, who was a crane operator for 32 years. "I think the town itself will be fine, but things are just tough all over for the working man."

Some employees conceded that the company had done all it could to keep the operation afloat as long as possible. Bill Morris, a 30-year warehouseman, disagreed.

"A lot of us felt they brought in nothing but junk machinery when they changed their production process in 1985 just to get some use out of the stuff," Morris said. "But I'll tell you, the men busted their butts out there to make it work. We just had too much rotten luck."

John Davenport, president of United Steel Workers of American Local 5074, was philosophical.

"We all made some mistakes and things just didn't turn out liked we hoped they would," Davenport said. "We wished they would have held off awhile to see what happened to prices, but given the trends, no one can say the company didn't do everything in its power to remain operating."

A special contract with the Bonneville Power Administration in 1985, for example, required the company — the largest single consumer of power betwen Eugene and San Francisco — to operate at "off-peak hours" in exchange for low power rates.

"But prices just refused to cooperate," said Marvin Johnson, Hanna Nickel engineering manager. "I find it difficult to believe there is anyone in the world who can produce nickel for a profit as a main line of business."

He and others recall the early

See RIDDLE, Page B2

Historical dates of Riddle

Here is a time line of significant events regarding operation of Hanna Mining Company and Hanna Nickel Smelting Co.'s mine at Riddle. It was announced Wednesday that the nickel mine and smelter would close permanently, leaving about 270 people out of work.

1864 — First ore deposits are discovered on Nickel Mountain by settlers, who, due to unusual green tint of ore, believe they have found major copper deposits.

1881 — Discovery that ore contains nickel, not copper, triggers prospecting and preliminary development work on the mountain.

1920 — Efforts to mine ore for shipment to Eastern processing plants proves too costly and is abandoned after several years.

1952 — Smelting operation is built by the federal government for strategic stockpiling and for use in building Korean War-bound jet engines.

1954 — Hanna buys smelting operation for $53 million; first refined liquid is poured July 12. Ferronickel, a combination of iron and nickel, is the first to be produced in the nation from domestic ores.

1980 — Employment hits an all-time peak of nearly 650 workers.

1982 — The first long-term closure takes place, due to falling nickel prices. Operation remains closed from April 1982 through December 1983. Nearly 400 jobs are trimmed by the time the mine reopens 19 months later.

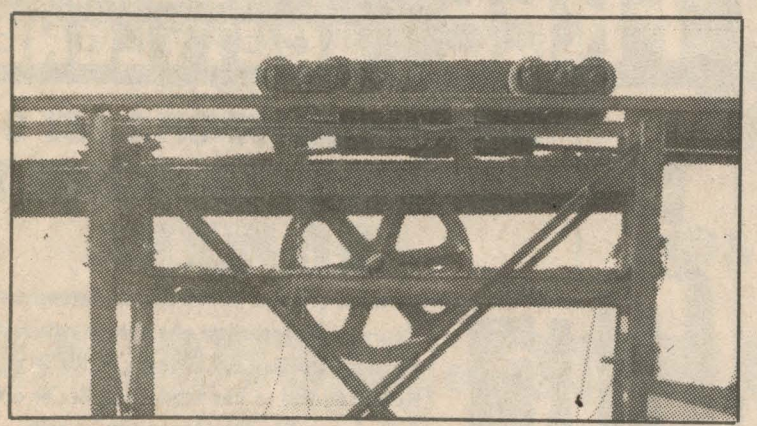
1985 — Second major shutdown in August occurs; 200 workers lose jobs. Company invests $13 million to revamp processing method.

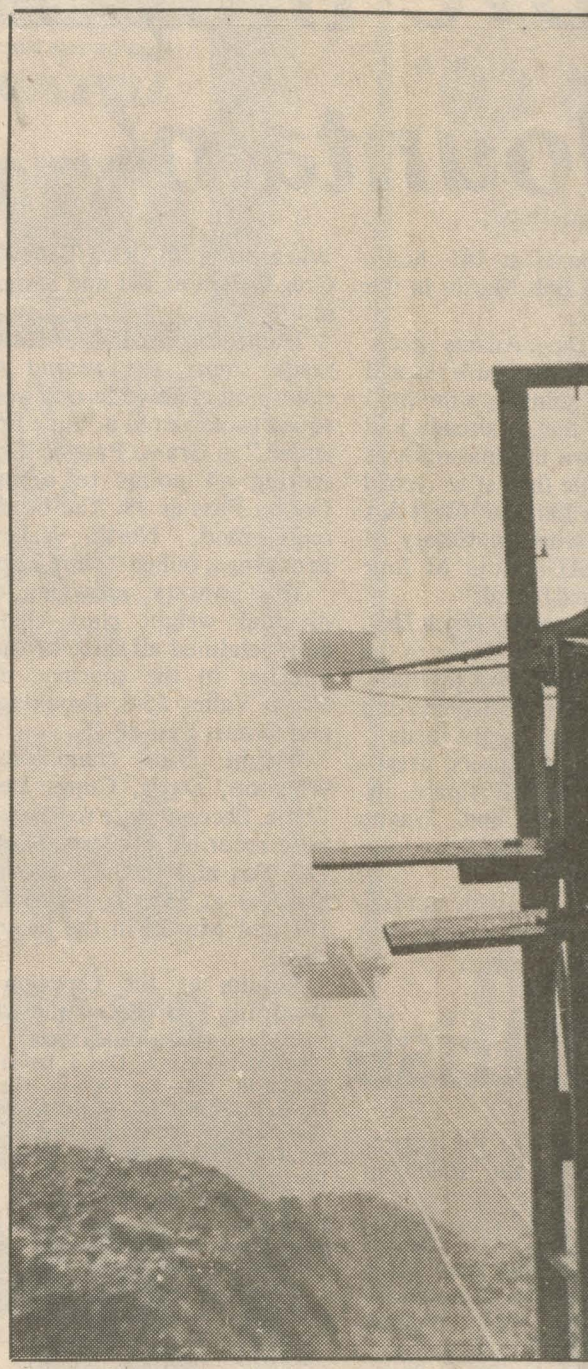
1986 — Third closure, in August, idles the plant. The last metal is poured Oct. 7. Remaining nickel stockpiles are loaded and shipped in mid-December.

1987 — Hanna's parent company, M.A. Hanna Co. of Cleveland, announces permanent closure of the plant Jan. 7. Termination notices are sent to 270 employees.

The Oregonian

Tram After Tram After Tram...





...that nickel-tainted ore just keeps flowing down Nickel Mountain—or so every current Hanna Nickel employee hopes. After the loud silence of idleness, endured for close to 20 months, the pleasant purr of tram car after tram car carrying ore from atop the mountain to the smelter below merely serves as soothing music to Hanna workers' ears.

And the music is virtually non-stop, with the mine running 24 hours a day, seven days a week, 19 of 21 possible shifts. Since the mine started back up in mid-January, more than 72,000 tons of waste material has already been however, and there are about 80 workers employed at the mine, bringing the total Hanna Nickel workforce to around 310.

If it's details about the mine operation that you seek, the man with the answers is mine supervisor John Murphy (at center right), who attended to lots of questions and microphones last Thursday when the company scheduled a "media tour" centered around the re-opening of the mine, which signalled a return to full production under the "off-peak power plan"

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Nickel Mountain stands 3,500 feet above sea level, and many days stands above cloud cover as well, resulting in a surrealistic view of tram cars which seem to disappear into white nothingness (above right) but actually find their proper destination some four miles away at the plant smelter. The 63 tram cars each have a 50-to 52-cubic-yard capacity, or roughly two tons of material.

At present, one area of Nickel Mountain is currently being mined (below left) while another is being prepared for mining. It takes between 15 and 18 shovel loads—and only about eight or nine minutes of an experienced operator's time—to fill up one of the 100-ton capacity trucks. The shovel bucket itself can scrape up 4.6 cubic yards of rock material.

From the trucks, the rock material is taken to the tram loading facility (below left), where the yellow tram cars do the next leg of work. Human labor is still at the crux of it all, however, and there are about 80 workers employed at the mine, bringing the total Hanna Nickel workforce to around 310.

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initiated in conjunction with the Bonneville Power Administration.

The off-peak plan—utilizing the electricty-gulping smelter only during off-peak hours when rates are cheaper—has a 20-month life which could see Hanna continue operation through mid-1985. But Hanna executives have expressed the hope that further BPA negotiations, along with an improved international nickel market, could keep things going for much longer, tram after tram after tram...

VICTOR ATIYEH
GOVERNOR

Department of Geology and Mineral Industries

1129 S.E. SANTIAM ROAD, ALBANY, OREGON 97321 PHONE (503) 967-2039

June 12, 1981

Pat Beyer
Hanna Nickel Smelting Company
P. O. Box 85
Riddle, Oregon 97469

Dear Pat:

Thank you for your help with the nickel article. Here are a few copies for your use.

Thank you again.

Sincerely,

Jerry J. Gray

Jerry J. Gray
Economic Geologist

JJG/bjd

Enclosures

12/30/80

Mr. Gray:

As promised, I am enclosing a couple of copies of our most current brochure on the Riddle operation. Also, for your information and records, Herbert D. Wedge is now our general manager replacing Mr. Matson.

Pat Beyer
Sec. to Mr. Wedge

874-2211

WHAT STRATEGIC METAL DOES OREGON SUPPLY THE REST OF THE UNITED STATES?

NICKEL

BY JERRY J. GRAY

What strategic metal does Oregon Supply the rest of the United States?

Nickel! Oregon has the only producing nickel mine in the United States.

Of the U.S.'s demand for nickel, how much does Oregon supply?

Oregon's annual production of contain nickel in ferronickel (50% iron and 50% nickel) ranges from 14 to 16,000 tons which is 6 to 10 percent of U.S.'s demand for nickel. Scrap accounts for 20 to 30 percent and the rest is imported.

Why is nickel called a strategic metal?

Nickel is vital to the iron and steel industry. Without nickel, the sophisticated industrial complexes, including the aerospace industry, that provide our high standard of living would not be possible. Nickel's greatest value is in alloys with other elements, where it adds strength and corrosion resistance over a wide range of temperatures.

Where in Oregon is nickel ore being mined and smelted?

The ore body being mined lies on top of Nickel Mountain. The smelter is at the foot. Nickel Mountain is located four miles west of the town of Riddle in southwestern Douglas County.

Who is doing the mining and smelting?

The Hanna Mining Company and Hanna Nickel Smelting Company began production of ferronickel (a combination of iron and nickel), the first to be produced in the United States from domestic ores, in July 1954. The companies have operated on an around-the-clock schedule since that time and provided steady, year-around work for approximately 600 employees.

In early 1953, two subsidiaries of M. A. Hanna Company signed a Federal

contract to build a nickel smelter and to develop the deposit of nickel ore at Nickel Mountain. The firm was to furnish, for the national stockpile, 95 to 125 million pounds of contained nickel in ferrnonickel at a price of 79.39¢/lb for the first 5 million pounds and 60.5¢/lb thereafter. In later years when the Federal Government sold the ferronickel from its stockpile, it realized over $2.00/lb.

What kind of ore deposit is at Nickel Mountain?

Nickel Mountain ore is a garnierite type which is classified into three groups: soil (bright red at surface grading into a yellow-brown color at depth), saprolite (weather peridotite, light to dark green) and box works (yellow-brown to bright green). Soil has 20 percent of the nickel resource, the saprolite 70 percent, and the box works 10 percent. Nickel Mountain appears to be a peridotite erosional remnant of an overthrust sheet. Fresh peridotite contains 0.2 percent nickel. Ore body was formed by the leaching and transportation downward of the nickel during the weathering of the peridotite. The deposit is made up of six major areas, covering approximately 600 acres. Average nickel grade in the crude ore presently under active development is approximately 1.0 percent.

How is the deposit mined?

The mining is by the multiple bench open pit method. The benches are at least 50' wide with 20' vertical faces. Up to 80 percent of the ore can be dug without blasting. When blasting is necessary, a hole is drilled and filled with an explosive and set off. Loading pit run ore is accomplished with diesel shovels. The ore is loaded into 60-ton diesel trucks and hauled to the screening plant. See flow diagram shown in Figure 1.

Can the ore be upgraded by flotation or other standard ore benefaction methods?

Because of the mineralogy of the ore, the only upgrading that can be done must be based on the physical characteristic of the ore such as soft or hard, fine or coarse and/or color.

How is the ore upgraded?

As the ore is being mined, large boulders, called pit rejects, are separated from the ore by the shovel operator and ultimately deposited on waste dumps. The boulders are mostly unweathered peridotite and contain low amounts of nickel in them. More upgrading takes place at the screening-crushing plant. The trucks dump the ore directly into the screening plant feed hopper. A separation is made according to the size of the material, with the smaller going directly to the tramway surge pile and the larger to the crusher. After crushing, the material is visually classified and directed to the tramway or the reject stockpile.

How does the ore get from the screening-crushing plant on top of Nickel Mountain to smelter at the foot of the Mountain?

An 8,300 foot aerial tramway with a 2,000 foot drop connects the screening-crushing plant with the smelter. At the tramway the ore is fed to the loading terminal where it is loaded automatically into 50-cubic foot tram cars. It is conveyed downhill to the smelter storage stockpile.

The tramway runs continuously, carrying ore in the upright tram cars and returning the empty cars in an inverted position. The ore is discharged on to the stockpile by inverting the cars at the lower end of the tramway. A speed of 600 feet per minute is maintained by the braking action of the two 300-horsepower generators driven by the weight of the loaded tram cars. The braking action of the generators produces approximately 500 horsepower, which is used in the generating of electricity for the operation of the mine facilities.

How is the nickel gotten from the ore?

Ore from the stockpile is processed at the smelter to produce ferronickel, containing approximately 50 percent nickel. Steps in the process include reclaiming ore, drying, fines screening, rejection of lean rock by screening, crushing, sampling, calcining, melting, reducing to ferronickel, refining, casting, and skull metallics recovery. These steps are shown in the pictorial flow diagram , Figure 1. The highlight system with its 4th of July pyrotechnics, Figure 2 and 3, is the melting and reducting of the ore and refining of the nickel. The ore is fed into the melting furnaces by gravity and further heated to a temperature of approximately 3000 degrees Fahrenheit where it melts. This molten ore is then poured from the melting furnaces into ladles where the nickel extraction occurs.

Reduction of nickel and iron is accomplished by the Ugine Process, which consists of adding a reducing agent containing metallic silicon to an oxide ore in the presence of molten ferrous metals and using vigorous mixing action for good contact of reductant and ore. In Hanna's smelter, crushed ferrosilicon containing 48 percent silicon is used to extract the nickel. The ferrosilicon used is produced in a separate electric furnace in the smelter. During a mixing cycle, nickel and iron are extracted from the molten material through a chemical reaction between the nickel ore and the ferrosilicon. The ferronickel is allowed to settle to the bottom of the ladle. The slag is poured off and granulated with high pressure water jets.

What is done with the slag?

After the slag is granulated, it is transported by water to a large green slag pile. A small portion of the slag is sent to another company that screens the slag into different sizes, bags it, and ships it to California and elsewhere

for use in sandblasting. The slag also is used for fill and sanding of highways.

How long will this operation last?

As quoted in the reclamation plan on file with the Department, mining will be going on until at least the year 2003. Other deposits, somewhat lower in grade, are known in Curry and Josephine Counties which might provide a source of ore after Nickel Mountain has been mined out.

What effect has the Riddle operation had on the local economy?

Employment in Douglas County is mainly timber dependent, which means employment can have seasonal highs and lows and can have periodic wild swings up and down caused by the national demand for wood products. Because of the year round employment of 600 plus, the Riddle operation tends to provide a steady base level for the local economy.

The following table summarizes the Riddle operation's annual performance:

TABLE 1:

PRODUCTION--Ferronickel	42,250,415 Lbs.
Nickel Contained	21,787,960 Lbs.
ORE MINED	3,822,587 Tons
PAYROLL	$16,000,000
ELECTRICAL POWER AND FUELS	$ 9,000,000
ENVIRONMENTAL COST	$ 504,400
PROPERTY TAXES	$ 298,400
COUNTY ROYALTY FEES	$ 275,000

Figure 1. A Pictorial Flow Diagram for the Riddle Operation at Nickel Mountain (Courtesy - The Hanna Mining Company)

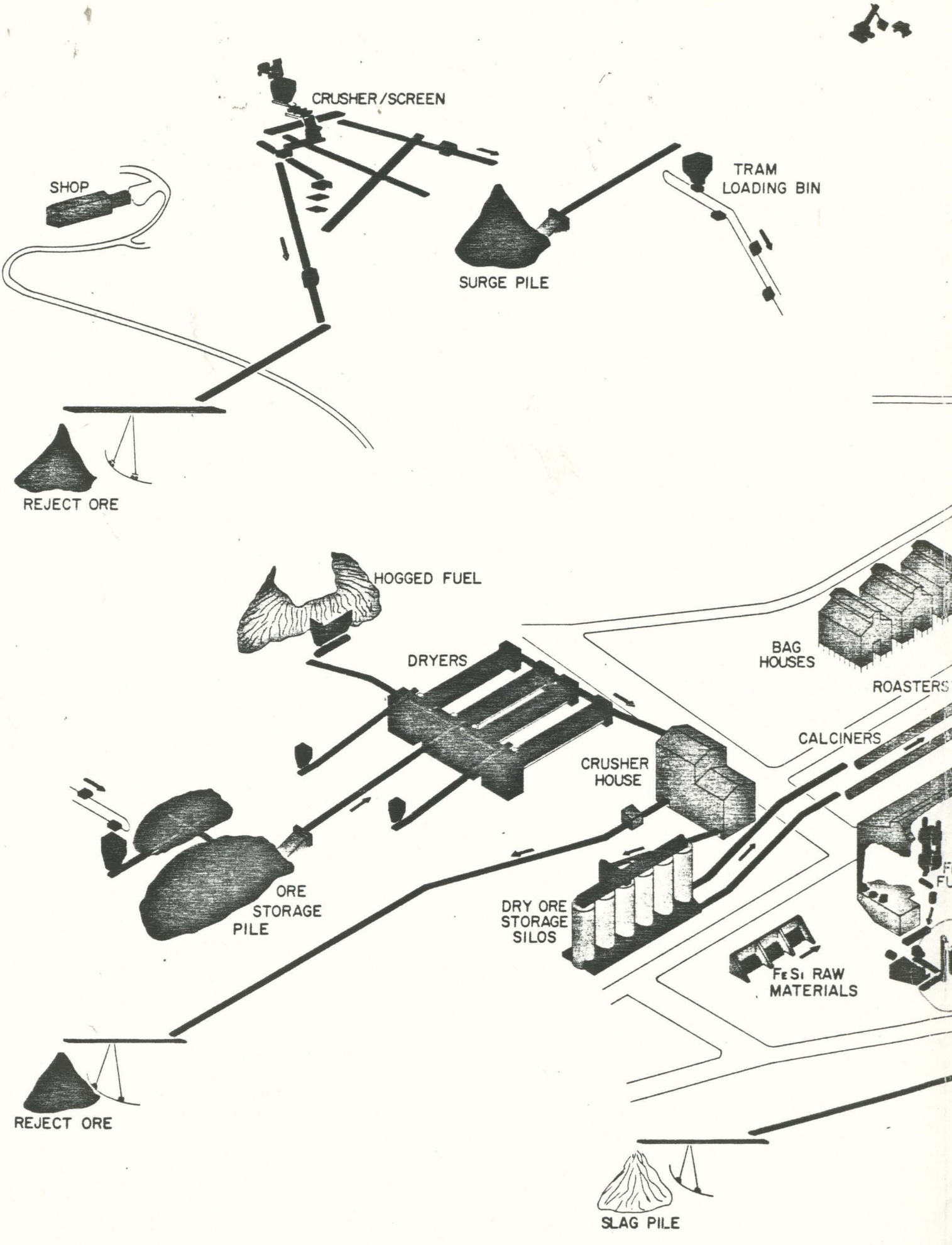
The mining ore is shown at the top center. The ore is moved to the top left for crushing/screening and start of the tram ride. The end of the tram ride is on bottom left. The ore moves to the right, through the smelter complex ending as ferronickel at the right and slag at bottom left center.

Figure 2. Pyrotechnics Show during Nickel Ore Smelting (Courtesy - The Hanna Mining Company)

The molten nickel ore and ferrosilicon are mixed by pouring from ladle to ladle.

Figure 3. Pyrotechnics Show During Nickel Metal Refining (Courtesy - The Hanna Mining Company)

The nickel refining is carried out while the ferronickel is molten.


CRUSHER/SCREEN
SHOP
TRAM
LOADING BIN
SURGE PILE
REJECT ORE
HOGGED FUEL
DRYERS
BAG
HOUSES
ROASTERS
CALCINERS
CRUSHER
HOUSE
ORE
STORAGE
PILE
DRY ORE
STORAGE
SILOS
FeSi RAW
MATERIALS
REJECT ORE
SLAG PILE

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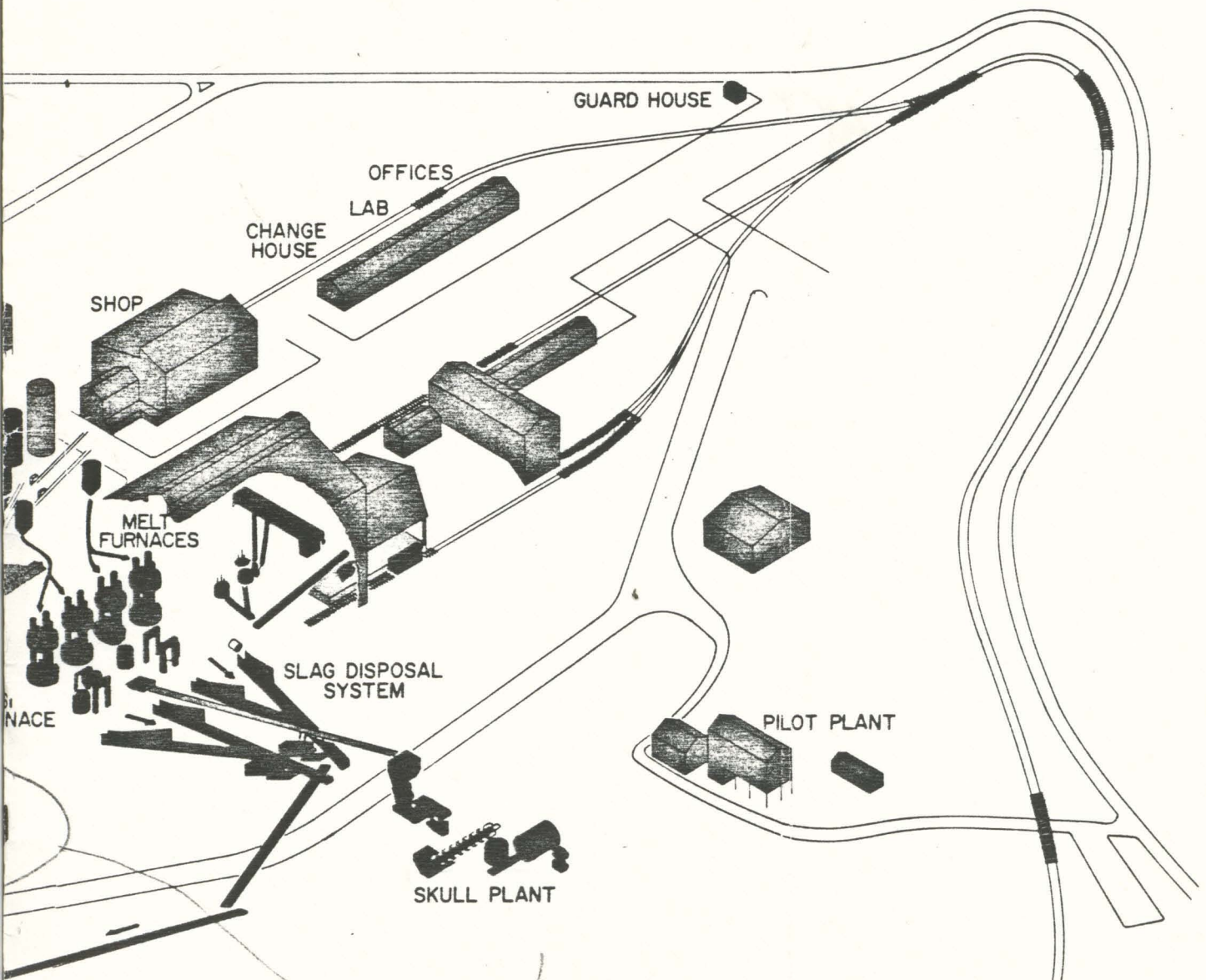

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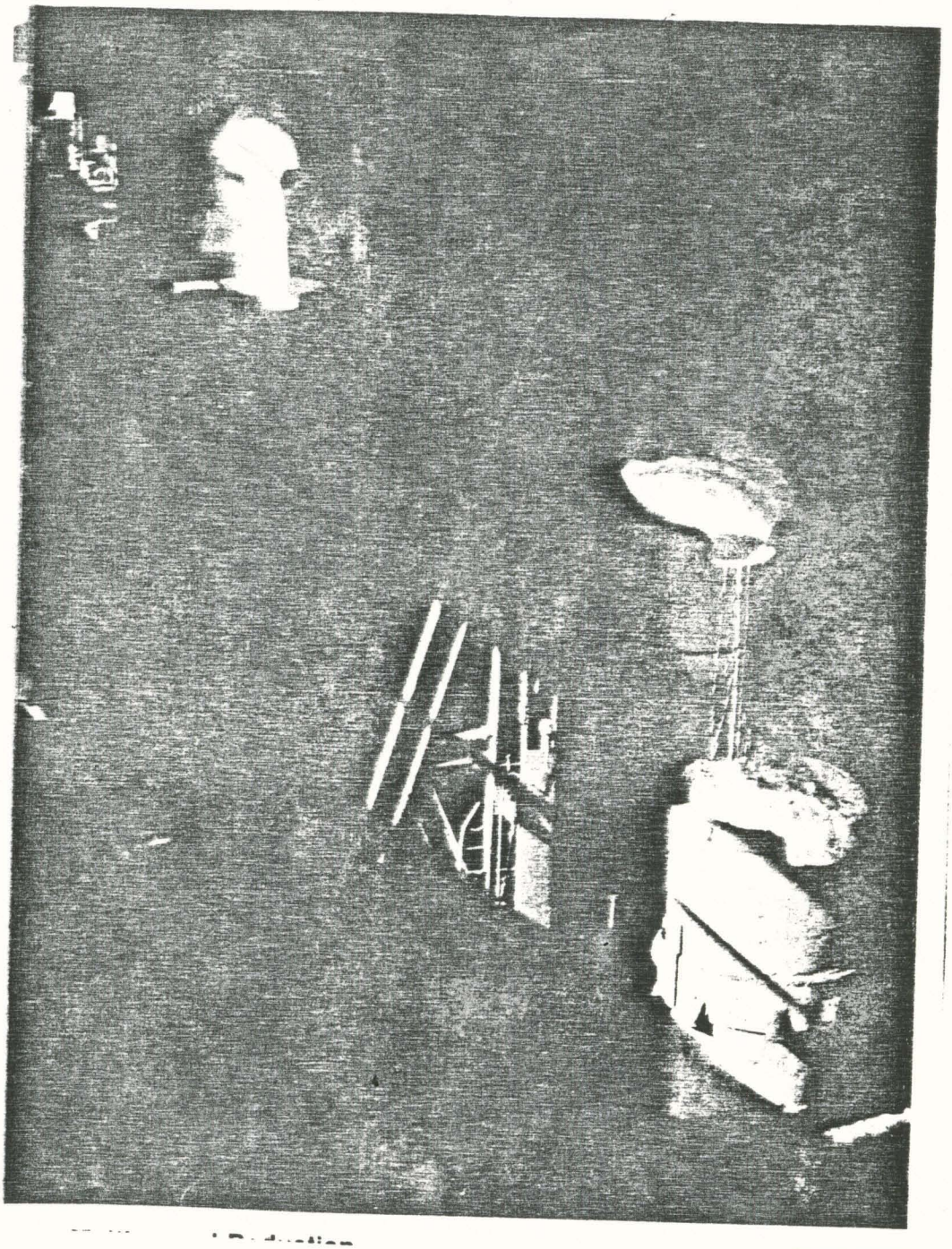

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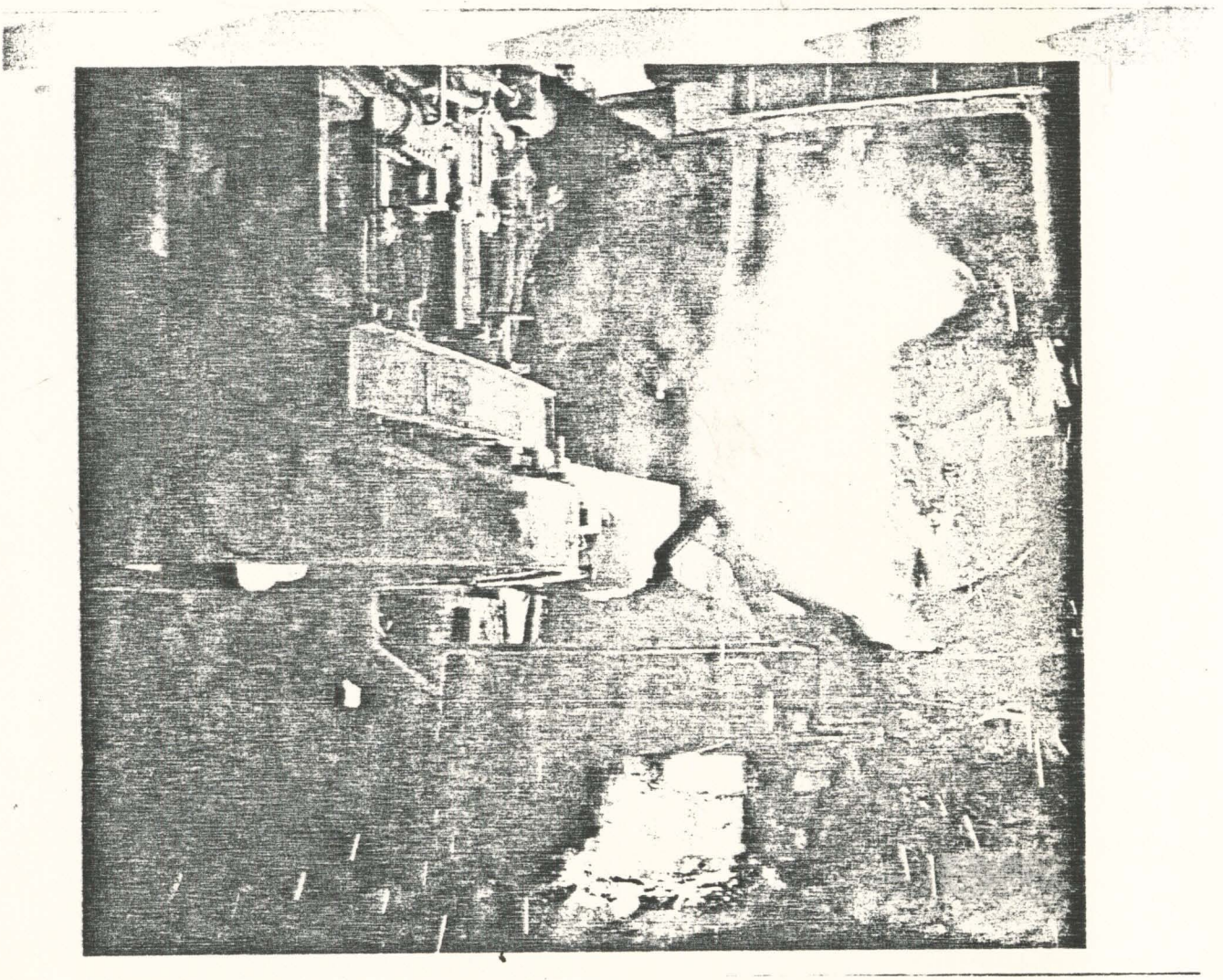

Figure 3. Pyrotechnics Show During Nickel Metal Refining
(Courtesy - The Hanna Mining Company)

The nickel refining is carried out while the ferronickel is molten.

Cal-Nickel project a threat to Smith

By DAVID JAMIESON
For The Mail Tribune

CRESCENT CITY — If while walking on a dirt road miles from the nearest civilization you were to suddenly come upon a great chemical processing complex full in the heat of production, you would probably be struck speechless.

As accustomed as we are to piecemeal evidence of logging, mining and road-building in isolated areas, the straight combination of industry and a back-county setting seems odd, like mixing oil and water.

Yet if a California mining corporation proposal for claims in northern California's Del Norte County come to pass, just such a mix could be created. That possibility has raised profound environmental concerns, and it has sorely tested the cooperative capabilities of local, state and federal agencies to deal with those concerns.

The Califonia Nickel Corp. — Cal-Nickel — is midway through a two-year, $3 million feasibility study of its holdings on Gasquet Mountain about 20 miles northeast of Crescent City. At the heart of the study is a plan to strip mine nickel and cobalt ore from the 3,500-acre claim and extract the metals by means of a $200 million ore processing plant to be constructed on the site.

The initial findings of a comprehensive study confirm what generally was suspected: the existence of about 50 million tons of low-grade nickel laterite ore, enough for Cal-Nickel to project the annual extraction of $150 million worth of nickel and cobalt over a 30-year period.

On that basis, Cal-Nickel has contracted for further environmental, engineering, economic and chemical processing studies, due out in a final report sometime this summer.

The proposal is unprecedented in Oregon and Califonia. It has set the wheels of government spinning.

Because the claims are in the Six Rivers National Forest, the U.S. Forest Service invoked the 1872 Mining Law, which was and is a blank check for miners to exploit mineral resources as best they can. The state of California was just as quick to claim the protection of the Smith River as its primary ground for involvement, pushing Del Norte County as lead agency.

About 10 percent of the Cal-Nickel claim overlaps a RARE II area — the North Fork of the Smith — that has been designated for "further study." The project lies wholly within the drainage of the Smith River, the only California river classified a state "Wild and Scenic River."

Much of the initial confusion has been ironed out. Del Norte County has been designated lead agency and will apply an agreed-upon combination of local, state and federal standards to the project. All the agencies will take an active role in monitoring development. The Forest Service has taken the attitude that the 1872 Mining Law has precedence over RARE II considerations.

Still very much in doubt, however, is the application of the Wild and Scenic Rivers designation.

Two years ago the California Department of Fish and Game was commissioned to come up with a classification and management use plan for the Smith. The project has advanced

or tailings since all agents are re-used by reduction of gas and recycling of all leach and solvent extraction re-agents."

The relatively low concentration of the metals — perhaps 20 pounds of nickel, two pounds of cobalt and 40 pounds of chromium per ton of ore — necessitates the location of an on-site processing plant.

It also necessitates strip mining the ore. Because Cal-Nickel's deposits have been found to average 15 to 25 feet in depth over the entire 3500 acre claim — with some pockets to 90 feet — the environmental impact could be considerable.

That impact could be heightened by the nature of the Gasquet Mountain site.

The soil is both highly erodible and permeable and it is drenched with an annual rainfall of about 100 inches. While much of the deposit is located on the relatively flat bench surrounding Gasquet Mountain, the deposit boundary, in some cases, extends to the edges of slopes that drop steeply into Hardscrabble Creek and the Smith's North Fork.

That could be Cal-Nickel's biggest problem. The state Regional Water Quality Board is obligated to enforce a "zero turbidity over background count" for the Smith, a river of remarkable clarity. Cal-Nickel officials are well aware of the problem and have commissioned specific plans to deal with it.

Revegetation is another problem Cal-Nickel is expected to address in its study report.

Unlike surrounding areas, Gasquet Mountain is sparse of plant growth and animal life. Trees 40 years old are less than 30 feet tall and eight inches through the base. Largely responsible for that are the laterite soils present and the heavy rainfall. Over the years, much of the common earth has been lost through leaching, leaving soil low in plant nutrients and high in plant-toxic, oxidized minerals such as nickel, cobalt, iron and magnesium.

Ironically, one of the re-agents used in the industrial extraction process could play a part in revegetation of the mined areas, according to the initial Dames and Moore report.

Ammonia, which is an ingredient of some commercial fertilizers, will be present in the tailings, the solids remaining after the nickel and cobalt have been extracted. As they note, "It could be an advantage if it remains as fertilizer . . . a disadvantage if it leaches out and becomes a contaminant."

The removal of those minerals and the fortification of the soil may well result in more abundant plant growth. On the other hand, it could upset the delicate ecological balance that has been achieved over decades of weathering.

The California Department of Fish and Game has pointed out a cut-over area quite close to the Cal-Nickel claim that has resisted eight separate Forest Service efforts to revegetate it. And at, according to Fish and Game, on "presumably better soil on the edge of the laterite."

Cal-Nickel also can expect to do considerable road improvement. The existing network, established over the years by scattered mining activity, is largely unmaintained and nearly impassable in the rainy season. A good

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Still very much in doubt, however, is the application of the Wild and Scenic Rivers designation.

Two years ago the California Department of Fish and Game was commissioned to come up with a classification and management use plan for the Smith. The project has advanced erratically over that period, accumulating information but arousing local ire because of its general lack of organization and direction.

The study has undergone a change in leadership and is moving from the classification stage to the development of a management plan.

Cal-Nickel officials are aware of a general Department of Fish and Game opposition to their project, but they, as yet, have no guidelines to follow in drawing up their plans.

Some of the restrictions Cal-Nickel faces are quite clear, though, especially those involving the use of surface water. The Wild and Scenic Rivers Act prohibits diversion of any water from the Smith or its tributaries for anything other than domestic use.

Like any chemical processing plant, the Cal-Nickel plant would require water, plenty of it.

Harris Lowenhaupt, vice president of the company and chief chemist for the project, estimates the plant would require 2.9 million gallons of water daily at a rate of 270 feet per minute. While declining to quote an actual percentage, Lowenhaupt says "virtually all" the water could be recycled and re-used, the major loss coming from evaporation in cooling towers.

But if the nearby waters of Hardscrabble Creek and the Smith's North Fork are forbidden to use, where to get it? The answer, according to Lowenhaupt, lies in on-site wells.

"Hydrologists from Dames and Moore (the environmental consultants retained by Cal-Nickel to compile environmental information) have done exploratory work on the mountain and their findings indicate that there is sufficient water available for the project at a depth of 500 feet," Lowenhaupt says.

State law prohibits discharge of any waste into the Smith, a fact which unsettles those associated with the project less than one would think. A quote from a recent U.S. Bureau of Mines paper on the advancements in nickel extraction technology gives reasons:

"(The process) does not affect air quality or create polluting discharges of waste water and eight inches through the base. Largely responsible for that are the laterite soils present and the heavy rainfall. Over the years, much of the common earth has been lost through leaching, leaving soil low in plant nutrients and high in plant-toxic, oxidized minerals such as nickel, cobalt, iron and magnesium.

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Cal-Nickel also can expect to do considerable road improvement. The existing network, established over the years by scattered mining activity, is largely unmaintained and nearly impassable in the rainy season. A good portion of Cal-Nickel's exploratory effort has gone into rocking, grading and waterbarring the roads, improvements that will have to be expanded to accommodate the heavy equipment and traffic necessary to build and operate the plant.

There are other restrictions as well. The plant must meet California standards of air quality. Scenic considerations would be handled through Regional Water Quality Board action. The initial Dames and Moore report states that the plant itself would not be visible from Gasquet or Highway 199.

Gasquet Mountain is only part of an enormous laterite deposit called the Josephine Belt. It extends from southern Oregon down to Mendocino County in California. According to Grants Pass geologist Lloyd Frizzell, a local geologist and currently under contract to Cal-Nickel, the entire deposit covers a total of between 20,000 and 30,000 acres. It is the only one of its kind in North America, he says.

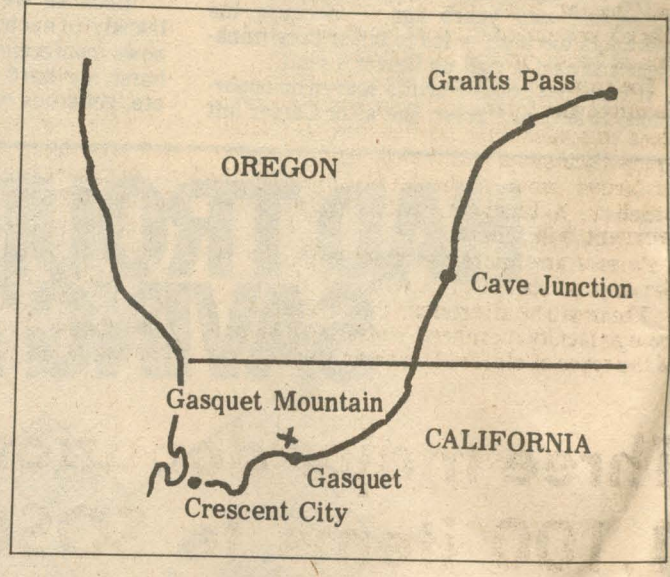
The laterite has largely gone untapped because richer deposits exist elsewhere in the world, because of the comparatively low market price of nickel and cobalt, and because of the difficulty in extracting the metals. The only plant on the deposit, operated by the Hannah Mining Co., in Riddle, was built during World War II and it relies heavily upon cheap electricity from the Columbia River system. Even with that, when the price of metal drops, the plant is forced into shutdowns and layoffs.

Recent developments in the extraction process and a general market trend of elevated prices for raw materials are two reasons for the latest interest.

Cal-Nickel, actually a wholly-owned subsidiary of a Vancouver, B.C.-based company called Ni-Cal Developments LTd., owns rights to two other substantial claims in Del Norte County. The company has voiced plans to proceed in a similar manner once the Gasquet Mountain operation begins.

Inter-American Nickel, the Oregon subsidiary of Ni-Cal, controls claims on Eight-Dollar Mountain and other portions of southern Oregon west of Highway 199.

Photos by Steve Yarbrough



Cal-Nickel Corp. is half way through $3 million feasibility study at Gasquet Mountain in northwestern California (top). If sample nickel laterite ore excavation proves potential, and other environmental considerations can be met, the company expects it could extract $130 million of nickel and cobalt during a 30-year period. Map indicates location of exploration site north of Gasquet.

COMMODITIES

Canada Nickel Producers to Cut Output Sharply In Response to Last Year's Price Decline of 68%

By Neil Behrmann
Special to The Wall Street Journal

LONDON — The nickel market has turned to gloom from boom, in one of the most rapid turnarounds ever in the metals markets.

As a result, both **Inco** Ltd. and another leading Canadian producer, **Falconbridge** Ltd., announced that they intend to slash production this year by around 16,000 metric tons, or 6% of total output. Canada is the world's leading producer of nickel.

World nickel prices slumped 68% during the past year, following a surge in Soviet exports and cutbacks in consumer orders. The "price decline has been spectacular," said David Phillips, chief executive officer of Inco.

At $2.75 a pound, current nickel quotes compare with a peak of $10.84 a pound in April 1988. Prices have fallen by 35% since the middle of last month alone, dealers say.

Nickel prices collapsed because an acute shortage in the market was transformed into a surplus, says Jim Lennon, a metals analyst at Shearson Lehman Hutton Ltd. in London.

A boom in the stainless steel industry, which accounts for 60% of nickel demand, came to an end, he says. Meanwhile, the Soviet Union raised exports to around 80,000 metric tons last year from 60,000 metric tons in 1988.

Soviet exports account for only about 12% of world supplies, but it is "the swing factor" in the market, says Angus MacMillan head of research at Billiton-Enthoven Metals Ltd. in London.

He estimates that the Soviets sold as much as 85,000 metric tons last year and "assumes that these levels will more or less be maintained in 1990."

Moreover, Cuba, which traditionally sells a large proportion of its nickel output to East Europe, also exported about 14,000 tons of the metal to the West last year, up from 12,000 tons in 1988, Mr. Lennon of Shearson says. Cuba is planning to double production to 100,000 tons by the mid-1990s, he says.

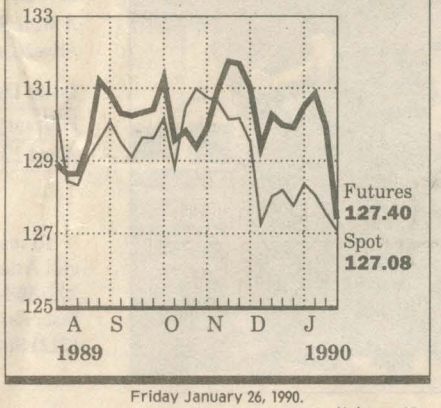
"Both the Soviet Union and Cuba need the money and they had to increase the volume of exports to offset the declining price," Mr. Lennon says.

The steep fall in nickel prices is the inevitable result of an unusual boom in 1987 and 1988, dealers say.

After averaging between $1.80 and $2.25 a pound from 1982 to 1987, prices surged after strikes and other supply disruptions in such producing nations as the Dominican Republic, Brazil, Indonesia and Australia. The turnaround caught stainless steel producers and other consumers in the Far East, Europe and the U.S. by surprise, and dealers say there was such a shortage that buyers were forced to bid up prices to exceptional levels.

Dow Jones Commodity Indexes

(Weekly averages)



Friday January 26, 1990.

	Close		Net Chg.	Yr. Ago
Dow Jones Futures	127.40	+	.13	141.78
Dow Jones Spot	127.08	+	.03	140.07
Reuter United Kingdom	1785.0	–	3.3	1963.1
C R B Futures*	231.37	–	.06	241.27

*Division of Knight-Ridder.

Yet as 1989 got under way, the shortage of nickel came to an end, dealers say. Despite the numerous production disruptions in 1988, output managed to rise in that and the following year. Meanwhile, high prices encouraged merchants to recover more nickel from scrap metal.

Demand has also begun to sag. Following extraordinary growth in stainless steel production in the past two years, output may be "significantly lower" this year, says Mr. MacMillan of Billiton-Enthoven. There will be lower orders for stainless steel from the automobile, house building and capital goods industries, he says.

In addition to buying cheap nickel from scrap merchants, stainless steel manufacturers and other users are depleting nickel stocks that they had built up in the past two years.

Industry is thus buying less metal from the mines, Mr. MacMillan says. As a result, supplies from Western and Communist bloc producers will exceed world consumption of 605,000 metric tons by 80,000 metric tons, estimates Mr. Lennon of Shearson.

In the next few months, however, there could be "a good price rally," says Edwin Arnold, metals analyst at Merrill Lynch Pierce Fenner & Smith in London.

Low nickel prices will "choke off the supplies of extra scrap," he predicts, and prices should stabilize, provided that stainless steel production isn't too depressed.

Looking forward to other commodity markets this week:

RESULTS OF PETROGRAPHIC STUDY OF
DIAMOND DRILL CORE SAMPLES FROM
NICKEL MOUNTAIN, RIDDLE, OREGON

D.D. #1 80-90

Color - limonite brown
Texture - brecciated, veined
Odor - earthy (strong)
Minerals:

(1) Limonitic clay, possibly nontronite, a hydrated silicate of ferrous iron	90% plus or minu
(2) Augite and enstatite)	
(3) Tremolite, probably formed by the hydrothermal alteration of the above augite) ----	8% plus or minu
(4) Chromite	2% plus or minu

D.D. #1 120-125

Color - variable
Texture - brecciated, veined
Odor - earthy
Minerals:

(1) Quartz, aggregate, latest mineral (unfractured)	45% plus or minu
(2) Actinolite (hydrothermal)	1% plus or minu
(3) Antigorite and chrysotile (hydrothermal)	25% plus or minu
(4) Limonitic clay, possibly nontronite	29% plus or minu

D.D. #1 220-223½

Color - brown with green streaks
Texture - brecciated, veined
Odor - earthy
Minerals:

(1) Limonitic clay, possibly nontronite	60% plus or minu
(2) Antigorite (hydrothermal)	30% plus or minu
(3) Quartz, aggregate, latest mineral	10% plus or minu

D.D. #1 314-318

Color - dark green
Texture - massive but slightly veined
Odor - slightly earthy
Minerals:

(1) Antigorite (hydrothermal)	70% plus or minu
(2) Olivine, altered, in part to antigorite and secondary magnetite	30% plus or minu
(3) Carbonate coating	1% minus

Remarks - Rock, originally a peridotite, is largely antigorite and secondary magnetite (with some relict olivine) produced by hydrothermal alteration.

D.D. #1 372.5-376.5

Color - variable green
Texture - massive but veined
Odor - somewhat earthy
Minerals:

(1) Olivine (with included magnetite)	80-90%
(2) Antigorite	5-10%
(3) Nickeliferous serpentine	5%

Remarks: Nickeliferous serpentine appears to be latest mineral.

D.D. #1 399-405

Color - dark green
Texture - massive but slightly veined
Odor - slightly earthy
Minerals:

(1) Olivine, in part altered to antigorite	80% plus or mi
(2) Enstatite and intergrowth of a (3) Clino pyroxene [augite (?)] ———	20% plus or mi
(4) Carbonate	1% minus

D.D. #1 405-415

Color - green
Texture - massive but veined
Odor - slightly earthy
Minerals:

(1) Olivine	60% plus or mi
(2) Enstatite	5% plus or mi
(3) Antigorite, part chrysotile, and included magnetite grains (hydrothermal)	35% plus or mi

REMARKS:

Very little nickeliferous material was identified. Nickeliferous serpentine is present in one sample. The original material, peridotite, has been partly altered to serpentine, possibly by hydrothermal solutions as indicated by so-called hydrothermal minerals, i.e. the tremolite-actinolite and the antigorite. The antigorite is associated with the fractures in the rock and if it was hydrothermal solutions that caused serpentinization, they would naturally have altered most markedly the areas surrounding the cracks and fissures. Quartz was the latest mineral formed and may very well have been deposited by circulating ground water.

The presence of nickeliferous serpentine, however, shows that some nickel-bearing minerals were probably formed by hydrothermal solutions.

TO FREEPORT SULFUR COMPANY

Spectro-chemical Analysis of Drill Cores

Sample No.	% Nickel	% Cobalt	% Chromium	% Aluminum
80-90	1.20)	0.005)	0.74)	0.20)
	1.05)	0.004)	0.64)	0.25)
120-125	0.35)	0.003)	0.11)	0.066)
	0.36)	0.005)	0.09)	0.070)
220-223½	0.29)	0.003)	0.15)	0.038)
	0.30)	0.004)	0.22)	0.030)
314-318	0.13)	0.005)	0.28)	0.029)
	0.15)	0.004)	0.31)	0.038)
372-376½	0.18)	0.004)	0.28)	0.092)
	0.21)	0.004)	0.26)	0.100)
399-405	0.21)	0.005)	0.34)	0.50)
	0.24)	0.005)	0.36)	0.48)
405-415	0.16)	0.003)	0.33)	0.49)
	0.17)	0.004)	0.25)	0.46)

Lab. No.	Description	Assays	
	Rough and Ready Creek	Ni	Cr_2O_3
P-8805	Hole 1 0' - 1'	1.06	3.29
P-8806	" 1' - 2'	1.18	2.59
P-8807	" 2' - 3'	1.18	2.20
P-8808	" 3' - 4'	1.29	2.62
P-8809	Hole 2 0' - 1'	0.92	3.56
P-8810	" 1' - 2'	1.20	2.94
P-8811	" 2' - 3'	0.96	1.71
P-8812	" 3' - 4'	0.61	1.27
P-8813	" 4' - 5'	0.52	0.84
P-8814	Hole 4 0' - 1'	0.95	2.64
P-8815	" 1' - 2'	1.07	2.58
P-8816	" 2' - 3'6"	1.11	2.35
P-8817	Chetco Trail - Baldface Trail Junction Shovel pit depth 1'	0.59	2.68
P-8818	" " " 1' - 2'	0.47	1.84
P-8819	" " " 2' - 3'	0.44	1.53
P-8820	" " " 3' - 4'	0.40	1.51
P-8821	Mud Springs Trail 1' - 2'	0.31	2.50
P-8822	" " " 2' - 2'6"	0.40	2.33
P-8827-B	Alberg Mine Flat 0' - 1'	0.68	3.14
P-8828	" " " 1' - 2'	0.74	3.22

MEMO OF FIELD TRIP TO SOUTHERN OREGON JUNE 21 TO JULY 2 INCLUSIVE, 1949

To: F. W. Libbey

A total of six localities were visited by the writer, who was accompanied by Mr. Lorne Turville, during the recent inspection of Josephine County nickeliferous laterite areas. None of the spots inspected proved to be very promising, in fact, almost without exception the areas were found to contain a great preponderance of both surface and subsurface boulders which made sampling at depth extremely difficult. Samples were taken at the following places:

(1) Section 14, T. 40 S., R. 9 W. This is located at the lower end of the Mud Springs Trail at a point 200 feet more or less south of Rough and Ready Creek. The hole was drilled in transported material.

(2) NE¼ Section 5, T. 40 S., R. 9 W. A hole was drilled beside the trail leading to the Alberg cabin. The area surrounding the hole is a rather extensive flat, but unfortunately the amount of soil that has been developed is small.

(3) Section 9, T. 40 S., R. 9 W. A small flat lying on top of a ridge was drilled at several places where characteristic laterite soil was noted.

(4) SW¼ Section 17, T. 40 S., R. 9 W. The flat at this place was nearly completely paved with surface boulders and no samples were taken.

(5) NW¼ Section 19, T. 40 S., R. 9 W. This area was similar to that in Section 17, no samples being taken.

(6) The flats on the west side of Josephine Creek due west of Woodcock Mountain were examined but found to contain no suitable lateritic material. The area is characterized by numerous boulders with very little soil in evidence.

In addition to the above areas the following samples were taken on the Cook Trail which follows along the divide which forms the Josephine-Curry County boundary immediately north of the Wimer Road: At the Bald Face Creek junction a series of samples was taken some of which apparently contain manganese; a second series of samples was taken from a shallow hole drilled along the narrow gauge road about .4 of a mile north of the Cedar Springs junction.

Four properties were sampled for possible cobalt-nickel mineralization: the upper tunnel of the Cowboy Mine, Mr. C. W. Martin's tunnel on Sams Creek; an outcrop on Upper Evans Creek in section 25, T. 34 S., R. 3 W.; and the tunnel being driven in the hornblendite mass not far from the Gold Ray Dam.

Two days were spent assisting Wolfe in moving his office across the street, and about four hours were spent in a futile search for the property on Josephine Creek which Niel Allen requested an inspection of.

Numerous rock specimens for the student rock collection were brought back to the Portland office from Grants Pass where Wolfe had collected them.

Ralph S. Mason

Lab. No.	Description	Assays	
	Woodcock Mountain	Ni	Cr_2O_3
P-6529	Redbird No. 2, Hole 1 0" - 1'	1.45	0.94
P-6530	" " ", Loc cut channel 2' - 3'	1.38	0.94
P-6531	" " ", Hole No. 2 0'6" - 1'6"	1.03	2.65
P-6532	" " ", " " " 1'6" - 2'6"	1.38	2.26
P-6533	" " ", " " " 2'6" - 3'6"	1.24	1.85
P-6534	Grab of inclined shaft dump	0.40	0.34
P-6535	" " top of inclined shaft	1.33	0.94
P-6536	" " unweathered peridotite top of mountain	0.23	0.40
P-6537	Claim No. 4 Loc cut 2½" - 4'0" laterite	0.67	1.50
P-6538	Grab of soil at top of mtn. 6" below surface	0.88	2.12
	Nickel Mountain		
P-6539	Laterite from big cut 2'3" - 4'0"	0.53	1.60
P-6540	" " " " 4'0" - 6'0"	0.66	1.41
P-6541	" " " " 6'0" - 8'0"	0.65	1.11
P-6542	" " " " 8'0" - 9'0"	0.67	0.89
P-6543	Surface of saddle "potential ore" zone	0.60	1.48
P-6544	Top of ridge Hole No. 1 6" - 1'0"	1.72	1.26
P-6545	" " " " " " 1'0" - 2'0"	2.37	0.93
P-6546	" " " " " " 2'0" - 3'0"	2.30	1.06
P-6547	" " " " " " 3'0" - 4'0"	1.65	0.77
P-6548	" " " " " " 4'0" - 5'0"	1.97	0.74

Lab. No.	Description	Assays	
	Nickel Mountain (Cont.)	Ni	Cr_2O_3
P-6549	Top of ridge Hole No. 1 5'0" - 6'0"	2.01	0.77
P-6550	" " " " " " 6'0" - 7'0"	1.85	0.87
P-6551	" " " " " " 7'0" - 8'0"	1.79	0.84

June 7, 1948

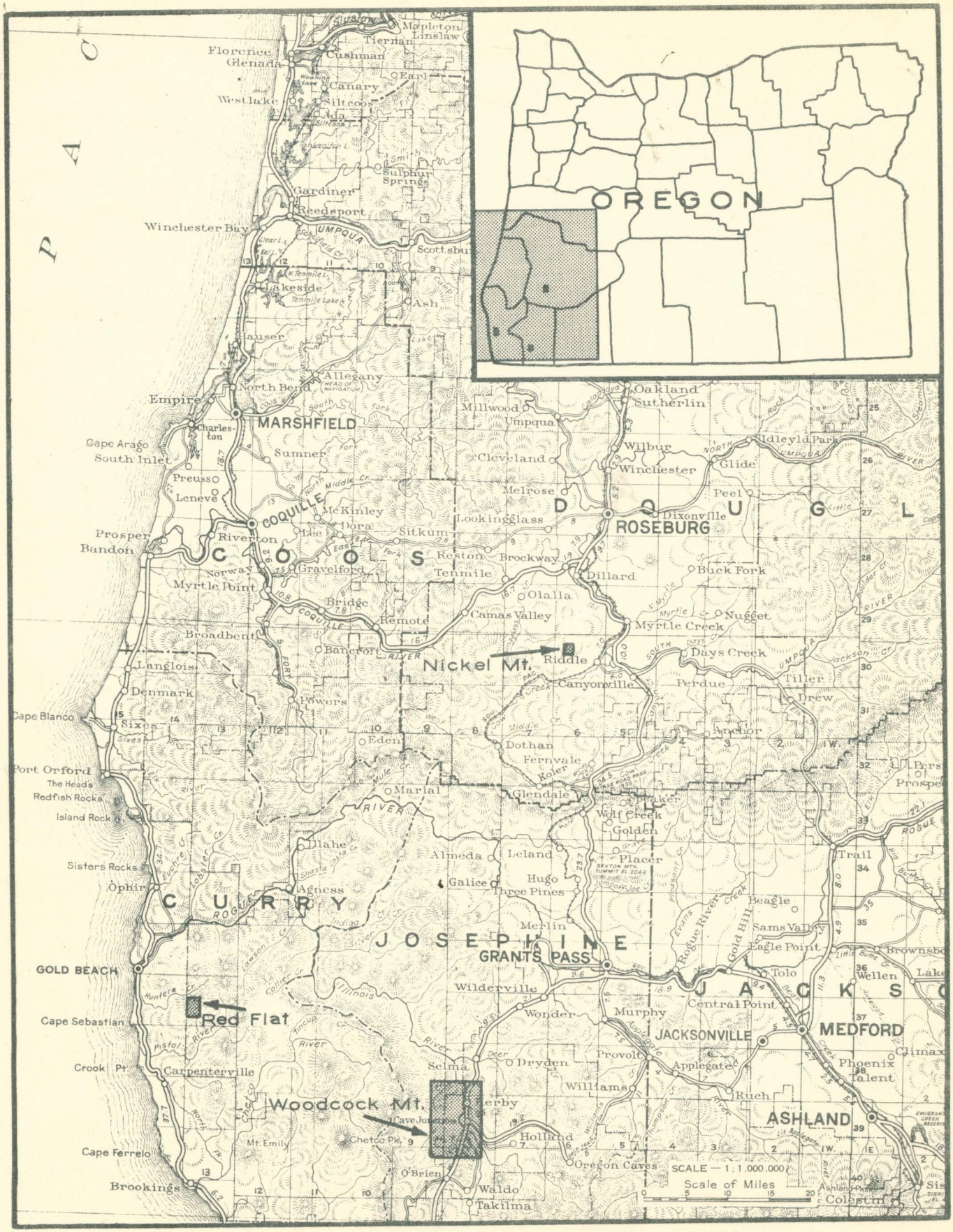
Nickel Occurrence near Azalea

To: F. W. Libbey

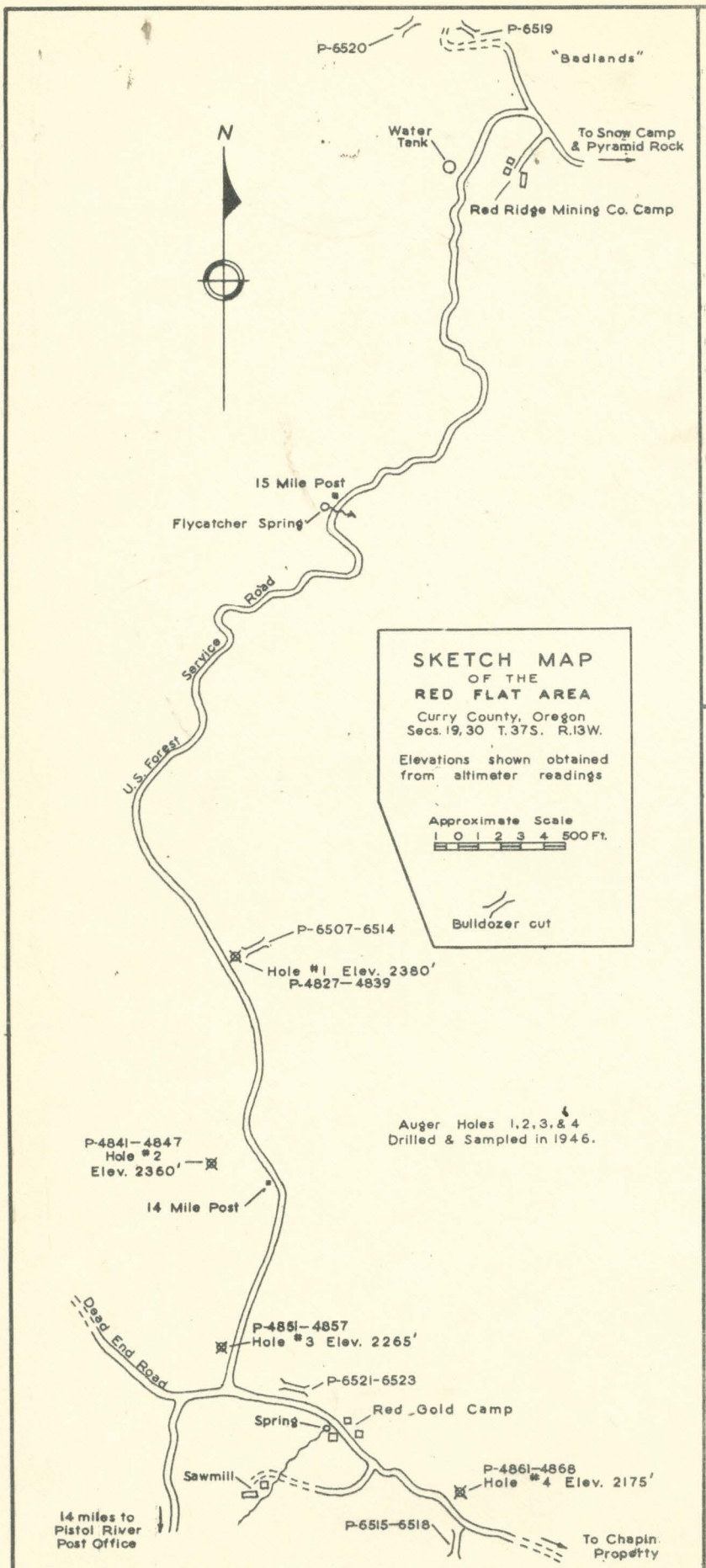
From. R.S.M.

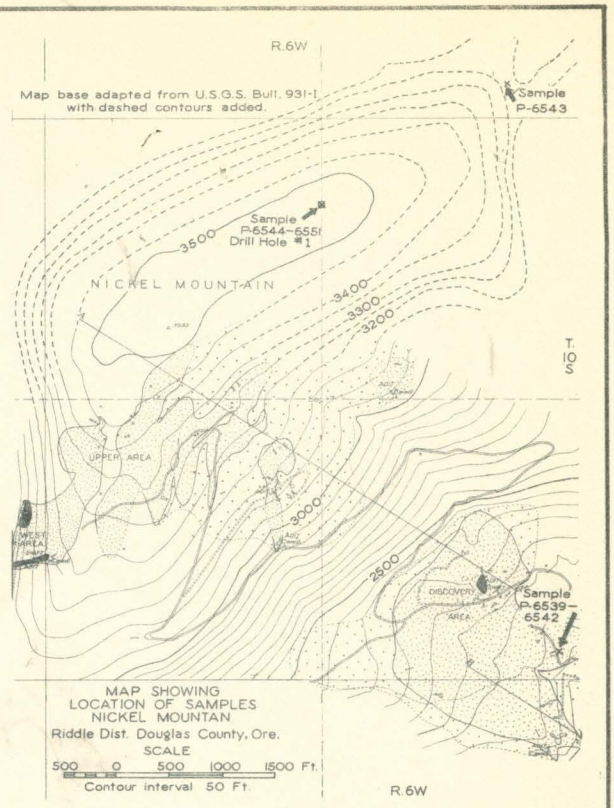
Frank Kolkow reported (June 7, 1948) that he visited a nickel deposit about twenty years ago in either the NE quarter of sec. 33 or the N.W. quarter of sec. 34, T 32 S., R. 4 W. The deposit is reached from Azalea by taking the road up Cow Creek to Starveout Creek, thence up Starveout to Fizzleout, up Fizzleout to Hogum Creek, inquiring at some of the houses along Hogum Creek how to get to the Jantzer (pronounced Yountzer) Mine. According to Kolkow the deposit has been opened up with a pit with perhaps a short adit in the face, the workings being visible from the Jantzer Mine. A trail leads up the northwest slope of Green Mountain from Jantzer Mine and the workings are said to be at an elevation of about 3,600 feet. Kolkow said that the ore was not garnierite but appeared to be more metallic, probably a nickel sulphide.

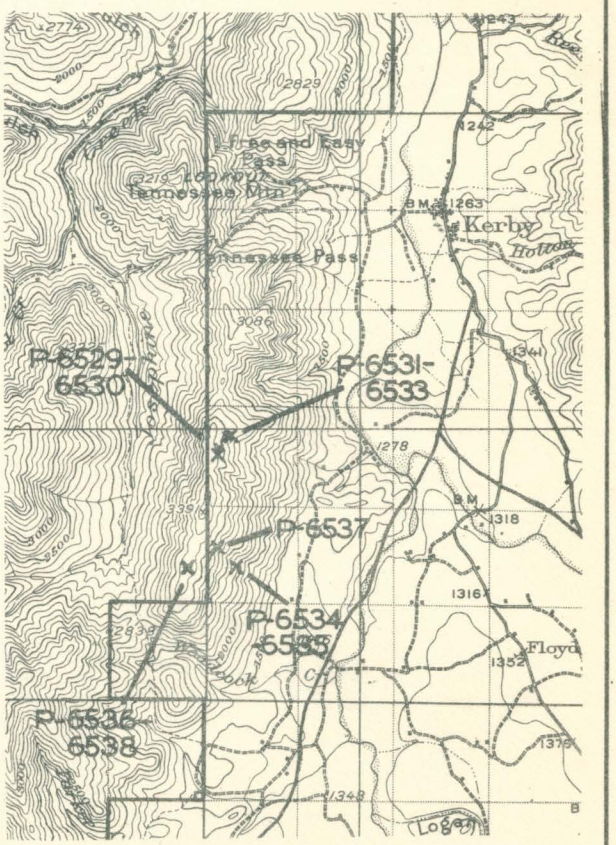
RSM:de



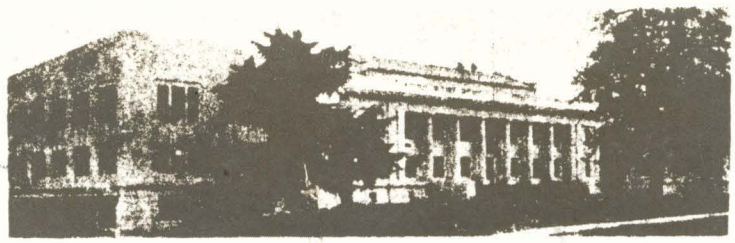
Index Map of Southwestern Oregon Showing
Location of Nickel-Bearing Laterite Areas


P-6520
P-6519
"Badlands"
N
Water Tank
To Snow Camp & Pyramid Rock
Red Ridge Mining Co. Camp
15 Mile Post
Flycatcher Spring
U.S. Forest Service Road
SKETCH MAP
OF THE
RED FLAT AREA
Curry County, Oregon
Secs. 19, 30 T. 37S. R. 13W.
Elevations shown obtained from altimeter readings
Approximate Scale
1 0 1 2 3 4 500 Ft.
Bulldozer cut
P-6507-6514
Hole #1 Elev. 2380'
P-4827-4839
Auger Holes 1, 2, 3, & 4
Drilled & Sampled in 1946.
P-4841-4847
Hole #2
Elev. 2360'
14 Mile Post
Dead End Road
P-4851-4857
Hole #3 Elev. 2265'
P-6521-6523
Red Gold Camp
Spring
Sawmill
P-4861-4868
Hole #4 Elev. 2175'
14 miles to Pistol River Post Office
P-6515-6518
To Chapin Property


R.6W
Map base adapted from U.S.G.S. Bull. 931-I with dashed contours added.
Sample P-6543
Sample P-6544-6551 Drill Hole #1
NICKEL MOUNTAIN
3500
3400
3300
3200
3000
2500
T. 10 S.
UPPER AREA
WEST AREA
DISCOVERY AREA
Sample P-6539-6542
MAP SHOWING
LOCATION OF SAMPLES
NICKEL MOUNTAIN
Riddle Dist. Douglas County, Ore.
SCALE
500 0 500 1000 1500 Ft.
Contour interval 50 Ft.
R.6W


Tennessee Mtn.
Tennessee Pass
Kerby
Holland
P-6529-6530
P-6531-6533
P-6537
P-6534-6535
P-6536-6538
Floyd
Logan
MAP SHOWING LOCATION OF SAMPLES
WOODCOCK MOUNTAIN
Josephine County, Oregon
Map base from U.S.G.S. Kerby Quad.
Scale
1 0 1 2 3 4 5 Miles.
Contour interval 100 Feet

D.I.B.



DOUGLAS COUNTY
Roseburg, Oregon

June 18, 1964

Hanna Mining Company
1300 Leader Bldg.
Cleveland 14, Ohio

Attn: Legal Department

Gentlemen:

We are in receipt of a report on the geology of certain county-owned mineral rights by the Oregon Department of Geology and Mineral Industries. These mineral rights are currently under lease to Hanna by Douglas County as recorded in the Douglas County Deed records Volume 329 pages 422-429.

The Court has examined this report and finds that it verifies the fact that no ores or minerals exist having present economic value to mine or extraction or under the following described properties:

> $W\frac{1}{2}$ of the $SE\frac{1}{4}$ Section 18 and the $NE\frac{1}{4}$ of the $NE\frac{1}{4}$ of Section 19; and the $W\frac{1}{2}$ of the $NW\frac{1}{4}$ Section 20 and the $NW\frac{1}{4}$ of the $SW\frac{1}{4}$ of Section 20, all in Township 30 South, Range 6 West, Willamette Meridian.

In the interest of further clarification, these lands shall be included in the operation of the lease.

Very truly yours,

DOUGLAS COUNTY COURT

BY: V T Jackson
County Judge

BY: E R Metzger
County Commissioner

BY: Ray E Doerner
County Commissioner

cc: E.E. Coleman
Hollis M. Dole

Yakobi Island 1.30% Ni

Mch 2 — 4th Th[illegible]

Aurora Nickel mine Mirror Harbor Chichagof Id —

1 — 56 ft wide aver 3.42% Ni + 2.18% Cu

2 — 3.09% Ni + 0.61% Cu

3 — 2.41% Ni + 1.0% Cu

1st matte ch[illegible] —

USGS Bull 692 p. 117 (Evidently p. 127 where Mildposits described — no assay)

Ec Geol 1924 p. 375 — (19 Tons to Tacoma Smelter 3.70% Ni + 1.7% Cu)
(Paul F Kerr Magmatic Sulphide ore from Alaska)

Aurora ore zone $2\frac{1}{2}$ mi long

(2). 1000 ft long + 140 ft wide 3.34% Ni + 1.4% Cu
1,400,000 tons of ore each 100 ft depth
50,000,000 tons for 1000 ft —

USGS Bull 947-C by Kennedy + Walton Pecora
disseminated ore body should produce 13,500 tons ore
Each 1 ft depth mixed waste with ore gets
0.2% Ni + 0.1% Cu — Bureau of Mines put down dd holes
— wrong direction

USGS Bull 931-F Reed + Dorr pp 105-138
936-I Pecora

(2)

Another DD hole but ore at 20 ft & Bureau quit

Yakobi Id ni located in Bohemia Basin reported on by Prof Grider of Univ of Kansas samples assayed 0.98% Ni - 3.65% Ni & half as much Cu

Buddington
USGS Bull 773 page 98 assays 2.18% Ni 1.55% Cu, 2.45% Ni, 0.68% Cu, 1.72% Ni 0.87% Cu, 4% Ni + 0.82 Cu.

1936
Dr. Hogbom, Stockholm Sweden, ch geol of Swedish gov Yakobi Id ni deposit next to Kirunavara iron mines of Sweden largest ore deposits in the world - 2 billion tons ore over 2% Ni above valley floor

---

USGS Bull 773

P. 8 - Prof F. Bastinyxan Yakobi John C Reed, John Van N Dorr
Pecora - Art Thrane of Int. Nickel Co - Univ for Pres Roosevelt

[red annotations:]
very small ... 773 not much devel...

773 - assays represent only picked samples ~~of~~ ~~from~~

773 - Snipe Bay, Baranoff Good assays but from spec -

773 Admiralty Id Fair nickel assays from spec - samples

USGS Bull | | USBM War Min Rep 333 (1944) Mirror Harbor, Chichagof Id, Alaska 1
692 (1917) | RI 4168 ditto (1948) Jan
773 (1923) | RI 4182 Yakobi Island Ni dep Sitka mining Dist. Alaska 1948 Jan
931-F (1942)
936-I (1942)
947-C (1946) | Alaska Dept. of Mines pamphlet No. 1 Strategic Min Occurrences in Interior Alaska May 1942

692 - deposits on W. coast Chichagof I d - Very small amount of devel work in 180 ft shaft + 2-levels no pertinent assays - no record of sampling

773 - ~~Chichagof Id~~ ~~Bohemia Basin~~ ~~Yakobi Id~~. In 1921 there SHP Vevelstad located 40 claims - locations by other groups made - statement of devel + assays given as furnished him by Mr. Vevelstad from a private report - Devel about same as mentioned in 692 - assays + widths given are somewhat indefinite and allow no picture of reserves - an average of 3.42% Ni & 1.58% Cu is given for upper level and on lower level " from 1.65 to 5.7% & 0.4 to 2.3% Cu widths are given as from 1.1 to 7.9 ft. " narrower widths gave the higher assays"

773 (contin) Bohemia Basin + Yakobi
Little = way of development - Assays
from spec show 1.18% Ni + 1.98 Cu -

931-F Bohemia Basin on Yakobi Id.
8 - Ni-bearing ore bodies - Prot - 4 more
unprospected indicated by float outcrops -
Dev'd mainly pits & tunnels -
Authors believe more sulphide
bearing ore bodies may be found
~~[illegible]~~ Estimated tonnage of
61 samples
grade - 5,853,000 tons 0.36 Ni & 0.27% Cu

936-I West coast Chichagof Id. 3 deposits
160 mi southwest of Juneau. 2 types of
deposits ① disseminated sulphides and
② Conc sulphides in pod-like masses
One of the conc sulph deposits is on
Fleming Id developed by 175 ft shaft
(Same as before) and ore shoot may contain
more than 10,000 tons have Ni + Cu content
of 2.00% and 1.000% respectively

a second outcrop of conc sulph 3000 ft.
southeast of the 1st has had no sub surface
devel: It is prob of lower grade
The dep of disseminated ore is
1000 ft southeast of the 2nd dep.
"It prob contains a few million tons of
low-grade material with perhaps 0.2%
of Ni and 0.10% of Cu.

Conc sulph dep good grade but
small - Dissem deposits large
but very low grade -

947-C Yakobi Bureau of Mines
drilled + sampled - 1941 + 1942 USGS did
magnetometer wk - 1943 -
Authors make revised estimate of reserves
20,700,000 tons average about 0.33% Ni
and 0.21% Cu

Chichagof Id - several concentrated sulph
deposits - known - largest on Fleming Id
contains prob. about 8000 l/ns of ore grade
of 1.57% Cu and 0.88% Cu - The other
deposits are all apparently small
The large disseminated deposit
prob contains several million tons
of material averaging 0.2% Ni and 0.1% Cu

Baranof Id deposit stated to contain only
a few tons of nickel-bearing rock.

Ex-factors - low grade of the large
deposits - on Yakobi Id & small tonnage
of heavy sulp bodies of Chichagof.
More ore could be developed on
Yakobi if further drilling is done
also on Chichagof -

Vevelstad's letter to Arthur M Hill 5

P. 3

Aurora Nickel Mine Mirror Harbor, Ahchagof Id. - no question quality of ore - quantity questionable

Correct to say that character of ore same as Sudbury ore.

"Ore zone" and ore reserves 2 diff things -

Cannot determine value of ore body by picked specimens -

P. 6 - Reference to statement on p. 6 that USGS Bull 947-C p. 45 that side hill ore bodies all one ore body 1600 ft long and 1200 ft wide wrong - statement is that deposits are in an area about 1600 ft long and about 1200 ft wide - In bull no mention here made of grade as Vevelstad infers on p. 6

Reference to Snipe Bay samples Buddington considered #3 sample average grade not verified in report

June 10, 1964

Douglas County Court
Court House
Roseburg, Oregon

Gentlemen:

I am in receipt of correspondence from Mr. E. E. Coleman, General Manager - Oregon, The Hanna Mining Company, Riddle, Oregon, in which he notes that Hanna leased land from Douglas County and that one of the provisions of the lease was that a determination be made as to whether or not any valuable mineral existed on these lands.

To this end Mr. J. T. Cumberlidge, geologist for Hanna Mining Company, prepared a map and a report of the geology and possible mineral potential of said land, a copy of which is attached. Also attached is a letter from our field geologist in charge of our Grants Pass office who accompanied Mr. Cumberlidge in the field in reviewing his work. You will note that it is his considered opinion that under present conditions there is nothing of economic interest in the area under consideration. I concur with our field geologist in this determination.

A copy of the lease form has been sent to me by Mr. Coleman and I would agree with the statement on the first page where it says that the leasing of this land would be in the public interest.

If this Department can be of any further assistance to you in this matter, please feel free to call upon us.

Sincerely yours,

Hollis M. Dole
State Geologist

HMD:jr
Encl.
cc E.E. Coleman
bc Len Ramp

Mr. Dole

The Hanna Mining Company

Riddle, Oregon

February 19, 1963

The Honorable Carl Back
House of Representatives
Oregon State Capitol Building
Salem, Oregon

Dear Mr. Back:

I would like to express my opposition to HB 1233 establishing a Department of Natural Resources. To me this bill, as written, would result in even higher governmental expenses than we are presently enduring, as well as providing a possible mammoth spoils system that could be exploited for maximum political influence by the party electing the Governor. This would not promote the best interests of the citizens of Oregon, regardless of what party might be in power.

Under the present law, the various departments, such as Agriculture, Forestry, Mineral Resources, etc., are administered by competent men, especially trained in their fields as provided by law. In most cases, they have held their positions for long periods of time and are thoroughly familiar with their departments and the problems involved therein.

HB 1233 would make all of these departments divisions of the Department of Natural Resources and the administrators of the various divisions would serve "at the pleasure of" the department head, who in turn would be appointed by and serve "at the pleasure of" the Governor. The bill states that director and division administrators must be "well qualified" but the qualifications are not spelled out. A very loose interpretation of qualifications could be made.

In the final analysis, all of these men would be, in essence, appointed by and could be removed by the Governor, at his pleasure.

This places entirely too much power in the hands of one man. Oregon is essentially a natural resource state and these resources should continue to be administered by capable, well trained men, not subject to appointment or removal "at the pleasure of" any one man.

Very truly yours,

E. E. Coleman

E. E. Coleman
General Manager-Oregon

EEC/il

bcc: Ivan Congleton - Salem
James B. Corlett - Portland
Hollis M. Dole - Portland

Al Flegel - Salem
W. O. Kelsay - Salem
Sidney Leiken - Salem

Letters were mailed to:

Sen. John D. Hare
Sen. John J. Inskeep
Sen. Arthur P. Ireland
Sen. Don S. Willner
Sen. Alice Corbett
Rep. Carl Back
Rep. Kessler R. Cannon
Rep. Gerald W. Detering
Rep. Wm. H. Holmstrom
Rep. Ross Morgan
Rep. Robert F. Smith

December 20, 1962

Mr. Emmons E. Coleman, General Manager - Oregon
The Hanna Mining Company
P.O. Box 85
Riddle, Oregon

Dear Emmons:

I have just received from the Tax Commission a copy of a memorandum prepared by one of their staff attorneys in regard to taxation of severed mineral interests. This also contains suggestions on how the problem might be solved by the State of Oregon.

Although I do not have extra copies of this, I am sure that you can obtain the same by writing to the State Tax Commission, 412 State Office Building, Salem, Oregon (attention: Donald H. Burnett).

It would appear to me that this would have more than ordinary interest to your company.

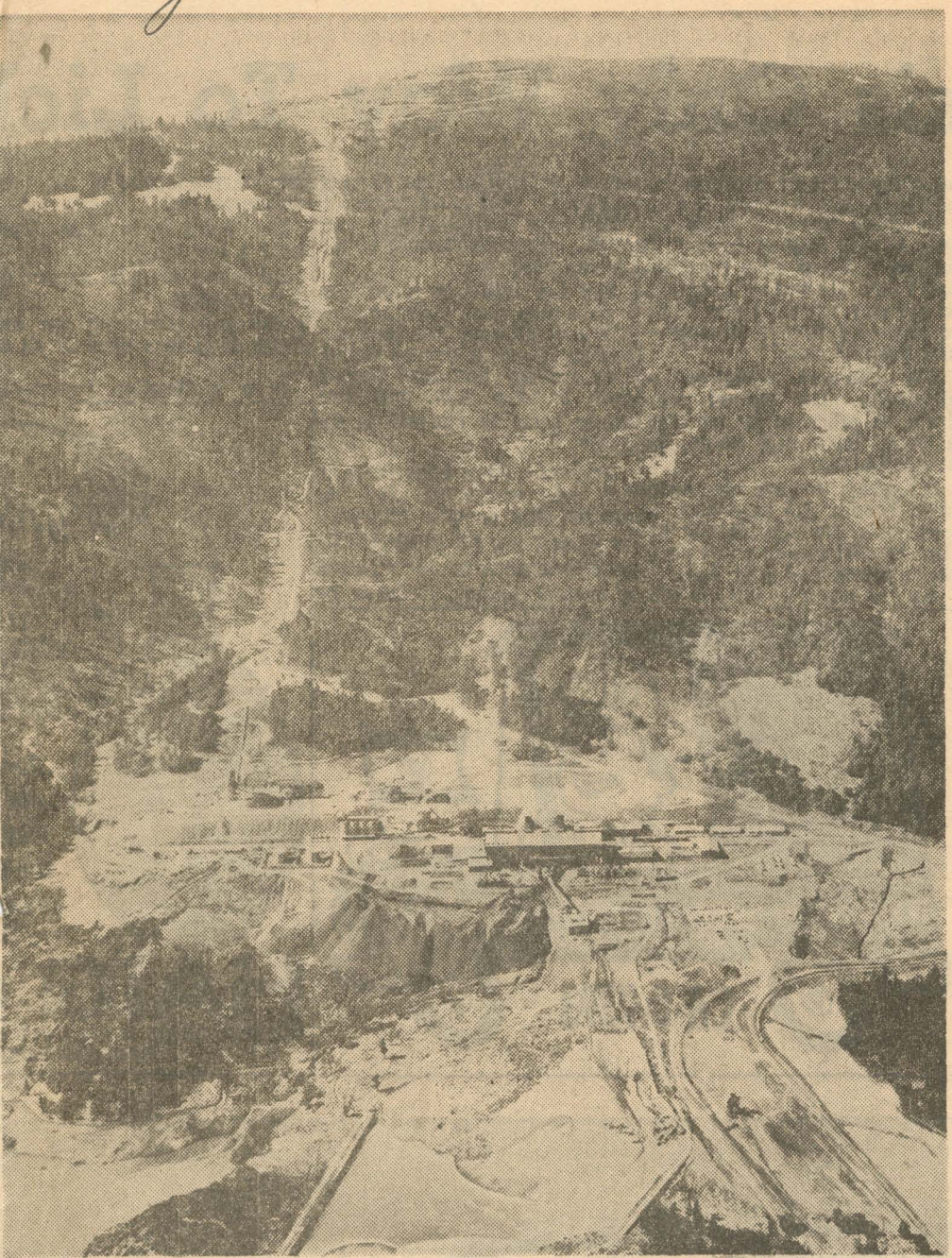
Best wishes for the Christmas season.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr

Bozeman 4-26-61



HIGH GRADE ferronickel for production of stainless and other alloy steels comes from this Hanna Mining Co. mine at the top of Nickel Mountain near Riddle, in Douglas County. Nickel plant is in foreground and aerial tramway can be seen connecting two locations. Hanna has completed acquisition of site.

Hanna Adds New Line

Mine Company Reveals Plans

The Hanna Mining Co. has entered a new field, the commercial production of marketing of nickel, W. A. Marting, president, announced Tuesday. The company has completed acquisition of the smelter that processes ore from the nation's only large nickel deposit and has begun marketing high grade ferronickel for use in the production of stainless and other alloy steels.

Through a subsidiary, the Hanna Nickel Smelting Co., Hanna Mining has operated the plant at Riddle, in Douglas County, since it was opened in 1955. To date it has produced more than 100 million pounds of nickel, all of which has been for the account of the government to help build the defense materials inventory of the strategic material.

Marting said Tuesday the company's experience has shown that it can produce nickel of dependable high quality at a competitive price. He said the company has sales agreements with major alloy steel producers in the country.

Canadian Link Included

Hanna Mining for many years has been a supplier of raw material to the steel industry. It is among the largest independent producers of iron ore, with holdings in Minnesota, Michigan and Missouri and has a substantial interest in Iron Ore Co. of Canada, which can produce more than 12 million tons of ore annually from the Quebec-Labrador fields.

The firm also has interests in ore vessels in the Great Lakes trade, in the St. Lawrence Seaway and on saltwater.

The company will distribute the nickel to steel companies and foundries across the country from warehouse stocks in Chicago, Detroit, Pittsburgh and Riddle.

Total employment at the plant and mine in Riddle is 450. Crude ore, containing about 1.5 per cent nickel comes from a deposit held for many years by Hanna Mining. It is moved to the plant over a 1.5 mile aerial tramway.

ANALYSES OF WOODCOCK MOUNTAIN NICKEL-BEARING LATERITE SAMPLES

Thickness of sample (feet)	Percent Ni	Percent Cr_2O_3
(Hole 1)		
0 - 1	1.02	2.23
1 - 2	1.18	2.51
2 - 3	1.39	2.27
3 - 4	1.04	2.64
4 - 5	0.57	1.93
	1.04*	2.32*
(Hole 2)		
0 - 1	0.85	2.80
1 - 2	0.91	2.79
2 - 3	1.08	2.79
3 - 4	1.02	2.08
4 - 5	0.88	1.90
5 - 5'8"	0.88	1.65
	0.94*	2.33*
(Hole 3)		
0 - 1	0.82	2.18
1 - 2	0.80	1.99
2 - 3	1.08	2.54
3 - 4	0.79	1.62
4 - 5	0.65	1.11
5 - 6	0.72	1.04
6 - 6'3"	0.59	1.10
	0.78*	1.65*
(Hole 4)		
0 - 1	0.92	3.47
1 - 2	1.53	3.74
2 - 3	1.63	3.80
3 - 4	1.40	3.32
4 - 5	1.58	4.39
5 - 6	(sample lost)	
	1.41*	3.74*
(Hole 5)		
0 - 1	0.93	3.61
1 - 2	0.99	3.27
2 - 3	0.95	2.60
3 - 4	0.93	2.52
4 - 5	1.21	2.37
5 - 6	1.40	2.14
6 - 7	0.78	0.94
7 - 8	0.68	1.28
8 - 9	0.71	0.75
9 - 10	0.71	1.08
10 - 11	0.64	0.65
11 - 12	0.91	2.94
	0.90*	2.01*
(Hole 6)		
0 - 1	0.75	2.94
1 - 2	0.98	2.89
2 - 3	0.83	1.42
3 - 4	0.95	2.41
4 - 5	1.05	2.09
	0.91*	2.35*
(Hole 7)		
0 - 1	0.97	4.60
1 - 2	1.15	3.99
2 - 3	1.12	3.96
3 - 4	0.99	3.73
4 - 5	1.21	4.85
5 - 6	1.13	3.44
6 - 7	1.40	4.13
7 - 8'2"	1.66	4.30
	1.20*	4.12*

Thickness of sample (feet)	Percent Ni	Percent Cr_2O_3
(Hole 8)		
0 - 1	1.10	4.28
1 - 2	1.40	5.30
2 - 3	1.68	6.37
3 - 4	1.25	5.51
4 - 5	1.96	4.56
5 - 6	2.02	4.70
6 - 7	1.85	4.07
7 - 8	1.80	2.96
8 - 9	1.51	2.78
9 - 10	1.79	3.50
10 - 11	1.14	3.02
11 - 12	1.50	2.52
12 - 13	1.33	2.26
13 - 14	1.26	2.26
14 - 15'2"	1.02	1.69
	1.51*	3.72*
(Hole 9)		
0 - 1	0.58	1.87
1 - 2	0.62	1.08
2 - 3	0.67	0.86
3 - 4	0.64	0.62
4 - 5	0.65	0.85
	0.63*	1.06*
(Hole 10)		
0 - 1	0.85	2.62
1 - 2	0.82	3.22
2 - 3	0.93	1.81
3 - 4	0.84	1.59
4 - 5	0.88	1.27
5 - 6	0.69	1.33
6 - 7	0.61	1.15
7 - 8	0.90	1.08
8 - 9	0.80	1.02
9 - 10	0.71	1.01
	0.81*	1.61*
(Hole 11)		
0 - 1	0.46	1.56
1 - 2	0.59	1.84
2 - 3	0.57	2.03
3 - 4	0.61	1.91
4 - 5	0.75	1.89
5 - 6	0.73	1.33
6 - 7	0.60	0.82
7 - 8	0.61	0.73
8 - 9	0.67	0.68
9 - 10	0.52	0.58
10 - 10'6"	0.42	0.60
	0.59*	1.27*

*Arithmetical average.

Thickness of sample (feet)	Percent Ni	Percent Cr_2O_3
(Hole 12)		
0 - 1	0.29	1.76
1 - 2	0.31	1.89
2 - 3	0.36	2.00
3 - 4	0.47	2.14
4 - 5	0.50	2.06
5 - 6	0.35	2.12
6 - 7	0.38	1.79
7 - 8	0.43	2.04
8 - 9	0.47	1.94
9 - 10	0.59	1.84
10 - 11	0.80	2.19
11 - 12	0.95	1.66
12 - 13	0.99	1.72
13 - 14	1.00	1.59
14 - 15	0.88	1.46
15 - 16	0.79	0.98
	0.54*	1.82*
(Hole 13)		
0 - 1	0.74	2.40
1 - 2	0.92	2.56
2 - 3	1.17	2.78
3 - 4	1.30	2.66
4 - 5	1.36	1.55
5 - 6	1.41	0.88
6 - 7	1.15	0.88
7 - 8	0.98	0.57
8 - 8'6"	1.03	0.71
	1.12*	1.67*
(Hole 14)		
0 - 1	0.77	2.26
1 - 2	0.76	2.29
2 - 3	0.72	1.75
	0.75*	2.10*
(Hole 15)		
1 - 2	1.47	1.02
2 - 3	1.45	1.26
3 - 3'6"	1.32	0.86
	1.41*	1.05*
(Hole 16)		
0 - 1	0.66	2.68
1 - 2	0.75	2.86
2 - 3	0.92	2.99
3 - 4	1.14	3.26
4 - 5	1.12	3.23
5 - 6	1.07	2.92
6 - 7	0.97	2.56
7 - 8	1.18	2.45
8 - 9	1.097	2.08
9 - 10	1.207	1.82
10 - 11	1.36	1.26
11 - 12	1.49	1.90
12 - 13	1.63	1.93
13 - 14	1.43	1.17
14 - 15	1.43	1.10
15 - 15'6"	1.23	0.99
	1.16*	2.20*

ANALYSES of WOODCOCK MOUNTAIN Ni & Cr LATERITE SAMPLES

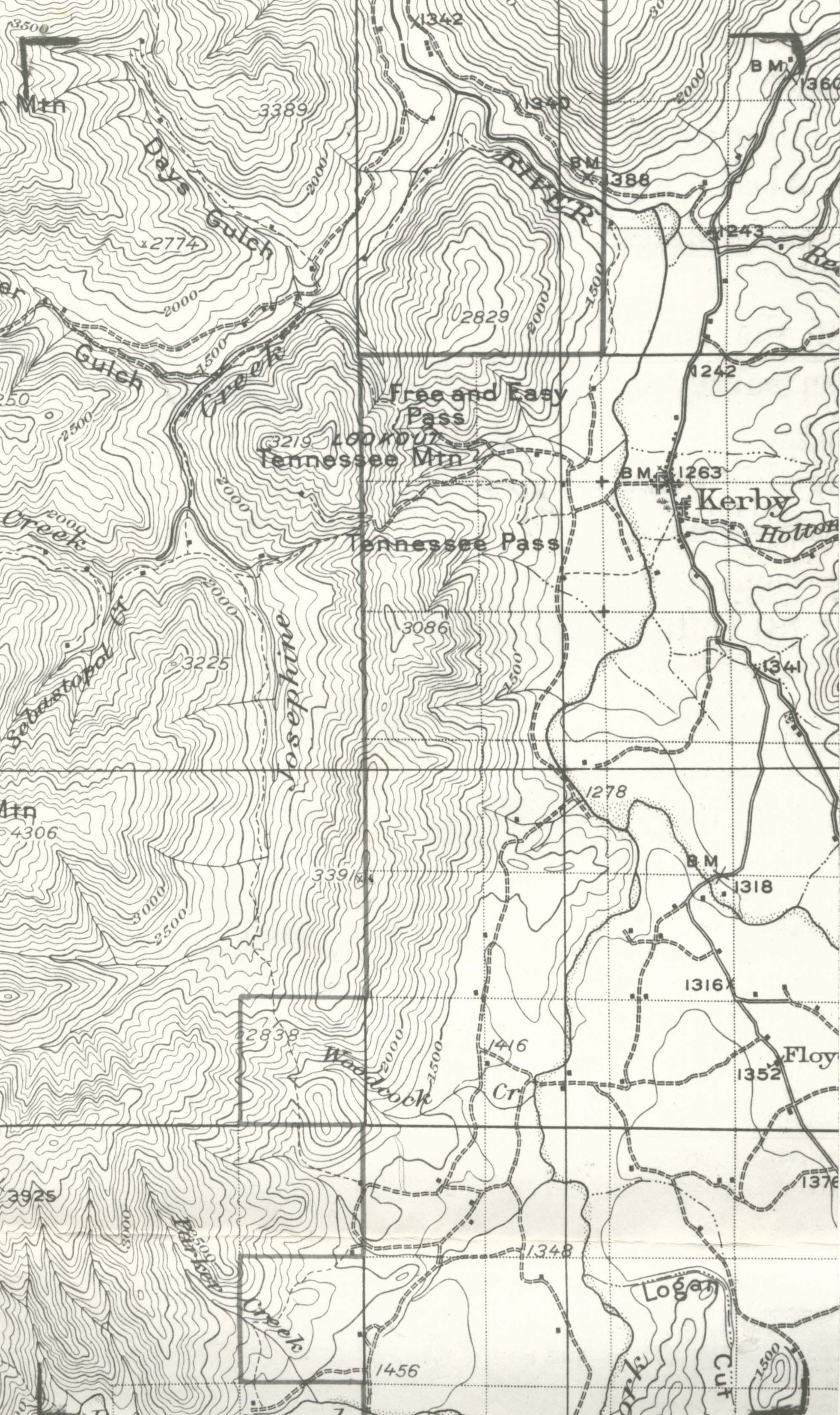
Date Sampled	Dept. LAB. No.	Auger Hole No.	Thickness of Sample (feet)	% Ni	% Cr_2O_3	Remarks
7/9/48	P-7425	1	0-1	1.02	2.23	
	P-7426		1-2	1.18	2.51	
	P-7427		2-3	1.39	2.27	
	P-7428		3-4	1.04	2.64	
	P-7429		4-5	0.57	1.93	
				1.04	2.32	Arithmetical average
7/9/48	P-7430	2	0-1	0.85	2.80	
	P-7431		1-2	0.91	2.79	
	P-7432		2-3	1.08	2.79	
	P-7433		3-4	1.02	2.08	
	P-7434		4-5	0.88	1.90	
	P-7435		5-5'8"	0.88	1.65	
				0.94	2.33	Arithmetical average
7/10/48	P-7436	3	0-1	0.82	2.18	
	P-7437		1-2	0.80	1.99	
	P-7438		2-3	1.08	2.54	
	P-7439		3-4	0.79	1.62	
	P-7440		4-5	0.65	1.11	
	P-7441		5-6	0.72	1.04	
	P-7442		6'-6'3"	0.59	1.10	
7/10/48		4		0.78	1.65	Arithmetical Average
7/10/48	P-7443	4	0-1	0.92	3.47	
	P-7444		1-2	1.53	3.74	Sample Bottle broken #20
	P-7445		2-3	1.63	3.80	
	P-7446		3-4	1.40	3.32	Sample Bottle broken #22
	P-7447		4-5	1.58	4.39	
	P-7448		5-6	—	—	Sample Bottle broken #24
				1.41	3.74	Arithmetical Average (5 samp
7/11/48	P-7449	5	0-1	0.93	3.61	
	P-7450		1-2	0.99	3.27	
	P-7451		2-3	0.95	2.60	
	P-7452		3-4	0.93	2.52	
	P-7453		4-5	1.21	2.37	
	P-7454		5-6	1.40	2.14	
	P-7455		6-7	0.78	0.94	
	P-7456		7-8	0.68	1.28	
	P-7457		8-9	0.71	0.75	

7/11/48	P-7458	5	9-10	0.71	1.08	
	P-7459		10-11	0.64	0.65	
	P-7460		11-12	0.91	2.94	
				0.90	2.01	Arithmetical Average
7/11/48	P-7461	6	0-1	0.75	2.94	
	P-7462		1-2	0.98	2.89	
	P-7463		2-3	0.83	1.42	
	P-7464		3-4	0.95	2.41	
	P-7465		4-5	1.05	2.09	
				0.91	2.35	Arithmetical Average
7/12/48	P-7466	7	0-1	0.97	4.60	
	P-7467		1-2	1.15	3.99	
	P-7468		2-3	1.12	3.96	
	P-7469		3-4	0.99	3.73	
	P-7470		4-5	1.21	4.85	
	P-7471		5-6	1.13	3.44	
	P-7472		6-7	1.40	4.13	
	P-7473		7-8'2"	1.66	4.30	
2nd column				1.20	4.12	Arithmetical Average 56
7/13/48	P-7474	8	0-1	1.10	4.28	
	P-7475		1-2	1.40	5.30	
	P-7476		2-3	1.68	6.37 X	
	P-7477		3-4	1.25	5.51	
	P-7478		4-5	1.96	4.56	
	P-7479		5-6	2.02	4.70	
	P-7480		6-7	1.85	4.07	
	P-7481		7-8	1.80	2.96	
	P-7482		8-9	1.51	2.78	
7/13/48	P-7483	8	9-10	1.79	3.50	
	P-7484		10-11	1.14	3.02	
	P-7485		11-12	1.50	2.52	
	P-7486		12-13	1.33	2.26	
	P-7487		13-14	1.26	2.26	
	P-7488		14-15'2"	1.02	1.69	
				1.51	3.72	Arithmetical Average
7/13/48	P-7489	9	0-1	0.58	1.87	
	P-7490		1-2	0.62	1.08	
	P-7491		2-3	0.67	0.86	
	P-7492		3-4	0.64	0.62	X
	P-7493		4-5	0.65	0.85	
				0.63	1.06	Arithmetical Average

				Ni	Cr_2O_3	
7/13/48	P-7494	10	0-1	0.85	2.62	
	P-7495		1-2	0.82	3.22	
	P-7496		2-3	0.93	1.81	
	P-7497		3-4	~~0.88~~ 0.84	1.59	
	P-7498		4-5	0.88	1.27	
	P-7499		5-6	0.69	1.33	
	P-7500		6-7	0.61	1.15	
	P-7501		7-8	0.90	1.08	
	P-7502		8-9	0.80	1.02	
	P-7503		9-10	0.71	1.01	
				0.81	1.61	Arithmetical Average
7/15/48	P-7504	11	0-1	0.46	1.56	
	P-7505		1-2	0.59	1.84	
	P-7506		2-3	0.57	2.03	
	P-7507		3-4	0.61	1.91	
	P-7508		4-5	0.75	1.89	
	P-7509		5-6	0.73	1.33	
	P-7510		6-7	0.60	0.82	
	P-7511		7-8	0.61	0.73	
	P-7512		8-9	0.67	0.68	
	P-7513		9-10	0.52	0.58	X
Col. 3 ?	P-7514		10-10'6"	0.42	0.60	
				0.59	1.27	Arithmetical Average
7/15/48	P-7515	12	0-1	0.29	1.76	X
	P-7516		1-2	0.31	1.89	
	P-7517		2-3	0.36	2.00	
	P-7518		3-4	0.47	2.14	
	P-7519		4-5	0.50	2.06	
	P-7520		5-6	0.35	2.12	
	P-7521		6-7	0.38	1.79	
	P-7522		7-8	0.43	2.04	
	P-7523		8-9	0.47	1.94	
	P-7524		9-10	0.59	1.84	
	P-7525		10-11	0.80	2.19	
	P-7526		11-12	0.95	1.66	
	P-7527		12-13	0.99	1.72	
	P-7528		13-14	1.00	1.59	
	P-7529		14-15	0.88	1.46	
	P-7530		15-16	0.79	0.98	
				0.69	1.82	Arithmetical Average

54

				Ni	Cr_2O_3	
7/15/48	P- 7531	13	0-1	0.74	2.40	
	P- 7532		1-2	0.92	2.56	
	P- 7533		2-3	1.17	2.78	
	P- 7534		3-4	1.30	2.66	
	P- 7535		4-5	1.36	1.55	
	P- 7536		5-6	1.41	0.88	
	P- 7537		6-7	1.15	0.88	
	P- 7538		7-8	0.98	0.57	
	P- 7539		8-8'6"	1.03	0.71	
				1.17	1.67	Arithmetical Average
7/15/48	P- 7540	14	0-1	0.77	2.26	
	7541		1-2	0.76	2.29	
	7542		2-3	0.72	1.75	
				0.75	2.10	Arithmetical Average
7/16/48	P- 7543	15	1-2	1.47	1.02	
	P- 7544		2-3	1.45	1.26	
	P- 7545		3-3'6"	1.32	0.86	
				1.41	1.05	Arithmetical Average
7/16/48	P- 7546	16	0-1	0.66	2.68	
	P- 7547		1-2	0.75	2.86	
	P- 7548		2-3	0.92	2.99	
	P- 7549		3-4	1.14	3.26	
	P- 7550		4-5	1.12	3.23	
	P- 7551		5-6	1.07	2.92	
	P- 7552		6-7	0.97	2.56	
	P- 7553		7-8	1.18	2.45	
	P- 7554		8-9	1.097	2.08	
	P- 7555		9-10	1.207	1.82	
	P- 7556		10-11	1.36	1.26	
	P- 7557		11-12	1.49	1.90	
	P- 7558		12-13	1.63	1.93	
	P- 7559		13-14	1.43	1.17	
	P- 7560		14-15	1.43	1.10	
	P- 7561		15-15'6"	1.23	0.99	
				1.16	2.20	Arithmetical Average


Mtn
3389
Days Gulch
2774
2000
Gulch
Creek
1500
1342
1340
RIVER
BM
1388
1360
1243
2829
1500
2000
1242
Free and Easy Pass
3219
LOOKOUT
Tennessee Mtn
BM
1263
Kerby
Holton
Tennessee Pass
Creek
Sebastopol Cr
3225
Josephine
3086
1341
1278
Mtn
4306
3391
BM
1318
3000
2500
1316
2838
Woodcock
1416
Cr
Floy
1352
3925
1376
Parker Creek
1348
Logan
Cut
1456

BENCH MARKS NEAR CAVE JUNCTION

C 57 (O.S.H.D.) -- About 1.9 miles north along the Redwood Highway from Kerby, Josephine County, at the northwest corner of the highway bridge over Reeves Creek, in the concrete wing wall. An Oregon State Highway Department standard disk, stamped "C 57 1930." (377.013 meters or 1,236.917 feet.)

1263 (U.S.G.S.) -- At Kerby, Josephine County, on the west side of the Redwood Highway, 1 foot from the southeast corner of the Taff store building. A United States Geological Survey standard cap, stamped "1263 2 1915" and set in the footing of the foundation. (384.925 meters or 1,262.875 feet.)

E 57 (O.S.H.D.) -- About 0.4 mile south along the Redwood Highway from Kerby, Josephine County, at the northwest corner of the highway bridge over Holton Creek, in the concrete wing wall. An Oregon State Highway Department standard disk, stamped "E 57 1930." (385.878 meters or 1,266.001 feet.)

H 57 (O.S.H.D.) -- About 4.4 miles south along the Redwood Highway from Kerby, Josephine County, on a concrete highway culvert, in the south end of the east head wall. An Oregon State Highway Department standard disk, stamped "H 57 1930." (398.993 meters or 1,309.030 feet.)

J 57 (O.S.H.D.) -- About 5.6 miles south along the Redwood Highway from Kerby, Josephine County, on the highway bridge over the West Fork Illinois River, in the top of the northwest pier. An Oregon State Highway Department standard disk, stamped "J 57 1930." (402.690 meters or 1,321.159 feet.)

L. 57 (O.S.H.D.) -- About 7.8 miles south along the Redwood Highway from Kerby, Josephine County, at the northwest corner of the highway bridge over Rough and Ready Creek, in the top of the concrete wing wall. An Oregon State Highway Department standard disk, stamped "L 57 1930." (422.716 meters or 1,386.861 feet.)

M 57 (O.S.H.D.) -- About 9.5 miles south along the Redwood Highway from Kerby, Josephine County, about 0.4 mile north of the post office at O'Brien, on the concrete highway culvert over O'Brien Creek, in the top of the south end of the east head wall. An Oregon State Highway Department standard disk, stamped "M 57 1930." (429.316 meters or 1,408.514 feet.)

HOLE	% Ni	% Cr2O3	Depth	Why Abandoned
1	1.04	2.32	5 '	Hit rock
2	0.94	2.33	5' 8"	" "
3	0.78	1.65	6' 3"	" "
4	1.41	3.74	6'	" "
5	0.90	2.01	6'	" "
6	0.91	2.35	5'	" "
7	1.20	4.12	8' 2"	" "
8	1.51	3.72	15' 2"	" "
9	0.63	1.06	5'	" "
10	0.81	1.61		" "
11	0.59	1.27	10' 6"	" "
12	0.60	1.82	16'	" "
13	1.12	1.67	8' 6"	" "
14	0.75	2.10	3'	" "
15	1.41	1.05	3' 6"	" "
16	1.16	2.20	15' 6"	" "

17 —

Woodcock #1

1 ac = 43,560

15 DEPTH

217800
43560 | 38,435 TONS/ACRE/15 THICK

2
5,17 | 653,400 CU/FT/ACRE
51
143
136
74
68
60
51
90
85

38,435
25 ACRES
192175
76870
960,875 TONS IN AREA
50% DILUTION FOR ROCKS
480,437 TONS LATERITE SANS ROCKS 25 ACRES 15' THK

38,435
960,875
76870
2 | 1,037,745
518,872 TONS 1% Ni

AVERAGE ANALYSES

HOLE	% Ni	% Cr2O3	Depth	Why Abandoned
1	1.04	2.32	5'	Hit rock
2	0.94	2.33	5' 8"	" "
3	0.78	1.65	6' 3"	" "
4	1.41	3.74	6'	" "
5	0.90	2.01	6'	" "
6	0.91	2.35	5'	" "
7	1.20	4.12	8' 2"	" "
8	1.51	3.72	15' 2"	" "
9	0.63	1.06	5'	" "
10	0.81	1.61	10	" "
11	0.59	1.27	10' 6"	" "
12	0.60	1.82	16'	" "
13	1.12	1.67	8' 6"	" "
14	0.75	2.10	3'	" "
15	1.41	1.05	3' 6"	" "
16	1.16	2.20	15' 6"	" "

STATE DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES
Head Office: 702 Woodlark Bldg., Portland 5, Oregon

Field Offices:
2033 First Street, Baker, Oregon
714 East "H" Street, Grants Pass, Oregon

WELL LOG

Date _____ 19____ Number _____

Recorded by MASON Source _____

County DOUGLAS Area _____

Quadrangle RIDDLE ____¼ ____¼ sec. ____ T ____ N/S., R ____ E/W.

HOLE NO 1
(Drilling Company and Address)

Method of Drilling HAND AUGER 3"EZ" Date 8-20 19 47

NICKEL MTN - FLAT 1000' E HOLE 47 250' N OF CU
(Property Owner and Address) AT END OF ROAD

Land surface, datum _____ ft. above / below ELEV 3525

Material	Thickness (feet)	Depth (feet)	Remarks
RED BROWN SOIL	6"	6"-1'	ROCK FRAGMENTS
" " "	1'	1'-2'	" "
GARNIERITE CHIPS YELLOW-BROWN	1'	2'-3'	" "
MORE GARNIERITE BOXWORK QTZ.	1'	3'-4'	" "
SERPENTINE - PERIDOTITE YELLOW-BROWN - FINE QTZ CHIPS	1'	4'-5'	" "
SERP - PERIO QTZ. LIMONITE - BOXWORK	1'	5'-6'	" "
LITTLE CHANGE	1'	6'-7'	" "
YELLOW LIMONITE BOXWORK QTZ - OLIVINE	1'	7'-8'	" "
HOLE BOTTOMED AT 8'			

NL 24-D

NL-28

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

702 WOODLARK BUILDING
PORTLAND 5, OREGON

June 3, 1949

mple submitted by R. S. Mason

mple received on May 23, 1949

alysis requested Silica, Iron, Magnesia

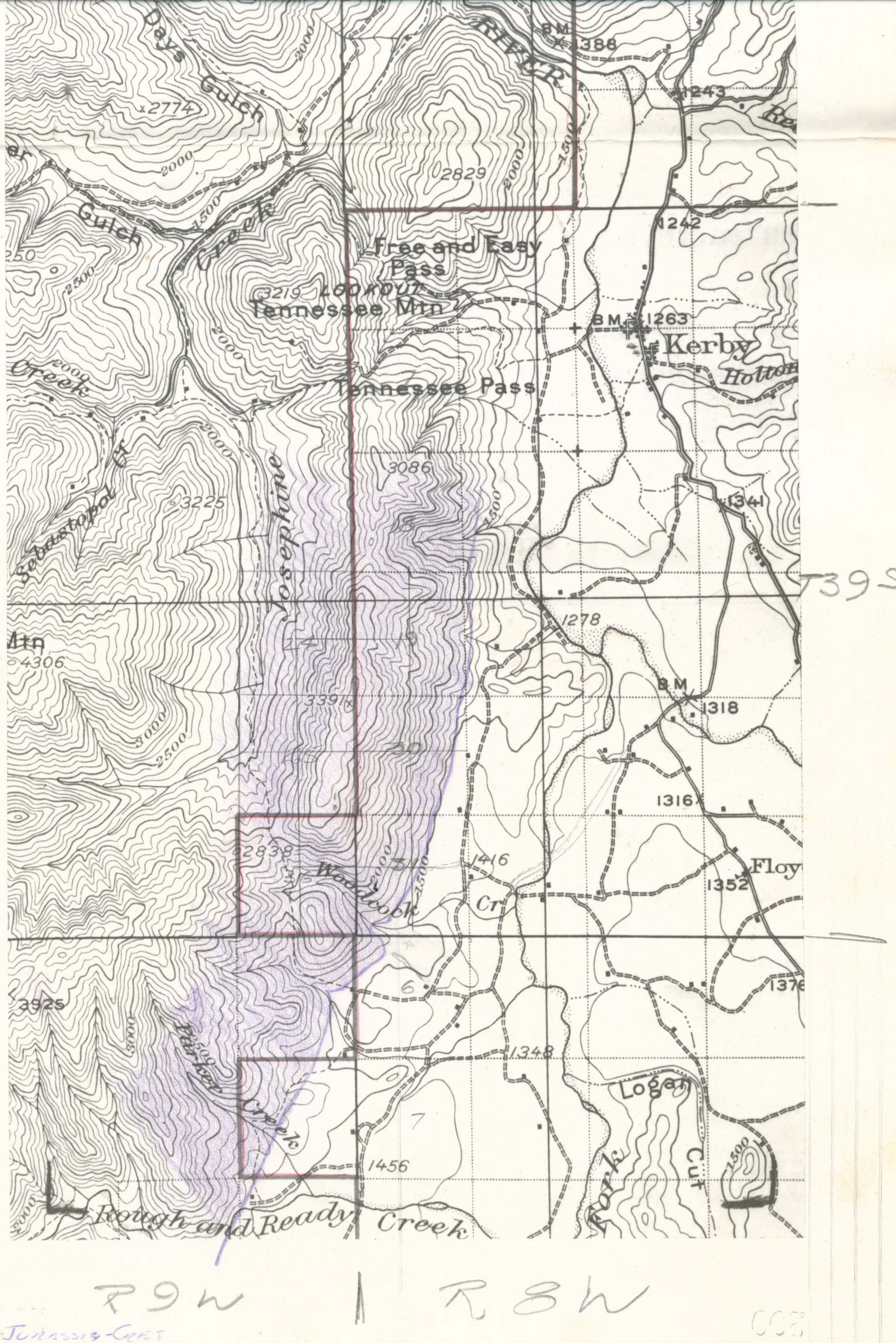
Analysis by:

L. L. Hoagland
Assayer

ab. No.	Sample Marked	Results of Analysis		Remarks
P-8586	Composite P-7494 - 7503 Hole #10 0 - 10 feet	Silica (SiO_2)	32.5 %	- - - - - - - - - - - - -
		Iron (Fe)	19.46%	
		Magnesia (MgO)	14.66%	
		Calcium (CaO)	1.13%	
* * *	* * * * *	* * * * * * * * * * * * *		* * * * * * * * * * * * * *

WOODCOCK #1

The Department did not participate in the taking of this sample and assumes responsibility only for the analytical results.


Days Gulch
2774
RIVER
BM 1388
1243
2829
Gulch
Creek
Free and Easy Pass
LOOKOUT
3219
Tennessee Mtn
1242
BM 1263
Kerby
Holton
Tennessee Pass
Creek
Sebastopol Cr
3225
Josephine
3086
1341
T39S
1278
Mtn
4306
3391
BM
1318
1316
2838
Woodcock
1416
Cr
Floy
1352
3925
Parker
Creek
1348
1376
Logan
Fork
Cut
1456
Rough and Ready Creek
R9W
R8W
JURASSIC-CRET