Northwest
Micro Mineral
Study Group

MICRO PROBE

SPRING, 2001 VOLUME IX, Number 3

SPRING MEETING . . . . . .VANCOUVER, WASHINGTON

May 12, 2001 9:30 am to 6:30 pm

Clark County P. U. D. Building
1200 Fort Vancouver Way
Vancouver, Washington

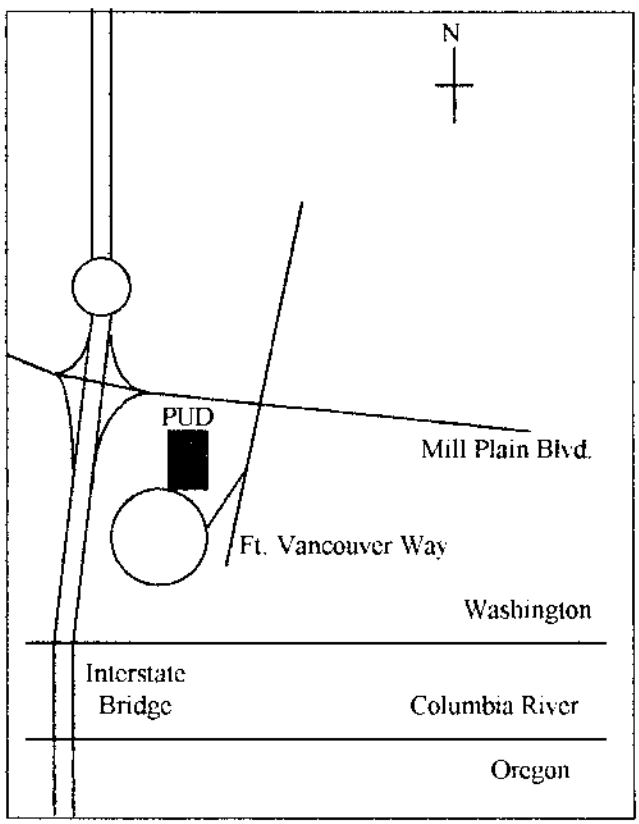
Once again we have a day to talk rocks and share collecting stories. Microscopes are a must as usual, and don't forget to bring your extra material for the give-away table so that others will have treasures to look over and take home.

Program:
See page 3 inside for a detailed explanation of the program planned for the morning and afternoon sessions.

Field Trip:
Bill Tomkins will be proposing a trip to the Oak Grove Fork mercury mines, and will be showing some slides to whet your apatite in the afternoon. For more details, see the extensive article that begins on page 6.

The kitchen area is available as usual and we will provide lemonade, coffee, hot water, etc. There will be a snack table, so bring makings for lunch and we will plan to have a sort of "piot luck" at noontime.

Restaurants are available in the local area. Some of us will plan to eat dinner together, so please plan to join us.



PRESIDENTS COMMENTS by Rudy Tschernich

After over 15 years of being president, Don Howard, asked for someone else to lead the Northwest Micro Mineral Study Group. We all thank Don for the years he devoted to the group and the leadership he demonstrated. Don will remain as editor of the Micro Probe but needs everyone to contribute information on minerals, field trips, locality closures, micro mounting, cleaning techniques, exciting collecting experiences, or anything related to micro minerals. Genie Howard will remain as secretary/treasurer.

Bob Smith was elected or "volunteered" to be president starting in the summer of 2001 and Rudy Tschernich "volunteered" to be president in the interim. A new president will be elected each year so that everyone will get a chance to be president. Yes, that means YOU!

Bill Tompkins was elected Field Trip Chairman, a position vital to the survival of the hobby. He has been out on many trips this winter and spring. Just contact him if you are interested in going somewhere. You will find a report by Bill elsewhere in this issue of the Micro Probe. For people new to the group we have published information about collecting localities in the Micro Probe for over 25 years. Get copies of the back issues to find out directions and information about localities. If you need additional directions or maps, see Rudy Tschernich, Don Howard, or any other member. We will be glad to help you.

Both Bob and I agreed that we want the Micro Group to be more involved with the Northwest Chapter of Friends of Mineralogy. They have an active group involved with micro minerals at their annual symposium and we need to be a part of it. This year the Friends of Mineral symposium has been moved from Tacoma to Kelso, Washington and will remain there for at least the next three years. This will make it easier for the people in the Portland area to attend the symposium. The main floor will have fine mineral displays, four floor dealers, and a micro mineral booth that is open to the public free of any charge. It is a great time to see the excellent minerals offered by the floor dealers. The nearby motel rooms will contain over 20 satellite dealers and collectors from the Northwest with specimens for trade or sale. If you choose to attend the many excellent speakers, in an adjoining room, a registration fee is required. See a flyer on the FM symposium in this issue of the Micro Probe.

The Micro Group use to have a pot luck dinner at the end of the meetings when we met in Raymond, Washington and stayed overnight. This tradition was carrier on for several years at Vancouver, but with a decreasing number of attendees, the potluck dinner was discontinued. It has been replaced informally by a pay-your-own dinner at the Old County Buffet by those who wish to attend. Any one wanting to join us for dinner needs only to closely follow Don Howard's lead at the end of the meeting and we will get there. Because it is hard to get out for lunch at the meeting and the lack of eating places near the meeting hall many people have been bringing their own lunch or have started a pot luck lunch in the kitchen of the meeting hall. This seems to be working well. The Micro Group will pay for some of the lunchmeat and bread. Please bring along something to add to the potluck lunch such as fruit, chips, drinks, potato salad, or dessert and have a good time.

At the last meeting we discussed ways to improve or change the Micro Group. Some of the ideas have been incorporated into this meeting without interfering with time for trading and talking to friends. Discussions, programs, and slide shows will be scattered throughout the meeting with long breaks between for trading, selling, and talking.

PROGRAM FOR THE MAY 12TH , 2001 MEETING

Some members show up at the being of the meeting to get free minerals and then leave. We want members to stay for the entire meeting. To accomplish this, all of the free minerals will not be set out at the beginning of the meeting. Part will put out at 9:30 am, 11 am and 12:30 pm. Rudy Tschernich is disposing of all of his trading and selling zeolites within the next two years in order avoid any conflict of interest with being curator of the Rice Museum. He will be bringing extra zeolites for the free table and selling others by the flat in order to dispose of his material. Now is the time to get extra micro minerals while the price is low. After his material is gone, it is gone.

9:30 am Doors open. Early trading and selling is usually brisk at the beginning of the meeting. Be there to get a good selection and a good place to set up your microscope. If you have a lot of trading/selling material, please bring along an extra table.

10:00 am PROGRAM 1: Comments on the relationship of chemical analysis in determining zeolite species. Questions from the members about the paper in this issue of the Micro Probe on zeolite species will be answered.

10:15 am PROGRAM 2: Rice Museum. Rudy Tschernich been appointed assistant curator of the Rice Museum of Northwest Rocks and Minerals at Hillsboro, Oregon and in 2003 will take over from Sharleen Harvey as curator. The role of the Micro Group with the Rice Museum will be discussed. Displays promoting micro minerals by using scanning electron microscope (SEM) and normal light photographs with corresponding micro minerals will be discussed. A case devoted to the Micro Minerals of Washington Pass will be considered. Working demonstrations of a SEM donated to the museum by Rudy Tschernich and operated by Don Howard will be explored. Plans to refinish the 30x60 foot out building at the museum into a Northwest Mineral Gallery devoted to minerals of all sizes from the Northwest will be discussed. Monthly or weekly classes open to the public are planned on mineral and rock identification, crystallography, mineral cleaning, photography of minerals, collecting of minerals, and anything else we can think of related to minerals. We want to make the Rice Museum a working museum that will become the center for mineral enthusiasts in the Northwest.

12:00 Pot Luck Lunch. Bring something to add to what is normally there.

12:30 pm The last batch of free material will be put on the tables.

1:00 pm We will have a very short business meeting followed by individual reports on collecting conditions and field trips taken by the members since the last meeting followed by the Field Trip Chairman's report on club sponsored trips. An update on closures, entry, and permits to gain access to the Mount Saint Helens Tree Farm will be given.

2:00 pm PROGRAM 3: Group discussion of the Minerals of Oregon. The minerals of Washington State have been well documented in several issues of Rocks and Minerals magazine and by several books by Lanny Ream and Bart Cannon. Idaho has been well documented by Lanny Ream in Minerals of Idaho. Minerals in the states of Montana and Oregon not well documented. We will start at this meeting, a discussion on what minerals (all sizes) are found in Oregon. We will try to EXCLUDE zeolites since we have already

studied them in detail. We will include what type localities for minerals are present in Oregon. What unusually fine mineral specimens are found in Oregon (display size and micros). What important quartz, gold, barite, calcite, apophyllite, stibnite, pyrite, and other minerals are present in Oregon. Members are encouraged to bring fine display or micro minerals to illustrate what is found in Oregon. I do not know the answers to these questions. We need your input. We need everyone to think about the minerals of Oregon and bring information or specimens to display at the meeting. We will concentrate on Montana at another time.

4:00 pm End of meeting. We would appreciate help putting away the tables, removing garbage, cleaning up the kitchen, and packing things out at the end of the meeting.

5:00 Dinner at the Old County Buffet in east Portland near Highway 205.

A field trip is planned for Sunday --- see the Field Trip Chairman's Report.

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FRIENDS OF MINERALOGY SYMPOSIUM HAS MOVED TO KELSO, WASHINGTON

September 28-29-30, 2001

Due to escalating costs at the Day's Inn in Tacoma, year 2001 Friends of Mineralogy symposium has moved to the Red Lion Inn next to I-5 at Kelso, Washington.

The theme will be a Rainbow of Minerals with emphases on colorful minerals and fluorescent minerals. If you have fluorescent minerals for trade or sale, this year would be a good time to bring them along. The hotel is excellent with large rooms for displays, floor dealers and a separate room for talks. Extra large rooms for satellite dealers are a welcome.

This year there will not be a separate micro mineral room. Space is allotted for demonstrations of micro minerals to the public on the main show floor. Six or seven 6-foot tables will be available. Ray Hill is organizing micro mineral events. The space can be used to study micro minerals and trade or give away specimens. One major difference is that the main show hall must close at 10 pm; therefore, micro activities will not be able to continue to the late hours as it has in the past unless you move to someone's private room.

The dealer and display section will be open to the public free of charge Friday from 6 pm to 10 pm, Saturday from 8 am to 10 pm, and Sunday from 8 am to noon. Invite your friends to come and see the displays and dealers. You are all encouraged to register for the talks to learn about the hobby and to meet friends. Northwest Micro Mineral Study Group Members with receive additional notices from FM this summer for registration to the talks and dinner. This is the biggest mineral event in the Northwest, be sure to attend.

THE PACIFIC NORTHWEST CHAPTER OF THE FRIENDS OF MINERALOGY 27TH ANNUAL MINERAL SHOW AND SYMPOSIUM SEPTEMBER 28TH TO 30TH 2001

Featuring : A RAINBOW OF MINERALS.

ADMISSION TO THE MINERAL SHOW IS FREE

Open 6 pm to 10 pm Friday Sept. 28th , 8 am to 10 pm Saturday Sept. 29th and 8 am to noon Sunday Sept. 30th

DISPLAYS will include some of the finest mineral specimens from the Pacific Northwest and the world. Exhibits will be presented by the **Rice Northwest Museum of Rocks and Minerals** from Hillsboro, Oregon, **Pacific Mineral Museum** from Vancouver, British Columbia and fine mineral collectors in the Northwest.

This year the **Northwest Region of the Fluorescent Mineral Society, Inc.** will have special displays of fluorescent minerals and a general meeting Saturday night.

Four outstanding **MINERAL DEALERS** will be selling beautiful specimens from all over the world include:

THE AESTHETICS UNDERGROUND, BANFF, ALBERTA
HARVEY GORDON MINERALS, RENO, NEVADA
LEHIGH MINERALS, BOUNTIFUL, UTAH
OXCART MINERALS, VIDA, OREGON

SILENT AUCTIONS will offer minerals at a bargain price.
MICRO MINERAL BOOTH with microscopes for viewing and identification of micro minerals. Micro minerals for exchange.

Over **25 SATELLITE DEALERS AND MINERAL COLLECTORS** will be selling minerals and related items from **ROOMS 168 THROUGH 191** in the north wing of the hotel. **COME, LOOK, BUY, or TRADE.**

THE FRIENDS OF MINERALOGY SYMPOSIUM

Sept 29TH Saturday 9 am to 9 pm and Sept. 30TH Sunday 9 am to noon

THIS PORTION REQUIRES A FEE

$38.00 per person paid before Sept. 15
$45.00 per person paid at the door
$15.00 students under age 25
payment includes access to all the speakers, live auction and includes dinner

SPEAKERS INCLUDE

Manuel Robbins	"Strange Fluorescence - Strange Color: the calcite of Terlingua, Texas"
	"Beauty beyond description: words are not adequate to describe fluorescence. Are photos?"
Jesse Fisher	"Recent work at the Rogerly Mine, Weardale, England"
	"The gem and rare element pegmatites of Southern California"
Don Newsome	"Fluorescent Minerals - from the simple to the sublime."
Lanny Ream	"Progress on mining heulandite at Challis, Idaho"
Sharleen Harvey	"Fluorescent minerals from the Purple Passion Mine and the Hogan Claim"

Join us at the **RED LION INN**, 510 Kelso Drive, **KELSO, WASHINGTON** phone 360-636-4400 At Exit 39 just east of I-5
For more information contact Sharleen Harvey, 2309 SW 1st Ave., Portland, OR 97201 phone 503-248-4194 or 503-647-2418

Cinnabar Along the Oak Grove Fork of the Clackamas River, Clackamas County, Oregon

Bill Tompkins

There are several old cinnabar mines along the Oak Grove Fork of the Clackamas River, just below the dam at Lake Harriet, Clackamas County, Oregon. This study is being made because the mines are in danger of being reclaimed due to water concerns downstream. Located in Secs. 4 and 5, T. 6 S., R. 7 E., along the south side of the river, the Kiggins Mines, the Nisbet Mines, and the Aimes-Bancroft Mines have been abandoned and many environmental groups want to see their demise.

Quicksilver

Quicksilver, also known as mercury, has a unique combination of physical and chemical properties that make it very useful in the manufacture of many products in the chemical, industrial and military fields. Being the only metal that is liquid at room temperature has led to its use in thermometers, barometers and other gauges.

Mercury (Hg) is silvery white with a faint bluish tinge. Below its melting point of -38.87°C, mercury is a white metallic solid, and above its boiling point of 357.58°C, it is a colorless vapor. Other properties include high density, uniform volume expansion, high electrical conductivity, ability to alloy readily forming amalgams with many different metallic elements, high surface tension, chemical stability, and toxicity of most of its chemical compounds.

The principal ore for mercury is the red sulfide, cinnabar (HgS). Native mercury and, more rarely, metacinnabar, schwatzite, livingstonite, and the chlorides and oxychlorides of mercury, have been found in some Oregon deposits. These deposits are found mainly in regions of Tertiary and Quaternary orogeny and volcanism. The mercury minerals were deposited from hot mineralized waters. The hot solutions rose along faults and other zones of broken rock and the mercury minerals were deposited in fractures and voids. Mercury ore bodies probably formed nearer the surface and at lower temperatures than the ores of most other metals deposited from hydrothermal solutions, and few deposits extend to depths greater than a thousand feet.

Cinnabar has a high specific gravity and is resistant to chemical decomposition. It therefore tends to concentrate in alluvium along streams and slopes during the weathering of the host rock. Most quicksilver deposits were discovered by prospectors using a gold pan to trace cinnabar float to its source.

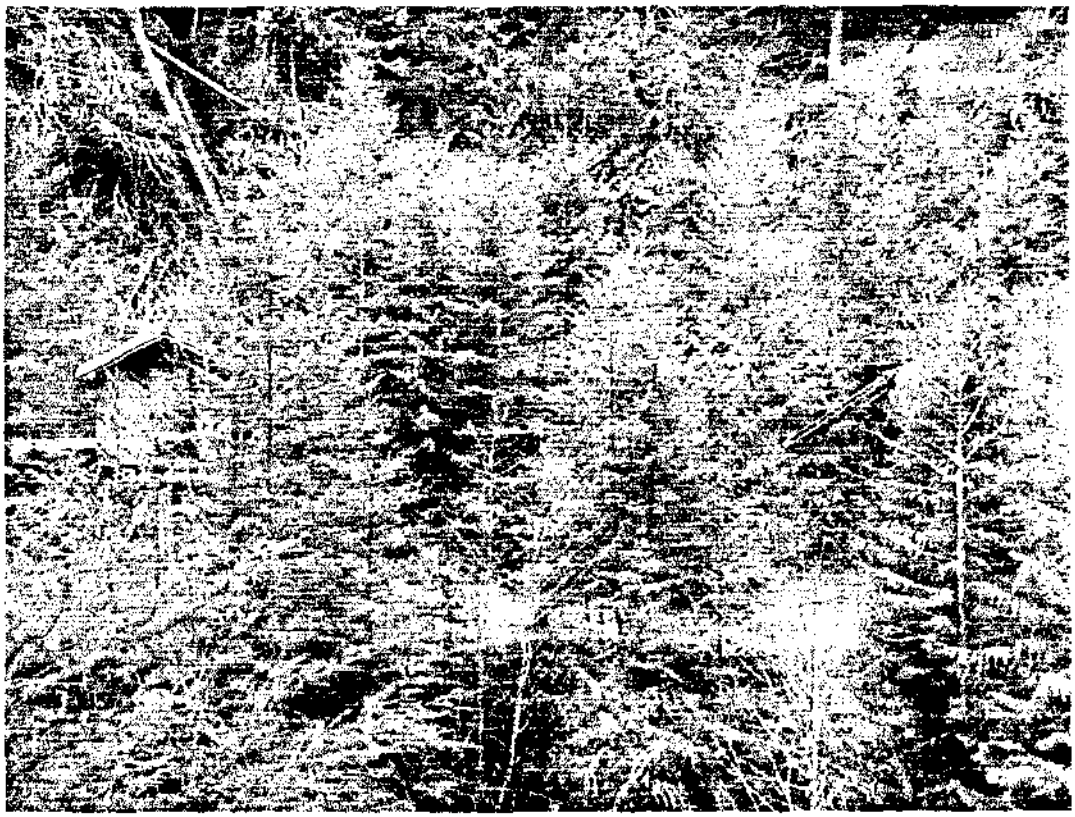
To obtain mercury from cinnabar, the ore is crushed and screened and then roasted. The mercury is released as vapor, then cooled in a condenser. The bulk of the mercury is obtained directly from the condenser. The soot from the condenser is also collected, mixed with lime, and then retorted to achieve a 95% recovery rate.

Mercury has been known since at least the 4th century B.C. and was used originally in religious ceremonies. Until the 16th century, consumption was small and mainly for medicinal or cosmetic purposes. Since then, large quantities have been used for the recovery of gold and silver in the amalgamation process. Since World War I, significant quantities of mercury have been used to manufacture explosives, drugs, electrical apparatus, and in instruments. In 1944, production began on the mercury dry

cell battery, and this has been the principal use of mercury ever since. The mercury cell process to produce caustic soda and chlorine became widespread after World War II. Other uses for mercury include mechanical measuring devices; as a catalyst in the manufacture of plastics; and in paints, agricultural chemicals, and dental supplies.

Prior to 1850, the bulk of the world's mercury came from only three mines: the Almaden in Spain, the Idria in Yugoslavia, and the Santa Barbara in Peru. In 1868, the Monte Amiata district in Italy became a large producer. In the United States, production of mercury was small before the California gold rush. California has historically been the leading U.S. mercury producer, with smaller amounts coming from Nevada and Texas. In 1979, however, Nevada produced almost all of the U.S. output from two mines in the McDermitt district.

In Oregon, prior to 1970, roughly 108,000 flasks of quicksilver were produced, representing about 3% of the total U.S. output. Of that amount, almost all was after 1927. Over 90% of Oregon's production was contributed by only 5 mines: the Bonanza in Douglas Co.; Black Butte in Lane Co.; Horse Heaven in Jefferson Co.; and Bretz and Opalite in Malheur Co. The Bonanza was by far the largest producer, with an output of almost 40,000 flasks. (A flask weighs 76 pounds.). The much smaller mines along the Oak Grove Fork of the Clackamas River produced a total of about 300 flasks, so they were not large producers. They were mainly two-man operations that could be worked profitably during times of high prices.



Overview of the Kiggins Mine site. Furnace building is at left, ore hopper is at right, original retort is at bottom center. The tunnels are just out of view at upper left

Oak Grove Fork of the Clackamas River, Oregon

There are three groups of mines at the Oak Grove Fork locality. The furthest upstream, the Kiggins group, was claimed first in 1923, by George Nisbit. The next mine downstream, the Nisbet group, also known as the Oak Grove group, was claimed 2 years later. The Aimes-Bancroft group is located uphill from the Nisbet mines and was claimed later.

In 1927, D. E. Kiggins was given a one eighth interest in the claims and he and Nisbit worked as partners until 1938, when Nisbet gave his interest in the Vermilion group to Kiggins and took ownership of the Oak Grove group for himself.
During the early years, ore was treated in a more or less continuous shaft-type furnace constructed by Nisbit in 1925 or 1926. To construct the furnace, Nisbet built a concrete wall across the open side of a chimney-like opening in a rock cliff. A wood-burning firebox was built into the bottom of the furnace by placing two large fire tiles in a roof-shape across the inside of the furnace near the bottom. The fire tiles kept the ore mass from crushing out the wood fire and allowed the burned ore to pass on both sides, reuniting beneath the firebox. When the furnace was in operation on a continuous basis, a wheelbarrow-load of burned ore was withdrawn through a chute opening at the bottom and a charge of new ore was added from a hopper at the top. In 1939 a cylindrical shaft-type furnace with a capacity of about15 tons per day was erected on the Oak Grove group of claims

From 1940 on, ownership of each mine group changed hands several times and now the area is not under claim by anyone.

The original extraction furnace formed by sealing off a vertical cleft in the rock with a concrete front wall. The bottom of the furnace is only 10 to 20 yards from the edge of the river, where ashes and burned out ore were disposed of.

Geology

All of the quicksilver deposits in Oregon occur in volcanic rocks of tertiary age. The deposits in the Oak Grove Fork area occur in veins filling fractures in Columbia River Basalt of middle Miocene age. Fissuring is generally northeasterly and southwesterly in direction with some minor branch fissures together with some horizontal friction. The work done has exposed fissures filled with banded calcite containing thin lines of cinnabar. The rock itself is dark gray to black. Structures range from columnar to blocky to massive, and the texture from fine-grained to glassy. In the mineralized area the basalt is cut by numerous calcite veinlets of random orientation. These veinlets increase in number near the larger mineralized veins.

Cinnabar occurs chiefly in fissure veins constituted mainly of banded calcite, although

one of the most productive veins on the Nisbit claims consists principally of the low-temperature zeolite stilbite. Cinnabar is also found as narrow fracture fillings in the basalt adjacent to the veins.

The cinnabar-bearing calcite veins explored by the workings range from about 6 inches to about 6 feet in width. Locally, the individual veins converge to form mineralized zones 10 to 15 feet wide. The calcite veins appear to have been introduced into open fractures in the basalt. Displacement along the fractures is evidently slight, although locally the basalt adjacent to the veins is brecciated and has been altered by hydrothermal solutions to a dark, gray-green rock which contains considerable clay and is locally stained by limonite.

The calcite veins commonly have a banded structure. The calcite is a mass of coalescing crystals (typically up to 1 centimeter in diameter) that have been deposited in successive stages, one band upon another, until the opening was completely filled. Open spaces between the terminal faces of one band of calcite and the base of the next, and also open spaces between some of the calcite crystals, are commonly filled with chalcedony containing felted mixtures of quartz; opal; a zeolite which is either heulandite or stilbite; calcite; and locally cinnabar, pyrite, jordisite, and ilsemannite. The mixture ranges in color from red to white to black, depending on which minerals are present.

In places, the zone of oxidation is pronounced. The calcite has been leached away, leaving the cinnabar intermixed in the remaining soil and rubble. A large part of the production at the Nisbit claim is said to have been made by hydraulicking rich residual material overlying the Sluice vein and the Oak Grove vein and recovering it in sluice boxes and a home-made shaking table. Because sloughed material and vegetation cover parts of the sluiced area, and because the reject from the concentrators went into the river and was carried away, there is little evidence of the amount of ore treated in this manner.

The Kiggins Mine

The first claims, made by Mr. Nisbit in 1923-23, were along the Vermilion Vein. There were a total of five lode claims in this group: the Vermilion Vein along side the river, the Falls Vein which is actually in the riverbed, the Stope vein, and two other unnamed veins. Adit No. 1 on the Vermilion vein produced the most cinnabar in this group of claims. All the workings are near the same altitude on the back edge of a river terrace. The Kiggins Mine includes 330 feet of drifts and stopes and about 200 feet of crosscuts divided among three adits.

The portal to adit #1 on the Vermilion vein at the Kiggins Mine. The calcite vein in the ceiling shows mineralization of cinnabar and jordisite.

The Vermilion vein is developed by three adits. The No. 1 adit explores the vein from the portal for 180 feet northwestward, at which point the vein dies out and ends against a steep, westward-dipping mineralized cross fault which shows both premineral and postmineral movement. Exploration north and west failed to discover the vein extension. The vein is irregularly mineralized with cinnabar for the entire distance, but only one ore chute contains mineable ore. This is near the portal of the No. 1 adit and extends downward to the No. 2 adit, with a pitch to the east of 50°. The amount of cinnabar in the vein decreases westward. The thickness of the vein similarly decreases westward from a maximum of 4 feet at the portal of the No. 1 adit to less than 2 feet at the cross fault zone.

The southeast extension of the Vermilion vein is explored by No. 3 adit, 320 feet southeast of the No. 1 adit. The vein in this adit dips 35° northeastward and splits into two steeper diverging veins, only one of which is mineralized with cinnabar. Cinnabar in the vein decreases eastward from the portal. The part of the vein between the two adits lies at the base of the cliff and is covered by vegetation and numerous driftwood logs.

The Stope vein north of the No. 1 adit is stoped westward for 30 feet and upward for 17 feet. The vein is eight inches thick and assays about six pounds of quicksilver per ton of vein material. It probably joins the Vermilion vein at greater depth.

The Falls vein crops out in the channel of the Oak Grove Fork of the Clackamas River for a distance of 250 feet from a point a short distance downstream from the furnace to a point opposite the No. 3 adit. The vein is 18 to 24 inches thick and is nearly vertical. The river channel follows the vein, which erodes more easily than the enclosing basalt. As a result, the vein lies in a narrow trench 3 to 5 feet wide and 10 to 20 feet deep in the riverbed. Part of this vein was mined opposite the No. 3 adit, but work could be done only during low-water stages of the river or when the dam upstream released little water. Numerous boulders and blocks of cinnabar-bearing calcite are strewn for more than half a mile downstream as the result of erosion of this vein.

In 1940, an option was given on the Kiggins claims to Horse Heaven Mines, Inc. After driving adit No. 3 to what is apparently the intersection between the Falls vein and the Vermilion vein and finding only minor mineralization, Horse Heaven Mining Co. failed to exercise its option to lease the Kiggins group and the property reverted to its owner.

The Nisbit Mine

The Nisbit group was claimed two years after the Kiggins group and was originally called the Oak Grove group of claims. In 1940, these claims were leased to Oregon Quicksilver, Inc. and they produced 66 flasks from the Nisbit claims. No recorded production was made after 1943.

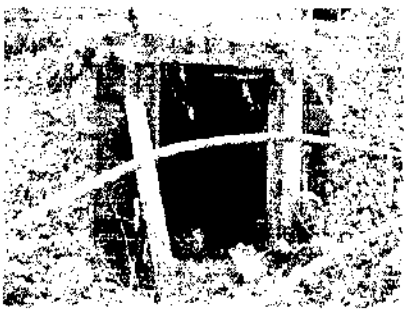
The Nisbit mine was developed by about 500 feet of underground workings distributed among five adits and an inclined shaft. There are also several open cuts. The Oak Grove vein is

Ruins of the furnace at the Nisbit mine.

developed by two adits and a surface trench; the Sluice vein by an adit and a surface trench; the Ben vein by one adit and a small stope; and the Zeolite vein by an adit and inclined shaft, both caved, and by a stope only partially accessible. Most of the production of the mine has come from the Zeolite vein.

The Oak Grove vein strikes east, dips 70° to 80° N., and was explored for a horizontal distance of 100 feet and for a vertical distance of 100 feet by two adits and a surface trench. It ranges from 6 inches to 6 feet thick. At the west face of the lower adit, the Oak Grove vein consists of three shears, each of which is mineralized with cinnabar, calcite, and silica. The vein is of stoping width where these mineralized shears are near each other. In the upper adit, the vein is a foot wide at the portal and well defined, but it splits westward into three minor shears that diverge. The Oak Grove vein produced 5 flasks of quicksilver, mostly from the lower adit. The average grade of vein material mined is about 9 pounds of mercury per ton.

The Sluice vein strikes east and dips 30° to 50° N. It ranges from 6 inches to 2.5 feet in thickness, and probably joins the Oak Grove vein at about 20 feet below the upper Oak Grove adit. The vein was stoped for 50 feet along the strike of the vein and 20 feet up the dip from the drift. Production was probably about 10 flasks.



Entrance to the Sluice vein adit.

The Ben vein has an irregular ore body about 1 to 3 feet thick which follows the trace of the intersection of two faults. One fault strikes N. 60° E. and dips 15° NW. The other, which terminates the ore body on the west and partly caps the stope, strikes N. 40° W. and dips 55° SW. This fault is premineral, but a small amount of postmineral movement has occurred. The line of intersection of the two faults strikes N. 50° W. and dips 14° NW. Production from the stope is estimated at about 20 flasks.

The Zeolite vein strikes N. 5° E. and dips 22° E., averaging 2 feet thick. The enclosing basalt has been altered by hydrothermal solutions to a mealy, soft, limonite-stained clay, which has been mineralized a short distance from the vein so that the ore body averaged 3 to 4 feet thick. The stope is about 40 feet on the strike and 60 feet long on the dip of the vein. It was stoped nearly to the surface. The zeolite vein consists principally of the zeolite mineral stilbite, with smaller amounts of calcite and silica. Cinnabar occurs in the zeolite and calcite in stringers, seams, and interbanded streaks, in small pockets, and as disseminated material in the basalt near the vein.

To the east, the Zeolite vein ore body terminates against a fault which strikes N. 52° W. and dips 80° W to vertical. No accessible workings cross this fault, so the relationship between the vein and fault cannot be determined. The absence of major postmineral faulting in the area indicates that the steep fault is premineral and that the Zeolite vein was mineralized by solutions that rose up it. At least one small postmineral normal fault offsets the Zeolite vein. It strikes N. 30° E. and dips 65° NW. and displaces the vein 1.5 feet. Production from the Zeolite vein was probably about 100 flasks of quicksilver.

Cinnabar was also found and mined in the open cuts on the West vein, the Top Hole vein, and another unnamed vein. About 175 tons of ore were mined from the large

open cut and 10 to 15 flasks of quicksilver were probably produced. The structure in these cuts is obscure, but the mineralization follows shear zones which may be the surface characteristic of calcite veins at greater depth. The basalt is highly weathered and altered to a structureless, soft, limonite-stained clay.

The Aimes-Bancroft Claims

Workings on the Aimes-Bancroft property consist of scattered open cuts, all of which are caved. Little information could be obtained from them. It is presumed they explore calcite veins that are similar to but not as well mineralized as those on the Nisbit and Kiggins properties.

The Aimes-Bancroft group of claims was located by A. G. Aimes, who had been hired by Nisbit to do surface trenching on the Oak Grove group of claims for annual assessment work. Aimes found cinnabar at the side line of the Oak Grove claim. The vein extended into the adjoining Clackamas claim, which Nisbit had located but had not recorded. Nisbit gave the Clackamas claims to Aimes and Kiggins. Aimes later acquired sole ownership of the claim and proceeded through the following years to locate other claims in the area. E. A. Bancroft later acquired an interest in the claim group. Production of 7 flasks from sorted high-grade ore was recorded in 1932. Ore was evidently treated in the crude furnace on the Vermilion claim. There is no record of any further production.

Four calcite veins 2 to 4 feet wide crop out in the river channel between the main workings of the Kiggins and Nisbit mines. The veins diverge slightly in attitude, but all of them strike northwest; three are vertical and the fourth dips steeply north. Small amounts of cinnabar have been observed in two of the veins.

The Dam at Lake Harriet and the Three Lynx Power Plant

The cinnabar mines along the Oak Grove Fork of the Clackamas River also interrelate with the dam at Lake Harriet and the power generating plant at Three Lynx. The dam at Lake Harriet, also called the Oak Grove Dam, was built by P.G.E. at about the same time the mines were claimed. The bulk of the water that would have run across the mines is instead diverted into a pipeline that leads from Lake Harriet to Frog Lake, about 6.5 miles away. The water then runs down slope to the Three Lynx power plant that produces electricity for use by P.G.E. customers. Without this pipeline, the mines would be flooded in times of high water runoff.

Summary

The cinnabar mines along the Oak Grove Fork of the Clackamas River, Oregon, have been a part of Clackamas County history since 1923. They are very scenic and contain some rare minerals and mineraloids. It is this writer's opinion that they should be available to interested parties instead of reclaimed and lost for future studies. If readers are interested in this site, they should find time to study it soon.

References

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THE MICROPROBE

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Jordisite

Don Howard

Jordisite?
What's that?
Never heard of it!

That is probably what you thought when you saw the title of this article. It is certainly what I thought when I read it in a list of minerals from the mines along the Oak Grove Fork of the Clackamas River: calcite, cinnabar, stilbite, pyrite, jordisite and ilsemannite. Well, I knew that ilsemannite was an oxide of molybdenum, because I had run across it while collecting at the Getchell Mine in Nevada some years ago.

But I had never heard of jordisite. So I immediately went to the first place I always look – Fleicher's *Glossary of Mineral Species*. There I learned two things: that Jordisite is MoS_2 , an amorphous form polymorphous with molybdenite, and that it is **not** something newly discovered and named. (I knew that because there was no article reference or date after the entry.) I wondered why I had never heard of it – could it be rare and unusual? It seemed strange to think of a rare and unusual mineral so close to home that I had never heard of.

The lack of an article reference was a bit strange and meant that I would have to do some more research to find out anything more. So next I went to *Dana's New Mineralogy* (eighth edition) to see if they had anything to say. Sure enough, jordisite is listed as 2.12.11.1 in their scheme of numbering, and a short paragraph told me that it was named in 1909, that it was black, massive, ductile and had a submetallic luster. The type locality was the Himmelsfurst Mine near Freiberg, Saxony, Germany. And to my surprise, in a list of eight occurrences was the name Kiggins Mine, Clackamas Co., Oregon. Here was a pretty unusual mineral with one of the prime locations in my own back yard and I had never heard of it. Clearly, this deserved delving deeper.

Fortunately, a reference in American Mineralogist was given as a place to start. That article talked about an occurrence in Chile, but it gave more references. Fortunately, one of those was to an article in the 1951 volume of American Mineralogist by Lloyd Staples describing the material from the Kiggins Mine. Thank goodness that American Mineralogist in years past was a very readable journal with useful information for people who like to look for rocks in the field.

I found out some fascinating things. First of all, the original article suggesting the name jordisite never described the mineral or its occurrence. Jordisite was said to be a black colloidal molybdenum sulfide that was the source of the ilsemannite found at the Himmelsfurst Mine. In previous times, the rules on naming a new mineral were certainly more lax!

Staples was involved in 1939 as a geologist developing the property along the Oak Grove Fork. He had hoped at first that the black mineral present would prove to be metacinnabar, a black cubic polymorph of the red hexagonal cinnabar. That would mean that there was more mercury to be had at the mine than the red cinnabar crusts indicated. Spectroscopic analysis quickly showed that the material contained molybdenum rather than mercury.

Staples went on to do a more thorough analysis of the material. This was not easy, as the jordisite is intimately admixed with silica and some pyrite, making analysis by the usual chemical means of the time difficult. However, he showed that there was sufficient sulfide for the mineral to be a disulfide of molybdenum. He chose to use the name jordisite introduced in 1909 by Cordu. Had he decided to name the material something different, the Kiggins Mine could well have been the "type locality" of this mineral, since Staples work seems to be the earliest to really characterize the mineral. Technically speaking, the type locality should be the place from which the mineral is first ***described***, and that seems to be the Kiggins Mine based on Staples' article.

The jordisite occurs as black seams between the individual crystal fragments of the calcite in the main vein of the property now described as the Kiggins Mine. Often, this has a parallel rim of bright red cinnabar running along one side. Both minerals appear to have been brought in by mineral waters and precipitated at relatively low temperatures. Most of the cinnabar is in the form of very finely crystalline layers. The material seems to have settled in the cracks between the grains of a clear to brownish calcite. The individual crystals of calcite are typically about one centimenter in size, and jumbled together in random orientations into a vein several inches across. The colloid that formed the jordisite also contained other compounds, especially a gelled silica along with minor amounts of iron sulfide, and these all precipitated together. The silica and pyrite seem to have recrystallized over time, but the jordisite did not recrystallize, remaining instead in the amorphous form.

Jordisite is not a particularly attractive mineral. Being amorphous, there are obviously no crystals present. Primarily, it forms black globs in the calcite vein. However, where both jordisite and cinnabar are present along with the clearish calcite, attractive specimens can be collected. Jordisite is more one of those names to be included in your list of minerals collected than something you would want to put in a display case for people to admire. It is a rare mineral, and in that sense should be valuable, especially to species collectors.

Ilsemannite, $Mo_3 O_8 \cdot n H_2O$, is associated with the jordisite. Ilsemannite forms as bluish to greenish crusts on the surface of the calcite. It is not at all attractive (generally, *ugly* is probably a better word). It can easily be mistaken for algae growing on the surface of weathered calcite. Since it is easily soluble in water, it readily washes off the specimens, so care must be taken not to wash the specimens too thoroughly if the ilsemannite is to be retained. Again, it is mostly a representative of what is found at the mine and not a beautiful mineral in its own right. It could easily be overlooked in the field.

Ilsemannite is a somewhat more widespread mineral than jordisite, perhaps because the normal blue color stands out more. It has been observed in deposits that contain wulfenite and molybdenite, but does not seem to occur in *all* deposits of these minerals. It has been assumed but not shown that the ilsemannite is an oxidation product of wulfenite and molybdenite. In fact, there is some speculation that the ilsemannite is actually derived from oxidation of jordisite, and that where present may actually indicate the presence of jordisite. Where distributed in the rock, jordisite would be very very hard to identify because of its nondescript appearance and lack of signal in x-ray diffraction experiments.

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Polymorphs

Don Howard

The preceding article describes jordisite as a polymorph. It also mentions that metacinnabar is a polymorph. In fact, the calcite is also a polymorph. Polymorphs seem to be rather common. What exactly is a polymorph? Why does such a thing occur?

Two materials that have *exactly* the same composition but have distinctly different structural arrangements of their atoms are said to be **dimorphous**. If three or more distinct arrangements are possible, the the material is said to be **polymorphous**. Here is am talking about crystal structures, as long as you include the possibility of no regular structure at all (amorphous). The different forms have to have exactly the same composition, including the water of crystallization, to qualify as polymorphs. Thus the copper arsenates (for example), that have differing ratios of water to copper, do not qualify even though they have very different crystal structures – they need different structures to accommodate the extra water molecules.

Why isn't there a single, stable structure for polymorphous materials? Actually, there always is a single stable structure *at a given temperature*. However, the energy of several structures is often very nearly equal, and changes in temperature (with the accompanying thermal expansion) can shift the balance between one structure and another. A good example of this is the face-centered cubic and hexagonal close-pack structures, each favored by numerous metals. In both structures, an atom is surrounded by 12 nearest neighbors in an identical arrangement. The difference comes in that the second nearest neighbors are slightly closer for the hexagonal arrangement than for the cubic. The trade-off is that the symmetry is higher in the cubic than in the hexagonal, so the entropy is different in the two cases. Since stability is a balance of energy and entropy that depends on temperature, the most stable arrangement will tend to depend on temperature.

An example of this can be seen in the element, tin. "Ordinary" of metallic tin is a tetragonal crystalline solid that is stable between 18° C and 170° C. Above this temperature range, a rhombohedral form is stable. In cooling, the rhombohedral form readily transforms to the tetragonal form. Below 18° C, a cubic arrangement (diamond structure) is the stable form (called gray tin). In this case, the transformation is not so

easy. The density must decrease from 7.28 to 5.75 g/cm^3. This large a change requires atoms to move a considerable distance, not easy in the solid state. Usually tin has to be cooled considerably below the threshold temperature for the transformation to begin, and even then it happens slowly, spreading out from a point of nucleation.

The physical properties of different structures can be very different. For instance, tin in the metallic state is soft and ductile, and it conducts electricity, but in the cubic modification, it is brittle and a very poor conductor. In the old days, this transformation was called "tin disease". Organ pipes were made of tin. In old churches, where winters were very cold, the transformation would begin. Since the "gray tin" modification is brittle, the affected organ pipe would shatter when the organist would try to play the note on that pipe.

Carbon is another example. The cubic modification (diamond) is clear, hard, and brittle, and an excellent electrical insulator. It is a form that is only truly stable at high temperatures and pressures, but the rate at which it converts is so slow that it would in fact never happen unless the diamond is heated. The stable form under ordinary conditions is the hexagonal modification (graphite). It is black and soft, and is a poor electrical conductor. Other forms of elemental carbon are known at well.

Another example of members very different in color and form is the HgS system. The hexagonal form, cinnabar, in which the Hg and S alternate in spiral chains along the c-axis, is bright red. The cubic form, metacinnabar, has a structure analogous to sphalerite, and is black. When sulfide is introduced to a mercurous salt in solution in the laboratory, it is the black form that is precipitated. In natural surroundings, metacinnabar gradually alters to cinnabar, but the change is very slow, particularly in macroscopic crystals, so metacinnabar samples can be found in nature. A third form, hypercinnabar, is also hexagonal but with a different atom arrangement. It is much rarer, being found primarily as microscopic grains embedded in metacinnabar.

Unlike HgS, MoS_2 tends to precipitate from water solution as a very finely divided solid without any definite structure (amorphous) called jordisite. The solid is so fine that it tends not to settle out easily, and therefore is referred to as a colloidal suspension. MoS_2 formed at higher temperatures from molten rock (quartz, calcite, etc.) takes on the layered hexagonal structure known as molybdenite. Apparently the structure stabilizes the compound, because molybdenite does not appear to oxidize as readily as jordisite.

Another common pair of dimorphs that alter differently are pyrite (cubic) and marcasite (orthorhombic). The latter is much more likely to oxidize into sulfates and eat up the wood in your rock cabinet or display case, in the process covering itself with a fluffy white crust of iron sulfate that ruins the appearance of a specimen.

Calcite is of course dimorphous with aragonite. A third form, vaterite, is far less common. It forms around other altering minerals, and alters easily to one of the other two modifications. Quartz forms a polymorphous set (α-quartz, β-quartz, tridymite, cristobalite, coesite, and stishovite). Each of these are stable over some temperature range, and they convert only very slowly from one form to another.

Sometimes a crystal of one member of a polymorph will completely convert internally to another. The microstructure is of one mineral, but the external form is that of another. Under those circumstances, such a sample would be a pseudomorph, but it often takes detailed x-ray analysis to identify such a situation.

CLOSURE OF THE MOUNT SAINT HELENS TREE FARM

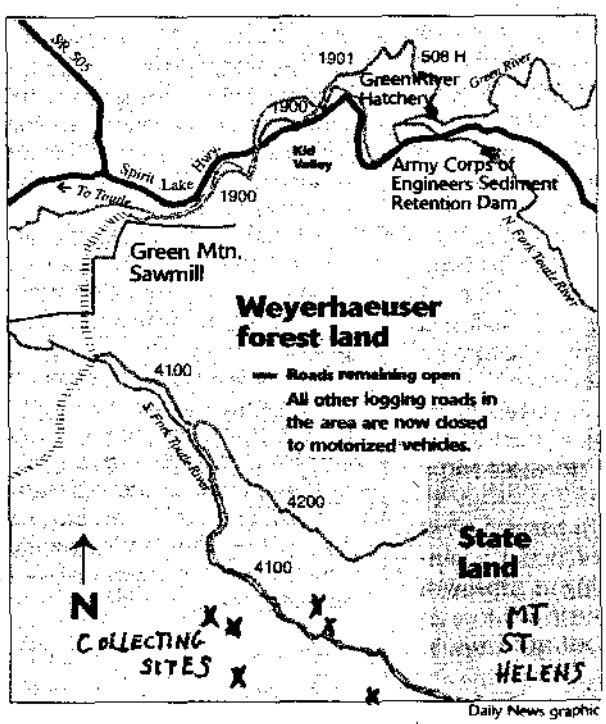
by Rudy Tschernich

The Mount Saint Helens Tree Farm, owned by the Weyerhaeuser Company, in Cowlitz County, southwestern Washington state has been one of the most prolific zeolite producers in the Pacific Northwest. It includes the localities described in past issues of the Micro Probe as Trouble Creek (better known as Road 5700), Elk Mountain (roads 1400 and 1446), 200/237 Road Quarry at Wolf Point, Baird Creek Quarry, Road 4680 on Signal Peak, and many smaller sites. **All of these sites are now closed.** See the newspaper article on the next page that was published in Longview, Washington this winter.

The main road number 4100 along the South Fork of the Toutle River (see map below) that leads to all the collecting sites is washed out half way to Mt St. Helens. All the side roads are now gated. At this time, access will only be allowed during modern rifle deer hunting season in the late fall. There is some discussion about selling permits to enter the tree farm at other times but nothing has been resolved. Permits have been sold by the Weyerhaeuser tree farms in King County for $50.00 to $100.00 per year. That is a lot just to collect micro sized zeolites. Furthermore, even if they do issue permits, it might just cover the area that was open for free last year with the dividing line at the 200 road. The gates to the southern section might still be locked.

News that all of the logging roads in that area were to be redone in order to put new culverts in to save the salmon habit and all the quarries would be put into operation sounded great last year. News that the zeolite rich 200/237 Road Quarry was to be one of those blasted this spring was exciting. I even had the Weyerhaeuser area engineer looking for zeolites and telling me where productive quarries were located. Now we can not get there from here.

There will be an update about this area at the May meeting.



Weyco closes forest to cars

Litter, crime force company to severely restrict access to land

By Andre Stepankowsky and Tom Paulu
THE DAILY NEWS

Weyerhaeuser Co. Friday dramatically cut public access to its Mount St. Helens Tree Farm, an action it hopes will curb a continuing wave of crime and damage to its property.

Effective immediately, the company barred all motorized vehicles on that 422,000-acre private forest except for corridors that provide access to the South Fork of the Toutle River, the Green River fish hatchery and a large tract of state and federal forest between the two branches of the Toutle.

Non-motorized use — hiking, horseback riding and mountain bike riding — will be allowed year round except in designated logging areas.

Motorized use in other parts of the tree farm will be allowed only during modern firearm seasons for elk and deer, which run from mid-October until mid-November. All vehicles must be licensed and street legal.

"Though we take this step reluctantly, we needed to find a way to improve safety while allowing people to enjoy our forests," Ray Arnold, the company's north forest area team leader, said in a prepared statement.

See Closure, Page A4

INSIDE

■ You'd be surprised at what people have done up there.
Page A4

From Page A1

The new rules end vehicle access to Elk, Hanaford, Fawn and Tradedollar lakes, which are popular fishing spots.

"It's going to impact thousands of people, believe me," said Gary Brault, owner of the Toutle River Fly Shop. "It's a sad day for the guy who likes to spend a couple of peaceful hours fishing on those nice lakes up there."

Dan Howell, secretary of the Cowlitz Game and Anglers Club, said he understands Weyerhaeuser's predicament. Outdoors clubs have volunteered to help pick up trash and repair damage done to Weyerhaeuser property.

"We are disappointed that a small faction of people — the sign shooters, the garbage dumpers, the poachers — are taking this away from us," Howell said.

Mark Smith, who operates several tourist businesses along Spirit Lake Memorial Highway, said he isn't surprised at the closure. "The woods unfortunately have been abused. The few troublemakers have ruined it for all of us. It's sad because we grew up being able to go in there."

Howell said there are positive aspects to the closure. It will reduce poaching, because studies have shown that nearly all poaching occurs close to open roads. And wildlife will be disturbed less by motorized vehicles.

Ross Gilchrist, security administrator for the company, said a six-member team of foresters is studying the possibility of imposing a fee-entry system to control public access better. The company will make a decision in late March, Gilchrist said.

Weyerhaeuser already charges for entry to its Snoqualmie Tree Farm near Mount Rainier. The company is only one of two private timberland owners in Washington to impose an access fee for entry to private timberlands, Gilchrist said. Many landowners, however, bar access completely.

Howell and Brault support a fee access system. "That won't rest well with a lot of people but it's an alternative," Brault said.

Friday's decision ends a century of mostly open-door policy to Weyerhaeuser lands in the area.

The company had shut down the southern half of the tree farm about two and a half years ago. It closed most of the northern half in response to continuing vandalism of logging equipment, illegal dumping, motor vehicle accidents, thefts and resources damage. The company also had to clean up highly toxic chemicals from the production of illegal methamphetamine labs.

"People have to put on moon suits to safely dispose of this stuff," company spokeswoman Kate Tate noted.

In addition to the latter problem, the company has had problems with drivers of all terrain vehicles slashing through tree plantations and through creeks, Tate said.

Tate said the company discussed the new restrictions with its community advisory panel. The group expressed disappointment at the decision, but generally understood the company's reasons for it, she said.

Under the new policy, motorized vehicles are still allowed:

■ On the 4100 road for about 10 miles up the South Fork of the Toutle, to the 4950 road.

■ On the 4200 road for about five miles. That road will lead to state and federal land between the North and South forks. This will allow access to Castle Lake and the Loowit Trail around Mount St. Helens.

■ Over several roads from the Green Mountain mill to the Green River hatchery, which is a hot spot for salmon fishing in fall.

Motorized vehicles will not be allowed off these roads.

Photo courtesy of Weyerhaeuser Co.

Volunteers from the Mount St. Helens Preservation Society remove a washing machine from a tributary of the Cowlitz River near the Cowlitz-Lewis border.

Grass to garbage: A litany of lawbreakers

Here's a rundown of some of the troubles Weyerhaeuser Co. says it encountered on its St. Helens Tree Farm in 2000:

■ The company discovered three marijuana grow sites and cleaned up two sites contaminated by toxic wastes from methamphetamine labs.

■ The company sustained $30,000 in damage and theft to logging and woods equipment. The tally does not include damage from a Dec. 18 vandalism in which someone shot a logging shovel 22 times with a high powered rifle.

■ More than 80 people were cited by the Cowlitz County Sheriff's office and state fish and wildlife agents for entering the tree farm when it was closed due to high forest fire danger.

■ All-terrain and four-wheel drive vehicles damaged soils, young trees or waterways in the Studebaker, Hemlock and Maratta creek drainages.

■ State fish and wildlife agents typically arrest at least one person each weekend for poaching.

■ Volunteers and company workers cleaned up 10 tons of garbage and other debris along 20 miles of company roads.

■ Private vehicle accidents have increased 20 percent in the last two years. On Dec. 21, a vehicle driven by an unlicensed driver rolled down a steep bank, injuring the two 15-year old occupants.

— *The Daily News*

NOMENCLATURE OF NW ZEOLITE SPECIES DETERMINED BY CHEMICAL ANALYSIS

by

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The nomenclature adopted for the naming of zeolite minerals by the International Mineral Association in 1998 requires the chemical composition of any zeolite with a wide variation in cations to be known before it can be named to species. Zeolites that require this special treatment include the groups: analcime/wairakite, chabazite, clinoptilolite, brewsterite, dachiardite, erionite, ferrierite, heulandite, mordenite, paulingite, phillipsite/harmotome, and stilbite. All of the other zeolites can be named to species without chemical analysis. When the chemical composition is not known, we can only give it a group name. The following list shows the zeolites from the Pacific Northwest that have been chemically analyzed by electron micro probe or wet chemical methods. Unfortunately, far too few samples have been chemically analyzed. The procedure is expensive and time consuming; therefore, in most cases it will never be preformed.

Note that some localities have more than one species in the same group. Example Durkee, Oregon has both species erionite-Ca and erionite-K and Altoona, Washington has dachiardite-Na at the base of each crystal group and dachiardite-Ca at the termination.

Other complications arise due to the cation exchange properties of zeolites and occurrences exposed to seawater. Zeolites collected above high-tide in sea cliffs are usually calcium dominant while those in the same cliff below high tide level or in beach boulders probably have been converted to sodium species of the same group. An example of this process is expected in the groups clinoptilolite, dachiardite, mordenite, chabazite, and erionite at Oceanside, Tillamook County, Oregon.

The number of localities listed under a species does not reflect the abundance of that species in the Pacific Northwest. It only reflects the results of the limited number of samples tested.

ANALCIME-Na

Yellow Lake, Olalla, British Columbia (Wise, W.S., pers. comm.)
Crowsnest Pass, Colman, Alberta (Wise, W.S., pers. comm.)
Museum Pit, Challis, Idaho (Ross and Shannon, 1924)
200/237 quarry, Wolf Point, Cowlitz County, Washington (Tschernich, 1997)
Upper Clackamas River, Clackamas County, Oregon (Oscarson and Bargar, 1996)
Collawash River, Clackamas County, Oregon (Oscarson and Bargar, 1996)
Sunedco 58-28 drill hole, Devils Creek, Marion County, Oregon (Oscarson and Bargar, 1996)

BREWSTERITE-Sr

Yellow Lake, Olalla, British Columbia (Tschernich, 1992)

CHABAZITE-Ca

Threemile Creek, Ritter, Grant County, Oregon (Tschernich and Wise, 1982)
CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)
Upper Fish Creek, Clackamas County, Oregon (Oscarson and Bargar, 1996)
Laurel Hill, Government Camp, Clackamas County, Oregon (Bargar et al, 1993)

CHABAZITE-Na

CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)

CLINOPTILOLITE-Ca

Altoona, Wahkiakum County, Washington (Wise and Tschernich, 1976a)
Cape Lookout, Tillamook, Oregon (Wise and Tschernich, 1978)
Rock Island Dam, Rock Island, Washington (Tschernich and Wise, 1982)
Succor Creek, Malheur County, Oregon (Tschernich, 1992) core of crystals
Durkee Opal Mine, Swayze Creek, Baker County, Oregon (Wise, W.S., pers. comm.)
Pass Valley, Deadmans River, Savona, British Columbia (Wise, W.S., pers. comm.)

CLINOPTILOLITE-K

Fish Creek, Clackamas River, Oregon (Tschernich, 1992)
Collawash River, Clackamas River, Oregon (Oscarson and Bargar, 1996)

CLINOPTILOLITE-Na

Richardson's Ranch, Madras, Oregon (Tschernich, 1992)
Yaquina Head, Agate Beach, Oregon (Tschernich, 1992)
Kamloops Lake, British Columbia (Wise and Tschernich (1976a)
CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)

DACHIARDITE-Ca

Altoona, Wahkiakum County, Washington (tips) (Wise and Tschernich, 1978)
Cape Lookout, Tillamook County, Oregon (Wise and Tschernich, 1978)

DACHIARDITE-Na

Altoona, Wahkiakum County, Washington (base) (Wise and Tschernich, 1978)
Yaquina Head, Agate Beach, Oregon (Wise and Tschernich, 1978)

ERIONITE-Ca

Milwaukie, Oregon (Wise and Tschernich,1976b)
Westwold, British Columbia (Wise and Tschernich, 1976b)
Owyhee Dam , Malheur County, Oregon (Wise and Tschernich (1976b)
Cape Lookout, Tillamook, Oregon (Wise and Tschernich, 1976b)
Beech Creek, Grant County, Oregon (Sheppard et al, 1974)
Durkee Opal Mine, Swayze Cr., Baker Co., Oregon (Passaglia et al, 1998)
CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)

ERIONITE-K

Rock Island Dam, Rock Island, Washington (Wise and Tschernich (1976b)
Yaquina Head, Agate Beach, Oregon (needles upper level) (Wise and Tschernich, 1976b)
Chase Creek, Falkland, British Columbia (Tschernich and Wise, 1982)
Pass Valley, Deadmans River, Savona, British Columbia (Tschernich, 1992)
Durkee Opal Mine, Swayze Cr., Baker Co., Oregon (Staples and Gard, 1969)
CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)

FERRIERITE-Na

Altoona, Wahkiakum County, Washington (type locality) (Wise and Tschernich (1976a)

FERRIERITE-Mg

Kamloops Lake, British Columbia (type locality) (Wise and Tschernich, 1976a)
Pinaus Lake, Westwold, British Columbia (Wise and Tschernich, 1976a)
Francois Lake, South Burns Lake Region, British Columbia (Wise and Tschernich, (1976a)
Monte Lake, British Columbia (Wise and Tschernich, 1976a)
Barlow Pass, Hood River/Clackamas County line, Oregon (Oscarson and Bargar, 1996)

HARMOTOME

Chase Creek, Falkland, British Columbia (Tschernich and Wise, 1982)
Fish Creek Quarry, Clackamas River, Oregon (Tschernich, 1992)
Old Bonanza Mine, Cheeney Creek, ZigZag, Clackamas County, Oregon (Bargar et al, 1993)

HEULANDITE-Ca

Francois Lake, South Burns Lake Region, British Columbia (Wise and Tschernich, 1976a)
Chase Creek, Falkland, British Columbia (Tschernich and Wise, 1982)
Green Hill, Challis, Idaho (Bart Cannon, pers. comm.)
Big Tree Creek, Yacolt, Clark County, Washington (Wise, W.S., pers. comm.)
Yellow Lake, Olalla, British Columbia (Wise, W.S., pers. comm.)
Sunedco 58-28 drill hole, Devils Creek, Marion County, Oregon (Oscarson and Bargar, 1996)
CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)
Upper Clackamas River, Oregon (Oscarson and Bargar, 1996)
Oak Grove Fork, Clackamas River, Oregon (Oscarson and Bargar, 1996)
Collawash River, Clackamas River, Oregon (Oscarson and Bargar, 1996)
Camels Back, Clackamas River, Oregon (Oscarson and Bargar, 1996)
Detroit Lake, Detroit, Oregon (Oscarson and Bargar, 1996)
Upper Fish Creek, Clackamas River, Oregon (Oscarson and Bargar, 1996)
Laurel Hill, Government Camp, Clackamas County, Oregon (Bargar et al, 1993)

HEULANDITE-Na

Museum Pit, Challis, Idaho (type locality) (Ross and Shannon, 1924)

MORDENITE-Na

Altoona, Wahkiakum County, Washington (Wise and Tschernich, 1976a)
Cape Lookout, Tillamook County, Oregon (Wise and Tschernich, 1978)
Museum Pit, Challis, Idaho (Ross and Shannon, 1924)

PAULINGITE-K

Rock Island Dam , Rock Island, Washington (type locality) (Tschernich and Wise, 1982)
Chase Creek, Falkland, British Columbia (Tschernich and Wise, 1982)
Riggins, Idaho (Tschernich and Wise, 1982)

PAULINGITE-Ca

Threemile Creek, Ritter, Grant County, Oregon (type locality) (Tschernich and Wise, 1982)

PHILLIPSITE-K

Cape Lookout, Tillamook County, Oregon (Wise and Tschernich, 1978)
Rock Island Dam, Rock Island, Washington (Tschernich and Wise, 1982)
Riggins, Idaho (Tschernich and Wise, 1982)
Clackamas River, Clackamas County, Oregon (Wise, W.S., pers. comm.)
CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)

PHILLIPSITE-Ca

Threemile Creek, Ritter, Grant County, Oregon (Tschernich and Wise, 1982)

PHILLIPSITE-Na

Yaquina Head, Agate Beach, Oregon (Wise, W.S., pers. comm.)
CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)

STILBITE-Ca

Skookumchuck Dam, Tenino, Washington (Passaglia et al, 1978)
Kosmos, Lewis County, Washington (Passaglia et al, 1978)
Roseburg, Douglas County, Oregon (Passaglia et al, 1978)

WAIRAKITE

Sunedco 58-28 drill hole, Devils Creek, Marion County, Oregon (Oscarson and Bargar, 1996)
CTGH drill hole, Breitenbush, Marion County, Oregon (Oscarson and Bargar, 1996)
Laurel Hill, Government Camp, Clackamas County, Oregon (Bargar et al, 1993)
200/237 quarry, Wolf Point, Cowlitz County, Washington (Tschernich, 1997)

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Microminerals from the Queen of the Hills Mine, Neihart District, Cascade County, Montana

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The Neihart Mining District is located in the Little Belt Mountains, southeast of Great Falls, in Central Montana. The district was known primarily as a silver producing district, but lead, zinc, gold, and some copper have also been produced. The district was discovered in the early 1880's, making it one of the oldest mining districts in the state. None of the mines are active today. The Neihart district and the town of Neihart were named for James L. Neihart, one of the early prospectors that discovered the district (Cheney, 1971). The town occupies the narrow valley of Belt Creek and now has a population of about 50 people; U. S. Highway 89 passes through the center of the town. To the east are the semi-open steep slopes of Neihart Baldy. Along this west facing slope many of the mines were developed. A second region of mining activity, within the district, was along Carpenter Creek and its tributaries, about 6 km north and a little east of the town site.

The ore bodies of the district developed in Pre-Cambrian age metamorphic rocks. These rocks and the Paleozoic sedimentary rocks, which lie above, are cut by a series of igneous stocks, dikes, and laccoliths. Several different intrusive events can be recognized that have distinct cooling histories and different mineralogies. See Schafer (1935) or Robertson (1951) for details of the geology.

The Queen of the Hills mine is located approximately 1 km north of the town of Neihart on the east side of Belt Creek. The initial claim was located in 1881 (Schafer, 1935). The claim was combined with the adjoining claims and sporadically worked through the latter part of the 1800's and the first half of the 1900's. Development of the mine occurred with three adits, all of which are now inaccessible. U.S. Highway 89 passes about 50 m from the bottom of the dump of the lower adit. Here is a large parking area, and a small road leads to the top of the dump and the two upper levels.

A variety of microminerals is present on the dump today. Barite, pyrite, galena, quartz, chalcopyrite, and ankerite/siderite are common. Good specimens are not difficult to find. Minerals of the oxidized zones are more difficult to find, but are still available with diligent searching. Below is a list of all minerals recovered from the dump.

Ankerite/Siderite is found in large chunks of carbonate rock. The carbonate rock contains cavities up to several centimeters in diameter, which contain rhombohedral crystals. The crystals exist as single individuals or twisted stacks of rhombohedral crystals. The color of these crystals ranges from very light tan to dark brown. Both ankerite and siderite have been reported by Schafer (1935), but only ankerite is reported by Robertson (1951). Without analytical work, it is difficult to separate these species.

Barite occurs as colorless to very light yellow plates. Large sections, over 5 cm, are occasionally present, especially near the north end of the dump. Very nice microcrystals up to a few millimeters in length are present in many of the rocks. The plates show several different habits, from the simple rectangular plates to more complex development of secondary faces. Barite is common throughout the dump.

Cerussite was recovered from rock of the oxidized zone, and fine crystals up to a few millimeters in length occurred in cavities. The crystals are colorless, have a high luster, and exist in a variety of habits including very thin plates. Twinning is common in these cerussite crystals. Cerussite is not common on the dump.

Chalcopyrite is not as common as the other sulfides, but is present as nicely formed crystals up to 3 mm in length. The crystals are bright golden color and generally form complex intergrowths that show coarse striations on the surface. Chalcopyrite is associated with other sulfides.

Covellite is not common at the Queen of the Hills. Small clusters of bright blue crystals less than 1mm in diameter (the clusters, not the crystals; with a good imagination and 40x, we think we can see the individual crystals) were found in a single rock. The rock was light tan in color and otherwise nondescript. Only three specimens were recovered.

Galena occurs in great abundance at the Queen of the Hills. Modified cubic crystals up to 3 mm across were present in several cavities, often associated with barite, pyrite, quartz, and other sulfide. Most of the crystals have a dull luster, and several are covered with a dull black sooty material.

Hematite is common at the mine, but was not found as crystals.

Limonite is found everywhere in the oxidized zone.

Malachite occurs very rarely. Two specimens were recovered and in both cases they were small (about .25 mm) medium green hemispheres.

Native Silver occurred in one specimen. The single specimen was composed of two bright silver wires, about 1.5 mm long, with "dumbbell-like" masses of silver on each end. The specimen was from rock of the oxidized zone and contained crystals of barite and cerussite as well as massive limonite and hematite.

Pyrite is very common in the dump with two different crystal habits common. Typical cubic crystals with light striations on the faces are present, but more common are smooth faced pyritohedron-formed crystals. Many pyrite crystals show an outer rim of oxidation.

Quartz lines many of the cavities and forms bright sharp crystals and radiating masses.

Smithsonite forms .5 mm white "rice grain" crystals that merge into waxy undulating masses. Smithsonite was found in a single rock from the oxidized zone.

Sphalerite dominates many of the rocks in the dump, but good specimens are hard to find. Most of the sphalerite is dark golden-brown to nearly black material that forms as intermediate filling between galena and pyrite in massive ore. No good specimens of this sphalerite were recovered. There is a later generation of sphalerite that forms green, yellow-green, or yellow crystals. Sphalerite of this type is much less common, but two crystals about 1.5 mm across were obtained.

Unknown Mn Oxide coats the interior of a few small cavities in the oxidized zone. The material is jet black and forms a felt-like lining in the cavities. This material was observed only in a single rock.

In addition to the above minerals, the following have been reported from the Queen of the Hills: pyrargyrite or polybasite or pearceite, cerargyrite(?) (Robertson, 1951). Schafer (1935) reported "ruby silver" minerals and possible cerargyrite.

Collecting at the Queen of the Hills mine is good. Much of the surrounding country is in Lewis and Clark National Forest with hiking and other forest activities available. We have seen people fishing in Belt Creek, but would think they might be "heavy fish" especially downstream from Carpenter Creek. There are many other mines in the district that are close to the Queen of the Hills. Inquire locally about access to the dumps. Most dumps in the vicinity of Neihart are no problem, but most along Carpenter Creek are behind "Keep Out" and "No Trespassing" signs. There are limited motel facilities in Neihart, but there are small forest service campgrounds both north and south of Neihart. If you are interested in collecting at this and other Neihart locations, time may be short. An article in the *Miles City Star* in December 2000, stated the Neihart District and the Barker District, to the north, are both being considered to be included in the EPA super fund sites----then they will be gone.

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FIGURE CAPTIONS

For color photographs, the number is in the upper left corner on the back.

 # 4 Calcite, Cinnabar and Jordisite (x7)

Kiggins Mine, Lake Harriet, Clackamas Co., Oregon

The jordisite is the black granular seams. These are often lined on one side by thin seams of bright red cinnabar. Both cinnabar and jordisite seams surround grains of amber colored calcite.

 # 5 Jordisite and Cinnabar in Calcite (x6)

Kiggins Mine, Lake Harriet, Clackamas Co., Oregon

Jordisite and cinnabar seams outlining individual calcite crystal grains.

 # 6 Metacinnabar (x8)

Mt. Diablo Mine, Clayton, Contra Costa Co., California

Individuals crystals perched on a drusy quartz crust. Metacinnabar is the isometric modification of HgS (see diagram below). Bits of red color among the black crystals show areas where the metacinnabar is altering to cinnabar.

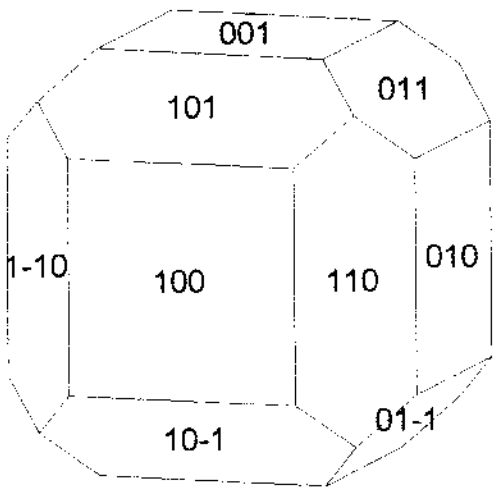
 # 7 Orpiment on Realgar (x8)

Getchell Mine, Churchill Co., Nevada

Clear amber crystals of orpiment against a background of red realgar. The Getchell mine is one of the places where ilsemannite is found. The fact that no other minerals containing molybdenum are reported from this mine may mean that jordisite is present but unidentified in the dark matrix rock..

Picture Credits:

Photographs and specimens Don Howard



Single crystal form of Metacinnabar: cube modified by dodecahedral faces, as seen in the crystal just to right of center in photograph #6.

IN MEMORY OF ANTHONY SOBELIK

It was with great surprise that in February I opened and read the following letter from Nancy Lenon, Tony Sobelik's daughter:

With a sad heart I write to tell you that Tony died January 30th. As he described in his Christmas letter, he did have surgery to implant the stimulator, which gave him relief from his shingles pain. The pain medication for surgery was a little hard on his 87 year old body, and so his hospital stay was lengthened. He was placed in the rehabilitation wing at the hospital, where he gained strength, and was scheduled to go home Monday, the 29th. However, on Sunday he suffered an event in which the circulation to part of his intestine was cut off, much like a heart attack or stroke. Nothing could be done to help him. Dad lost consciousness, but we continued to talk to him. Larry, Polly and I were with him in a two day vigil as he made his journey. Pain medication was given for comfort.

Dad made the request that no service be held. His ashes will join Mother's at Yaquina Head on the Oregon coast, a spot all of us made frequent visits to, and Polly, his granddaughter, in her younger years, titled "Creature Beach" because of the wonderful tide pools, birds, and marine mammals there.

I had fully expected Dad to continue life into his 90's. At the same time he had often expressed, "When I go, I want it to be quick and without tubes!" That part we could give him. Dad had the May meeting on his calendar and was planning to be there.

It will seem strange to hold our next meeting without Tony. He has faithfully been coming to meetings for over 20 years, full of good cheer and a happy word for everyone. He has regularly brought us up to date on the doings along Rickreal Creek and generally in the area around Dallas, Oregon.

Tony was a avid field collector. He would appear at our Field trips without fail in spite of what the weather might be doing. He loved to pound on rock! And often he was the one that found the prize for the day. But his interests went much deeper than just the rocks – he and his wife loved nature, the flowers, the birds, the animals as well as the rocks and minerals. Tony had wide interests in collecting that stemmed from a deep love of nature.

His gruff voice and cheery smile will be missed.