Leroi S.t 2.1

PRELIMINARY ASSESSMENT REPORT
LEROI COMPANY SMELTER

CERCLIS No. WAD988507323

Prepared for:

Work Assignment No. 54-16-0JZZ

Contract No. 68-W9-0054
United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

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ACRONYMS

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation Liability Information System
cfs	cubic feet per second
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
PA	preliminary assessment
SARA	Superfund Amendments and Reauthorization Act
SI	site inspection
SWL	static water level
URS	URS Consultants, Inc.
USGS	United States Geological Survey
WDH	Washington State Department of Health

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W9-0054 and Work Assignment No. 54-16-0JZZ, URS Consultants, Inc. (URS) conducted a preliminary assessment (PA) of the LeRoi Company Smelter (LeRoi) site (CERCLIS No. WAD988507323) in Northport, Washington. The PA represents the second of a three-step assessment process that begins with site discovery and concludes, if necessary, with a site inspection (SI). The assessment process is intended to identify, compare, and rank various sites across the nation and to identify priority sites requiring remedial responses. It does not include extensive or complete site characterization, contaminant fate determination, or quantitative risk assessment. The PA conducted at the LeRoi site was conducted under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA).

The LeRoi site PA was conducted to determine the potential threat to public health or the environment from the site, determine the potential release of hazardous constituents into the environment, and evaluate the need for additional investigative action. The PA is based on data derived from available files, literature, and communications pertaining to the site and an assessment of site conditions, as observed by URS on March 29, 1993. Photodocumentation from the LeRoi site visit is included in Appendix A.

2.0 BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

Site Name:	LeRoi Company Smelter
CERCLIS No.:	WAD988507323
Location:	117 Park Road Northport, Washington 99157
Latitude:	48°55'15" North
Longitude:	117°46'15" West
Legal Description:	T39N R40E S4
Site Owner:	Mr. Steve Frazier
Site Operator:	SSF Building Materials Mr. Steve Frazier
Site Contacts:	Mr. Steve Frazier Phone: (509)732-4464

The LeRoi site, approximately 32 acres, is located just north of the town center of Northport, Washington, along Highway 25. The site lies within Section 4 in Township 39 North Range 40 East, with the approximate latitude 48°55'15" North and longitude 117°46'15" West. The site address is 117 Park Road, Northport, Washington 99157. The city of Northport is located along the east bank of the Columbia River approximately 7 miles south of the United States-Canadian border in Stevens County.

Highway 25 and the Northport-Weneta Road define the southern and eastern boundaries of the LeRoi site, respectively. The Burlington Northern Railroad (formerly the Spokane Falls and Northern Railroad) runs parallel to the Columbia River and designates the western boundary. The Columbia River is located approximately 200 feet

west of the LeRoi property. The adjacent properties to the east are residential homes. Smelter Hill is located directly north of the site (USGS 1982). A city park, approximately 10 acres, is located northwest of the site along the Columbia River approximately 50 feet from the site. Figure 2-1 shows the site vicinity.

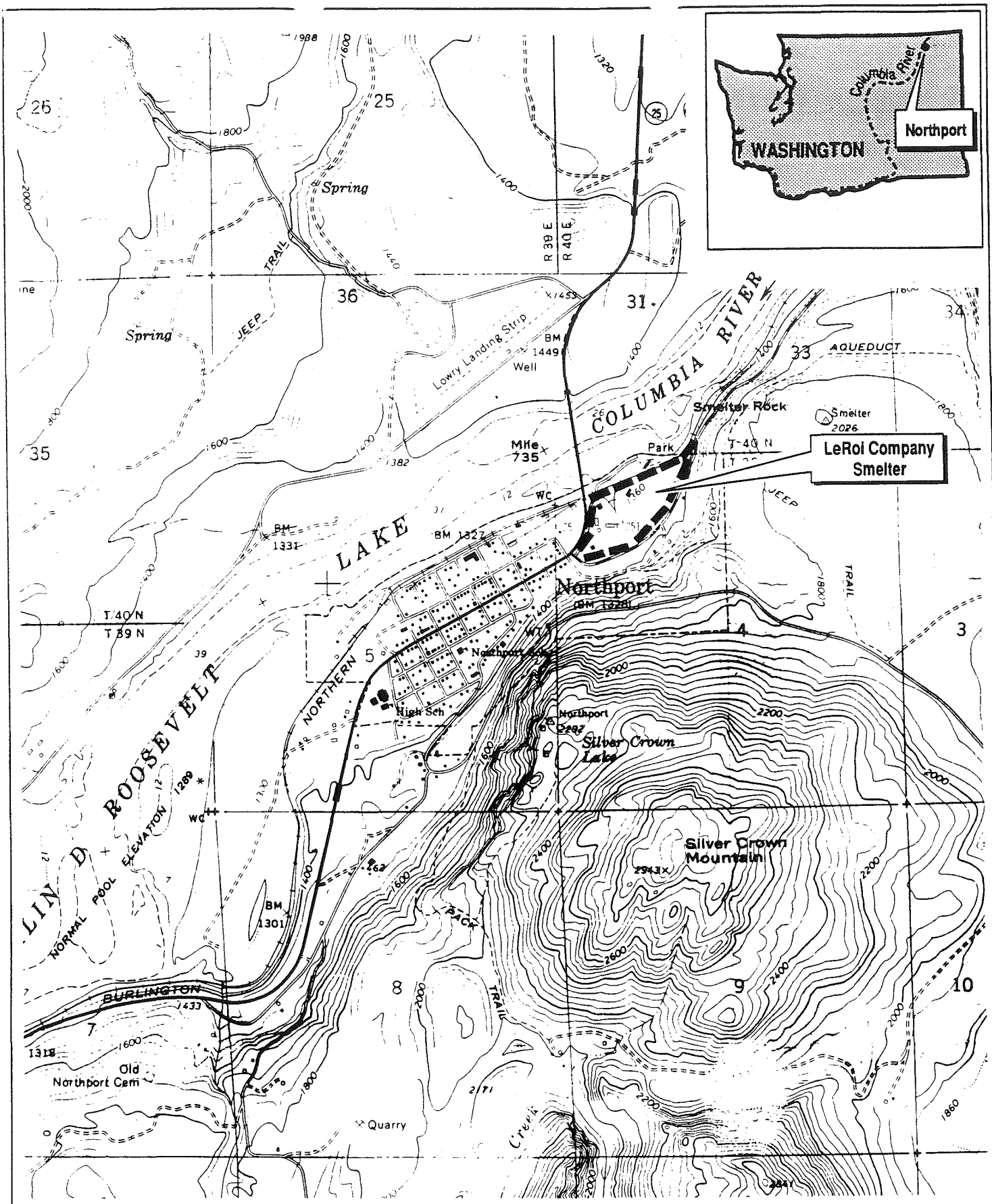
The site, which includes an old smelter and current lumber operations, encompasses a total area of 32 acres. Site access is obtained from an unpaved road from Highway 25 located on the south end of the site. This road also provides access to the city park located northwest of the site along the Columbia River. Figure 2-2 details the site and the immediate vicinity.

No portion of the site appears to be paved. Grasses and poplar trees grow throughout the northern portion of the property. The site surface is unlevel. A hill with an approximate slope of 10 degrees is located on the north end of the site, resulting in an elevation change of 50 feet. The site drainage appears to flow from northeast to southwest, then west toward the Columbia River (URS 1993).

Stone foundations and old brick walls from the former smelter facility remain on the site. The majority of these remains are located on the northern portion of the property. One of the three original smokestacks is still standing. This remaining stack was reported as the second largest stack, being only half the size of the large stack. It stands approximately 75 feet high and has a maximum width of approximately 10 feet (URS 1993).

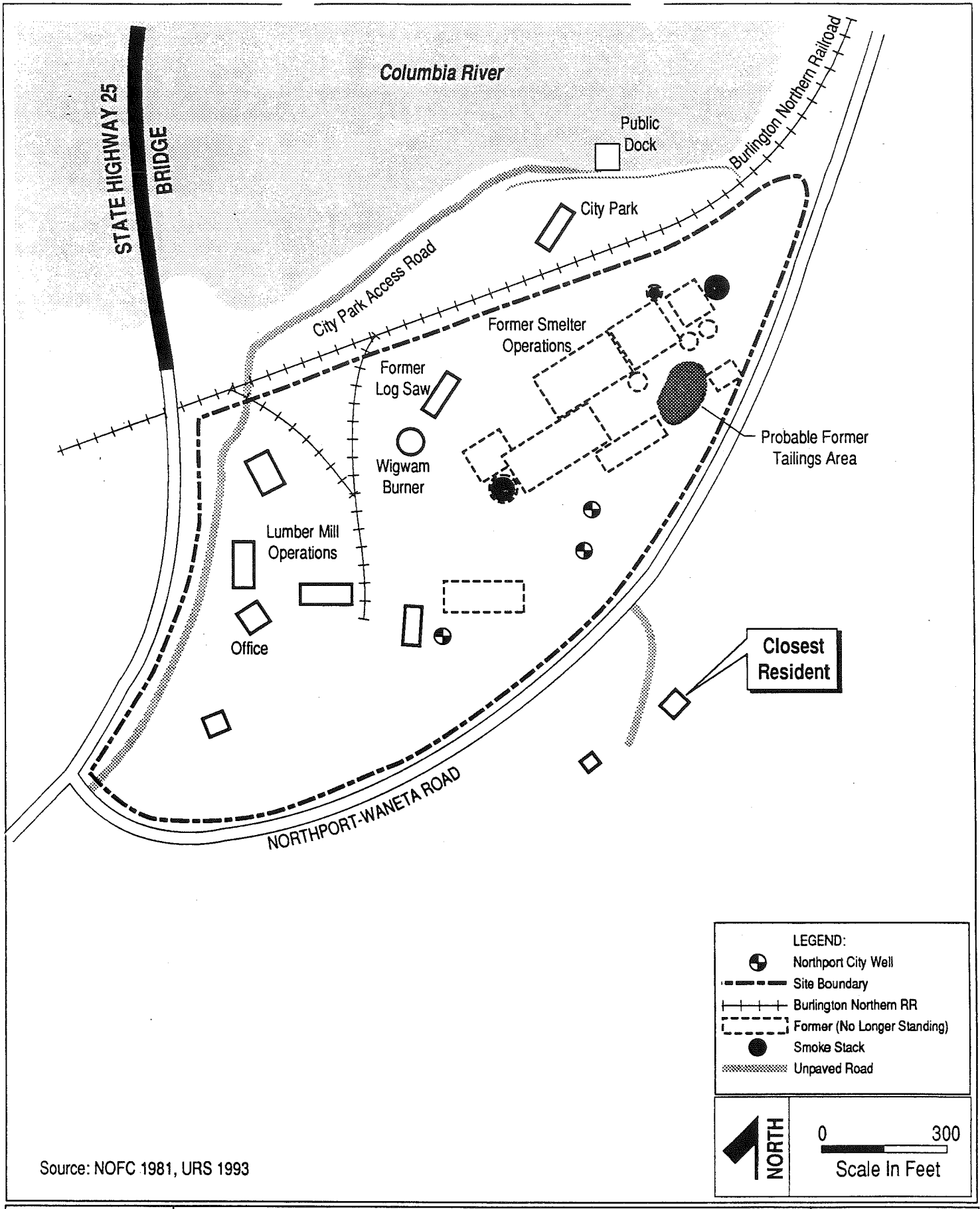
The current lumber operations are located on the southern third of the site. The majority of the structures used for the lumber operations were constructed over 20 years ago (Frazier 1993). Two lumber mill structures, an old wigwam burner, and an old log sawmill were identified on the site and are reported to be no longer in use (URS 1993; Frazier 1993).

The smelter buildings, which are no longer standing, included the furnace building (130 feet high, 100 feet wide, 700 feet long), the roaster building (90 feet high, 150 feet wide, 500 feet long), and the crusher and ore buildings (90 feet high, 100 feet wide, 600 feet long) (Heritage 1981).



Source: U.S.G.S. Topo Map 7.5 min. Northport, WA 1969, 1982

URS CONSULTANTS, INC.	NORTH	0 1/4 1/2 Scale In Miles	Figure 2-1 Vicinity Map	LeRoi Company Smelter Northport, Washington



Source: NOFC 1981, URS 1993

URS CONSULTANTS, INC.	Figure 2-2 Site Map	LeRoi Company Smelter Northport, Washington

2.2 SITE AND OWNERSHIP HISTORY

In the 1890s, a flurry of mining activities evolved in northeastern Washington and southern British Columbia. In 1892, D.C. Corbin, owner of the Spokane Falls and Northern Railroad, built a rail line to reach the "city" of Northport, then consisting of a lumber mill and several tents. The railroad tracks were located adjacent to the LeRoi site, which Mr. Corbin then owned. The railroad proved to be of great value to the economy of northeast Washington. In 1896, Mr. Corbin donated the site to the LeRoi Mining and Smelting Company for the construction of a smelter called Breen Copper Smelter. The smelter location was chosen because the area contained large quantities of materials necessary for smelting, such as limerock for flux.

The smelter began treating copper and gold ores transported from the Rossland Mine located in British Columbia, Canada. In 1901, the LeRoi Company smelting operations reorganized as the Northport Smelting and Refining Company (NOFC 1981). By 1908, it was one of the largest smelters on the West Coast, processing (by heap roasting) 500 tons of ore per day (SCHC 1993). In 1909, the smelter closed because of competition from another smelter, the Consolidated Mining and Smelting Operations, located in Trail, British Columbia (NOFC 1981).

During World War I, the government demand for lead encouraged the Northport Mining and Smelting Company to reopen and process the lead ores that had been discovered at Leadpoint, Washington (approximately 9 miles east of Northport). In September 1914, Jerome Day purchased the smelter and renovated it to accommodate lead ores. On March 5, 1921, the government curtailed its lead purchases. A few months later, the smelter closed and never reopened (NOFC 1981). The American Smelting and Refining Company purchased the site after the closure of the smelter in 1921. However, to the dismay of the town of Northport, the new company had no intention of operating a smelter. The company removed the smelting equipment and transported it to a smelter elsewhere. The company left the dismantled smelter inactive.

At a period between 1921 and 1953, the inactive site was purchased by J.D. Harms. Between 1953 and 1969, a lumber mill went into operation on the property. JB&T Lumber is the first known lumber mill company to have operated on the property. In 1975, Cecil Frazier purchased the property and operated the lumber mill. In 1985, Steve Frazier, the son of Cecil Frazier, purchased the property and business and has been operating the mill under the name SSF Building Materials (Frazier 1993; SCAO 1993). Table 2-1 summarizes the site ownership history.

Table 2-1
History of Site Owners

Year	Owner	Operator	Activity
Prior to 1896	Mr. D.C. Corbin	Spokane Falls and Northern Railway Company	vacant
1896-1901	LeRoi Mining and Smelting Company	Breen Copper Smelter	copper and gold smelting
1901-1909	Northport Smelting and Refining Company	Northport Smelting and Refining Company	copper and gold smelting
1909-1914	Northport Smelting and Refining Company	None	inactive
1914-1921 (World War I)	Mr. Jerome Day	Day Smelter	lead smelter
1921 - Unknown	American Smelting and Refining Co.	None	dismantled smelter machinery for another smelter; inactive
Prior to 1953 - Prior to 1969	Mr. J.D. Harms	None	inactive
Prior to 1969 - 1975	Unknown	JB&T Lumber	lumber mill
1975 - 1985	Mr. Cecil Frazier	Frazier Lumber	lumber mill
1985 - Present	Mr. Steve Frazier	SSF Building Materials	lumber mill

2.3 SITE OPERATIONS AND SOURCE CHARACTERISTICS

2.3.1 Copper and Gold Smelter Operations

The smelter, Breen Copper Smelter, operated from 1896 until 1909. The initial smelter operations were rudimentary and involved high releases of pollutants. The tellurium ore was more difficult to process; however, it contained high enough amounts of copper and gold to make the process worthwhile. Tellurium is naturally occurring and belongs to the same family of elements as sulfur and selenium. Because of the tellurium, the ore

had to be burned or heated to release the minerals. The burning released high amounts of sulfur dioxide into the air.

The ore was processed by heap roasting, which involves open burning of the raw ore prior to being placed in a mineral filtration furnace. The heap roasting process produced a disagreeable sulfur odor; the local citizens termed the burning piles as "stink piles." Local farmers believed that the heap roasting process was poisoning the nearby soils. A slag brick platform was used for the initial burning, or heap roasting, of the ore. The ore was piled on the brick platform to an approximate depth of 4 feet. Cord wood was then stacked on top of the ore pile and ignited. The tellurium in the ore would be vaporized during this process, thus freeing the gold and copper for smelting. The location of this brick platform is where the Northport city wells are currently located (Heritage 1981).

The burned ore was then placed into the furnace where the separation of the minerals took place. Limerock was used during the flux process. Tap holes were located at different levels in the furnace to filter the minerals and rocks (including iron, copper, and slag rock). The iron and slag rock tap hole was located higher than the copper tap hole. The iron and slag rock collected from this filtration was considered waste (Heritage 1981). The method of disposing of this waste material is unknown. The copper mineral was collected and loaded into box cars for shipment to a copper refinery.

Because gold is heavy, the gold settled to the bottom of the furnace and formed a gold matt. After the gold accumulated to a thickness of 14 inches, the furnace was shut down. Once the furnace and materials cooled, the sides of the furnace were removed to gain access to the gold matt. The gold matt was wedged from the furnace and cut into pieces before being loaded into boxcars and shipped to a gold refinery (Heritage 1981).

2.3.2 Lead Smelter Operations

During World War I, because of an anticipated demand for lead, the government encouraged the Northport Mining and Smelting Company to reopen and to process lead ores that had been discovered at Leadpoint, a few miles east of Northport. In September 1914, Jerome Day arrived in the Northport area as the new owner of the smelter. He purchased the smelter from Northport Mining and Smelting Company and announced that the smelter would be reconstructed to process lead ore. During the smelter's prime, nearly 500 workers were employed.

For security, an 8-foot-high wooden fence was initially constructed around the entire perimeter of the smelter. A guard tower was located every 300 feet along the fence. The guard towers were used during World War I. Security measures included locked gates for the railway (Heritage 1981).

The smelter was constructed of stone, brick, wood, and steel. Stone was used for the construction of the building foundations (URS 1993). Brick was used for the construction of most walls. The brick was obtained from a nearby brick factory that supplied the town of Northport (URS 1993; NOFC 1981). Steel and wood were used to frame and roof the buildings (URS 1993; NOFC 1981).

During the smelter operations, fires plagued the town of Northport. Perhaps because of a fire water-supply system and the use of mostly brick material, the smelter was spared from the prevalent fires. An old fire hydrant was observed on the west wall of the furnace building during the URS 1993 site visit.

Additional railroad tracks were added to the site for importing and receiving the ore and mineral product. A railroad track approximately 50 feet above the ground ran the full length of the ore building (Heritage 1981).

The lead smelter used a process more sophisticated than that used in the copper and gold process of the previous decade, although a high quantity of sulfur (approximately 30 tons per day) was still being discharged into the air. This emission was reportedly considered tolerable by the people. Filters for the smokestacks were added later (NOFC 1981).

Two large steam engines, fueled by coal, initially provided power for the facility. Both flywheel steam engines (flywheels were 28 feet in diameter) were hooked onto one long line shaft. On the other end of the line shaft, a dynamo produced 10,000 volts of electricity prior to being boosted by a generator that provided up to 100,000 volts. After the smelter reopened, a high-voltage line from Canada supplied the power, and the steam plant was shut down.

2.3.3 Operations Between Smelting and Lumber Mill Use

After 1921, the abandoned and dismantled smelter remained inactive. The town of Northport demolished the buildings for the usable brick. One building retained enough walls to provided an ice-skating rink during the winter (NOFC 1981). The railroad was

abandoned and the tracks were salvaged. By 1929, only half of the upper Stevens County population remained and the entire upper Stevens County was suffering great economic hardship.

Prior to 1969, a small lumber mill was constructed on the site (Frazier 1993; USGS 1982). This mill operated a log sawmill. No wood-treating chemicals were used at this mill. A wigwam burner was used for burning scrap material (Frazier 1993). (See Section 2.3.4 for further details of the lumber mill.)

2.3.4 Lumber Mill Operations

The current operations on the site involve a lumber mill, SSF Building Materials, owned by Steve Frazier. It is one of the largest businesses of Northport, employing from 18 to 25 people. The entire site is used for the mill. The south half of the property holds the main lumber operations. The north half of the site, which contains the smelter remnants, is used to store lumber products and old metal parts (cars, piping, roofing).

The current lumber mill processes mostly cedar wood, originating in the form of rough dimension lumber, into exterior siding and exterior paneling. The mill process includes cutting the wood, drying the cut wood, and then shipping. Mill operations are run on propane. All water used for the mill operations is obtained from the city water supply. The mill does not discharge to or collect water from the Columbia River.

The scrap wood materials, including sawdust, are sent to Kettle Falls for the Kettle Falls Water Power Company, which burns the material for energy. Originally, the mill operation burned the scrap wood on site inside a wigwam burner (Frazier 1993). Although the on-site burning has been eliminated for years, the wigwam burner was observed on the site (URS 1993). No wood treating or chemical use is reported in the current and past mill operations (Frazier 1993).

2.3.5 Source Characteristics

Smelting operations produce a tailing waste referred to as slag. The slag was usually placed in piles near the smelter for temporary or permanent disposal. Historical photographs (1914-1921) indicate possible tailing piles were located on the northeast portion of the LeRoi property. Refer to Appendix B for the historical photographs. No visible evidence of tailing piles was observed during the 1993 site visit (URS 1993), although the slag piles could be covered by topsoil and vegetation, thus preventing their

identification. The location or process of disposal of the slag piles is unknown. Steve Frazier, the current site owner, indicated that the slag may have been deposited directly into the river. At the time of the 1993 URS site visit, brick masonry was observed in the river adjacent to the property. The brick appeared to be the remnants of the large smokestack (see Appendixes A and B).

Konrad Hartbauer, a long-time resident of Northport, stated that the smelter slag was used for bricks in residents' homes (Hartbauer 1993). The slag was broken into blocks approximately 9 by 12 inches. Being glossy black, they offered unique character for residents' basements (NOFC 1981).

The chemicals of concern in the slag would be gold, copper, lead, and tellurium. No surface impoundments were observed in the historical documentation of the site. Surface impoundments are commonly used in the smelting process for the collection of wastewater and could be a potential source of heavy metals (Larkin 1993). However, mining operations in the early 1900s likely disposed wastewater directly into a surface water body (e.g., the Columbia River).

No spills of any hazardous substances are known to have occurred on the property. No areas on the site were observed to be distressed. The site and nearby hills contained an abundance of young poplar trees, apparently replacing the logged coniferous trees (URS 1993).

2.4 INVESTIGATIVE AND REGULATORY HISTORY

2.4.1 Regulatory History for LeRoi

No regulatory investigation previously occurred at the LeRoi site.

2.4.2 Overall Regulatory History

Environmental concerns in the Northport area have been expressed and investigated since 1925. Because of its proximity to the Canadian border, the Northport area has received both air and water pollutants from Canadian mining, smelting, and milling operations. In 1925, the area became involved in the first international case concerning air pollution, the Trail Smelter Case (see Section 2.4.3). Recently, furan and dioxin pollutants from a pulp mill located in Castleguard, British Columbia, have been found in

the Columbia River near Northport. The Northport area has shown increased incidence of colitis and related intestinal disease, multiple sclerosis, diabetes, heavy metals poisoning, Parkinsons disease and related neurological problems, and immune and respiratory problems (WDH 1992; Walen 1993). The Washington State Department of Health (WDH) and Washington State Department of Ecology (Ecology) are conducting an investigation of the pollutants and their harm to the environment (Fields 1993). Additionally, a lead smelter in Trail, British Columbia, is a potential source for high lead concentrations in the air. WDH is conducting air monitoring of the area and blood lead level tests (Fields 1993). See Appendix C for further information on the investigations by Ecology and WDH.

Concerned citizens of the region have formed an organization, Citizens for a Clean Columbia. The organization is involved with the investigations concerning the health and environmental problems of the region.

2.4.3 The Trail Smelter Case of 1926 to 1934

A smelter in Trail, British Columbia, prospered during the 1920s and 1930s. The Trail smelter discharged sulfides into the air through a brick stack 409 feet high. The air pollution traveled south and remained trapped in the northern Stevens County Columbia River Valley. In 1925, the Trail smelter increased the discharge of sulfur dioxide into the air from 4,700 to 10,000 tons a month—11 times that of the old Northport smelter. The citizens of Northport complained that sulfur fumes were causing concern for their health and environment. They insisted their soils and forests were becoming sulfur poisoned, causing their crops and forest land to die. They formed a "Citizens Protective Association" that worked with local governments to try to save the community (NOFC 1981).

The United States State Department opened negotiations to collect damages from the Canadian government for the citizens of Northport. On February 28, 1931, the International Joint Commission recommended that the Canadian government stop polluting the atmosphere. This dispute is known as the Trail Smelter Case of 1926 to 1934. It was the first case of air pollution to come before an international tribunal.

3.0 EXPOSURE PATHWAYS OF CONCERN AND POTENTIAL TARGETS

3.1 GROUNDWATER PATHWAY

3.1.1 Geology and Hydrogeology

The geology of the Upper Columbia River Valley in Stevens County is composed of lacustrine and till deposits varying between medium- and coarse-size rocks (BCNRC 1956). Limestone is prevalent in the area (Ecology 1993a). Glacial movement caused the deposits of till. Till deposits provide high percolation of surface waters. The top of the aquifer (approximately 1,280 feet elevation) supplying the community water is nearly the same elevation as the bottom of the Columbia River (approximately 1,290 feet) (Schwab 1993; USGS 1982). Because of its proximity, the Columbia River provides the majority of recharge for the aquifer. Although the area has high percolation rates, rainwater causes little recharge for the aquifer because of an annual average net precipitation of only 9.55 inches (Appendix D).

Table 3-1 summarizes the general lithology of the site obtained from one of the municipal on-site wells (Ecology 1993a).

Table 3-1
Stratigraphy of the LeRoi Site

Depth (feet)	Description
0-25	clay with medium to coarse sand
25-75	fine sand (limestone)/silt/some clay
75-100	very fine sand (limestone)/water bearing
100-180	very fine sand (limestone)
180-190	fine sand (limestone)
190-230	sand/some coarse sand

Source: Well listings for on-site well from the Washington State Department of Ecology, Spokane office (Ecology 1993a).

3.1.2 Groundwater Targets

A total of 65 wells are located within a 4-mile radius of the site (Schwab 1993; USGS 1993; Ecology 1993a). Of the 65 wells, 62 supply domestic drinking water and 3 supply community drinking water. The total drinking water population is 494 people within a 4-mile radius of the LeRoi site (Schwab 1993; Ecology 1993a). A breakdown of these wells is shown in Table 3-2.

Table 3-2
Groundwater Drinking Populations Within 4 Miles of the LeRoi Site

Distance From Site (miles)	Number of Domestic Wells	Domestic Population	Number of Community Wells	Community Population	Total Population[a]
On-site	-	-	3	325	325
0-¼	-	-	-	-	0
¼-½	4	11	-	-	11
½-1	8	22	-	-	22
1-2	21	57	-	-	57
2-3	21	57	-	-	57
3-4	8	22	-	-	22
Total	62	169	3	325	494

[a]Based on an estimate of 2.71 people per household and a total population of 325 for Northport, Washington, to obtain person/household/well (USDC 1990; Ecology 1993a; USGS 1993).

The town of Northport has three drinking water wells with 202 connections supplying water to approximately 325 residents. The total production for these wells is 100,000 gallons per day. Well production ranges between 70 to 150 hundred gallons per minute. The wells are located on the LeRoi site just east of the former furnace building. The depths of the three wells range between 101 feet to 226 feet below ground surface (bgs). The depth to water is approximately 75 feet bgs (Ecology 1993a). The wells supply a storage tank (100,000-gallon capacity) located on the hill southeast of town. This system has been in place since 1969 (WFI 1993).

According to Joe Schwab, the water manager for the Northport Water System, there have been no problems with the town water. Well water is not chlorinated prior to

distribution. In accordance with WDH quality control, the water is tested monthly for water bacteria, quarterly for inorganics, and yearly for radiation. A review of the latest analysis indicated all potential contaminants are below the detection levels (URS 1993; Schwab 1993). The wells supplying the system have never run dry. Mr. Schwab expressed no concern for the water quality of the wells being impacted by the former smelter. He believes the depth was adequate to prevent leaching of potential contaminants to the aquifer (Schwab 1993). A summary of the Northport town wells is shown in Table 3-3.

Table 3-3
Northport Water System

Well Name	Total Depth (feet)	Average Production (gallons/minute)	Year Installed
Well #1	157	70	1969
Well #2	226	150	1971
Well #3	101	130	1978

Source: Washington State Department of Health, Environmental Health 1993. Water Facilities Inventory.

3.2 SURFACE WATER PATHWAY

3.2.1 Surface Water Flow and Quality

The LeRoi site is located along the upper Columbia River in northeastern Washington. This area is fairly dry, with an average annual precipitation of 20.29 inches (NOAA 1991) and a 2-year 24-hour precipitation of 1.2 inches (UW 1993). The average temperature during the winter months is approximately 30°F. Precipitation accumulates in the form of snow during these months.

Most of the runoff water would travel directly west from the south half of the property and southwest from the north half of the property to the Columbia River approximately 90 feet away, with an elevation decrease of approximately 50 feet. The site is not located within the 100-year floodplain.

The Columbia River is the only surface water body identified 15 miles downstream of the site. The river flow and elevation is controlled because of several dams located both upstream in Canada and downstream in the United States. An upstream dam is located approximately 15 miles upstream. The first downstream dam, Coulee Dam, is located approximately 50 miles downstream. The 50-mile stretch along the Columbia River from Coulee Dam to Northport is considered Lake Roosevelt.

A gaging station is located at the State Highway 25 bridge in Northport, near the site. The gaging station is maintained by the United States Geological Survey (USGS) in conjunction with the national stream quality accounting network program. Monthly, the flow and water quality samples are taken from this gage. The average flow for the river is 89,325 cubic feet per second (cfs). For the period between 1985 through 1986, the maximum flow for the river was 113,000 cfs and the minimum flow was 57,500 cfs (USGS 1986). At the time of the site visit, the river appeared to be 15 feet below its normal height. Two reasons are attributed to the low water level: water had been released from the downstream dam in anticipation of spring runoff, and the dam upstream has lessened the volume of water released because of construction of a bridge (Frazier 1993).

The surface water quality results from the 1986 and 1987 USGS summaries indicate unacceptable colony counts of bacteria (coliform fecal and streptococci fecal) during various months of the year. The remaining results indicate no problems (Appendix E).

The Columbia River water in the region is polluted with dioxins and furans possibly caused by a pulpmill located in Canada. Testing is currently being conducted to determine the source of the chemicals and effect the pollutants may have on the environment (see Section 2.3.5).

3.2.2 Surface Water Targets

Twelve surface water intakes are located 15 miles from the site downstream along the Columbia River. One surface water intake (Permit #4638), located approximately 15 miles downstream, is used for both domestic and irrigation water. The surface water right was obtained May 20, 1946. See Appendix F for a copy of the surface water right. The remaining surface water intakes are used for irrigation with the exception of one intake used for mining operations. No other surface water intakes were identified (Ecology 1993a).

Fisheries identified along the Columbia River within the 15-mile target distance consist of only nonanadromous species. No anadromous fish are found above the Chief Joseph Dam in Bridgeport, approximately 100 miles downstream from Northport. The fish species in this portion of the Columbia River include Rocky Mountain white fish (*Prosopium williamsoni)*, Kokanee (*Oncorhynchus nerka kennerlyi*), rainbow trout (*Salmo gairdneri*), walleye pike (*Stizostedio vitreum*), and white sturgeon (*Acipenser transmontanus*) (BCNRC 1956; Scott 1973). The white sturgeon is anadromous in most large rivers but landlocked in the upper Columbia River (Scott 1973). The white fish and the Kokanee are similar to their anadromous counterpart (Scott 1973). No information concerning the annual fish harvest was available for the northern Columbia River from the Washington State Department of Fisheries or Department of Wildlife (URS 1993).

According to Larry Lavoy, a fish biologist with the Washington State Department of Fisheries, many residents fish near Kettle Falls approximately 23 miles downstream from Northport along the Columbia River. The Washington State Department of Health has issued precautions concerning the consumption of fish collected from Lake Roosevelt (Columbia River above Coulee Dam) due to dioxins and furans. Additionally, the Tellgard Mill in Castleguard, British Columbia, is suspected to be responsible for the dioxin and furan contamination of the Columbia River (Lavoy 1993).

Wetland frontage 15 miles downstream of the LeRoi site consists of palustrine environments. The total wetland frontage for 15 miles downstream is approximately 5 miles of palustrine environments (URS 1993). No other sensitive environments were identified 15 miles downstream from the site (URS 1993; WDW 1993).

3.3 SOIL PATHWAY

3.3.1 Soil Description

The surface soils in the region are brown podzolic, gray wooded soils. These soils are light colored, relatively infertile, and poor in lime and iron. They are typically found in coniferous forests. Underlining the surface, the soils consist of intermingled glacial deposits that vary between medium and coarse sizes (BCNRC 1956). See Section 3.1.1 for a more complete description of soils.

3.3.2 Soil Targets

The LeRoi site is located within the city limits of Northport. All the residents of Northport, approximately 358 people, live within a 1-mile radius of the site (USGS 1982; USDC 1990). No residents live on the property. Six people are assumed to be residing within 200 feet of the east boundary of the site (USGS 1982; Schwab 1993). There are no daycares or schools within 200 feet of the site. A city park is located approximately 50 feet from the northwest boundary of the site. Access to this park is obtained by the site's access road. Access to the site is not restricted. Residential populations identified within a 1-mile radius of the site are summarized in Table 3-4.

Table 3-4
Resident Populations Located Within 4 Miles of the LeRoi Site

Distance From Site (miles)	Resident Population
0 to ¼	20
¼ to ½	261
½ to 1	77
1 to 2	57
2 to 3	57
3 to 4	22
Total Population	494

Source: USGS 1982, USDC 1990, Ecology 1993a, URS 1993.

3.3.3 On-Site Concerns

Between 18 and 25 full-time employees work with the current lumber mill located on site. Additionally the site is easy accessed and a city park encourages residents to approach the smelter on the west side of the property.

3.4 AIR PATHWAY

3.4.1 Regional Characteristics

The LeRoi site is located on the north side of Northport in a rural area. No other communities are within a 4-mile radius of the site. This area is within a valley that has been reported to collect air pollutants from the north. This area has a relatively cold and dry climate, with a monthly average rainfall of 1.7 inches (NOAA 1991).

3.4.2 Air Targets

The residential population within 4 miles of the site is detailed in Table 3-4. The closest resident is located within 200 feet of the LeRoi site (see Section 3.3.2).

Within 4 miles of the site are a total of approximately 120 acres of palustrine wetlands (WDW 1993). Three osprey breeding and nesting grounds are located within a 4-mile radius of the site (at distances of 1 mile, 2 miles, and 3 miles) (WDW 1993). All nests, however, are north of the site (upstream and upwind). Osprey are currently being monitored by the State of Washington and are not listed as endangered species with either the state or federal governments (WDW 1993).

Sheep Creek, which is located 2 miles upstream of the Columbia River, is identified as a critical spawning habitat for resident fish species (WDW 1993). No other sensitive areas were identified. No endangered species were identified in the area.

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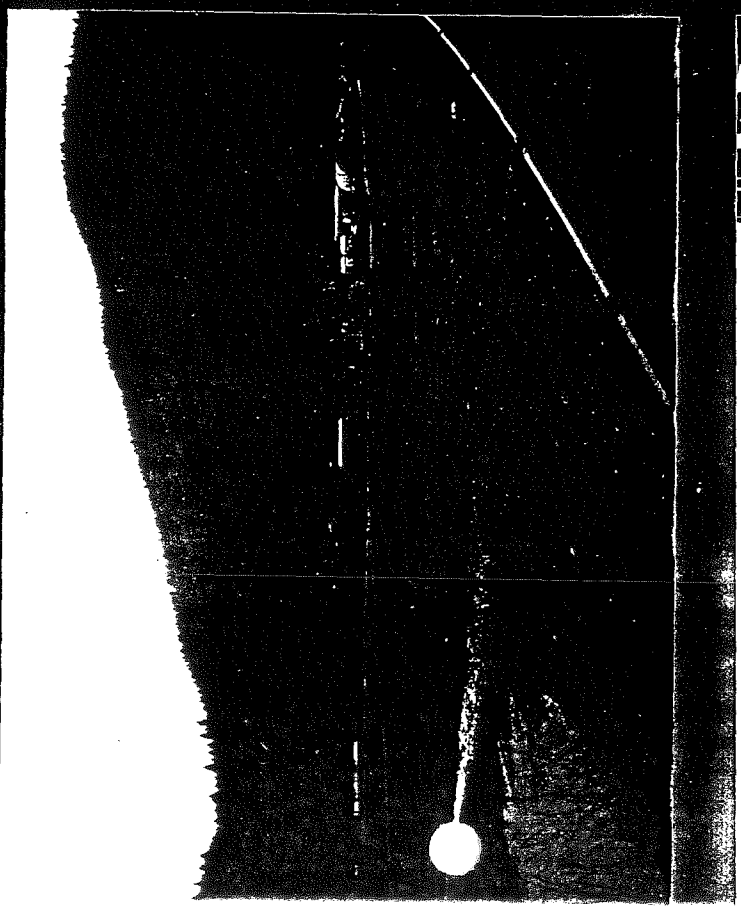
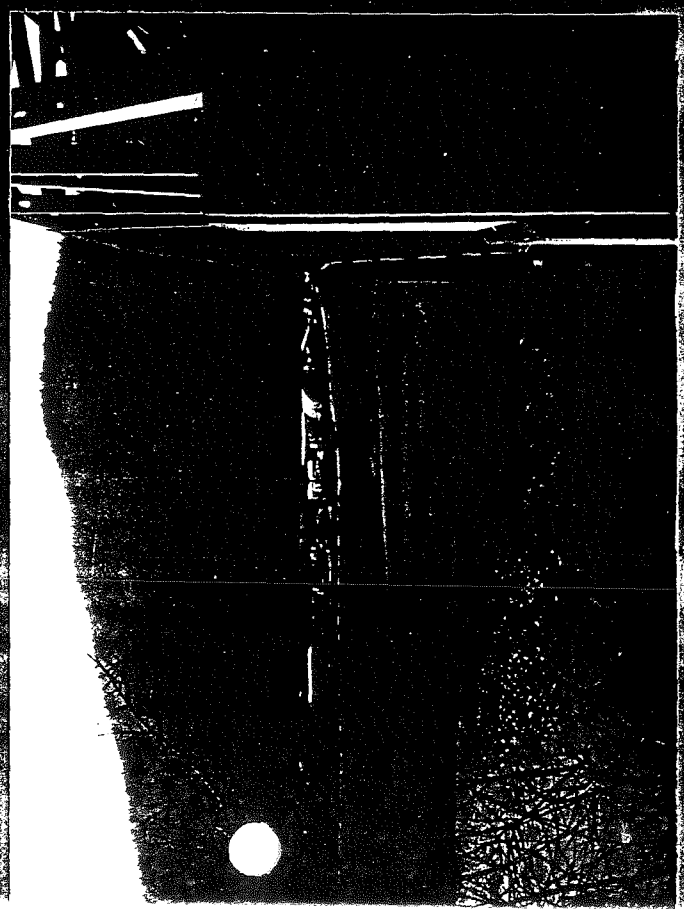
Appendix A
Photodocumentation

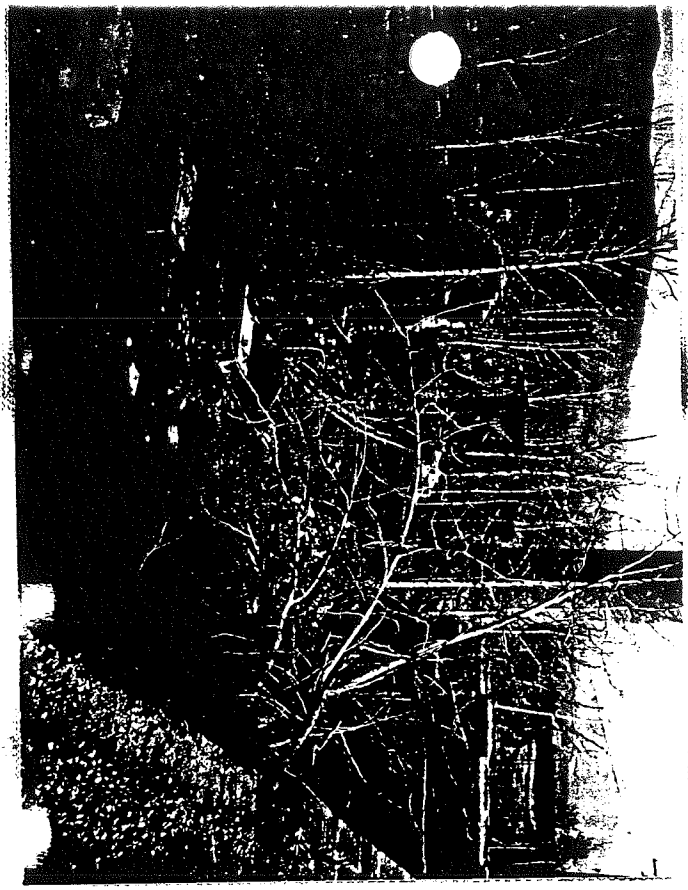
ARCS
Photograph Log

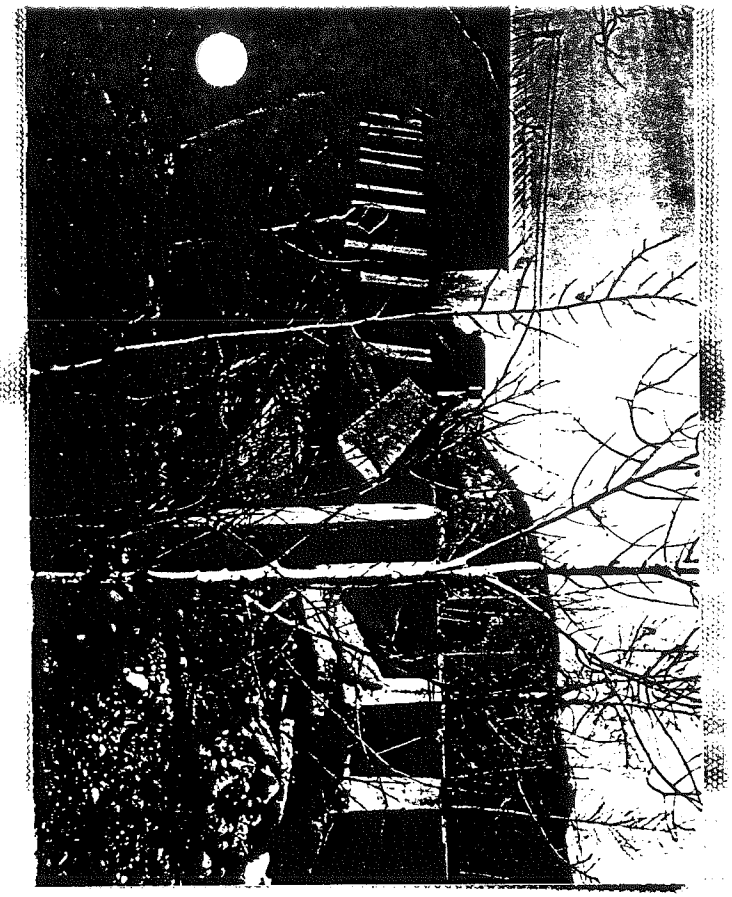
Project/Site Name

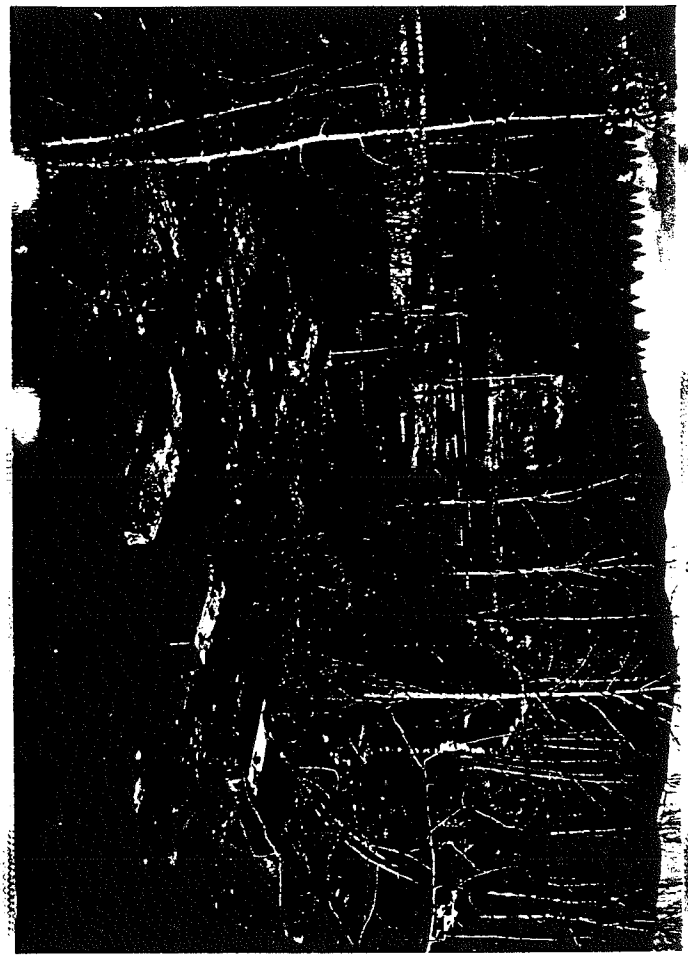
LeRoi Company Smelter

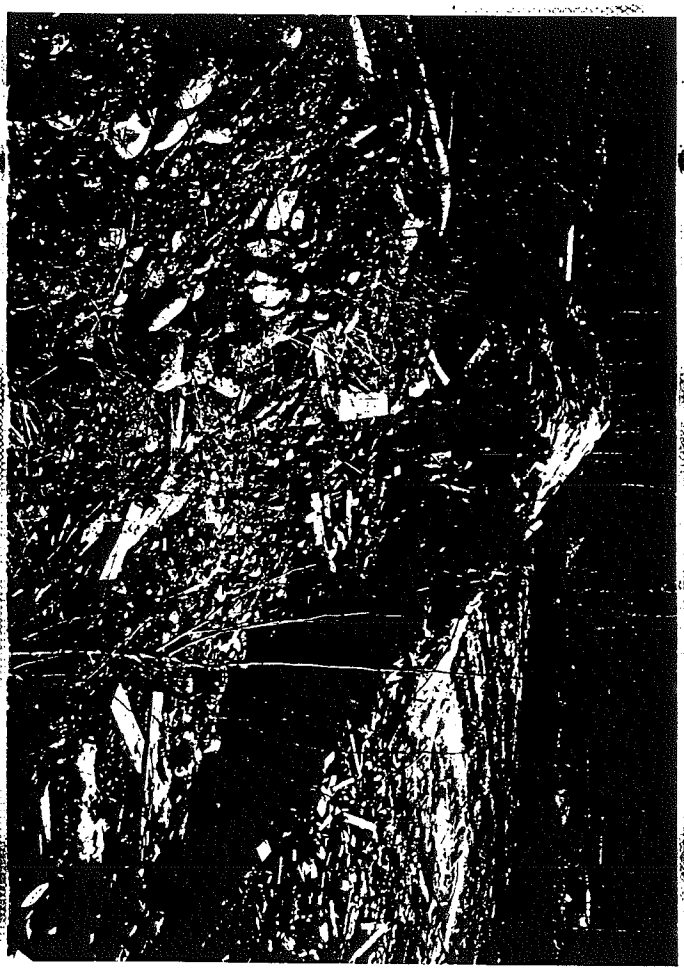


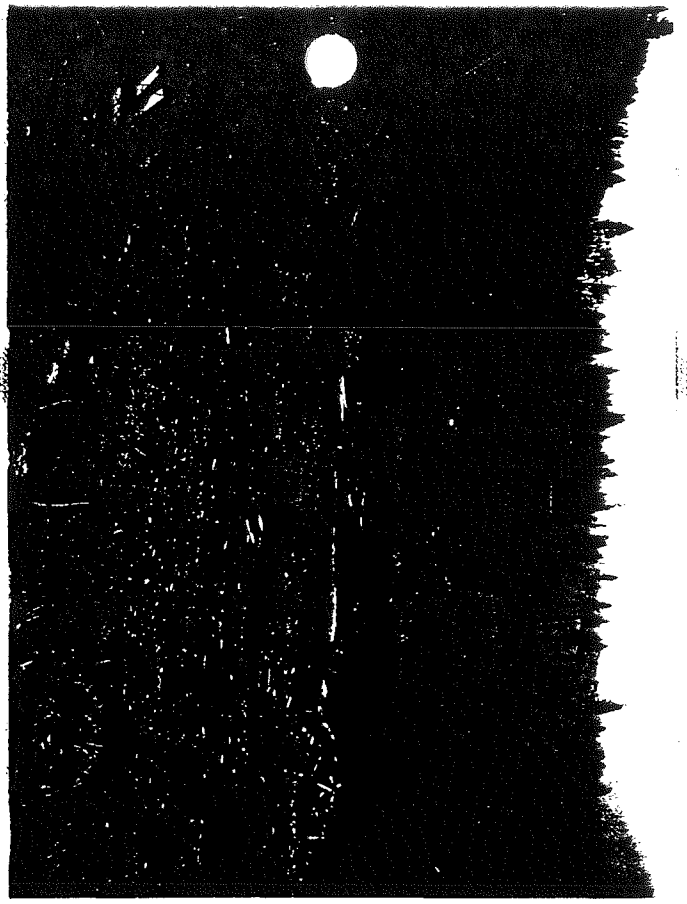


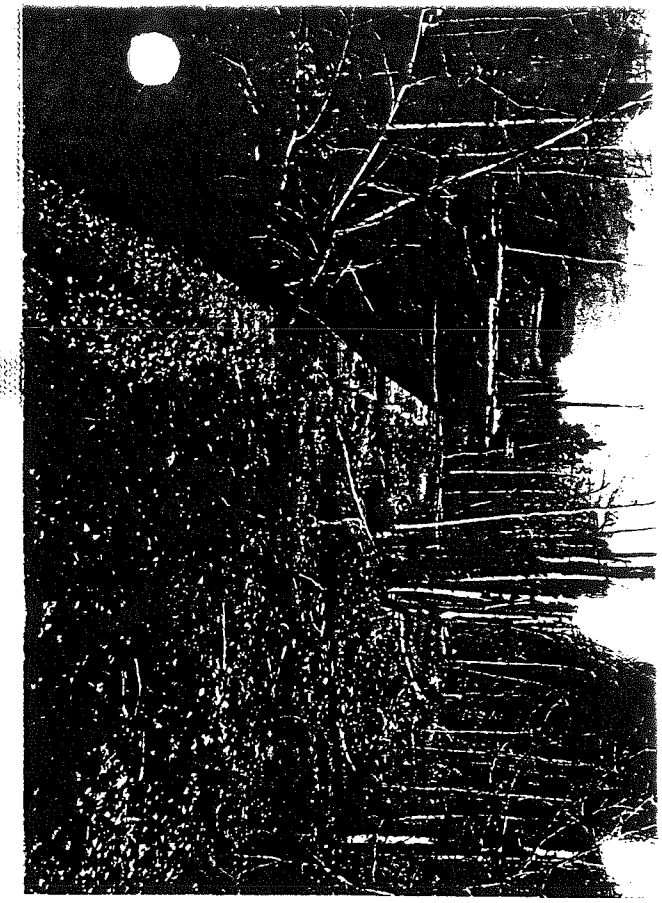


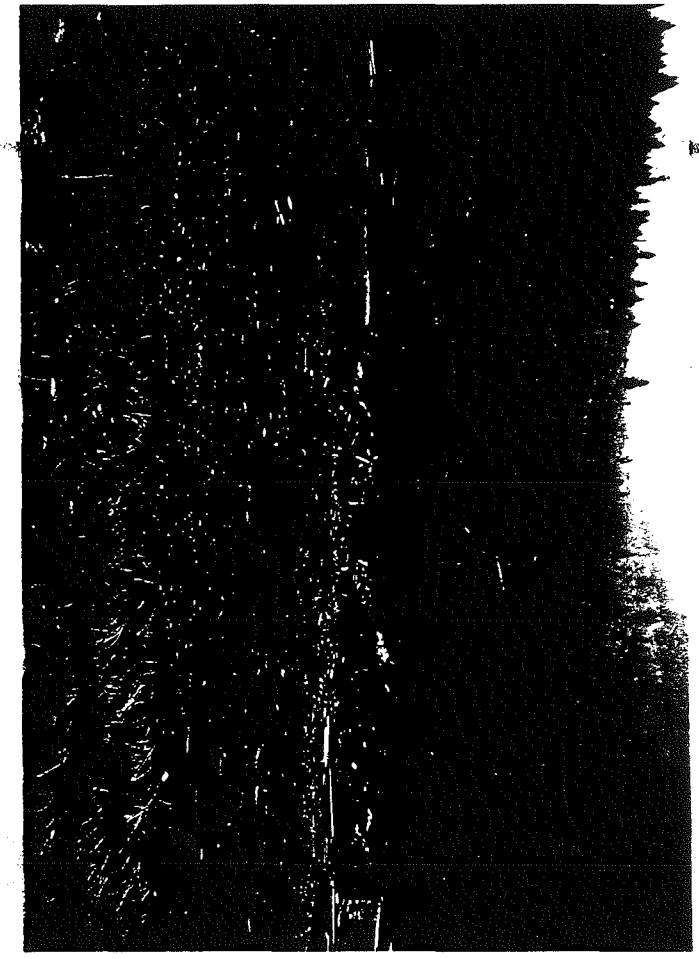


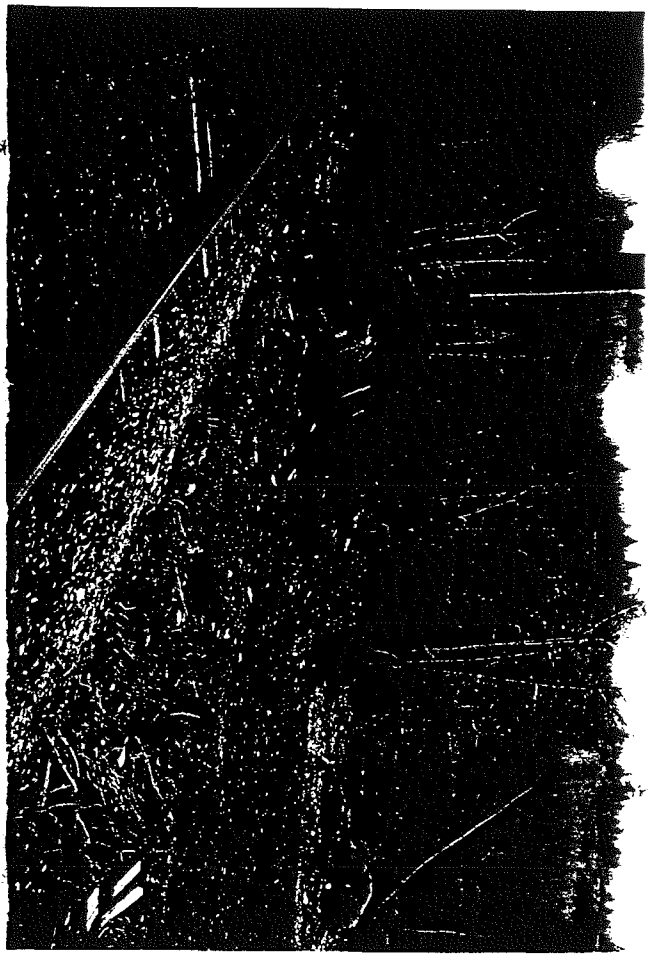


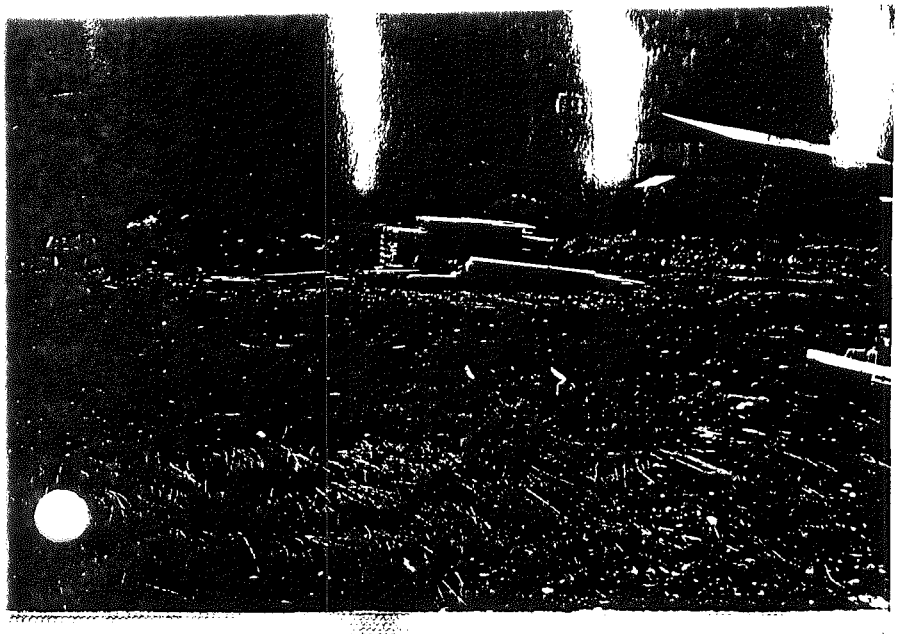


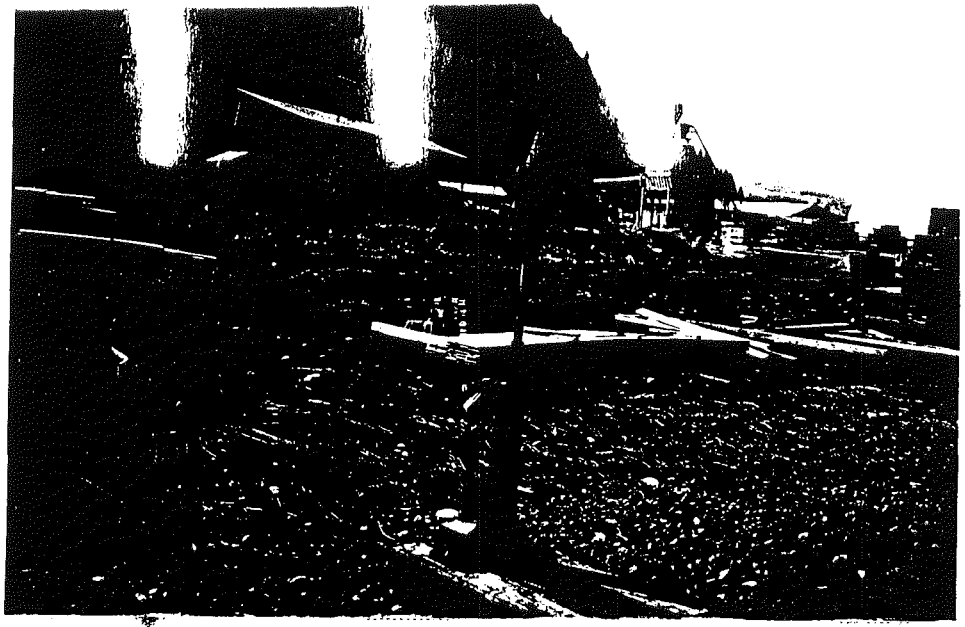


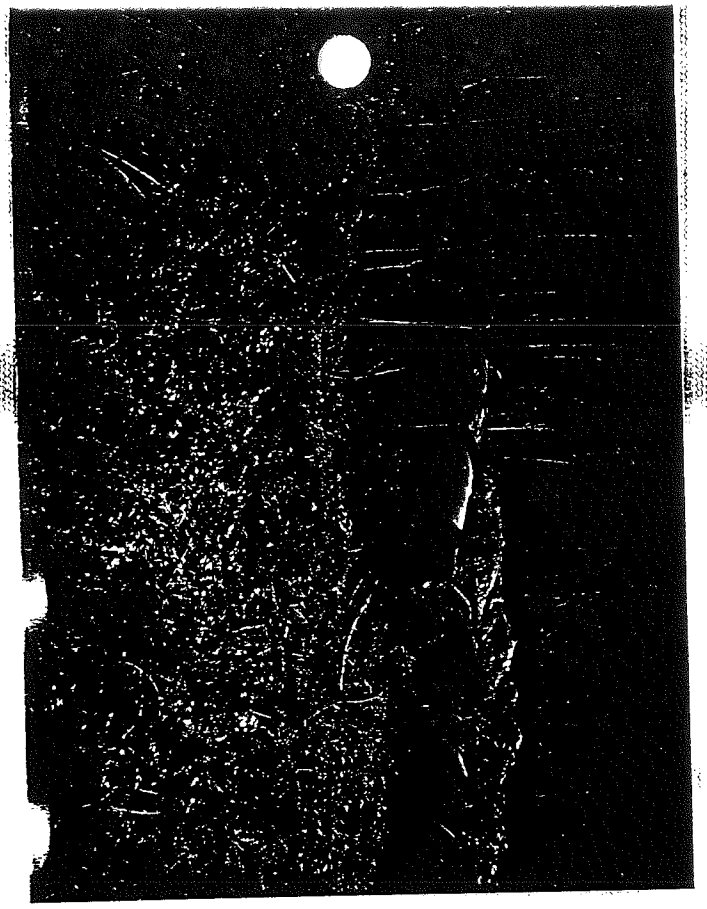


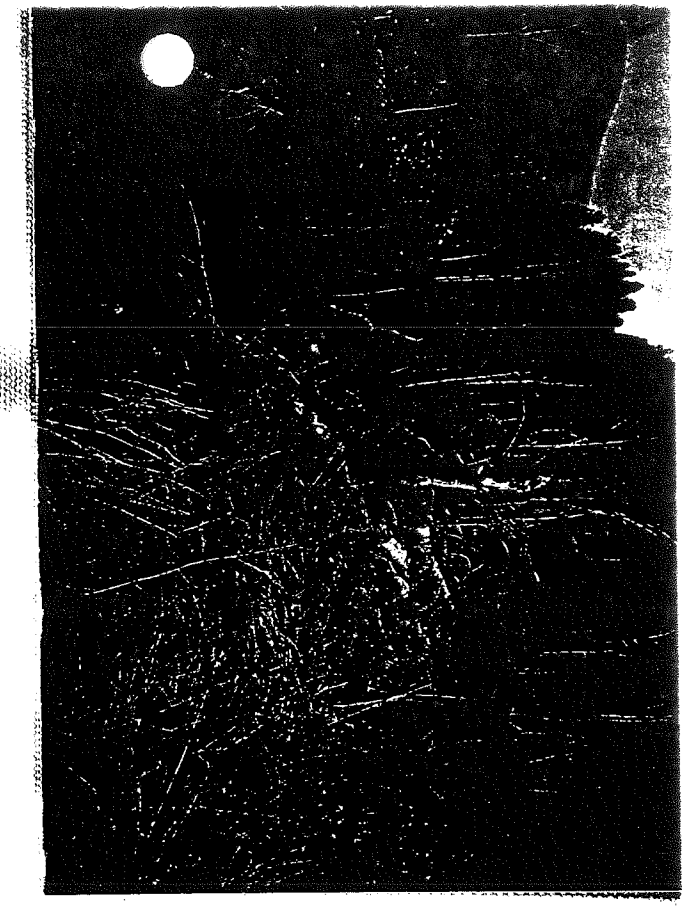


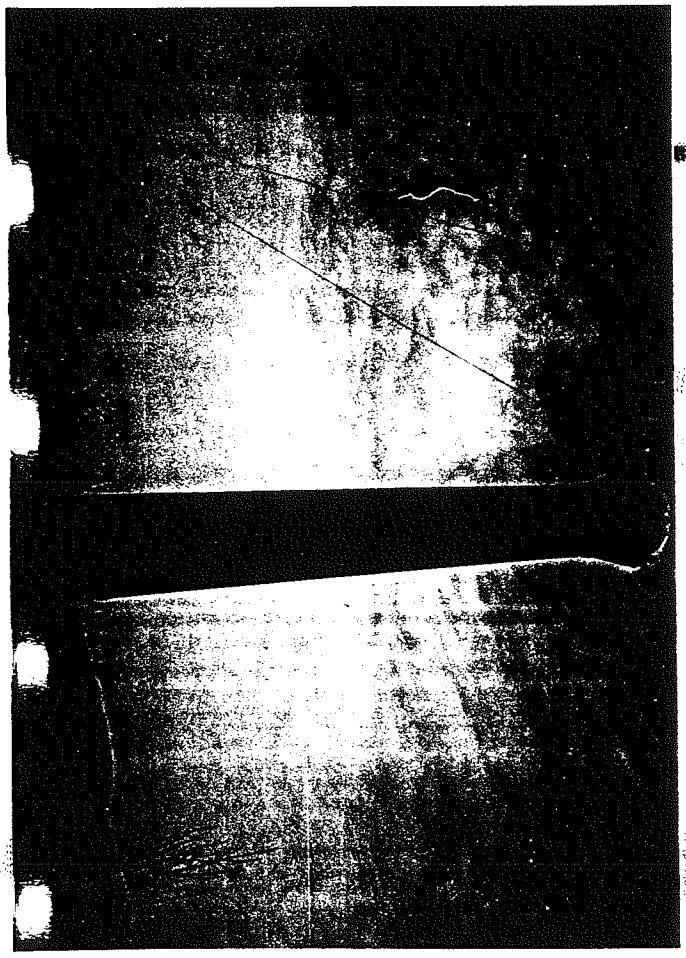


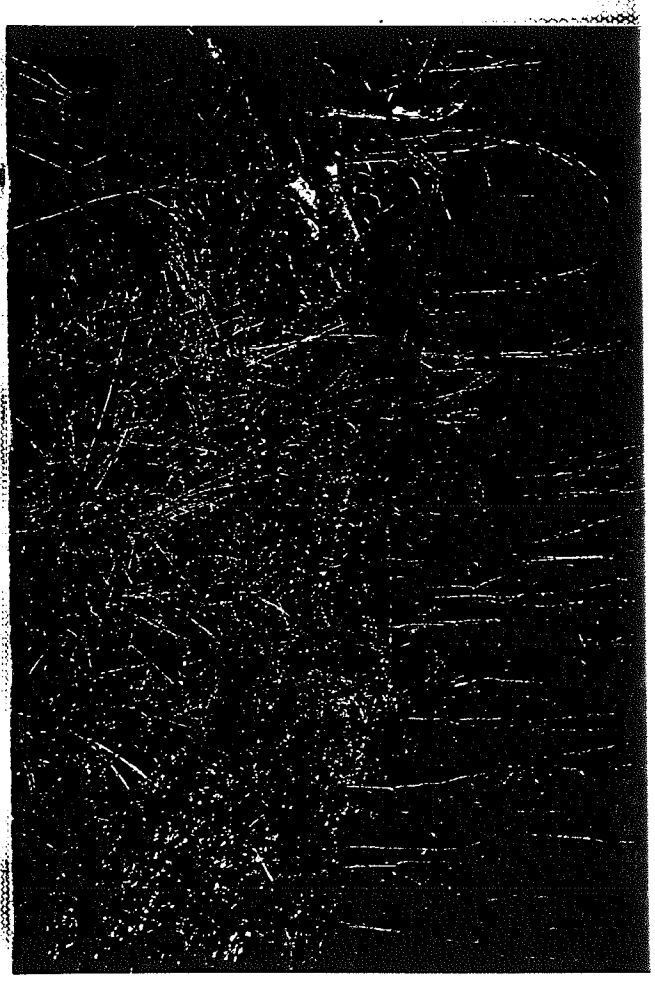


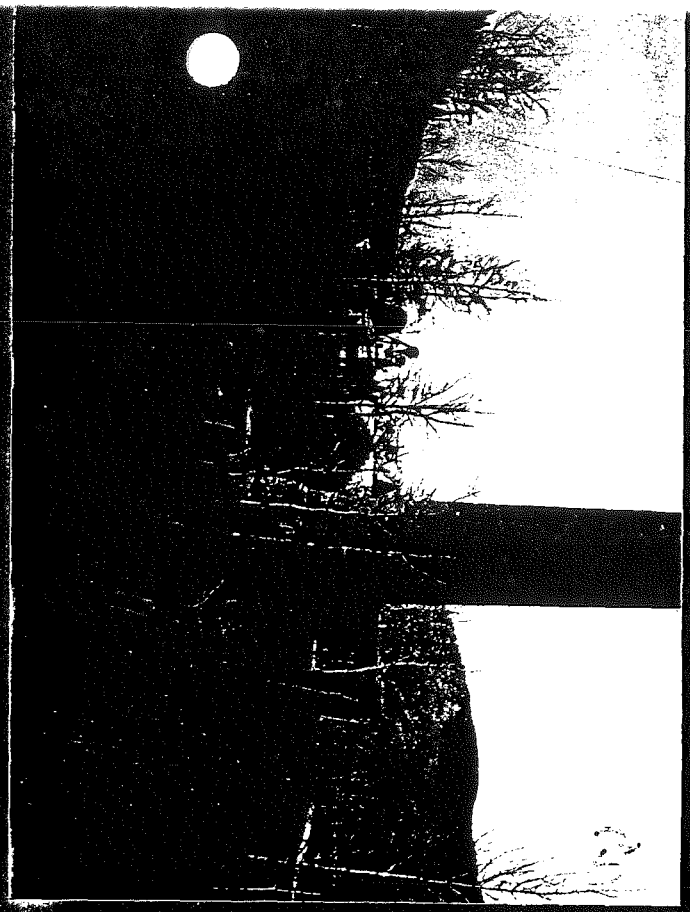


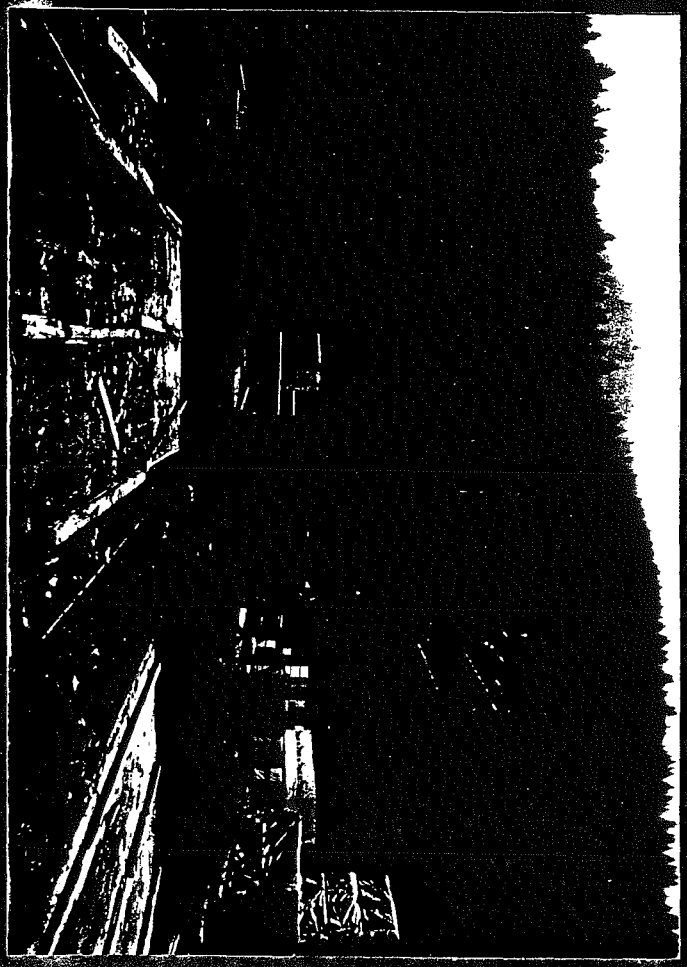


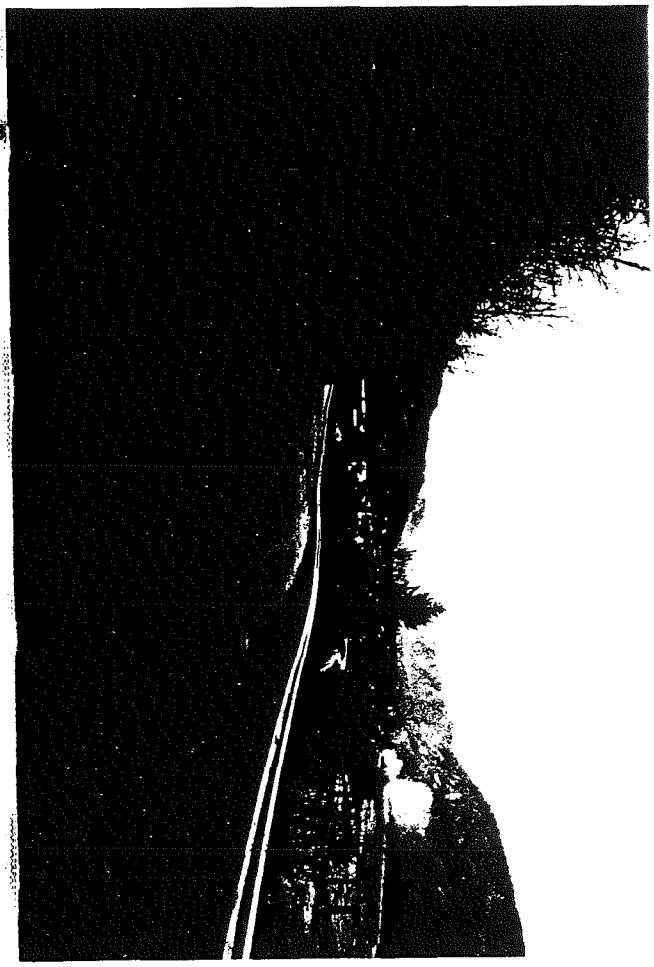












URS Consultants, Inc. Page 1	ARCS Photograph Log	DCL # 62750.08.20.258 18.c
Project Number: 62750.08	Project/Site Name: LeRoi Company Smelter	Photographer(s) Signatures(s): Jeff Kesner
Camera Type:	Film Type/Speed: 35 mm/200	Roll Number: One / Date: 3/29/93

Frame	Date	Time	Orientation	Subject
1	3/29/93	9:01	East	Panorama of lumber mill and smelter.
2	3/29/93	9:02	East	Former smelter.
3	3/29/93	9:02	East	Current lumber mill.
4	3/29/93	9:18	South	City water well house (1 of 3).
5	3/29/93	9:20	NW	Panorama of smelter area.
6	3/29/93	9:22	N	Smelter.
7	3/29/93	9:26	SW	City well #2 of 3.
8	3/29/93	9:26	NW	City well #3 of 3.
9	3/29/93	9:34	SE	Concrete foundations.
10	3/29/93	9:35	NE	Debris dump.
11	3/29/93	9:37	NW	Panorama of existing stack and city park.
12	3/29/93	9:37	NW	Panorama of existing stack and city park.
13	3/29/93	9:37	North	Panorama of existing stack and city park.
14	3/29/93	9:41	North	Panorama of site from railroad tracks.
15	3/29/93	9:41	NE	Panorama of site from railroad tracks.
16	3/29/93	9:41	East	Panorama of site from railroad tracks.
17	3/29/93	9:41	East	Panorama of site from railroad tracks.
18	3/29/93	9:41	SE	Panorama of site from railroad tracks.
19	3/29/93	9:41	SE	Panorama of site from railroad tracks.
20	3/29/93	9:41	South	Panorama of site from railroad tracks.
21	3/29/93	9:48	North	Panorama of north end of site.
22	3/29/93	9:48	North	Panorama of north end of site.
23	3/29/93	9:48	NE	Panorama of north end of site.
24	3/29/93	9:49	South	Smelter stack.
25	3/29/93	9:49	South	Smelter stack.
26	3/29/93	9:55	East	Smelter Building located near mill.
27	3/29/93	10:11	North	Smelter rock from city dock.

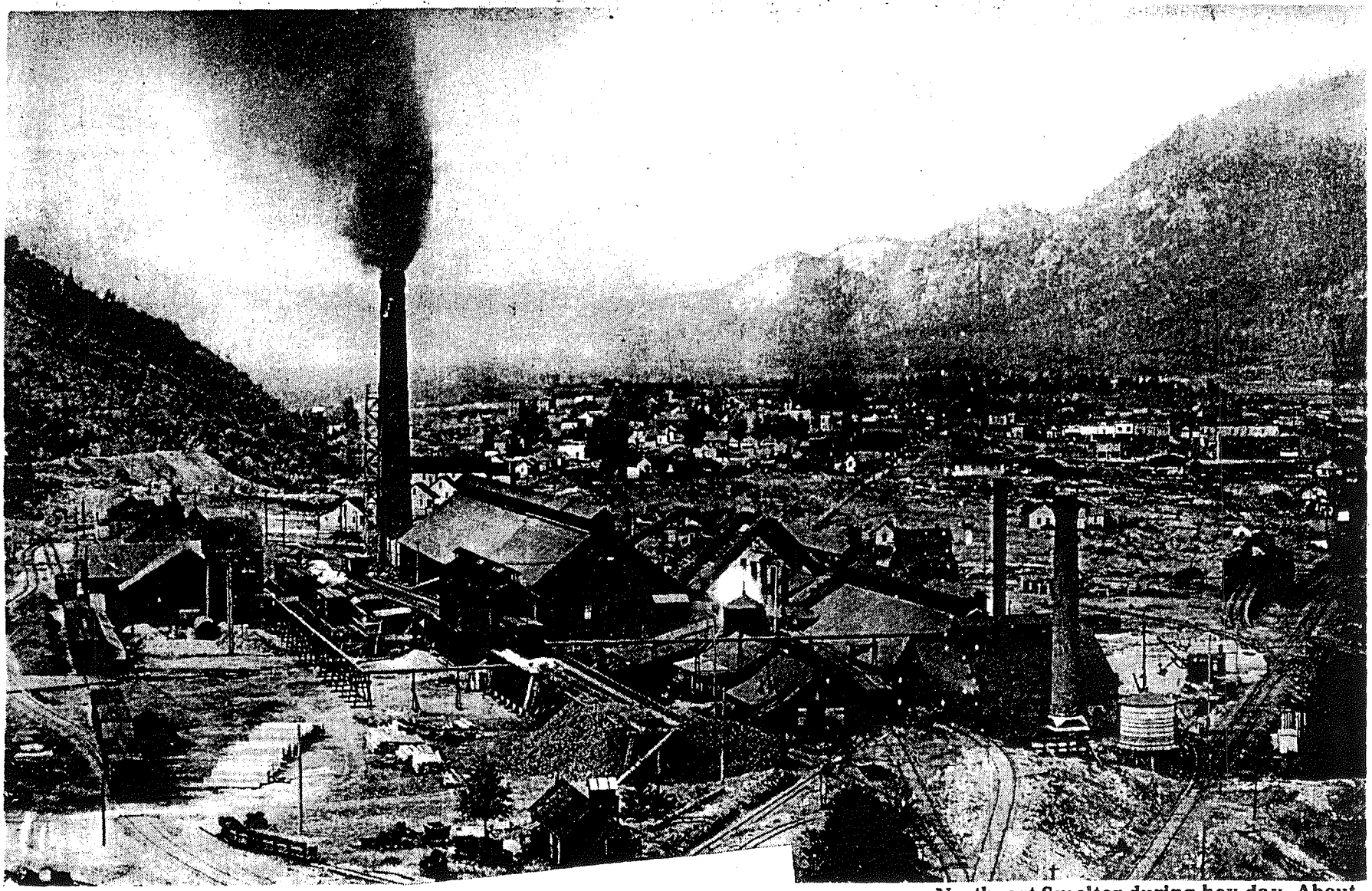
Date Delivered to Processor	Date Received from Processor	Comments

URS Consultants, Inc. Page 2	ARCS Photograph Log	DCL # 62750.08.20.258 18.c
Project Number: 62750.08	Project/Site Name: LeRoi Company Smelter	Photographer(s) Signatures(s): Jeff Kesner
Camera Type:	Film Type/Speed: 35 mm/200	Roll Number: One / Date: 3/29/93

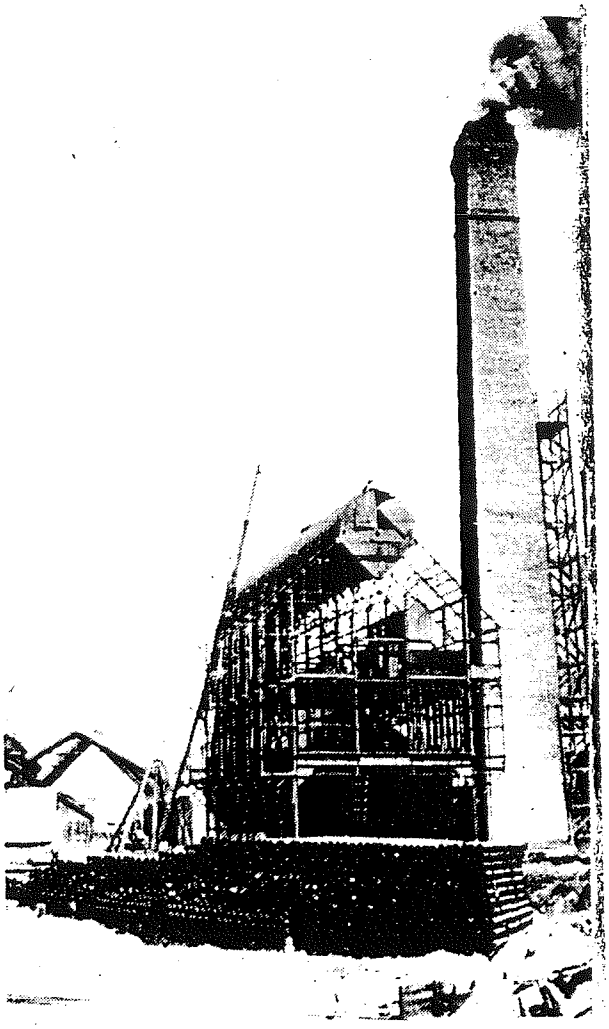
Frame	Date	Time	Orientation	Subject
28	3/29/93	10:16	NE	Smelter debris in Columbia River.
29	3/29/93	10:16	SW	Smelter debris in Columbia River.
30	3/29/93	10:18	South	Remains of smelter.
31	3/29/93	10:18	North	Remains of smelter.
32	3/29/93	10:28	West	Panorama of site.
33	3/29/93	10:28	SW	Panorama of site.
34	3/29/93	10:28	South	Panorama of site.
35	3/29/93	11:01	0	Photo of photo of smelter 1874.

Date Delivered to Processor	Date Received from Processor	Comments

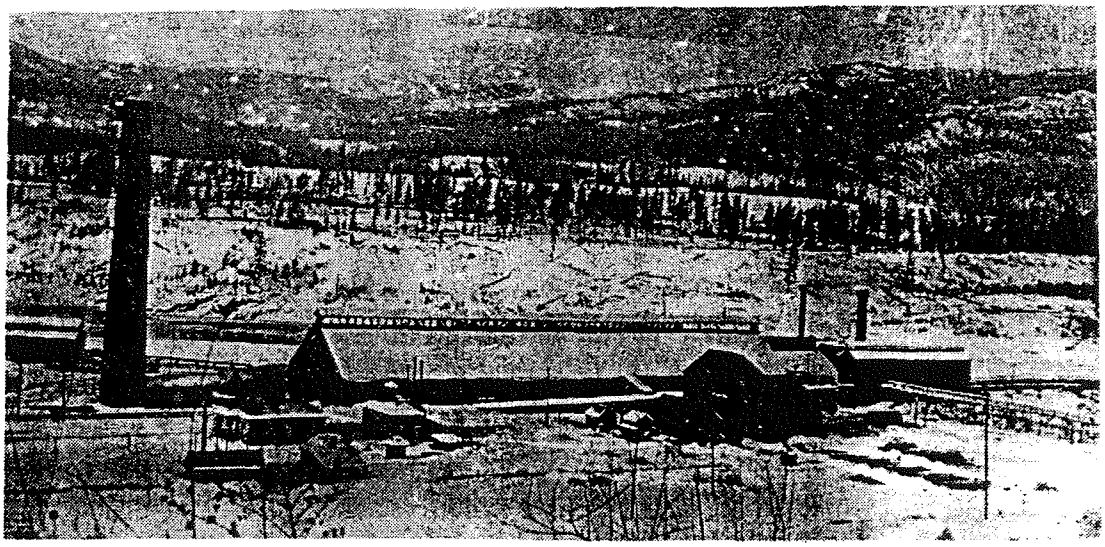
Appendix B
Historical Photographs



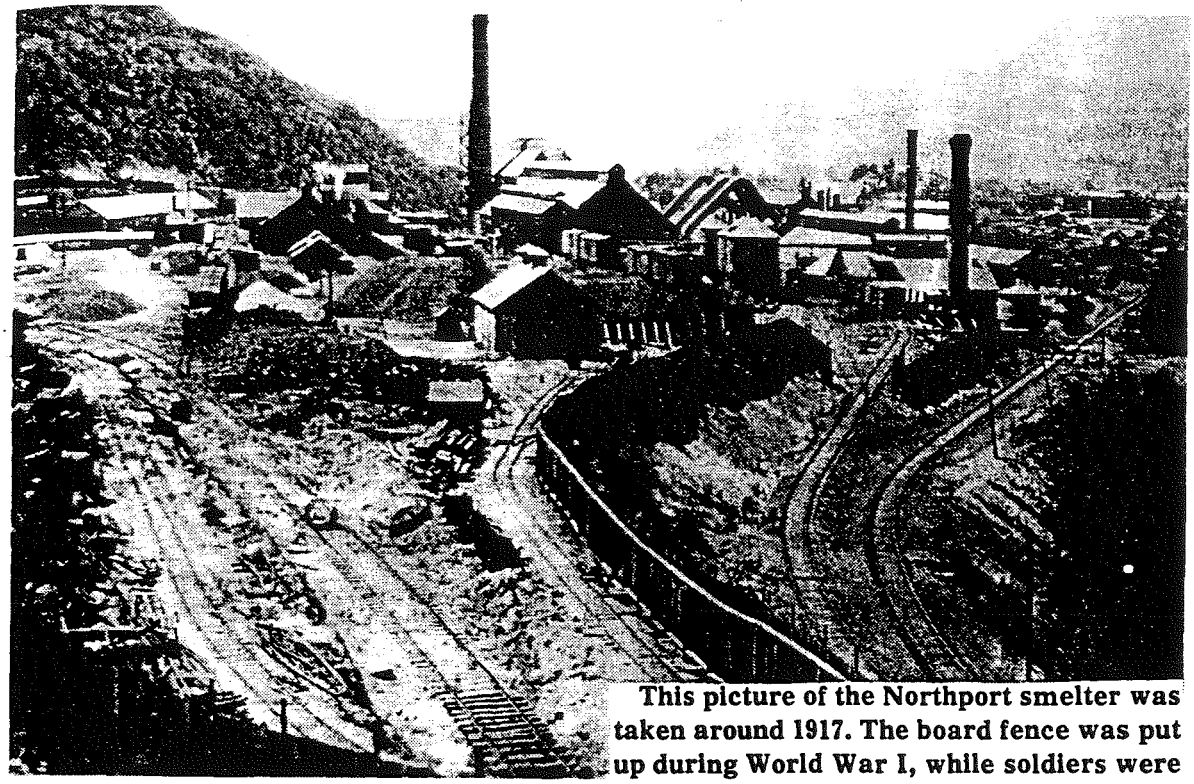
Northport Smelter during hey day. About 1914.



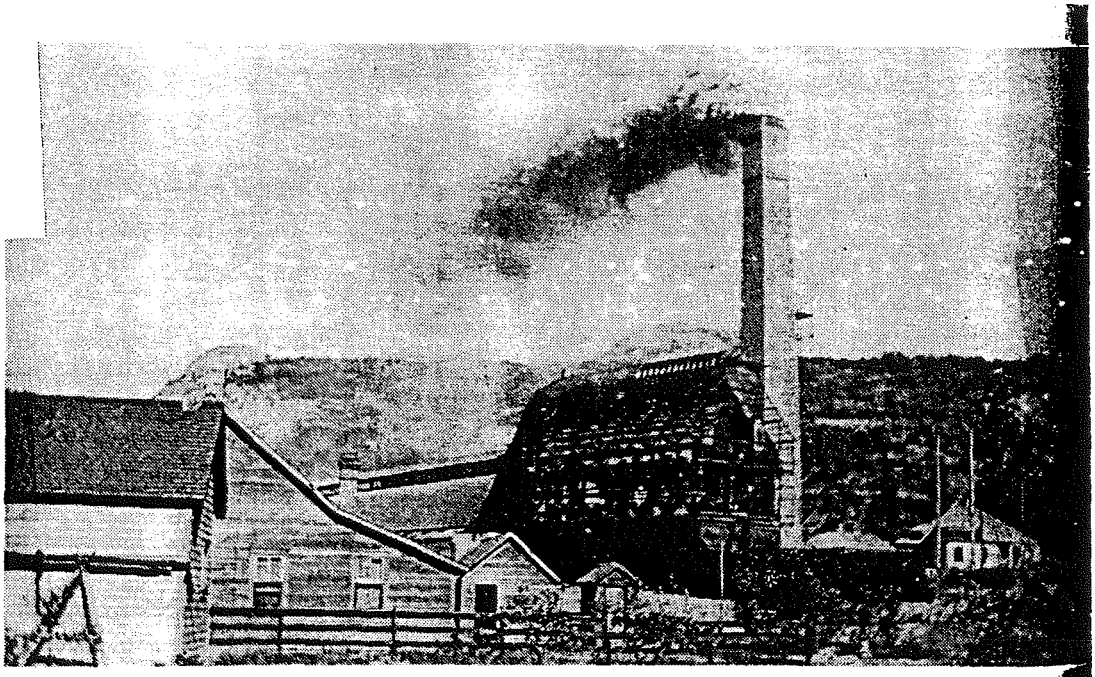
Northport Smelter stack. 850 pipes in foreground.



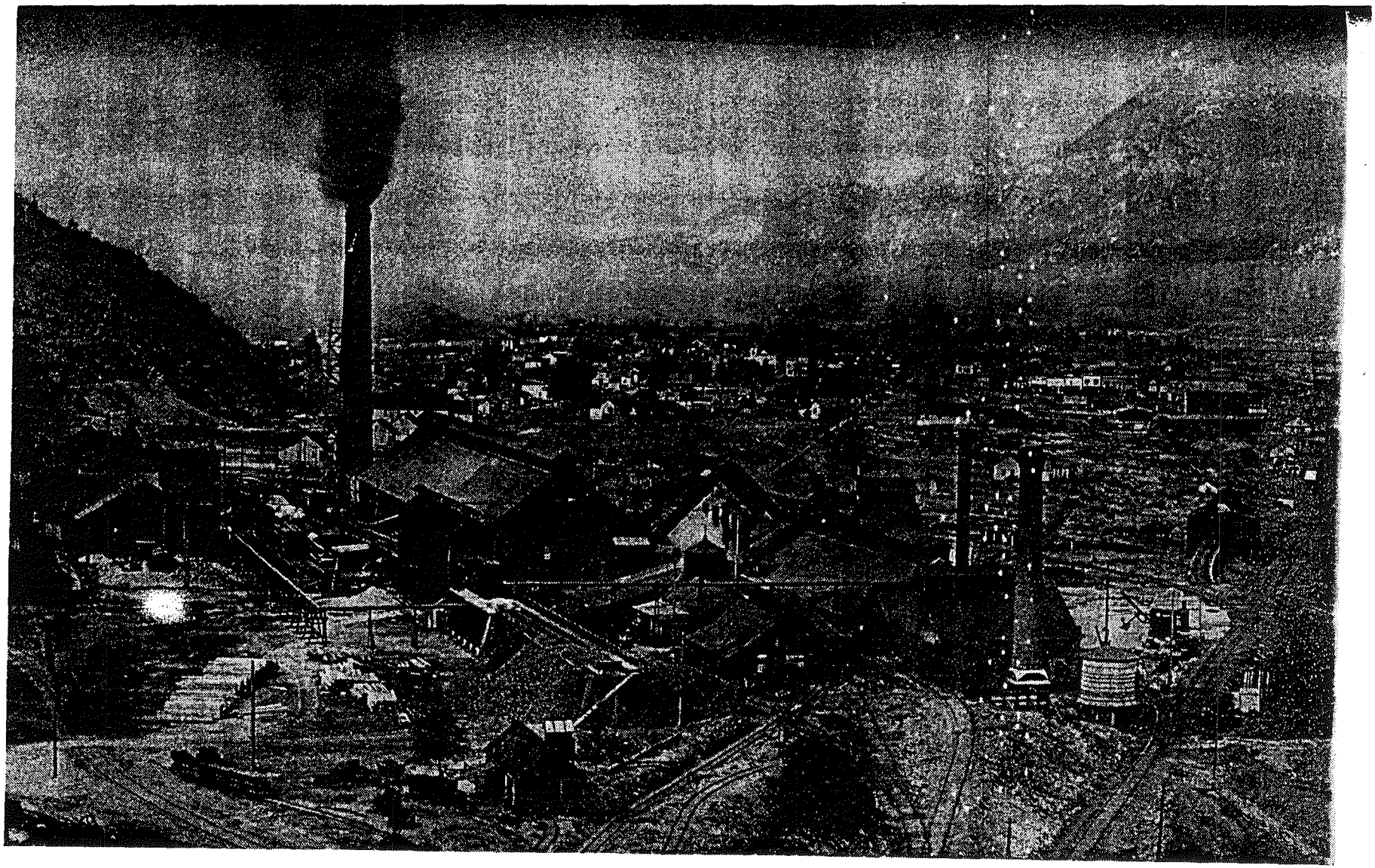
Northport smelter - Early picture.



This picture of the Northport smelter was taken around 1917. The board fence was put up during World War I, while soldiers were guarding the smelter.

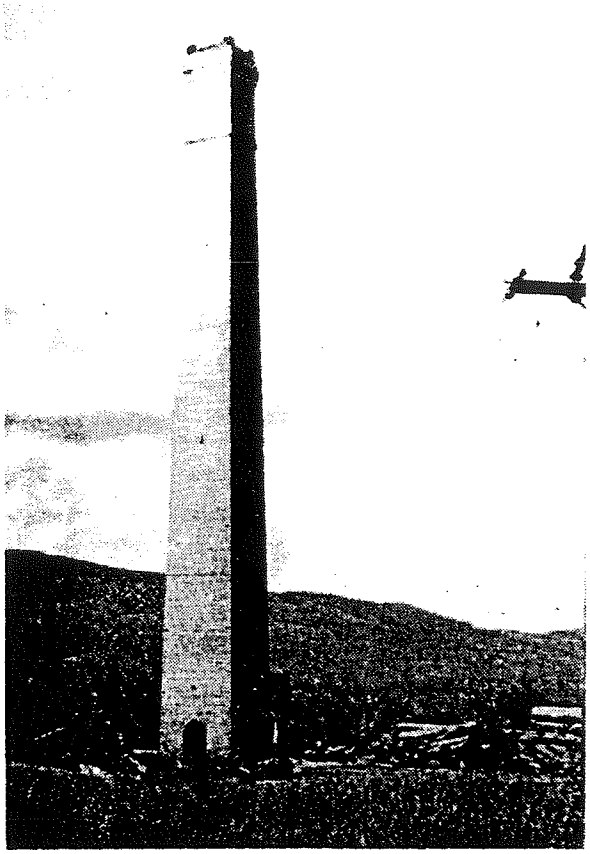


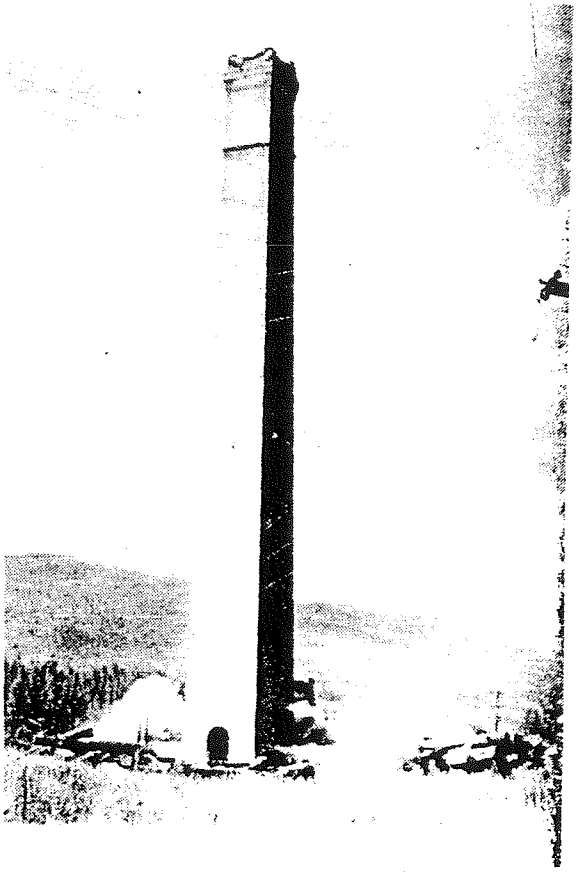
Smoke pours from Northport stack.



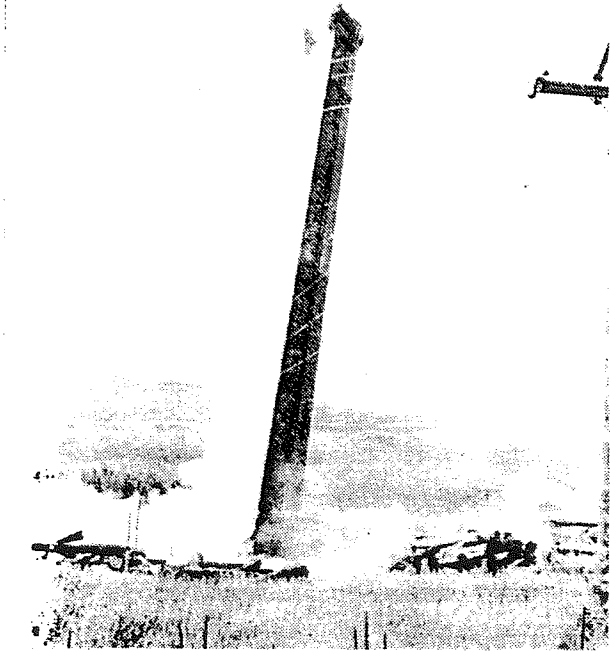
Northport Smelter about 1915.

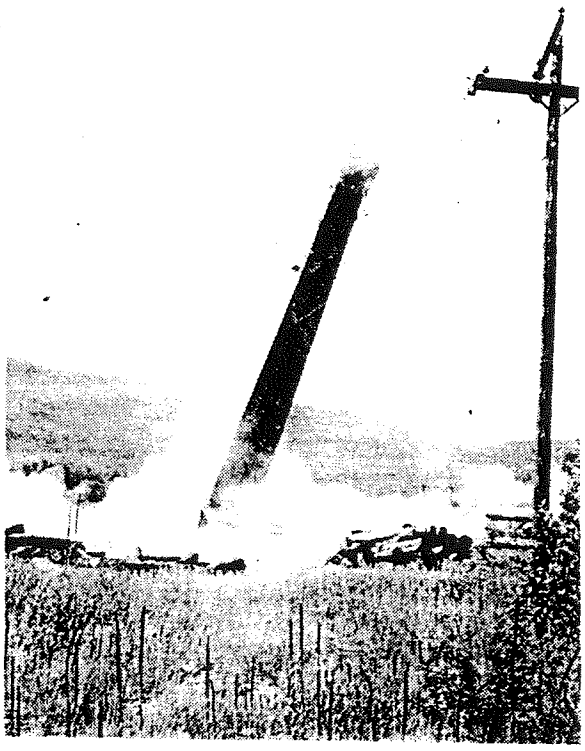
Ore Smelter at Northport.

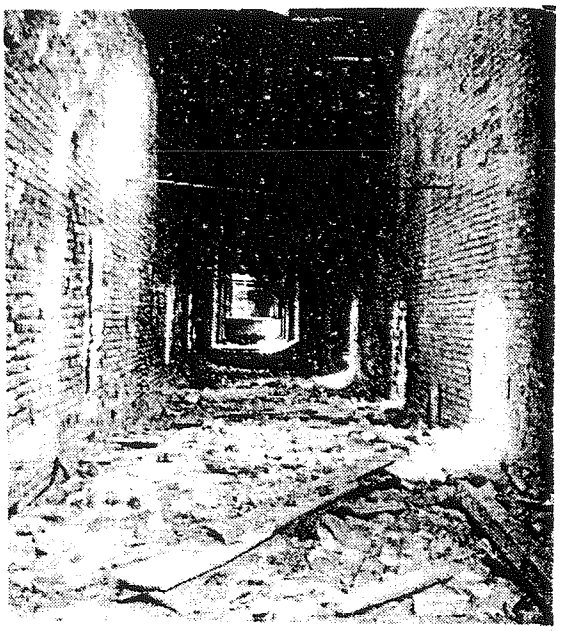




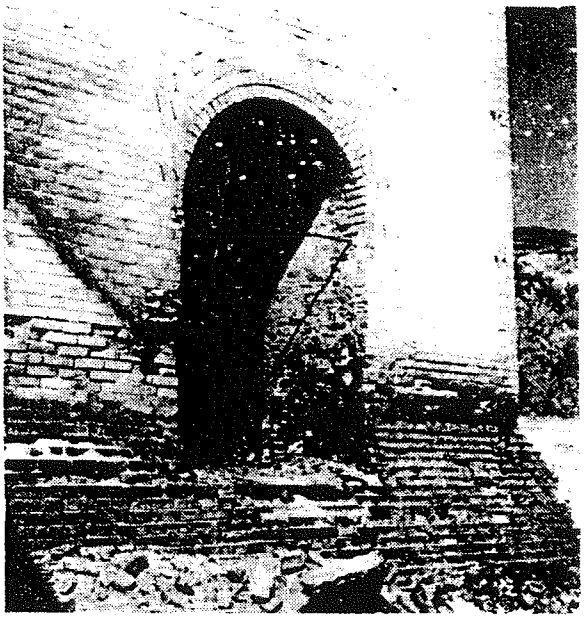
Old Northport Smelter smoke stack comes down. Last remains of once proud smelter.

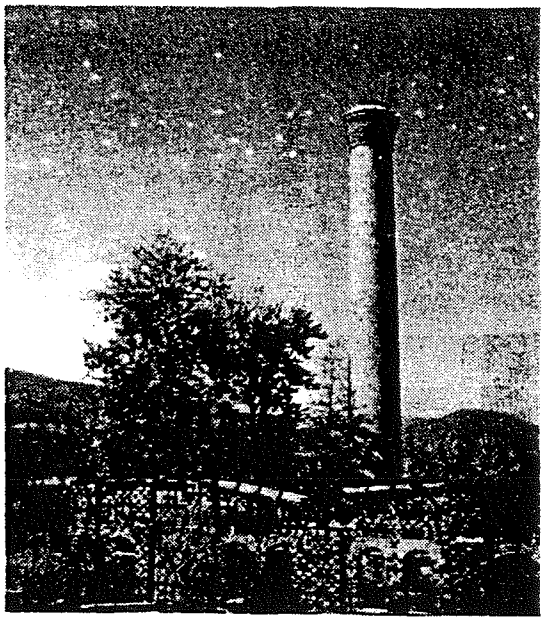






NORTHPORT SMELTER - In last years of decay. Pictures from book "Washington Ghost Towns" by Lambert Florin, Portland, Ore. and published by Superior Publishing, Seattle, Wash.





Appendix C
Washington State Department of Health Investigations

CITIZENS FOR A CLEAN COLUMBIA
Telephone 509-725-5024

"Committed to protecting the Columbia River and its tributaries"

CITIZENS WORKING WITH GOVERNMENT AND INDUSTRY FOR A HEALTHY ENVIRONMENT AND STRONG ECONOMY

DATE: May 28th, 1992 - 7:00 p.m.

PLACE: Northport School

PURPOSE: Washington State Department of Health Study

Citizens for a Clean Columbia believe that from a healthy environment will come a strong economy and a strong economy is essential to a healthy environment. While working with various agencies to create a healthier Columbia River it was brought to our attention that there are a host of illnesses suffered by area residents.

Do you, members of your family, children or friends have vague health problems that seem to defy diagnoses? Do you know someone who has had to move from our area because they were sick? Do they seem to feel fine living somewhere else? Do you, or do you know someone with serious of life threatening health problems that seem to be more prevalent here than in other areas considering the population base? How many people do you know that are disabled?

(1) The Northport area has shown increased incidence of colitis and related intestinal disease, multiple sclerosis, diabetes, heavy metals poisoning, Parkinsons and related neurological problems, immune and respiratory problems. Symptoms may include chronic constipation or diarrhea, muscle cramps, muscle tics or twitching, arthritic conditions, double vision, ringing in the ears, headaches and chronic allergies, etc.

Plan to attend the May 28 Washington State Department of Health meeting in Northport for an open discussion of these regional health issues.

British Columbia Governmental Officials and businesses have been invited to attend this meeting. We support their efforts to develop alternate slag disposal and zero-discharge of dioxins in the future.

C.C.C. members have cond ed a health survey in Northport an' 'een instrumental in encouraging the D.O.H. to hold the meeting in Northport. C.C.C. funds have fina. ed this public service mailing and your support for this will be greatly appreciated in order to keep the public informed of future mailings. All donors will be placed on our mailing list. Meetings are open to the public.

Name _____

Address _____

Phone _____

Yearly Membership: $25.00

Please send membership or any tax deductible donation to:

Citizens for a Clean Columbia
3918 Haag Road
Kettle Falls, WA 99141

Citizens for a Clean Columbia
Box 588
Northport, WA 99157

Citizens for a Clean Columbia
Rt. 1, Box 716
Davenport, WA 99122

Important Washington State Department of Health Announcement

POSTAL PATRON

BULK RATE
U.S. POSTAGE
PAID
Permit No. 43
Kettle Falls, Wash.

Appendix D
Calculations

URS CONSULTANTS, INC.

[redacted]

Calculation for Net Precipitation

Calculation performed according to HRS Final Rule
(40 CFR Part 300), Section 3.1.2.2 using formulas:

Date: 04/05/93
Site: LeRoi Company Smelter
Latitude: 48 55' 15" N
Longitude: 117 46' 15" W

Individual of Data Entry: Michelle Wittenbrink
Type of Temperture (C or F): F
DATA Available Temperture or Evap. (D or E): D
>Latitude (50,45,40,35,30,20,10,0): 45.00

Net Precipitation = Monthly Precipitation - Evapotranspiration (E)
E(Jan..Dec) = 0.6*F(Jan..Dec)[10T(Jan..Dec)/I] ^ a
Variables:

E(Jan..Dec) = Monthly potential evapotranspiration, if E<0 then E=0 is used

F(Jan..Dec) = Monthly latitude adjusting value

T(Jan..Dec) = Mean monthly Temperature (Centigrade)

I = Sum[T(Jan..Dec)/5] ^ 1.514

a = 6.75*(10^-7)*(I^3)-7.71*(10^-5)*(I^2)+1.79*(10^-2)*I+0.49239

(Fill in only the shaded spaces)

Month	Monthly Variables: Enter what is available: Degree (C or F)	Precipitation	Evaporation		Calculated Variables: Variable T	Variable I	Variable a	Variable F	Variable E	Difference Variables: Precip-Evap.	Positive P-E
Jan	25.60	2.33		#	-3.56	-0.31		0.80	-0.42	2.33	2.33
Feb	32.00	1.64		#	0.00	0.00		0.81	0.00	1.64	1.64
March	38.90	1.35		#	3.83	0.67		1.02	0.59	0.76	0.76
April	48.00	1.28		#	8.89	2.40		1.13	1.69	-0.41	0.00
May	57.60	1.87		#	14.17	4.89		1.28	3.25	-1.38	0.00
June	64.00	1.92		#	17.78	6.91		1.29	4.24	-2.32	0.00
July	69.80	0.98		#	21.00	8.91		1.31	5.20	-4.22	0.00
Aug	68.10	1.36		#	20.06	8.31		1.21	4.56	-3.20	0.00
Sept	59.70	1.16		#	15.39	5.55		1.04	2.90	-1.74	0.00
Oct	47.60	1.64		#	8.67	2.31		0.94	1.37	0.27	0.27
Nov	35.50	2.11		#	1.94	0.24		0.79	0.21	1.90	1.90
Dec	28.90	2.65		#	-1.72	-0.15		0.75	-0.17	2.65	2.65
Average Annual Precipitation		20.29									
						Total I	Variable a				TOTAL
						39.72	7110.61				9.55

NET PRECIPITATION = 9.55 INCHES

[redacted]

URS Consultants, Inc.

Calculation of Well Population

Site Name LEROI

Work Assignment No. 54-16-0JZZ

CERCLIS Id. No. WAD988507323

(PA) SI SIP (circle one)

Calculation by Michelle Wetterlund 4/20/93
Date

Checked by [signature] 4/21/93
Date

Radius (mi)	No. of City Wells	City Well Population	No. of Comm. Wells	Comm. Well Pop.	No. Of Private Wells	Private Well Pop.	Total Well Pop.
onsite	3	325	Ø	Ø	Ø	Ø	325
0-1/2	Ø	Ø	Ø	Ø	4	11	11
1/2-1	Ø	Ø	Ø	Ø	8	22	22
1-2	Ø	Ø	Ø	Ø	21	57	57
2-3	Ø	Ø	Ø	Ø	21	57	57
3-4	Ø	Ø	Ø	Ø	8	22	22
Total					62	169	494

Residents/Household in ~~city/county (circle one)~~ 2.71 Kettle Falls area

Total Population in city/county (circle one) _____

Notes: _____

References: City of Northport 1993; Ecology 1993

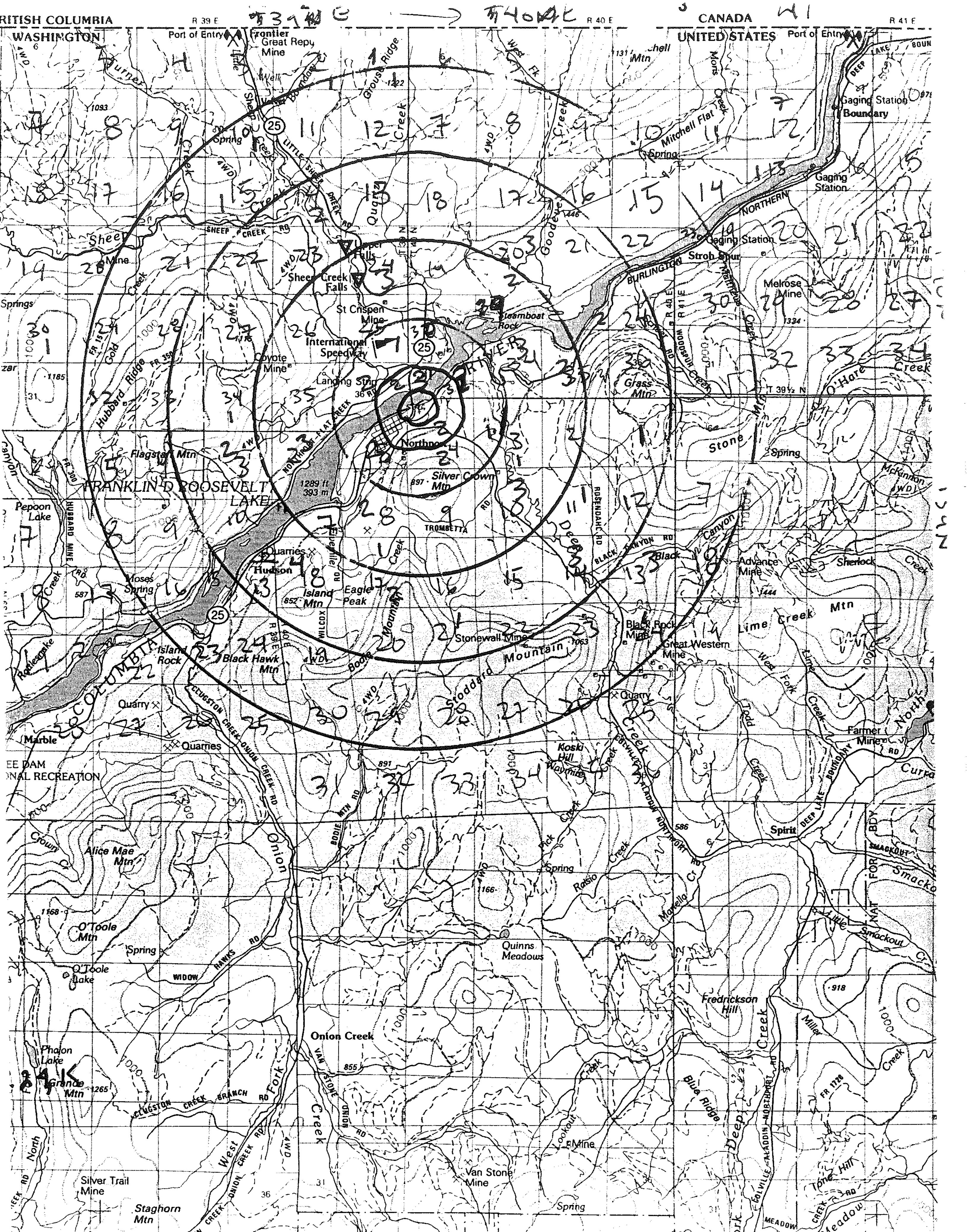
SITE: COUNTY:

TOWNSHIP	RANGE	SECTION	DW	MW	IRRI	INDUS
T39N	R41E					
	- NONE					
T40N	R40E	12	~~IIII~~ II			
		20	~~IIII~~			
		25	II			
		31	III			
		34	III			
		13	I			
		35	III			
T40N	R39E	1	I			
		2	.			
		3	I			
		10	I			
		14	II			
		15				I
		24	III			
		25	I			
		30	I			
		34	I			
		36	IIII			

SITE:

COUNTY:

TOWNSHIP	RANGE	SECTION	DW	MW	IRRI	INDUS
T 39N	R 40 E	S 3	II			
		4	IIII			
		5	II			
		8	II			
		10	III			
		11	I			
		13	III			
		14	III			
		17	III			
		18	IIII			
		21	I			
		24	I			
T 39N	R 39 E	S 2	III			
		3	II			



RITISH COLUMBIA
WASHINGTON
CANADA
UNITED STATES
R 39 E
R 40 E
R 41 E
Port of Entry
Frontier
Great Repu Mine
Grouse Ridge
Sheep Creek
Little Sheep Creek Rd
Sheep Creek Rd
Upper Falls
Sheep Creek Falls
St Crispen Mine
International Speedway
Coyote Mine
Landing Strip
Steamboat Rock
Gaging Station
Boundary
Mitchell Flat Creek
Spring
Northern
Burlington
Stroh Spur
Melrose Mine
Woodsoh Rd
Grass Mtn
O'Hare Creek
T 39½ N
Stone Mtn Creek
McKinnon
Hubbard Ridge
Gold Creek
Flagstaff Mtn
Northport
Silver Crown Mtn
Franklin D Roosevelt Lake
1289 ft 393 m
Trombetta
Rosendahl Rd
Black Canyon Rd
Advance Mine
Sherlock
Lime Creek Mtn
Pepoon Lake
Hubbard Mine Rd
Quarries
Hudson
Island Mtn
Eagle Peak
Wilcox Rd
Bodie Mountain
Stonewall Mine
Stoddard Mountain
Black Rock Mine
Great Western Mine
Moses Spring
Rattlesnake
Island Rock
Black Hawk Mtn
Columbia
Quarry
Marble
Clugston Creek Onion Creek Rd
Koski Hill
Waymire
Farmer Mine
Boundary Rd
Deep Lake
Spirit
Alice Mae Mtn
Crown
Bodie Mtn Rd
Onion
Pick Creek
Ratsio
Marcello Cr
Smackout
Nat Forest Bdy
O'Toole Mtn
O'Toole Lake
Widow Hanks Rd
Quinns Meadows
Fredrickson Hill
Miller Creek
Phalon Lake
Grande Mtn
Onion Creek
Van Stone Onion Rd
Clugston Creek Branch Rd
West Fork
Blue Ridge
Deep Creek
Colville Aladdin Northport Rd
Lookout
Mine
Van Stone Mine
Silver Trail Mine
Staghorn Mtn
Tone Hill
Meadow
North
Spring

Appendix E
Surface Water Flow and Quality

12400520 COLUMBIA RIVER AT NORTHPORT, WA
(National stream quality accounting network station)

LOCATION.--Lat 48°55'21", long 117°46'32", in SW¼SW¼ sec.33, T.40 N., R.40 E., Stevens County, Hydrologic Unit 17020001, at State Highway 25 bridge at Northport, 9.9 mi downstream from gaging station at international boundary, and at mile 735.1.

DRAINAGE AREA.--60,200 mi², approximately.

PERIOD OF RECORD.--Water years 1910-11, 1952 to current year. Prior to November 1951 published as "at Northport." November 1951 to September 1957 published as 12399500 "at international boundary," October 1957 to September 1963 as "at Northport," October 1963 to September 1973 as "at international boundary."

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1951 to September 1975, April 1976 to September 1981.
pH: November 1951 to September 1969.
WATER TEMPERATURES: November 1951 to September 1981.
SUSPENDED-SEDIMENT DISCHARGE: February 1910 to January 1911.

WATER QUALITY DATA, WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)
NOV											
13...	1100	81700	150	8.30	7.5	1.6	11.2	100	62	26	75
FEB											
12...	1200	110000	141	8.30	1.5	0.5	13.0	97	K3	K11	80
MAR											
18...	1100	72300	164	8.10	4.0	0.8	12.8	--	31	K6	88
MAY											
22...	1100	107000	133	8.00	10.5	2.9	10.9	102	24	K10	64
JUL											
17...	1100	88100	117	8.10	18.5	1.2	9.1	102	K5	K7	57
SEP											
18...	1200	60800	133	8.00	15.0	1.0	9.9	103	38	160	69

DATE	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY WH WAT TOTAL FIELD MG/L AS CACO3	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
NOV											
13...	7	22	4.9	2.1	6	0.1	0.7	68	11	1.3	<0.1
FEB											
12...	13	24	4.8	1.4	4	0.1	0.7	67	9.6	0.8	0.1
MAR											
18...	18	26	5.5	2.1	5	0.1	0.8	70	17	1.1	0.2
MAY											
22...	11	19	4.1	1.9	6	0.1	0.8	53	10	0.9	0.1
JUL											
17...	6	17	3.6	1.4	5	0.1	0.8	51	10	0.7	0.1
SEP											
18...	3	20	4.7	2.0	6	0.1	0.9	66	9.8	1.0	0.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)
NOV											
13...	4.7	95	88	0.13	21000	<0.10	0.07	0.4	0.03	0.01	0.03
FEB											
12...	4.6	85	86	0.12	25200	0.17	0.03	<0.2	0.02	0.02	0.03
MAR											
18...	5.0	100	100	0.14	19500	1.30	0.16	0.3	0.06	0.04	0.05
MAY											
22...	6.0	70	75	0.09	20200	<0.10	0.08	0.8	0.04	0.03	0.02
JUL											
17...	4.1	62	68	0.08	14700	<0.10	0.06	0.2	0.02	<0.01	<0.01
SEP											
18...	4.0	80	82	0.11	13100	<0.10	0.06	0.3	0.01	0.01	0.02

K - Results based on colony count outside the acceptable range (non-ideal colony count).

Flow max 113000
min 57500
mean 89325

12400520 COLUMBIA RIVER AT NORTHPORT, WA--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985

DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
NOV											
13...	<10	<1	37	<0.5	18	<1	<3	8	6	6	<4
FEB											
12...	<10	<1	31	<0.5	<1	<1	<3	7	5	1	<4
MAR											
18...	--	--	--	--	--	--	--	--	--	--	--
MAY											
22...	20	<1	35	<0.5	17	8	<3	9	11	3	<4
JUL											
17...	--	--	--	--	--	--	--	--	--	--	--
SEP											
18...	10	<1	41	<0.5	8	<1	<3	5	<3	2	<4

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
NOV											
13...	7	<0.1	<10	<1	<1	<1	93	<6	25	2	441
FEB											
12...	<1	<0.1	<10	<1	<1	<1	110	<6	24	6	1780
MAR											
18...	--	--	--	--	--	--	--	--	--	0	--
MAY											
22...	3	<0.1	<10	1	<1	<1	81	<6	24	10	2890
JUL											
17...	--	--	--	--	--	--	--	--	--	4	951
SEP											
18...	<1	<0.1	<10	1	<1	<1	84	<6	12	2	328

12400520 COLUMBIA RIVER AT NORTHPORT, WA
(National stream quality accounting network station)

LOCATION.--Lat 48°55'21", long 117°46'32", in SW¼SW¼ sec.33, T.40 N., R.40 E., Stevens County, Hydrologic Unit 17020001, at State Highway 25 bridge at Northport, 9.9 mi downstream from gaging station at international boundary, and at mile 735.1.

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DEC												
18...	1100	97600	140	8.1	3.0	0.6	13.3	102	K3	K8	72	12
JAN												
29...	1100	57500	169	8.1	2.5	1.0	12.7	99	K6	K2	83	14
MAR												
12...	1200	76000	169	8.4	4.0	1.5	14.2	115	K7	K5	79	8
MAY												
20...	1100	110000	142	8.0	8.5	2.0	11.3	102	K6	K2	66	6
JUL												
15...	1100	113000	124	8.1	15.5	1.2	10.0	106	K6	K17	57	6
SEP												
03...	1200	97900	114	8.1	17.5	0.6	10.0	109	K4	360	54	3

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY, CARBON-ATE IT-FLD (MG/L AS CACO3)	BICAR-BONATE IT-FLD (MG/L AS HCO3)	CAR-BONATE IT-FLD (MG/L AS CO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
DEC												
18...	21	4.6	1.6	5	0.1	0.8	60	73	0	12	0.9	<0.1
JAN												
29...	24	5.5	2.3	6	0.1	0.7	69	84	0	12	1.8	0.2
MAR												
12...	23	5.3	2.3	6	0.1	0.5	71	85	0	14	1.1	0.1
MAY												
20...	19	4.4	1.8	6	0.1	0.7	60	73	0	9.9	0.8	0.1
JUL												
15...	17	3.6	1.4	5	0.1	0.7	51	63	0	9.3	0.8	0.1
SEP												
03...	16	3.5	1.1	4	0.1	0.7	51	62	0	9.0	0.6	0.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)
DEC												
18...	4.8	72	82	0.1	19000	<0.01	0.12	0.03	0.3	0.03	0.02	0.02
JAN												
29...	5.1	86	93	0.12	13400	<0.01	0.11	0.05	0.3	0.04	0.03	0.03
MAR												
12...	5.6	94	94	0.13	19300	<0.01	<0.10	0.03	0.4	0.05	0.03	0.02
MAY												
20...	5.6	80	79	0.11	23800	0.02	0.24	0.03	0.2	0.04	0.04	0.04
JUL												
15...	4.2	67	68	0.09	20400	<0.01	<0.10	0.03	0.3	0.01	<0.01	<0.01
SEP												
03...	3.7	88	65	0.12	23300	<0.01	<0.10	<0.01	<0.2	<0.01	0.01	<0.01

K - Results based on colony count outside the acceptable range (non-ideal colony count).

12400520 COLUMBIA RIVER AT NORTHPORT, WA--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
DEC											
18...	10	<1	35	<0.5	<1	<1	<3	4	3	4	<4
JAN											
29...	20	<1	37	<0.5	<1	<1	<3	1	4	3	<4
MAR											
12...	--	--	--	--	--	--	--	--	--	--	--
MAY											
20...	20	<1	35	<0.5	21	<1	<3	10	22	16	7
JUL											
15...	--	--	--	--	--	--	--	--	--	--	--
SEP											
03...	--	--	--	--	--	--	--	--	--	--	--

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
DEC											
'18...	4	<0.1	<10	<1	<1	<1	100	<6	29	6	1580
JAN											
29...	6	<0.1	<10	<1	<1	<1	110	<6	26	4	621
MAR											
12...	--	--	--	--	--	--	--	--	--	4	821
MAY											
20...	3	<0.1	<10	1	<1	<1	93	<6	20	6	1780
JUL											
15...	--	--	--	--	--	--	--	--	--	4	1220
SEP											
03...	--	--	--	--	--	--	--	--	--	2	529

Appendix F
Surface Water Right for Domestic Uses

S. P. No. 363—8-40—12M. 22856.

CERTIFICATE RECORD No. 8, PAGE No. 3510

STATE OF WASHINGTON, COUNTY OF Stevens

CERTIFICATE OF SURFACE WATER RIGHT

(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the State Supervisor of Hydraulics thereunder.)

This is to certify that JOHN E. MC DONALD *of* Evans, *State of* Washington, *has made proof to the satisfaction of the State Supervisor of Hydraulics of Washington, of a right to the use of the waters of* Roosevelt Lake, *a tributary of* Columbia River, *with point or points of diversion within* Government Lot 1 *Sec.* 29 & 32, *Twp.* 38 *N., R.* 38 *E. W. M., under* Appropriation *Permit No.* 4638 *issued by the State Supervisor of Hydraulics, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Hydraulics of Washington and entered of record in Volume* 8, *at Page* 3510, *on the* 2nd *day of* March, 1950; *that the priority date of the right hereby confirmed is* May 20, 1946; *that the amount of water under the right hereby confirmed, for the following purposes is limited to an amount actually beneficially used and shall not exceed* 0.01 of a cubic foot per second for the purpose of domestic supply; and 0.07 of a cubic foot per second for the irrigation of 4 acres.

A description of the lands under such right to which the water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

W½ of Lots 14, 15, 16, Block 2, Lots 17 to 20 inc., Block 2, Tax Nos. 795 to 796, Block 2, Lots 5 to 12 inc., Block 4, Lots 14, 16, to 20 inc., Block 4, S½ Lot 24, 25 to 35 inc., Block 4, Lots 16 and N½ Lot 17, Block 5, all in Town of Millington (now Bossburg).

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 2nd *day of* March, 1950

Theo. J. Postlethwait
State Supervisor of Hydraulics.

ENGINEER

MJW