Versar INC.

REVIEW DRAFT

ENVIRONMENTAL RISK ASSESSMENT SURVEY OF FOOTE MINERAL COMPANY FACILITY AT CAMBRIDGE, OHIO A SUBSIDIARY OF NEWMONT MINING CORPORATION

Versar Job No. 879

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ATTACHMENT 18

1.0 NEWMONT MINING: FOOTE MINERAL COMPANY, CAMBRIDGE PLANT

1.1 Summary of Assessment

1.1.1 Introduction

The Foote Mineral Company, Cambridge Plant, produces an estimated 6,000 tons of ferrovanadium alloys per year for use in the steel industry, and smaller amounts of vanadium chemicals. The facility currently employs 92 persons and is located between the towns of Cambridge and Byesville, Ohio.

Two slag and baghouse dust landfills are located on what was once wetlands on site and cover a total of about 25 acres. One of the landfills is currently used for disposal of slag and baghouse dust. Two EP toxicity tests performed on various baghouse dust samples showed total chromium above the limits for definition as hazardous waste.

A survey of the Cambridge Plant was conducted on April 16, 1985, and included interviews with plant personnel, a review of available permit and environmental management documents, a site inspection, and (at a later date) contacts with appropriate regulatory agency personnel.

1.1.2 Risk Assessment Rating

The probability of environmental impairment liability resulting from the Foote Mineral, Cambridge, Ohio Plant is medium to high (above average) when compared to similar operations. The greatest potential for environmental impairment on the Foote Mineral site are related to: (1) groundwater quality, due to the presence of on-site landfills, open raw materials stockpiles, an underground and two above ground fuel storage tanks, and the practice of dumping of waste solvents and oils on the ground on site. (The groundwater monitoring study performed at the site is inconclusive regarding leachate impacts on groundwater.), (2) surface water contamination due to leachate seepage from the landfills and product stockpiles, and the unpermitted direct discharge of untreated cooling water blowdown, and (3) air quality, due to fugitive dusts originating from the open slag dump, the open baghouse dust dump, the open raw materials stockpiles and uncharacterized emissions from a "slag laundering" operation.

There are currently no pending environmental claims or regulatory penalities; however, there are some potential regulatory problems involving licensing of the landfill, permitting the landfilling of wetlands, permitting air emissions from the slag laundering operation, and permitting direct discharge of uncharacterized and untreated cooling water blowdown containing algicides, biocides, and chromate, in addition to the contamination potentials mentioned above.

The factors considered in the above average risk assessment given to this facility are as follows:

Negative Factors

- The facility provided no information on the handling of uranium-bearing ores and the disposition of waste products from uranium-bearing ores used at the facility is undetermined. Regulatory personnel contacted state that uranium-bearing ores have been used at the facility, but no inspections have been made to determine disposal methods.
- Several potential sources of groundwater quality impairment exist on site, including two open waste slag and baghouse dust landfills, open raw materials stockpiles, an underground and two above ground fuel storage tanks, and the practice of dumping waste solvents and oils on the ground on site.
- The groundwater monitoring study performed at the site is inconclusive regarding contaminant impacts on groundwater quality.
- Baghouse dust disposal at the active on-site landfill was analyzed and found to be above EP toxicity limits for total chromium in two of the samples. The dust is not handled according to RCRA regulations for disposal of hazardous waste.
- The baghouse dust and slag contain other toxic metals at lower concentrations as shown by analyses.
- The landfills are located in flood plains and close proximity to surface water.
- The facility does not have a dredge-fill permit from the U.S. Army Corps of Engineers for constructing the landfills on wetlands.

- Leachate seepage from the landfills is not contained or treated before release. The landfills are constructed on wetlands and leachate has apparently killed about 10 acres of wetland trees. Leachate seeps around the base of the landfills have not been characterized for chemical contamination.

- The facility has not characterized the direct discharge of cooling water blowdown to an on-site ditch. The cooling water contains additives including chromate, biocide, and algicides.

- Spills and overflows in the chemical process building can discharge directly to the sanitary sewer through floor drains.

- Rainwater runoff from the raw material stockpiles has not been characterized for chemical contamination.

- Potential impacts of contaminants from the facility on the adjacent wetlands and stream and the wetland and stream biota have not been addressed; specifically water quality and especially sediment concentrations of toxic metals.

- Fugitive dusts originating from the open slag dump, the open baghouse dust dump, and the open raw materials stockpile can transport particulates bearing toxic metals. Fallout of these dusts can contaminate stormwater runoff. There have been complaints from nearby residents about dusts and fumes generated by the facility.

- Air emissions from the "slag laundering" operation have not been characterized, and the facility does not hold a permit for this air contaminant source.

Positive Factors

- Most of the air contaminant sources are permitted.

- There are no pending claims involving environmental issues.

- The local POTW is aware of the facility's discharges to the sanitary sewer. The POTW is in the process of developing an industrial pretreatment program; the facility's discharge will be sampled and characterized. There was a problem with chlorine residual in the facility's discharge about two years ago, but there have been no problems since.

1.1.3 Recommendations

A detailed series of recommendations to better characterize and reduce the potentials for environmental impairment at the Foote Mineral, Cambridge facility is presented in Section 1.7.2. These recommendations center around (1) determining whether and to what degree the facility may be influencing air groundwater and surface water quality and identifying possible remedial actions, if warranted, (2) taking steps to minimize environmental contaminant releases from the various sources discussed in this report including the landfills, the raw material stockpiles, and the slag laundering operation.

1.2 Survey Background

1.2.1 Location of Facility

The Foote Mineral Company, a manufacturer of vanadium ferroalloys, vanadium chemicals, and boron/titanium ferroalloys is located about a mile southwest of the town of Cambridge, Ohio. The principal consumer of vanadium alloys is the steel industry. The facility location is shown in Figure 1.2-1. The site covers 130 acres and was developed on swamp and farmland. To the north, between the facility and the town of Cambridge, lies open land and wetlands, a few houses, and an interstate interchange with motels. Route 209, an industrial park and a country club lie to the west, to the south is a former strip mine, open land, and a county school for the mentally retarded. To the east of the facility, there are a few residences, open fields, and Interstate 70. The town of Byesville is about one mile southeast of the facility.

1.2.2 Facility Information/History

The Vanadium Corporation of America began operations at the site in 1953 with a single electric furnace, and in 1956 chemical manufacturing operations and a chemical laboratory were added. In 1970, Foote Mineral (Newmont Mining) merged with the Vanadium Corporation of America, but is not wholly owned by Newmont Mining. In 1970, a second furnace and the first baghouse were added, and in 1975, the second baghouse was added.

The facility operates in three shifts, five days a week, and currently employs 92 persons. Annual sales total about $21 million. There are no current or pending lawsuits against the facility related to environmental affairs, and there have not been any in the past. There

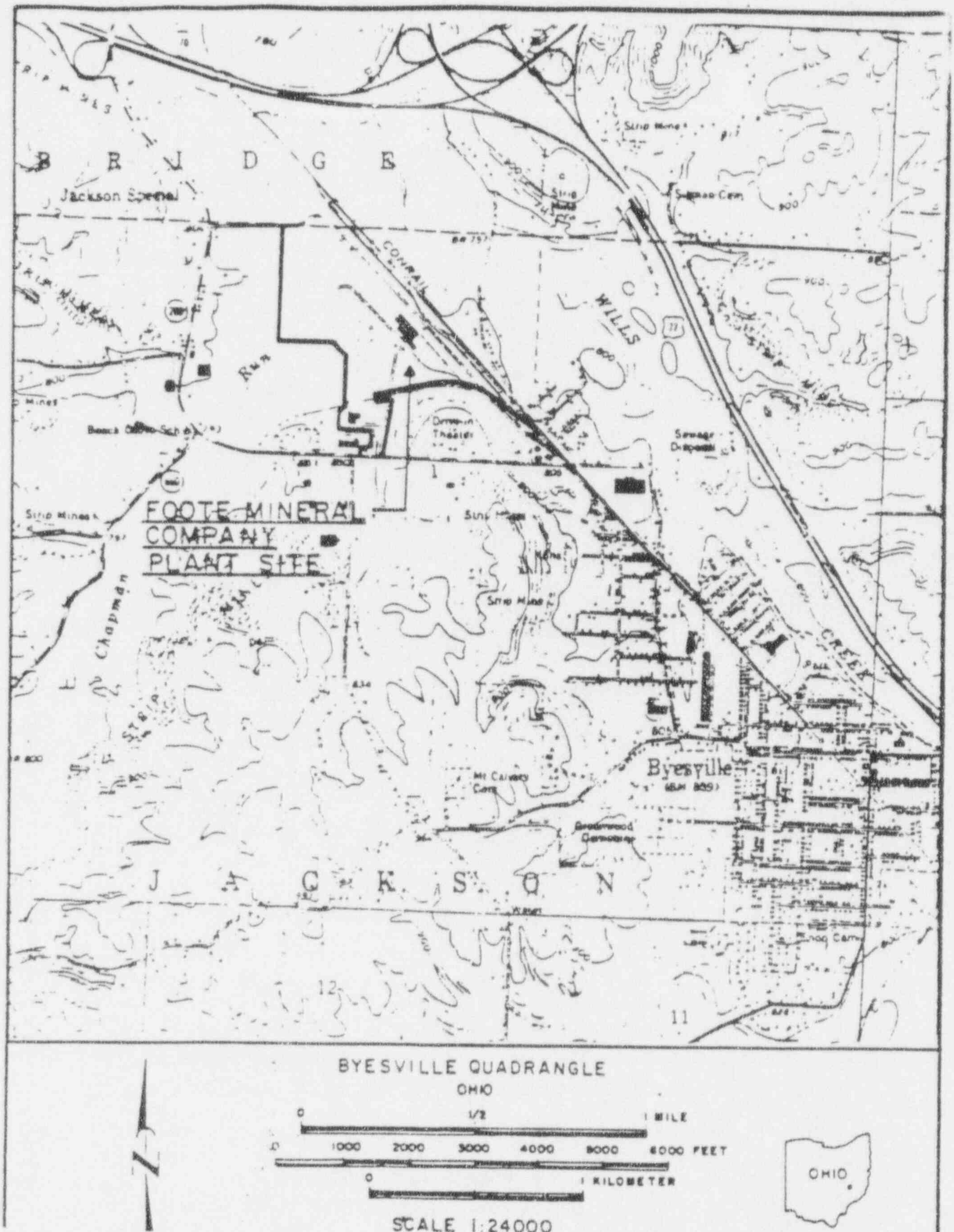

Figure 1.2-1. Facility Location

are no current or pending regulatory actions by federal, state, or local environmental officials.

According to facility personnel, the Ohio EPA requested Foote Minerals to apply for a license for an on-site slag and baghouse dust landfill in the spring of 1983. In response, Foote argued that since the Ohio regulations specifically exempt slag landfills from the licensing requirements, Foote should not be required to license the landfill. To date, the Ohio EPA has not responded to this argument.

1.2.3 Climatic Data

The Cambridge, Ohio, area receives about 40 inches per year annual precipitation, and the groundwater aquifer is recharged by local precipitation, with discharge to the local creek. Wind direction is generally to the northeast with an average velocity of 4 miles per hour in the winter and spring and 2 miles per hour in the summer and fall.

1.2.4 Population

The city of Cambridge, with a population of about 12,000-13,000 is located about a mile north of the facility, and the town of Byesville, with a population of about 3,500, is located about a mile southeast of the facility. There are an estimated 200 inhabitants within one mile of the facility. Figure 1.2-2 shows the population distribution surrounding the facility.

1.2.5 Geology and Groundwater

The facility is located in an area of thin permeable layers of valley fill (sand, rock fragments, coal fragments) surrounded by bedrock. The bedrock is stratified and contains confined aquifers. The Byesville water supply is partially drawn from the valley fill aquifer but mostly from the underlying bedrock aquifers. High iron content and saline water are local problems; however, specific data on the site are inconclusive. Several borings at the site revealed clay layers over the bedrock which may act as confining layers, preventing downward migration of contaminants.

THE PLOT CENTER IS AT:
LATITUDE 39.8882
LONGITUDE 81.5644

RADII		POPULATION	
From	To	Within Ring	Cumulative
0.00	0.50	0	0
0.50	1.00	0	0
1.00	2.00	2088	2088
2.00	5.00	8185	10273
5.00	10.00	18660	28933

QUADRANT TOTALS:

Sector	Population
N	3831
NNE	746
NE	1414
ENE	0
E	1787
ESE	3339
SE	234
SSE	838
S	1789
SSW	0
SW	0
WSW	1089
W	1624
WNW	0
NW	0
NNW	12300

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BG/ED centroid distribution around FM - CAMBRDG, OH

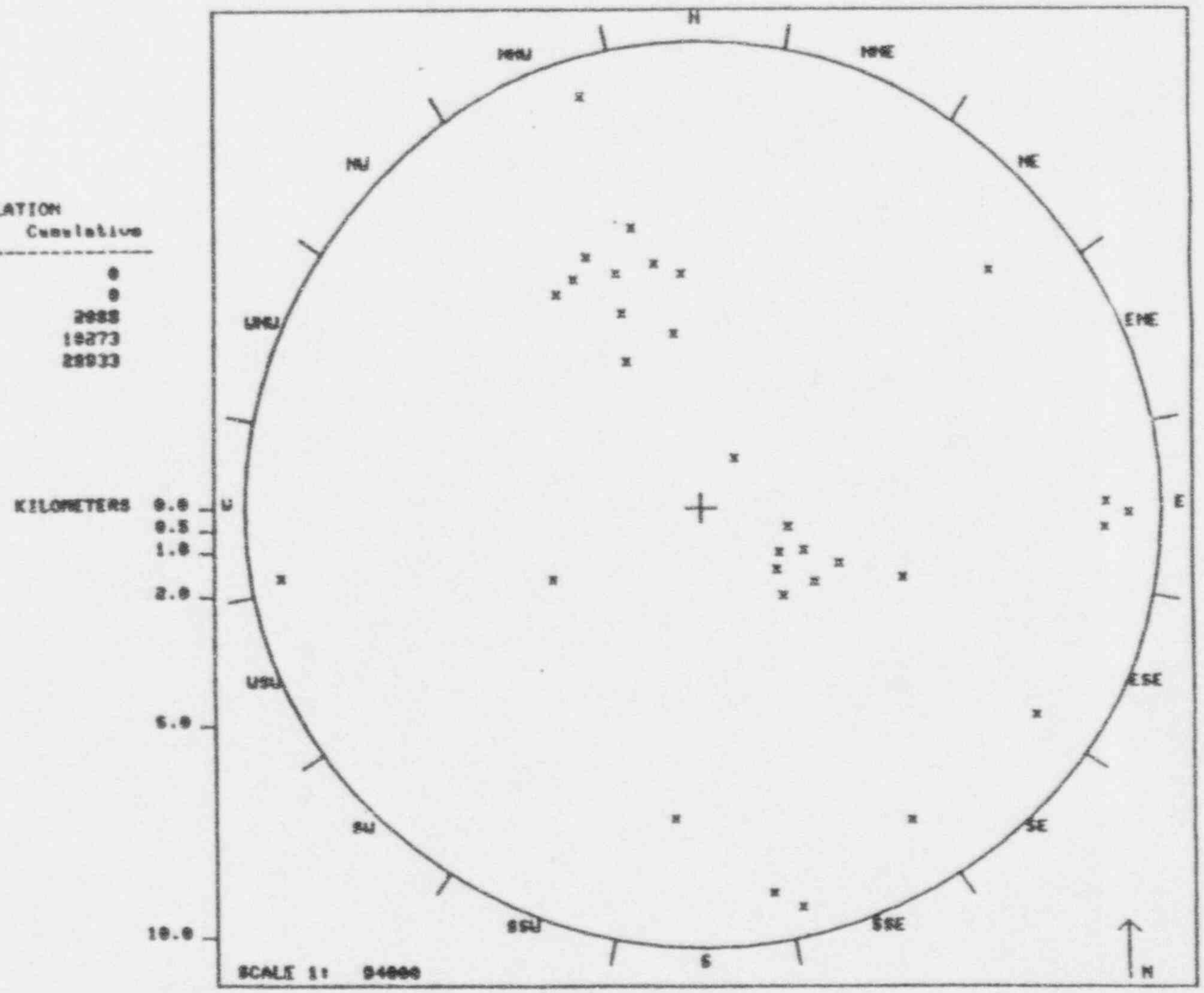

Figure 1.2-2. Surrounding Population Distribution

Borings at the site revealed silty clays in the upper 8-11 feet underlain by saturated fine sand. One boring exposed several sand lenses interfingered with the clayey material. Bedrock was encountered in two of the borings at about 24 feet and 60 feet deep.

1.2.6 Surface Water

Storm drains and a drainage ditch in the northeast section of the plant area convey runoff to an intermittent stream which runs through the site from east to west and joins Chapman Run, which flows past the west side of the site from south to north, through a wetland. Runoff from the raw material stockpile area on the west half of the site and the active landfill drains through a wetland to Chapman Run. Chapman Run joins Wills Creek northwest of the facility. The town of Byesville's POTW discharges to Wills Creek upstream of the confluence with Chapman's Run. Wills Creek is used as potable water supply by the city of Cambridge, which draws water from Wills Creek downstream of the Byesville POTW discharge, and the confluence with Chapman Run. The Byesville POTW is a secondary treatment facility. According to the Cambridge water utility, there are no contamination problems in Wills Creek that are currently causing problems in their treatment process, which consists of flocculation, sedimentation, filtration, and chlorination. The Cambridge water supply utility runs regular tests on the potable water as supplied to consumers but has not run tests on the raw water from Wills Creek recently. USGS data from sampling performed in 1980 upstream of the facility indicate high concentrations of iron in Chapman Run's sediments; however, this may be precipitate of mine drainage from strip mined areas to the east. USGS data shows that other streams in the area have high iron concentrations in the sediments also.

The facility is located within a 100-year storm event floodplain, but according to facility personnel, there has been no flooding at the plant that affected operations.

1.3 Facility Description

1.3.1 General Information

The Foote Mineral Company, Cambridge facility manufactures ferrovanadium alloys and vanadium chemicals from raw materials brought to the site by truck and rail. A site plan for the Cambridge facility is presented in Figure 1.3-1. Oil-fired boiler residues in open drums, and open stockpiles of slag from steel production, aluminum scrap, aluminum dross, fluorspar, mill scale, steel punchings, pebble lime, and vanadium bearing residues are located outside the facility building. The raw materials are loaded into a multicompartment silo. There is a drying and crushing system for some of the ores, located near the baghouses. An operator dispenses the various raw materials for each melt from the silo into a weighing hopper, which is then transferred via an overhead crane, and the raw materials are fed into the electric are furnaces at controlled rates. Baghouse dust from the electric arc furnaces is landfilled on site. Slag is dumped via a chute through a water spray to a cooling basin outside the west end of the building. The slag is then sold to contractors for fill material or landfilled on site. The molten vanadium alloy material is poured into molds located inside the building, allowed to cool, and then crushed, graded, and packaged for shipment.

Vanadium chemicals are produced in a separate chemical processing building in the southeast corner of the site. A small pilot plant is located in the chemical production facility building. There is a machine, which is equipped with a dust collector, for the sizing of fused vanadium flake . A small smelting furnace in the pilot plant has not been operated since 1968, according to facility personnel. The pilot plant area is also used to warehouse empty containers and full containers of vanadium pentoxide. (Vanadium pentoxide is a listed hazardous waste - EPA No. P120 - and should be disposed of according to RCRA regulations.) At one time, the area was used for storage of PCB equipment but this equipment has been disposed of.

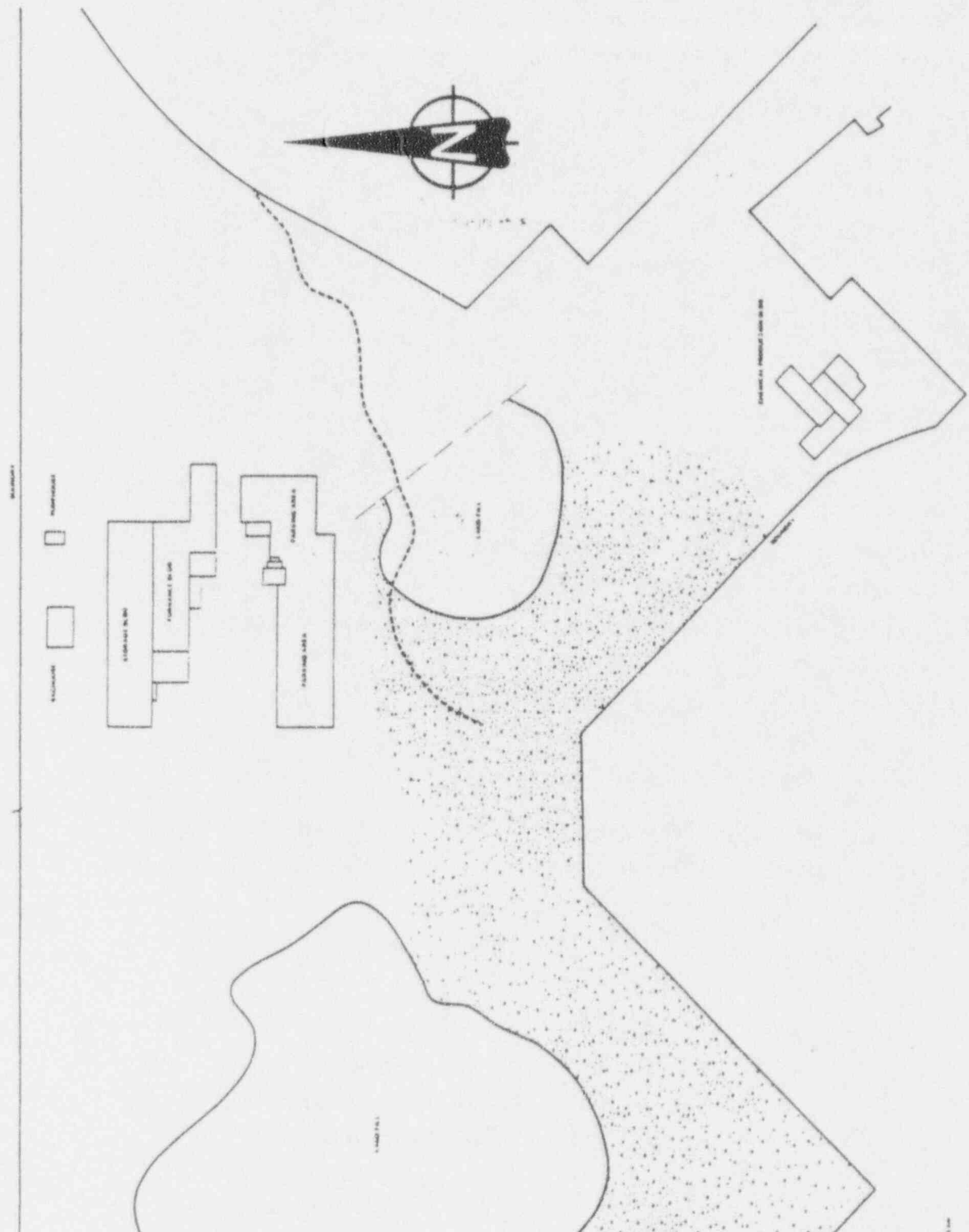

Figure 1.3-1. Site Plan

1.3.2 Process Descriptions

A ferrovanadium production process flow chart is presented in Figure 1.3-2. The vanadium bearing raw materials include fossil fuel-burning boiler residues, vanadium pentoxide-fused flake, a vanadium bearing steel slag, aluminum can scrap and aluminum dross, silicon metal, and lime. The aluminum and silicon are used as reducing agents, and the lime is used as flux. Information supplied by the facility indicates production volumes for 1985, which are assumed to be annual projected production volumes. A description of the production processes and the projected production volumes follows:

A. Ferrovanadium 70/80 production will total 796,106 pounds of alloy in 1985. The process consists of an electroalumino reduction of vanadium pentoxide (as fused flake) into ferrovanadium and slag phases. This reduction takes place in the No. 1 furnace only. The slag is poured through a water spray system and after cooling is either landfilled on site or sold as a construction material. The alloy is poured into flat cast iron molds to cool. After cooling the alloy is crushed and sized according to customer requirements. The material is packaged in bags, cans, drums, and is also shipped in bulk.

B. Production of Ferovan 42 will total 4,173,000 pounds of alloy and low nitrogen Ferovan will total 2,889,000 pounds of alloy in 1985. The Ferovan 42 and Low Nitrogen Ferovan processes are two step. The first step consists of lowering the iron content of the Highveld slag by melting in the No. 1 furnace combined with a partial reduction of the iron oxides using silicon. The metallic iron is cast and sold as a by-product. The molten, vanadium, and iron bearing slag is transferred to the No. 2 furnace where it is combined with other vanadium bearing materials. The vanadium oxides are reduced using aluminum in the form of metallic can scrap (low nitrogen ferovan) or in the form of aluminum can scrap and aluminum dross (Ferovan 42). After the reduction, the alloy and the slag are processed as described above.

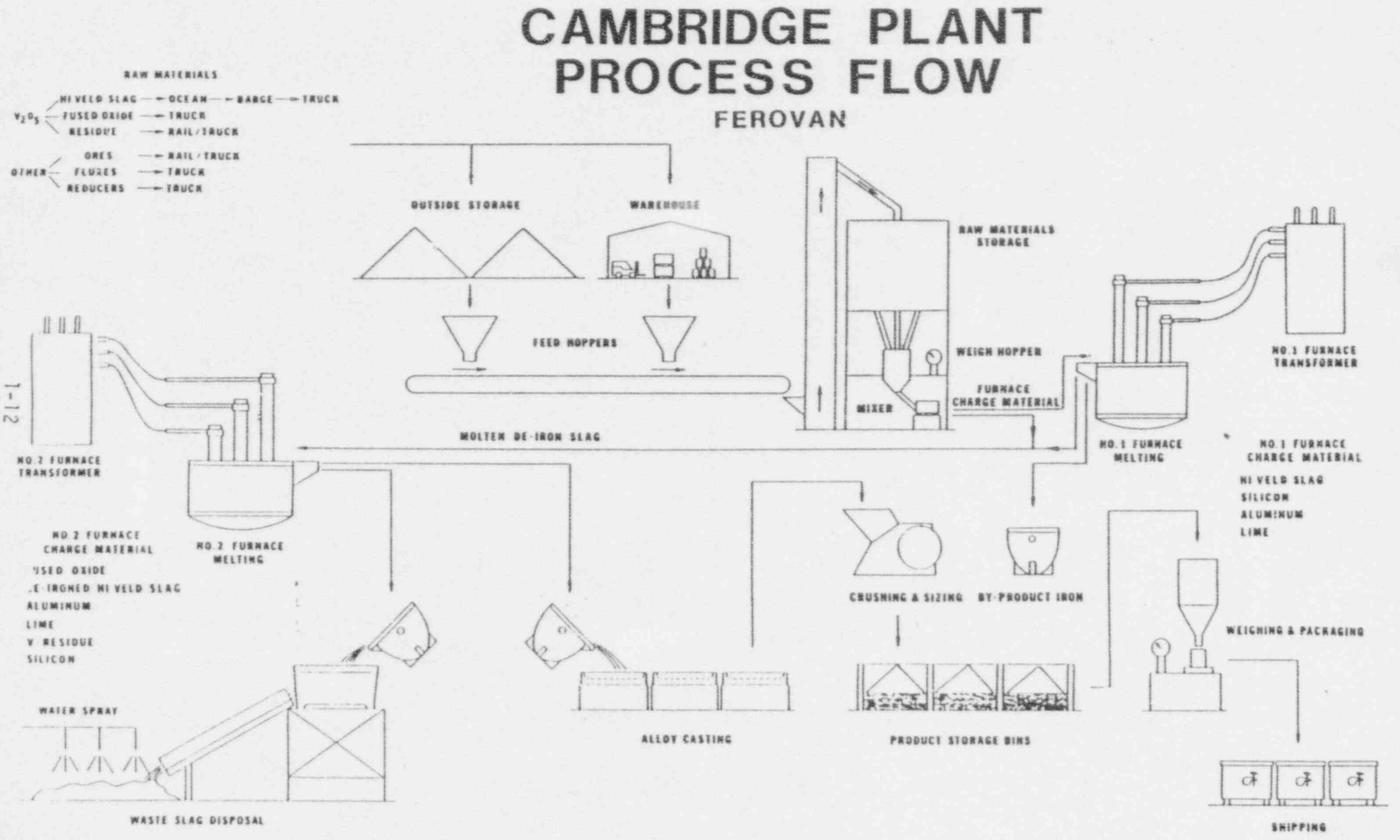

Figure 1.3-2. Cambridge Plant Process Flow

C. Grainal 79 and Grainal 100 production in 1985 is given as 4,092,000 and 261,000 pounds of alloy, respectively. Raw materials consist of borax, titanium oxides, titanium scrap metal, aluminum can scrap, zirconium oxide, and fluxes. Raw materials proceed through the silo storage, weighing and mixing stations and are introduced into the No. 1 furnace at a controlled rate. The boron, zirconium, and titanium oxides are reduced by the aluminum leaving alloy and slag phases. The molten slag and alloy are processed as described above.

D. Vanadium chemicals are produced in relatively small quantities in the chemical production building located in the southeast corner of the site. There are several steam-jacketed stainless steel process vessels some of which are equipped with fume collectors. There are several steel storage tanks in the process area also. At the time of Versar's visit, one of the process vessels had overflowed. There is a floor trench in the area of the steam-jacketed process vessels. The steel grating over the trench and the concrete floor surrounding the trench are corroded from spills. The drain empties into the sanitary sewer, according to facility personnel. There is no diking around the process vessels and no emergency cutoff device to prevent spills from reaching the sanitary sewer system.

Production of sodium metavanadate (technical grade) in 1985 is projected at 19,800 pounds. Sodium metavanadate is produced by solubilizing vanadium pentoxide in aqueous solution with sodium carbonate and sodium peroxide. The water is driven off by evaporation in the steam jacketed kettles and the resulting yellowish crystals are crushed and packaged in plastic bag-lined fibre drums. Ammonium metavanadate (technical grade, 1985 production 15,300 pounds) is produced by reaction of aqueous solutions of sodium vanadate, ammonium chloride, and ammonium sulphate. The precipitate is filtered, washed with water and dried. The whitish crystals are shipped in plastic bag-lined fibre drums.

Ammonium metavanadate (C.P. Grade, 1985 production 15,000 pounds), is produced in a similar manner to ammonium metavanadate technical grade except that the starting material is ammonium metavanadate technical grade and the precipitating agent is ammonium chloride. The product is shipped in plastic bags in fibre drums. There is no production of technical grade ammonium metavanadate listed for 1985. Vanadium pentoxide (C.P. Grade, 1985 production 10,000 pounds), is produced in an approximately 4x4x4 foot oven. There were three ovens at the facility at the time of the site visit but only one is currently used. The material is produced by thermal oxidation (calcining) of ammonium metavanadate (C.P. grade). The material is packaged in plastic bag lined fibre drums for shipment. Ammonium vanadate is a listed waste (EPA Hazardous Waste No. P119).

Vanadium oxytrichloride is produced in a separate room at the end of the chemical production facility building. Vanadium oxytrichloride production for 1985 is listed as 87,000 pounds. The material is produced in a red hot fluidized bed by the chlorination of vanadium pentoxide in the presence of a carbon (charcoal) reducer. There is a wet air (sodium carbonate solution) scrubber on the distillation unit. The scrubber column is packed with an inert plastic material to increase surface area. Spent scrubber water is trickled to the sewer from a holding tank and is diluted with city water from a hose placed in the sewer connection. Purification of the vanadium oxytrichloride product is by distillation. The product is shipped in liquid form in special 200 gallon containers and via tank truck. There are two 3,000 gallon bulk storage tanks outside the building from which tank trucks are loaded. The material cannot be exposed to air and is normally moved via nitrogen displacement. This vanadium oxytrichloride production system was not operating at the time of the site visit.

Cerium briquetting operations are carried out in the chemical production facility building; 1985 production of cerium briquettes is estimated at 1,353,000 pounds. Production operations were not underway at the time of the site visit. Cerium concentrates and a lignosal binder (received at the facility in bags) are proportioned and combined with water in a rotating mixer. This mixture is then fed into a briquetting machine which produces 1/2 inch by 2 inch compacted briquettes. The product is loaded into steel pallet boxes and shipped to the Foote Mineral Company's Graham, West Virginia facility for further processing.

There is no production of vanadyl sulphate (C.P. grade) and vanadyl chloride (syrupy) listed for 1985; however, these chemicals can be produced at the facility. Vanadyl sulphate is produced by heating sulfuric acid, vanadium pentoxide, ethyl alcohol and water in a steam-jacketed stainless steel kettle. The product is then filtered, dried, packed in plastic bag-lined fibre drums and shipped. Vanadyl chloride (syrupy), is produced by heating hydrochloric acid, vanadium pentoxide, and methyl alcohol in stainless steel steam-jacketed kettles. The product is decanted into glass jugs and shipped.

1.3.3 Raw Materials

A detailed breakdown of the estimated raw material usage by product for the vanadium alloy and vanadium chemical products produced in 1985 is presented in Appendix 1-B, and a raw materials inventory is shown in Table 1.3-1. Raw materials are shipped to the site by rail and truck. A coveyor belt transfers material unloaded from the rail cars to the raw materials storage silo. Inside the smelting facility building, near the storage silo and opposite the furnace room, raw materials are stored in boxes, bins and bags. Drums of raw materials are also stored indoors on pallets stacked four tiers high. Packaged materials are handled by forklifts on pallets.

Bulk raw materials are stored in open piles on the ground outside the facility building on the northwest and northeast sides. These materials include aluminum scrap and aluminum dross, Highveld slag (a South African steel slag), magnesium ferrosilicon fines, graphite electrodes, fluorspar, mill scale, steel punchings, Quebec Imenite, Quilon Imenite,

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Table 1.3-1. Raw Materials Inventory

Raw Material	Quantity (tons est. 1985)
Vanadium pentoxide fused flake (lbs. V205)	851.9
Highveld slag (lbs. V205)	1786.1
Vanadium bearing residues (lbs. V205)	800.7
Aluminum dross (lbs.)	1194.0
Aluminum scrap (lbs.)	2982
Silicon metal remelt (90%)(lbs.)	259.3
Magnesium ferrosilicon fines (lbs.)	405.4
Pebble lime (lbs.)	4498.3
Graphite electrodes 10" (lbs.)	59.9
Graphite electrodes 12" (lbs.)	83.9
Syndolag (CaO, MgO) (lbs.)	54.4
Refractories (lbs.)	2530.6
Fluorspar (lbs.)	110.6
Mill scale (lbs.)	31.7
Steel punchings (lbs.)	769.6
Quebec ilmenite	262.3
Quilon ilmenite	583.0
Sorel slag	262.3
Titanium scrap	218.6
Manganese ore	437.2
Zircon sand	320.6
Borax	117.4

sorel slag, pebble lime, titanium scrap and manganese ore. Vanadium-bearing boiler residues from burning fossil fuels are stored in 55 gallon steel drums on pallets stacked two tiers high. Photographs 1-4 of the raw material stockpiles can be seen in Appendix 1-A.

Sulfuric acid used for cooling water treatment is stored in 30-gallon plastic drums outside the facility pumphouse at the northeast corner of the site. About 9 drums were stored here on wooden pallets at the time of the site visit. There is an aboveground diesel fuel storage tank outside the pumphouse for the emergency pump system. The diesel tank holds about 250 gallons and is supported above an undiked concrete pad on angle-iron legs.

There are two aboveground fuel oil tanks of about 10,000 gallon capacity at the northeast corner of the site. These tanks are surrounded by earthen dikes and according to facility personnel the tanks are no longer used and are empty. There is a fuel pump house next to these tanks.

There is an underground fuel oil tank located outside the chemical production building. According to facility personnel this tank has never been used and is currently empty. No other details are known. Chlorine gas cylinders are stored on wooden cradles on a concrete pad outside the north end of the chemical production building, next to two 3,000 gallon liquid vanadium oxytrichloride tanks. The concrete pads below the vanadium oxytrichloride tanks are corroded below the pipe and loading connections, apparently from spillage.

1.4 Waste Treatment Processes

1.4.1 Air Emissions

A listing of air emission sources, types, estimated quantities and operating permit numbers are presented in Appendix 1-C. According to facility personnel, only the dust from the smelting furnace baghouses is disposed of in an on-site landfill. All other dusts are collected and recycled. In response to an anonymous complaint, on March 21, 1984, occupational exposures to metals and metal oxides were measured by the Industrial Commission of Ohio, Division of Safety and Hygiene. Samples were taken in the breathing zone of the workers and analyzed for ferrovanadium, aluminum, and magnesium. Occupational exposures to vanadium pentoxide measured inside the furnace building were an order of magnitude above threshold limit values during molten alloy pouring operations. There were no visible emissions (except for fugitive dusts) or odors noticed at the time of the site visit; however, slag laundering operations were not observed. According to regulatory personnel, there have been complaints from neighbors about dust and fumes. The problems were fixed by repairs to the air pollution control equipment and no legal actions were taken.

Air contaminant controls are maintained on the raw material, alloy, and shipping department crushing and grinding equipment, and two of the chemical plant processes. There are uncontrolled emissions from the metavanadate and vanadium pentoxide chemical processes, but these are likely to be small in quantity.

There is an uncontrolled emission from the "slag laundering" pit, where molten slag is poured into a shallow water-filled pit outside the furnace building (see photograph 5 - Appendix 1-A), to cool. When the molten slag contacts the water in the pit a steam cloud bearing "trace amounts of hydrogen sulfide" is released. It appears that there is an emission of particulate slag from the deposits that can be seen near the chute in the photo. An estimated 3,000 gallons of slag laundering pit water are emitted each day as steam. The facility estimates that less than 1 ppm of this emission is hydrogen sulfide. The slag laundering operation was not observed at the time of the site visit. The facility does not hold an operating permit for the slag laundering emissions; regulatory personnel do not think a permit is required.

Fugitive dusts can arise from the open outdoor raw material stockpiles, the open slag dump, the open baghouse dust dump, and vehicle traffic; especially on the unpaved roads between the furnace building, raw material stockpiles, and the open dumps. Fugitive dusts can also be released from raw materials handling operations (see photograph 6 - Appendix 1-A). Fugitive emissions are not now being permitted in this area, since it is in attainment of national standards for particulates.

There are two fabric type baghouses for the smelting furnaces, which can be used separately or in conjunction for either furnace. The baghouse for the number two smelting furnance has a 120,000 cubic foot per minute (CFM) capacity and an estimated dust accumulation of 16,000 pounds per year, the baghouse for the number one smelting furnace has a 100,000 CFM capacity and collects an estimated 6,000 pounds of dust per year. The baghouses and cyclones for the crushing equipment and shown in photograph 7 (Appendix 1-A). The smelting furnace baghouse dust empties into an open dump truck and is deposited in an open dump on site. Photograph 8 (Appendix 1-A) shows baghouse dust being deposited in the open dump truck through a cloth chute. The facility has operating permits for both of these baghouses.

There is a 20,700 CFM cyclone and fabric type dust collector on the raw materials handling and storage system. The facility has an operating permit for this equipment.

A raw materials rotary kiln dryer and crusher, located outside the smelting facility building near the baghouses (see photograph 9 - Appendix 1-A), is equipped with an 8,000 CFM fabric type dust collector, with an estimated discharge of 400 pounds per year. The facility holds a permit to operate this equipment.

Ferro-vanadium alloys are poured into moulds for cooling after smelting and the ingots are crushed in two sets of crushing and sizing equipment. The primary and secondary alloy crushing and screening equipment produces 3" sized pieces and is equipped with an 8,000 CFM baghouse which collects an estimated 3,000 pounds of metallic alloy and slag dust per year. The tertiary alloy crushing and screening equipment reduces the product material to 3/4" size and is equipped with a 3600 CFM fabric type dust collector. This equipment collects an estimated 180 pounds of metallic alloy and slag dust per year. The facility holds operating permits for the primary, secondary and tertiary alloy crushing equipment described above.

There is a vanadium pentoxide grinding and screening system equipped with a 5000 CFM fabric type dust collector. The amount of vanadium pentoxide dust collected and discharged by this system is estimated to be 20 pounds per year. The facility holds an operating permit for this equipment.

An estimated 500 pounds per year of vanadium pentoxide and magnesium oxide dusts are generated by the residue crushing equipment. The residue crusher is not equipped with emissions controls and the facility does not hold a permit to operate this equipment. Facilities in Ohio must apply for permits for all air contaminant emissions sources.

The sample preparation area crushing and pulverizing equipment is connected to two fabric-type collectors of 1500 cubic foot per minute capacity each. Estimated metallic alloy and slag emissions from this equipment are 60 pounds per year. The facility has an operating permit for this equipment.

Shot blast equipment and various shipping department machines are serviced by fabric-type 5000 CFM dust collection equipment, which is permitted. An estimated 140 pounds per year of metallic alloy and slag dust is emitted from this equipment.

The shipping department alloy grinding and screening system emissions of metallic alloy and slag dust are estimated to be 100 pounds per year. The fabric-type 1200 CFM collector is permitted.

Alloy screening and shipping department bagging machines emit an estimated 200 pounds per year of metallic alloy and slag dust, and are serviced by a permitted 1770 CFM fabric-type collector.

Emissions controls at the chemical manufacturing facility include a wet scrubber/carbonate neutralization system for chlorine gas from the vanadium oxytrichloride process, and a 2600 CFM fabric-type collector on the cerium biquetting equipment. Spent caustic from the chlorine gas scrubber is collected in an aboveground holding tank and trickled into the sanitary sewer, with the addition of city water added from a hose to dilute the caustic.

The office heating boiler and chemical plant process boiler are both gas fired and have permits to operate. The chemical plant boiler can be optionally fired with fuel oil but this system is not used; the fuel oil tank is empty as discussed above. An air emissions inventory summarizing all emission sources is presented in Table 1.4-1.

1.4.2 Wastewater

An inventory of process and sanitary wastewater sources and quantities generated by the facility is presented in Table 1.4-2. A limestone pit used for neutralization of laboratory chemicals before overflow into the sewer system was not discussed during Versar's visit to the site and may not be in current usage. According to facility personnel the Cambridge POTW is aware of Foote Mineral's discharges to the sewer and have not asked Foote to monitor the discharges or obtain a permit for the discharges. An analysis of the discharges from the ammonium metavanadate and vanadium oxytrichloride processes is shown in Appendix 1-D. There is a chlorine residual in the discharge which caused problems at the Cambridge POTW in the past. According to POTW personnel, the problem was remedied and there have been no further problems. The Cambridge POTW is starting a pretreatment program in which the facility will be considered a "significant source."

The facility discharges 8,000 gallons per day of sanitary wastewater to the City of Cambridge sanitary sewer. The facility is charged for this disposal. Small quantities of laboratory chemicals are diluted with city water and flushed to an intermediate holding tank filled with

Table 1.4-1. Cambridge, Ohio, Air Emissions Inventory

Source	Control	Pollutant	Quantity (lbs/yr)
Heating boiler (natural gas)	-	Hydrocarbons	ND
Process boiler (gas/#2 fuel oil)	-	Hydrocarbons	ND
Tertiary alloy crusher and screen	Fabric	Metallex alloy	180
Raw material handling storage area	Cyclone/fabric	Particulates	1,800
Vanadium oxytri-chloride plant	Wet scrubber	Chlorine	ND
Shipping, alloy, grinding/screening	Fabric	Metallic alloy slag dust	100
Shotblast equipment/shipping	Fabric	Metallic alloy slag dust	140
Vanadium pentoxide grinding/screening	Fabric	Vanadium pentoxide dust	20
Alloy crushing/screening	Fabric	Metallic alloy slag dust	3,000
Alloy screening bagging machines	Fabric	Metallic alloy	200
Rotary kiln dryer	Fabric	Particulates	400
No. 2 smelting furnace	Fabric	Furnace fume	16,000
No. 1 smelting furnace	Fabric	Furnace fume	6,000
Crushing/pulverizing	2 Fabric collector	Metallic alloy slag dusts	60
Briquetting equipment	Fabric	Cerium oxide	10
Residue crushing	—	Vanadium pentoxide	500
Slag dispersing/quenching system	—	Hydrogen sulfide	Trace
Miscellaneous/fugitive sources	—	Particulates	ND

ND = No data.

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Table 1.4-2. Cambridge, Ohio, Wastewater Emission Inventory

Source	Quantity	Disposal
Sanitary sewage	8,000 gpd	County sewer system
Laboratory chemicals	ND	Neutralized/county sewer system
Vanadium oxytrichloride scrubber solution	1,400 gpd	County sewer system
Boiler water blowdown	20 gpd	County sewer system
Ammonium metavonadate decant solution	300 gpd	County sewer system
Vanadate filter backwash	500 gal/week	County sewer system
Recirculator water blowdown	150 gpd	Drainage ditch

limestone. The overflow from this tank drains to the county sewer system. The total annual discharge is unknown, and this wastewater has not been characterized for chemical constituents.

Vanadium oxytrichloride scrubber solution is diluted with city water and discharged to the sanitary sewer. When this production process is in operation, approximately 30 days per year, about 1,400 gallons per day of spent scrubber solution (spend sodium hypochlorite, pH = 8), is discharged to the county sewer system, diluted approximately 8:1 with city water.

When ammonium metavanadate is being produced, decant from the centrifuging opearation is drained to the county sewer system. About 300 gallons per day of wastewater contaminated with ammonia is discharged. When sodium metavanadate or ammonium metavanate are being produced, a filter is periodically backwashed to the county sewer. Approximately 300 gallons per week are discharged.

Boiler feedwater is treated using a Nalco proprietary product, an organic mixture containing diethylamine ethanol. Approximately 20 gallons per day of wastewater containing 30-60 parts per million of this chemical is discharged to the county sewer system as boiler blowdown.

About 150 gallons per day of recirculating cooling water blowdown is released to an on-site drainage ditch which discharges to Chapman Run. The wastewater contains proprietary mixtures (Betz) of biocides, algicides, and a deposit control additive. The deposit control additive consists of an organo-phosphanate, a triazole derivative, caustic soda; the biocide includes 20% bistrichloromethyl sulfone, 5% methylene trithiocyanate and inert ingredients; the algicide is a mixture of 24% n-alkyldimethyl benzyl ammonium chloride, and 5% bis (tributyl in oxide) and inert ingredients. The cooling water additives also include 75-100 parts per million chromate and 1,200 parts per million sulfate ion.

1.4.3 Solid and Hazardous Wastes

Some of the slag and all of the baghouse dusts are landfilled on site in a non-regulated landfill. In recent years the quantity of slag that has been landfilled has been reduced due to sales of this material for construction purposes.

"Garbage" is generated in small quantities and is now removed to a sanitary landfill by a local contractor. In the past garbage from the plant was dumped at the on-site landfills.

The active slag landfill is located on the northwest end of the site and was filled in over a wetland. Baghouse dust is dumped on the northeast corner of the fill. This landfill covers about 15 acres and is estimated to be 60 feet deep by facility personnel. There is some remaining wetland between the toe of this landfill and Chapman's Run to the west.

On the west side of the entrance road, between the chemical production building and the furnace building is a smaller slag dump area which is no longer used. This dump was also filled in over a wetland, and an intermittent stream flows through this landfill and into Chapman Run.

The top of the active landfill on the northwest end of the site is graded in a dish shape which slopes to the middle of the landfill area. Surface runoff on the top of the fill therefore runs to the middle of the area and percolates through the landfill or evaporates. Photograph 10 - Appendix 1-A shows materials at the active landfill, including empty chemical bags, shipping pallets, and hundreds of empty steel drums. There were also many ash piles from bonfires on the top of the landfill. Leachate seeps were observed along the toe of the landfill (see Photographs 11 and 12 - Appendix 1-A). The leachate seeps run into the portion of the wetland still exposed. There were dead trees in this wetland on the south side of the fill, in an area of about 10 acres (see photograph 12 - Appendix 1-A). The wetland is continuous to Chapman's

Run to the south. Contaminants in the leachate can reach Chapman's Run by drainage through the wetland. Humic material in the wetland may act as a sink for heavy metal contaminants. The volumes and chemical analyses of some of the components of discard slags and baghouse dusts which are generated at the plant are summarized in Table 1.4-3 below.

Analysis for Grainal 79 baghouse dust shown in Table 1.4-3 includes a measurement for L.O.I. 6.6%, which is assumed to mean "lost on ignition." It is also assumed that the analyses for Grainal 79 baghouse dust are percentages, as are the other analyses as reported. Foote Mineral personnel note that the analyses of baghouse dusts will vary depending on a number of factors including the raw material furnace charge and the baghouse efficiency.

EP toxicity leachate test analyses run on samples of discarded slag and baghouse dust are shown in Appendix 1-E. These tests show total chromium above the EP toxicity limits in two separate samples. Other samples are shown to leach quantities of arsenic, cadmium, barium, lead, mercury and selenium below EP toxicity limits but in some cases above federal drinking water standard. Permitting issues concerning the landfill are discussed in Section 1.5-2 below.

Facility personnel informed Versar that the past practice of the maintenance shop for disposing of waste oils and solvents was to dump them on the ground behind the shop. Solvent usage in the past amounted to about 150 gallons per year, and about six 55-gallon drums of lubrication and crankcase oil were used each year. In April of 1984 Foote Mineral contracted Safety Klean to supply and recycle cleaning solvents for the maintenance shop. The facility has been operating for 32 years, and given the waste usage rates as estimated by facility personnel, a total of about 4,800 gallons of solvents and 192 drums of oil have been dumped on site over the years.

Table 1.4-3. Analysis of Furnace Generated Materials

1. Ferovan 42 Discard Slag (includes Low Nitrogen Ferovan)
   Annual Volume: 16,000 tons, based on an annual production of 1,700 tons of vanadium

Analysis:	V_2O_5	0.3%	MnO	0.20%
	SiO_2	4.0%	FeO	0.29%
	Al_2O_3	48.0%	CaO	28.0%
	TiO_2	2.0%	MgO	13.0%
	Cr_2O_3	Trace		

2. Grainal 79 (or Grainal 100) Discard Slags
   Annual Volume: 3,700 tons, based on an annual production of 2,600 tons of alloy

Analysis:	V_2O_5	<0.1%	CaO	27.0%
	SiO_2	1.0%	MgO	11.0%
	Al_2O_3	49.0%	Fe_2O_3	0.6%
	TiO_2	6.0%	B_2O_3	0.9%
	MnO	0.5%	ZrO_2	4.0%

3. 70/80 Ferrovanadium Discard Slag
   Annual Volume: 1,100 tons, based on an annual production of 330 tons of alloy

Analysis:	V_2O_5	0.3%
	SiO_2	0.2%
	Al_2O_3	56.0%
	FeO	0.43%
	CaO	30.0%
	MgO	12.0%

4. Ferovan 42 Baghouse Dust (includes Low Nitrogen Ferovan and 70/80 Ferrovanadium)
   Annual Volume: 1,115 tons, based on an annual production of 1,700 tons of vanadium as Ferovan and 330 tons of vanadium as 70/80 Ferrovanadium

Analysis:	V	1.60%	Fe	1.11%
	SiO_2	10.04%	Ti	0.24%
	Al_2O_3	5.72%	Cr	0.16%
	CaO	5.82%	Mn	2.41%
	MgO	36.39%		

Table 1.4-3. (Continued)

5. Grainal 79 Baghouse Dust (includes Grainal 100)
   Annual Volume: 225 tons, based on an annual production of 2,600 tons of alloy

Analyis:				
	SiO_2	4.5%	Fe_2O_3	8.0%
	Al_2O_3	7.5	TiO_2	7.0%
	CaO	24%	CrO_2	1.2%
	MgO	27%	MnO	6.5%
			B_2O_3	2.0%

(corrected as per a factory communication supplied to Versar)

The facility contracted General Electric to remove and dispose of 73 PCB capacitors in March of 1985. Copies of the purchase order, manifest and related correspondence are shown in Appendix 1-F. The following PCB containing equipment is located at the facility. The PCB storage area is located in the chemical production building.

Transformers:
(1) 975 gallons (in storage); spare for an in-service unit
(2) 85 gallons (in storage; no function
(3) 75 gallons (in service); contaminated only: 759 PPM
(4) 800 gallons (in storage); spare for an in-service unit contaminated only: 85 PPM

Oil Circuit Breakers:
(1) 3 mineral oil filled tanks contaminated at levels between 70 PPM-118PPM (In service)
(2) 1 mineral oil filled tank contaminated at 26327 PPM.

It is not clear from the materials supplied to Versar how many PCB capacitors remain at the facility.

1.5 Environmental Compliance and Management

This section addresses the various environmental management, compliance, administration, and regulatory enforcement issues relating to the Foote Minerals facility's control of hazardous substances. Both the major aspects of the facility's management program and the impacts on that program of pertinent regulations are discussed.

1.5.1 Waste Treatment Processes

A. Air Emissions

The facility lists maintaining compliance to air quality emissions standards as their major environmental concern. There are no current regulatory actions involving Foote Mineral. Representatives of the Ohio EPA inspect the Cambridge facility on an annual basis to determine compliance with air quality standards. Written inspection reports are sent to the facility but these have not been supplied to Versar for review. The facility is required to submit a permit application for the residue crushing equipment. A permit for this equipment has not yet been submitted. In the past, there have been complaints from neighbors to the Ohio EPA about dust and fumes from the facility. The facility responded by repairing emissions control equipment which solved the problems. No formal legal actions were taken against the facility. The facility is located in an area of compliance of National Ambient Air Quality Standards for particulates. For this reason, permitting of fugitive dust emission sources has been given low priority by Ohio EPA.

B. Process Water Discharges

About 150 gallons per day of non-contact cooling water is discharged to a ditch on-site. The discharge is not permitted, and contains biocides, algicides, and a chromate additive. The discharge has not been quantitatively analyzed, but contains toxic chemicals as detailed above.

All other process waters are discharged to the county sewer system. The Cambridge POTW operators are aware of the Foote Mineral facility discharges and have not asked Foote Mineral to obtain a permit for the discharges, nor have they required monitoring of the discharges to date. An analysis of the discharges from the ammonium metavanadate and vanadium oxytrichloride processes is shown in Appendix 1-D. The results show high levels of residual chlorine, this was the basis of a problem at the POTW in the past. According to Cambridge utilities personnel, the problem has been solved. The utility is starting up an industrial pretreatment program in which Foote will be considered a significant source.

1.5.2 Waste Storage

Facility personnel state that waste solvents and waste oil have been dumped on site in the past. A solvent supplier/recycler was contracted in April of 1984; but according to facility personnel waste oil is still * dumped on site. An estimated total of about 4,800 gallons of solvent and 192 55-gallon drums of waste oil have been dumped on site. Under the Federal CERCLA Legislation the facility was required to notify the EPA of these spills in June of 1981.

Foote Mineral has hazardous waste generator status under RCRA (EPA I.D. #040042319244); however, Foote Mineral has requested EPA to remove the Cambridge facility from the listing of hazardous waste generators because they contend that their wastes are not listed and do not exceed EP toxicity test limits for definition as hazardous waste. Furthermore, it is Foote Mineral's contention that they fall under the RCRA exclusion of "...solid waste from the exploration, mining, milling, smelting and refining or ores and minerals." A letter from Foote Mineral to EPA Region V in Chicago stating this position is shown in Appendix 1-G. The EP toxicity test data supplied to Versar indicate that the baghouse dust fails the EP toxicity limits for chromium in two samples, and therefore this material should be handled as hazardous waste under RCRA regulations.

The Ohio EPA inspects the facility on an irregular basis for possible hazardous waste violations. In the spring of 1983 the Ohio EPA requested that Foote Mineral apply for a license for the on-site slag and baghouse dust landfill. In response Foote argued that since Ohio regulations specifically exempt slag landfills from the licensing requirement, Foote should not have to license the landfill. Facility personnel informed Versar that Foote agreed to landfill only slag and baghouse dust and to dispose of garbage off-site. There has been no further action by Ohio EPA in reference to the landfill.

The slag and baghouse dust landfills were constructed over wetlands continguous with Chapman's Run, within the jurisdiction of the U.S. Army Corps of Engineers. Dredge-fill permits are required prior to filling wetlands within the Army Corps of Engineer's jurisdiction. The Army Corps of Engineers has determined that Chapman Run at the location of the Foote Mineral facility is within Corps jurisdiction because the flow rate in Chapman Run at this point exceeds 5 cubic feet per second. Dredge-fill permits have been required prior to filling of wetland areas since 1977. If a dredge-fill permit cannot be obtained, the facility could be required to restore the wetlands.

In 1981 Foote Mineral engaged a consultant to determine the effect of the facility's storage and/or disposal practices on the underlying groundwater. Four groundwater monitoring wells were installed and a groundwater sampling and analysis program was begun. Soil samples were taken when the monitoring well borings were made and the soil materials underlying the site were characterized. The locations of the monitoring well installations are shown in Figure 1.5-1. There are no monitoring wells located to the west of the slag and baghouse dust dump, i.e., between Chapman's Run and the dump, and there are no monitoring wells located between the raw materials stockpiles and Chapman's Run. The consultant's report of the 1981 groundwater investigation asserts that groundwater flow at the site is to the north-northeast towards Wills Creek. Groundwater elevations measurements contained in the same report do not bear out this conclusion. Groundwater flow can be assumed to be from the highest elevations to the lowest in unconfined aquifers. The highest groundwater elevation measured was at monitoring well number 3, on the northeast edge of the site. Measured water elevations in wells 2 and 4 were lower, and the groundwater elevation measured in well number 1 was the lowest by over three feet. Well number 1 is located near the intermittant stream along the topographic low of the site. Chapman's Run and the surrounding wetlands are the local topographic low areas adjacent to and on the site and the most probable discharge points for groundwater flow. Groundwater flow apparently follows the land surface contours at this site, from the northeast boundary to the southwest, with discharge to Chapman's Run and the wetlands.

Monitoring well number 2 is downgradient of the chemical production facility building; monitoring well number 1 is downgradient of the furnace building, but not the raw materials stockpiles. Monitoring well number 4 is upgradient of the slag dump; it is not located directly between the dump and Chapman's Run, but is 200 yards northwest (upgradient) of a direct line between the slag dump and Chapman's Run. A "septic odor" was noticed in the first 8 feet of soil samples taken here, and was attributed to possible leakage of a nearby sanitary sewer line.

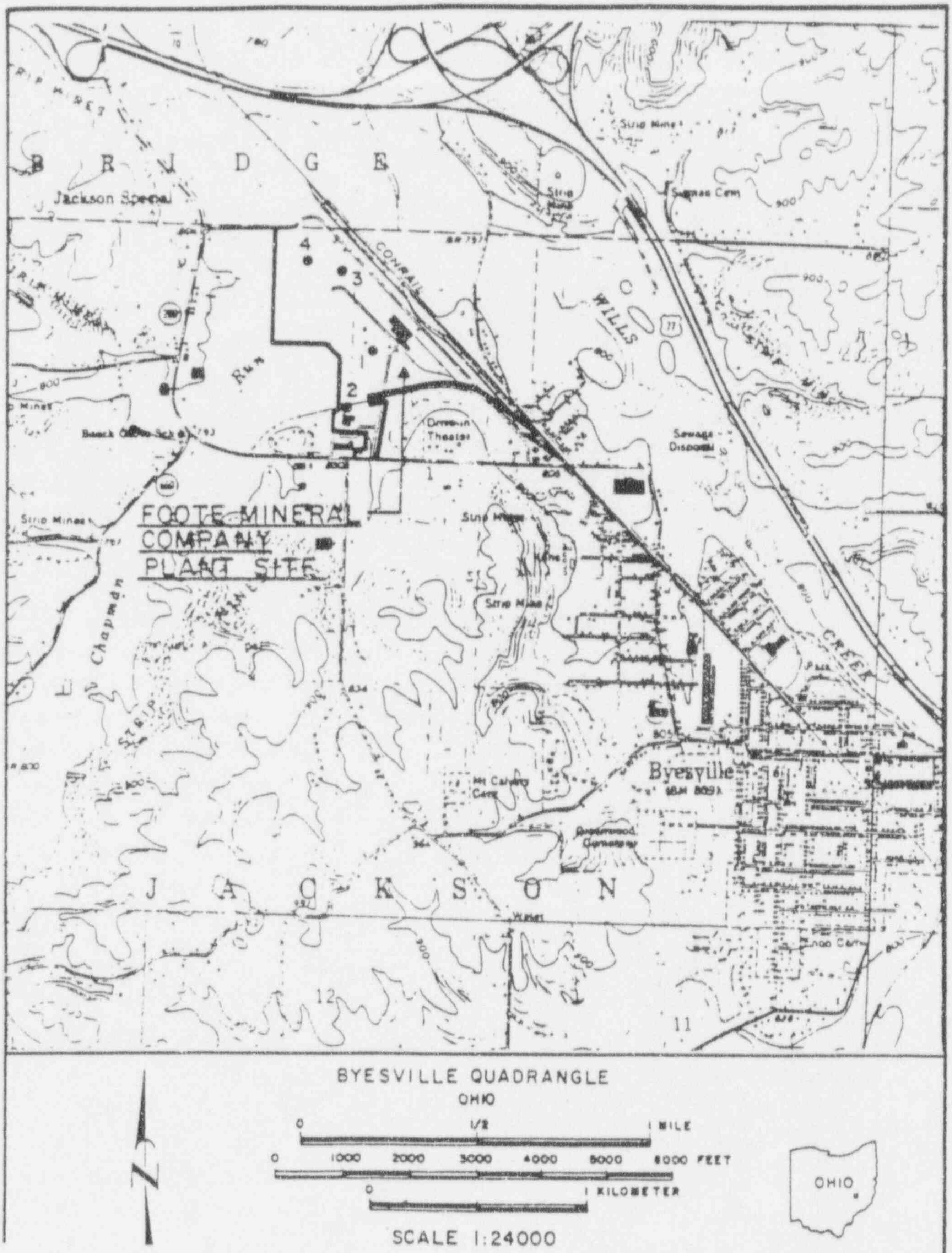

Figure 1.5-1. Location of Monitoring Wells

This well is screened in the uppermost sandy water-bearing layer. Monitoring well number 3 is screened in a relatively impermeable clay strata from 31 to 61 feet deep. Directly above this clay strata is a wet sand lens from 28 to 31 feet; however, this sand lens is protected from surface leachate contamination by an overlying gray clay layer from 16 to 26 feet deep. The vulnerable surficial water-bearing strata at the location of well number 3 is a wet sand lens from 12 to 16 feet. The monitoring well is not screened in this strata. Monitoring well number 3 is located along the northeast border of the site and is probably upgradient of the groundwater flowing beneath the site.

Given the groundwater flow direction at the site, the locations of wells 1, 3 and 4 are upgradient of groundwater which has passed potential contaminant sources under the site. Wells 3 and 4 are screened in or below relatively impermeable strata. Only well number 2 is located downgradient of a potential contamination source and is also screened in the surficial water-bearing strata. The water bearing strata at this location is protected from surface leachate contamination by 23 feet of relatively impermeable overlying clay.

The groundwater monitoring program undertaken in 1981 is not sufficient to determine if leachate from the potential sources of the open slag and baghouse dust dump and open raw material stockpiles has contaminated groundwater, for the reasons discussed above. Groundwater monitoring results compiled from this program can be seen in Appendix 1-H.

There is a potential for contaminated runoff water to reach surface water directly through drainage ditches, or overland flow. Surface water surrounding the facility was sampled in September of 1980. Runoff water and sediments were not sampled at this time. Samples were taken in Chapman's Run upstream and downstream of the site, in a creek impoundment upstream of the site on the southeast side, and in a pond by the railroad on the northwest side of the site. Samples showed high levels of chromium, arsenic and nickel in the impoundment upstream of the site to the southeast. This impoundment is said to receive water from a coal cleaning plant. Results of analysis and sampling locations are shown in Appendix 1-I.

The facility has tested and inventoried PCB equipment. Hydraulic systems in foundry equipment were tested and found to contain no PCBs.

Three out-of-service transformers are stored in a room of the chemical production building also used for storage of vanadium oxytrichloride cylinders. This room is accessed from the laboratory facility and from the outside through overhead doors. The room has a concrete floor but no spill containment curbing. The transformers are labeled, although some of the labels are not in plain sight; but in back of or between the closely spaced equipment. There are two out of service PCB marked transformers stored in an unfenced graveled area outside of the pilot plant. One of these transformers is marked as containing greater than 500 ppm PCBs. TSCA regulations require that PCB equipment storage areas have roofs, concrete floors and spill containment, and locked access. TSCA regulations also require documented inspections of the equipment. The internal memorandum regarding PCB equipment included in Appendix 1-E indicates that Foote Mineral management are aware of the inspection requirements; PCB equipment inspection reports were not available for review.

1.5.3 Raw Material Storage

Raw materials are stored inside the smelting facility building in a storage silo (see photograph 7 - Appendix 1-A), and in part of the building opposite the furnace room in boxes, drums, bags and open bins. Bulk raw materials are stored in open piles on bare ground on the northwest and northeast sides of the facility (see photographs 1-4 - Appendix 1-A). This method of storage has the potential to contaminate groundwater and surface water, from rainwater leaching through the open piles. Photograph 4 - Appendix 1-A shows a drainage ditch which runs behind the open raw materials stockpiles and discharges to Chapman's Run. Rainwater runoff from the raw material stockpile areas discharges to surface water. The runoff water has not been tested for contamination, and is not currently permitted. Surface water and groundwater sampling efforts are discussed above.

1.5.4 Tank Management and Spill Control

There are no large quantities of bulk liquid raw materials or fuels currently stored in aboveground or underground tanks at the facility. There are two aboveground 3,000 gallon steel vanadium oxytrichloride tanks outside the chemical production building. These tanks are located on a concrete pad without spill containment curbing. Tank trucks are loaded from these storage tanks, over a graveled area.

There are aboveground and underground fuel storage tanks which are no longer used. According to facility personnel these tanks have been emptied. Table 1.5-1 summarizes data concerning the bulk liquid storage tanks on site. There is no inspection or leak testing program at this time.

1.5.5 Site Observations

A. Security Measures

The facility employs security guards five days a week, and at least one salaried employee is on site on off-days. The plant property is fenced except for the slag and baghouse dust dump, and the area around the chemical production and pilot plant building.

B. Safety Measures

The facility has a written Fire Protection Program which is included as Appendix 1-J of this report. Fire protection is provided by a sprinkler system in the smelting facility building and the office space in that building. This system is inspected on a regular basis. The pond located near the railroad tracks on the northwest side of the site is used as a water source for the sprinkler system; there is a 1000 gallon per minute pump for the system located near the pond. There is no sprinkler system in the chemical production and pilot plant building.

Table 1.5-1. Bulk Liquid Storage Tank Inventory

Number	Size (Gallons)	Above or Below Ground	Contents	Age (Years)	Inspection/ Testing	In Use?
(2)	3,000	Above Ground	Vanadium Oxytrichloride	Unknown	None	Yes
(1)	Unknown	Below Ground	Fuel Oil	Unknown	None	No
(1)	250(est.)	Above Ground	Diesel Oil	Unknown	None	Yes
(2)	10,000	Above Ground	Fuel Oil	Unknown	None	No
(2) (Varies)	500(est.)	Above Ground	Chlorine	Unknown	None	Yes

A, B, and C type fire extinguishers are on hand and employees are trained in their use. Training includes a film and literature supplied by the Ohio Industrial Commission. Training was also provided by the local fire department. Transformers in use at the facility are protected by CO_2 or Halon fire extinguishing systems. The facility has an employee fire brigade and employees make fire inspections.

C. Housekeeping

The practice of discarding waste solvent on the ground has presumably been discontinued since Safety Kleen was engaged to supply and recycle cleaning solvent in April of 1985. The practice of discarding waste oil to the ground should be discontinued.

D. Environmental Organization

Mr. Richard Young was in charge of environmental affairs until April of 1985. At the time of Versar's visit to the facility Mr. Young had been promoted to another position at a different facility, and the job of environmental affairs manager had not been filled. Foote Mineral is looking for a person with an Electrical Engineering degree to fill the position. Apparently the facility manager of environmental affairs has primary responsibilities in other areas, since an Electric Engineering background seems inappropriate for an environmental affairs manager.

E. Personnel Training

Personnel training is given for fire protection. There are no training programs for handling hazardous materials given to employees or management.

F. Site Modifications

The facility has no current plans for process changes. The actual time of operations varies according to the marketplace for the products. The facility management expect that 230 operating days will be logged this year. The plant has been closed 20-40% of the time over the last two years.

1.6 Regulatory Agency Contacts

Versar has contacted several individuals in regulatory agencies to solicit comments and concerns related to environmental affairs at Foote Mineral. The results of these interviews are presented in this section.

Mr. Michael Moschell
Ohio EPA Hazardous Waste Section
Southeast District Office
Logan, Ohio

Mr. Moschell conducted an inventory of on-site landfills and was also at the facility in response to a complaint that solvents were being dumped on site. Mr. Moschell discovered that Stoddard solvent (a widely used petroleum-based cleaning solvent) was being dumped on site. Foote Mineral personnel agreed to stop dumping solvent and to contract with a solvent reclaimer. Mr. Moschell was under the impression that EP toxicity tests run on the landfilled materials showed contaminants below EP toxicity levels. Mr. Moschell also stated that Foote Mineral used to work with uranium-bearing ores; however, no survey has been made to determine the status of the waste materials related to the uranium-bearing ores.

Mr. Jerry Roberts
Ohio EPA Solid Waste Section
Southeast District Office
Logan, Ohio

Mr. Roberts was not familiar with the Foote Mineral facility, and was not aware if the facility had compliance problems in the past. Mr. Roberts stated that a license would be required for on-site landfilling of any solid wastes other than slag, specifically landfilling baghouse dusts would require licensing. The licensing process would involve development of an operating plan and engineering plans for the landfills. Within the next year, regulations concerning on-site landfilling of slag will change, and a license for slag dumping may be required.

Mr. Rodney Wood
U.S. Army Corps of Engineers
Ohio River Division

Dredge-fill permits from the Army Corps of Engineers have been required prior to filling wetlands under the Corps' jusisdiction since 1977. The facility is located below the 5 cubic foot per second flow rate point, which marks the headwaters of the Corps' jurisdiction. Actions taken in response to the illegal filling of wetlands are determined on a case-by-case basis. The usual course of events would begin with the issuance of a stop-work order for the landfilling operations, the facility would be required to apply for a dredge-fill permit, and a public notice would be given concerning the permit application. Should the permit be denied, the facility could be required to restore the wetlands to their original condition.

Mr. Richard Lexner
Ohio EPA, Wastewater Section
Southeast District Office
Logan, Ohio

Mr. Lexner was under the impression that there are no discharges to surface water from the facility; he made an inspection of the facility about a year ago and determined that no NPDES permits were required for this reason, and the facility was in compliance. The Ohio EPA is beginning to permit nonpoint source discharges; however, Foote is not considered a major facility and is not given priority in the nonpoint source permitting program at this time. The biggest concern Mr. Lexner has about the facility is potential contamination from the slag dump. During Mr. Lexner's inspection of the facility, he was presented with analyses of the slag waste which showed to his satisfaction that the material is inert. He may ask for further analyses in the future.

Mr. Robert Norman
Utilities Director, City of Cambridge
1700 Burgess Avenue
Cambridge, Ohio 43725

The City is in the first stages of instituting an industrial pretreatment program; survey questionnaires have been sent to the industrial dischargers. Sampling of discharges will be part of the pretreatment program start-up. Foote Mineral will be considered a significant user of the POTW facilitites. Dumping of a chlorine compound was a problem a couple of years ago, but this problem was remedied, and there have been no problems since. Mr. Norman also supplied information on the Cambridge city water supply; he stated that contamination of Wills Creek has not caused problems at the water supply plant thus far.

Mr. Glen A. Greenwood
Ohio EPA, Air Quality Section
Southeast District Office
Logan, Ohio

Mr. Greenwood stated that there are no regulatory actions planned against Foote Mineral at this time. The facility is inspected once a year and a letter report is sent to the facility with Ohio EPA's findings. There have been complaints in the past from residents close to the facility about dust and fumes; Ohio EPA responded to the complaints and after the facility repaired air pollution control equipment the problems were considered to be solved. No formal legal actions were taken against the facility.

According to Mr. Greenwood, a permit is probably not required for the slag laundering operation, since mainly steam is emitted. Mr. Greenwood was under the impression that all air contaminant sources at Foote Mineral were permitted, and stated that operators of air contaminant sources must apply for a permit for each air contaminant source.

The facility is located in an area which is in compliance with National Ambient Air Quality Standards for particulates, and therefore no fugitive dust emission controls are required at this time. Permits for fugitive dust emissions are only required for sources in noncompliance areas.

Mr. Larry Pennington
Ohio EPA, Surface Water Section
Southeast District Office
Logan, Ohio

Mr.Pennington was contacted in order to obtain background information on use classification of Chapman's Run. The streams in the area were intensively surveyed last year, including a fish and macroinvertebrate survey. A final report is being compiled and the use classification of these streams may change.

Mr. Al Sedam
U.S. Geological Survey
Columbus, Ohio

Mr. Sedam provided hydrogeological information of the general area, and surface water quality reports.

1.7 Conclusions and Recommendations

1.7.1 Conclusions

The probability of environmental impairment liability associatecd with the Foote Mineral, Cambridge, Ohio facility is considered to be above average when compared to similar facilities. This assessment is based on the type and quantitites of materials used and stored at the site, the on-site disposal of wastes, present and planned waste management practices, and the probability of environmental contamination resulting from present operations.

Specific areas of concern regarding the facility include (1) the potential for air, groundwater, and surface water contamination by the open slag dump, the open baghouse dust dump, and the open product stockpiles; (2) the indadequate monitoring of surface and groundwater; (3) potential surface water contamination resulting from the unpermitted cooling water blowdown discharge to a ditch which flows off site; (4) uncontained storage of out-of-service PCB electrical equipment, including outdoor storage over gravel-covered soil; (5) the lack of dredge-fill permit for construction of two landfills on wetlands; (6) the residue crushing equipment and the slag laundering operation are unpermitted air contaminant sources; (7) at the time of Versar's visit, the environmental affairs manager position was vacant (the facility was looking for an electrical engineer to fill the position, which seems inappropriate); (8) the facility used uranium bearing ores in the past, no information was provided to Versar in the pre-survey questionnaire or during the site visit pertaining to use of uranium-bearing ores or disposal of by-products. Regulatory agency personnel contacted by Versar mentioned that uranium-bearing ores were used at the facility, but did not provide further details. Regarding this last issue, waste products have been disposed in on-site landfills, and the facility has not investigated the potential radionuclide contamination of air, surface, and groundwater that could result from on-site use and disposal of uranium-bearing ores and by-products.

1.7.2 Recommendations

The following recommendations are made to better characterize and/or reduce the potential for environmental impairment at the Foote Mineral, Cambridge, Ohio, site.

- 85-1. Potential groundwater contamination from the sources detailed above should be monitored in a program which (a) establishes local groundwater flow patterns from field survey data; (b) places an adequate number of monitoring wells downgradient of potential contaminant sources; (c) samples at least the surficial water bearing permeable strata at risk of contamination.
- 85-2. Leachate seeps around the base of the landfilled area appear to have differing chemical make-ups, due to the variety of colors of the seepage observed. The various leachate seeps should be sampled and analyzed for all reasonable chemical constituents, including organic chemicals,, toxic metals, including vanadium and vanadium compounds, and radionuclides.
- 85-3. The landfill leachate impacts on the adjacent wetlands and stream sediments and biota should be assessed.

The studies may point to appropriate techniques for mitigating environmental contamination from the landfilled areas. A remedial action plan should be developed in response to the landfill leachate contamination problem.

85-4. Air contamination via fugitive emissions from the landfills should be characterized for toxic constituents, including radionuclides and the impacts on local residents assessed.

• 85-5. The baghouse dust disposed of at the landfill fails the EP toxicity test for chromium and should be handled and disposed as hazardous waste.

• 85-6. Sampling of the baghouse dusts should be carried out on a frequent basis since the toxic constituents of the baghouse dusts vary widely. In addition, various materials which do not appear to be slag cover the active "slag landfill." Besides broken-up pieces of slag at the active landfill, materials which appeared similar to baghouse dust and certain raw materials were observed. The deposits of these waste materials are widely distributed over the entire landfill site. These materials should be sampled, analyzed, and their environmental impairment potentials as air, surface water, and groundwater contaminants assessed.

• 85-7. The facility should obtain a dredge-fill permit from the U.S. Army Corps of Engineers for the construction of the landfills on wetlands under the Corps jurisdiction.

• 85-8. An NPDES permit should be obtained from the discharge of cooling water blowdown directly to surface water.

• 85-9. Air emissions from the slag laundering operation should be characterized, and a permit obtained if required. The facility should apply for an air pollutant source permit for the unpermitted residue crushing equipment.

• 85-10. Runoff water from various areas of the facility including the raw materials stockpile areas should be characterized, and a runoff contaminant control program should be instituted.

• 85 11. Additional information should be developed on the use, processing, and handling of uranium-bearing ores and the disposition of the waste products generated.

- 85-12. Vanadium pentoxide product returns were observed in the pilot plant section of the chemical production building during the site visit. Vanadium pentoxide is a listed hazardous waste (P120) and should be disposed of according to RCRA regulations. Ammonium metavanadate is also a listed hazardous waste (P119) and should be disposed of in accordance with RCRA regulations if this product is returned to the facility.

- 85-13. The out of service PCB equipment should be stored in a manner consistent with TSCA regulations and inspected according to the required schedule. Records of the inspections, spills, leakage, and repairs should be kept on all PCB equipment on site.

1.8 Site Visit Personnel and Date

Versar:	Mr. Ross Pickford, Environmental Scientist Mr. Al Picardi, Environmental Scientist
Foote Mineral:	Mr. Charles E. Montague, Plant Manager Mr. Dick Hitzel, Supervisor, Chemical Plant Mr. Dave Bock, Plant Metalurgist
Date:	April 16, 1985