Health Assessment for

SCHUYLKILL METALS CORPORATION SITE

CERCLIS NO. FLD062794003

PLANT CITY, FLORIDA

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Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

HEALTH ASSESSMENT
SCHUYLKILL METALS CORPORATION SITE
PLANT CITY, FLORIDA

Prepared by:
State Health Office
Florida Department of Health and Rehabilitative Services (HRS)

Prepared for:
Agency for Toxic Substances and Disease Registry

SUMMARY

The Schuylkill Metals Corporation (SMC), located in Plant City, Florida, operated as a secondary lead recovery facility from 1972 to 1986. The SMC facility is currently on the National Priorities List (NPL) because of documented environmental contamination and vulnerable ground water resources in the proximity. According to the December, 1987 Remedial Investigation (RI) report, surficial ground water at the site is contaminated with lead, nickel and sulfate. Lead was found at high concentrations in surface water and surface soil on site. The high risk population are residents who live south-southeast of the site, because the overflow of surface water from the ditch and ponds and migration of contaminated ground water from the site may contact the nearby residential area.

BACKGROUND

A. SITE DESCRIPTION

The SMC site is located at 402 South Woodrow Wilson Street in the southwestern portion of Plant City, Florida. It covers approximately 17.4 acres and has an irregular shape (see Figure 1). An eight foot chain-link fence with locked entry gates surrounds the property to discourage unwanted entry.

Common boundaries to the SMC property include:

- -North: Seaboard Coastline Railroad and relatively undeveloped land
- -South: Housing development area and agricultural land
- -East: National Oil Company (northeast) and a housing development (east)
- -West: Agricultural land, sparse housing

Air photographs taken in September, 1980 indicates the site contains many areas with little vegetation.

According to the Drinking Water Data Base of the Florida Department of Environmental Regulation (DER), the municipal well system of Plant City is located a half mile northeast of the SMC site.

SMC operated from 1972 to 1986 as a secondary lead recovery plant utilizing used automobile batteries. Prior to 1981, acid washdown from waste water was stored in a 2.2-acre unlined waste water holding pond. Initially lime, and later ammonia, was used to adjust the pH of the waste water in the holding pond. The waste water treatment system was upgraded in 1981 and all waste water was treated with sodium hydroxide for pH adjustment and

discharged under permit to the publicly owned treatment works (POTW). In July 1986, SMC entered into a consent agreement with DER that included provisions for conducting a RI.

The SMC facility is currently ranked 40th on the National Priorities List (NPL). A consent agreement has been entered between SMC and the State of Florida. DER directed corrective action of the ground water and soil contamination; this initiated the RI.

During the RI it was determined that intermediate ground water flow was generally from the west to east across the site.

B. SITE VISIT

A site visit has not yet been made by Florida HRS staff, and therefore, an accurate description of the physical characteristics of the site cannot be made. An overhead photograph taken in September, 1984 was used to determine the population at risk and the physical hazards at the SMC site.

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

A. ON-SITE CONTAMINATION

Contaminants of concern at the site consist of the following:

MEDIA	CONTAMINANT	RANGE	
Surficial Aquifer	Chromium	BDL - 0.33	mg/L
	Lead	0.11 - 0.17	mg/L
	Sulfate	7,580 - 180,000	mg/L
Surface Water	Lead	0.1 - 1.5	mg/L
Subsoil	Lead	380 - 12,000	mg/kg

BDL: Below Detection Limit

B. OFF-SITE CONTAMINATION

Only one off-site ground water monitoring well was tested during the RI at SMC and this well was upgradient from the SMC site. Three private well locations and depths were given in the RI report, but no analytical results were found in the report (see Table 1 and Figure 2).

C. PHYSICAL HAZARDS

The site is surrounded by an eight-foot chain-link fence. The main entry gate located on Woodrow Wilson Street is locked to discourage unwanted entry. An open disposal lagoon located on site contains a high concentration of lead and appears to be a potential physical hazard for on-site remediation workers.

DEMOGRAPHICS

The SMC Facility is located in the southwestern portion of Plant City, Florida. There are no active industrial operations on-site. The site is bounded by agricultural land and several homes. A junior high school, an elementary school, and a hospital are located within a one-mile radius of the site. Plant City, with an approximate population of 20,000, is located in northeastern Hillsbourough county. Most Plant City residents are either involved in agriculture or commute 25 miles west to Tampa, or ten miles east to Lakeland, Florida for employment. There are approximately 19,000 residents living within a 3-mile radius of the site. The closest residential homes are located about 30 feet from the eastern boundary of the site.

EVALUATION

A. SITE CHARACTERIZATION (DATA NEEDS AND EVALUATION)

1. Environmental Media

Based on analytical results from the RI Report, major contaminants in ground water were lead, nickel and sulfate. The contaminant of concern in surface water and surface soil is lead. Ground water at the site was also tested for endrin, chlordane and toxaphene but the detection limits for these were too high for health-related evaluation. However, pesticides were not utilized or produced by the Schuylkill Metal Plant; therefore, retesting for these compounds is not warranted.

According to the RI Report, only one off-site monitoring well (T-1, see Figure #2), located approximately 600 feet southwest of the site, was included in the sampling schedule. Because the well is located upgradient in relation to the site, it is not appropriate for the evaluation of off-site ground water quality and possible impact from the site. Off-site ground water testing and surface soil analyses are needed to identify the extent of contamination and related environmental pathways because ground water and surface soil at the SMC site were heavily contaminated with lead.

2. Demographics and Land Use

No further information are required.

3. Quality Assurance and Quality Control (QA/QC)

The Quality Assurance and Quality Control data that were included in the RI consisted of results from analyses of several blank and duplicate samples. No contaminants were detected in the blank samples. Conclusions presented in this health assessment are based on data contained in the RI. The validity of the conclusions are, therefore, dependent on the quality of data provided.

B. ENVIRONMENTAL PATHWAYS

Based on the analytical results of the RI report, environmental pathways of concern at MSC site are ground water movement, surface water runnoff, migration to surficial aquifer and wind blown dust. The primary contaminants of concern in relation to these pathways are lead in surface soil and surface water, and lead, chromium, and sulfate in the surficial aquifer.

1. Exposure to on-site contamination

On-site ground water

According to the RI report, the surficial aquifer is located in a bed of medium grain sands, organic peat, and muck, which is quite permeable. Under the surficial aquifer is a thin layer of clay, minor silt, and fine sand. Below this thin layer is a thick layer of Hawthorn clay, phosphate rock, and sand. The intermediate aquifer is lying below the above layers, and is comprised of limestone, chert, trace phosphate, and it is very permeable. Below the intermediate aquifer is the Floridan aquifer. Between the upper bed of Floridan aquifer and the intermediate aquifer is the Hawthorn calcareous layer which is interbedded with stiff clay. This stiff clay prevents the migration of ground water from the intermediate aquifer to Floridan aquifer. However, contaminated ground water may migrate into the Floridan aquifer where the stiff clay is fractured.

On-site surface soils

On-site surface soils at SMC were found to be contaminated with lead. The concentration of lead in identified hot spots were as high as 12,000 mg/kg. When evaluating the photographic site map of September 1980, it was noted that the SMC site contained many barren areas and there is potential for the generation of contaminated dust.

On-site surface water

Surface waters in the ditch and disposal pond were also found to be contaminated with lead. According to the Site List Summary Status Report of DER, 1987, the disposal ponds are unlined creating favorable conditions for contaminants to migrate to the

surficial aquifer. The ditch at SMC is connected to Pemberton Creek and represents a potential threat to surface waters in the area through runnoff of contaminated soils and overflow of the disposal pits during high precipitation.

C. HUMAN EXPOSURE PATHWAYS

The contamination of the environmental media previously indentified constitute the following potential human exposure pathways:

1. Incidental ingestion of contaminated soil via hand to mouth activities such as eating and smoking and direct dermal absorption via contact with the soil. Either pathway could effect remediation workers on site. Inhalation of contaminated airborne dust/soil generated from on-site activities also could expose on-site workers and nearby residents. Potential exposures from this off-site medium cannot be evaluated because off-site soils were not tested for contamination.

2. Ingestion and dermal absorption of contaminated ground water. The RI report indicates that contamination is found in the surficial aquifer at the site. Off-site ground water testing, however, was not adequate to determine whether or not the plume of contamination has extended beyond the site boundaries. If contamination of the intermediate aquifer and Floridan occurs as (discussed in the Environmental Pathways section) then exposure via ingestion, direct dermal uptake via washing, and inhalation exposures during bathing may occur.

3. Ingestion and dermal absorption of contaminated surface water. Because surface water from the ditch at SMC runs into Pemberton Creek, the bioaccumulation and subsequent ingestion of contaminated fish and dermal absorption via direct contact with the creek water may occur.

PUBLIC HEALTH IMPLICATIONS

Lead is the contaminant of concern in soil at the site. Populations at potential risk of exposure to this contaminant are remedial workers, trespassers, and residents living in close proximity to the south and southeast boundaries of the site. There is no known exposure to on-site ground water. Therefore, even though high levels of lead, sulfate, and nickel are present in the on-site ground water, this contaminated medium does not pose a public health threat. A number of nearby residents use ground water wells for domestic water supply, the potential exists for migration of site-related contaminants to these wells, and subsequent exposure of these area residents. At present, off-site migration of site-related contaminants has neither been confirmed nor characterized and the public health implications of

this potential exposure cannot be assessed at this time. The contaminant levels measured in on-site ground water would be of public health concern if they were to migrate to private wells off site.

1. Exposure to on-site contaminants

On-site ground water

The contaminants of concern in ground water on site are lead, sulfate, and chromium.

Lead - Lead has been implicated in numerous illnesses in man. It has been demonstrated to cause central nervous system effects including sensory disturbances known as lead palsey, kidney pathology, and damage to blood forming organs and processes (Hammond and Belies, 1980). These overt illnesses usually occur at high doses but there is evidence of organ systems (excluding kidney) being negatively affected at low levels of exposure. New evidence also suggests an association between blood lead levels and hypertension with no apparent threshold value. Possible increases in the risk of stroke, heart attack and death have also been reported (EPA, 1985a).

Children represent a highly sensitive and susceptible population to lead toxicity. This is due to greater intestinal absorption of lead, and a comparatively greater susceptibility to encephalopathy (EPA, 1985a). In addition, lead accumulates in the body and is only slowly excreted. Therefore, repeated low-dose exposures may result in excessive body burdens which may be toxic (CDC, 1985).

Permanent and severe mental retardation has been documented in severe poisonings. More sinister is the ability of lead to cause neuropsychological defects such as decreases in cognitive abilities and behavioral changes at very low blood levels (EPA, 1985a). There is recent concern that lead may act at even low levels with **in utero** exposures (Bellinger **et al**, 1987). Lead has also been shown to effect various enzyme systems related to proper blood forming processes with no evidence of a safe threshold value (EPA, 1985a).

Sulfate - Sulfate is slowly and incompletely absorbed from the digestive tract. This results in increased water in the intestinal tract via osmotic forces. The sulfate then passes out the body through the feces.

Sulfate, although not well absorbed via the oral route, has an extremely potent laxative action, even at orders of magnitude lesser than concentrations than measured in on-site ground water. It produces an osmotic gradient with movement of water into the lumen, producing a laxative effect. Depending on the salt, sulfate produces this effect at concentrations in excess of 200

mg/L (Salvato, 1982). Exposure to sulfate levels detected in on-site ground water would be a concern for inducing acute episodes of diarrhea, as well as other, related, adverse effects such as loss of body fluids, electrolytes, and essential nutrients. The taste threshold is reported to be between 300 and 400 mg/l (NRC, 1982).

Chromium - Chromium is commonly encountered in the trivalent and hexavalent forms. In water, chromium is predominantly in the hexavalent form with small amounts of trivalent chromium present as organic complexes (EPA, 1984b). In a survey of 91 public water supplies in Florida, the U.S. Geological Survey (USGS) found chromium concentrations of less than 1 ug/L to 10 ug/L in 88 sites, with 3 sites having greater than 25 ug/L (Irwin **et al**, 1985).

Chromium trivalent is an essential nutrient in the human diet. In contrast, chromium hexavalent is the more toxic form which has been implicated in producing liver and kidney damage, internal hemorrhage, dermatitis and respiratory damage (EPA, 1985b). In the industrial setting, it is hexavalentchromate which is the most toxicologically important form. Injuries include ulceration and perforation of the nasal septum, rhinitis and pharangitis (EPA, 1984b).

Much of the difference in toxicity between forms of chromium is due to variability in the solubility and poor intestinal absorption of the trivalent form. Hexavalent chromium is more readily absorbed across membranes (EPA, 1984b). This ability, along with its action as a strong oxidizing agent, contributes much to the toxic potential of the hexavalent form.

Reproductive effects have also been seen in laboratory animal bioassays. The documented ability of chromium to cross the placenta has been implicated in its ability to induce cleft palates, skeletal defects, and neural tube defects (EPA, 1984b).

There is sufficient evidence for carcinogenicity of chromium via inhalation exposures from epidemiological studies of workers in the chromate producing industry and possibly with chromium platers and alloy workers. These workers had significant increases in lung cancer with indications that cancers at other sites may also be associated with such exposures. These responses in human populations are supported by positive findings for carcinogenicity in a number of animal bioassays assessing various routes of administration (EPA, 1984b).

On-site surface soil

Surface soils at Schuylkill Metals contain large quantities of lead. The highest concentration (12,000 mg/kg) was found in surface soil (0.5 to 1 feet) in the area of the processing building.

Potential human exposure pathways to on-site contaminated soils are ingestion, inhalation of suspended particles and dust, and direct dermal contact.

On-site surface water

Lead was also found at high concentrations (1.5 mg/l) in a surface water disposal pond. Ingestion of on-site surface water (accidental ingestion) and direct dermal contact with lead in surface water at the SCM site may pose a potential health concern to trespassers, especially children.

2. Exposure to off-site contaminants

No off-site testing was reported in the RI, therefore, health effects evaluation for nearby residents cannot be made. Because residential homes are located just 30 feet from the site (south and southeast of the site), studies of private well and surface soil in this area are needed.

CONCLUSIONS AND RECOMMENDATIONS

This site is a potential health concern because of the potential risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse health effects. As noted in the Environmental Contamination and Physical hazards section, human exposure to lead, nickel and sulfate in ground water may occur through ingestion; exposure to lead in surface soil may occur through skin contact, inhalation, and incidental ingestion. A better evaluation of the health threat to the public will be made when the off-site studies of private wells and surface soils are done.

ATSDR recommends the following;

1 Perform a detailed private well survey within a one-mile radius including those those who own/use private wells for domestic uses.

2. Precautionary measures should be taken by remediation workers to minimize potential exposure to lead-contaminated surface soils.

3. Additional testing of off-site ground water and surface soil should be considered to evaluate all aspects of environmental exposure pathways.

4. Ground water testing at Plant City municipal well field should be conducted because the well field is located one half mile downgradient from the SMC site.

5. In accordance with CERLA as amended, the Schuylskill Metals site has been evaluated for appropriate follow-up with respect to health effects studies. Although there are indications that human exposure to on-site/off-site contaminants may be currently occuring and may have occured in the past, this site is not being considered for follow-up health studies at this time because the information on population at risk are not sufficient to perform a health study.

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APPENDICES

Figure 1: Location of Monitoring Wells and Sampling Site at Schuylkill Metals Corporation.

Figure 2: Site vicinity map

Table 1: Private wells in the vicinity of Schuylskill Metals Corporation.

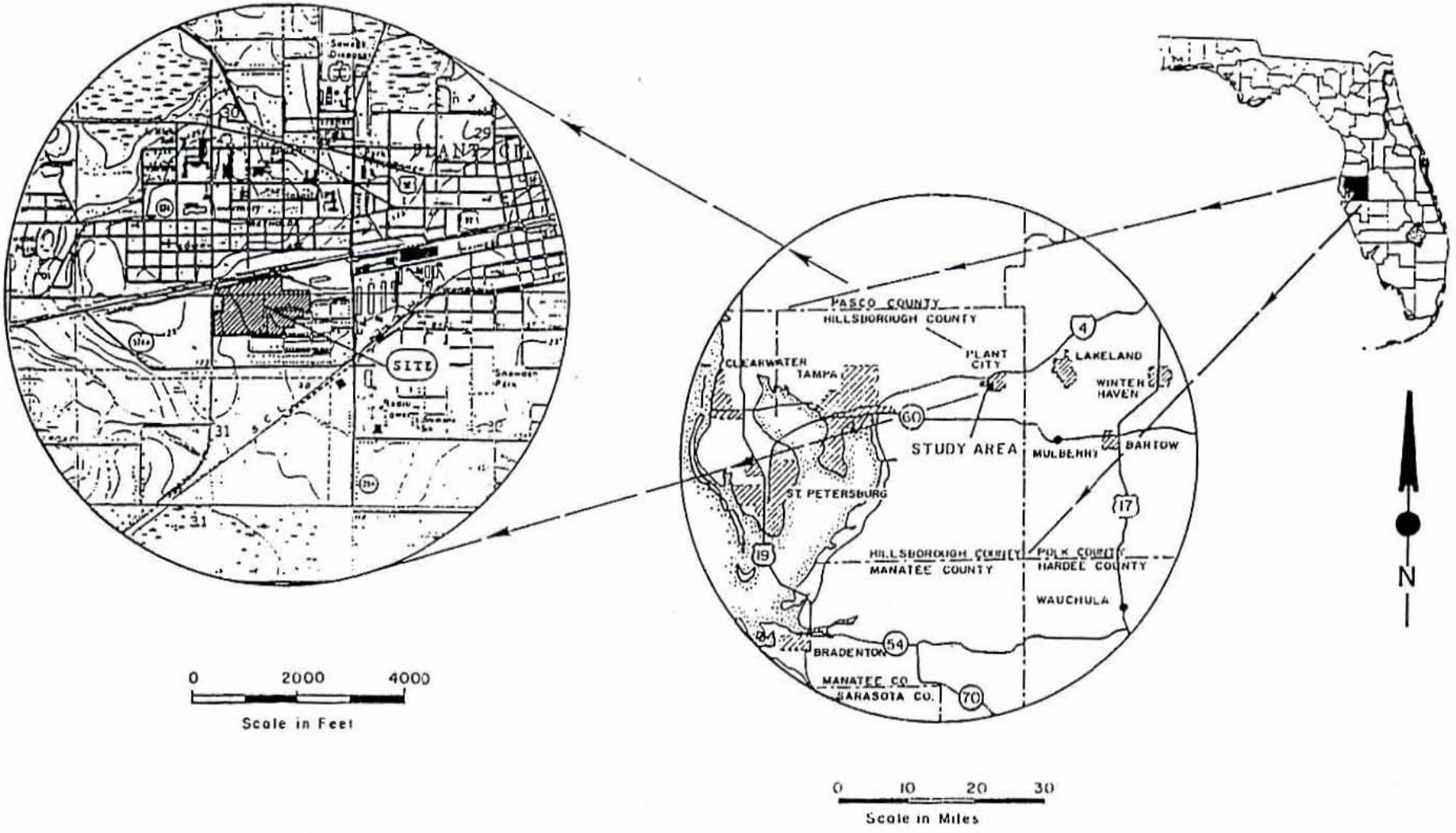

FIGURE 1-1	FILE No. 85C5449	NAME SCHUYLKILL METALS PLANT CITY, FLORIDA FOR SCHUYLKILL METALS CORPORATION	LOCATION MAP SCHUYLKILL METALS SITE - PLANT CITY, FLORIDA.

Woodward-Clyde Consultants

DRAWN BY: JMacD	MADE BY: RL CHECKED BY: TK	DATE: 07/29/86 DATE: 07/29/86	FILE No. 85C5449
SCALE: NOTED			FIGURE 1-1