PB94-964134
EPA/ROD/R05-94/259
November 1994

EPA Superfund Record of Decision:

Ormet Corporation, Hannibal, OH, 9/12/94

RECORD OF DECISION
DECLARATION

Site Name and Location

Ormet Corporation
Hannibal, Ohio

Statement of Basis and Purpose

This Record of Decision presents the selected remedy for the Ormet Corporation Superfund Site (the Site). The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments Reauthorization Act (SARA) and, to the extent practicable, with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The decision is based on the administrative record for the Site.

Assessment of the Site

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD) present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

The purpose of this remedy is to eliminate or reduce contamination in soils, sediments and ground water, and to reduce the risks associated with exposure to contaminated materials. This is the first and final remedy planned for the Site. The components of the remedy include:

Ground Water - Pumping shall continue at the Ormet Ranney well and existing interceptor wells to maintain capture zone of contaminated ground water. Interceptor well water shall be treated by ferrous salt precipitation and clarification, or other means necessary to achieve standards set by the Ohio Environmental Protection Agency (OEPA) Program implementing the National Pollutant Discharge Elimination System (NPDES). Treated water shall be discharged to the Ohio River.

Leachate - Trench drains shall be installed to intercept and extract all leachate seeping from the Construction Material Scrap Dump (CMSD). Leachate shall be treated to NPDES discharge limits.

CMSD - The Construction Materials Scrap Dump (CMSD) shall be re-contoured and covered with a dual-barrier cap that meets the requirements of the Resource Conservation Recovery Act (RCRA), Subtitle C.

Soils - Residual soil contamination in the Former Spent Potliner Storage Area (FSPSA) shall be treated by in-situ soil flushing.

Contaminated soils from the Carbon Runoff and Deposition Area (CRDA) shall be excavated and consolidated under the cover at the CMSD. Soils to be excavated from the trench drains shall also be consolidated under the CMSD cap.

Sediments - PCB and PAH-contaminated sediments shall be removed by dredging from the Outfall 4 stream backwater area. Sediments with PCB concentrations lower than 50 ppm shall be solidified and consolidated under the CMSD cap. Sediments with PCB concentrations higher than 50 ppm shall be disposed of off-site in a EPA approved disposal facility.

Site-wide - Use of institutional controls to limit ground water and land use.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and, with respect to the FSPSA, satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principle element. However, the CMSD, sediments, and CRDA soils will not be treated. It is impracticable to treat the homogeneous materials in the CMSD, and it is not cost-effective to treat on-site the small volume of soils and sediments to be excavated. Solidification will reduce mobility of the PCBs and PAHs in sediments; however, EPA has determined in the past that solidification does not constitute treatment.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years of commencement of remedial action to ensure that the remedy continues to be protective of human health and the environment.

State Concurrence

The State of Ohio does not concur with the selected remedy.

9/12/94
Date

David A. Ullrich
Regional Administrator
for

TABLE OF CONTENTS

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

Ormet Superfund Site

A. SITE LOCATION AND DESCRIPTION

The Ormet Superfund Site (the Site) is owned and operated by the Ormet Corporation (Ormet), a primary aluminum reduction facility. The Site is located in Monroe County, Ohio, on the west bank of the Ohio River (river mile 123.4) approximately 35 miles south of Wheeling, West Virginia and 2.5 miles north of Hannibal, Ohio, on State Highway 7 (Figure 1). Immediately to the southwest of the Ormet Site is the Consolidated Aluminum Corporation (CAC).

The Ohio River is immediately adjacent to the Site, and is used for commercial and recreational boat traffic. The Hannibal Lock and Dam is approximately 3 miles down-river. The primary population centers are Hannibal, Ohio (2.5 miles south, population 800), New Martinsville, West Virginia (across the Ohio River from Hannibal, population about 6,705), and Proctor, West Virginia (population 150, about 3/4 miles downwind and upriver). There are no drinking water intakes along the river within 100 miles downstream of Ormet.

The Ormet Site is located in an area known as Buck Hill Bottom, a portion of the Ohio River Floodplain that formed as river sediments were deposited on the inside of a meander bend. This lens-shaped bottomland is approximately 2.5 miles long and 0.5 mile wide. The Ormet property occupies about 245 acres in the northern portion of the area. The northeastern portion of the Ormet property is the area that was investigated during the Remedial Investigation and Feasibility Study (RI/FS) (Figure 2). The southwestern portion contains the active manufacturing facility.

B. SITE HISTORY AND ENFORCEMENT ACTIVITES

Since the plant started operations in 1958, Ormet's main process has been the reduction of alumina to produce aluminum metal. From 1958 to 1968, approximately 85,000 tons of spent potliner, a hazardous by-product of aluminum production (containing cyanide), were placed in an unlined, 10-acre open area in the northeast part of the Site, identified in Figure 2 as the Former Spent Potliner Storage Area (FSPSA).

There are five impoundments on Site, called the Former Disposal Ponds (FDP). Total area of FDPs 1-4 is about 5 acres. FDP 5 is about 13 acres in size. These ponds are unlined and constructed of natural materials. FDPs 1 through 4 received approximately 50,000 cubic yards of process waste from the air emissions wet scrubbing system in the form of sludge, the primary constituents of which were alumina, particle carbon, and calcium-based salts.

From 1968 to 1981, much of the potliner waste was removed from the FSPSA by Ormet and transported to an on-site recovery plant that removed a useable material called cryolite from the potliner. Waste slurry from the cryolite recovery plant was routed to FDP 5, although FDPs 1-4 may have received minor amounts of cryolite plant waste. The tailings are alkaline and consist primarily of carbonaceous material from the potliner, along with sodium and calcium-based salts. The volume of materials in FDP 5 is about 370,000 cubic yards. Since 1980, spent potliner material generated by the plant has been transported off-site for disposal.

From about 1966 until mid-1979, Ormet deposited waste construction materials and other miscellaneous plant debris, including capacitors and spent potliner, in the southeastern corner of the Site, adjacent to Pond 5 and the Ohio River (Figure 2). This 4 to 5 acre area is designated as the Construction Material Scrap Dump (CMSD). A list of materials disposed of in the CMSD is contained in the RI report, Appendix G.

An area referred to as the Carbon Runoff and Deposition Area (CRDA) (Figure 2) contains carbon deposits, probably carried there by storm water runoff from an area of the Ormet plant where spent graphite anodes were crushed in a mill. Some of the carbon runoff may also have entered the 004 outfall stream and backwater area (Figure 2).

In 1972, Ormet initiatied a ground water investigation which identified high levels of fluoride coming from FDP 5. To protect the quality of its process water, two extraction wells were installed to intercept the plume. These wells have operated continuously through the present day.

A 1978 study by Ormet showed improvement in the ground water from under FDP 5, but indicated decreased quality in the area of the FSPSA. A 1984 study confirmed that the FSPSA was leaching contaminants to ground water. Additional sampling in 1985, 1986, and two rounds of sampling during the Remedial Investigation (RI) in 1988 and 1990 show concentrations of fluoride in ground water decreasing down-gradient of the disposal ponds, but fluoride and cyanide are on the rise in and downgradient of FSPSA.

The 1985 study identified low levels of toluene but no other organic compounds in ground water.

Based on contamination found at the Site and its potential impact on drinking water supplies, U.S. EPA placed the Site on the National Priorities List (NPL) in September 1985.

In May 1987, the United States Environmental Protection Agency (EPA), Ohio Environmental Protection Agency (OEPA), and Ormet Corporation (Ormet) entered into an Administrative Order by

Consent (Consent Order) providing for Ormet to conduct the Remedial Investigation/ Feasibility Study (RI/FS) under EPA and OEPA supervision. The RI report was completed in December 1992 and the FS was completed in December 1993.

In addition to defining the contamination found in the disposal areas described above, seeps were discovered during the RI near the Plant Recreational Area ballfields and along the western edge of the CMSD. The seeps contained cyanide ranging in concentrations from 79 to 950 ppb.

C. HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA held a public availability session in April 1993, after the RI was completed, to explain to interested parties the results of the investigation and what the next steps would be. At this time, EPA conducted one-on-one, in-home interviews with residents to determine whether people had concerns about the Site they did not wish to express publicly. No such concerns were conveyed to the interviewers.

The RI/FS reports and the Proposed Plan were released for public comment on April 11, 1994. Information repositories have been established for the Administrative Record at the New Martinsville Public Library and the Hannibal Post Office.

A public meeting was held on April 20, 1994, at the River High School in Hannibal, Ohio. EPA conducted the meeting, explained the Proposed Plan, and answered questions about the Site and the Superfund remedy selection process. Approximately 40 people attended. Oral comments were documented by a court reporter, and a transcript of the meeting has been placed in the Administrative Record.

EPA received a timely request for extension of the comment period from Ormet on April 25, 1994, and the extension was granted. Therefore, the RI/FS and Proposed Plan were available for public comments from April 11 to June 10, 1994. Comments received during that period, and EPA's response to those comments, are documented in the attached Responsiveness Summary.

The public participation requirements of CERCLA sections 113 (k)(2) (i-iv) and 117 have been met in the remedy selection process. This decision document presents the selected remedial action for the Ormet Site chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The decision for this Site is based on the Administrative Record.

D. SCOPE OF THE SELECTED REMEDY

This ROD addresses the final remedy for the Ormet Site. The threats to human health and the environment result from source materials in the CMSD, the FSPSA, the CRDA, and backwater area sediments, which have migrated or threaten to migrate to ground and surface water. This response action shall contain the source material in the CMSD, CRDA and the backwater area, treat contaminated soils in the FSPSA, and restore a Class II aquifer to drinking water quality.

This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for the Site. Treatment of the soils in the FSPSA is expected to eliminate the source of cyanide in ground water, and allow for unrestricted use of that portion of the Site. However, it is impracticable to treat the contents of the CMSD because of the heterogeneity of landfill contents, so this source shall be contained. The small volume of soils and sediments to be excavated makes a treatment component for these media non-cost-effective, so they will be consolidated under the CMSD cap.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a five-year review shall be conducted to ensure that the remedy continues to be protective of human health and the environment.

E. SUMMARY OF SITE CHARACTERISTICS

Site Geology and Hydrology

The Site is located in the Ohio River valley near the base of the West Virginia Panhandle. The area is part of the Appalachian Plateau province, characterized by steep hills and valleys. The Ohio River receives virtually all natural drainage in the area. The only flat land is generally found as small areas of floodplain adjacent to the Ohio River, where deposition of sediments and changing river levels have carved terraces in the alluvial materials. Proximity to the river for transportation and water, and ease of development, has made these flat areas magnets for development.

The sandy, gravelly sediments that form these bottomlands make prolific aquifers along the length of the Ohio River. The same qualities that make them good aquifers also make them vulnerable to contamination.

The Ormet property itself consists of two main, relatively flat terraces at about 630 and 665 feet elevation. To the northwest of the property and Highway 7 are steep, heavily forested hills that rise in elevation to 1300 feet in less than a mile. A small stream bisects the property, generally separating the active plant from the disposal areas to the northeast. The source of this stream is a permitted outfall (Outfall 004) for plant process water. The stream conveys the process water and stormwater runoff along the southwestern edge of the disposal areas to a small backwater area of the Ohio River (Figure 2).

The alluvial aquifer beneath the surface of Buck Hill Bottom is a source of drinking water, currently producing about 4 million gallons per day. Most of this water is pumped by two high-capacity "Ranney" wells, one on Ormet property, the other belonging to CAC. The CAC well provides drinking water to both CAC and Ormet employees, a total of about 3200 people. Ormet uses its Ranney well to provide non-contact cooling water to its alumina reduction process. The ground water under the Site would be classified as Class IIb ground water, since it is not currently used for drinking but has the potential to be used, and is considered restorable in a reasonable timeframe.

Nature and Extent of Contamination

The areas and media investigated during the two phases of the RI included the following:

* Former Disposal Ponds (FDPs)
* Former Spent Potliner Storage Area (FSPSA)
* Carbon Runoff and Deposition Area (CRDA)
* Construction Material Scrap Dump and Western Seeps (CMSD)
* Ballfield and Northern Seeps (SP)
* Ground Water (GW)
* Surface Water (SW)
* Sediments (from Ohio River and Backwater Area) (SED)
* Air
* Environmental Evaluation

As a result of the investigation, low to moderate levels of contamination were identified in all media and sources. Specific contaminants of concern for human health are shown in Table 1.

Cyanide, fluoride, chromium, arsenic, and polynuclear aromatic hydrocarbons (PAH) were found in solids from the FDPs. The contaminants do not appear to be migrating to any significant degree, either to ground water or air, except that fluoride is present in ground water down-gradient of FDP-5 at levels that exceed the MCL. A comparison with sample results from 1972, however, shows that fluoride concentrations down-gradient of FDP-5 have decreased by one to three orders of magnitude at a given sampling location. For example, at sampling location TH-6/MW-34, fluoride levels have declined from a high in 1972 of 1050 ppm to 1990 levels of 6.5 ppm. Similar reduction is seen at location MW-17. MW-39 is the highest recent result at 110 ppm, but this is still a tenfold reduction over 1972 results. It is apparent that fluoride leaching from FDP-5 has long-since peaked, and can be expected to continue its decline as long as the current pumping regime is maintained.

Pond solids are characteristically alkaline in nature (i.e., pH > 7.0). There is no evidence of surface runoff from the ponds. However, a steel conduit extends from the pond 5 dike along the Ohio River north of the CMSD, and may provide subsurface drainage from that pond, or from the CMSD. Sampling results of effluent from the conduit showed cyanide at greater than 4 mg/L.

At the FSPSA, relatively high concentrations of PAHs were detected in soils in the 2-4 foot horizon. Because PAHs are relatively immobile, they are not expected to contribute significantly to releases to ground water from the FSPSA. Moderate levels of cyanide and arsenic, both mobile in ground water, were identified in the FSPSA. The FSPSA is the primary contributor to cyanide and fluoride contamination in ground water, and may also be a factor in the arsenic showing up in down-gradient wells. In contrast to the situation at FDP-5 above, fluoride levels in and down-gradient of the FSPSA have shown an increasing trend since 1972. For example, at the MW-18/TH-11 location, levels of fluoride have risen from 10 ppm in 1972 to 710 ppm in 1990.

The CRDA is underlain by moderate to low-permeability soils. A single composite sample from the CRDA showed polychlorinated biphenyls (PCBs) at 56 mg/kg. PAHs were detected in the surficial carbon soil at higher levels than in the underlying native soils, indicating low potential for migration to ground water. However, the CRDA is a probable source of PCBs and PAHs to the backwater and river bank, transported by stormwater runoff. Arsenic was also detected as high as 83 mg/kg in soils at the CRDA.

The CMSD is a significant source of cyanide and PCBs in the seeps, backwater sediments, and river water. The principal transport mechanism appears to be discharge of seep water to the 004 Outfall stream, and there may be transport via the steel conduit mentioned above. There is a low-permeability clay/silt layer underneath the CMSD which appears to provide a natural barrier to contaminants leaching to ground water, and the Ormet Ranney well creates a hydraulic gradient away from the river, so ground water discharge to surface water is not considered a reasonable migration pathway. PAHs are present at levels that contribute to an increased ecological risk, but are not believed to be migrating out of the source area.

Two seeps were identified to the north of FDP 5 and the CMSD. These seeps drain out in the vicinity of the plant recreation area ballfield. Sample results indicate cyanide as high as 1.5 mg/l.

Ground water at the Site is contaminated in excess of Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) for a number of contaminants, including tetrachloroethene (PCE), cyanide, fluoride, arsenic, antimony, and beryllium. The primary source of the plume appears to be due to infiltration of precipitation through the FSPSA. The plume extends about 3,000 feet from the FSPSA before it reaches the interceptor wells. It is characterized by a basic pH near the FSPSA, which becomes progressively more neutral with distance from the source. Sodium is also typically elevated in the plume. Table 2 shows ranges of concentrations at the Site for chemicals of concern in ground water.

A small backwater area at the mouth of the 004 outfall stream creates a sink for contamination. PCBs at nearly 100 ppm and total PAHs of over 1100 ppm were identified in the sediments.

Although industrial activity upstream from the Site contributes a certain level of ambient contamination in Ohio River water and sediment as it reaches the Site, both media are showing some effects from the Site. The effects are mainly in the form of elevated pH and concentrations of PAHs, PCBs and cyanide. Because the influence of the two Ranney wells makes the river a losing stream for ground water in this stretch, stormwater runoff and seep discharge are the most likely transport mechanisms to the river.

These same transport mechanisms account for the PAHs and PCBs found in the backwater area sediments, which are the main contributors to the current risk. PCBs were not found in sediment samples upstream from the backwater area, and PAHs are two orders of magnitude lower in background samples.

Sampling of fugitive dust emissions indicate that PM_{10} particles are migrating off-site. However, air modeling indicates the risk to the nearest down-wind receptors in Proctor, West Virginia, is negligible.

F. <u>SUMMARY OF SITE RISKS</u>

Human Health Risks

Analytical data collected during the RI from all media were combined with site-specific and nationally applied standard assumptions and criteria to produce a Baseline Risk Assessment (BRA). The BRA is used to estimate the risks from the Site to human health and the environment if no action is taken and none of the existing controls are operated or maintained. The results of a human health BRA are presented in terms of the potential for an individual to have an excess lifetime cancer risk (ELCR) due to exposure to Site contaminants and/or to experience toxic (non-carcinogenic) effects from Site contaminants, as measured by a Hazard Index (HI). EPA considers a cumulative ELCR of 1×10^{-4} (one in ten thousand) and/or a HI of 1 or greater to present sufficient added risk to prompt a response action.

In the initial step of the BRA, a list of contaminants of concern was developed by applying screening criteria set out in EPA's Risk Assessment Guidance for Superfund (RAGS) to chemicals and compounds identified at the Site. Chemicals were screened out if they were not detected, infrequently detected and not generally a high risk chemical, present at levels below those essential to human nutrition, considered to be present due to field or lab contamination, or a tentatively identified compound (one whose identity and therefore concentration could not be resolved by the analytical process used. Table 1 contains a comprehensive list of the chemicals that survived the screening process and were considered in the human health and/or the environmental risk assessment.

In the exposure assessment, reasonable maximum exposure (RME) scenarios were developed for a variety of human receptors based on current land uses on and around the Site, and based on hypothetical future land uses. For exposure to occur, there must be an actual or potential complete pathway for contamination to move from the Site and ultimately enter a receptor's body. Potentially complete exposure pathways are detailed in Tables 3 and 4 for current and hypothetical future land use, respectively.

From the list of chemicals of concern, exposure point concentrations (EPC) were calculated. The EPCs were combined in standard equations with toxicity and cancer potency data from EPA data bases and standard or site-specific exposure assumptions to calculate an estimate of the carcinogenic and non-carcinogenic risks to individuals identified in the RME scenarios. Table 5 contains the risk characterization estimates.

The risk characterization indicates that estimated risks are greatest under a future residential land use scenario that includes direct contact with and ingestion of contaminated soils and sediments, inhalation of particulate matter, ingestion of contaminated ground water, and ingestion of fish contaminated with PCBs from the Site. The ELCR under this RME scenario is approximately 1×10^{-1}, driven by ingestion of fish containing PCBs. Given the nature of the sample used to estimate fish tissue concentrations, this estimate appears to be a worst case rather than reasonable maximum exposure. In addition, this stretch of the Ohio River is under a fish consumption advisory due to ambient contamination from a variety of industrial sources up- and down-river. Fishing advisories, while not enforceable, may tend to minimize the amount of fish ingested by any given individual.

If fish ingestion is not considered, the ELCR is approximately 9 x 10^{-3} for a future resident living down wind of pond 5. A Hazard Index greater than 1 occurs for future residential adults from ingestion of drinking water, and for children based on drinking water and soil contact.

Under a hypothetical future situation in which the facility is operating but the existing barrier wells are no longer pumped (possibly due to changes in the manufacturing process), future plant workers could experience an increased cancer risk of 1 x 10^{-3} and an HI > 1 from ingestion of drinking water in the event the CAC Ranney well becomes contaminated. The contributing chemicals in both future residential and industrial drinking water scenarios are arsenic, beryllium, and tetrachloroethene.

The unacceptable risks under current exposure scenarios are an ELCR of 1 x 10^{-1} and HI > 1 to a current resident who regularly ingests fish (see above) and an ELCR of 2 x 10^{-4} to a hypothetical trespasser who gains access to the Site from the Ohio River and is exposed to surface water and sediments in the backwater area and along the river bank. PCBs and PAHs are the chemicals contributing to the trespasser risk. The CMSD, CRDA, and the sediments themselves are the sources of the PAHs and PCBs.

EPA believes it is valid to estimate risks under a variety of present and future scenarios, including future residential use, at any site. By estimating the risk under the highest form of exposure, EPA can compare a remedy which eliminates that risk to remedies that eliminate risk based on lower but perhaps more likely exposure scenarios. EPA can then make a more informed risk management decision.

A significant area of controversy for this Site is the question of whether future residential development of the Site is a likely use, and therefore whether it is a reasonable scenario on which to base a remedy selection. Historically, EPA has considered future residential use to be a valid scenario because most Superfund Sites are not active, operating industrial facilities. Many Sites are closed, abandoned, and not maintained by the owner, or no owners can be found, which increases the possibilities for residential use.

Ormet, on the other hand, is an active manufacturing facility, in a rural area, next to another manufacturing facility (CAC). There are no residences in the immediate area. Monroe County Census figures indicate a 10% decrease in the population in the past 8 years. EPA believes it is reasonable to assume that the current land use will continue for the forseeable future. This will make residential development of the Site highly unlikely. Therefore, the selected remedy is based on clean-up to standards based on future commercial/industrial use of the property. However, EPA believes it is also reasonable to assume that at some time in the future the Ormet Ranney well may no longer be used, in which case containment of the plume would be lost and contamination allowed to reach the CAC drinking water well and affect the drinking water supply for over 3000 workers. Therefore, the remedy also focuses on restoration of the ground water to drinking water quality.

Environmental Risks

An environmental evaluation performed at the Site concluded that the contaminants of concern from an ecological standpoint are known to produce sublethal and other toxic effects in the types of organisms found on Site.

Two State endangered species occupy the Ohio River in the general area of the Site. The Ohio lamprey has been reported at locations an unspeciifed distance downstream of the Hannibal lock and dam. The channel darter may occur in the vicinity of the lock and dam. However, the lock and dam may provide a barrier to their movement upstream. In addition, a State special interest species in the river is the ghost shiner, which occupies large pools and protected backwaters.

Sediments from the southwestern CMSD seeps and the backwater area produced high mortality among bioassay organisms. Hyallela azteca experienced 100 percent mortality, and growth of Chironomous tentana was depressed.

Surface water in the backwater area and immediately downstream exceeds the four-day average ambient water quality criteria (AWQC) for antimony, lead, cyanide, and PCBs. Cyanide at two locations exceeded the one-hour average criterion. This demonstrates that Site contaminants in river water can potentially cause lethal and sublethal effects in aquatic organisms.

In addition, concentrations of contaminants in river sediments were compared to reference sites (relatively clean) and sites with a high instance of tumors in fish. Sediments on-site and downstream of the Site exceed the lowest concentrations for PCBs and PAHs observed at the fish tumor Sites. Backwater area PAH concentrations exceeded the highest levels reported from the fish tumor Sites, indicating the backwater area is likely to pose severe carcinogenic risk to fish entering from the Ohio River, due to exposure to PCBs and PAHs in sediments. As discussed above, the CMSD and the CRDA are the likely sources for PCBs and PAHs in the backwater area sediments and the river.

G. RATIONALE FOR FURTHER ACTION

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementation of the response action selected in this ROD, may present an imminent and substantial endangerment to public health or welfare, or the environment. Therefore, based on the findings of the RI report and the discussion above, a Feasibility Study (FS) was performed to develop alternatives to address the threats at the Site.

The backwater area sediments pose a current threat to human health and the environment, and will be addressed by the remedy. The CRDA and CMSD, while not themselves posing unacceptable risks, are sources of contamination to the sediments and as such must be addressed by the remedy. The FSPSA and ground water contamination must be addressed because the aquifer is a current source of drinking water and under a future scenario where Ormet's Ranney well should cease pumping, the CAC drinking water well could be contaminated, thus exposing workers to unacceptable levels of contamination.

Because the human health risk assessment identified risk from all sources to hypothetical future residents, the former disposal ponds (FDPs) were carried through the FS. As discussed in Section F, above, and based on community input during the public comment period; EPA believes future residential use to be an unlikely scenario. Under none of the current use scenarios did the FDPs contribute to any significant risk. Estimated risk under future industrial use falls with the acceptable risk range.

While FDP-5 appears to be a source of elevated fluoride in ground water, data from the last 20 years indicate a steady decrease in fluoride levels down-gradient of FDP-5 due to the pumping of the interceptor wells and Ormet's Ranney well. It is reasonable to believe this trend will continue. Site-wide ground water compliance monitoring during remedial action will provide a basis to determine whether the downward trend is continuing. Therefore these areas will not require active remedial action, and will not be considered further in this decision document. The descriptions of alternatives in Section H below are modified from the FS to eliminate remedial components and costs associated with the FDPs.

H. DESCRIPTION OF ALTERNATIVES

The Feasibility Study (FS) Report identified and evaluated alternatives that could be used to address threats and/or potential threats posed by the Site. All of the alternatives described in the following paragraphs, except for the No Action Alternative, include the common element of Site-wide institutional controls in the form of deed restrictions and a common perimeter fence. In addition, capping components in Alternatives 3 through 10 include provisions for flood protection because part of the CMSD is located in the 100-year flood plain

ALTERNATIVE 1: NO ACTION

CERCLA requires that a "No Action" alternative be considered as a basis upon which to compare other alternatives. This remedy was assembled by combining the no-action remedial measures for each of the areas and media under consideration in the FS Report. The no-action response for ground water is considered to exclude continued pumping of the Ormet Ranney well and interceptor wells, which currently contain the plume in the alluvial aquifer beneath the Ormet property. No operation and maintenance (O & M) activities are included to prevent further deterioration of present Site conditions over the long-term. This alternative would not comply with State or Federal health-based standards and would not adequately protect human health or the environment.

ALTERNATIVE 2 - ALTERNATIVE 10: These alternatives are composed of different combinations of the remedial action components which are listed in Table 6. The specific alternatives are shown in Table 7.

In consideration of the ground water policy set forth in the NCP (40 CFR 300.430 (a)(iii)(F)), the remediation goal for ground water is to resore it to drinking water quality.

Alternatives 2 through 10 all include collection and treatment of CMSD and ballfield seeps using collection trenches (SP-4). The liquid would be routed to an oil-water separator first, then to the ground water treatment system for treatment prior to discharge to the river. These alternatives also include re-routing of the 004 Outfall ditch through the CRDA to bypass the backwater area and discharge directly to the river.

Alternatives 2-8 all include GW-3 component for ground water, consisting of continuing to operate the existing pumping system, with treatment of the barrier well water by Ferrous salt precipitation and clarification to achieve NPDES discharge standards, followed by discharge to the Ohio River.

The ground water component (GW-5) for Alternatives 9 and 10 calls for new extraction wells to be installed closer to the source, with the idea of collecting lower volumes of more highly contaminated ground water. An added step of activated alumina adsorption would be added to the treatment train. The Ormet Ranney well would continue to pump in this alternative.

Based on data provided in the FS report (Appendix K), there appears to be no significant difference in remediation timeframes between GW-3 and GW-5. Both are expected to achieve the goal within 35 to 40 years, based on calculations provided in FS Appendix K. The calculations, however, do not take into account the increased restoration that may be realized by implementation of soil flushing, as is called for in several alternatives as a component of the FSPSA remedy.

Alternatives 2 through 5 are containment only alternatives, except for the treatment of collected seep water and ground water, followed by discharge to the river. Because no treatment of source areas occurs, the volume of untreated waste remaining in place is essentially the same as that reported in the RI for the source areas:

FSPSA	---------------	no waste volume estimate: contaminants are residual cyanide, fluoride, and PAH from previously removed potliner.
CRDA	---------------	5,700 CY carbon material containing PAHs, PCBs and arsenic
CMSD	---------------	240,000 CY fill material containing cyanide, PCBs, PAHs.
Sediments	---------------	2,000 CY containing PCBs, PAH, cyanide

For Alternatives 3, 4, and 5 a portion of the waste would be excavated and landfilled off-site. However, this still represents a containment measure.

Alternative 2 achieves containment through the use of vegetated soil covers for the source areas, except that the CRDA would be consolidated under the cover for the CMSD, and river sediments would be contained in place with sheet piling and concrete revetments. (FSPSA-2, CMSD-3, CRDA 3, SED-6).

Cost:	Capital	- $9,670,000	(includes first 10 years O & M on ground water
	O & M	- $1,300,000	Annual cost
	Present Worth	- $15,100,000	30 years at 10%

Alternative 3 would consolidate all of the CRDA, and river sediments at concentrations less than 50 mg/kg PCBs, within the CMSD (concentrations greater than 50 would be disposed of off-site). An estimated 1000 CY of sediments would be excavated and solidified prior to diposal in the CMSD. Then all remaining sources, including the CMSD, would receive single barrier synthetic caps (basically a layer of 40 mil high-density polyethylene (HDPE) with a vegetated soil cover for protection. (FSPSA-4, CMSD-4, CRDA-3, SED-8).

Cost: Capital - $12,150,000
O & M - $1,300,000 Annual cost
Present Worth - $17,550,000 30 years at 10%

Alternative 4 is essentially the same as Alternative 3, except that all the sediments would be excavated, and the source areas would receive dual barrier caps consisting of 2 feet of engineered clay cover with the addition of a 40 mil HDPE layer. This cover would comply with RCRA Subtitle C landfill closure requirements. (FSPSA-3, CMSD-5, CRDA-3, SED-7).

Cost: Capital - $16,400,000
O & M - $1,300,00 Annual cost
Present Worth - $21,800,000 30 years at 10%

Alternative 5 is identical to Alternative 3 except approximately 4,000 yards of the more contaminated soil from the FSPSA would be excavated and transported for off-site disposal. (FSPSA-9, CMSD-4, CRDA-3, SED-8).

Cost: Capital - $14,150,000
O & M - $1,300,000
Present Worth - $19,550,000

Alternative 6 involves excavation of the entire CMSD and CRDA, with on-site thermal oxidation and on-site disposal of the residual ash under a single-barrier synthetic cap. The FSPSA component would be the same as Alternative 5, and river sediments would be fully excavated and consolidated on-site with the CMSD/CRDA residuals. This would result in a volume of treated waste of approximately 246,000 CY. (FSPSA-9, CMSD-7, CRDA-5, SED-7.)

Cost: Capital - $109,700,000
O & M - $1,300,000
Present Worth - $115,100,000

Alternative 7 incorporates a treatment component for the source of contamination to ground water. Under this alternative, the FSPSA would be subjected to in-situ soil flushing, at the conclusion of which it would receive a vegetated soil cover. The CMSD and CRDA components would be the same as in Alternative 6. The sediments would be excavated and treated by solvent extraction, with the residuals consolidated under the CMSD cap. This alternative would result in the highest degree of treatment, with the total volume of treated waste on the order of 250,000 CY, including the un-estimated waste volume at the FSPSA. (FSPSA-6, CMSD-7, CRDA-5, SED-9).

Cost: Capital - $108,400,000
O & M - $1,300,000
Present Worth - $113,800,000

Alternative 8 calls for in-situ soil flushing at the FSPSA, followed by a single-barrier synthetic cap. The CMSD, CRDA, and river sediments would be dealt with the same as in Alternative 5. (FSPSA-6, CMSD-4, CRDA-3, SED-8).

Cost: Capital - $12,150,000
O & M - $1,300,000
Present Worth - $17,550,000

In Alternative 9, the CRDA and river sediments would be completely excavated and the FSPSA would undergo partial excavation. The river sediments would be solidified, and material from all three areas taken to off-site disposal facilites. The FSPSA residual materials would be contained under a single-barrier synthetic cap. The CMSD would be excavated and would undergo on-site thermal oxidation, with residuals contained under a single-barrier synthetic cap. The GW-5 ground water component would be implemented here. (FSPSA-9, CMSD-7, CRDA-4, SED-10).

Cost: Capital - $123,400,000
O & M - $3,000,000
Present Worth - $134,400,000

Alternative 10 involves only containment measures. The CRDA and sediments would be excavated and consolidated in the CMSD after the sediments were solidified. All remaining source areas would receive single barrier clay caps that would comply with Ohio solid waste closure requirements. (FSPSA-10, CMSD-8, CRDA-3, SED-10).

Cost: Capital - $34,100,000
O & M - $3,000,000
Present Worth - $44,100,000

I. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP sets out nine criteria against which Alternatives 1 through 10 were evaluated. The criteria are based on the remedy selection requirements of CERCLA Section 121, and are described in Table 8.

Because of the large number of components that were developed to address many of the sources, it is more efficient to compare the performance of the components of the alternatives against criteria 2 through 7 (the balancing criteria). This will provide a clearer picture of the relative merits of the components. For a description of each component, refer to Table 6.

Threshold Criteria

1. Overall Protection of Human Health and the Environment

All alternatives under consideration except for Alternative 1 (the No Action alternative) are protective of Human Health and the Environment. Alternatives 2 through 10 would eliminate the risks associated with drinking contaminated groundwater by pumping the groundwater and treating it prior to discharge to the Ohio River. In addition, Alternatives 2 through 10 would eliminate the risk associated with the FSPSA, CMSD, CRDA, and sediments through containment and/or treatment. Therefore, potential impacts to human health or the environment will be eliminated under these alternatives.

Alternative 1 would not provide or enhance protection of human health or the environment because it does not contain or treat contamination sources at the Site. Because Alternative 1 fails to meet this threshold criterion, it will not be considered further in this document.

2. Compliance with ARARs

Below is an analysis of the ability of the components of each alternative to achieve key ARARs. For a detailed breakdown of all potential ARARs considered in the FS, please see Table 7-2 in Attachment 3 to the Addendum in the FS report. For a General discussion of the ARARs listed in this section, see Section K.

<u>40 CFR 141 (the Safe Drinking Water Act (SDWA)</u>: SDWA Maximum Contaminant Levels are relevant and appropriate to groundwater remedial actions that are current and potential sources of drinking water. Both GW-3 and GW-5, the two groundwater remediation alternatives, will meet this ARAR.

<u>OAC:3745-33-01 through OAC:3745-33-10 (Clean Water Act, the National Pollutant Discharge Elimination System (NPDES)</u>: NPDES requirements are applicable to direct discharges of pollutants to surface waters. States must establish site specific discharge limits and other requirements for discharges of toxic pollutants based on application of "best available technology economically achievable" (BAT). Both GW-3 and GW-5 involve discharge of treated groundwater to surface water. Both of these alternatives will include treatment technology sufficient to meet these requirements.

<u>RCRA Subtitle C at 40 CFR 264.310 (OAC:3745-57-10)</u>: RCRA Subtitle C Landfill Closure requirements apply to closure of RCRA hazardous waste landfills. EPA has determined that these

requirements are relevant and appropriate to remedial alternative components involving capping in place of materials in the CMSD because disposal of spent potliner had occurred in the CMSD, and this material was subsequently listed as a RCRA hazardous waste. CMSD-5 will meet these requirements. CMSD-3, CMSD-4 and CMSD-8 involve caps that do not meet these requirements, and can therefore be eliminated from further consideration. EPA determined that RCRA Subtitle C is relevant but not appropriate to remedial alternative components involving capping in place of materials in the FSPSA because the potliner was removed from the FSPSA for processing in the cryolite recovery plant.

RCRA Subtitle D: RCRA Subtitle D Landfill Closure Requirements (OAC: 3745-27-11(G)) regulate closure of areas containing solid wastes. EPA has determined that these requirements are relevant and appropriate to CMSD-7 (treatment residuals from excavation and thermal oxidation of the CMSD would be landfilled on-site) and remedial alternative components involving capping in place of materials in the FSPSA. FSPSA-10, employing a single barrier clay cap, meets this requirement. FSPSA-4 and FSPSA-9, employing a single-barrier FML cap, will meet this requirement if a demonstration of "equivalency" to the materials set forth in the regulation can be made. EPA has determined that a single-barrier FML cap can be designed to comply with OAC: 3745-27-11(g). FSPSA-3, employing a dual barrier cap, would meet and exceed the Subtitle D requirements. FSPSA-2, employing a soil cover, does not meet this requirement. FSPSA-6 involves treatment of soils by soil flushing to remove contaminants of concern for ground water protection. However, soil flushing has not been demonstrated to be effective at treating polynuclear aromatic hydrocarbons (PAHs). Because PAHs are present in the FSPSA soils above risk-based levels for direct contact, a final cover may be needed after treatment goals are achieved in order to be protective from direct contact. A solid waste cap pursuant to OAC:3745-27-11(G) would accomplish this, and could be considered relevant; however, a solid waste cap is intended to prevent not only direct contact, but to prevent infiltration of precipitation from leaching contaminants to ground water. Because soil flushing will have already treated the soils for leachable contaminants, the additional level of protection afforded by a solid waste cap is not warranted, and would not be appropriate. A vegetated soil cover will provide sufficient protection from direct contact, and is more cost effective. This would represent a combination of FSPSA-6 and FSPSA-2.

40 CFR Part 761 (Regulations under the Toxic Substance Control Act, regulating disposal of Polychlorinated Biphenyls (PCBs) greater than 50 ppm): These regulations are applicable to all remedial alternative components that involve excavation of PCB-contaminated soils with concentrations greater than 50 ppm. PCBs were found in the CRDA soils and backwater area sediments, and in the CMSD. CRDA-3 and CRDA-4 will comply with these regulations

because the excavated soils with PCBs greater than 50 ppm will be disposed in a TSCA-compliant landfill. Remedial components CRDA-5 and CMSD-7, involving thermal oxidation would meet TSCA requirements for destruction removal efficiency.

Balancing Criteria

3. Long-Term Effectiveness and Permanence

GW-3 and GW-5 would both provide long-term effectiveness and permanence. In fact, GW-3 has been containing the groundwater contamination plume for approximately 20 years and it has been estimated that the plume will be remediated if the pumping continues over the next 30 to 40 years. GW-5, which calls for replacing the existing intercepter wells with wells located in the center of the plume is expected to remediate the groundwater within similar timeframes as those estimated for GW-3.

CRDA-3, CRDA-4, and CRDA-5 would all provide long-term effectiveness; however, only CRDA-5 would provide for a permanent solution through excavation, treatment and off-site disposal. Since all of these options require disposal in a landfill, long-term maintenance of these landfills would be required.

SED-7, SED-9, SED-4, and SED-10 would all be effective over the long-term; however, SED-9 would provide for a more permanent solution by treating the contaminated sediments via solvent extraction prior to consolidation under a cap. SED-6 would be less effective in that this alternative allows for containment in the backwater area, leaving the contained sediments vulnerable to flood events. In addition, SED-6 would eliminate a benthic habitat. SED-8 would not be effective in the long-term since this alternative allows for PCB contaminated sediment to remain in the backwater area above the cleanup level of 1 ppm.

CMSD-5 and CMSD-7 call for containment under either a dual and single barrier cap, respectively, both of which would be effective over the long-term given proper operation and maintenance (O & M). By its nature, a dual barrier cap provides an added level of effectiveness by allowing less infiltration of precipitation than a single barrier cap (all other components of both caps being equal). All capping alternatives would require such long-term maintenance to maintain their effectiveness.

FSPSA-9, FSPSA-4, FSPSA-3, FSPSA-10 all call for containment under either a single or dual barrier cap which would be effective over the long-term. FSPSA-6 includes a vegetative cover which would not reduce infiltration through the fill, but which would promote continued flushing of contaminants to ground water for extraction and treatment. All alternatives would require long-term maintenance. In addition, FSPSA-6 calls for soil flushing which provides for permanent treatment of this source by flushing out contaminants which could then be captured by a groundwater pumping system.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment

Both of the groundwater alternatives (GW-3 and GW-5) will reduce the toxicity, mobility or volume (TMV) of contaminants through treatment by pumping out contaminated groundwater and treating it prior to discharge to the Ohio River.

CRDA-5 would reduce TMV through off-site thermal treatment with off-site disposal of the residual ash. CRDA-3 and CRDA-4 are purely containment alternatives, which will reduce mobility but not through treatment.

SED-9 would reduce TMV through treatment; however, treatment will result in an additional waste stream which would require further treatment prior to disposal. SED-7, SED-4, and SED-10 would reduce mobility of contaminants through solidification prior to disposal under the CMSD cap. Solidification is necessary due to the high water content of the sediments. However, there will be a total volume increase due to the addition of the solidification agents. SED-6 and SED-8 would not reduce TMV through treatment.

CMSD-7 would reduce TMV through treatment by thermal oxidation. CMSD-5 would not reduce TMV through treatment; however, capping will reduce the mobility of contaminants by placing an impermeable barrier over the waste.

FSPSA-9, FSPSA-4, FSPSA-3, and FSPSA-10 would not reduce TMV through treatment. Although FSPSA-9 calls for partial excavation of the FSPSA, this alternative simply transfers this material to an off-site disposal facility, therefore there would be no net volume reduction to the environment. FSPSA-6 would increase mobility of contaminants to the groundwater through soil flushing; however, the groundwater pumping system would capture the contaminants and treat the groundwater prior to discharge to the Ohio River.

5. Short-Term Effectiveness

Both GW-3 and GW-5 are estimated to achieve cleanup levels in approximately 35 to 40 years. Currently the intercepter wells and Ranney well called for in GW-3 are containing the contaminated groundwater. GW-5 calls for relocating the intercepter wells from the edge of the plume to the center of the plume, closer to the FSPSA. Relocating the current intercepter wells would not be effective in the short-term because it would not capture contaminated groundwater located between the FSPSA and the Ranney well.

CRDA-3 and CRDA-5 would be equally effective in the short-term. CRDA-4 may pose some short-term exposures since the material would need to be transported off-site for disposal.

All of the sediment alternatives (SED-4, 7, 6, 8, 9, and 10) would present short-term impacts to the benthic habitat in the backwater area during dredging and/or containment. However, since this area is connected to the Ohio River, resedimentation is expected to occur rapidly, except for SED-6 which would eliminate the backwater area. SED-6 eliminates the backwater area by cutting this area off from the Ohio River and capping the sediments in place. SED-8 would allow PCBs above the cleanup level (1 ppm) to remain in the backwater area.

CMSD-5 would provide more short-term effectiveness through capping than CMSD-7, which calls for excavation of the CMSD prior to treatment and capping. Excavation of the CMSD could cause fugitive dust emissions which would require engineering controls during implementation.

FSPSA-4, FSPSA-3, and FSPSA-10 would provide more short-term effectiveness through capping than FSPSA-9, which calls for excavation of the FSPSA prior to treatment and capping. Excavation of this area could cause fugitive dust emissions which would require engineering controls during implementation. FSPSA-6, which calls for soil flushing is expected to take ten years to reduce the contaminant concentrations prior to capping.

6. Implementability

GW-3 has been operating for approximately 20 years and is successfully containing the groundwater plume on-site. GW-5 would be implementable, but less so than GW-3 since GW-3 is already in existence and GW-5 would require the placement of additional wells. In addition, there are concerns that the treatment plant under GW-3, which was recently constructed, may not be able to handle the higher concentration of contaminated groundwater which would be produced by placing new wells closer to the FSPSA (GW-5). However, the new well locations under GW-5 could be accommodated with an additional treatment component added to the treatment system.

CRDA-3, CRDA-4, and CRDA-5 are readily implementable. Given the relatively small volume of material, off-site landfill capacity should not pose a problem for CRDA-4.

All of the sediment alternatives will require at least temporary isolation of the backwater area from the Ohio River which can be achieved by placing sheet piling along the entrance to the river. All of the sediment alternatives appear to be readily implementable; however, SED-9 may require a treatability study prior to solvent extraction treatment. Given the relatively small volume of material, off-site landfill capacity should not pose a problem for SED-4.

CMSD-5 would be readily implementable. CMSD-7 would be implementable; however, given its proximity to the Ohio River, excavation and treatment of such a large volume of material may pose some construction problems.

FSPSA-3, FSPSA-4, FSPSA-6, and FSPSA-10 are expected to be readily implementable. FSPSA-9 implementability would be dependent on the availability of off-site landfill space for disposal of the excavated material. A treatability study would be needed prior to implementation of FSPSA-6.

7. Cost

The currently operating groundwater system (GW-3) is estimated to cost $1.8 million, whereas GW-5 is estimated to cost $3.3 million. In addition, the O&M costs are expected to be higher for GW-5 than for GW-3.

CRDA-3 would cost $100,000 for excavation and consolidation with the CMSD. The costs increase by an order of magnitude to $1.6 million under both CRDA-4 and CRDA-5 when this small volume of material is excavated and treated/disposed off-site.

The least expensive sediment alternatives are SED-6 and SED-8 which are estimated to cost $228,000 and $224,000, respectively. Both of these alternatives contain at least a portion of contamination in-situ and do not provide any form of treatment. SED-7 is the most cost effective at $270,000 by removing the material and solidifying prior to placement under the CMSD cap. SED-4 is the least cost-effective in that it provides the same level of treatment as SED-7 but is estimated to cost $1.3 million. SED-9 provides a higher level of treatment than SED-7 but still requires containment under the CMSD cap. SED-9 is estimated to cost $1 million. SED-10 is estimated to cost $400,000 for excavation, solidification and consolidation under the CMSD cap. The additional cost for SED-10 compared to SED-7 is the result of excavating river sediments. Given the highly industrialized use of the Ohio River in this area, a fishing advisory has been in place for the Ohio River between East Liverpool, Ohio and the Greenup Locks and Dam near Portsmouth, Ohio. EPA believes that by addressing the backwater area sediments, the source of contamination from the Ormet Site, the Ohio River will be protected from contamination from the Ormet Site. Therefore, remediation of the Ohio River sediments is not considered necessary.

CMSD-7 is the least cost-effective alternative in that it is estimated to cost $68 million and will still require some containment after treatment. CMSD-5 is much more cost-effective at $1.8 million.

The least expensive containment alternatives for the FSPSA are FSPSA-4 and FSPSA-10 which are estimated to cost $1.4 million for a single barrier cap. FSPSA-9 is the most expensive alternative at an estimated cost of $2.6 million for partial excavation and both off-site disposal and an on-site single barrier cap. FSPSA-3 has an estimated cost of $1.8 million. FSPSA-6 is the most effective of the FSPSA alternatives because it provides for treatment of the Site's principal threat via soil flushing at an estimated cost of $520,000 (consisting of $420,000 for 10 years of flushing and $100,000 for containment after year 10). At the time the FS was prepared, soil clean-up standards had not been determined (see Section J below). Should soil flushing need to extend beyond year 10 to achieve soil clean-up standards, the costs will increase by about $4,000 per year, which is the estimated annual O & M cost.

Modifying Criteria

8. State/Support Agency Acceptance

The State of Ohio did not concur with the proposed plan because it felt the plan was not stringent enough. Given the revised risk management scenario and associated no-action component at the former disposal ponds, the State does not concur with the selected remedy either.

9. Community Acceptance

EPA proposed a remedy for public comment based on future residential use at the Site. Substantial community response indicated support for a remedy that does not assume future residential use, commenting that based on current demographics and the economic situation of the area, the possibility of future residential occupancy of the Site is remote. Because EPA has modified the remedy to address the concerns of the community to the extent practicable, EPA expects that the community will support the remedy.

J. <u>THE SELECTED REMEDY</u>

The combinations of remedial components that form the alternatives analyzed in the FS were developed to address risk based on future residential use of the Site. EPA has made a risk management decision to focus the remedy on the more likely situation that the Site use will remain the same as it currently stands or, at most, industrial development will occur. Accordingly, EPA has developed the selected remedy from the following combination of remedial components:

Institutional Controls

Institutional controls shall be implemented for the Site. These controls shall be in the form of access restrictions and deed restrictions. Access restrictions shall include installation of a chain-link fence a minimum 6 feet high topped with three strands of barbed wire. The fence shall, at a minimum, fully encompass all source and/or disposal areas including the former disposal ponds, and shall be kept locked at all times. Regular inspections shall be performed to ensure the integrity of the fence is maintained.

EPA shall provide language in a consent decree or enforcement order issued to Ormet setting restrictions against installation of drinking water wells and against construction for any residential purposes. These restrictions shall be recorded with the deed for the Ormet property in the manner customary for such recordings in the jurisdiction within which the property lies. The restrictions shall be recorded no later than the start of remedial action.

Ground Water

GW-3: Ground water shall be extracted using the existing system of two barrier wells for contaminant capture, supplemented by the high-capacity Ormet Ranney well to ensure plume containment. The water from the extraction wells shall be treated by a system that will allow the quality of the effluent to meet standards set by the State's NPDES program and incorporated into a permit issued to Ormet by the State.

The system shall maintain a capture zone so as to prevent Site contaminants from migrating in the subsurface to the Ohio River. Water quality shall be monitored three times per year starting no later than 4 months after remedial action is completed. Changes in the frequency of ground water monitoring may be considered based on information collected during operation of the extraction system over the course of the remedy. EPA shall select the specific monitoring locations during the remedial design. These locations may include, but are not limited to, existing monitoring wells.

Parameters to be monitored shall be determined during remedial design, and shall include, but are not limited to, analysis for volatile organic compounds, metals, and cyanide. The GW-3 component shall be operated until the ground water throughout the plume has achieved the clean-up standards for 3 consecutive years, as demonstrated through sampling at the specific monitoring locations. The clean-up standards for contaminants of concern for ground water are listed in Table 2. It should be noted that the standard set for manganese is an interim standard, based on background established in the BRA. A statistical determination of background for manganese may be performed during remedial design, based on data from wells not affected by the contaminant plume identified in the RI report. EPA may then determine a final clean-up standard for manganese.

CMSD Seeps

SP-4: CMSD seeps shall be remediated by installation of gravel-filled collection trenches, wherein seep water shall flow to a sump and be pumped from the sump to an oil/water separator. If the effluent from the oil/water separator meets NPDES standards in the NPDES permit, it may be routed to the Ohio River. Otherwise, the effluent shall be routed to a carbon adsorption treatment system to remove PCBs and any other organic contaminants. The existing ground water treatment plant alone will not be able to treat the seep water effectively because of the presence in the seep water of PCBs. If metals or cyanide removal is also necessary to meet NPDES standards, treatment for such contaminants shall also be performed prior to discharge to the Ohio River. Spent carbon from the carbon filters shall be considered a hazardous waste. If it is regenerated for re-use the treatment shall be done at a RCRA Subpart X-licensed facility. If not regenerated it shall be disposed of at a RCRA Subtitle C disposal facility.

Soils excavated to install the CMSD seep trenches shall be temporarily stored and analyzed for PCBs. Should the soils exceed 50 ppm total PCBs they shall be disposed of off-site at an EPA-approved TSCA facility. Soils of less than 50 ppm shall be solidified along with the backwater sediments and consolidated under the CMSD cap.

PCBs were found in the seeps during the RI, but no soil sampling was performed adjacent to the seeps. This area is a potential source area of PCBs to the backwater sediments. Therefore, during design a limited soil sampling program for PCBs shall be performed on the area between the western slope of the CMSD and the 004 outfall stream. If PCBs are found in the soil in excess of 1 mg/kg (the sediment clean-up standard) they shall be treated in the same manner as the soils excavated to install the trench drains.

Former Spent Potliner Storage Area

FSPSA-6, in contingent combination of FSPSA-2: Surface and subsurface contamination in the FSPSA shall be treated by in-situ soil flushing. Water, or another appropriate flushing fluid, shall be sprayed or infiltrated through the soils. Contaminants will be flushed to ground water for ultimate capture and treatment under GW-3.

Unlike applying MCLs to ground water clean-up, there are no promulgated clean-up standards that can be applied to soil, especially with respect to potential impacts of soil to ground water. EPA has instead accepted the use of computer-aided numerical models and other methods that take site specific data on soil conditions and generate contaminant concentrations for soil that are protective of ground water (EPA/540/2-89/057, Determining Soil Response Action Levels Based on Potential Contaminant Migration to Ground Water: A Compendium of Examples).

During the design phase of the remedy, a soil model acceptable to EPA, such as SESOIL, shall be utilized to develop site-specific soil clean-up standards for the ground water contaminants of concern listed in Table 2. Once the clean-up standards are accepted by EPA they shall be incorporated into this ROD. Any data needed for input to the soil model that were not collected during the RI shall be acquired during design.

Treatment of the FSPSA soils may cease when soil clean-up standards are achieved, as demonstrated by sampling and analysis of soils in the FSPSA for the contaminants listed in Table 2, and when all compliance points for ground water in and immediately down-gradient of the FSPSA achieve ground water cleanup levels for three consecutive monitoring events. The compliance monitoring program shall continue in all monitoring locations while residual ground water contamination (that which has migrated out of the immediate area of the FSPSA) continues to be extracted and treated.

When treatment ceases, a representative number of soil samples shall be analyzed for carcinogenic polynuclear aromatic hydrocarbons (CPAHs). The results shall be used to calculate residual risk levels based on direct contact under a construction worker, maintenance worker, and plant worker industrial exposure scenario. If residual risk exceeds an ELCR of 1×10^{-4}, a vegetated cover shall be installed to prevent direct contact.

Construction Materials Scrap Dump

CMSD-5: The CMSD shall be re-contoured to remove as much waste as possible from below the 100-year flood level. Although RCRA Subtitle C does not require a dual-barrier cap *a priori*, a dual barrier cap shall be installed over the CMSD to ensure maximum protection from the effects of inundation in the event of a 100-year flood. At a minimum, the cap shall include the following components:

- A vegetated soil layer of sufficient thickness that the clay layer is below the local frost line;
- Six-inch sand drainage layer, or synthetic equivalent;
- 40 mil high-density polyethylene flexible membrane liner;

- Two-foot thick engineered clay layer;
- Soil necessary to achieve slope requirements;
- Controls that will prevent erosion in the event of a 100-year flood, such as rip-rap or concrete revetments.

Figure 3 shows a schematic drawing of the capping components, except for the erosion controls. The cap shall shall meet all substantive requirements of RCRA Subtitle C for a hazardous waste landfill closure, including requirements for post-closure care. The conduit located to the north of the CMSD which discharges directly to the Ohio River shall be removed.

Carbon Run-off and Deposition Area

CRDA-3: The CRDA shall be excavated down to native soil and the materials consolidated within the CMSD prior to installation of the CMSD cap. Excavation shall continue until the remaining soils in the CRDA meet the sediment clean-up standards (as determined through verification sampling), to ensure no further contamination of the backwater area occurs. The 004 outfall stream shall be re-routed through the CRDA, or other appropriate area of the property, to bypass the backwater area and discharge directly to the Ohio River. The CRDA shall be re-vegetated to prevent excessive sediment loading to the backwater area and the river, and controls shall be put in place to prevent continued run-off from the plant area to the CRDA.

Composite samples of the excavated soils shall be analyzed for PCBs. Soils in any container whose composite sample result exceeds 50 ppm shall be disposed of off-site in an EPA-approved TSCA disposal facility. Soils below 50 ppm shall then be consolidated with the CMSD prior to installation of the CMSD cap.

Backwater Area Sediments

SED-7: The backwater area shall be temporarily isolated from the Ohio River by sheet piling or another appropriate method. Sediments in the backwater area shall then be excavated and temporarily bulk-stored. Clean-up standards for sediments are as follows:

Total Carcinogenic PAHs	60.0 ppm
Total PCBs	1.0 ppm

Because there are no promulgated standards for sediment quality, the PAH cleanup standard was set based on calculation of risk-based levels assuming a trespassing scenario, as set out in the Baseline Risk Assessment (BRA) (see Attachment 1 of the Addendum to the FS). The value was compared to values calculated from EPA guidance on Sediment Quality Criteria (U.S. EPA, 1988, Interim Sediment Criteria Values for Non-Polar Hydrophobic Organic Contaminants). The human health values were lower than the sediment criteria. Therefore, to protect both human health and the environment, the clean-up standard above was chosen.

The clean-up standard for PCBs is based also on the calculated value from the sediment quality guidance. This standard is consistent with levels for human exposure under a residential scenario, as set out in Oswer Directive 9355.4-01 FS A Guide to Remedial Actions at Superfund Sites With PCB Contamination, August 1990. Although residential exposure is not considered likely at the Ormet Site, this clean-up standard will be protective of human health and the environment.

Achievement of the sediment cleanup standards in the backwater area shall be verified by sampling as excavation proceeds. Dredging will be considered complete when sampling over the full area of the backwater indicates compliance with the standards.

A fact that must be considered is that dredging is an inexact technology, and cannot be expected to remove all sediment above the standards, although that is the intent of the remedy. In addition, during dredging a certain amount of re-suspension of sediment can be expected which, when it settles out, will probably contain PCBs greater than the risk-based concentration. EPA expects a dredging method to be used that will minimize resuspension and remove as much sediment as possible. However, within the limits of the technology the PCB standard may not be achieved through dredging alone. An additional consideration in selecting the dredging method is the need to minimize air emissions of PCBs.

Once dredging is completed and the temporary barrier is removed, re-sedimentation will commence as "clean" river sediments are carried into and deposited over the bottom of the backwater area. Once sufficient sediment thickness has accumulated, any remaining PCBs (and PAHs as well) will be effectively covered and further contact minimized.

Composite samples of the excavated sediments shall be analyzed for PCBs. Sediments in any container whose composite sample result exceeds 50 ppm shall be disposed of off-site in an EPA-approved TSCA disposal facility. Sediments between 1 ppm and 50 ppm shall undergo solidification, then be consolidated with the CMSD prior to installation of the CMSD cap. Because of the potential for reaction of some solidification agents with water (e.g., lime and water create an exothermic reaction), treatability studies and best engineering judgement shall be used to determine the most appropriate method of solidification, in order to reduce air emissions as much as is practicable.

Points of Compliance

For ground water, the point of compliance with the cleanup levels shall be everywhere within the plume, including the area under the FSPSA, because the remediation goal for ground water is restoration to drinking water quality. EPA shall select specific locations to serve as points of compliance during remedial design. These locations may include existing monitoring wells, but additional wells may also be required by EPA.

The area to be monitored for ground water compliance shall also include locations downgradient of FDP-5. FDP-5 is currently within the plume area, and is contributing to ground water contamination, though not to the extent of the FSPSA (see Section E, Nature and Extent of Contamination). EPA believes that natural flushing will continue to reduce FDP-5's contribution to ground water contamination in a timeframe commensurate with the time needed for flushing at the FSPSA. The five-year reviews required under CERCLA will provide adequate intervals to evaluate the ground water situation with respect to FDP-5.

Once excavation and disposal of the CRDA and backwater area soils and sediments is completed and the outfall stream re-routed, verification sampling in the backwater area shall establish a baseline for continued monitoring, to ensure that any waste remaining on Site does not provide a continued source of contamination to the river. The point of compliance for determining that the remaining wastes are not mobile to surface water and river sediments shall be the boundary of the backwater area, as delineated by the location of the temporary barrier that will be installed prior to excavation of the sediments. The media to be sampled shall be surface water and sediments.

Residual Risk

Once the remedy is fully implemented, as demonstrated through achievement of the clean-up standards, the carcinogenic risk under a current land use and future worker use of drinking water is expected to still exceed the risk range of 1×10^{-4} ELCR, with HI >1 for fluoride. The reason the preferred risk level of 1×10^{-6} will not be achieved is that the contaminant concentrations at the lower risk level are not measurable. The analytical detection limit is 1.5 ug/l for both arsenic and beryllium. The residual risk exceeds the upper limit of EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} due to the presence of arsenic and beryllium. The clean-up standard for arsenic has been set at the analytical quantitation limit because that standard is the lowest quantitative measure that can practicably be achieved and is consistent with background concentrations for arsenic in ground water established in the risk assessment. It is not practicable to establish clean-up levels below naturally occurring background, even if this results in exceeding the risk range. All other ground water clean-up standards are based on the MCLs, per OSWER directive 9355.0-30, and the NCP.

Implementation of this remedy will not restore the Site to residual risk levels consistent with residential use, which EPA considers to be unlikely. Should such use occur, however, the remedy may no longer be protective, and further remediation may be warranted. Any change in land use will be considered under the 5-year reviews as well as during implementation of the remedy.

Cost of the Remedy

Capital:	$12,000,000
O and M:	$1,300,000 annual
Present: Worth	$17,400,000

K. STATUTORY DETERMINATIONS

U.S. EPA's primary responsibility at Superfund sites is to undertake remedial actions that protect human health and the environment. Section 121 of CERCLA, as amended by SARA, has established several other statutory requirements and preferences. These include the requirement that the selected remedy, when completed, must comply with all applicable, and relevant and appropriate requirements (ARARs) imposed by Federal and State environmental laws, unless a waiver of the ARAR is justified. The selected remedy must also provide overall effectiveness appropriate to its costs, and use permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable. Finally, the statute establishes a preference for remedies which employ treatment that significantly reduces the toxicity, mobility or volume of contaminants.

The selected remedy for the Ormet Site will satisfy the statutory requirements established in Section 121 of CERCLA, as amended by SARA, to protect human health and the environment, to comply with ARARs, to provide overall effectiveness appropriate to its costs, and to use permanent solutions and alternate treatment technologies to the maximum extent practicable. Treatment is not part of the CMSD, CRDA, or seeps components of the remedy because an attempt to treat the hazardous substances present in these areas prior to consolidating the CRDA and seeps into the CMSD and then capping the CMSD would not provide a sufficiently significant additional decrease in risk presented by these areas to justify the increased cost of attempting such treatment.

1. Protection of Human Health and the Environment

Implementation of the selected remedy will protect human health and the environment by reducing the risk of exposure to hazardous substances present in surface soils, seeps, sediments, and ground water at the Site. Excavation of the contaminated sediments and placement of them into an approved Toxic Substances Control Act (TSCA) -compliant facility (if over 50 ppm PCBs) or solidification and placement in the CMSD (if less than 50 ppm PCBs) will remove the direct contact threat to humans and the ecological risk to fish and other organisms in the backwater area. Excavation of the CDRA and seeps and placement into the CMSD will remove the threat of continued migration of hazardous substances from these areas into the backwater area. Installation of trench drains and collection of seep water will prevent contaminants from migrating from the CMSD to the backwater area. A RCRA Subtitle C-compliant for the CMSD will reduce the risk of exposure to hazardous substances present in soil, seeps and sediment at the Site, and will also reduce the rate of infiltration by which precipitation passes through the contaminated soil and maintain that reduction over time. By reducing the rate of infiltration, the final cover will also reduce the rate of leachate generation in the CMSD; therefore, the final cover will also reduce the risk that hazardous substances, pollutants, and contaminants present in the CMSD will migrate into the backwater area and contaminate the clean sediments. Soil flushing the FSPSA will increase the rate at which hazardous substances leach into the ground water and will, therefore, reduce the length of time needed to clean up the FSPSA as a source of contamination to ground water. Extracting and treating the ground water will reduce the ingestion-related risk to future workers and will restore the aquifer to its most beneficial use. Institutional controls will be imposed to restrict uses of the Site to prevent exposure to hazardous substances and contaminants in the soils and ground water at the Site. No unacceptable short-term risks will be caused by implementation of the remedy.

2. Attainment of Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA requires that remedial actions meet legally applicable or relevant and appropriate requirements (ARARs) of other environmental laws. Legally "applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site. "Relevant and appropriate" requirements are those requirements that, while not legally applicable to the remedial action, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the remedial action.

Non-promulgated advisories or guidance documents issued by Federal or State governments ("to-be-considered or TBCs") do not have the status of ARARs; however, where no applicable or relevant and appropriate requirements exist, or for some reason may not be sufficiently protective, non-promulgated advisories or guidance documents may be considered in determining the necessary level of clean-up for protection of human health and the environment.

Below is a discussion of the key ARARs for the selected remedy. For a complete list of potential ARARs and TBCs for the that were evaluated for the alternatives considered at this Site, see Attachment 3 to the Addendum in the FS Report. Table 9 lists ARARs for the selected remedy. To the extent that a regulation referenced by a listed ARAR is inconsistent with the requirements of the ROD, the ROD requirements shall prevail.

Action-specific ARARs

Toxic Substances Control Act

Regulations promulgated pursuant to the Toxic Substances Control Act regulate the disposal of PCBs in concentrations of 50 ppm or greater. PCBs were found in five media at the Site: in sediments and surface water in the Outfall 004 backwater area; in fill material at the CMSD; in the CMSD seep water; and in a composite soil sample taken at the CRDA. Because these soils and sediments will be excavated and disposed of, TSCA is applicable and disposal must be in accordance with TSCA requirements. PCB-contaminated soils and sediments with concentrations of 50 ppm or greater will be disposed of in compliance with TSCA and 40 CFR 761.60. PCB-contaminated soils and sediments with concentrations less than 50 ppm are not subject to TSCA disposal requirements and may be consolidated in the CMSD.

Resource Conservation and Recovery Act

Subtitle C and D Closure Requirements

Resource Conservation and Recovery Act (RCRA), closure requirements govern the closure/capping of hazardous waste (Subtitle C) and solid waste (Subtitle D) disposal areas. Spent potliner was deposited in the FSPSA and the CMSD. Spent potliner from primary aluminum reduction is a listed hazardous waste (K088) under RCRA Subtitle C, at 40 CFR 261.32. Because these materials were deposited prior to 1980, the effective date of RCRA, RCRA Subtitle C requirements are not applicable.

Cyanide is the hazardous constituent for which spent potliner is listed (40 CFR Part 261, App. VII). Because cyanide is present in the spent potliner at the CMSD, and this material is to be capped in place without treatment, the RCRA Subtitle C closure requirements are both relevant and appropriate for the CMSD. Ohio's hazardous waste program is authorized pursuant to Subtitle C; thus the RCRA subtitle C closure requirements for hazardous waste landfills in Ohio is OAC:3745-57-10. Spent potliner was disposed of there, and seeps containing cyanide emanate from the western boundary of the CMSD toward the backwater area and the river. These seeps indicate that the cyanide is mobile within the CMSD. The selected remedy will meet this ARAR.

The soils in the FSPSA will be treated in situ by soil flushing. The cyanide will be removed from the soil in the soil flushing process. However, as discussed in Section F above, CPAHs in surface soil may present an unacceptable risk from direct contact and soil flushing is not expected to be effective for CPAHs. Should a residual risk remain after treatment that exceeds a 1 x 10-4 risk (industrial use), capping of the FSPSA or other remedial measures may be required to prevent direct contact. Should capping be required , RCRA subtitle C or D closure requirements would be relevant but not appropriate for the reasons discussed in Section I above.

Chemical-specific ARARs

Federal Drinking Water Standards at 40 CFR Part 141 promulgated under the Safe Drinking Water Act (SDWA) include both Maximum Contaminant Levels (MCLs) and, to a certain extent, non-zero Maximum Contaminant Level Goals (MCLGs), that are applicable to municipal drinking water supplies servicing 25 or more people. The National Contingency Plan ("NCP") at 40 CFR 300.430(e)(2)(i)(B) provides that MCLs and non-zero MCLGs established under the SDWA shall be attained by remedial actions for ground waters that are current or potential sources of drinking water.

At the Ormet Site, MCLs and non-zero MCLGs are not applicable, but are relevant and appropriate, because the aquifer below the Site is a used as a source of potable water. The selected remedy shall meet MCLs and non-zero MCLGs at the Site.

The NCP provides that ground water clean-up standards should generally be attained throughout the contaminant plume or at and beyond the edge of the waste management area when waste is left in place. The point of compliance for the federal drinking water standards will be throughout the plume.

Section 402 of the Clean Water Act establishes the National Pollutant Discharge Elimination System ("NPDES") program. This program has been delegated to the State of Ohio and Ohio has set forth its NPDES regulations at OAC:3745-33-01 through OAC:3745-33-10. Discharge of the treated ground water will meet these ARARs.

Location-specific ARARs

A small portion of the Ormet Site is located in the 100-year flood plain of the Ohio River. Floodplain protection is an environmental area of substantial concern, especially in light of the damage caused by the Mississippi River floods in 1993. U.S. EPA is committed to ensuring that all actions it takes within floodplains proceed with adequate protection against such catastrophic events. Controls to safeguard human health and the environment in the event of flooding must be part of any containment design considered at Ormet.

A potential location-specific ARAR that was evaluated during the RI/FS, and mentioned in the Proposed Plan, was OAC:3745-54-18 B, which requires a hazardous waste facility located in a floodplain (in this case, a portion of the Construction Materials Scrap Dump (CMSD)) to be designed, constructed, operated, and maintained so as to prevent washout of hazardous materials in a 100-year flood event.

OAC:3745-54-18 B is applicable to the active portion of a facility. Since there will be no active portion at Ormet because the selected remedy requires closure of the CMSD under RCRA Subtitle C, this regulation is not applicable to Ormet. Nevertheless, floodplain protection is assured because Subtitle C closure and post-closure care regulations at OAC:3745-57-10 are relevant and appropriate and EPA has determined OAC:3745-57-10 provides a standard of floodplain protection equivalent to OAC:3745-54-18 B. OAC:3745-57-10 requires the final cover to be designed and constructed in a manner to minimize infiltration through the closed landfill and erosion or abrasion of the cover. Because a portion of the CMSD is located within a 100-year floodplain, design and construction of the final cover pursuant to OAC 3745-57-10 must include measures sufficient to meet the above requirements, and prevent transport of hazardous materials away from the landfill, during a 100-year flood.

The selected remedy is a Subtitle C cap with a dual-barrier system combined with erosion controls appropriate to maintain the integrity of the containment system for the site's location in a floodplain. The cap will effectively prevent infiltration of floodwaters or precipitation, which could leach hazardous waste. Erosion controls will prevent scouring of the cap and transport of waste directly to surface water.

Alternatively, OAC:3745-54-18 B might be considered relevant and appropriate; however, as it is simply equivalent to what is required by the closure regulation, it has not been specifically listed as a relevant and appropriate requirement. To the extent that OAC:3745-54-18 B is relevant and appropriate to a remedial action involving capping of the CMSD, EPA has determined that the selected remedy would meet any requirements of that regulation for protection from washout.

3. Cost Effectiveness

Cost effectiveness compares the effectiveness of an alternative in proportion to its cost to achieve environmental benefits. For ground water, GW-3 is the most effective component because it provides the same degree of protection as does GW-5 at a cost which is lower than costs for GW-5. For the CRDA, CRDA-3 is the most cost-effective component because it involves such a small volume of material that treatment and off-site disposal of it would not provide an increment of protection sufficiently greater than that provided by excavation and containment (CRDA-3) as to warrant the additional costs. For sediments, SED-7 is the most cost-effective component because it will remove the risks in the backwater area at the most reasonable cost through excavation and solidification, followed by containment in the CMSD. The less expensive remedial components for sediment would leave some of the contaminated backwater area sediments in-place. The more expensive components would provide additional treatment, but would still be followed by containment in the CMSD. The treatment would not provide sufficient additional environmental benefit as to warrant the additional costs. For the CMSD, CMSD-5 is the most cost-effective component. The estimated cost of CMSD-5 is $1.8 million, as compared to $68 million for CMSD-7, . In addition, treatment residuals from CMSD-7 would still have to be contained on site, with associated cap maintenance costs. Because CMSD-5 removes all pathways for contaminant migration at a significantly lower cost than CMSD-7, the cost of CMSD-7 is not proportional to the environmental benefits that may be achieved. Finally, for the FSPSA, FSPSA-6 is the most cost-effective component because it provides effective treatment of the Site's principal threat at the lowest cost of all remedial components except no action.

The selected remedy for this Site, consisting of all of these components, is cost-effective because it provides the greatest degree of overall effectiveness proportional to its costs when compared to the other alternatives evaluated. The net present worth of the remedy is $17,400,000. See Section I.7. of this decision document for a detailed comparison of costs.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner at this Site. Of those alternatives that are protective of human health and the environment and that comply with ARARs, EPA has determined that the selected remedy provides the best balance in terms of long-term effectiveness and permanence, reduction of toxicity, mobility, or volume of contaminants, short term effectiveness, implementability, and cost, taking into consideration State and community acceptance.

The excavation and placement of the backwater sediments, seeps, and CRDA material into the CMSD, followed by installation and maintenance of a final cover over the CMSD, ground water extraction and treatment, treatment of the FSPSA, and restriction of Site access through installation of a fence and institutional controls will provide the most permanent solution practicable, proportional to the cost.

5. Preference for Treatment as a Principal Element

Based on current information, EPA believes that the selected remedy is protective of human health and the environment and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The remedy does satisfy the statutory preference for treatment of the principal threat; the cyanide in the FSPSA and the ground water. It does not, however, satisfy the preference for treatment in the CMSD, CRDA, sediments or seeps because such treatment was not found to be practicable or cost effective.

L. DOCUMENTATION OF SIGNIFICANT CHANGES

A significant change from the preferred alternative set out in the proposed plan, to the remedy selected in this decision document, is that the former disposal ponds (FDPs) have been eliminated as sources to be addressed by the remedy. The principal reason for this is that EPA revised its risk management approach based on input from the community during the public comment period.

In the proposed plan, EPA based its preference for the proposed alternative on a future, residential use scenario. Under this scenario, EPA determined that all source areas needed to be remediated because of the risk posed to future residents. However, after consideration of the majority of public comments which rejected the future residential use scenario, EPA has modified its risk management approach for this site. The majority of the community views expressed were very skeptical regarding the likelihood of residential development in the area. Commenters believe that the cost and degree of protectiveness associated with the level of clean-up necessary to address future residents was overwhelming, given the unlikelihood of such land use. The logic presented at the public meeting was that if Ormet should go out of business due to the expense of the residential use scenario remedy, there would be no incentive to develop residential property near the Site because there would be no jobs to support such residents. One commenter provided Monroe County Census data showing a decline in population since 1982. Given this public sentiment, along with the fact that Ormet has been operating at this location for 34 years and other companies occupy much of the adjoining land along the Ohio River, EPA agrees that the current land use is unlikely to change to residential use in the foreseeable future. Therefore, the remedy selected for the Site is now governed by current land use.

The Baseline Risk Assessment did not evaluate future industrial use at the site, because it was assumed that clean-up to acceptable residential risk levels would be protective of future workers. Subsequent to revising the risk management approach, U.S. EPA has evaluated the risks to future workers from the FDPs under several scenarios and concludes that the risk to current or future worker from exposure at the FDPs falls with the acceptable risk range of 1×10^{-6} to 1×10^{-4} ELCR. Details of the additional risk evaluation are documented in the Administrative Record, in memoranda dated June 28, 1994, and August 1, 1994.

The RI report did conclude that the ponds are probably a minor source of ground water contamination, which is currently being catured and treated and will continue to be captured and treated under GW-3. EPA believes that over the time needed to treat the residual contamination in the FSPSA (the primary source of contamination to ground water), any contamination in the FDPs that is going to leach to ground water will have done so (see further discussion in Section E above). Compliance monitoring during and after remedial action will provide a basis to evaluate this hypothesis further.

Consequently, EPA now selects the no action alternative for the FDPs because they present no significant direct exposure or inhalation risk under the current land use scenario or under future industrial use scenarios. However, this determination by EPA does not preclude the State of Ohio from exercising any authorities it may have to require additional work at the former disposal ponds.

Because waste will be left in place at the Site, EPA will be conducting five-year reviews of the Site and will, therefore, have the opportunity to reevaluate the protectiveness of the remedy should land use in the area change. The five-year reviews will also be appropriate intervals in which to document the fluoride trends in ground water.

The Proposed Plan provided that a solid waste cover may be installed at the FSPSA if residual risk after soil flushing should be unacceptable. However, the Proposed Plan did not propose soil clean-up standards that are protective of ground water for the FSPSA, as set forth in Section J above. Once these standards are achieved, there will be no need to prevent infiltration of precipitation (a primary objective of solid and hazardous waste caps) because all leachable contaminants above the standards will have been treated. Should residual risk due to carcinogenic PAHs in surface soil be unacceptable, as discussed in Sections F and J, a vegetative soil cover will provide sufficient protection against direct contact.

In responding to comments about the appropriateness of the proposed ground water clean-up standards for vanadium and manganese, EPA re-checked the calculation of the risk-based numbers for those contaminants, and found that the standards for both manganese and vanadium need revision. Apparently, an error in calculation resulted in the proposed vanadium standard of 54 ug/L. After re-calculating, EPA has revised the risk-based standard to 260 ug/L.

For manganese, based on the current reference dose, the risk-based standard should be revised from 380 ug/L to 180 ug/L to achieve a Hazard Index of unity. However, 180 ug/L is below the background level for manganese of 230 ug/L determined in the Baseline Risk Assessment. Comments received during the public comment period suggest naturally occurring background may be even higher than this. Therefore, EPA is setting an interim clean-up standard for manganese of 230 ug/L. EPA may revise this standard if a statistical analysis performed during remedial design indicates a significantly different background standard would be more appropriate.

The impact of these changes on the cost of the remedy is to reduce it by the amount estimated in the FS for clean-up of the FDPs. The value of that component is as follows:

Solidification	-	$7,900,000
Containment	-	$2,900,000
Total	-	$12,800,000

All risk scenarios presented in the BRA were available during the public comment period, and summarized in the Proposed Plan. EPA has not changed any of the remedial components or considered any new technologies or process options in making this change. In response to public comments, EPA revised its risk management scenario and performed an additional risk evaluation to ensure the revised remedy was protective of human health and the environment. EPA believes the preceding explanation provides sufficient basis for revising the proposed plan to the remedy selected herein.

FIGURE 1. General Location of the Ormet Corporation Plant.

Ormet Corporation

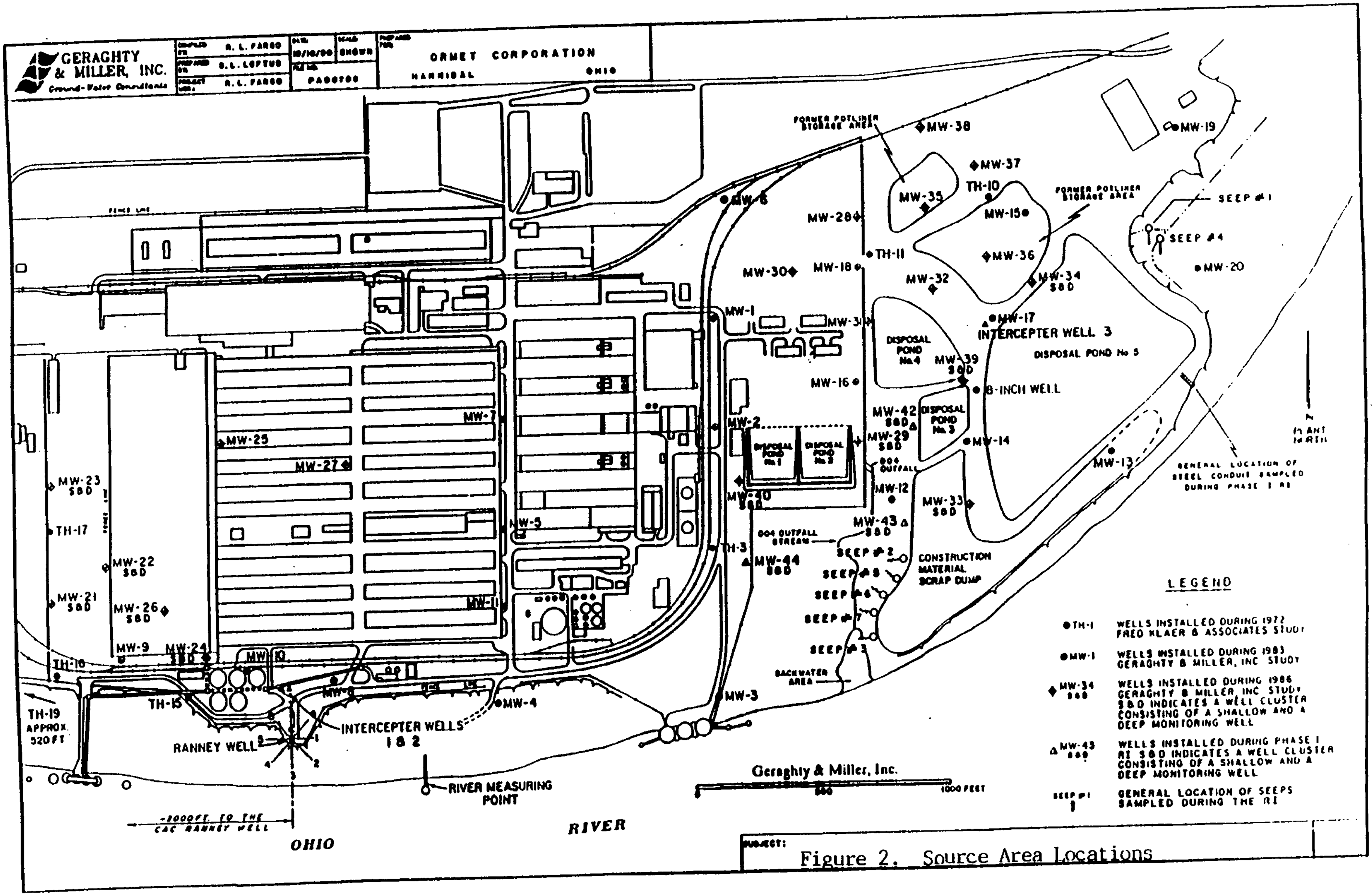
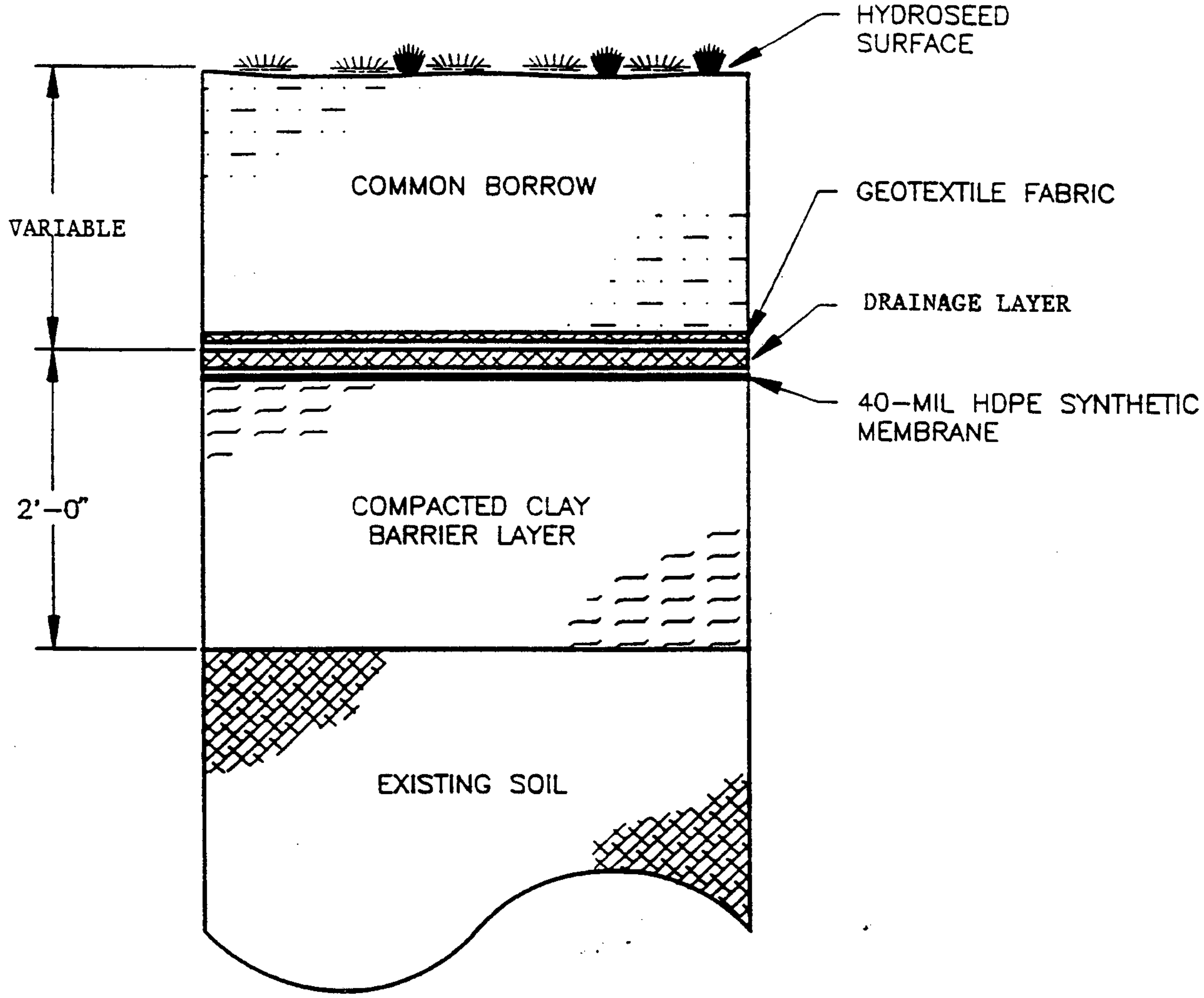


Figure 2. Source Area Locations



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GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL DUAL BARRIER CAP DETAIL

ORMET CORPORATION
HANNIBAL, OHIO

FIGURE **3**

TABLE 1 SUMMARY OF CONTAMINANTS OF CONCERN AT THE ORMET CORPORATION SITE

Chemical	Range of Concentrations							
	Disposal Ponds, mg/kg	Potliner Area, mg/kg	CRDA, mg/kg	CMSD, mg/kg	Seeps, mg/L	Groundwater, mg/L	River Sediments, mg/kg	Surface Water, mg/L
INORGANICS								
Aluminum	616-199,000	2,560-42,500	18,700-107,000	58,800-121,000	0.384-1.05	0.029-178	6,580-12,600	0.826-2.88[a]
Antimony	7.6-88	--[b]	9.5-56	--	0.017-0.032	0.025-0.042	--	0.04
Arsenic	15-123	3.0-25	3.8-663	32.2-56.9	0.005-0.006	0.0018-0.394	5.3-10.0	0.005-0.011
Barium	17-848	33-136	137-309	106-150	0.012-0.072	0.042-4.75	72-165	0.048-0.078
Beryllium	1.0-14	0.23-2.2	1.5-7.8	2.6-3.8	0.00055-0.00064	0.00025-0.035	0.94-2.0	--
Cadmium	1.8-2.7	--	1.2-2.0	2.0-3.6	0.02-0.03	0.0041-0.012	1.7-2.0	--
Calcium	586-352,000	806-24,300	2,130-194,000	8,610-16,100	3.97-177	2.81-144	2,110-32,500	20.5-43.1
Chromium	6.4-119	4.8-168	14-47	2.0-42.5	0.023-0.06	0.0058-0.401	13-52	0.008-0.012
Cobalt	2.0-19	1.9-13.0	1.8-23	4.2-11.4	0.0057-0.052	0.0042-0.814	2.7-32	0.007
Copper	12-130	1.8-791	29-94	303-542	0.013-0.144	0.017-1.02	30-119	0.004-0.026
Iron	3,180-13,600	6,690-106,000	5,210-49,800	21,800-27,800	0.408-2.62	0.044-144	12,500-43,500	1.87-5.73
Lead	2.3-214	7.2-74	2.9-85	54.7-84.1	0.003-0.005	0.0023-0.139	20-92	0.003-0.009
Magnesium	172-6,010	661-2,930	2,110-3,860	901-1,670	4.8-48.5	0.61-16.7	1,370-6,120	5.92-7.19
Manganese	13-227	198-3,220	131-2,140	330-1,060	0.003-31.3	0.01-15.4	519-1,490	0.262-0.772
Mercury	0.14-0.59	0.089-0.098	0.17-0.31	--	--	0.00026-0.0033	0.22-0.39	--
Nickel	19-656	0.59-146	24-558	36.6-62.5	0.043-0.051	0.026-0.767	10-73	0.01-0.012
Potassium	810-2,510	796-2,810	1,200-2,750	311-1,150	3.17-29.9	4.36-42.1	907	1.72-2.99
Selenium	--	0.31-0.61	--	--	0.014-0.02	0.0023-0.027	--	--
Silver	2-2.4	11	--	--	0.018-0.049	--	--	--
Sodium	6,410-69,400	1,190-14,200	1,960-11,500	22,300-48,700	945-4,900	18.7-2,640	501-2,060	10.3-15.3
Thallium	0.67-1.2	--	0.54-0.6	--	--	0.0028	--	--
Vanadium	13-741	6.1-62	31-270	29.4-42.4	0.006-0.029	0.0026-0.369	8.9-17.0	--
Zinc	13-170	24-109	28-294	59.6-125	0.006-0.029	0.0087-0.449	106-524	0.023-0.066
Cyanide	1.8-294	2.7-647	0.82-254	7.9-21.7	0.163-4.383	0.011-18.6	1.1-42	--
Non-CLP Inorganics								
Chloride	4-350	--	5-200	8-10	39-17	5-320	96-300	13-41
Cyanide, Amenable	1-120	--	3-28	--	0.0686-0.9	0.01-41.0	--	0.078
Cyanide, Total	2-430	1.0-1,900	3-130	7.9-21.7	0.0794-8.8	0.01-67	1-39	0.0076-0.428
Fluoride	31-7,200	0.3-1,500	64-270	440-540	6.5-200	0.1-1,000	2.3-83	0.1-12
Nitrogen, Ammonia	13-146	13-360	--	70-110	1.5-4.2	0.1-230	43-88	--
Silica	8-79	--	14-29	--	6-28	5-4,300	11-33	3-6
Sulfate	34-8,000	--	22-1,700	41-270	210-6,100	8-850	13-60	65-110

continued-

(a) Metal values in this column for total metals.
(b) "--" indicates either not detected or not analyzed for.

Table 1 - continued

Chemical	Range of Concentrations: Disposal Ponds, mg/kg	Potliner Area, mg/kg	CRDA, mg/kg	CMSD, mg/kg	Seeps, mg/L	Groundwater, mg/L	River Sediments, mg/kg	Surface Water, mg/L
ORGANICS								
Volatiles								
Acetone	0.003-0.22	0.029-0.16	--	0.098-0.27	0.033-0.49	0.001-0.029	--	0.011-0.02
Benzene	0.002-0.025	--	0.31-0.35	--	--	0.001-0.024	0.024	--
2-Butanone	0.009	0.006-0.088	0.057	0.016-0.043	--	--	0.12	--
Carbon disulfide	0.002-0.079	--	--	0.004	--	0.001-0.01	--	--
Chlorobenzene	0.002-27	0.005-0.007	0.006-0.18	--	0.043-0.044	--	--	--
Chloroform	0.004-0.039	--	0.004-0.01	--	--	0.003	0.006-0.007	--
Ethylbenzene	0.008	--	0.001-0.004	0.002	0.002	--	--	--
Methylene chloride	0.002-0.198	0.004-0.02	0.018-0.033	0.002-0.092	0.002-0.003	0.002-0.017	0.032-0.038	0.001-0.002
Styrene	0.002	--	0.007-0.008	--	0.025	--	--	--
1,1,2,2-Tetrachloroethane	0.006	--	--	0.003	--	--	--	--
Tetrachloroethene	0.002-0.047	--	0.002-0.011	--	0.001	0.005-0.022	--	--
1,1,1-Trichloroethane	0.004	--	--	--	0.005-0.015	0.002-0.003	--	--
Trichloroethene	0.002	--	--	--	0.002	0.001-0.003	--	--
Toluene	0.002-0.006	--	0.002-0.034	0.002	0.003-0.005	0.001-0.004	--	--
Semivolatiles								
4-Methylphenol	--	0.21-3.4	0.055	--	--	--	--	--
2,4-Dimethylphenol	--	0.072-1.8	0.15-0.18	--	--	--	1.2	--
Naphthalene	0.076-3.7	0.13-81	0.07-0.57	1.3	--	--	0.07-1.8	--
2-Methylnaphthalene	0.057-0.83	0.037-39	0.053-0.22	0.46	--	--	0.098-0.74	--
Acenaphthene	0.066-2.2	0.62-1.4	--	--	--	--	0.078-1.3	--
Acenaphthylene	0.05-5.3	0.046-260	0.067-1.4	5.1-13.0	--	--	0.058-0.17	--
Dibenzofuran	0.12-4.3	0.043-120	0.073-0.87	2.7-8.5	--	--	0.081-3.3	--
Fluorene	0.065-4.5	0.04-140	0.056-0.64	4.1-110	--	--	0.084-7.8(a)	--
Phenanthrene	0.34-56	0.19-670	0.055-9.5	44-130	--	0.004	0.45-110	--
Anthracene	0.046-44	0.045-230	0.064-3.7	13-35	--	--	0.17-38	--
Di-n-butylphthalate	0.067-5.5	0.043-0.063	0.045-0.085	47-240	--	0.002-0.003	0.058	--
Fluoranthene	0.099-150	0.18-880	0.052-14	43-280	0.004	0.008	1.4-310	0.003
Pyrene	0.36-55	0.12-860	0.042-13	31-220	0.003	0.003	0.82-190	0.003
Benzo(a)anthracene	0.1-100	0.076-770	0.046-16	25-180	--	--	0.18-150	--
Chrysene	0.14-130	0.74-740	0.048-20	--	--	--	0.74-180	0.003
bis(2-Ethylhexyl)phthalate	0.11-14	0.27-1.7	0.042-0.82	--	0.001-0.23	0.02-0.11	0.21-0.85	--
Di-n-octylphthalate	--	0.067	0.41-0.66	35-310	--	--	--	--
Benzo(b)fluoranthene	0.21-140	0.056-1,200	0.08-24	50	--	--	0.81-390	--
Benzo(k)fluoranthene	0.096-75	0.04-1,200	0.086-19	21-200	--	--	0.19-170	--

continued-

(a) Elevated detection limit.

Table 1 - continued

Chemical	Range of Concentrations							
	Disposal Ponds, mg/kg	Potliner Area, mg/kg	CRDA, mg/kg	CMSD, mg/kg	Seeps, mg/L	Groundwater, mg/L	River Sediments, mg/kg	Surface Water, mg/L
Semivolatiles - continued								
Benzo(a)pyrene	0.43-55	0.043-710	0.097-.097-19	18-160	--	--	0.56-180	--
Indeno(1,2,3-cd)pyrene	0.25-40	0.061-220	0.08-6.6	5.2-14	--	--	0.61-91	--
Dibenz(a,h)anthracene	0.61-11	0.086-220	0.15-1.7	35-220	--	--	0.093-22	--
Benzo(g,h,i)perylene	0.22-45	0.085-190	0.084-5.4		--	--	0.26-88	--
PCBs								
Aroclor-1242	--	--	--	--	0.00083-0.0074	--	--	0.001-0.0015
Aroclor-1248	--	--	--	3.6-22.6	--	--	1.04-97.5	--

TABLE 2. CHEMICALS OF CONCERN FOR GROUND WATER, SHOWING CLEAN-UP STANDARDS AND RESIDUAL RISK

Chemicals of Concern for Ground Water	Concentration Range (ug/l)	Clean-up Standard (ug/l)	Residual Risk at Clean-up Standard
Tetrachloroethene	5.0 - 40	5[1]	ELCR=3.1E-06
Arsenic	1.8 - 394	10[2]	ELCR=1.20E-04
Beryllium	0.25 - 35.0	4[1]	ELCR=1.7E-04
Cyanide	11.0 - 18,600	200[1]	HI=0.2
Manganese[a]	ND - 15,400	230[3,4]	HI=0.9
Vanadium	2.6 - 369	260[3]	HI=0.73
Fluoride	100 - 710,000	4000[1]	HI=1.3

1. MCL or Proposed MCL
2. Analytical Quantitation Limit (higher than background)
3. Risk Based
4. Background

a. Manganese is an interim standard per Section J of the ROD

Assumptions for Residual Risk Levels:

Worker exposed to drinking water. No showering so no inhalation assumed.

C	Concentration at Clean-up Standard (mg/L)
EF	250 days
ED	25 years
AT_n	25 years
AT_c	70 years
BW	70 kg
IR	2L/day water
RfD	Reference Dose
SF	Slope Factor

Residual Risk Calculations

$$HI = \frac{C \times IR \times EF \times ED}{RfD \times BW \times AT_n \times 365 \text{ days/yr}}$$

$$ELCR = \frac{SF \times C \times IR \times EF \times ED}{BW \times AT_c \times 365 \text{ days/yr}}$$

TABLE 3 POTENTIALLY COMPLETE PATHWAY SUMMARY - CURRENT SCENARIOS

Population	Exposure Point	Source/Release Mechanism	Exposure Medium	Exposure Route	Quantify?
Occupational (Adult)	Plant Recreation Area	Disposal ponds, potliner area/ fugitive dust emission	Air	Inhalation (Particulates & Volatiles)	Yes - Particulates. No - Volatiles, unable to quantify with available data.
			Soil	Ingestion	No - Unable to quantify with available data.
			Soil	Dermal	No - Unable to quantify with available data.
Recreational (Adult & Child)	Plant Recreation Area	Disposal ponds, potliner area/ fugitive dust emission, seepage	Air	Inhalation	No - Occupational exposures represent higher exposure potential. Ormet workers and families are not frequent visitors to area.
			Soil	Ingestion	No - Pathway not always complete, exposure infrequent and potential low.
			Soil	Dermal	
Residential (Adult & Child)	Proctor, West Virginia (off-site)	Disposal ponds, potliner area/ fugitive dust emission	Air	Inhalation (Particulates & Volatiles)	Yes - Particulates. No - Volatiles, unable to quantify with available data.

continued-

Table 3 - continued

Population	Exposure Point	Source/Release Mechanism	Exposure Medium	Exposure Route	Quantify?
Residential (Adult & Child)	Ohio River	Disposal ponds, potliner area/ CMSD, Carbon Runoff Area/ fugitive dust emission, surface runoff	Surface Water	Incidental Ingestion	No - Current exposure potential for these pathways low. Pathway evaluated for future residential scenario.
			Surface Water	Ingestion of Fish	Yes
			Sediments	Ingestion	Yes
Hypothetical Trespasser	004 Backwater Area (Ohio River to Outfall 004 discharge pipe)	004 Discharge, CMSD, Carbon Runoff Area/ fugitive dust emission, surface runoff		Dermal	Yes
			Surface Water	Ingestion	Yes
				Dermal	Yes
			Sediments	Ingestion	Yes
				Dermal	Yes
	Ohio River Bank	Disposal Ponds, Potliner Area, CMSD, Carbon Runoff Area/ fugitive dust emission, surface runoff	Surface Water	Ingestion	Yes
				Dermal	Yes
			Sediments	Ingestion	Yes
				Dermal	Yes

continued-

Table 3 - continued

Population	Exposure Point	Source/Release Mechanism	Exposure Medium	Exposure Route	Quantify?
Hypothetical Trespasser	Source Areas	Disposal Ponds, Potliner Area, CMSD, Carbon Runoff Area/ fugitive dust emission, direct contact	Soil	Dermal Ingestion	No - Pathways involving direct contact with the source likely presents low potential. Evaluated in future scenarios.
			Air	Inhalation	No - Pathway evaluated for worker whose exposure potential is higher.
	Seeps	Groundwater/ seepage to surface	Surface Water	Ingestion	No - Pathway not always complete and potential for exposure is low.
				Dermal	No - Pathway not always complete and potential for exposure is low.

TABLE 4 POTENTIALLY COMPLETE PATHWAY SUMMARY - HYPOTHETICAL FUTURE SCENARIOS

Population	Exposure Points	Source/Release Mechanism	Exposure Media	Exposure Route	Quantify?
Occupational (Adult Plant or Maintenance Worker)	CAC Ranney Well	Disposal ponds, potliner area/ infiltration	Groundwater	Ingestion	Yes
Resident (Adult & Child)	Drinking water well in plume	Disposal ponds, potliner area/ infiltration	Groundwater	Ingestion Inhalation Dermal	Yes No. Pathway not likely to present high exposure potential.
	Residence-Downwind of Pond 5 Residence-Potliner Area	Specific source areas/fugitive dust, direct contact	Air	Inhalation (Particulates & Volatiles)	Yes. Particulates where pathway is complete No. Volatiles unable to quantify with available data.
	Residence - Ponds 1-5 Residence-CRDA Residence-CMSD		Soil Soil	Ingestion Dermal	Yes Yes
	Ohio River	Disposal ponds, potliner area/ CMSD, carbon runoff area/ fugitive dust surface runoff	Surface Water Sediment Fish	Ingestion Dermal Ingestion Dermal Ingestion	Yes Yes Yes Yes Yes
	004 Backwater area (Ohio River to out-fall 004 discharge pipe)	004 Discharge, CMSD, carbon runoff area/ fugitive dust emission, sur-face runoff	Sediments Surface Water	Ingestion Dermal Ingestion Dermal	Yes Yes Yes Yes

Table 5 Summary of Potential Excess Lifetime Cancer Risks and Non - Carcinogenic Hazards, from the Ormet, Hannibal, Ohio

Hypothetical Current Scenarios

Media	ELCR	HI	SCOC
Backwater Area Sediments	2×10^{-4}	--	PCB, PAH

Hypothetical Future Resident Scenarios

Media	ELCR	HI	SCOC
pond 5 soils	3×10^{-4}	1.0	As,Be,PAH
pond 1-4 soils	1×10^{-3}	3.0	As,Be,PAH,V
FSPSA soils	7×10^{-3}	0.8	As,Be,PAH
CRDA soils	1×10^{-3}	3.0	As,PAH,PCB
CMSD soils	5×10^{-3}	1.0	As,Be,PAH,PCB
Backwater Area Sediments	3×10^{-4}	--	PCB, PAH
ground water	2×10^{-3}	600	As,Be,CN^-,F,Mn,PCE,V

Hypothetical Future Worker Scenarios

Media	ELCR	HI	SCOC
ground water	1×10^{-3}	30	As,Be,CN^-,F,Mn,PCE,V

ELCR = Excess lifetime cancer risk - (U.S.EPA's acceptable risk range is 10^{-4} 10^{-6})
HI = Hazard index - (HI < 1.0 is protective)
SCOC = Chemicals of concern significant to risks
PCB = Polychlorinated biphenyl
PAH = Polynuclear aromatic hydrocarbon

TABLE 6. COMPONENTS OF REMEDIAL ACTION ALTERNATIVES

Groundwater

- GW-3: Pumping of Ranney and existing interceptor wells, treatment of the interceptor well water by ferrous salt precipitation, clarification of effluent, and discharge to the Ohio River;
- GW-5: Pumping of Ranney well and new interceptor wells installed closer to the FSPSA, treatment of interceptor well water by ferrous salt precipitation, clarification, post-treatment by activated alumina adsorption, and discharge to the Ohio River;

CMSD and Ballfield Seeps

- SP-4: Collection of Ballfield and CMSD seeps using trench drains, treatment of CMSD seeps by oil/water separation and/or carbon adsorption;

Former Spent Potliner Storage Area

- FSPSA-2: Containment by vegetated soil cover;
- FSPSA-3: Containment by dual barrier cap;
- FSPSA-4: Containment by single barrier synthetic cap;
- FSPSA-6: Treatment by in-situ soil flushing and containment by vegetated soil cover;
- FSPSA-9: Partial excavation with off-site landfilling of excavated Soils, and containment by single barrier synthetic cap;
- FSPSA-10: Containment by single barrier clay cap;

Construction Material Scrap Dump

- CMSD-3: Recontouring, and vegetated soil cover;
- CMSD-4: Recontouring and containment by single barrier synthetic cap, placement of rip rap/other engineering controls to prevent washout of CMSD materials;
- CMSD-5: Recontouring and containment by dual barrier cap, placement of rip rap/other engineering controls to prevent washout of CMSD materials;

TABLE 6 (CONT'D

Construction Material Scrap Dump (cont'd

- CMSD-7: Complete excavation, treatment by thermal oxidation, and containment by single barrier synthetic cap, placement of rip rap/other engineering controls to prevent washout of CMSD materials;

- CMSD-8: Containment by single barrier clay cap, placement of rip rap/other engineering controls to prevent washout of CMSD materials;

Carbon Run-off and Deposition Area

- CRDA-3: Excavation and consolidation under CMSD cover;

- CRDA-4: Excavation with off-site landfilling of the excavated material;

- CRDA-5: Excavation and treatment by thermal oxidation;

Backwater Area Sediments

- SED-4: Complete dredging, treatment by solidification, and off-site landfilling of the dredged sediments.

- SED-6: sheet piling containment and concrete revetments.

- SED-7: Complete dredging, treatment by solidification, and consolidation under CMSD cap.

- SED-8: Partial dredging, treatment by solidification, consolidation under CMSD cap.

- SED-9: Complete dredging, treatment by solvent extraction, and consolidation under CMSD cap.

- SED-10: Complete dredging (including Ohio River sediments), treatment by solidification, and consolidation under CMSD cap.

TABLE 7

FORMATION OF SITEWIDE REMEDIAL ALTERNATIVES

Sitewide Remedial Alternative Number	Remedial Alternative Category	Remedial Measures						
		Ground Water	Seeps	Former Spent Potliner Storage Area	Former Disposal Ponds	Construction Material Scrap Dump	Carbon Run-off and Deposition Area	Ohio River Sediments
1	No-Action	GW-1	SP-1	FSPSA-1	FDP-1	CMSD-1	CRDA-1	SED-1
2	Containment	GW-3	SP-4	FSPSA-2	FDP-2	CMSD-3	CRDA-3	SED-6
3	Containment	GW-3	SP-4	FSPSA-4	FDP-5	CMSD-4	CRDA-3	SED-8
4	Containment	GW-3	SP-4	FSPSA-3	FDP-7	CMSD-5	CRDA-3	SED-7
5	Containment/Off-Site Disposal	GW-3	SP-4	FSPSA-9	FDP-5	CMSD-4	CRDA-3	SED-8
6	Treatment/Containment	GW-3	SP-4	FSPSA-9	FDP-3	CMSD-7	CRDA-5	SED-7
7	Treatment/Containment	GW-3	SP-4	FSPSA-6	FDP-7	CMSD-7	CRDA-5	SED-9
8	Excavation/Treatment/Containment	GW-3	SP-4	FSPSA-6	FDP-5	CMSD-4	CRDA-3	SED-8
9	Excavation/Treatment/Off-Site Disposal	GW-5	SP-4	FSPSA-9	FDP-7	CMSD-7	CRDA-4	SED-4
10	Treatment/Containment	GW-5	SP-4	FSPSA-10	FDP-10	CMSD-8	CRDA-3	SED-10

Table 8 Nine Evaluation Criteria

Threshold Criteria:

1. Overall Protection of Human Health and the Environment: Addresses whether a remedy provides adequate protection and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with ARARs: Addresses whether a remedy will meet all requirements of other federal and state environmental laws and regulations and/or provides grounds for invoking a waiver.

Primary Balancing Criteria:

3. Long-Term Effectiveness and Permanence: Refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment: Assesses the degree to which a remedy utilizes treatment to address the principle threats at the Site.

5. Short-Term Effectiveness: Addresses the potential adverse effects that implementation of a remedy may have on human health and the environment, i.e. during construction and before cleanup levels are achieved.

6. Implementability: Addresses the technical and administrative feasibility of a remedy, including the availability of services and materials.

7. Cost: Includes the estimated capital and operation and maintenance costs for a remedy, also expressed in net present worth costs.

Modifying Criteria:

8. State Acceptance: Indicates whether the State of Ohio supports the alternative.

9. Community Acceptance: Addresses the acceptability of the alternative to the local community based on comments received during the public comment period.

TABLE 9. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR THE SELECTED REMEDY

STATE ARARS

Ohio Administrative Code

OAC:3745-1-04:	General Narrative Water Quality Standards
OAC:3745-1-05:	Antidegradation Policy for Surface Water
OAC:3745-9-10:	Water Well and Test Hole Abandonment
OAC:3745-51-07 A,B:	Residues of Hazardous Wastes in Empty Containers
OAC 3745-54-15:	Inspection Requirements for Hazardous Waste Facilities.
OAC: 3745-54-31:	Design and Operation of Hazardous Waste Facilities.
OAC:3745-54-97 A-F:	General Ground Water Monitoring Requirements
OAC:3745-55-01:	Ground Water Corrective Action Program
OAC:3745-55-14:	Disposal and Decontamination of Equipment, Structures, and Soils
OAC:3745-55-17:	Post-Closure Care and Uses of the Property
OAC:3745-55-71-78:	Proper Use of Containers
OAC:3745-57-01 A-D:	Environmental Performance Standards for Land-Based Units
OAC:3745-57-05 A:	Cover Inspection During and Immediately After Construction
OAC:3745-57-10:	Closure and Post-Closure Care
OAC:3745-57-12, 13:	Special Requirements for Igniteable, Reactive, or Incompatible Waste
OAC:3745-81-11 B:	MCLs for Inorganic Chemicals
OAC:3745-81-23 A:	Inorganic Monitoring Requirements
OAC:3745-81-27:	Alternate Analytical Techniques

Ohio Revised Code

ORC:3734.02(F):	Unauthorized Storage, Treatment, or Disposal of Hazardous Waste
ORC:3734.02(I):	Air Emissions From Hazardous Waste Facilities
ORC:3734.05:	Prohibits Violation of Air Pollution Control Regulations
ORC:3767.13, .14:	Prohibits Nuisances in Waterways

FEDERAL ARARS

40 CFR 761.60(a)(5):	Disposal of PCB-Contaminated Dredged Materials