Five-Year Review Report

First Five-Year Review Report
for
Ormet Corp. Superfund Site
Hannibal, Monroe County, Ohio

April 2002

Prepared by:
United States Environmental Protection Agency
Region 5
Chicago, Illinois

Approved by: Date:

<Original signed by Wm. E. Muno, May 6, 2002>

_____ _____

William Muno
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Executive Summary

The remedy for the Ormet Corp. Superfund site in Hannibal, Monroe County, Ohio included: continued operation of the interceptor wells and groundwater treatment system for the removal of contaminated groundwater; the continued pumping of the Ranney well for plume containment; construction and operation of a soil flushing system in the former spent potliner storage area; construction of a landfill and a Toxic Substance Control Act (TSCA) cell at the construction materials scrap dump (CMSD); construction of a means for collecting the leachate at the CMSD landfill and a pre-treatment system for its treatment and subsequent operation of the system; removal of contaminated soils and sediments from the carbon runoff and deposition area and the outfall 4 stream backwater area and placement of the removed materials in the CMSD landfill or the TSCA cell within it; fencing; maintenance of the remedial components; and institutional controls. The site achieved construction completion with the signing of the Preliminary Close Out Report on August 4, 1998. The trigger for this review was the recorded start of remedial action on April 14, 1997.

The assessment of this five-year review found that the remedy was constructed in accordance with the Record of Decision and the Explanation of Significant Differences. The remedy is functioning as anticipated. Because the remedial actions are protective, the remedy at the site is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Ormet Corp.		
EPA ID *(from WasteLAN)*: OHD004379970		
Region: 5	**State:** OH	**City/County:** Hannibal, Monroe County
SITE STATUS		
NPL status: x Final __ Deleted __ Other (specify) _____		
Remediation status (choose all that apply): __ Under Construction x Operating __ Complete		
Multiple OUs?* __ YES x NO	**Construction completion date:** 8/4/98	
Has site been put into reuse? __ YES x NO (operating plant)		
REVIEW STATUS		
Lead agency: x EPA __ State __ Tribe __ Other Federal Agency _____		
Author name: Bernard J. Schorle		
Author title: Remedial Project Manager (RPM)	**Author affiliation:** USEPA, Region 5	
Review period:** 1/28/02 to 5/1/02		
Date(s) of site inspection: 3/13/02		
Type of review:	x Post-SARA __ Non-NPL Remedial Action Site __ Regional Discretion	__ Pre-SARA __ NPL State/Tribe-lead __ NPL-Removal only
Review number: x 1 (first) __ 2 (second) __ 3 (third) __ Other (specify) _____		
Triggering action: __ Actual RA Onsite Construction at OU #___ __ Construction Completion __ Other (specify) _____		x Actual RA Start at OU# NA __ Previous Five-Year Review Report
Triggering action date *(from WasteLAN)*: 4/14/97	**Due date:** 4/14/02	

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Issues:
- The construction materials scrap dump (CMSD) landfill cover has not been properly maintained.
- The plume from former disposal pond No. 5 (FDP-5) could be monitored more meaningfully.
- Monitoring of the groundwater to determine that polychlorinated biphenyls (PCBs) are not escaping from the CMSD landfill area is not being done.
- The background concentrations of manganese and arsenic have not been agreed upon.
- Ohio EPA continues to object to the FDPs not having been actively remediated.

Recommendations and Follow-up Actions:
- The vegetation on the landfill cover is to be improved; reseeding and placement of fertilizer can be tried first. This has already begun.
- An additional well, well MW-14, which is downgradient of FDP-5, should be added to the monitoring program and another monitoring well should be sampled three times per year instead of annually.
- Two wells need to be added to the monitoring program for the determination of PCBs downgradient of the CMSD landfill area twice a year.
- What has been done and needs to be done concerning the determinations of the background concentrations for manganese and arsenic will be evaluated.
- USEPA will continue to follow the information available on the FDPs and the groundwater downgradient of them.

Protectiveness Statement(s):
The immediate threats at the site have been addressed, and the remedy is protective of human health and the environment. Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater data to maintain a record of the groundwater contamination. Current monitoring data indicate that the remedy is functioning as required.

Ormet Corp. Superfund Site
Hannibal, Monroe County, Ohio
First Five-Year Review Report

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in a five-year review report. In addition, the five-year review report identifies issues found during the review, if any, and identifies recommendations to address them.

The Agency is preparing this five-year review report pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Part 300). CERCLA §121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The United States Environmental Protection Agency (USEPA), Region 5, which is the lead agency for the site, has conducted the five-year review of the remedy implemented at the Ormet Corp. Superfund site in Hannibal, Ohio. This review was conducted for the entire site by the remedial project manager (RPM) through March 2002. This report documents the results of the review.

This is the first five-year review for the Ormet Site. The triggering action for this statutory review is the reported initiation of the remedial action on April 14, 1997. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Event	Date
Plant started operations	1958
Placement of spent potliner in former spent potliner storage area (FSPSA)	1958 to 1968
Use of retention disposal ponds (former disposal ponds--FDPs)	1958 to 1981

Event	Date
Wastes to construction materials scrap dump (CMSD)	1966 to mid 1979
Removal of much of the spent potliner	1968 to 1981
Verification of groundwater contamination in the Ranney well at the reduction plant and subsequent installation of interceptor wells	about 1972
Proposed to National Priority List (NPL)	9/18/85
Placed as final on NPL	7/21/87
Administrative Order by Consent between Ormet Corporation, Ohio Environmental Protection Agency, and U.S. Environmental Protection Agency (USEPA) for Ormet to perform the remedial investigation (RI) and feasibility study (FS), reported effective date	5/19/87
Remedial Investigation Report	12/29/92
Feasibility Study Report including Addendum required by USEPA	December 1993
Proposed Plan	Undated, reportedly released 4/11/94
Public meeting for the Proposed Plan, FS Report, RI Report, and other documents	4/20/94
End of comment period for the Proposed Plan	6/10/94
Record of Decision (ROD)	9/12/94
Consent Decree for remedial design and remedial action between Ormet Primary Aluminum Corporation and USEPA	Lodged 9/28/95 Entered 12/18/95
Explanation of Significant Differences (ESD)	4/1/97
Approval of design	4/15/97
Preliminary Close Out Report signifying construction completion	8/4/98

III. Background

History and Investigations

The Ormet Corp. Superfund site (site) is located in Monroe County, Ohio, approximately 3 miles north of the city of Hannibal (southeastern part of the state). The site is located along the Ohio River at approximately rivermile 123, about 35 miles south of Wheeling, West Virginia. The site is bounded on the northwest by Ohio State Route 7 and on the east and southeast by the Ohio River. To the southwest are the Ormet Primary Aluminum Corporation reduction plant and the former Consolidated Aluminum Corporation (CAC) rolling mill, now owned by the Ormet Aluminum Mill Products Corporation. The site is at the reduction plant.

Since the reduction plant started operations in 1958, the main process has been the reduction of alumina to produce aluminum metal. From 1958 to 1968, spent potliner, a hazardous by-product of the aluminum production, was placed in an unlined open area in the northeast area of the site, which is referred to as the former spent potliner storage area (FSPSA). (Many of these areas are shown in Figure 1 which shows nearly all of the monitoring wells.) From 1968 to 1981, much of the potliner waste was removed and transported to an on-site recovery plant that removed a useable material called cryolite from the potliner. A waste slurry from the cryolite recovery plant was routed to former disposal pond (FDP) No. 5, although FDPs 1 through 4 may have received minor amounts of cryolite plant waste. These tailings were alkaline and consisted primarily of carbonaceous material from the potliner along with sodium and calcium-based salts. Since 1980, the remaining potliner material has been transported off site for disposal.

At various times from 1958 to 1981, one or more retention disposal ponds (ponds 1 through 5), located in the northeastern portion of the site, were used. These are the former disposal ponds mentioned above, which are unlined and constructed of natural materials. Primarily, ponds 1 through 4 were used for the disposal of process wastes from the air emissions wet scrubbing system in the form of a sludge, the primary constituents of which were alumina, particle carbon, and calcium-based salts.

From about 1966 until mid 1979, Ormet deposited waste construction materials and other miscellaneous plant debris in the southeastern corner of the Ormet property, adjacent to pond 5. This 4 to 5 acre area is designated the construction materials scrap dump (CMSD). An area referred to as the carbon runoff and deposition area (CRDA) contained carbon deposits, probably carried there by storm water runoff from the Ormet plant area. Some of the carbon runoff may also have entered the 004 outfall stream and backwater area.

The alluvial aquifer beneath the surface of the site 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 the reduction plant's property and the other on the rolling mill's property. The rolling mill's Ranney well, which is about 2000 ft to the west of the reduction plant's Ranney well, provides drinking water to employees at both plants, a total of about 3200 people at the time of the remedial investigation. The reduction plant's Ranney well is used to provide non-contact cooling water for the reduction plant. The groundwater under the site at the time of the remedial investigation was considered to be a Class IIb groundwater, since it was not then used as a source of drinking water but had the potential to be so used, and was considered restorable in a reasonable time frame.

In 1972 a hydrogeologic study verified the presence of groundwater contamination in the Ranney well pumping center at the reduction plant. As a result of this study, two interceptor wells (#l and #2) were installed north of this Ranney well to intercept the plume before it reached the pumping center. Site contamination found by USEPA and the State, combined with its potential impact on drinking water supplies, prompted USEPA to propose that the site be place on the National Priorities List (NPL) in September 1985. In May 1987, the USEPA, Ohio EPA, and Ormet Corporation entered into an Administrative Order by Consent (Consent Order) providing for Ormet to conduct a remedial investigation (RI) and feasibility study (FS) under the oversight of USEPA and Ohio EPA. The remedial investigation report was completed in December 1992 and the feasibility study report was completed in December 1993. In addition to defining the contamination found in the disposal areas described above, during the remedial investigation seeps were discovered near the plant recreational area ballfields and along the western edge of the CMSD. The seeps contained cyanide ranging in concentrations to 950 ppb.

Extent of Contamination

This section covers what was found during the remedial investigation.

Cyanide, fluoride, chromium, arsenic, and polynuclear aromatic hydrocarbons (PAHs) were found in solids from the FDPs. The contaminants did not appear to be migrating to any significant degree, either to groundwater or air, except that fluoride was present in groundwater down-

gradient of FDP-5 at levels that exceeded the maximum contaminant level (MCL). A comparison with sample results from 1972 showed that fluoride concentrations downgradient of FDP-5 had decreased by one to three orders of magnitude at a given sampling location. Pond solids were found to be characteristically alkaline in nature and no evidence was found of surface runoff from the ponds.

At the FSPSA, relatively high concentrations of PAHs were detected in soils in the 2 to 4 foot horizon. Because PAHs are relatively immobile, they were not expected to contribute significantly to releases to groundwater from the FSPSA. Moderate levels of cyanide and arsenic, both mobile in groundwater, were identified in the FSPSA. The FSPSA was found to be the primary contributor to cyanide and fluoride contamination in groundwater, and may also be a factor in the arsenic showing up in downgradient wells. In contrast to the situation at FDP-5, fluoride levels in and downgradient of the FSPSA were found to have shown an increasing trend since 1972.

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. The CRDA was thought to be 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 was found to be a significant source of cyanide and PCBs in the seeps, backwater sediments, and river water. The principal transport mechanism appeared to be the discharge of seep water to the 004 outfall stream. A low-permeability clay/silt layer was found underneath the CMSD which appeared to provide a natural barrier to contaminants leaching to groundwater, and the reduction plant's Ranney well creates a hydraulic gradient away from the river, so groundwater discharge to surface water is not considered a reasonable migration pathway. PAHs were found at levels that contributed to an increased ecological risk but were not believed to be migrating out of the source area.

Groundwater at the site was found to be contaminated in excess of MCLs for a number of contaminants, including tetrachloroethene (PCE), cyanide, fluoride, arsenic, antimony, and beryllium. The primary source of the plume appeared to be infiltration of precipitation through the FSPSA. The plume extended about 3,000 feet from the FSPSA before it reached the interceptor wells. It was characterized by a basic pH near the FSPSA, which became progressively more neutral with distance from the source. Sodium was also typically elevated in the plume. The following table, taken from the 1994 Record of Decision, shows the ranges of concentrations as well as the clean-up standards specified for chemicals of concern in groundwater at the site.

Chemicals of Concern for Groundwater	Concentration Range (µg/l)	Clean-up Standard (µg/l)
tetrachloroethene	5.0--40	5[a]
arsenic	1.8--394	10[b]
beryllium	0.25--35	4[a]
cyanide	11.0--18,600	200[a]
manganese[e]	ND--15,400	230[c,d]
vanadium	2.6--369	260[a]
fluoride	100--710,000	4000[a]

a. maximum contaminant level (MCL) or proposed MCL; for cyanide, the value is the concentration of cyanide amenable to chlorination, not total cyanide
b. analytical quantitation limit (greater than background); background, however, has not been firmly established
c. risk based
d. background
e. This is an interim standard for manganese, based on background determined during the risk assessment; further analysis is to be performed to determine what background should be.

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

Although industrial activity upstream from the site contributed a certain level of contamination to the Ohio River water and sediments as they reached the site, both media were found to show some effects from the site. The effects were 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 groundwater in this stretch, stormwater runoff and seep discharge were found to be the most likely transport mechanisms to the river.

Site Risks

The risk characterization for the baseline risk assessment for human health that was performed during the remedial investigation indicated that estimated risks were greatest under a future residential land use scenario that included direct contact with and ingestion of contaminated soils and sediments, inhalation of particulate matter, ingestion of contaminated groundwater, and ingestion of fish contaminated with polychlorinated biphenyls (PCBs) from the site. A significant area of controversy concerning the site at the time the remedy was selected was the question of whether future residential development of the site was a likely use, and therefore whether it was a reasonable scenario on which to base the remedy selection. The site is an active manufacturing facility in a rural area next to another manufacturing facility, which now, however, is also owned by the Ormet Corporation. There were no residences in the immediate area, and Monroe County census figures indicated a 10% decrease in population in the previous 8 years. As a result, USEPA believed it was reasonable to assume that the current land use would continue for the foreseeable future and that residential development of the site would be highly unlikely. Therefore, the selected remedy was based on cleaning up to standards based on future commercial or industrial use of the property. However, USEPA believed it was also reasonable to assume that at some time in the future the Ranney well at the reduction plant might no longer be used, in which case containment of the plume would be lost and contamination might reach the Ranney well at the rolling mill which supplies drinking water. Therefore, the remedy selected included the restoration of the groundwater to drinking water quality.

The environmental evaluation performed for the site for the remedial investigation concluded that the contaminants of concern (many more substances than the seven listed in the table above) from an ecological standpoint were known to produce sublethal and other toxic effects in the types of organisms found on site. Sediments from the southwestern CMSD seeps and the backwater area produced high mortality among bioassay organisms. Surface water in the backwater area and immediately downstream exceeded 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 demonstrated that site contaminants in river water could 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 occurrence 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 was likely to pose severe carcinogenic risk to fish entering from the Ohio River due to exposure to PCBs and PAHs in sediments. The CMSD and the CRDA were considered the likely sources for PCBs and PAHs in the backwater area sediments and the river.

Basis for Taking Action

The backwater area sediments posed a current threat to human health and the environment and were to be addressed by the remedy specified in the ROD. The CRDA and CMSD, while not posing unacceptable risks themselves, were sources of contamination for the sediments and were to be addressed by the remedy. The FSPSA and groundwater contamination were to be addressed because the aquifer was a current source of drinking water and under a future scenario where the reduction plant's Ranney well would cease pumping, the drinking water well at the rolling mill could become contaminated.

The former disposal ponds were carried through the feasibility study because under the future residential use risk assessment they presented an unacceptable risk. It was later decided that future residential use of this area was an unlikely scenario. Under none of the current use scenarios did these ponds contribute to any significant risk. Estimated risk under future industrial use fell within the acceptable risk range. While FDP-5 appeared to be a source of elevated fluoride in the groundwater, data from the previous 20 years indicated a steady decrease in fluoride levels downgradient of FDP-5 due to the pumping of the interceptor wells and the Ranney well at the reduction plant. It was thought to be reasonable that this trend would continue and that site-wide groundwater monitoring during remedial action would provide a basis to determine whether the downward trend was continuing. Therefore, the ROD stated, ". . .these areas will not require active remedial action, and will not be considered further in this decision document." Although the ROD later says that the no action alternative was being selected for the FDPs, in actuality limited action was selected for the FDPs. The FDPs were to be enclosed within the fence that was to surround the areas being addressed and, although not clearly stated, were to be subject to the property restrictions that were to be imposed. Also, the area to be monitored for groundwater compliance was to include locations downgradient of FDP-5. See the Site-wide part of the Remedy Selected section below for further information on these restrictions.

IV. Remedial Action

Remedy Selected

The components of the remedy resulting from the 1994 Record of Decision and the 1997 Explanation of Significant Differences (ESD) are:

Groundwater. Pumping of the reduction plant's Ranney well and the existing

interceptor wells would continue in order to maintain a capture zone for the contaminated groundwater. Interceptor well water would be treated by ferrous salt precipitation and clarification or other means necessary to achieve standards set by the Ohio EPA National Pollutant Discharge Elimination System (NPDES) program before discharge to the Ohio River.

Leachate. Trench drains would be installed to intercept and extract all leachate seeping from the construction materials scrap dump. The leachate would be treated to meet NPDES discharge limits.

CMSD. The construction materials scrap dump (CMSD) would be recontoured and covered with a dual-barrier cap that would meet the requirements of Subtitle C of the Resource Conservation Recovery Act (RCRA). A Toxic Substance Control Act (TSCA) cell would be constructed within the CMSD.

Soils. Residual soil contamination in the former spent potliner storage area (FSPSA) would be treated by in-situ soil flushing. Contaminated soils from the carbon runoff and deposition area (CRDA) would be excavated and consolidated under the cover at the CMSD. Soils to be excavated from the trench drains would also be consolidated under the CMSD cap. Soils with PCB levels at or above 50 ppm would be placed in the TSCA cell.

Sediments. PCB- and PAH-contaminated sediments would be removed by dredging from the outfall 4 stream backwater area. Sediments with PCB concentrations lower than 50 ppm would be stabilized and consolidated under the CMSD cap in the original decision and sediments with PCB concentration higher than 50 ppm were to be disposed of off-site. It was later decided with the ESD to build a TSCA cell as part of the CMSD landfill, and with this decision it was decided to place all of the PCB-contaminated sediments in this cell.

Site-wide. Institutional controls in the form of access restrictions and deed restrictions to limit groundwater and land use were to be implemented. The access restrictions included a fence. This type of access restriction cannot be part of institutional controls, but is rather another aspect of the remedy. The "deed restrictions" were implemented in accordance with the 1995 Consent Decree as a "Declaration of Restriction on the Use of Real Property" as part of a "Notice of Obligation To Provide Access and Related Covenants" that was made a part of the *Monroe Co. Record of Official Records*. The restrictions required that there be no installation of drinking water wells and no construction for residential purposes.

Ohio EPA did not concur with the Proposed Plan because it felt that the plan was not protective enough. With the revised risk management scenario and associated no-action component for the former disposal ponds in the ROD, the State did not concur with the selected remedy either.

Remedy Implementation

A Consent Decree for remedial design and remedial action between Ormet Primary Aluminum Corporation and USEPA was entered on December 18, 1995. Ohio EPA was not a party to this decree. The remedial design was approved April 15, 1997 following the issuance of the Explanation of Significant Differences on April 1, 1997. The remedial action is listed as beginning April 14, 1997.

The construction activities were separated into two discrete phases. The activities in the first phase were performed in March through April, 1997. In summary, these pre-construction activities consisted of :

preparation of the Health and Safety/Contingency Plan;
preparation of the Backwater Area Isolation Structure submittal; and
finalization of the Construction Quality Assurance Project Plan.

The second phase was carried out from May 1997 to June 1998. In summary, these construction activities consisted of:

site preparation;
removal of contaminated material from portions of the CRDA;
recontouring the CMSD;
installation of the CMSD seep collection and treatment system;
construction of the TSCA cell;
relocation of the outfall 004 discharge;
removal of contaminated sediment from the backwater area;
installation of the FSPSA soil flushing system and placement of a vegetative soil cover in the area;
construction of the site fencing; and
site restoration.

The activities of both phases were performed in substantial accordance with the approved Final Design. There were some changes necessitated by field conditions; these changes were requested by Ormet and approved by USEPA. Construction completion for the site was reached on August 4, 1998 with the issuance of the Preliminary Close Out Report. Activities at the site were consistent with the ROD and the ESD.

USEPA has a copy of a record from volume 18, pages 749 through 755, of the *Monroe Co. Record of Official Records*, dated January 19, 1996 (recorded date) (item 011527), which is a "Notice of Obligation to Provide Access and Related Covenants" for the Ormet site. The document grants access to the United States and imposes specified restrictions and covenants on the approximately 47 acres of real property described. This property is particularly described in the document; the brief description given of it is "generally located along the Ohio River at approximately rivermile 123; and bounded on the northeast by Ohio State Route 7, on the east and southeast by the Ohio River, and on the southwest by the former Consolidated Aluminum Can (CAC) facility." Here the CAC (actually Consolidated Aluminum Corporation) facility is the reduction plant, which was previously owned by CAC. Among the restrictions are a prohibition on the use of groundwater under the property which might endanger human health, but groundwater may be

used for industrial purposes, and a prohibition on residential use of the property.

Operation and Maintenance

There was a round of sampling of monitoring wells performed in May 1997 to provide a baseline characterization of groundwater conditions prior to the beginning of remedial activities. Routine sampling of the wells began in May 1998. Sampling is done three times a year (generally in January, May, and September). Some wells are sampled at each event, some wells are only sampled annually (in May), and a few wells are not sampled. Water levels are measured in almost all of the wells at each event. The wells that are sampled at each event are 10 wells that are within and downgradient or approximately downgradient of the FSPSA and 1 well that is immediately downgradient of the CMSD; these wells have been identified as the points of compliance (MW-32, MW-35, MW-36, and MW-37 within the FSPSA; MW-16, MW-18, MW-28, and MW-31 at the downgradient edge of the FSPSA; MW-2 in the near plant area approximately downgradient of the FSPSA and MW-5 in the mid-plant area near the edge of the plume from the FSPSA, probably outside the plume; and MW-12 downgradient of the CMSD). Samples from the wells are analyzed for the substances for which clean-up standards were set (the substances in the table above), except that samples from only 5 wells are analyzed for tetrachloroethene, and for pH, specific conductance, and sodium, which are indicators of the plume.

The interceptor wells and their groundwater treatment system have been operating since about 1972. These wells along with the reduction plant's Ranney well control the direction of the groundwater flow at the site. A pre-treatment system was installed during the remedial construction to pre-treat any collected leachate seeps from the CMSD landfill and any leachate collected from the TSCA cell within it. The discharge from this pre-treatment system goes to the groundwater treatment system.

A soil flushing system was installed in the FSPSA. Its purpose is to remove the contaminants, mostly fluoride and cyanide, still there and transfer them to the groundwater. These contaminants are then picked up by the interceptor wells. The flushing system is turned off during the coldest months of the year (typically from November through March). Two supplementary components were added to the original flushing system after the initial construction to enhance its performance. After heavy rains, surface water was observed to frequently pond in the southern portion of the FSPSA. In order to minimize this ponding and thereby deliver additional water to the subsurface, a series of shallow infiltration trenches were installed in the regraded FSPSA material. The infiltration trenches were installed to an approximate depth of 1.5 feet. The second improvement involved adding a shallow sump equipped with a small pump to the southern FSPSA area that was susceptible to ponding. The pump sends the water from the sump to the northernmost portion of the FSPSA where the water is discharged to the surface via a spray-hose. The flushing system was operated on a trial basis from August 1998 through October 1998, with flushing being done for about 3 hr per day. Beginning in April 1999, full operation began, flushing for 8 hr per day. In 2001, to reduce ponding that had been occurring, the operation was modified; the system continuously cycles, on for about 1.5 hr and off for 0.75 hours, for a total of about 14 hr per day.

Maintenance also includes periodic inspections of the various components of the remedy and

repairs when needed. The results of these inspections are reported to USEPA annually.

V. Progress Since the Last Five-Year Review

This is the first five-year review.

VI. Five-Year Review Process

Preparation

Discussions between Ohio EPA's site coordinator, Mike Sherron, and USEPA's remedial project manager, Bernard Schorle, who has conducted the review, began during the latter part of January 2002. The potentially responsible party's (PRP's) representative was formally notified of the upcoming review by a letter dated February 15, 2002. The state's site coordinator had already been in contact with the PRP's representative and had visited the site earlier.

Discussions with the regional community involvement coordinator (CIC), Robert Paulson, began in January also. The CIC put together a notice about the review which was then sent to the PRP's representative, the two repositories, some local officials, and the two unions that represent the workers at the two Ormet plants. There are no residents close to the site. This notice was mailed February 15, 2002. The notice told the recipients the locations of the libraries and asked for any comments that they might have. The comments were to be postmarked no later than March 22, 2002. No comments have been received. A notice will be sent to the same parties announcing the completion of the five-year review and the availability of the report once the report is signed. Because the site has not generated much interest in the past and there were no comments submitted this time, no interviews were conducted with any local people not directly connected with the site.

Document Review

Because the remedial project manager was assigned to this site after the completion of construction it was necessary for him to review a number of documents prepared prior to the time he was assigned in order to acquire additional background knowledge. For the review itself, the annual reports from the PRP covering groundwater monitoring and operation and maintenance were reviewed. The most recent of these reports available were dated March 14, 2002 for the groundwater monitoring report and April 4, 2002 for the operation and maintenance report; the groundwater monitoring report covered the results of the monitoring through September 2001 and it included a table presenting the results for the groundwater monitoring for the wells being monitored that includes data from as far back as late 1983.

The groundwater clean-up standards have been presented in the table above. It is to be noted that the standard for manganese is subject to review. It is generally not required that a substance be cleaned up to a concentration below the background level, and the background level for manganese has not yet been established. There possibly may be some adjustment in the arsenic clean-up level also if it is determined that the background level is above the clean-up level given in the table above.

Data Review

The water levels in the wells show that the water table under most of the site (up into the FSPSA) is below the water level in the Ohio River. Thus, water is flowing from the river into the aquifer and this prevents the contamination in the aquifer from passing into the river. This is caused by the pumping influence of the interceptor wells and the reduction plant's Ranney well. This inflow from the river extends out to the northeast well past FDP-5, almost to well MW-41, a well considered to be a background well that is located in that direction beyond what is shown in Figure 1. The water levels also indicate that the operation of the soil flushing system at the FSPSA has had no discernable effect on the groundwater flow patterns in that area.

According to the latest annual groundwater monitoring report, the pumping by the two Ranney wells has created large cones of influence around each pumping center. These cones result in a groundwater divide situated roughly parallel to and west of the fence line separating the two plants. This divide, which is a high point or ridge in the surface of the water table, creates a barrier that prevents the flow of groundwater from under the reduction plant to the rolling mill's Ranney well.

Groundwater monitoring has been carried out in accordance with the *Remedial Action Groundwater Monitoring Plan*, Revision 1, April 28, 1997. The two substances in the groundwater that are of most interest are cyanide and fluoride. In the discussion below about trends, the trends are for the last couple of years.

Cyanide amenable to chlorination, to which the MCL applies, is that portion of the total cyanide that is weakly bound in cyanide complexes or is in the form of free cyanide. It is more reactive and more toxic than the metal-cyanide complexes. The analysis for amenable cyanide is generally only performed when the total cyanide concentration exceeds the MCL, which is the clean-up level here. The cyanide occurring in the groundwater here appears to be predominately the stable cyanide complexes. It is to be noted that analyses for amenable cyanide tend to be subject to a greater degree of variability than analyses for other plume indicators, such as total cyanide and fluoride. At two of the compliance wells, the most recent amenable cyanide concentrations were below the clean-up goal; that at MW-12 is frequently below the detection limit while that at MW-28 has just dropped below the goal after having been above the goal for five sampling events, previously having been below the goal. In most of the wells the concentrations of amenable cyanide fluctuate so much that a trend cannot be determined. In wells MW-16, MW-31, MW-36, and MW-37 the total cyanide appears to be decreasing. In the other compliance wells, except MW-12, where the concentrations are below the detection limit, there appears to be no trend or the concentrations are fairly steady for total cyanide.

As indicated above, fluoride is potentially a more reliable indicator of changes in plume quality. The most recent fluoride concentrations were below the clean-up goal in two of the compliance wells, MW-12 and MW-28. A downward concentration trend is reported at four of the compliance wells. The only increasing trend reported is in well MW-16, which is downgradient of the soil flushing area and is probably showing the effect of the removal of fluoride from the soil there. In the other six compliance wells, including the two where the concentrations are below the clean-up level, no trend has been established.

Arsenic concentrations in six of the compliance wells in the most recent sampling are below the clean-up goal, which happens to be the new value recently selected for the MCL (10 µg/l). The concentrations in MW-18, at the downgradient edge of the soil flushing area, have recently been increasing after showing a slight decrease; the concentration here is now more than twice the previous MCL of 50 µg/l. In five of the compliance wells a decreasing trend is reported recently; two of these wells are in the group with concentrations below the clean-up level. In the other compliance wells the concentrations have been steady or there is an unknown trend because the concentrations are below the detection limit (generally 4 µg/l). Ormet has proposed that the background level for arsenic, and hence the clean-up goal, should be 40 µg/l, the highest concentration found in the wells that were proposed as being background wells. The Agency has not accepted this level.

Beryllium concentrations have been consistently below the clean-up level, as have vanadium concentrations. Tetrachloroethene (PCE) is analyzed for in only four of the compliance wells. Recent analytical results reportedly show the area of the aquifer being affected by PCE has decreased. However, PCE is above the clean-up level in three of the five wells being sampled, two of which are compliance wells.

Manganese concentrations have recently been increasing in two compliance wells (MW-5, which is in the mid-plant area and appears to be outside the plume from the FSPSA or any of the other areas of concern, and MW-37, which is in the soil flushing area), decreasing in two wells (MW-16, which is downgradient from the soil flushing area, and MW-35, which is within the soil flushing area), and showing no consistent trend or steady concentrations in seven wells. (The reason for the increase at MW-5, which appears to primarily monitor groundwater that is outside the area of concern, is unknown. The concentration here was 400 µg/l in May 1997 for the baseline characterization, fell to 160 µg/l in September 1998 and January 1999, and then has risen to about 800 µg/l in September 2001. The concentration in this well has been as high as 1700 µg/l in the period going back to December 1983. Well MW-7, which is nearby, is not a compliance well so it is sampled only once a year. During the period beginning in May 1997, the concentration here has remained fairly steady at about 2100 µg/l.) It is to be noted that the manganese concentrations in groundwater can be affected by the presence of other substances due to oxidation and reduction reactions that can occur involving the manganese that is present in the solid matrix (rock, etc.). Ormet has proposed that the background level for manganese, and hence the clean-up goal, should be 9780 µg/l, the highest concentration found in the wells that were proposed as being background wells. The Agency has not accepted this level. It is to be noted that the secondary maximum contaminant level (SMCL) for manganese is 50 µg/l and the tentative clean-up level set in the ROD is 230 µg/l. During 2001, the highest manganese concentrations, except for some cases noted below, were 1500 to 3000 µg/l found in MW-37, 1900 to 2100 µg/l found in MW-32, and 2000 µg/l found in MW-7; but in well MW-37 prior to 2001, going back to 1997, the highest concentration was 720 µg/l. Of these three wells, only MW-7, which is located in the midst of the reduction plant, was one of the designated background wells used to develop the proposed new background concentration. The concentrations reported for MW-7 in the Ormet analysis for background concentrations, covering data through January 1995, ranged from a high of 7880 µg/l in December 1983 down to 2300 µg/l in January 1995, the reported concentrations always decreasing with time. In 2001, 3100 µg/l was reported for a duplicate sample from MW-18 in May when the regular sample was reported at 970 µg/l and the concentrations in

January and September were 300 µg/l. In May 2001, 2900 µg/l was reported for MW-34S but only 44 µg/l was reported in May 2000. More data over time for the manganese concentrations should lead to a better understanding of the trends.

For the period from May 2000 to May 2001, Ormet's contractor reported that the pumping of the interceptor wells and the Ranney well removed approximately 20,000 pounds of fluoride (from May 1999 to May 2000, approximately 18,900 pounds) and approximately 2,900 pounds of cyanide (in the year earlier period, approximately 2,900 pounds) from the alluvial aquifer. The contractor also estimated that during this 2000--2001 period the mass of fluoride in the aquifer decreased by about 5300 pounds, nearly 20% (during 1999--2000, the mass decreased by about 3,400 pounds, about 11%), and the mass of cyanide in the aquifer decreased by about 380 pounds, about 8% (during the year earlier period, the mass decreased by about 900 pounds, about 16%). The fact that the decreases in the estimated masses of fluoride and cyanide in the aquifer are substantially less than the masses removed indicate that fluoride and cyanide are being added to the aquifer, mainly due to the soil flushing. The contractor concluded, in the March 14, 2002 report on groundwater monitoring, "Although the area of the aquifer with fluoride and cyanide concentrations above the clean-up goals has remained relatively unchanged over the past two years, overall concentration trends, decreases in the estimated masses of fluoride and cyanide in the alluvial aquifer, and the rates of fluoride and cyanide mass removal through pumping indicate continued improvement of ground-water quality in the alluvial aquifer."

The flow patterns determined from the water level measurements in the wells show that the water removed by the interceptor wells and the reduction plant's Ranney well continue to contain the plume. These wells continue to remove contaminants from the aquifer which are then removed from the water in the treatment plant to levels that meet the acceptable discharge levels, as has been done since about 1972. The soil flushing system, which has only operated for six or seven months of the year for three years, appears to be accomplishing its intended purpose, transferring contaminants from the soil in the soil flushing area to the groundwater, as the results of the contractor's calculations presented above indicate.

A review of the operation and maintenance reports indicates that there have been few problems with the site. Ormet has adjusted the method of operation for soil flushing to prevent ponding of water in the low spot; there would appear to be no advantage to applying excess water to the area.

Site Inspection

Inspection of the site was conducted on March 13, 2002 by the RPM and the state's site coordinator. The purpose of the inspection was to observe the site and check on those things that are not generally reported on. Except for the two items noted here, the site appeared to be in very good condition.

The state's site coordinator had previously visited the site and, as a result of that visit, had expressed a concern about the cover on the CMSD landfill. The vegetation was quite sparse. As a result of his discussions with Ormet's representative, some work on improving the vegetative cover had already begun. The sparseness was primarily limited to the relatively flat top of the

cover. There did not appear to be any problem with erosion of the cover in these areas.

Also, the state's site coordinator expressed a concern with the condition of FDP-5. He was concerned that some of the solids that were placed in the pond are still visible and he was concerned that small trees are growing in the berm surrounding this former disposal pond, especially where the berm is close to the river. It was determined that the top of the berm is approximately 20 ft higher than the reported elevation of a 100-year flood in the area and about 40 ft higher than the pool elevation of the river. The pond no longer has a liquid discharge to it. It was observed that vegetation has covered some of the solids placed within the berm. In the opinion of the RPM, it did not appear that it would make much difference whether the small trees were growing on the berm or not. Ormet's representative indicated that they may remove some trees. There is a similar concern by the state's site coordinator about the solids placed in the other four FDPs still being exposed. It is to be noted that the ROD did not specify any active remedial action for the FDPs and Ohio EPA did not agree with this.

The institutional controls are discussed in the remedy implementation section of Part IV above. No violations of the restrictions were observed. With Ormet still operating the facility, it is expected that there would be no problems with violations at this time.

The site was discussed with Ormet's representative and with an employee of Ormet's contractor who has several years of experience with the site. As mentioned before, no discussions were engaged in with any local people that do not have a direct connection with the site.

USEPA Response to Ohio EPA Comments Not Addressed Elsewhere

In a letter dated April 12, 2002, Michael Sherron, Site Coordinator, Ohio EPA, presented the comments of Ohio EPA on the March 31, 2002 draft of the five-year review report based upon the staff's review. This letter is included in Appendix A. Below are USEPA's comments on those items in the letter which were not fully addressed elsewhere in this report, in some cases by changing the draft that was reviewed; the Ohio EPA comment is followed by the USEPA response. In many cases when responding to a particular Ohio EPA comment some of the supporting material that applies to that comment and that follows the bullets in the letter will be responded to with the response to the comment.

> Overall, Ohio EPA concurs with many of the conclusions drawn in the review, but disagrees with conclusions regarding the disposition of the Former Disposal Ponds (FDPs). The bullets below list specifics followed by further discussion of Ohio EPA's perspective on this issue.

It is to be noted that Ohio EPA believed that the remedy selected in the 1994 ROD should have included active remediation of the FDPs, so this is not a new disagreement.

1. Section III, Background, second paragraph. "These tailings were alkaline and consisted primarily of carbonaceous material from potliner along with sodium and calcium based salts." Ohio EPA believes this statement, while factual, does not indicate the full breadth of contaminants documented to have been found in the ponds. The ecological risk assessment indicates 39 chemicals were identified.

The tailings mentioned are the main materials that were sent to FDP-5. While additional information describing them could be added, it is questionable whether this information would be useful. According to Table 3-4 ("Summary of Contaminants of Concern at the Ormet Corporation Site") of the *Baseline Risk Assessment Environmental Evaluation, Ormet Corporation, Hannibal, Ohio*, March 15, 1991, prepared by Donohue & Associates, Inc., there were 23 inorganics, 7 non-CLP inorganics (that is, inorganics that are not in the normal list of analytes analyzed for at the time in the Contract Laboratory Program), and 34 organics detected in samples from the disposal ponds (samples from all five ponds); carbon, water, and many other substances were not analyzed for. A few additional substances detected in the ponds are listed in Table 3-3 ("Chemicals Detected Infrequently at the Ormet Site") of the evaluation. In Section 6.1 ("Conclusions") of the evaluation, it says, "Twenty-nine inorganic and 39 organic chemicals are present in environmental media at the Ormet Corporation Site. . .". These were the contaminants of concern and are those listed in Table 3-4 (which was included in the ROD as Table 1). In this table there were columns for eight different media and there were 24 inorganics, 7 non-CLP inorganics, and 39 organic substances listed; 5 of the organics were not detected in the disposal pond samples. (The environmental evaluation is part of Appendix R of the December 1992 remedial investigation report.)

The description of the tailings that is in the Background section in this report is the description that was given in the text of the ROD. The ROD contained an environmental risks section in which the results of the environmental evaluation were discussed. In this section, various areas of the site that contributed unacceptable impacts were pointed out; the FDPs were not one of the areas discussed. There were no recommendations in the ROD or in the conclusions of the environmental evaluation that the FDPs be remediated because of an unacceptable environmental impact.

2. The comment in the first bullet applies to a similar statement in the third paragraph of Section III.

In the paragraph cited the sludge that was sent to FDP-1 through FDP-4 is briefly described as ". . .a sludge, the primary constituents of which were alumina, particle carbon, and calcium-based salts." The response above applies here.

3. Section IV, Extent of Contamination, Table from 1994 ROD. The table legend indicates, "HQ= hazard quotient (greater than 1.0 considered unacceptable)." The HQ for flouride is listed at 1.3, which, according to legend would be "considered unacceptable." It is somewhat perplexing that we have included a residual risk clean up standard in an unacceptable range. A clarifying statement or explanation is needed here. Removal of the table, although a temporary measure, does not answer the root question.

The table, from the 1994 ROD, has not been removed from the five-year review report, only the column that listed the "Residual Risk at Clean-up Standard". (In the ROD, the risks for the non-carcinogens were incorrectly labeled hazard indexes rather than hazard quotients (HQs)). The risk column was removed because the scenarios upon which the results were based were not included. The clean-up standard selected for fluoride is the MCL. It is not unusual in the Superfund program to select a clean-up standard that is an MCL that results in a risk that is outside the generally desirable range. It should also be noted that the calculated hazard quotient was obtained using a reference dose for "fluorine (soluble fluoride)".

4. In the explanation of Significant Differences it is written that, "Ohio EPA did not concur with the Proposed Plan because it felt that the plan was not strict enough. With the revised risk management scenario and associated no-action component for the former disposal ponds, the State did not concur with the selected remedy either." This is not an accurate portrayal of Ohio EPA's non-concurrence. In the ROD Non-Concurrence letter issued by the Director of Ohio EPA on October 31, 1994, the basis for the non-concurrence was the determination by USEPA that Ohio EPA's ARARs were not applicable to the site. These ARARs were disregarded and USEPA did not satisfy Ohio EPA that the selected remedy provided sufficient protection of human health and the environment.

Apparently this refers to the statement which appears at the end of the Remedy Selected subsection in part IV that has been revised slightly since the March 31, 2002 draft reviewed by Ohio EPA was issued. The statement is a paraphrase of what the ROD said concerning state or 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." (Note that this has nothing to do with the Explanation of Significant Differences.) Of course, at the time the ROD was issued USEPA did not have Ohio EPA's non-concurrence letter so the statement in the ROD was probably based on the understanding that USEPA acquired from the discussions with Ohio EPA. Actually, the statement in the ROD appears to express the sense of the October 31, 1994 letter.

In that letter from the Director, Ohio EPA, concerning the September 12, 1994 Record of Decision, two major points were presented as the reasons for Ohio EPA not concurring with the remedy selected. One was a claim that Ohio EPA's environmental regulations were not followed in selecting a remedy for the FDPs. Specifically, it said, "State regulations would require, at a minimum, that a cap be designed and constructed for the FDPs in accordance with Ohio Administrative Code (OAC) 3745-27." Such a regulation, if it were determined to be an applicable or relevant and appropriate requirement (ARAR), would be an "action-specific ARAR". Action-specific ARARs are not used to determine a remedy but are used to indicate how a selected remedy is to be implemented. (See page 1-29 of *CERCLA Compliance With Other Laws Manual*, Draft Guidance (later designated as Interim Final), August 8, 1988, OSWER Directive 9234.1-01.) Since no remedy was selected for the ponds that required capping, this regulation would not be an ARAR for the ponds. USEPA did not determine that it was not applicable and USEPA did not disregard it.

The other major point made in the letter was that Ohio EPA felt that OAC 3745-54-18(B), dealing with floodplain washout, should apply to the CMSD landfill and USEPA had stated in the ROD that OAC 3745-57-10 provided a standard of floodplain protection equivalent to OAC 3745-54-18(B). Ohio EPA said that it did not believe that OAC 3745-54-18(B) would be met by the selected remedy. The ROD fully explained why USEPA determined that OAC 3745-54-18(B), which would be applicable to the active portion of a facility but there would be no active portion at this site during remediation and the time following, was not the correct ARAR.

The letter also questioned the ability of the groundwater extraction system to achieve the groundwater clean-up standards within a reasonable timeframe. The letter did not state that there was a concern that the selected remedy might not provide sufficient protection of human health and the

environment, which is claimed in this April 12, 2002 comment letter.

5. Page 12, first paragraph, discusses the manganese levels and the discrepancy in the clean up value. The Five Year Review indicates the inconsistency in the data. Ohio EPA operates an ambient groundwater monitoring network and has data from public water supplies in the area of the Site. During the site visit for the Five Year Review, Robert Fargo of HMI, Ormet's environmental consultant, indicated that Ormet would not be interested in re-evaluating the background values because the work plan had been approved by USEPA prior to conducting the original evaluation which determined a background concentration of manganese to be 9,780 µg/l. Mr. Fargo further indicated that it was his recollection that data obtained from public drinking water sources in the vicinity of the Site had similarly high values for manganese.

   Ohio EPA believes Mr. Fargo should further substantiate this claim with data submitted for review by both Ohio EPA and USEPA in order to compare these findings with data from ambient monitoring stations and drinking water sources near the Site. Data collected from Ohio EPA's ambient monitoring network for similar aquifers suggests this background value is several times higher than it should be. The clean up goal for manganese should be revised to reflect naturally occurring levels of manganese in the Ohio River Valley Aquifer. For example, the average value of manganese reported in the Ohio's Ground Water Quality 2000, 305 (b) Report, in sand and gravel aquifers is 158 ug/l. The range of manganese levels in samples collected for the Ohio EPA ambient groundwater monitoring network, Ground Water Characterization Program was 5.3 ug/l to 5130 ug/l. The data used for the statistical analysis to determine clean up levels for manganese at the site should be representative of wells that are not affected by the site activities.

The PRP's representative confirms that they would not be interested in reevaluating the manganese or arsenic background levels. However, he says that neither he nor the consultant recall that any claim was made that manganese levels similar to the high values seen in the background study were seen in public drinking water sources.

USEPA, as has been indicated in this report for the review, will be addressing the background levels for these two substances in the future. The ROD says that once an analysis has been done USEPA may determine a final clean-up standard for manganese; it is presumed that this means that if another clean-up standard is not selected the previous one will remain. It is not something that has to be determined in the near future.

The uses of the terms "discrepancy" and "inconsistency" for the manganese data do not appear to be appropriate.

The following is the supporting material that followed the bullets in the letter.

The following discussion will explain Ohio EPA's continued concern over releases to the environment from the Former Disposal Ponds (FDPs).

The Ohio EPA has consistently indicated that the FDPs pose a risk to groundwater and the ecological resources in the vicinity of the Ormet site. Appendix R of the Remedial Investigation Report dated December 29, 1992, stated a potential for risk to ecological resources from the Ormet Corp. Superfund Site. Appendix R contained a USEPA contracted "Baseline Risk Assessment Environmental Evaluation" (BRAEE). This evaluation was conducted by Donahue and Associates and was dated March 15, 1991.

The conclusions in the BRAEE indicate:

"Twenty-nine inorganic and 39 organic chemicals are present in environmental media at the Ormet Corporation Site and have been or are suspected of being released to areas off site where ecological resources occur. The highest concentrations of these contaminants of concern are present in the following areas.

- Carbon runoff area
- Five disposal ponds on site
- A former potliner and deposition area
- A construction materials scrap dump
- Sediments in a stream channel and Ohio River backwater area created primarily by the NPDES outfall number 004.

The remedy selected addressed all of the above except the second bullet.

The BRAEE also concludes the following:

> The chemicals selected as contaminants of concern at this Site produce sublethal and other toxic effects in the kinds of organisms potentially threatened at this Site.
>
> Terrestrial vegetation on site appears stressed and disturbed. This condition may be due to some combination of physical and chemical factors. Screening level bioassay results indicate that soils and waste material on site are potentially limiting to natural succession processes and recolonization and re-establishment of the Site.
>
> There is a potential for bioaccumulation of contaminants of concern to reach levels in exposed organisms at which important ecological populations (e.g., raptors, game species and songbirds) and functional ecological relationships (e.g., predation) may be adversely impacted.
>
> Soil on site produces significant mortality in exposed earthworm populations. This indicates that major terrestrial food chains involving important vertebrate populations are potentially impacted by the chemical and physical conditions of soil and waste material on site."

It is the author's understanding that the FDPs were originally to be included as part of the active remedial action for the Site. The proposed plan was altered during negotiations based on the determination that future residential land use was not a viable future scenario for this Site and thus the risk to human health was reduced to acceptable levels. The ecological risk assessment does not appear to have been factored in to the selection of a no-action alternative. In addition, fluoride, a major contaminant of concern for the Site was not addressed in the original ecological risk assessment. Fluoride was detected in every sample collected of material from the FDPs and warrants a proper evaluation.

As such, Ohio EPA recommends a comprehensive risk assessment be conducted to evaluate the concerns which were not addressed by the BRAEE or the selected no-action remedy. The BRAEE raised concerns regarding revegetation of the FDPs, potential toxicity to ecological receptors and had several recommendations for additional site assessments. Completion of an updated comprehensive risk assessment will provide data necessary to objectively determine the threat to the environment.

In the previously referenced non-concurrence letter, Ohio EPA indicated:

> "Although the FDPs were identified for remediation in the Proposed Plan, USEPA has removed them from the selected remedy in the ROD. Since USEPA has determined that "no action" is required at the FDPs, USEPA has concluded that Ohio environmental regulations, i.e. ARARs, do not apply. Ohio EPA contends that USEPA's site wide institu-

> tional controls would constitute an action per CERCLA in order to manage site risks and therefore, State ARARs would apply. State regulations would require, at a minimum, that a cap be designed and constructed for the FDPs in accordance with Ohio Administrative Code (OAC) 3745-27.
>
> Ohio EPA also does not agree that the FDPs do not continue to adversely impact site groundwater. It is Ohio EPA's position that in order to assist in the remediation of contaminated groundwater the FDPs, as a source area of groundwater contamination, must be addressed by this remedial action."

> USEPA has indicated a desire to add MW-14 to the list of wells for annual sampling to determine if the FDPs are continuing to contribute to groundwater contamination. This suggests that Ohio EPA's original concerns warrant re-evaluation.
>
> Ohio EPA believes that the FDPs pose a significant long-term risk to the environment through continued groundwater contamination and ecological exposure. The conclusions from the BRAEE indicate a clear potential for risk to the environment which has not, to date, been addressed by this remedial action. The above referenced ARARs in the original letter of non-concurrence also remain a concern to Ohio EPA. In addition, weathering of FDPs has occurred and has resulted in materials with potentially different properties than were present on Site during the RI/FS process. As such, Ohio EPA, and this author, believes there is a continued responsibility to review and address these issues.

A statement similar to "A potential for risk to ecological resources from the Ormet Corp. Superfund site exists" could not be found in the "Conclusions" subsection of the environmental assessment report. It is to be noted that the conclusions are general statements about the site, not about any particular area of the site.

The Proposed Plan was not altered; no revised proposed plan was issued. The preferred alternative of the Proposed Plan did include active remediation of the disposal ponds, but this was not made part of the remedy selected in the ROD. That this was dropped from the remedy was thoroughly explained in section L (Documentation of Significant Changes) of the ROD. The discussion on this issue in the ROD ended with, "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." (As mentioned elsewhere in this report, the action selected for the FDPs was not "no action" but "limited action" because institutional controls and fencing for the FDPs were specified.)

Environmental risks were discussed in the ROD. Fluoride was discussed in the environmental evaluation. The environmental evaluation, in its conclusions, did not mention a concern about revegetation in the FDPs specifically nor did it recommend that an additional site assessment be done. Additional monitoring downgradient of FDP-5 is not being recommended to determine if the FDPs are continuing to contribute to groundwater contamination; the additional monitoring is being recommended in order to more completely monitor the plume from FDP-5. Nothing has been found in this five-year review to indicate that another environmental assessment needs to be done at this time. There is no evidence that the FDPs are affecting any other areas on the site or off except the groundwater, which is being captured.

VII. Technical Assessment

Question A. Is the remedy functioning as intended by the decision documents?

The review of the available information indicates that the remedy is functioning as it was intended. Even with the sparse vegetation on the CMSD landfill cover, the cover is functioning as it should. The soil flushing going on in the FSPSA appears to be doing its job, moving contaminants into the groundwater, and the PRP has adjusted the operation of the system to the realities of the area. USEPA has no information on the costs of operation and maintenance.

Monitoring downgradient of FDP-5 can be improved by sampling and analyzing well MW-14 and increasing the frequency of sampling and analyzing well MW-39S as part of the monitoring program. The ROD stated that the area to be monitored for groundwater compliance was to include locations downgradient of FDP-5, which was within the plume area and was contributing to groundwater contamination. Some wells being monitored annually (MW-39S, MW-17, and MW-34S) provide some information for the groundwater downgradient of FDP-5, but these wells may also be influenced by the plume from the soil flushing area and well MW-14 should not be so influenced.

Since the plant is still operating there are really no problems with the institutional controls that had to be placed on the property.

Question B. Are the exposure assumptions, toxicity data, clean-up levels, and remedial action objectives used at the time of the remedy selection still valid?

There have been no major changes in the physical conditions of the site that would affect the protectiveness of the remedy. The site is being used as anticipated so the exposure assumptions that were made do not need to be changed.

Most of the applicable or relevant and appropriate requirements (ARARs) that have been discussed in the decision documents dealt with the construction of the remedy and are no longer a concern, except for the requirement that a landfill cover have an acceptable vegetative cover. The remaining ARARs that still have to be attained deal with the quality of the groundwater. There has been a change in one of the requirements under these ARARs; the MCL for arsenic has been changed from 50 µg/l to 10 µg/l. The Agency has not yet announced how this is to be applied in the Superfund program; the compliance date for water treatment plants, to which this primarily applies, is several years in the future. At this site, this change may be a moot point since the ROD set the clean-up level for arsenic at 10 µg/l based on that being the analytical quantitation limit at the time and being greater than the background level. The background level for arsenic, however, still needs to be established.

In the short term, not having finally established the background levels for arsenic and manganese does not affect the protectiveness of the remedy because in the near future there are no changes in the clean-up that are to be made. A decision will be made on what these two clean-up goals are to be before any changes are made in the operation of the clean-up systems. Finalizing these goals should be addressed over the next five years, but at this point it does not appear that it will

even be necessary to determine them by the next five-year review; in fact, the more data (data both on the concentrations that are present at and near the site and data on the toxicity of these substances) that can be obtained before making the decision, the more appropriate will that decision be. The toxicity of arsenic is something that is much discussed, and there may be further changes in what might be considered protective. USEPA is reportedly reviewing manganese.

Question C. Has any other information come to light that could call into question the protectiveness of the remedy?

There has been no new information that would make one think that the remedy that was selected was not sufficient.

Technical Assessment Summary

According to the data reviewed, the site inspection, and discussions with the state's site coordinator and Ormet's representative, the remedy is functioning as intended by the ROD as amended by the ESD. There have been no changes in the physical conditions at the site that would affect the protectiveness of the remedy. The only change in ARARs that was found that might affect the clean-up goals in the groundwater is the change in the MCL for arsenic, but the clean-up goal for arsenic, which is subject to change based upon the results of an analysis of the background concentrations, had already been set at the new MCL because it was set at the background level determined at that time. The other clean-up goals, except the goal for manganese, are set at the MCLs or proposed MCLs. The clean-up goal for manganese is to be revisited; the background level must be determined, and it is likely that the background level will be the clean-up goal. The value listed in the ROD, 230 µg/l, based on background and risk, is approximately 30% of the concentration for tap water for nonfood manganese that is given in Region 3's September 2001 "Risk-Based Concentration Table" (see www.epa.gov/reg3hwmd/); the Region 3 value corresponds to a hazard quotient of 1.0 for the exposure scenario that was used.

Although there is some variability in the concentrations of the chemicals of concern, with upward, downward, and no trends being observed, this is not unusual. Certain of these chemicals (arsenic and manganese) are affected by the redox properties of these aqueous solutions, and this can cause concentrations to fluctuate. The soil flushing system has been in operation only 3 years, so a significant trend in the concentrations in the wells located downgradient of that area is not unexpected. The observed variability in the concentrations did not call into question the protectiveness of the remedy.

VIII. Issues

The following issues were identified during this review:

- The CMSD landfill cover has not been properly maintained; the vegetation on top of the landfill is too sparse. This does not currently affect protectiveness but it could in the future if the cover deteriorates.

- The plume from FDP-5 needs to be monitored more completely by adding to the monitoring

program. In the ROD it was stated that one of the reasons for not selecting an action for the FDPs was that the fluoride contamination in the groundwater downgradient of FDP-5 had been decreasing. Also, when discussing the groundwater points of compliance the ROD said, "The area to be monitored for ground water compliance shall also include locations downgradient of FDP-5." Some information is being obtained now, but these wells are on the edge of the plume from the soil flushing area. Not having this additional monitoring information at this time does not affect the protectiveness since this groundwater is being captured by the interceptor wells, but it could in the future if the concentrations in this area do not decrease sufficiently.

- Monitoring of the groundwater to determine that PCBs are not escaping from the CMSD landfill and the TSCA cell is not being done. A waiver for the fact that the location of the TSCA cell did not meet a siting criteria was granted in the ESD. One of the reasons was that the groundwater would be monitored semi-annually. This monitoring does not affect the current protectiveness, since the groundwater downgradient of the TSCA cell is being captured by the interceptor wells, but protectiveness in the future could be affected if PCBs do escape to the groundwater and this is unknown and the pump-and-treat system is turned off.

- The background concentrations of manganese and arsenic have not been agreed upon. These may affect the eventual clean-up standards for these two substances. Not having this information at this time has no effect on the protectiveness and it is not likely to have an effect in the future since these will have to be agreed upon before the clean-up systems are shut off.

- Ohio EPA, which did not concur on the 1994 ROD, continues to object to there having been no active remediation of the former disposal ponds in the remedy specified. It is USEPA's conclusion that the decision not to cap or solidify and cap the FDPs that was made in the ROD is still the correct decision.

IX. Recommendations and Follow-Up Actions

Improper maintenance of the CMSD landfill cover: It is recommended that the PRP provide proper vegetation on the landfill, the vegetation that is required by landfill regulations. The PRP had already started to improve the vegetation at the time of the site visit by the RPM. USEPA will oversee that the required vegetation is obtained. The target date for having an acceptable vegetative cover is October 2003. Ohio EPA plans to visit the site during fall 2002 to inspect the vegetation.

Monitoring of the plume from FDP-5: It is recommended that monitoring well MW-14 be added to the group of wells that are sampled three times a year and that monitoring of well MW-39S be changed from annually to three times a year. Well MW-14 is being added because it is a well that is downgradient of FDP-5 and may not be influenced by the plume from the soil flushing area. The frequency of sampling for well MW-39S is being increased because of the long flow path into this well that is under FDP-5 and because the fluoride concentrations here are relatively high. This change is to be done as soon as possible. Samples from MW-14 are to be analyzed

for the group of substances that the majority of the wells are analyzed for and samples from well MW-39S are to be analyzed for the same substances that are now analyzed for there. USEPA will oversee this work.

Monitoring the groundwater for PCBs: It is recommended that the monitoring program be augmented by adding the sampling and analysis for PCBs, twice a year, in two wells that are downgradient of the TSCA cell. The wells selected for this monitoring must be approved by USEPA. USEPA will oversee this. The monitoring of these wells should begin no later than January 2003.

Background values in the aquifer for manganese and arsenic: The determination of the background values for manganese and arsenic is to be addressed and a method for making this determination decided upon. USEPA will review what has been done and discuss the issue with the PRP's representative. These discussions are expected to begin in 2002.

Former disposal ponds: USEPA will continue to follow the information developed about these ponds and the groundwater downgradient of them.

X. Protectiveness Statement

The remedy is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater. The PRP is still operating the manufacturing facility which also contributes to decreased opportunities for exposure and this supplements the institutional controls. Threats at the site have been addressed through capping, excavation, soil flushing, plume containment, groundwater pump-and-treat, installation of fencing, and the implementation of institutional controls.

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to maintain a record of the groundwater contamination. Current monitoring data indicate that the remedy is functioning as required to achieve clean-up goals.

XI. Next Review

The next five-year review for the Ormet Corp. site is required in April 2007, five years from the date of this review.

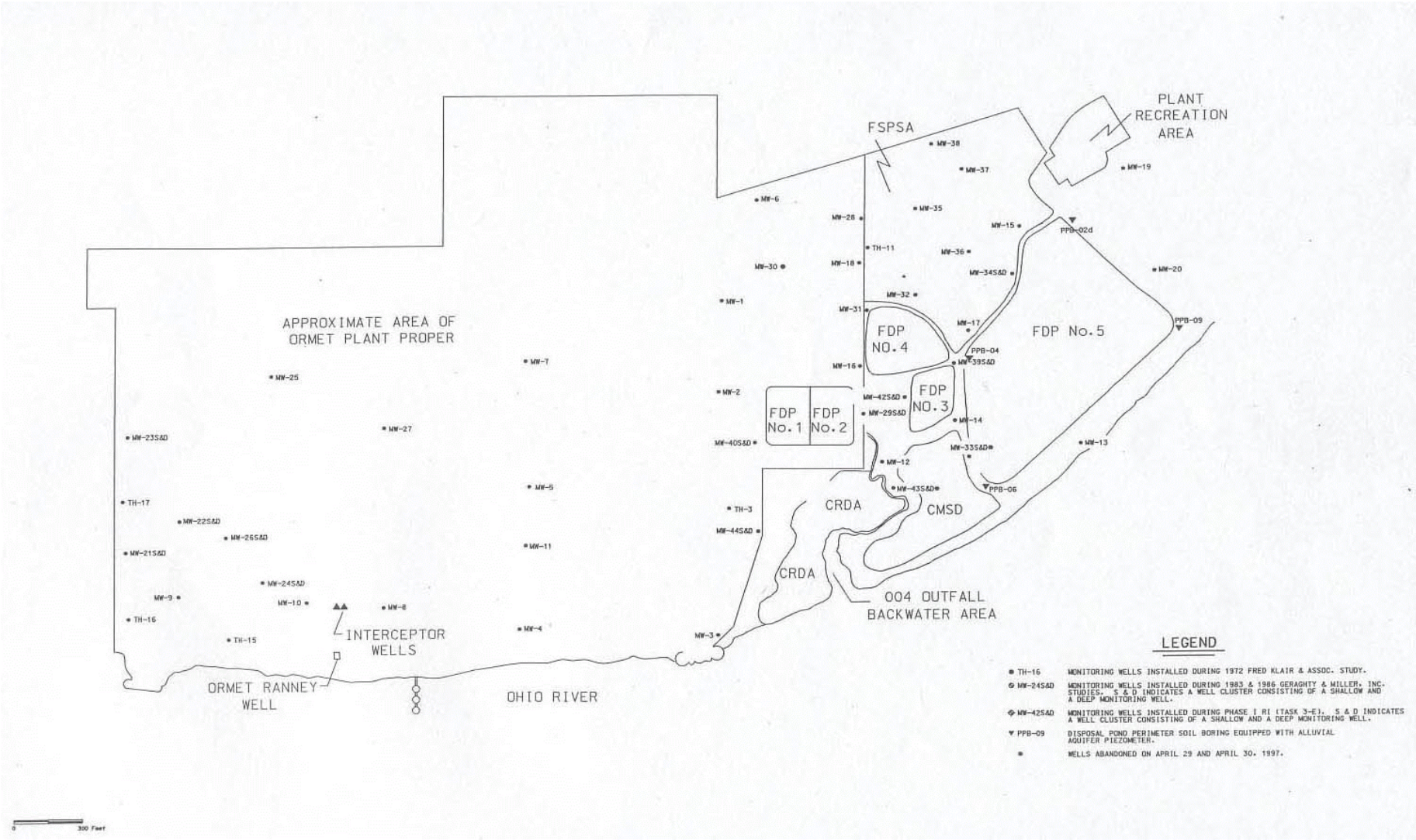

Figure 1. Base Map, Ormet Corp., Reduction Plant, Hannibal, Ohio
(Obtained from map produced by HydroSystems Management, Inc.)

Appendix A

April 12, 2002 Letter
Michael D. Sherron, Site Coordinator
Ohio Environmental Protection Agency

Five Year Review
Ormet Corporation Superfund Site
Hannibal, Ohio
Ohio EPA Comments

Original contained Ohio EPA Letterhead
Southeast District Office
2195 Front Street
Logan, Ohio 43138
Tele: (740) 385-8501 Fax: (740) 385-6490

MONROE COUNTY
ORMET CORPORATION
DERR CORRESPONDENCE

April 12, 2002

Bernard J Schorle, RPM
SR-6J
USEPA Region IV
77 West Jackson Boulevard
Chicago, IL 60604-3507

Re: Five Year Review, Ormet Corporation Superfund Site, Hannibal, Ohio, Ohio EPA comments

Dear Mr. Schorle:

The staff of Ohio EPA have reviewed the draft report dated March 31, 2002, titled, "First Five-Year Review Report for Ormet Corp. Superfund Site, Hannibal, Monroe County, Ohio." Based on this review, Ohio EPA provides the following comments.

Overall, Ohio EPA concurs with many of the conclusions drawn in the review, but disagrees with conclusions regarding the disposition of the Former Disposal Ponds (FDPs). The bullets below list specifics followed by further discussion of Ohio EPA's perspective on this issue.

- Section III, Background, second paragraph. "These tailings were alkaline and consisted primarily of carbonaceous material from potliner along with sodium and calcium based salts." Ohio EPA believes this statement, while factual, does not indicate the full breadth of contaminants documented to have been found in the ponds. The ecological risk assessment indicates 39 chemicals were identified.

- The comment in the first bullet applies to a similar statement in the third paragraph of Section III.

- Section IV, Extent of Contamination, Table from 1994 ROD. The table legend indicates, "HQ= hazard quotient (greater than 1.0 considered unacceptable)." The HQ for flouride is listed at 1.3, which, according to legend would be "considered unacceptable." It is somewhat perplexing that we have included a residual risk clean up standard in an unacceptable range. A clarifying statement or explanation is needed here. Removal of the table, although a temporary measure, does not answer the root question.

- In the explanation of Significant Differences it is written that, "Ohio EPA did not concur with the Proposed Plan because it felt that the plan was not strict enough. With the revised risk management scenario and associated no-action component for the former disposal ponds, the State did not concur with the selected remedy either." This is not an accurate portrayal of Ohio EPA's non-concurrence. In the ROD Non-Concurrence letter issued by the Director of Ohio EPA on October 31, 1994, the basis for the non-concurrence was the determination by USEPA that Ohio EPA's ARARs were not applicable to the site. These ARARs were disregarded and USEPA did not satisfy Ohio EPA that the selected remedy provided sufficient protection of human health and the environment.

- For the section discussing Preparation of the review: Ohio EPA suggests the following wording: "The Ormet Corporation Five-Year Review was conducted by USEPA Remedial Project Manager, Bernard Schorle, with input from Ohio EPA's representative, Site Coordinator Mike Sherron. Discussion regarding the site was initiated in January 2002 and Ohio EPA's representative visited the site in early February. The PRP's representative was formally notified of the upcoming review via correspondence dated February 15, 2002.

- Page 12, first paragraph, discusses the manganese levels and the discrepancy in the clean up value. The Five Year Review indicates the inconsistency in the data. Ohio EPA operates an ambient groundwater monitoring network and has data from public water supplies in the area of the Site. During the site visit for the Five Year Review, Robert Fargo of HMI, Ormet's environmental consultant, indicated that Ormet would not be interested in re-evaluating the background values because the work plan had been approved by USEPA prior to conducting the original evaluation which determined a background concentration of manganese to be 9,780 µg/l. Mr. Fargo further indicated that it was his recollection that data obtained from public drinking water sources in the vicinity of the Site had similarly high values for manganese.

  Ohio EPA believes Mr. Fargo should further substantiate this claim with data submitted for review by both Ohio EPA and USEPA in order to compare these findings with data from ambient monitoring stations and drinking water sources near the Site. Data collected from Ohio EPA's ambient monitoring network for similar aquifers suggests this background value is several times higher than it should be. The clean up goal for manganese should be revised to reflect naturally occurring levels of manganese in the Ohio River Valley Aquifer. For example, the average value of manganese reported in the Ohio's Ground Water Quality 2000, 305 (b) Report, in sand and gravel aquifers is 158 ug/l. The range of manganese levels in samples collected for the Ohio EPA ambient groundwater monitoring network, Ground Water Characterization Program was 5.3 ug/l to 5130 ug/l. The data used for the statistical analysis to determine clean up levels for manganese at the site should be representative of wells that are not affected by the site activities.

- Page 12, Site Inspection Section. Ohio EPA believes that there should be notable progress toward revegetation during the year 2002 growing season. Please indicate in the report that, "The Ohio EPA representative will revisit the Site during the fall of 2002 to report on the progress of the revegetation of the CMSD landfill."

- Section VII, Technical Assessment Summary, 10th line - The report states: "The value listed in the ROD, based on background risk, ..." Revise the report to include the numerical value, 230 µg/l, as the actual clean up value stated in the ROD.

The following discussion will explain Ohio EPA's continued concern over releases to the environment from the Former Disposal Ponds (FDPs).

The Ohio EPA has consistently indicated that the FDPs pose a risk to groundwater and the ecological resources in the vicinity of the Ormet site. Appendix R of the Remedial Investigation Report dated December 29, 1992, stated a potential for risk to ecological resources from the Ormet Corp. Superfund Site. Appendix R contained a USEPA contracted "Baseline Risk Assessment Environmental Evaluation" (BRAEE). This evaluation was conducted by Donahue and Associates and was dated March 15, 1991.

The conclusions in the BRAEE indicate:

> "Twenty-nine inorganic and 39 organic chemicals are present in environmental media at the Ormet Corporation Site and have been or are suspected of being released to areas off site where ecological resources occur. The highest concentrations of these contaminants of concern are present in the following areas.
> - Carbon runoff area
> - Five disposal ponds on site
> - A former potliner and deposition area
> - A construction materials scrap dump
> - Sediments in a stream channel and Ohio River backwater area created primarily by the NPDES outfall number 004.

The remedy selected addressed all of the above except the second bullet.

The BRAEE also concludes the following:

> The chemicals selected as contaminants of concern at this Site produce sublethal and other toxic effects in the kinds of organisms potentially threatened at this Site.
>
> Terrestrial vegetation on site appears stressed and disturbed. This condition may be due to some combination of physical and chemical factors. Screening level bioassay results indicate that soils and waste material on site are potentially limiting to natural succession processes and recolonization and re-establishment of the Site.
>
> There is a potential for bioaccumulation of contaminants of concern to reach levels in exposed organisms at which important ecological populations (e.g., raptors, game species and songbirds) and functional ecological relationships (e.g., predation) may be adversely impacted.
>
> Soil on site produces significant mortality in exposed earthworm populations. This

> indicates that major terrestrial food chains involving important vertebrate populations are potentially impacted by the chemical and physical conditions of soil and waste material on site."

It is the author's understanding that the FDPs were originally to be included as part of the active remedial action for the Site. The proposed plan was altered during negotiations based on the determination that future residential land use was not a viable future scenario for this Site and thus the risk to human health was reduced to acceptable levels. The ecological risk assessment does not appear to have been factored in to the selection of a no-action alternative. In addition, fluoride, a major contaminant of concern for the Site was not addressed in the original ecological risk assessment. Fluoride was detected in every sample collected of material from the FDPs and warrants a proper evaluation.

As such, Ohio EPA recommends a comprehensive risk assessment be conducted to evaluate the concerns which were not addressed by the BRAEE or the selected no-action remedy. The BRAEE raised concerns regarding revegetation of the FDPs, potential toxicity to ecological receptors and had several recommendations for additional site assessments. Completion of an updated comprehensive risk assessment will provide data necessary to objectively determine the threat to the environment.

In the previously referenced non-concurrence letter, Ohio EPA indicated:

> "Although the FDPs were identified for remediation in the Proposed Plan, USEPA has removed them from the selected remedy in the ROD. Since USEPA has determined that "no action" is required at the FDPs, USEPA has concluded that Ohio environmental regulations, i.e. ARARs, do not apply. Ohio EPA contends that USEPA's site wide institutional controls would constitute an action per CERCLA in order to manage site risks and therefore, State ARARs would apply. State regulations would require, at a minimum, that a cap be designed and constructed for the FDPs in accordance with Ohio Administrative Code (OAC) 3745-27.
>
> Ohio EPA also does not agree that the FDPs do not continue to adversely impact site groundwater. It is Ohio EPA's position that in order to assist in the remediation of contaminated groundwater the FDPs, as a source area of groundwater contamination, must be addressed by this remedial action."

USEPA has indicated a desire to add MW-14 to the list of wells for annual sampling to determine if the FDPs are continuing to contribute to groundwater contamination. This suggests that Ohio EPA's original concerns warrant re-evaluation.

Ohio EPA believes that the FDPs pose a significant long-term risk to the environment through continued groundwater contamination and ecological exposure. The conclusions from the BRAEE indicate a clear potential for risk to the environment which has not, to date, been addressed by this remedial action. The above referenced ARARs in the original letter of non-concurrence also remain a concern to Ohio EPA. In addition, weathering of FDPs has occurred and has resulted in materials with potentially different properties than were present on Site during the RI/FS process. As such,

Ohio EPA, and this author, believes there is a continued responsibility to review and address these issues.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

<Original signed by Michael D. Sherron>

Michael D. Sherron
Site Coordinator
Division of Emergency and Remedial Response
(740) 380-5251