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REGION 5
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JUN 2 8 2006

REPLY TO THE ATTENTION OF

SUBJECT: **ACTION MEMORANDUM** – Documentation of Threat and Determination of Need to Conduct a Time-Critical Removal Action at the Little Traverse Bay CKD Release, Petoskey, Resort Township, Emmet County, Michigan (Site ID # B5AM)

FROM: Ralph Dollhopf, On-Scene Coordinator
Emergency Response Branch - Section 1

TO: Richard C Karl, Director
Superfund Division

THRU: Bill Bolen, Chief
Emergency Response Branch

I. PURPOSE

This memorandum is to document the existence of imminent and substantial threats to public health, welfare, and the environment at the Little Traverse Bay CKD Release Site (hereafter referred to as the Site) in Petoskey, Resort Township, Emmet County, Michigan. On February 22, 2005, EPA entered into an Administrative Order on Consent (AOC) (V-W-'05-C-810) whereby certain potentially responsible parties agreed to undertake interim removal activities at the Site. The Findings of Fact and Conclusions of Law in the AOC demonstrate the authority of EPA to carry out a removal action at the Site. The purpose of this Action Memorandum is to further document the conditions at the site at the time of the AOC and to document the need for continuing removal action at the site. The removal action is necessary to mitigate the immediate threat to public health and the environment posed by the direct seepage and release of cement kiln dust (CKD) leachate onto the Little Traverse Bay shoreline beaches and into the waters of Lake Michigan.

The pH of uncontrolled CKD leachate at the Site has been documented at levels above 12.5 standard units (s.u.) the standard for the corrosivity characteristic for Resource Conservation and Recovery Act (RCRA) hazardous wastes. Detected concentrations of copper, mercury, molybdenum, nickel, selenium, vanadium, and zinc exceed several Federal and State of Michigan water quality standards. Access to the CKD leachate release areas was uncontrolled prior to the AOC. The CKD leachate release areas are located within

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residential areas. Shallow shoreline seep pools containing high-pH CKD leachate as well as near-shore surface water impacted by the release of high-pH CKD leachate are open to the environment and pose a direct contact hazard to the nearby residential population and other users of the beach.

The removal action proposed herein will mitigate the threats to public health, welfare, and the environment posed by the Site through the completion of the following:

- Providing immediate site security and implementing access restriction controls, including fence construction and posting warning signs, to mitigate potential threats to human health through direct contact with the released CKD leachate;

- Preparing a Site Health and Safety Plan and a Site Control and Access Management Plan;

- Identifying and removing areas of pooled CKD leachate along shoreline and/or grossly contaminated soil or shoreline material;

- Arranging for transport of collected leachate to secure off-site treatment, storage and disposal facilities;

- Defining and characterizing the nature and extent of CKD leachate release areas both along the Little Traverse Bay shoreline and offshore;

- Designing and implementing on-shore interim control measures to prevent the further release of CKD leachate from the CKD pile source areas; and

- Confirming the effectiveness of and performing initial operation and maintenance of implemented on-shore interim seepage control measures until such time as additional or permanent engineering controls can be designed and constructed to prevent CKD leachate releases to the beach and surface waters of Lake Michigan.

A time-critical removal action was and is necessary to abate the above threats. Continued site investigation was and is necessary to determine the full extent of threats posed by historical CKD wastes on site and to develop engineering options for the mitigation of such threats. It is anticipated that all this work will be conducted by potentially responsible parties in accordance with the AOC and pursuant to oversight by U.S. EPA and other supporting agencies including the Michigan Department of Environmental Quality (MDEQ).

This site is not on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MIN000509941

A. Site Description

1. Physical Location

The Site is located along an approximately 2,500-foot long section of the south shore of Little Traverse Bay at the Bay Harbor Resort, just west of the city of Petoskey in Resort Township, Emmet County, Michigan. The primary features of the Site are two large, remnant CKD piles. During an October 2004 MDEQ inspection, two active CKD leachate release areas were identified along the rocky shoreline of the Little Traverse Bay of Lake Michigan. The first CKD leachate release area, identified as the Seep 1 release area, is located to the north of the Seep 1 CKD Pile (referred to within historical documents as the eastern west CKD pile of the western CKD piles) and has an estimated length of 1,000 feet. The second CKD leachate release area, identified as the Seep 2 release area, is located to the north of the Seep 2 CKD pile (referred to within historical documents as the central west CKD pile of the western CKD piles) and has an estimated length of 600 feet. The Seep 1 release area is located approximately 1,000 feet east of the Seep 2 release area. The geographical coordinates of the Seep 1 release area are -85.043985811° W 45.361797047° N and the coordinates for the Seep 2 release area are -85.048530787° W and 45.362920637° N. The land surrounding the Site consists of developed and undeveloped residential properties as well as a private recreational property (golf course).

The Site is located within an area previously utilized for limestone mining and cement manufacturing operations. CKD material was consolidated into four large stockpiles across the area. The three CKD piles collectively referred to as the western CKD piles (referred to within historical documents west pile, central west pile, and eastern west pile and currently referred to as the West CKD Pile, the Seep 2 CKD Pile, and the Seep 1 CKD Pile, respectively) were redeveloped as a part of the Bay Harbor Resort's 27-hole golf course. The CKD piles were graded, contoured, and covered with a minimum of 6 inches of overburden to build portions of the golf course. The fourth CKD pile (referred to within historical documents as the eastern pile and currently identified as the East CKD Pile) was redeveloped into East Park, a recreational property currently owned by Resort Township.

According to the Region 5 Superfund Environmental Justice Analysis, the group of residents closest to the Site reside in census tract #9708, block group #3. This block group has a total population of 573. Of the 573, 8% are classified as minority. Approximately 48% of the families residing in this block group have an income of less than the established state low income level. The demographic conditions do not indicate an environmental justice priority for the community around this Site.

According to the year 2000 census, the population of Resort Township, Emmet County, Michigan, is 2,479. The population density of Resort Township is 129.7 people per square mile.

2. Site Characteristics

The native geology at the Site consists of limestone from the Traverse Group formation of the middle Devonian age (approximately 375 million years old). Within the area surrounding the Site, the Traverse Group formation is comprised of principally the Petoskey and Charlevoix limestone units. This formation is overlain by the Antrim Shale formation.

The upper levels of limestone are thinly bedded (0.5 to 2 feet thick) and are separated by thin shale layers varying in thickness from 0.5 to 5 feet. Limestone at deeper depths tends to become more massive, but is interbedded with thin shale layers.

Overlying the layers of limestone and shale are unconsolidated sands, gravels, clays, as well as mixtures of these materials left by glacial meltwater. The thickness of these materials range from 14 to 67 feet, with an average thickness of approximately 49 feet. This layer of unconsolidated material generally covers the underlying bedrock, except in areas of bedrock outcrops. The unconsolidated glacial material ranges from 0 to 6 feet in the area surrounding the Site. The shoreline in the area of the Site is composed of limestone rock and cobblestone.

In general, the regional groundwater system at the Site flows from south to north toward Lake Michigan, the regional discharge point for groundwater in the area. Numerous seeps and springs can be observed flowing from thinly bedded outcrop exposures across a wide range of elevations at the Site, indicating that perched groundwater may migrate at elevations above the regional water table in some areas of the Site.

The topographic elevations across the Site and surrounding area vary, ranging from approximately 580 feet above sea level at the shoreline to between 610 and 700 feet above sea level on top of the CKD piles.

3. Site History

The Site was part of a larger property (Property) that has been used for limestone mining and cement manufacturing for more than 100 years. Historical records indicate that the cement manufacturing plant and adjacent mines were operated by the Penn-Dixie Company from approximately 1870 through 1980. Subsequent to Penn-Dixie ceasing operations in 1980, the Property, including the Site, was eventually purchased by the CMS Land Company, who later sold the Property to the Bay Harbor Company for redevelopment into a lakeshore vacation and resort community.

Prior to development, the Property contained several disturbed areas remnant from historic mining activities and cement manufacturing. The Property included a western shale quarry, several CKD piles (including the western CKD piles, consisting of three adjacent piles, and a non-contiguous eastern CKD pile), mine overburden stockpiles, haul roads, debris and abandoned equipment, and a dump area.

Redevelopment of the former mining and cement manufacturing properties, including the Site, was initiated in 1994. Redevelopment of certain portions of the area was conducted in accordance with an Administrative Agreement and Covenant Not to Sue (Covenant), executed between the State of Michigan and the Michigan Department of Natural Resources (MDNR, currently the MDEQ) and redevelopment partners Bay Harbor Company, CMS Land Company and CMS Capital Corp. (collectively referred to as CMS), Boyne USA, Inc., and JAKS, Inc. on July 11, 1994. The area subject to the Covenant consisted of two parcels totaling approximately 756 acres. Hazardous substances had reportedly been released, deposited, stored, disposed of, or otherwise located on cerain portions of the above parcels. The Covenant did not apply to redevelopment activities completed at the former plant property, an approximately 300-acre area that included several quarry areas (eastern and central quarries), mine overburden stockpiles, and the former cement plant area.

The Covenant detailed the closure requirements for the Property, including the closure activities for the western CKD piles and eastern CKD pile. The western CKD pile consisted of three separate CKD piles while the non-contiguous eastern CKD pile consisted of a single CKD pile previously covered with mine overburden. Closure requirements for the western CKD piles included the contouring and/or covering of the piles to eliminate any direct contact exposure potential to the CKD as well as to provide and maintain the turf and landscaping for the proposed golf course. Appropriate collection systems and storm water management controls were to be incorporated into the golf course design to control surface and seep water runoff. Closure requirements for the eastern CKD pile included the evaluation and, if necessary, the enhancement of the existing cover.

The agreement also required preparation and submittal of a Quality Assurance Project Plan (QAPP) detailing all site closure requirements, and required the preparation and submittal of semi-annual progress reports throughout the duration of closure activities. A QAPP was subsequently prepared and submitted on July 29, 1994 on behalf of the developers by NTH Consultants, Ltd. The QAPP is available in the Site files.

The semi-annual progress reports submitted during construction documented closure activities and the redevelopment progress. A total of five semi-annual progress reports were prepared from February 15, 1995 to February 14, 1997.

A review of the semi-annual progress reported revealed the documentation of the following closure activities completed in association with the western CKD piles:

1) Slope stabilization of the northern slope of the western CKD piles was completed resulting in a slope of approximately 38 degrees from horizontal. Shot-rock used for grading was placed along the slope, covered with soil, seeded and hydro mulched.

2) Rough grading and contouring of portions of the top surfaces of the western CKD piles was completed prior to the piles being covered with soil overburden and final contouring established for the golf course surface. Seeding and sodding was then completed to establish turf grass for the golf course holes.

3) Closure activities associated with the central western CKD pile (Seep 2 CKD Pile) included:

   a) CKD materials, which had eroded from the main portion of the central west pile (Seep 2 CKD Pile) to areas below the future access road, were removed and placed back on the pile. The steeper side slopes of the central west CKD pile (Seep 2 CKD Pile) were covered with shot rock.

   b) A subsurface collection trench system to collect CKD leachate from the central west pile (Seep 2 CKD Pile) was installed along the majority of the length of the central west CKD pile (Seep 2 CKD Pile) during late October 1995, prior to paving Coastal Drive. The collection trench was installed along the south side of Coastal Drive.

   c) A pump station designed to pump collected leachate from the subsurface collection system to the City of Petoskey's sanitary sewer system was operational as of January 6, 1997, to divert the collected leachate to the City of Petoskey's wastewater treatment plant.

   d) A surface water collection ditch was installed on the south side of Coastal Drive, south of the leachate collection trench, during late 1995 and July 1996. The surface water ditch system was designed to collect surface water runoff in the area of the central west CKD pile (Seep 2 CKD Pile) and keep this runoff separate from the subsurface leachate collection system.

4) Closure activities associated with the western portion of the western CKD pile (currently known as the West CKD Area) included relocating approximately half of this CKD pile to the central west CKD pile (currently known as the

Seep 2 CKD Pile). This was necessary to complete restoration activities along the small stream which flows directly east of this CKD pile.

5) There was no other subsurface leachate collection system installed along the eastern or western CKD piles (Seep 1 CKD and West CKD Piles).

A review of the semi-annual progress reported revealed the documentation of the following closure activities completed in association with the eastern CKD pile (East CKD Pile):

1) Culverts were installed under the access road to direct surface water runoff along the railroad right-of way, away from the eastern CKD pile.

2) Closure activities implemented on the eastern portion of the eastern CKD pile included:

   a) The eastern portion of the eastern CKD pile was partially covered with overburden materials, and sparse vegetation. This area had been graded by prior owners into two or three tiers which were back sloped away from Lake Michigan, and the area had been partially covered with mine overburden, but the covering was determined to be inadequate. The area had also contained some solidified areas of CKD where the shoreline had eroded close to the CKD materials. The solidified CKD was pulled back from the shoreline and limestone was placed over it as well as above the high water level to protect the shoreline from further erosion. At the eastern end of the eastern CKD pile, CKD was pulled away from the stream directly east of the pile. This area was gently sloped and covered with shot-rock. Due to the back slope of the eastern portion of the eastern CKD pile, water runoff channels were established near the rear top portion of the former quarry face. These channels were covered with shot-rock to limit erosion.

   b) An access road was developed coming into the area from U.S. 31. The road was designed to come through the saddle-shaped portion of the eastern portion of the eastern CKD pile. Road grading required moving CKD material onto the western portion of the eastern CKD pile, away from the shoreline.

3) Closure activities on the western portion of the eastern CKD pile included:

   a) The western portion of the eastern CKD pile did not have any cover material present and only very sparse vegetation. Miscellaneous debris found on portions of this area were collected and disposed of

appropriately. The western portion of the east CKD pile was graded and gently sloped, and covered with topsoil.

4) With the exception of observing the vegetation growth for two growing seasons to ensure the integrity of the cover layers, and to complete the periodic observations for evidence of seeps, the Closure Activities were completed on the eastern CKD pile by February 15, 1995.

5) The property containing the area of the eastern CKD pile was eventually donated to the local government (Resort Township) and developed into a green-belt park under local government control.

In accordance with the Covenant, closure activities also included the investigation and sampling of groundwater and groundwater seeps in the vicinity of the western CKD piles. The sampling activities and sampling results for events conducted in accordance with the Covenant is discussed under Part B.1 of this document.

In 2003, contractors designed and constructed a pre-treatment plant to adjust the pH of the leachate collected from the central west pile (Seep 2 CKD Pile). The pre-treatment plant was designed to adjust the pH of the leachate using concentrated sulfuric acid. The treated leachate was then discharged to the City of Petoskey's wastewater treatment plant through a sewer line.

Since the construction and operation of the CKD leachate collection system along the central west CKD pile (Seep 2 CKD Pile) in October 1995, the collected leachate has been collected and then discharged to the City of Petoskey's wastewater treatment plant. Following the construction of the pre-treatment plant in 2003, CKD leachate neutralization was added to the process. In January 2004, the City of Petoskey's wastewater treatment plant temporarily stopped accepting the treated discharge. The discharge collection system was subsequently shut down from January 2004 through September 2004.

On August 17, 2004, CKD leachate releases in the vicinity of the central west CKD pile (Seep 2 CKD Pile) were observed impacting the rocky shoreline of Little Traverse Bay during a routine site visit by the MDEQ. At that time, reddish-brown leachate was observed seeping out along a 600-foot section of the lakeshore, identified as the Seep 2 release area. Subsequent MDEQ investigations in August and September, 2004 documented additional leachate seeps in the vicinity of the eastern west CKD pile (Seep 1 CKD Pile), identified as the Seep 1 release area. MDEQ measured pH values as high as 13.2 s.u. within seep pools along the rocky shoreline at both the Seep 1 and Seep 2 release areas. In addition, surface water pH readings were measured consistently between 9.0 and 9.5 s.u. as far offshore as approximately 90 feet from the shore at the Seep 2 release area.

The Little Traverse Bay Bands of the Odawa Indians subsequently requested assistance from the U.S. EPA Region V Emergency Response Branch to address risks to public health and natural resources from caustic discharge into the Little Traverse Bay of Lake Michigan in October 2004.

4. Removal Site Evaluation

On September 30, 2004, OSC Ralph Dollhopf, START contractors, and representatives on the U.S. Coast Guard (MSO Sault Ste. Marie), MDEQ, and the Northwest Michigan Community Health Agency (NWMCHA) met with Bay Harbor Development representatives on Site to investigate seep discharge from the Site into Little Traverse Bay. At the Seep 2 release area, several pools of darkly colored liquid (CKD leachate) were observed along the shoreline of Little Traverse Bay.

On this same day EPA START contractors conducted monitoring of pH at 10 monitoring locations across the Seep 1 and Seep 2 release areas using a WTW-Multiline P4 pH meter. Within the Seep 1 release area, monitoring of four discolored seep pools documented pH values ranging from 9.98 to 13.01 s.u. and monitoring of one clear seep pool documented a pH value of 9.26 s.u. Within the Seep 2 release area, monitoring of two discolored seep pools documented pH values ranging from 11.7 to 12.15 s.u. and monitoring of one clear seep pool documented a pH value of 8.73 s.u. Monitoring of surface water of the Little Traverse Bay within the Seep 2 release area documented a pH value of 8.69 s.u.

On November 4, 2004, OSC Dollhopf, START, representatives from the Little Traverse Bay Bands of the Odawa Indians, MDEQ, and NWMCHA returned to the site to conduct additional monitoring activities and to collect water samples for laboratory analysis. START contractors conducted a monitoring of pH at 19 monitoring locations across the Seep 1 and Seep 2 release areas using an Orion Model 260 pH meter.

Within the Seep 1 release area, monitoring of six discolored seep pools documented pH values ranging from 10.02 to 13.06 s.u. and monitoring of a three clear seep pools documented pH values ranging from 9.89 to 10.62 s.u. Within the Seep 2 release area, monitoring of seven discolored seep pools documented pH values ranging from 10.04 to 13.06 s.u. and monitoring of two clear seep pools documented pH values ranging from 8.21 to 9.26 s.u. Monitoring of surface water of the Little Traverse Bay within the Seep 1 release area documented a pH value of 9.00 s.u.

Following the completion of monitoring activities, START collected three samples to further evaluate the conditions at the monitoring points that exhibited the highest field pH readings. One sample was collected from a seep pool within the Seep 1 release area (MP-26, field pH 13.06 s.u.) and two samples were collected from seep pools within the Seep 2 release areas (MP-16, field pH 12.78 and MP-17, field pH 13.06). Samples were analyzed by Fibertec Environmental Services for total metals, hardness,

orthophosphate, specific conductance, nitrite, pH, total dissolved solids (TDS), chloride, sulfate, and alkalinity.

Laboratory analyses for pH ranged from 11.85 s.u. (MP-26) to 11.87 s.u. (MP-17). Laboratory analyses also detected metal analytes (arsenic, copper, lead, nickel, selenium, vanadium, and mercury) at levels above the State of Michigan Water Quality Standards. These analyses confirmed the presence of metal concentrations and pH values above the State of Michigan Water Quality Standards in seep pools along the Little Traverse Bay shoreline, north of the Seep 1 and Seep 2 CKD Piles.

On February 22, 2005 CMS entered into an Administrative Order on Consent for Removal Action for the Little Traverse Bay CKD Release Site (AOC) (Docket No. VW-05-C-810) with U.S. EPA to carry out a time critical removal action.

Subsequent to the development of the Order, other events have occurred which reinforce the determination that there are threats to human health and the environment posed by conditions at this site. Therefore, documents referring to those events, but not available at the time of AOC execution have also been included within the Administrative Record (Attachment 1). Information contained in these documents, which became available following the initial drafting of this memorandum execution of the AOC have been utilized during the ongoing removal action activities conducted in accordance with the AOC.

B. Other Actions to Date

1. Previous Investigations

Several investigation events transpired at the Site for the purpose of evaluating conditions during and after site redevelopment. The following summary describes these:

- **June 20, 1989: MDEQ Chemical Assessment of Kiln Dust Solids and Seeps at the Defunct Dundee Cement Company Site Petoskey, Emmet County, Michigan.**

This work was conducted by MDEQ in response to citizen complaints about reddish colored seepage entering Little Traverse Bay from the base of two discrete cement kiln dust piles located on the Dundee Cement Company site west of Petoskey. The report listed the following conclusions:

1) The kiln dust pile samples collected from the east and west deposits showed detectable concentrations of arsenic, chromium, copper, lead, nickel, selenium and zinc.

2) Analytical results for the west seep sample collected June 20, 1989 exceeded Michigan's Water Quality Standards for pH, total dissolved solids and Rule 57 (2) values for lead and nickel. These findings are consistent with previously reported results. The west seep had an elevated pH of ≥ 11.0 s.u. (reflecting the alkaline conditions of the kiln dust piles) and contained elevated concentrations of total dissolved solids, chlorides, chemical oxygen demand, sulfate, total organic carbon. The pH and total dissolved solids values, which apply to controllable sources, exceeded their respective daily maximum Water Quality Standard.

3) The source of elevated metals, total dissolved solids, alkalinity and pH in the west seep was most likely due to influence by the kiln dust deposits.

4) The east CKD pile seepage is seasonally dependent.

5) Kiln dust piles were porous at the surface to allow percolation. Based on available information from the site assessment, there appears to be a high probability that precipitation does percolate through the kiln dust pile matrix to create the observed seeps and pool areas located at the base of the kiln dust piles. The elevated alkalinity, dissolved solids and metal concentrations in the west seep most likely result from the process of percolation and diffusion for the soluble fraction of the metals through the interstitial spaces for the kiln dust matrix.

- **May 18, 1994: Environmental Data Report, Former Penn-Dixie Cement Plant, Resort Township, Emmet County, MI, prepared for Bay Harbor Associates (Appendix B-1 of Quality Assurance Project Plan July 29, 1994), NTH Consultants, Ltd.**

  NTH Consultants, Ltd presented discussion of historical data regarding environmental conditions at the former Penn-Dixie Cement Plant Property.

  Included within the report is discussion of CKD samples collected in 1988 and 1989 that were analyzed by the Extraction Procedure (EP) Toxicity Leachate test. Results indicated that the CKD on Site was not a characteristic hazardous waste according to Michigan's Hazardous Waste Management Act, 1979 P.A. 64, as amended. NTH discussed the fact that testing was not completed using the testing procedure specified under modifications to federal hazardous waste law. Updated in September of 1990, U.S. EPA Method 1311 was the method for determining characteristic hazardous waste. NTH discussed the results from the completed EP Toxicity Leachate tests and concluded that leachate concentrations of metals in the CKD samples do not leach at concentrations of concern.

NTH also discussed the groundwater seeps that were documented in 1989 and 1990. The report stated that arsenic was detected in the seeps at concentrations well above the new water quality standard established by the U.S. EPA for protection of aquatic life. The report also stated that analytical results for chlorides, sulfates, total dissolved solids, and alkalinity may be the strongest indicator that the CKD could be contributing some of these salts and minerals.

- **February 15, 1995: First Semi-Annual Progress Report, Closure Activities for the Bay Harbor Development, Resort Township, Emmet County, Michigan. NTH Consultants, Ltd.**

  The first progress report issued during in accordance with the Covenant provided information about the design of the golf course, the start of construction of the golf course and access roadway, and groundwater and subsurface investigations performed. A summary of environmental assessment information from the report follows:

  1) A sample was collected from the flowing, west CKD pile groundwater seep (Seep 2 release area). Analytical results were consistent with historical analyses and show elevated pH levels, elevated total dissolved solids levels, and elevated concentrations of several heavy metals.

  2) Two studies were conducted to define an alleged dump area on the Property: a Ground Penetrating Radar Survey and an Electromagnetic Survey. Survey reports indicated areas where subsurface objects were potentially located. Several small test pits were excavated, and buried materials typical of household trash were found slightly below the ground surface. This evidence confirmed that there were small, isolated areas on the Property where residential dumping had occurred.

  3) Two 12-inch production wells were installed within the Property.

- **July 31, 1995: Hydrogeologic Investigation, Bay Harbor Development, Petoskey, Michigan, NTH Consultants, Ltd.**

  The purpose of the investigation was to evaluate the hydrogeologic conditions in the area of the central west CKD pile and seeps, and monitor groundwater quality. Results of the investigation follow:

  1) Groundwater was generally encountered in this area under both unconfined and confined conditions within the fractured limestone bedrock. Based on these findings, it was concluded that groundwater does not come into direct contact with the CKD materials. The direction of groundwater flow in the area

of investigation, based on static water level data collected on April 26, 1995, was to the north-northeast, towards Lake Michigan.

2) Concentrations of dissolved cadmium were detected in three groundwater samples, and concentrations of dissolved arsenic were detected in a duplicate sample. The detected levels of dissolved cadmium and arsenic were below Part 201 residential groundwater and groundwater-surface water interface criteria. Concentrations of dissolved metals for the other samples collected during this investigation were below the laboratory-reported minimum detection limits (MDLs).

3) Elevated levels of pH and TDS were detected in groundwater collected at locations OW-2 and OW-2A at both shallow and deep well screen placements. Based on these results, groundwater near OW-2 and OW-2A appeared to have been impacted by alkaline salts from the CKD to a depth of at least 26 feet below the water table. The levels detected were in excess of federal secondary drinking water standards for both pH and TDS.

4) Initial contact of infiltrated surface water (rain) with the CKD material in the piles results in an elevation of pH and TDS in that water. Following subsequent migration of this CKD-impacted surface water, the quality of groundwater and seep water can be impacted. The exact source area of the central west CKD pile seep (Seep 2) had not yet been determined.

- **March 20, 1996: Assessment of Potential Impacts from the Seep Collection System to the City of Petoskey's Wastewater Effluent and Biosolids, Bay Harbor Company, Bay Harbor, Michigan, NTH Consultants, Ltd.**

Part of the closure agreement for the central west CKD pile (Seep 2 CKD Pile) was the installation of a collection system and the systematic disposal of the wastewater to the City of Petoskey's Wastewater Treatment Plant (WWTP). An analysis of the wastewater to be discharged into the WWTP was required prior to the issuance of a permit. The results of that analysis are described below:

1) The results indicate that the water from the [western] seep is quite alkaline and contains various dissolved alkaline salts and trace metal concentrations. While efforts to eliminate the continued flow of the seep have not yet been successful, the water quality characteristics of the seep appear to be somewhat improved.

2) Elevated trace metals were present in the samples of the leachate collected from the subsurface collection system. Concentrations were higher than surface water quality effluent limits (Rule 57 limits) and arsenic and nickel exceeded the federal drinking water limits.

- **1997 - 1999: Interim Report on Shoreline Survey Investigations Below Coastal Drive, March, 1999, Bay Harbor Development, Bay Harbor, Michigan, NTH Consultants, Ltd.**

  Shoreline survey observations were conducted by NTH during August and October 1997, April, June, and October 1998; and were to be conducted in April and June 1999. Readings of pH were measured in the surface water of Little Traverse Bay approximately every 240 feet along and within ten feet of the shoreline below the area of Coastal Drive. The report stated that background readings for pH collected from varying locations in Lake Michigan and within tributary surface creeks were in the range of 8.4 to 8.7 s.u. Readings collected from the shoreline ranged from 8.2 to 9.1 s.u. NTH noted an elevation in readings along the eastern portion of the area during the spring and fall sampling events, suggesting some type of seasonal impact.

  The report concluded that results for the lake water off shore in the area along the eastern portion of the central west CKD pile (Pines lot # 6) and below the area of the former seep outfall (Seep 2) have consistently only shown either non-detect or low trace metal concentrations. However, in samples collected in October 1998, the reported concentrations for silver in each sample and zinc in only the background sample were above risk based concentrations calculated to be protective of aquatic life against long term (chronic) effects.

  The report also concluded that pH readings and TDS concentrations in the lake water samples collected for laboratory analyses from near the Pines lot #6 and below the area of the former seep outfall (Seep 2) have been slightly higher than the background concentrations determined for samples collected from Lake Michigan near Bay Shore. Two samples collected on May 23, 1997 from below Pines lots #5 and 6 documented pH values of 9.1 and 9 s.u., respectively.

- **June 1999: Notice of Migration Form EQP4482, June 9, 1999, Mr. Andrew Stempky, MDEQ – Environmental Response Division, Gaylord, Michigan, NTH Consultants, Ltd.**

  NTH submitted the Notice of Migration of Contamination Form required under R 299.51017(a) under the authority of Part 201, 1994, as amended, the Natural Resources and Environmental Protection Act. This form identified copper and nickel concentrations from monitoring well OW-1 and sulfate concentrations from monitoring well OW-2 as hazardous substances that may migrate beyond the boundaries of the property. NTH noted within the cover letter that the copper and nickel concentrations were detected in an unfiltered sample and that filtered samples have not contained concentrations above the Generic Residential Cleanup Criterion. NTH also noted that the sulfate concentration exceeded the

secondary drinking water standard and that groundwater from the area is not used for drinking water.

- **April and June 1999: Bay Harbor Report on Shoreline Survey Below Coastal Ridge Drive, September 30, 1999, Mr. Andrew Stempky, MDEQ – Environmental Response Division, Gaylord, Michigan, NTH Consultants, Ltd.**

  NTH submitted a letter report to transmit the April and June 1999 shoreline survey data. Readings were collected in the previously described manner. During the April 1999 survey event, 13 of the 14 survey locations exhibited pH readings above 9.0 s.u. Readings ranged from 8.9 to 9.4 s.u. Samples collected from two locations with field pH readings of 9.4 and 9.2 s.u. reported laboratory pH values of 8.3 s.u. within both samples.

- **November, 2004: An Investigation of the Cement Kiln Dust Seep Discharge into Little Traverse Bay at Bay Harbor, September 7-8, 2004, Emmet County, MDEQ Water Bureau.**

  MDEQ performed an investigation at the Site in response to a visit in August, 2004, when elevated pH levels were recorded in lake water at the Site shoreline, and as far off shore as 90 feet. The purpose of this investigation was to evaluate the chemical composition and aquatic toxicity of the CKD leachate from the Seep 2 release area.

  Two sampling locations were selected for this investigation: one from a shallow, Lake Michigan shoreline pool filled with nearly black seep water for chemical and toxicity testing (Seep 2 site), and one from a site approximately 2.5 miles west and 7 feet off shore of the first location (background site) for chemical testing. Samples were taken at both locations for analysis of metals and nutrients, alkalinity, hardness, suspended solids, TDS, turbidity, and toxicity. In situ measurements of pH and specific conductance were recorded on Site at the sampling locations, and at eight additional locations successively further offshore of the seep location. Specific results from this study are summarized as follows:

  1) The pH of the Seep 2 discharge was 12.52 s.u., and the pH of a near shore, impacted site was 10.15 s.u. Both values exceed the Michigan water quality standard range of 6.5-9.0 s.u. for pH.

  2) The specific conductance of the seep discharge was 37,439 micro ohms per centimeter (umhos/cm); significantly greater than 285 umhos/cm that was measured at the background site.

3) Concentrations of the total mercury in the seep discharge was 0.3 micrograms per liter (ug/L). This concentration exceeds the Human Noncancer Value (HNV) of 0.0018ug/L and the Wildlife Value (WV) of 0.0013 ug/L for [mercury] by over 160 x and 230 x, respectively.

4) Concentrations of copper (28 ug/L), nickel (220 ug/L), selenium (110 ug/L), vanadium (190 ug/L) and zinc (38 ug/L) exceed the Final Chronic Value and Aquatic Maximum Value applicable to these metals.

5) The concentration of arsenic in the seep discharge was 220 ug/L. This concentration exceeds the FCV of 150 ug/L and the HNV of 50 ug/L for arsenic.

6) Aquatic toxicity testing on two species indicated that the seep discharge was acutely toxic to both *Daphnia magna* [Lethal concentration to 50% of subjects (LC_{50}) = 3.2% sample; 31 Toxicity Unit acute (TUa)] and fathead minnows (LC_{50} = 3.2% sample; 31 TUa). Toxic effects to both D. magna and fathead minnows were extremely rapid in test concentrations as low as 10% sample. Time to complete mortality of D. magna exposed to 10% sample ranged from seconds to minutes. Time to complete mortality of fathead minnow exposed to 10% sample ranged from minutes to 24 hours.

7) The bodies of dead D. magna and fathead minnows exposed to high concentrations of the sample were unusually well-preserved during the test, indicating that microbial activity was suppressed by the toxicity of the sample.

8) Toxicity was likely caused by pH and potassium concentrations in the seep discharge. The concentrations of potassium in the samples (12,300-12,900 mg/L) exceeded expected acutely toxic levels (330 mg/L, *D. magna*; 308 mg/L, fathead minnows) by nearly 2 orders of magnitude. The concentration of copper in the sample used for the *D. magna* test (28 ug/L) also exceeded an expected acutely toxic level for *D. magna* (8.4 ug/L).

9) Seep discharge likely had a dramatic toxic effect on aquatic life in the seep discharge area. The high level of toxicity to D. magnga and fathead minnows, indicates that little or no aquatic life would be expected to survive at concentrations of the seep discharge as low as 10%. In addition, the rapid impact of the toxicity indicates that avoidance of high concentrations of the toxic seep discharge by most aquatic life would be unlikely.

Results of the water chemistry evaluation indicate that seep discharge exceeds Michigan water quality standards for pH, arsenic, copper, mercury, molybdenum, nickel, selenium, vanadium, and zinc. The study concludes that exposure to the

CKD leachate will have injurious effect on the public health, wildlife, and aquatic life.

C. State and Local Authorities' Role

1. State and Local Actions to Date

The Site came to the U.S. EPA's attention through the Little Traverse Bay Band of the Odawa Indians (LTBB). In October, 2004, LTBB requested assistance to address risks to public health and natural resources from the CKD discharge into the Little Traverse Bay of Lake Michigan.

On July 1, 1994 a summary of comments and concerns was submitted by MDNR (MDEQ) to NTH regarding the Closure Activities proposed for the Bay Harbor Development. The relevant comments and concerns are summarized below:

1) Exacerbation of/or Contribution to the Existing Conditions:
   MDNR (MDEQ) expressed concern regarding the impacts that could result from the irrigation of the portions of the golf course constructed over the CKD piles. Also, MDNR (MDEQ) stated concerns regarding the movement of water into and within the CKD piles.

2) During a previous meeting the Developer's legal counsel and environmental consultant agreed that flow from all seeps, currently known to exist or come to exist in the future, either continual or intermittent flow, would be collected and properly treated and disposed. MDNR (MDEQ) expressed concern regarding the limited detail these plans are discussed in the Closure Activities report and requested a definitive statement of obligations to address all seeps and the contingency plans that would be in place to satisfy that obligation.

On January 4, 2002 the City of Petoskey entered into an Administrative Consent Order with CMS on the basis of the violations described below. The following is a Finding, established within the Administrative Consent Order from the City of Petoskey, showing violations of the permit to accept seep discharge:

"In violation of the Permit and Ordinance, Bay Harbor Development Company has failed to submit certain self-monitoring compliance reports; has failed to conduct sampling at the required frequency; has reported sampling results that were not based on 24-hour composite sampling; has exceeded effluent imitations for pH, mercury, arsenic, cadmium, copper, and lead; has exceeded Ordinance limitations for chemical oxygen demand (COD) and total suspended solid; and has failed to immediately inform the City of exceedances and collect additional samples immediately after exceedances were reports."

On September 3, 2004 public health officials with the NWMCHA issued a public health advisory instructing people to avoid the areas of the shoreline along the Little Traverse Bay where CKD discharge was detected. The health advisory was based upon the results of the MDEQ investigation at the Seep 2 release area, which documented approximately 600-feet of impacted shoreline at a distance out from shore of about 90 feet. The health advisory stated that the discharge along the shoreline is hazardous to humans and pets.

On December 3, 2004 the NWMCHA public health officials issued a second public health advisory for a second stretch of the Bay Harbor shoreline. The health advisory was based upon the results of the verification sampling by the U.S. EPA that documented highly alkaline leachate discharging into the Little Traverse Bay from a second release area. The health advisory applied to the approximately 800-foot long section of shoreline identified as the Seep 1 release area, located approximately 1,000 feet west Seep 2 release area.

III. THREATS TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

The conditions at the Little Traverse Bay CKD Release Site present an imminent and substantial threat to the public health, or welfare, and the environment, and meet the criteria for an emergency removal action provided for in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Section 300.415, Paragraph (b)(2). 40 C.F.R. § 300.415(b)(2)(i), (ii), (iv), (v), and (vii), respectively, which specifically allows removal actions for:

i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

Following a November, 2004 site visit by Michigan Department of Community Health (MDCH) staff, a public health consultation was completed by the MDCH in cooperation with the Federal Agency for Toxic Substances and Disease Registry (ATSDR). The public health consultation evaluated the potential human health hazards associated with exposure to contamination seeping onto the beach and into Lake Michigan within the Bay Harbor area. The following is a summary of the identified hazards:

- The ATSDR and MDCH determined that the high pH levels found within puddled seep discharges along the shoreline of Lake Michigan at Bay Harbor pose a public health hazard. Direct exposure to pH levels ranging between 9 and 13.5 s.u. within the puddled seep discharges that are in close proximity to residential homes may result in irritation of the eyes, skin, and mucous membranes. Exposure to pH levels greater than 11.5 s.u. may result in irreversible damage to these tissues.

- The ATSDR and MDCH determined that the mercury levels detected within the seep discharge pose a public health hazard. When mercury is released into surface water, microorganisms change it into methylmercury, which is a highly toxic form of mercury that can build up (bioaccumulate) within fish and in animals that eat fish, including humans. Exposure to high levels of mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain function may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems. Methylmercury exposure can have adverse cardiovascular effects upon adults, resulting in elevated blood pressure and increased incidences of heart attack. A Michigan fish advisory in effect for northern Lake Michigan recommends that women of childbearing age and children under the age of 15 limit their consumption of walleye due to unacceptable levels of mercury found within these fish. The mercury concentrations released to Lake Michigan from the CKD piles contributes to the mercury content of fish and exacerbates the hazards to humans who eat walleye from Lake Michigan.

- The ATSDR and MDCH public health consultation also evaluated the potential human health hazards associated with concentrations of inorganic chemicals that exceeded State of Michigan surface water quality standards. The State of Michigan water quality standards consider the potential effects on aquatic and terrestrial wildlife as well as the potential effects on humans who may swim or eat fish taken from the water.

    - The human noncancer value (HNV) is the maximum contaminant concentration in surface water that is not expected to result in noncancer effects in people. Concentrations of arsenic, mercury, and molybdenum exceeded their respective HNVs. The mercury concentrations released to Lake Michigan from the CKD piles contributes to the mercury content of fish and exacerbates the hazard to humans who eat walleye from Lake Michigan.

- Inorganic chemicals released into Lake Michigan exceed the State of Michigan water quality standards for the protection of both terrestrial and aquatic wildlife. Standards protective for the protection of wildlife under both acute and long-term exposure scenarios were exceeded.

    - The wildlife value (WV) is the maximum contaminant concentration in surface water that will not be harmful to terrestrial wildlife exposed to the surface water over a lifetime. The mercury concentration exceeds the WV value.

    - The aquatic maximum value (AMV) is the maximum contaminant concentration in surface water that will not likely result in injurous or

debilitating effects to aquatic life from brief exposures. Concentrations of copper, nickel, selenium, vanadium, and zinc exceeded their respective AMVs.

- The ATSDR and MDCH public health consultation noted that children may be at greater risk in the Bay Harbor setting. Children are more likely to be exploring/playing in or near the puddle water containing high pH levels. Children may not recognize the discolored pooled water as a danger and may be exposure to high pH at their eyes or skin. Very young children are also more sensitive to mercury exposure through the consumption of Lake Michigan fish.

The study performed by the MDEQ Water Bureau in 2004 came to the final conclusion that exposure to the CKD leachate will have injurious effect on the public health, wildlife, and aquatic life. The main principles driving this conclusion were:

- Seep discharge likely had a dramatic toxic effect on aquatic life in the seep discharge area. The high level of toxicity to the two species tested, indicates that little or no aquatic life would be expected to survive at concentrations of the seep discharge as low as 10%. Toxic effects to both species were extremely rapid in test concentrations as low as 10% sample with time to complete mortality when exposed to 10% sample ranging from seconds to minutes. In addition, the rapid impact of the toxicity indicates that avoidance of high concentrations of the toxic seep discharge by most aquatic life would be unlikely.

- Toxicity was likely caused by pH and potassium concentrations in the seep discharge. The concentrations of potassium in the samples exceeded expected acutely toxic levels by nearly 2 orders of magnitude. The concentration of copper in the sample also exceeded an expected acutely toxic.

- The bodies of dead *D. magna* and fathead minnows exposed to high concentrations of the sample were unusually well-preserved during the test, indicating that microbial activity was suppressed by the toxicity of the sample.

ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

The Little Traverse Bay CKD Release Site is located adjacent to Little Traverse Bay of Lake Michigan, which is contiguous to Lake Michigan. Impacts to the surface water body from releases from the Site have been documented.

The Great Lakes Water Quality Agreement of 1978 states that values of pH should not be outside the range of 6.5 to 9.0 s.u. (Great lakes Water Quality Agreement, Annex 1, Specific Objectives, Section 1 (C)(2) as amended by Protocol signed November 18, 1987,International Joint Commission United States and Canada). Additionally, Lake

Michigan is protected as a potable water source. Concentrations of arsenic, mercury, and molybdenum exceed the State of Michigan HNVs, which are maximum contaminant concentrations that are not expected to result in noncancer effects in humans.

iii) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

The reconsolidation of the CKD piles was designed to eliminate direct contact exposure to the CKD with a minimum of 6 inches of overburden, cover and vegetation. The CKD piles were not encapsulated prior to covering, therefore groundwater migrates through the piles, resulting in leachate. The leachate migrates from the source area CKD pile to the shoreline of Little Traverse Bay thus resulting in contamination discharge into Lake Michigan. Impact on the lake water adjacent to the release areas (Seep 1 and 2 release areas) and offshore has been documented through analysis of pH, conductivity, metals content, and toxicity in the surface water.

iv) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released

Closure activities did not include encapsulating the CKD piles with impermeable materials to prevent groundwater infiltration, therefore the CKD piles are vulnerable to groundwater, which is influenced by rain events. Physical evidence suggests that initial contact of infiltrated surface water (rain) with the buried CKD piles on Site results in an elevation of pH, TDS and metal concentrations in that water. Increase in seepage volume is observed following rain events through aerial photos and ground collection of seepage.

Seasonal dependence has been documented in previous reports. MDNR (MDEQ) noted in 1989 report that the east kiln pile seepage is seasonally dependent. In 1999 NTH Consultants observed in the Interim Report elevated readings along the eastern portion of this area during the spring and fall sampling events, suggesting some type of seasonal impact.

v) The availability of other appropriate federal or state response mechanisms to respond to the release

There are no other adequate authorities to respond to the releases at the site. By letter dated January 11, 2005, MDEQ has agreed that removal activities are the appropriate way to respond to the site.

IV. ENDANGERMENT DETERMINATION

Given the Site conditions, the nature of the confirmed and potential hazardous substances and the potential exposure pathways described in Sections II and III above,

actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions selected in this Action Memorandum, present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

The AOC requires the following actions to mitigate threats posed by the presence of hazardous substances at the Site:

1) Develop and implement a Site health and safety plan, including a Site contingency plan;

2) Develop and implement a Site Control and Access Management Plan;

3) Restrict access to the CKD release areas through the construction of fences and posting of warning signs;

3) Characterize, remove, and properly dispose of hazardous substances and wastes (CKD leachate pools, contaminated soils, sediment, and other beach material) in accordance with U.S. EPA's Off-Site Rule (40 CAR § 300.440).

4) Design and implement on-shore interim control measures to prevent the further release of CKD leachate from the CKD pile source areas; and

5) Confirm the effectiveness of and perform initial operation and maintenance of implemented on-shore interim seepage control measures until such time as additional or permanent engineering controls can be designed and constructed to prevent CKD leachate releases to the beach and surface waters of Lake Michigan.

Applicable or Relevant and Appropriate Requirements

All applicable, relevant, and appropriate requirements (ARARS) will be complied with to the extent practicable. All hazardous substances, pollutants or contaminants removed off Site pursuant to this removal action for treatment, storage, and disposal will be treated, stored, or disposed of at a facility in compliance, as determined by U.S. EPA, with the U.S. EPA Off-Site Rule, 40 CAR § 300.440.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Continued risk to public health and the environment will result if no action or delayed action ensues.

OUTSTANDING POLICY ISSUES

None.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the selected removal action for the Little Traverse Bay CKD Site, in Petoskey, Resort Township, Michigan, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the administrative record for the Site (see Attachment 1).

Conditions at the Site meet the NCP section 300.415(b) criteria for a removal. You may indicate your continued approval of the removal activities set forth herein and in the AOC by signing below.

APPROVE: Richard C Karl DATE: 6-27-06
Director, Superfund Division

DISAPPROVE: _____ DATE: _____
Director, Superfund Division

Attachments

1. Administrative Record Index
2. Region 5 EJ Analysis

cc: D. Chung, U.S. EPA, 5203-G
M. Chezik, U.S. DOI, w/o Enf. Addendum, w/o Enf. Addendum
R. Wagner, MDEQ, w/o Enf. Addendum
P.O. Box 30473
Lansing, MI 48909

Michael Cox, Michigan Attorney General, **w/o Enf. Addendum**
P.O. Box 30212
Lansing, MI 48909

ATTACHMENT 1

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
LITTLE TRAVERSE BAY CKD RELEASE SITE
RESORT TOWNSHIP, EMMET COUNTY, MICHIGAN

ORIGINAL
APRIL 29, 2005

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	02/22/05	U.S. EPA	Respondents	Administrative Order on Consent for Removal Action at the Little Traverse Bay CKD Release Site	34

UPDATE #1
JUNE 1, 2006

1	05/18/06	Field, R., U.S. EPA	U.S. EPA	Memorandum re: Modification to the AOC (V-W-'05-C-180) for the Little Traverse Bay CKD Release Site	2
2	05/31/06	Karl, R., U.S. EPA	Respondents	Modifications to the February 22, 2005 AOC (V-W-'05-C-180) for the Little Traverse Bay CKD Release Site	3

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
LITTLE TRAVERSE BAY CKD RELEASE SITE
RESORT TOWNSHIP, EMMET COUNTY, MICHIGAN

UPDATE #2
JUNE 9, 2006

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	12/24/87	H&D, Inc.	File	Bay Shore Resorts Basic Hydrogeologic Conditions	
2	06/20/89	MDNR	File	Staff Report: Chemical Assessment of Kiln Dust Solids and Seeps at the Defunct Dundee Cement Company Site	8
3	06/05/90	Ozoga, J., MDNR	Koch, M., MDNR	Memorandum re: Additional Hydogeological Information on the Shale Quarry Proposed as a Disposal Area at Three Fires Point Facility	28
4	05/18/94	NTH Consultants, Ltd.	Bay Harbor Associates	Environmental Data Report for the Former Penn-Dixie Cement Plant	94
5	07/01/94	Leemon, N., MDNR	Venman, B., NTH Consultants, Ltd.	Summary of MDNR's Comments and Concerns re: Closure Activities Proposed for the Bay Harbor Development (DRAFT)	
6	07/11/94	Dept. of the Attorney General	Bay Harbor Company, CMS Land Company, Boyne USA, Inc., JAKS, Inc. & CMS Capital Company	Administrative Agreement and Covenant not to Sue	
7	02/15/95	NTH Consultants, Ltd.	Bay Harbor Company	First Semi-Annual Progress Report for Closure Activities at the Bay Harbor Development	133
8	07/31/95	NTH Consultant, Ltd.	Bay Harbor Company	Hydrogeologic Investigation for the Bay Harbor Development	74
9	08/15/95	NTH Consultants, Ltd.	Bay Harbor Company	Second Semi-Annual Progress Report for Closure Activities at the Bay Harbor Development	75

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
10	02/15/96	NTH Consultants, Ltd.	Bay Harbor Company	Third Semi-Annual Progress Report for Closure Activities at the Bay Harbor Development	154
11	03/20/96	NTH Consultants, Ltd.	Bay Harbor Company	Assessment of Potential Impacts from the Seep Collection System to the City of Petoskey's Wastewater Effluent and Biosolids	34
12	06/06/96	Larsen, L., Toxicologist MDEQ	Stempky, A., MDEQ	Human Health Effects of High ph in Water and Cement Kiln Dust Waste	
13	08/14/96	NTH Consultants, Ltd.	Bay Harbor Company	Fourth Semi-Annual Progress Report for Closure Activities at the Bay Harbor Development	34
14	02/14/97	NTH Consultants, Ltd.	Bay Harbor Company	Fifth Semi-Annual Progress Report for Closure Activities at the Bay Harbor Development	135
15	08/15/97	NTH Consultants, Ltd.	Bay Harbor Company	Sixth Semi-Annual Progress Report for Closure Activities at the Bay Harbor Development	33
16	06/00/98	U.S. EPA	File	Technical Background Document to Ground Water Controls at CKD Landfills (DRAFT)	
17	03/00/99	NTH Consultants, Ltd.	Bay Harbor Company and Bay Harbor Golf Club	Interim Report: Shoreline Survey Investigations Below Coastal Ridge Drive for the Bay Harbor Development	7
18	06/09/99	NTH Consultants, Ltd.	Stempky, A., MDEQ	Notice of Migration Form EQP4482 for the Bay Harbor Golf Club w/Cover Letter	5
19	08/20/99	U.S. EPA	Federal Register	Standards for the Management of Cement Kiln Dust	
20	09/30/99	Rector, D., NTH Consultants, Ltd.	Stempky, A., MDEQ	Letter re: Bay Harbor Report on Shoreline Survey Below Coastal Ridge Drive	1
21	01/31/02	City of Petoskey,	Respondents	Administrative Consent Order No. 01-001-003	15

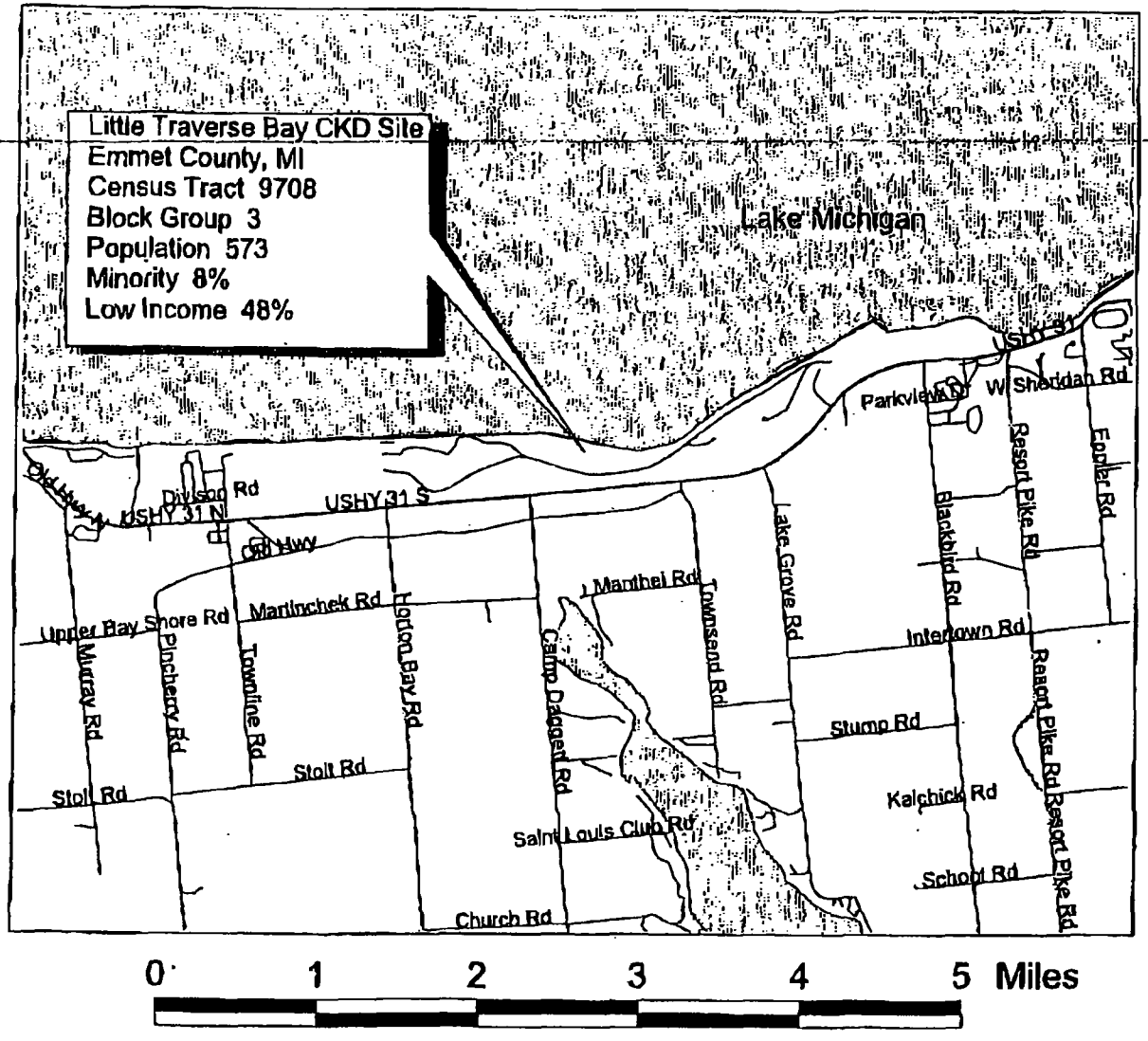
NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
22	08/27/04	Kendzierski, S., Environmental Health Services	Dollhopf, R., U.S. EPA	Aerial Overflight Photo-documentation of Shoreline Conditions	
23	10/00/04	Ettawageshik, F., Little Traverse Bay Bands of Odawa Indians Tribal Chairman	Mathur, B., U.S. EPA	Letter re: Request by Little Traverse Bay Bands of Odawa Indians for Assistance with Contamination by CDK Leachate	
24	11/00/04	MDEQ	File	An Investigation of the Cement Kiln Dust Seep Discharge into Little Traverse Bay at Bay Harbor, September 7 & 8, 2004	
25	03/21/05	Weston Solutions, Inc.	U.S. EPA	Site Monitoring and Sampling Activities at the Little Traverse bay CKD Release Site	
26	04/04/05	Michigan Dept. of Community Health & ATSDR	File	Public Health Consultation for the Bay Harbor Cement Kiln Dust Seep Discharge	
27	04/05/05	Weston Solutions, Inc.	U.S. EPA	Site Monitoring and Sampling Activities September 30, November 4 & 22, 2004 at the Little Traverse Bay CKD Release Site	
28	04/05/05	Weston Solutions, Inc.	U.S. EPA	Site Monitoring and Sampling Activities April 12,2005 at the Little Traverse Bay CKD Release Site	
29	04/21/05	Kendzierski, S., Environmental Health Services	Dollhopf, R., U.S. EPA	Aerial Overflight Photo-documentation of Shoreline Conditions	
30	05/20/05	Kendzierski, S., Environmental Health Services	Dollhopf, R., U.S. EPA	Aerial Overflight Photo-documentation of Shoreline Conditions	
31	06/17/05	CMS Energy Enterprises	U.S. EPA	Maps Generated from May/ June 2005 Shoreline Survey	

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
32	07/28/05	U.S. EPA	CMS Energy Enterprises	Final Removal Action Work Plan for the Bay Harbor Development Area	
33	00/00/00	Dollhopf, R., U.S. EPA	Karl, R., U.S. EPA	Action Memorandum: Documentation of Threat and Determination of Need to Conduct a Time-Critical Removal Action at the Little Traverse Bay CKD Release Site **(PENDING)**	

Attachment 2
Region 5 EJ Analysis

Region 5 Superfund EJ Analysis

Little Traverse Bay CKD Site Emmet Co., MI



State of Michigan averages:
Minority: 21%
Low Income: 29%

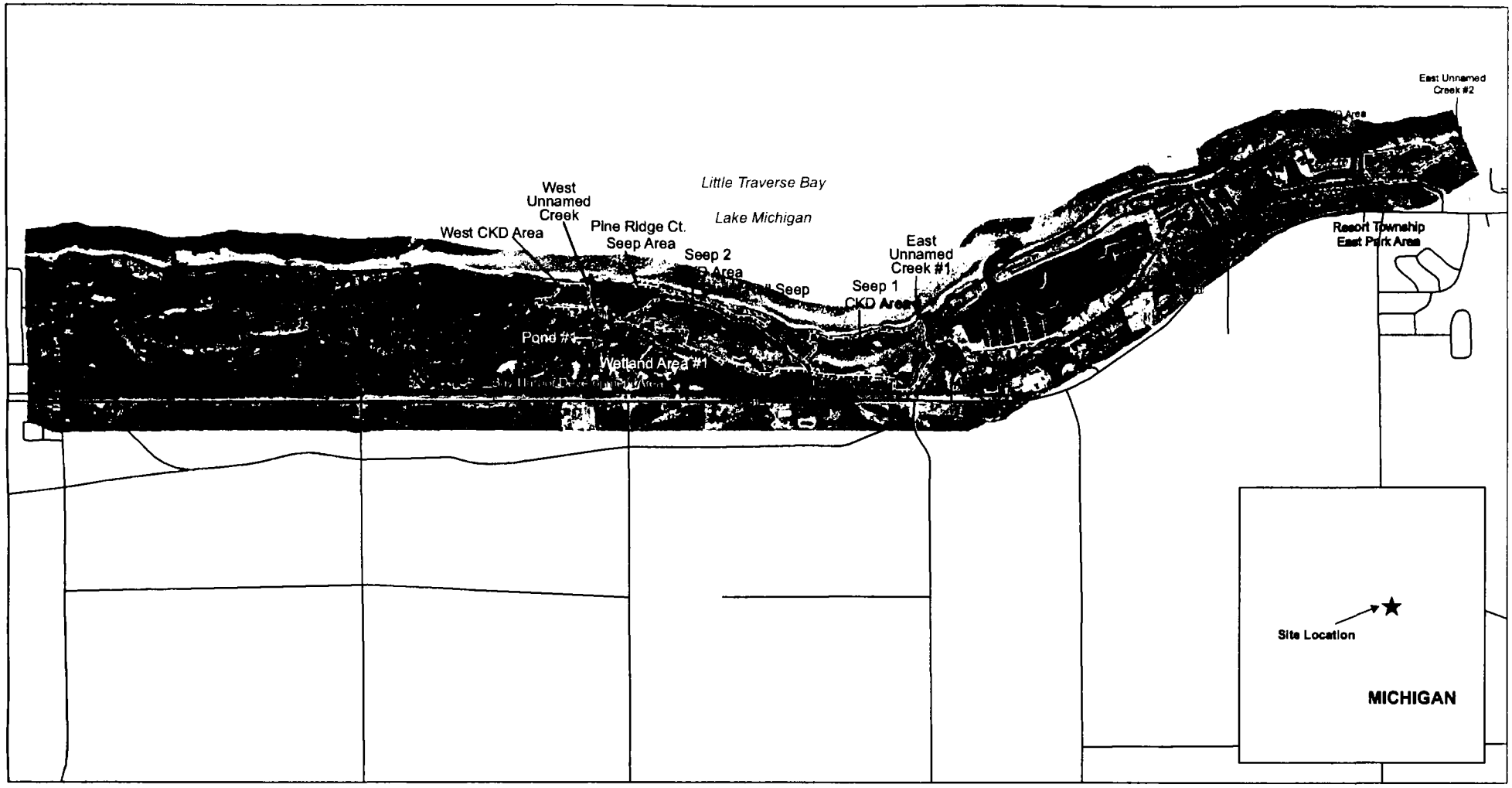
U.S. EPA Region 5
Environmental Justice Case Criteria
for State of Michigan

Minority: 42% or greater

Low Income: 58% or greater

Date of Map: 9/1/05

Source of Map: Census 2000 Database/
ArcView 3.0



CKD Investigation Area

Approximate Site Boundary

Feet

1,600 0 1,600

Meters

500 0 500

Barr Footer: Date: 8/27/2006 12:18:45 PM File: I:\Projects\22\24\001\GIS\Maps\WorkPlan\June27_2005\SiteLocation.mxd User: kaw

Figure 1-1

SITE LOCATION
Little Traverse Bay
CKD Release Site
Emmet County, Michigan

ENFORCEMENT CONFIDENTIAL ADDENDUM

LITTLE TRAVERSE BAY CKD RELEASE SITE
PETOSKEY, RESORT TOWNSHIP, EMMET COUNTY, MICHIGAN

(REDACTED 1 PAGE)

ENFORCEMENT CONFIDENTIAL
NOT SUBJECT TO DISCOVERY