EPA Region 5 Records Ctr.
239904

Five-Year Review Report

Second Five-Year Review Report
for
Ninth Avenue Dump Superfund Site
Gary, Lake County, Indiana

September 2005

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Date: 9/29/05

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List of Acronyms

ARARs	applicable or relevant and appropriate requirements
AWQC	ambient water quality criteria
BTEX	benzene, toluene, ethylbenzene, and xylene
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COD	chemical oxygen demand
ESD	Explanation of Significant Differences
FS	feasibility study
FSR	final site remedy
FWQC	federal water quality criteria
IC	institutional control
IDEM	Indiana Department of Environmental Management
INDOT	Indiana Department of Transportation
ISBH	Indiana State Board of Health
ISR	interim site remedy
LNAPL	light non-aqueous phase liquid
MAC	maximum allowable concentration
MCL	maximum contaminant level
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OU	operable unit
PAHs	polycyclic aromatic hydrocarbons
PCA	primary containment area
PCBs	polychlorinated biphenyls
PRP	potentially responsible party
RA	remedial action
RD	remedial design
RI	remedial investigation
ROD	Record of Decision
SVE	soil vapor extraction
TDS	total dissolved solids
TOC	total organic carbon
UAO	unilateral administrative order
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

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Executive Summary

The remedies for the Ninth Avenue Dump site in Gary, Lake County, Indiana, according to the September 1988 and June 1989 Records of Decision, the October 1991 Explanation of Significant Differences, and September 1994 Record of Decision Amendment included: a slurry wall around the known extent of groundwater contamination; an extraction system for removing groundwater and the light non-aqueous phase liquid (LNAPL) and a system for separating these and treating the water before reintroducing it; disposal of the LNAPL extracted and separated from the groundwater in an off-site incinerator; a means for discharging excess surface water; an intermediate slurry wall inside the other slurry wall to form the primary containment area; installation of a multilayer cap over the primary containment area; installation and operation of a soil vapor extraction system in the highly contaminated area; deed and access restrictions to protect the remedy and prevent the use of groundwater; monitoring and maintaining the site. The site achieved construction completion with the signing of the Preliminary Close Out Report on September 25, 1995. The trigger for this review was the signing of the first five-year review report in September 2000.

The assessment of this five-year review is that the remedy has been implemented in accordance with the decision documents, except for the fact that not all of the institutional controls have been implemented. The remedy is functioning as anticipated. The remedy is protective of human health and the environment in the short term. It is not protective in the long term because some of the institutional controls have not been implemented.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name (from *WasteLAN*): Ninth Avenue Dump		
EPA ID (from *WasteLAN*): IND980794432		
Region: 5	State: IN	City/County: Gary/Lake County
SITE STATUS		
NPL status: x Final _ Deleted _ Other (specify) _____		
Remediation status (choose all that apply): _ Under construction x Operating _ Complete		
Multiple OUs?* x Yes _ No	Construction completion date: 9/25/95	
Has site been put into reuse? _ Yes x No		
REVIEW STATUS		
Lead Agency: x EPA _ State _ Tribe _ Other Federal Agency _____		
Author name: Bernard J. Schorle		
Author title: Remedial Project Manager	Author affiliation: USEPA, Region 5	
Review period:** ____ to 9/05		
Date(s) of site inspection: 9/9/05		
Type of review: x Post-SARA __ Non-NPL remedial action site __ Regional discretion	__ Pre-SARA __ NPL State/Tribe-lead __ NPL-removal only	
Review number: _ 1 (first) x 2 (second) _ 3 (third) _ Other (specify) _____		
Triggering action: _ Actual RA on-site construction at OU # __ _ Construction completion _ Other (specify) _____	_ Actual RA start at OU # __ x Previous five-year review report	
Triggering action date (from *WasteLAN*): 9/27/00	Due date: 9/27/05	

*--"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 main issue that has been identified for this site is the fact that not all of the deed restrictions and access agreements have been implemented.

Recommendations and Follow-up Actions: The deed restrictions and access agreements that are missing must be implemented. Because of the difficulties that have been encountered in the past trying to establish these institutional controls and the apparent uncertainties as to what should be done, a reliable estimate as to when this can be accomplished is difficult. However, an IC Implementation Plan will be developed by March 30, 2006.

Protectiveness Statement(s): The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. The remedy is not protective of human health and the environment in the long term since some of the institutional controls that are needed to prevent future exposure to, or ingestion of, contaminated groundwater, exposure to the contents of the waste disposal area, and residential, commercial and agricultural use of the property have not been implemented. Threats at the site have been addressed through capping, vapor extraction, maintenance of the site, and monitoring of the groundwater and exhaust gases.

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Ninth Avenue Dump Superfund Site
Gary, Lake County, Indiana
Second 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 the review 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 §121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 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.

Region 5 of the United States Environmental Protection Agency (USEPA) has conducted the five-year review of the remedy implemented at the Ninth Avenue Dump Superfund site in Gary, Indiana. This review was conducted for the entire site by the remedial project manager through July 2005. This report documents the results of the review.

This is the second five-year review for the Ninth Avenue Dump site. The triggering action for this statutory review is the signing of the first five year review report on September 27, 2000. 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 or unrestricted exposure.

II. Site Chronology

Event	Date
Began operation as an uncontrolled chemical waste disposal facility	about 1973
Reportedly ceased operation	about 1980
Proposed for placement on the National Priorities List (NPL)	12/30/82
Preliminary assessment completed	2/1/83
Final listing on NPL	9/8/83

Event	Date
Combined remedial investigation (RI) and feasibility study (FS) for operable unit (OU) 1 started	8/15/85
RI report received	6/30/88
FS report for OU 1 received	7/5/88
Proposed Plan released and public comment period began	7/5/88
Record of Decision for OU 1	9/20/88
Unilateral Administrative Order	12/7/88
Combined RI/FS for OU 2 started	8/23/88
Remedial design (RD) for OU 1 started	1/13/89
Final Draft FS submitted	1/30/89
Proposed Plan released and public comment period began	3/20/89
Record of Decision for OU 2	6/30/89
Unilateral Administrative Order	8/17/89
RD for OU 2 started	9/20/89
Remedial action (RA) for OU 1 started	12/11/90
Administrative Order on Consent (De Minimis Settlement)	1/30/91
Explanation of Significant Differences	October 1991
RA for OU 1 completed	7/12/93
RA for OU 2 started	2/14/94
Proposed Plan issued	3/29/94
Public meeting held	4/13/94
Record of Decision Amendment	9/13/94
Unilateral Administrative Order	12/27/94
Preliminary Close Out Report (construction completion under CERCLA)	9/25/95
Administrative Order on Consent (cost settlement)	3/5/96
Five Year Review Report	9/27/00
RA for OU 2 completed	9/30/04
Site inspection for the second five-year review	9/9/05

III. Background

Land and Resource Uses and Physical Characteristics

Ninth Avenue Dump is an inactive chemical and industrial waste disposal site located at 7537 Ninth Avenue in Gary, Indiana. The site is an approximately seventeen acre parcel in an area of mixed industrial, commercial, and residential use approximately 1/8 mile east of Cline Avenue. Immediately surrounding the site are vacant, privately-owned properties. South of the site is an NPL site, MIDCO I, and an Indiana Department of Transportation (INDOT) maintenance facility. The nearest residential area is on the west side of Cline Avenue. The site is approximately 1 1/4 mile south of the Grand Calumet River and 1 3/4 mile north of the Little Calumet River.

The Ninth Avenue Dump is located in a low-lying area with poor drainage. Prior to filling, the site consisted of parallel ridges separated by wetlands areas. Prior to the construction of the remedy, the site was relatively flat with small depressions and mounds remaining from waste disposal or cleanup activities. Interconnected ponds and wetlands surrounded waste disposal areas in the north, west and south. The wetlands areas to the east and south of Ninth Avenue

Dump were relatively undisturbed and served as habitat for fish, migratory birds, and other wildlife.

History of Contamination and Initial Response

Hazardous waste disposal occurred at the site from the early to mid 1970s, with some filling, believed to be associated with cleanup activities, continuing until 1980. The site operator reportedly accepted dry industrial, construction and demolition waste such as ashes, broken concrete, bricks, trees, wood, tires, cardboard, paper and car batteries. The site also received liquid industrial waste including oil, paint solvents and sludges, resins, acids and other chemical wastes including flammable, caustic and arsenic contaminated materials.

In 1975, the Indiana State Board of Health (ISBH) inspected the site. The inspection documented the existence of approximately 10,000 55-gallon drums at the surface, many of which were empty. Evidence was also found that liquid wastes had been dumped on the site. A state inspector estimated that approximately 550,000 gallons of liquid industrial waste had been dumped and 1,000 drums had been buried on the site. Subsequent inspections revealed portions of discarded auto batteries, drummed liquid wastes and abandoned tanker trucks. In 1975 and 1980, the site operator, Steve Martell, was ordered by ISBH and USEPA to initiate surface cleanups. In 1983, the site was placed on the National Priorities List (NPL) and a Partial Consent Judgement was signed by USEPA and Martell. The Consent Judgement required Martell to evaluate surface and subsurface conditions and submit a plan for remedial action. During this period, Martell removed drums, tank cars, and some contaminated soils from the surface of the site. In early 1985, when Martell appeared to have insufficient funds to perform the investigations required under the Consent Judgement, USEPA took over performance of the remedial investigation (RI) and feasibility study (FS).

Extent of Contamination

It was found that the depth of the fill materials ranged from about 0 to 10 feet during the RI. The water table was about 3 feet below the surface over much of the site. Most of the filling appeared to have been in the central and southern portions of the site, with filling apparently having stopped at the pond in the southern portion. During the RI it was found that some of the soils were contaminated with a variety of ketones, chlorinated ethanes, BTEX (benzene, toluene, ethylbenzene, and xylene), PAHs (polycyclic aromatic hydrocarbons), phenols, pesticides, PCBs (polychlorinated biphenyls), plasticizers, and dioxins and furans. On- and off-site surface water bodies and sediments contained only low levels of VOCs (volatile organic compounds), PAHs, pesticides, and metals at low frequencies of detection. A light non-aqueous phase liquid (LNAPL) (frequently referred to at this site as an oil layer, a term that will sometimes be used here, especially when mentioning older documents) was found floating on the groundwater in the central and south central portions of the site. The groundwater under the site, which flows generally to the northeast at very low velocities, was found to be contaminated with approximately 100 organic and inorganic substances, including many of the compounds found in the LNAPL. However, groundwater contamination was found, for the most part, to have not migrated beyond the boundaries of the original operating area, except on the eastern and northeastern sides of this operating area. The groundwater at the site was also found to be contaminated by high concentrations of dissolved solids, including chlorides, that have migrated from an off-site source south of the site (a formerly uncovered road salt storage pile).

Site Risks

In the baseline risk assessment, which assumed that there would be no remediation of the site and

which is the assessment that is done during the remedial investigation, the current use scenario showed carcinogenic risks as high as 1.5×10^{-2} for trespassers on the site, mainly due to dermal contact with soils contaminated primarily with PAHs and PCBs. Under the current use scenario, no risk was found for groundwater use off the site. Surface water was found to present no significant risk to human health but some metals and pesticides were found to exceed federal ambient water quality criteria (AWQC), indicating potential harm to aquatic life. It was found that sediments might affect aquatic life through transfer of PCBs and chlordane to water. In the future use scenario, again assuming that no remediation would be carried out, groundwater under the site, used as a source of drinking water, would result in a mean carcinogenic risk for ingestion of 1.6×10^{-1} and a hazard index of 62. High carcinogenic risks would also be present due to ingestion of (7.2×10^{-5}) and dermal contact with (3.9×10^{-3}) surface soils. Sediments exceeded background levels or a 10^{-6} carcinogenic risk for several PAHs, PCBs, and pesticides. (USEPA generally will take action if the carcinogenic risk exceeds 1×10^{-4} and the hazard index exceeds 1.0.)

Basis for Taking Action

Actual or threatened releases of hazardous substances from this site, if not addressed by implementation of the response action selected in the decision documents, might present an imminent and substantial endangerment to public health, welfare, or the environment. This determination was based on the findings in the remedial investigation and the baseline risk assessment. The site was found to contain a number of toxic chemicals and an organic phase floating on the groundwater.

IV. Remedial Action

Remedy Selected

The original final site remedy (FSR) for the Ninth Avenue Dump site was described in a Record of Decision (ROD) issued on June 30, 1989. Previously, a ROD had been issued on September 20, 1988 for the interim site remedy (ISR) (first operable unit). An Explanation of Significant Differences (ESD) was issued in October 1991 that modified the 1988 ROD (the ISR ROD).

The interim site remedy, described in the 1988 ISR ROD, was to include:

- construction of a soil/bentonite slurry wall to surround an oil layer floating on the groundwater;
- installation and operation of an oil/groundwater extraction and groundwater recharge system;
- installation and operation of a small scale on-site groundwater treatment system to treat excess water due to rainfall inside the slurry wall;
- groundwater monitoring; and
- storage of the extracted oil on the site until implementation of the final remedy.

The final site remedy, described in the 1989 FSR ROD, was to include:

- excavation of oil-contaminated waste and fill down to the native sand (estimated to involve about 36,000 yd^3);
- thermal treatment of the excavated waste and fill and the extracted oil, most likely in a mobile on-site incinerator;
- removal of debris and contaminated sediments from on- and off-site surface water bodies;
- filling the excavated area with treatment process residuals, trench spoils, and pond sediments and debris;
- covering the area within the slurry wall with a hazardous waste landfill cap;

- extracting, treating, and reinjecting contaminated groundwater inside the slurry wall to promote soil flushing;
- discharge of a small quantity of treated groundwater outside the slurry wall to compensate for infiltration;
- deed and access restrictions to prohibit use of groundwater under the site and protect the cap; and
- long-term groundwater monitoring.

The 1991 ESD described the following changes that were to be made in the interim site remedy and the components of the final site remedy that were to be implemented as part of the interim site remedy:

- expanding the area enclosed by the slurry wall, if possible, to include all groundwater that contained contamination that was known to exceed target cleanup levels, which are defined in the 1989 FSR ROD (this expansion was also mentioned in the 1989 FSR ROD);
- discharging excess water from the site to the Grand Calumet River in accordance with National Pollutant Discharge Elimination System (NPDES) permit limits;
- only temporarily storing extracted oil and then shipping it to an acceptable off-site incinerator for disposal; and
- performing a portion of the FSR early by treating the extracted groundwater prior to its reinjection inside the slurry wall.

A Record of Decision Amendment was issued on September 13, 1994 that changed part of the remedy for the second operable unit. Additional studies of the site had shown that the amount of material that would have to be excavated and treated according to the FSR ROD would be about twice as much as had been estimated, resulting in a very significant increase in costs. Since contamination was to be left at the site beneath a cap under the FSR ROD, a more cost-effective remedy was sought and selected with the ROD Amendment. The thermal treatment of excavated soils was dropped and soil vapor extraction was selected as a means of removing some of the more volatile and mobile contaminants in the area where the oil layer was located. This ROD Amendment included these major components:

- installation of the intermediate slurry wall, unless the USEPA determines that it is not feasible, that will separate the "surface water area" within the outer slurry from the contaminated area, forming the primary containment area (PCA);
- removal of debris and contaminated sediments from the surface water bodies on the site that are to remain, and placement of this material under the cap;
- installation of a soil vapor extraction (SVE) system covering the portions of the primary containment area known to be contaminated (after necessary dewatering) and subsequent operation of the system to provide a performance that is appropriate and acceptable to USEPA while maintaining the water level about 10 feet below the present surface;
- disposal of the oil extracted during implementation of the first operable unit in a manner which is appropriate and acceptable to USEPA, most likely in an off-site incinerator;
- installation of a RCRA Subtitle C cap over the primary containment area, landscaping of the site, and establishment of a storm water management system which includes discharge of excess water and which is appropriate and acceptable to USEPA;
- containment or extraction and disposal, by a means which is appropriate and acceptable to USEPA, of contaminated groundwater or source(s) of groundwater contamination found outside the primary containment area;
- removing or securing any equipment which was used during implementation of the first operable unit that will not be used as part of this remedy;
- maintenance of an acceptable water level within the primary containment area and disposal of the excess water by a means which is appropriate and acceptable to USEPA;

- deed and access restrictions that prohibit use of groundwater at the site and protect the remedy; and
- operation and maintenance of the remedy, including the fence and slurry wall installed in the first operable unit, and monitoring of the site to ensure protectiveness.

As a result of the 1994 ROD Amendment, the objectives of the remedy are to contain the contaminants in place and to reduce the amounts of contaminants at the site in order to reduce the time during which the system will have to be monitored. It was not cost-effective to remove the contaminants by off-site disposal or thermal treatment, but it appears to be cost-effective to remove some of the contaminants, particularly the more mobile organics, using soil vapor extraction.

Remedy Implementation

The Ninth Avenue Respondents, operating under three Unilateral Administrative Orders (UAOs) (the first with a prospective effective date of December 30, 1988, the second with a prospective effective date of August 17, 1989, and the third with an effective date 30 days after December 27, 1994) have performed the remedial design and the site construction. Site mobilization for the remedial action (RA) for the first operable unit took place on March 4, 1991.

As a result of the construction of the interim site remedy, the Ninth Avenue Respondents installed the following:

- a three-foot wide slurry wall around approximately 17 acres that contained the known extent of groundwater contamination;
- an extraction system for removing groundwater and oil from inside the slurry wall;
- a system for the separation of the oil from the groundwater, tanks for the storage of the oil, and a treatment system for the groundwater that provided an approximately 90% reduction in the chemical oxidation demand (COD) of the water;
- a trench system for the reintroduction of the groundwater to the soil inside the slurry wall in order to promote flushing of the oil toward the extraction wells;
- a system for removing surface water from the site, treating it, and pumping it through a pipeline to the Grand Calumet River; and
- a building for the treatment systems and office and storage space.

The Remedial Action Report for the first operable unit was accepted by USEPA on July 12, 1993.

The RD and RA activities for the second operable unit have been conducted in accordance with the work plans and design plans and specifications and have included:

- a study of the soils in the southern and western portions of the area enclosed by the first (outer) slurry wall to determine the proper location for the intermediate slurry wall and to determine what areas, if any, would be outside the primary containment area and would contain contaminated soils that would have to be excavated and placed in the primary containment area where they would be under the cap;
- an investigation of the small area outside the first slurry wall in the northeast corner where there were indications that some contamination had been left outside this slurry wall;
- a pilot study of soil vapor extraction in the area to be capped to provide information needed for the design of the SVE system;
- removing groundwater from within the primary containment area, in order to lower the level for the proper operation of the SVE system and provide an inward gradient across the slurry wall, treating the water to meet discharge requirements, including the temporary installation of a system to reduce the chloride content, and discharging the water through

the pipeline to the river;
- installation of the intermediate slurry wall using the vibrating beam technique;
- removal of contaminated soils and fill and debris from around and in the surface water body that is to remain within the first slurry wall and placement of these materials in the area to be capped;
- removal of a small area of contamination outside the first slurry wall in the northeast corner and placement of this material in the area to be capped;
- decontaminating and securing the equipment used in the treatment of extracted oil and groundwater and surface water during the interim site remedy;
- installation of the SVE system;
- installation of a RCRA Subtitle C cap over the primary containment area after the proper grade had been prepared;
- reconfiguring the surface water ponds so they generally remain connected and installing a new water removal pump; and
- monitoring the air quality during construction.

The site achieved construction completion with the signing of the Preliminary Close Out Report on September 25, 1995. The equipment in the building used during the interim site remedy and the preparation for construction of the final remedy that was not to be used following the construction of the final remedy has been removed.

Figure 1 shows the site layout and the locations of the wells that are presently at the site. PW-3 and PW-6 are two of the pumping wells that were used to remove groundwater from the highly contaminated area. The W wells are the monitoring wells around the perimeter of the slurry walls that surround the primary containment area. The IW wells are the injection wells and the EW wells are the extraction wells for the SVE system.

The original facility consisted of four parcels, three consisting of about 2.27 acres each that had frontage on Ninth Ave. and a fourth consisting of about 10 acres and that had no frontage on a constructed street. Deed restrictions that protect the remedy and prevent the use of groundwater at the site have been placed on all but one of these parcels. The parcels which are restricted are owned by the city of Gary and have key numbers 25-40-0099-0012, 25-40-0099-0013, and 25-40-0099-0032; the city obtained these parcels after the previous owners failed to pay the taxes. The city filed these deed restrictions on May 20, 1997. The fourth parcel, with key number 25-40-0099-0011, was purchased from the Lake County Board of Commissioners for a nominal amount of money. The Commissioners Deed was executed on August 15, 1988 and recorded on September 1, 1988; the sale had been held July 28, 1988. The purchaser transferred the property to the present owner, reportedly her brother, on January 4, 1995. The present owner, who has been named a potentially responsible party (PRP) for the site, has not cooperated with the Respondents or with USEPA, instead demanding a significant amount of money for the placement of restrictions on the parcel. The Respondents have been unable to reach an agreement with the present owner so USEPA is working on obtaining the necessary restrictions. The implementation of and compliance with land and groundwater use restrictions are necessary on these parcels to protect human health and the environment because groundwater within the slurry walls has concentrations that exceed maximum contaminant levels (MCLs).

There are also small parts of two adjacent properties that have been placed within the fence surrounding the site that still require restrictions. At this time neither the Respondents nor USEPA has obtained deed restrictions on these parcels.

The Respondents have obtained an access agreement from the landowner of the property to the west of the site. No contamination is present on this parcel.

The Remedial Action Report for the second operable unit was accepted by USEPA on September 30, 2004. The work that has been done at the site by the Ninth Avenue Respondents has been done in accordance with the NCP and the UAOs that have been issued.

Monitoring and Operating and Maintaining the Remedy

The Respondents have operated the SVE system, which withdraws contaminated gas from the soil under the cap and destroys the contaminants before the gas is discharged to the atmosphere. It was modified in May 1999 by converting the thermal oxidation system to a catalytic oxidation system in order to reduce costs associated with natural gas usage.

During operation, the SVE system has been monitored by periodically taking and analyzing samples of the combined gas being extracted from the eight extraction wells in the primary containment area and samples of the gas being exhausted from the treatment unit; there are also eight injection wells where air is pumped under the cap. The exhausted gas has always been below the required levels for the contaminants. The main chemical of concern in the extracted gas has been vinyl chloride. The concentrations of this substance have required the operation of the gas treatment system for the extended period it has been operated. The concentration of vinyl chloride that could be exhausted without treatment (the MAC or maximum allowable concentration) was determined for the current site configuration (the location and height of the stack) and several alternate configurations based on an acceptable risk criterion of 10^{-6}.

The SVE system was shut down October 2, 2002 in order to evaluate what had been accomplished and to obtain data for the design of the final phase of the operation of the system, which was to be a passive operation, if it were determined that this change should be made. Based on the results, it was decided to proceed to the passive system. The active system was restarted on July 20, 2005 to clear out the gases accumulated under the cap during the shutdown, with the intention of installing the passive system during Fall 2005; gas samples were taken July 29, 2005. The wells that were used for air injection will be equipped with turbine ventilators and will be the extraction wells. The former extraction wells, now equipped with one-way valves, will become the air inlet wells.

Concentrations of various substances have been analyzed for in six perimeter wells (around the outside of the slurry wall surrounding the primary containment area) for the past several years. At present, only chloride in the perimeter wells and chloride, total dissolved solids (TDS), and total organic carbon (TOC) in two wells in the containment area (former groundwater extraction wells) are analyzed for annually. Every two years and every four years additional parameters are analyzed for in these wells and in three of the SVE wells, which were air injection wells under the active operation of the SVE system. The concentrations of chloride in the perimeter wells are used as an indicator for possible leakage through the slurry wall.

There have been no serious problems with the maintenance of the site. There have been some minor problems with vandalism and theft at the site, which is in an area that is quite deserted in the evening and at night. None of the damage has resulted in any threats to human health and the environment. To make it easier to monitor the site, the building has been equipped with alarms activated by motion detectors and a video surveillance system has been installed at the site.

The water in the pond inside the outer slurry wall but outside the containment area is controlled by pumping water to the river when necessary.

V. Progress Since the Last Five-Year Review

In September 2000, USEPA and the Indiana Department of Environmental Management approved changes in the groundwater monitoring program. These changes were made because it was determined that not as much monitoring was needed since the concentrations were changing slowly and because it was believed that monitoring the chloride concentration outside the slurry wall was sufficient to determine if the wall was leaking.

The Respondents were given permission to shut down the SVE system so that the condition of the site could be checked and the manner in which the system should be operated in the future could be studied. The SVE system was shut down in October 2002 and testing was begun. In March 2005, after the testing was completed, the Respondents were given approval to change the SVE system to passive operation.

The recommendation in the previous five-year review report that the groundwater use restrictions and remedial action protections be placed on the parts of the site for which these have not been obtained be vigorously pursued has not been accomplished.

VI. Five-Year Review Process

Administrative Components

The IDEM support agency coordinator and the Respondents were officially notified on August 8, 2005 that this five-year review was to take place; they were already aware that the review was to take place. The review consisted of: a review of past documents, including those documents that provided the history of the site; an examination of the monitoring reports prepared since construction was completed and the data that they presented; notification of the community that the review was to take place; site inspection; and report preparation and review.

Community Notification and Involvement

An advertisement was in the *Post-Tribune* in Northwest Indiana on August 5, 2005 to inform the public of the upcoming review. In the advertisement, the public was told that comments concerning the site could be submitted until August 22, 2005. The advertisement also told them briefly what remedy was implemented at the site and where the repository is located. No comments were received as a result of the advertisement.

A notice will be sent out informing the public of the completion of the review and the availability of the report once the report is signed. A copy of the report will be placed in the repository.

Document Review

For this review, the "Shut Down Test Results, 9th Avenue Program", January 15, 2005, was the primary report from the Respondents that was used. The RODs, the ROD Amendment, the ESD and the remedial investigation and two feasibility study reports have also been consulted.

Data Review

The water level had been lowered to 10 to 12 feet below the surrounding ground surface during the dewatering operation that took place as the cap was being installed. However, the water levels under the cap in the primary containment area rose to about the levels outside the outer slurry wall after the cap was installed and have remained at these levels, which are higher than

had been hoped for when the system was designed. Why the levels are this high has not been determined. The level is generally higher than the groundwater level outside the slurry wall at the downgradient side of the containment area, but lower than the outside groundwater at the upgradient side. These levels are being followed regularly. No attempt has been made to lower the level since the cover was installed because of the difficulty of disposing of water from under the cap due to the high salt content, because the SVE system has been removing contaminants at a good rate despite the high water levels, and because there have been no signs of water escaping from under the cap. Switching to the passive operation of the SVE system will decrease the desire to have a greater vadose zone height under the cap because the primary purpose of the passive operation is to allow the gas pressure to be near atmospheric pressure while also allowing some oxygen to enter the area; during active operation the primary purpose was removal of contaminants.

Modeling of the groundwater indicates that the concentrations of vinyl chloride, the substance of greatest concern because of its mobility and toxicity, in the PCA will begin to decrease within about 25 years. The modeling also indicates that it will not migrate outside the PCA during that time. Then, as the concentrations decrease, the probability of vinyl chloride passing outside the slurry wall will continue to decrease.

Perimeter monitoring was conducted in September 2002 and September 2004. Generally the concentrations of the various parameters in the perimeter wells have remained unchanged or have been decreasing. There have been no indications that water has been moving through the slurry wall to the outside groundwater. The results of the analyses of the samples from the former groundwater extraction wells in the primary containment area and the three SVE wells show that the remedial operations have reduced the concentrations of chemicals of concern under the cap.

The SVE system has performed very well with generally only minor downtimes due to maintenance and replacements of components.

The highest gas concentrations under the cap are near the extraction wells. These concentrations were generally about two to three orders of magnitude greater than those at the injection wells during the shut down test. During this test the total concentrations of volatile organic compounds (VOCs) in the extraction wells decreased in all but one of the wells, the well with the lowest concentrations at the start of the test. During the test the concentrations in the injection wells remained approximately the same or increased in all except one well.

The presence of methane and carbon dioxide in the extracted gas and the significant reductions in the concentrations of oxygen below the concentrations present in air during active operation indicated that, besides the SVE system removing VOCs by sweeping them out, the system was further reducing the presence of organic substances by aerobic and anaerobic degradation. Because of the low amount of oxygen in the extracted gas and a desire to maintain an aerobic atmosphere in at least the areas where the extracted gas was passing, it was decided during the operation of the active system to operate it on a continuous basis rather than periodically. Periodic operation might be done to reduce costs under conditions where the concentrations of organics in the extracted gas become low when the system is operated continuously because of limited ability to reach and volatilize the contaminants.

It was decided to go to the passive system because it was no longer necessary to treat the exhausted gases to meet the risk requirements at the site fence and on the site. Because the concentrations of the organics are highest in the gas at the present extraction wells it was decided to install the passive system in a manner in which the present injection wells become the extraction wells. This will result in the air that is flowing into the space under the cap entering where the

contamination is at the highest level.

Site Inspection

The site was inspected on September 9, 2005. The remedial project manager, the state project manager, and representatives of the Respondents conducted the inspection.

The site is in good shape. There is heavy vegetation on the site, particularly on the landfill cover. Presently, the soil vapor extraction system is operating again in order to decrease the level of contaminants in the gas under the cover. This fall this active extraction system will be replaced with one driven by turbine ventilators. Prior to the installation of the ventilators, the cover will be mowed. It has not been mowed in the past.

Response to Comments

No comments were received.

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. Generally, the contaminant levels are decreasing and the contamination is being contained. The RCRA subtitle C cap is currently achieving the remedial objective of minimizing the migration of contaminants to groundwater and surface water and preventing direct contact with, or ingestion of, underlying contaminants. There is no evidence of cap breach or inconsistent use of the site. The slurry wall is achieving the remedial action objective of containing groundwater contamination. The SVE system is achieving the remedial action objective of reducing the contaminant levels.

The implementation of restrictions that prohibit interference with the cap and the use of groundwater under the site is necessary for the remedy to be protective of human health and the environment in the long term and for the remedy to function as intended because groundwater inside the slurry walls has concentrations that exceed MCLs. Deed restrictions have been obtained for most, but not all, of the site. See the discussion above in the Remedy Implementation subsection.

USEPA has no information on the costs of operation and maintenance at this time.

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 at the site that would affect the protectiveness of the remedy. The site is being used as anticipated (that is, the site is not being used). Therefore, new exposure assumptions are not needed at this time. The remedial action objectives are still valid.

The applicable or relevant and appropriate requirements (ARARs) that are still of interest for the site have to do mainly with requirements related to monitoring, groundwater contamination, and air emissions. The ARARs were discussed in the FSR ROD and the ROD Amendment. No new requirements that would be more stringent than those that have already been identified have been discovered that, if the remedy were being selected at this time, might have to be designated as ARARs.

The deed restrictions that have been imposed, up to this time, on part of the site prohibit residential, commercial, or agricultural use of the properties until the final approval by USEPA of the completion of all remedial action and the achievement of all cleanup and performance standards. Until this same time, there shall also be no use of the properties that would allow the continued presence of humans at the properties other than for the implementation of remedial action work or maintenance work.

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 suggest that the selected remedy is not protective in the short term. But because the required ICs have not been fully implemented, the protectiveness of the remedy is not assured in the long term. Full implementation of ICs should ensure the long-term protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed and the site inspection and discussions with the Respondents, the remedy is functioning as intended by the two Records of Decision, the Record of Decision Amendment, and the Explanation of Significant Differences. There have been no changes in the physical conditions at the site that would affect the protectiveness of the remedy.

VIII. Issues

The main issue that has been identified for this site is the fact that not all of the deed restrictions and access agreements have been implemented.

IX. Recommendations and Follow-Up Actions

Issue	Recommendation and Followup Action	Party Responsible	Oversight Agency	Milestone Date	Affects Current Protectiveness	Affects Future Protectiveness
Waste disposal area w/o deed restrictions. Owner has not implemented restrictions.	Develop IC Plan to implement land and groundwater use restrictions	EPA	EPA	6 mo	No	Yes
Waste disposal area w/ deed restrictions	Evaluate effectiveness of deed restrictions	EPA or PRPs	EPA	6 mo	No	Yes
Areas within site but not within original disposal area	Develop IC Plan to implement land and groundwater use restrictions	EPA	EPA	6 mo	No	Yes

The deed restrictions and access agreements that are missing must be implemented. Because of the difficulties that have been encountered in the past trying to establish these institutional controls and the apparent uncertainties as to what should be done, a reliable estimate as to when this can be accomplished is difficult. However, an IC Implementation Plan will be developed by March 30, 2006.

X. Protectiveness Statement

The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. The remedy is not protective of human health and the environment in the long term since some of the institutional controls that are needed to prevent future exposure to, or ingestion of, contaminated groundwater, exposure to the contents of the waste disposal area, and residential, commercial and agricultural use of the property have not been implemented. Threats at the site have been addressed through capping, vapor extraction, maintenance of the site, and monitoring of the groundwater and exhaust gases.

XI. Next Review

The next five-year review for the Ninth Avenue Dump site is required in September 2010, five years from the date of this review.

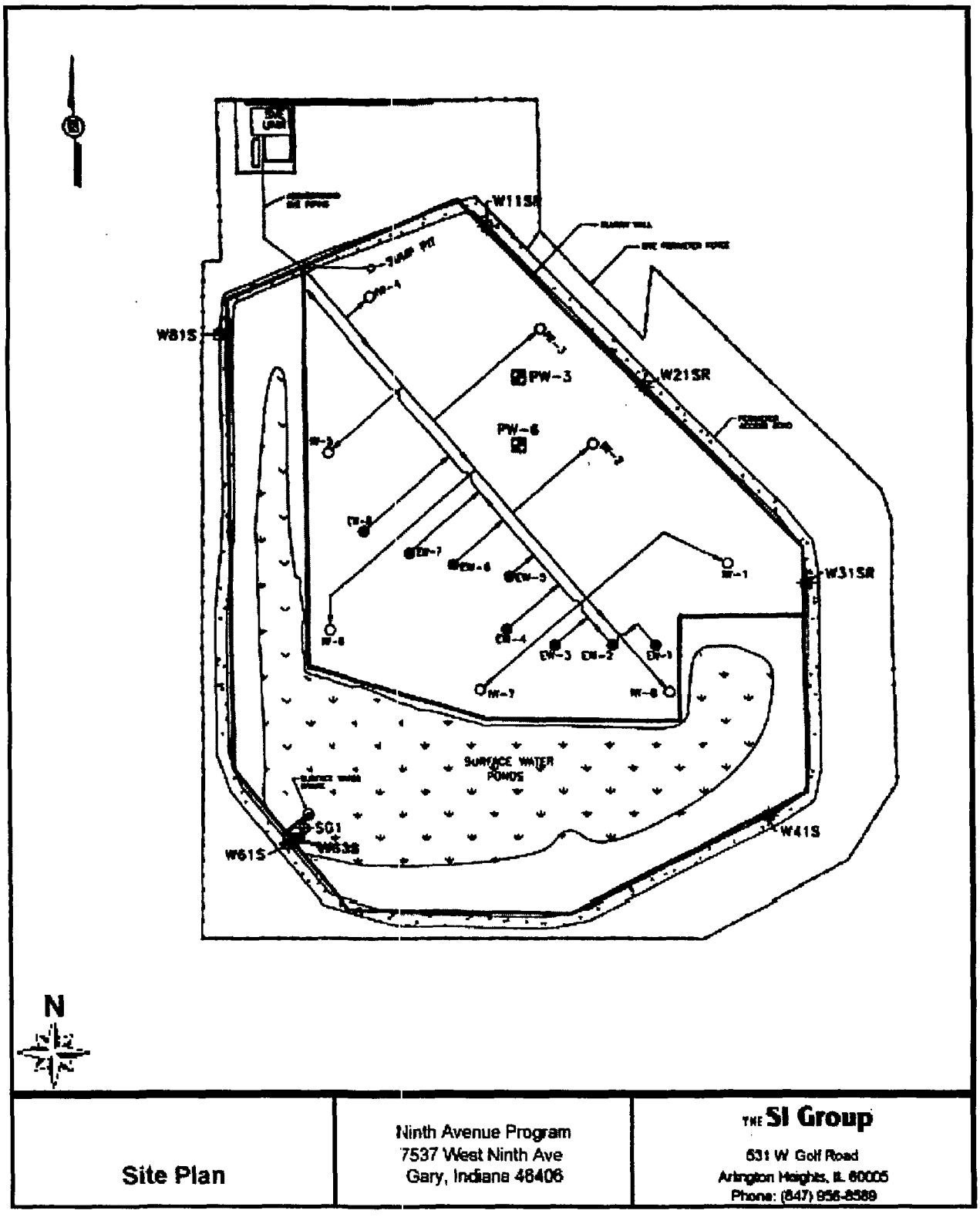

Figure 1. Site Plan Showing Well Locations