UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

STATEMENT OF BASIS

For

Proposed Soil and Groundwater Cleanup

At

ASHLAND CHEMICAL COMPANY
14303 Paxton Avenue, Calumet City, Illinois
ILD 043 369 446

U.S. ENVIRONMENTAL PROTECTION AGENCY
STATEMENT OF BASIS
For Proposed Cleanup at
ASHLAND CHEMICAL COMPANY
14303 Paxton Avenue
Calumet City, Illinois
ILD 043 369 446

INTRODUCTION

This *Statement of Basis*, issued by the U.S. Environmental Protection Agency, explains the proposed remedy for cleaning up hazardous contaminants at the Ashland Chemical Company (Ashland) facility in Calumet City, Illinois (the Facility), as required under Section 3008(h) of the Resource Conservation and Recovery Act (RCRA). This *Statement of Basis* also summarizes the other alternative remedies that were analyzed for this facility. EPA will select a final remedy for the Facility only after the public comment period has ended and EPA has reviewed and considered the information provided by the public during this period.

EPA is issuing this *Statement of Basis* as part of its public participation responsibilities under the RCRA. The public comment period for the *Statement of Basis* begins on ___ and ends on ___ . Information describing how interested persons may comment on this document can be found on pages ___ and ___. This document summarizes detailed information from the *RCRA Facility Investigation Report*, the *Corrective Measures Study*, and other pertinent documents contained in the Administrative Record for the Ashland Facility. EPA encourages the public to review these documents to gain a more comprehensive understanding of the facility and the RCRA investigation and cleanup activities that have already been conducted by Ashland.

Following the public comment period, EPA will respond to all of the significant comments and select specific remedies in a document called the *Final Decision and Response to Comments.* EPA may modify the proposed remedy or select another remedy based on new information or a re-evaluation of existing information or public comments. Therefore, the public is encouraged to review and comment on all alternatives.

Ashland will then prepare and submit a document for EPA approval titled *Corrective Measures Implementation Plan* that describes in detail how the corrective measures will be constructed and implemented. Ashland will implement the plan upon approval by EPA. The plan will include a schedule completing each of the required tasks, including submitting Ashland's *Operation, Maintenance and Monitoring Plan* for EPA approval.

PROPOSED REMEDY

EPA is proposing that Ashland implement the following remedy at the Facility to address contaminated soils and groundwater at the Facility:

- Excavate contaminated soils from SWMU-F6 and dispose of them at an off-site landfill;
- Excavate contaminated soils from AOC-1 and dispose of them at an off-site landfill;
- Establish institutional controls to prohibit the installation of groundwater supply wells at the Facility, and protect construction workers from exposure to contaminated subsurface soils and groundwater at the Facility;
- Monitor natural attenuation of groundwater contamination to assess the effectiveness of removing the sources of the groundwater contamination, and monitor the long-term stability and natural attenuation of the contaminants in the groundwater; and
- Demonstrate that Ashland will have adequate funds to complete the construction as well as operation and maintenance of the selected remedy.

A more detailed discussion of the proposed remedy begins on page 14.

FACILITY BACKGROUND

Location and History

Ashland currently owns the Facility located at 142nd and Paxton Avenue, Calumet City, Illinois. Figure 1 presents the site location map. The Ashland Facility is bordered by the Little Calumet River on the north. A recreational boat launch, dock and marina is located immediately east of the Facility. A park is located to the west, and residential and commercial properties are located south of the Facility. The entire Facility occupies approximately 55 acres in Section 1, Township 36 North, Range 14 East, of Cook County, Illinois. This Facility consists of the active Ashland plant and the former Fina Site.

Ashland began operations on the 9-acre eastern portion of the Facility in 1965. Ashland used reactor units to manufacture acrylic, phenol-formaldehyde and polyester resin. Ashland purchased the adjacent, approximately 46-acre Fina Site in 1997. Based on records provided by Ashland, the former Fina Site was operated from 1949 until 1990. The former Fina plant manufactured chemicals including formaldehyde, aqua ammonia, hexamine, and polyethylene emulsion from the beginning of plant operation until 1989. Between 1970 and 1977, the former Fina plant also manufactured polystyrene plastic. Ownership of the former Fina Site has changed during the course of its operational history.

- Spencer Chemical Company owned the 46-acre Site until 1963.
- Gulf Oil Corporation purchased and operated the entire Site until 1968, when Cosden Chemical bought the property.
- From 1970 to 1977, Cosden manufactured polyethylene emulsion production and polystyrene plastic.
- In 1977, Rohm and Haas Corporation purchased the process information and the equipment to manufacture polyethylene emulsion, but Cosden still owned the property.
- Rohm and Haas discontinued its use of the polyethylene emulsion equipment in 1989.
- Cosden continued its polystyrene plastic manufacturing operations on a portion of the property Cosden until 1990.
- Cosden changed its name to Fina in 1986 and dismantled the plant in 1990.
- In 1997, Ashland purchased the adjacent 46-acre Fina property and combined it with its 9-acre site, for a total of 55 acres.

Hydrogeological Setting

The facility is relatively flat with a noticeable drop toward the Little Calumet River. Fill, clays and silty clays are present across the site, down to 58 feet below the ground surface. Bedrock at the Facility is overlain by the fill and unconsolidated glacial material. The shallow sand and gravel perched shallow groundwater is in the unconsolidated sand and fill materials that are present from 0 to 8 feet below the ground surface. An approximately 40-foot thick low permeability clay layer act's as an aquitard between the shallow perched groundwater and the bedrock aquifer. There is no hydraulic connection between this shallow perched water and the bedrock aquifer. The shallow perched water zone is referred to as the hydrostratigraphic unit and is the unit of concern at this facility. The general direction of the shallow perched groundwater flow is in a northern direction toward the Little Calumet River, and the average depth to groundwater is approximately 3.75 feet below ground surface.

Ecological Setting

The site is developed and is covered by buildings. The ground surface, a rubble fill, is so disturbed and of such poor quality that vegetation growing on-site consists primarily of invasive and opportunistic herbaceous and woody plants. Although there are no permanent aquatic habitats on-site, the Little Calumet River borders the site to the north. In general, the limited habitats have been heavily influenced by historical land use.

Corrective Action Process

EPA and Ashland entered into an Administrative Order on Consent in 1998 to begin the corrective action process. In March of 1999, Ashland submitted a work plan for a Release Assessment Investigation of both the Fina site and the Ashland site. Ashland submitted a *Release Assessment Report* in 2000, which identified 12 Solid Waste Management Units called SWMUs A1 through A6, and F1 through F6, as well as two other Areas of Concern, called AOC-1 and AOC-2. Ashland submitted a *RCRA Facility Investigation* report in 2003. During a

July 16, 2003 site visit, EPA observed stained surface soil at AOC-1 on the former Fina portion of the property. EPA determined that Ashland had not completely investigated AOC-1 and directed Ashland to perform a supplemental RFI, which was completed in 2005. Ashland submitted its *Corrective Measures Study* report in 2007 to propose corrective measures for the past releases of hazardous contaminants.

Interim Measures Taken

Based on file records (*ENSR. 1989. Potential Adverse Human Health Effects from Residual Chemicals following remediation at Cosden Chemical's Polystyrene Facility),* and prior to Ashland Chemical's purchase of the former Fina site in 1989, Fina excavated SWMU-F6 to remove much of the soil that made up the original earthen pit. Fina removed approximately 1,000 cubic yards (27,000 cubic feet) of soil from SWMU-F6 and disposed of it off-site. After the excavation, six soil samples were collected and analyzed for ethylbenzene and styrene. Ethylbenzene and styrene were detected at 47 mg/kg and 15 mg/kg. Additional samples were collected in 1995 and analyzed. Only ethylbenzene was detected above the Illinois Tiered Approach to Corrective Action Objectives (TACO). Groundwater samples from the SWMU-F6 area also had detection of 1.8 mg/l styrene and 0.080 mg/l. The eastern portion of the earthen pit was excavated to a depth of four feet, while the western portion of the pit was excavated to a depth of six inches. Upon completion of soil removal activities, Fina backfilled the excavation with clean fill. This removal activity was performed under the Illinois Environmental Protection Agency (IEPA) oversight.

SUMMARY OF FACILITY RISKS

Investigation Results

Based on our review of the *Release Assessment Report* that Ashland submitted in 2000, as well as the July 16, 2003 site visit, EPA determined that there were no past releases at SWMUs A1 through A-6, F1, F2, F5, or AOC-2 that might pose potential risks to human health and the environment, and that Ashland's *RCRA Facility Investigation* should focus on SWMUs-F3, F4, F6, and AOC-1. On the 9-acre area eastern portion of the Facility, Ashland identified six SWMUs (SWMUs-A1 through A6). On the 46-acre area of the former Fina operations, Ashland identified six additional SWMUs (SWMUs F1 through F6) and one other Area of Concern (AOC-1). Ashland assessed the potential for releases from each SWMU and AOC-1 and sampled the soil and groundwater. Based on Ashland's investigation, EPA determined that the only releases which posed a potential risk to human health and the environment were at SWMU-F6 and AOC-1.

SWMU-F3 is a wastewater treatment system that was first operated in 1970. It was used to manage wastewater from chemical and polystyrene manufacturing. It consisted of a 6,300 cubic-foot equalizing basin, a 10,300 cubic foot clarifier, and two concrete sludge basins of 13,500 and

15,750 cubic feet. The sludge basins were dirt lined prior to 1980. The equalization basin and the clarifier have been inactive since 1989.

SWMU-F4 is a 20,000-gallon above ground tank that was used for storing a hazardous by-product called ethylbenzene-styrene. This tank was used from 1980 to 1990.

SWMU-F6 is a former earthen-lined "blow-down" waste dump pit located on the former Fina property immediately south of the polystyrene suspension process building (See Figure 2). The pit is approximately 25,000 square feet in size. The pit was used to accumulate hazardous blow-down waste from the polystyrene suspension process. The waste consisted of suspension water that contained detergent, liquid styrene monomer, butyldiene rubber, ethylbenzene and polystyrene plastic. From 1970 to 1980, process blow-down waste drained to the dump pit via concrete conduits in the building. In 1980, the earthen pit was replaced with a two foot deep (approximate) concrete pit. The concrete pit is located approximately 18 feet south of the polystyrene suspension building.

AOC-1 is located on the northwestern portion of the former Fina property. AOC-1 formerly contained a group of four above ground storage tanks including three approximately 850,000 gallon tanks used to store styrene and one 80,000 gallon tank used to store ethylbenzene. Ashland described clay berms surrounding the tank areas. Figure 3 identifies Tank Areas 1, 2, 3, and 4. Tank Areas 1, 2, and 3 were used for styrene storage. Tank Area 4 was used for ethylbenzene storage. Ashland also reported that records indicate there might have been a fourth styrene storage tank located in AOC-1 at one time.

Based on Ashland's August 2003 RFI Report which provided modeling data, EPA issued an Environmental Indicator Determination in September 2003 that Ashland has controlled migration of contaminated groundwater at the Ashland facility. Modeling data provided by Ashland also showed that groundwater discharges from the Ashland facility would not impact the sediments in the Little Calumet River. Subsequent groundwater monitoring data that Ashland collected in 2005 supported the modeling data which indicated contaminated groundwater was not released to the Little Calumet River and that contaminated groundwater has remained within the Ashland facility boundary. Also, in October 2004, EPA issued another Environmental Indicator Determination that current human exposure at the Ashland facility was controlled. Full detail of the Environmental Indicator Determination can be found in the Administrative records.

During the *RCRA Facility Investigation*, soil, groundwater, and any other affected media were sampled, and the results are compared against human health and/or ecological screening criteria. If certain chemicals were above the screening criteria, those chemicals were assessed further in the human health and ecological risk assessments. At the Ashland Facility, Illinois EPA's Tiered Approach to Corrective Action Objectives (TACO) rules (35 IAC 742) were utilized, as well as other EPA-approved risk methodologies. TACO is the Illinois EPA's health risk-based method for developing remediation objectives for contaminated soil and groundwater. This section describes how soil and groundwater samples taken at SWMUs F-3, F-4, F-6 and AOC-1 compare

with the TACO standards. With EPA's approval, Ashland used TACO to identify risks and develop remediation objectives for contaminated soil and groundwater at the Facility.

TACO offers a tiered approach to developing remediation objectives based on the site-specific conditions and the remediation goals for the site. In the Tier 1 approach, the property owner compares site sample analytical results to pre-calculated baseline remediation objectives presented in "Look-up Tables" for inhalation, ingestion, and migration. [The Look-up Tables are found at Section 742 Tables A and B: Tier 1 Soil Remediation Objectives (SROs), and can be viewed at www.ipcb.state.il.us]. If the remediation objectives in the Look-up Tables are exceeded, then the property owner also may take into account certain facility-specific considerations. A Tier 2 risk evaluation involves deriving site-specific ROs using site-specific data in the equations that were used to generate Tier 1 ROs. In a Tier 2 risk evaluation, the exposure assumptions used in the Tier 1 equations are not modified. The remediation objectives for the Ashland facility are based upon the Tier 1 objectives in some situations. In other situations, facility-specific risk factors were evaluated in Tier 2 to develop appropriate cleanup standards for this Facility.

Tables1 and 2 below summarizes the findings of the RFI and the human health risk assessment for the two contaminated areas at the Facility. A more detailed breakdown of the findings and their implications can be found under the section entitled "Human Health Risks".

Table 1: Summary of Soil Sample Results

Area Name	Contaminant of Concern	Results (mg/kg)	TACO Tier 1 Soil Remediation Objective for Residential Properties (mg/kg)	TACO Tier 1 Soil Remediation Objective for Routine Exposure of Industrial Workers to Surface Soils (mg/kg)	TACO Tier 1 Soil Remediation Objective for Exposure of Construction Workers to Subsurface Soils without Special Safety Precautions (mg/kg)
SWMU-F3	Total Chromium	380	230	420	690
SWMU-F4	Total Chromium	410	230	420	690
	Total Lead	14	400	800	700
SWMU-F6	Ethylbenzene	280	400	400	58
	Styrene	**3000**	685	1500	430
AOC-1	Total Petroleum Hydrocarbons	**9,900**	Not Applicable	Not Applicable	Not Applicable

The results seen in Table 1 show that the only contaminants of concern in SWMU-F3 and SWMU-F4 were chromium and lead, and that the levels were not above the relevant TACO standards for industrial land use.

Table 2: Summary of Groundwater Sampling Results

Area Name	Contaminant of Concern	Highest Level Detected (mg/kg)	TACO Tier 2 Remediation Objective for Protecting Surface Waters (mg/kg)	Class II Groundwater Standard (mg/kg)
SWMU-F6	Ethylbenzene	53	53	1.0
	Styrene	16	16	0.5

Ethylbenzene and styrene are the only contaminants of concern at SWMU-F6. The concentration of ethylbenzene in groundwater ranges from 0.0012 to 53 milligrams per liter (mg/L), and concentration of styrene ranges from 0.0037 to 16 mg/L.

Ashland detected ethylbenzene and styrene in both shallow and deep soil samples at SWMU-F6. Ethylbenzene concentrations detected in soils ranged from 0.0084 to 280 milligrams per kilogram (mg/kg). Styrene concentrations ranged from 0.0075 to 3,000 mg/kg. Ashland detected ethylbenzene and styrene soil contamination within a depth of three to six feet below ground surface (bgs).

At AOC-1, Total Petroleum Hydrocarbon, Diesel Range Organics (TPH-DRO) (collectively, hydrocarbon) was considered as the contaminant of concern. Petroleum hydrocarbons represent complex mixtures of compounds, some of which are regulated constituents and some compounds are not regulated. A total of 12 samples were collected from AOC-1 by Ashland. Hydrocarbon was detected at an elevated level in a single soil split sample at (0-0.5 feet). Near Tank #3, hydrocarbon concentrations ranged from 2,100 to 9,900 mg/kg. These TPH-DRO levels detected were generally within the range that is acceptable by many states. Risk-based ROs for TPH have not been developed under the TACO rules. To further evaluate the hydrocarbon contamination, Ashland conducted additional sampling investigation of soil and groundwater in June and July of 2004 at AOC-1. Ashland did not detect any hydrocarbon, ethylbenzene or styrene in groundwater and soil samples. Based on these findings, it was determined that no further nature and extent investigation was warranted at AOC-1. It is reasonable therefore, to expect that the lack of continued presence of elevated hydrocarbon below the (0.5) foot depth, other than the one detected sample location, or in the underlying groundwater, hydrocarbon would not pose unacceptable risks to human and the environment.

Investigations conducted at SWMU-F6 identified ethyl benzene and styrene as the Constituents of Concern (COC) in the perched shallow groundwater 5 feet below ground surface (bgs). An approximately 40- foot thick low permeability clay layer act's as an aquitard between the shallow groundwater and the Silurian aquifer. The horizontal extent of the COCs as identified in the groundwater data are just south and west of the SWMU-F6 well within the Ashland boundary; and the vertical extent impacts are from the top of the water table (1-4 ft bgs) to the

top of the clay aquitard. This shallow groundwater is not hydraulically connected to the deeper aquifer and there is no evidence to suggest that it is affected by the COCs.

The concentrations in soil samples from SWMU-F6 also exceeded the Tier 1 contaminant standards for the "soil migration to Class II groundwater" route for both ethylbenzene (19 mg/kg) and styrene (18 mg/kg). This indicates that the contaminated soil is the likely source of the groundwater contamination. In order to calculate site specific standards, Ashland performed site specific modeling and determined that 1,060 mg/kg of ethylbenzene and 685 mg/kg of styrene would prevent exceedances of the Class II groundwater standards at this facility. TACO applies the soil saturation limit for individual organic chemicals to address concerns about contaminant sources and free products that might be present. The default (pre-calculated) soil saturation limit for ethylbenzene is 400 mg/kg. This level was used in Table 1 because it would be a more stringent cleanup level than the level of 1,060 mg/kg described above.

Ashland detected a hot spot location at boring BH-39 (3-4 feet below ground surface) where detected concentrations of styrene from 1700 mg/kg to 3,000 mg/kg exceeded the default soil saturation limit for styrene as given in TACO (See Figure 4). The default (pre-calculated) soil saturation limit for styrene is 1500 mg/kg, but that would be less stringent than the level of 685 mg/kg, which was used in Table 1. The 685 mg/kg cleanup level was derived from the calculation of soil remediation objectives (SRO) and groundwater remediation objectives (GRO) that are protective of hypothetical construction workers at the site.

TACO also requires that the total organic concentrations of all the contaminants from a single sampling point (whether they exceed the Tier 1 objectives or not) must not exceed the soil attenuation capacity. TACO provides a default value of 6000 mg/kg as the saturation level for the total of the organic contaminants in soils within the top meter, and 2000 mg/kg for soils below one meter of the surface. The value of 6000 mg/kg was used in Table 1 because the concentration of total hydrocarbons exceeded the default value in one sample at AOC-1. The risk evaluation indicated that the 600 mg/kg cleanup level will be consistent with current land use and will be protective of the environment.

Human Health Risks

After contaminant levels were identified in the *RCRA Facility Investigation*, Ashland performed a human health risk assessment to determine whether health problems could result if the contamination was not cleaned up. Human health risks are identified when there is a pathway for humans to be exposed to toxic contaminants. These risks can be controlled by preventing humans from being exposed to unacceptable concentrations of the contaminants.

Chromium and lead are contaminants of concern at SWMU-F3 and SWMU-F4. None of the contaminant levels in the soil samples taken from SWMU-F3 and SWMU-F4 exceeded the conservative TACO Tier 1cleanup criteria for soil contamination (see Table 1). Accordingly, those two areas are considered safe for the typical human exposures that are associated with industrial land use.

Ethylbenzene and styrene are contaminants of concern at SWMU-F6. The International Agency for Research on Cancer has determined that ethylbenzene is a possible human carcinogen. Exposure to high levels of ethylbenzene in air for short periods can cause eye and throat irritation. Exposure to higher levels can result in dizziness. Irreversible damage to the inner ear and hearing has been observed in animals exposed to relatively low concentrations of ethylbenzene for several days to weeks. Exposure to relatively low concentrations of ethylbenzene in air for several months to years causes kidney damage in animals.

The International Agency for Research on Cancer has determined that styrene is also a possible human carcinogen. People who breathe high levels of styrene (more than 1000 times higher than levels normally found in the environment) may experience nervous system effects such as changes in color vision, tiredness, feeling drunk, slowed reaction time, concentration problems, or balance problems.

None of the ethylbenzene concentrations in the soil samples taken from SWMU-F6 exceeded the TACO Tier 1 cleanup criteria for routine exposure to industrial workers (400 mg/kg), but some exceeded the corresponding standard for styrene (1500 mg/kg). Some of the samples also exceeded the standard for routine exposure for construction workers to ethylbenzene (58 mg/kg) and styrene (430 mg/kg) through the inhalation pathway (Table 1). Construction workers who dig below the ground surface might be exposed to subsurface contaminants, but industrial workers would generally be exposed only to contaminants in the soil near the surface.

The Illinois Environmental Protection Agency has designated the on-site groundwater as a Class II (General Resource) Groundwater, rather than a Class I (Potable Resource) Groundwater. Groundwater is not currently used for any purpose at the Facility, and it cannot be used for drinking water in the future. However, the concentrations of ethylbenzene and styrene in the groundwater near SWMU-F6 currently exceed the Class II standards (see Table 2). The apparent source of the groundwater contamination is approximately 270 cubic yards of contaminated soil.

Ashland's risk evaluation of a hypothetical exposure by construction workers indicated that the ethylbenzene and styrene in the shallow groundwater at SWMU-F6 may pose adverse impacts to construction workers. Accordingly, controls are needed to protect construction workers.

EPA and Ashland have not identified any local potable or industrial users of groundwater within a one-mile radius of the Facility. Calumet City has identified 19 groundwater users within its city boundaries, and there are additional groundwater wells in nearby Burnham. However, since Ashland's groundwater contamination is on-site near SWMU-F6, none of these groundwater users are exposed to Ashland's groundwater contamination (See Figure 6). Shallow groundwater is encountered at approximately 1-4 feet below the ground surface. The shallow groundwater discharges from the Facility to the intermittent storm water ditch south of the facility to the Little Calumet does not affect the groundwater quality in Calumet City or neighboring cities. Modeling data using the maximum detected concentrations showed that the ethylbenzene and styrene concentrations in the groundwater migrating to surface water were significantly lower

than the water quality standards. Those standards are based on the current designated use of "Secondary Contact Water" for the Little Calumet River from its junction with the Grand Calumet River to the Calumet-Sag Channel. Shallow groundwater at the Facility is recharged primarily by seasonal variations in precipitation and not hydraulically connected to the deeper aquifer system.

At AOC-1, the hydrocarbon level in one soil sample was 9,900, mg/kg which exceeded the TACO level of 6,000 mg/kg, based on saturation above the attenuation capacity of the soil. Risk-based remedial objectives for Total Petroleum Hydrocarbons (TPH) have not been developed under the TACO rules. TPH is a term used to describe a large family of several hundred chemical compounds that originally come from crude oil. It is likely that samples of TPH will contain only some, or a mixture, of these chemicals. The International Agency for Research on Cancer (IARC) has determined that one TPH compound (benzene) is carcinogenic to humans. IARC has determined that other TPH compounds, (benzo[a]pyrene and gasoline) are probably and possibly carcinogenic to humans. Most of the other TPH compounds are considered not to be classifiable by IARC. Some of the TPH compounds can affect the central nervous system. One compound can cause headaches and dizziness at high levels in the air. Another compound can cause a nerve disorder called "peripheral neuropathy," consisting of numbness in the feet and legs. Other TPH compounds can cause effects on the blood, immune system, lungs, skin, and eyes. Animal studies have shown effects on the lungs, central nervous system, liver, and kidney from exposure to TPH compounds. Some TPH compounds have also been shown to affect reproduction and the developing fetus in animals. The level of hydrocarbons detected in the soil is not expected to have any impact on the groundwater.

Ecological Risks

Ecological risks occur when a plant or animal can come in contact with a contaminant long enough and at a high enough concentration that the contaminant can cause an adverse effect. Quite often, bodies of water are important to the relations and interactions between plants and animals, and the pathways by which plants and animals can be exposed to the contaminants.

The ground surface at the Ashland Facility is so disturbed and of such poor quality that vegetation growing on-site consists primarily of invasive and opportunistic herbaceous and woody plants. There is no high-quality ecological habitat on the Ashland property that could be adversely affected by the soil contaminants. There are no permanent aquatic habitats on-site. Ashland conducted an assessment of the effect that the contaminated groundwater from SWMU-F6 might have on surface water in a nearby stormwater ditch connected to the Little Calumet River [See Figure 5]. However, modeling data using the maximum detected concentrations showed that the ethylbenzene and styrene concentrations in the groundwater migrating to surface water were significantly lower than the water quality standards. Those standards are based on the current designated use of "Secondary Contact Water" for the Little Calumet River from its junction with the Grand Calumet River to the Calumet-Sag Channel. Subsequent groundwater monitoring data collected in 2005 supported the modeling data. Thus, the current level of

groundwater contamination migrating toward the Little Calumet River does not pose a risk to surface water.

SCOPE OF CORRECTIVE ACTION

EPA's short-term goals for this site are:

a. Control all current human exposures to contamination at or from the facility. That is, Ashland establishes control so that significant or unacceptable exposures do not exist for all media known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above risk-based levels for which there are complete pathways between contamination and human receptors.
b. Stabilize migration of contaminated groundwater at or from the facility. That is, Ashland stabilizes the migration of all groundwater known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above acceptable levels so that the groundwater remains within any existing areas of contamination as defined by monitoring locations designated at the time of the demonstration. In addition, any discharge of groundwater to surface water is either insignificant or currently acceptable according to an appropriate interim assessment. Ashland must collect monitoring and measurement data in the future as necessary to verify that migration of any contaminated groundwater is stabilized.

Our short-term goals have already been achieved. On December 3, 2004, EPA determined that (a) above has been achieved, and on September 16, 2004, that (b) above has been achieved.

Modeling data provided by Ashland also showed that groundwater discharges from the Ashland facility would not impact the sediments in the Little Calumet River. Subsequent groundwater monitoring data that Ashland collected in 2005 supported the modeling data which indicated contaminated groundwater was not released to the Little Calumet River and that contaminated groundwater has remained within the Ashland facility boundary.

EPA's long-term goals for the remedy being proposed today are:

- Protecting human health and the environment;
- Attaining the applicable media cleanup standards;
- Controlling the sources of the releases to the extent practicable; and
- Managing all remediation waste in compliance with the applicable standards.

Returning usable groundwater to its maximum beneficial use wherever practical is a factor leading to the goal of protecting human health and the environment. At this facility, Ashland must monitor the groundwater contamination at SWMU-F6 to make sure that the contaminant levels do not increase, or cause any harm to surface waters. Ashland may request EPA approval to discontinue the groundwater monitoring if/when the Class II groundwater quality standards have been met.

Only institutional controls are needed to limit human exposures at SWMU-F3 and SWMU-F4. The soil cleanup standards for SWMU-F6 are 400 mg/kg for ethylbenzene, and 685 mg/kg for styrene. The soil cleanup standard for AOC-1 is 6000 mg/kg of hydrocarbons. Ashland has informed EPA that it intends to restrict the property to industrial use only. So, these standards are based upon restricting the Ashland property to industrial or commercial land use. The site cannot be converted to residential land use unless further cleanup is conducted. The standards are also based upon Ashland complying with its *Health and Safety Plan* for protecting on-site industrial workers and construction workers from unacceptable exposures unless they are using the appropriate personal protective equipment.

SUMMARY OF ALTERNATIVES

EPA uses four threshold criteria and five balancing criteria in the evaluation alternative remedies for selection. Any alternative that fails to meet the four threshold criteria are screened out form further consideration. The five balancing criteria are used to identify the remedy that provides the best relative combination of attributes. The four threshold criteria are:

1. Protection of Human Health and the Environment
2. Attain Media Cleanup Standards
3. Controlling the Sources of Releases
4. Compliance with Waste Management Standards

The five balancing criteria are:

5. Long-term Reliability and Effectiveness
6. Reduction of Toxicity, Mobility or Volume of Wastes
7. Short-term Effectiveness
8. Implementability
9. Cost

EPA's proposed remedy will include several of the alternative components being considered below. For example, EPA's proposed remedy for a certain area might include excavation to a certain action level or covering contaminated soil with clean soil to block exposure pathways for routine industrial workers, but deeper contaminated soils might be left in place. So, another component of the remedy would involve implementing a health and safety plan to assure that construction workers would use the appropriate personal protective equipment when digging down into the deeper soils that remain contaminated. Some alternatives are best implemented for the entire site rather than for specific units or areas, while other alternatives are best implemented for a specific unit or area only.

Site-wide Actions

For all SWMU- F6 and AOC1 alternatives excluding the No Further Action, the following actions must be taken at the facility:

Action 1: Implement and Maintain Institutional Controls
This alternative involves institutional controls to restrict the future use of the property to industrial or commercial land use and to restrict the use of on-site groundwater are needed to make sure that human exposure pathways in the future will not be substantially different from the exposure pathways that were described in the studies and reports, which serve as the basis for EPA's proposed remedies. In addition, Ashland must comply with its *Health and Safety Plan* to assure that industrial workers and construction workers are protected from unacceptable exposures unless they are using the appropriate personal protective equipment. Further removal of contaminants would be needed if Ashland does not wish to implement the institutional controls. Under this alternative, Ashland must submit its *Health and Safety Plan* to EPA for approval within 90 days after EPA issues the *Final Decision and Response to Comments*, and Ashland must negotiate an agreement with EPA under the Illinois *Uniform Environmental Covenants Act* to restrict the land use and the use of groundwater within 180 days after the issuance of the *Final Decision and Response to Comments*.

Action 2: Monitored Natural Attenuation of Contaminated Groundwater
This alternative involves monitored natural attenuation to assess the effectiveness of removing the sources of the groundwater contamination, and to monitor the long-term stability and natural attenuation of the contaminants in the groundwater. The long-term cleanup standards for groundwater at the facility are the Illinois Class II Groundwater Quality Standards; the contaminant concentrations in groundwater near SWMU-6 currently exceed those standards for ethylbenzene and styrene. Ashland must monitor the groundwater contamination at SWMU-F6 to make sure that the contaminant levels do not increase, or cause any harm to surface waters. Ashland may request EPA approval to discontinue the groundwater monitoring if/when the Class II groundwater quality standards have been met. Ashland will develop a plan and submitted it to EPA for approval as part of the *Corrective Measures Implementation Workplan*.

Action 3: Financial Assurance
Adequate funds will be needed to cover the costs of the construction, as well as the operation, maintenance, and monitoring of the proposed remedy. Under this alternative, Ashland must provide EPA-approved financial assurance in an amount sufficient to cover the cost of the cleanup within 90 days after EPA selects the remedy and issues its *Final Decision and Response to Comments.* Ashland may demonstrate the adequacy of its financial assurance by using mechanisms that comply with EPA regulations at 40 Code of Federal Regulation 265 or 264 Subpart F. Those financial assurance mechanisms include financial trusts, surety bonds, letters of credit, insurance, or self-insurance as demonstrated by a financial test. Ashland may request that the amount of the financial assurance be reduced after successfully completing the construction, and annually during the operation and maintenance phase of the remedy.

The alternatives considered for SWMU-F6 and AOC-1 that meet the above five balancing criteria are described in the following sections. These proposed corrective measures are intended to address risks to human health and the environment under commercial/industrial land use scenarios. The table below summarizes the cost associated with each remedy alternative for each SWMU-F-6 and AOC-1

Media/Area of Concern	**SWMU-F-6**	**Remedy Alternatives**	**Cost**
On-site Soil		No Further Action	$0.00
		In-situ Chemical Oxidation (persulfate, Biox, Fenton)	$103,000.00
		Oxygen release Compound Technology	$115,000.00
		Air Sparging/ Soil Vapor Extraction	$309,000.00
		Electrical resistance heating	$200,000.00
		Limited Hot Spot Excavation and Treatment Disposal	$59,000.000
	AOC-1	**Remedy Alternatives**	**Cost**
On-site Soil		No Further Action	$0.00
		Limited Hot Spot Excavation and Disposal	$29,000.00

<u>SWMU-F6 Cleanup Alternatives</u>
A wide variety of alternative cleanup technologies for SWMU-F6 were considered in the 2007 *Corrective Measure Study* by Ashland.

Alternative 1: No Further Action
This alternative does not meet this project's media cleanup standard for styrene. Therefore, this approach is unacceptable.

Alternative 2: In-Situ Chemical Oxidation
This alternative involves the injection of oxidants and other chemical amendments directly into the area of contamination. Chemical oxidation has frequently been used to treat contaminated soil at sites contaminated with volatile organic compound and other hydrocarbons. Depending on the chemicals, the chemical oxidation treatment can either destroy the organic compounds or enhance biodegradation of the compounds or both. The oxidation process is relatively quick. For example, chemical oxidation with hydrogen peroxide and iron catalyst typically only requires days or weeks to remove the contaminants. The chemical oxidants considered for injection at SWMU-6 included:

(a) Fenton's Reagent
(b) BIOX
(c) Persulfates

Ashland conducted treatability tests using samples of site soils and groundwater to study how the chemical oxidants reacted with naturally occurring substances (e.g., organic matter, dissolved

iron). This information was used and other additional data was collected to accurately predict the amount of chemical amendment required for effective treatment. The treatability study showed that sodium persulfate or activated persulfate would successfully treat the shallow contamination at this small site. However, multiple oxidant injections could be required to reduce styrene concentrations to below the cleanup standard for this project. The Estimated cost for implementing Alternative 2 is $103,000.

Alternative 3: Localized Hot Spot Excavation and Off-site Disposal
This alternative involves excavation of contaminated soil and disposal at an appropriate off-site landfill. Excavation and disposal is commonly used for the remediation of VOC contaminated soils. An estimated 270 cubic yards of soil in the vicinity of subsurface borings BH-16, BH-39, and BH-58 would need to be excavated and disposed off-site to achieve the cleanup standard for this project; In addition, it might be necessary to pump groundwater out of the excavation to allow the work to proceed safely. The three 90-cubic yard excavations could generate 600 gallons of groundwater that would require treatment to remove contaminants. The contaminated groundwater would be treated at an appropriate wastewater treatment facility. The estimated cost of implementing Alternative 3 is $59,000.

Alternative 4: Enhanced Biological Remediation
This alternative relies on microbes to biologically degrade the contaminants naturally over time, provided the proper physiochemical conditions are present. However an insufficient oxygen supply can limit the effectiveness. The natural biological remediation process can be enhanced by injecting a compound that releases oxygen, such as magnesium peroxide. The estimated cost of implementing Alternative 4 is $115,000.

Alternative 5: Air Sparging and Soil Vapor Extraction
Air sparging is the injection of air below the water table to create bubbles or channels of air which strip VOCs from the soil or groundwater and carry them upward as vapors. In soil vapor extraction, a vacuum is applied to the soil above the air sparging location to collect and remove the vapors from the soil. The gas leaving the soil can then be treated to recover or destroy the contaminants. Air sparging and soil vapor extraction has been used to remediate contamination with volatile and semi-volatile organic compounds for many years. The long-term success is highly dependent upon the geologic conditions, the type of contaminant present, and the design of the system. The estimated cost of implementing Alternative 5 is $309,000.

Alternative 6: Electrical Resistance Heating and Soil Vapor Extraction
As its name suggests, electrical resistance heating uses electricity to heat soils or groundwater where contaminants are located. Electrodes are used to deliver the electricity. These electrodes can be installed either vertically to any depth or horizontally underneath buildings and operating facilities, and in the presence of buried utilities. Once the subsurface soil and groundwater reach the boiling point of water, subsurface steam production begins. As this steam moves through the groundwater table, it strips VOCs from the soil or groundwater. The steam can then be captured using soil vapor extraction, and can be treated to remove the contaminants. The estimated cost of implementing Alternative 6 is $200,000.

AOC-1 Cleanup Alternatives

The scope and effect of the contamination at AOC-1 is quite similar to the contamination at SWMU-F6 except that there is a different contaminant, that is less volatile and is found within the top six inches of soil. Based on the thorough analysis that Ashland conducted for SWMU-F6, Ashland screened out all but the following potential corrective measures for remediating the contamination at AOC-1:

Alternative 1: No Further Action
This alternative does not meet this project's cleanup standard for hydrocarbons. Therefore, this approach is unacceptable.

Alternative 2: Limited Hot Excavation and Off-site Disposal
This alternative involves excavation of contaminated soil and disposal at an appropriate off-site landfill. As discussed above, excavation of contaminated soils is used widely to cleanup hydrocarbon contamination. Limited hot spot removal will be performed in the immediate area surrounding AOC-1. The area of contamination is approximately 400 square feet wide (20 feet x 20 feet) but only 6 inches deep. Approximately 8 cubic yards of hydrocarbon contaminated soil will be excavated, transported, and disposed appropriately.

EVALUATION OF THE PROPOSED REMEDY AND ALERNATIVES

EPA's proposed remedy for SWMU-F6 and AOC-1 includes the following components:

- Alternative 3: Excavate contaminated soils from SWMU-F6 and dispose of them at an off-site landfill;
- Alternative 2: Excavate contaminated soils from AOC-1 and dispose of them at an off-site landfill;
- Action1: Establish institutional controls to prohibit the installation of groundwater supply wells at the Facility, and protect construction workers from exposure to contaminated subsurface soils and groundwater at the Facility;
- Action 2: Monitored natural attenuation of groundwater contamination to assess the effectiveness of removing the sources of the groundwater contamination, and to monitor the long-term stability and natural attenuation of the contaminants in the groundwater; and
- Action 3: Demonstrate that Ashland will have adequate funds to complete the construction as well as operation and maintenance of the selected remedy.

This Section profiles the attributes of EPA's proposed remedy against the nine remedy selection criteria, noting how it compares to the other options under consideration.

Protection of Human Health and the Environment

The overall protection of human health is addressed most effectively at the Ashland facility by the proposed remedy, including Alternatives 2, 3 and Actions 1 and 2, 3, and 4. The toxicity and volume of the contaminated soils remaining on-site will be reduced. Removal of contaminated soils will reduce further leaching of contaminants into the groundwater. Institutional controls will prevent potential unacceptable exposure of workers to contaminated soil and groundwater. Appropriate worker safety and health requirements for the proper handling of hazardous materials during remedial activities also will be required.

Attainment of Media Cleanup Standards

The excavation and removal of contaminated soils (Alternatives 2 and 3) will reduce the leachability of contaminants below the Media Cleanup Standards. Compliance with applicable groundwater protection standards would be addressed by monitoring the existing on-site wells to determine the efficacy of the remedial alternatives. Ashland will include a groundwater monitoring plan using existing wells to assess the compliance with the Class II groundwater standards for ethylbenzene and styrene. Other alternatives 4, 5 and 6 would take longer to achieve the media cleanup standards.

Controlling the Sources of Releases

The proposed remedy further enhances steps already taken by Ashland to control the sources of contamination. Ashland had previously removed approximately 1,000 cubic yards (27,000 cubic feet) of soil from SWMU-F6 and disposed of the contaminated soils off site. Upon completion of soil removal activities, the excavation was backfilled with clean fill. The additional removal of contaminated soil under Alternatives 2 and 3 will further reduce the amount of contaminants available to migrate to groundwater or surface water. Institutional controls and monitoring alone would not be very effective in stopping the leaching of contaminants through less-contaminated soils and to the groundwater.

Compliance with Waste Management Standards

Ashland must comply with all state and federal regulations that apply to the management of any remediation waste that is generated during the implementation of the remedy. Accordingly, Ashland must provide to EPA all documentation that will demonstrate the excavation, management, and off-site disposal of contaminated soils under Alternatives 2 and 3 will comply with State and Federal regulations. Of course, compliance would also be required if Alternatives 4, 5 and 6 were to be selected. Although the no further action alternative would not generate any remediation waste, it had to be screened out because it didn't meet the threshold criteria.

Long-term Reliability and Effectiveness

Excavation of contaminated soils has been used widely to remove volatile organic compounds such as ethylbenzene and styrene as well as hydrocarbon contamination. Implementation of the this remedy at other facilities so far has demonstrated that it is reliable, does not require operation and maintenance, and has a minimal risk of failure. Other alternatives would not be as reliable and effective.

Reduction of Toxicity, Mobility or Volume of Wastes

All of the alternatives for cleaning up contamination at SWMU-F6 and AOC-1 would reduce the toxicity and volume of the contaminated soils remaining on-site, and would reduce further leaching of contaminants into the groundwater. The *in situ* treatment remedies (such as Alternative 6) would not generate any significant amount of remediation waste that would have to be shipped off-site for treatment or disposal. The quantities of remediation wastes generated under the preferred alternatives (Alternatives 2 and 3) are not large amounts in comparison to cleanup projects at other sites.

Short-term Effectiveness

The proposed remedy provides the greatest improvement over the shortest period of time. The removal of contaminated soils provides immediate reduction of contaminants to groundwater and the nearby Little Calumet River. By removing contaminated soils from SWMU-F6 and AOC-1, ethylbenzene and styrene would be less likely to leach into the underlying water table and ultimately migrate into the Little Calumet River. Other alternatives have little if any immediate short-term effect.

Implementability

The excavation and disposal remedies do not require state or local approval. There may be local and state requirements regarding the format of the required deed restriction. There is adequate space available to operate the excavation equipment. Nearby landfills have adequate capacity for disposal of contaminated soils. Except for the no further action alternative, all of the alternatives that were considered are implementable. But the proposed remedy is as easily implementable as any of the alternatives.

Cost

Costs were estimated for each alternative. Costs could be considered in deciding between two or more corrective measure alternatives that were equally acceptable when evaluated for technical, human health, environmental and institutional criteria. Excavation and removal of localized hot spots will achieve the corrective action objectives in a cost effective manner and will allow continued productive use of the property. The cost for of the preferred alternative for cleaning up soil contamination at SWMU-F6 is $59,000.000 which is about 40 percent less than the second choice (Alternative 6) or $103,000,000. Although the cost is cheaper, it was not the determining factor in the selection,

In summary, excavation of localized hot spots and implementation of institutional controls provide the best balance of tradeoffs among the alternatives with respect to the evaluation criteria. The preferred alternatives protect human health and the environment and will effectively control the source of contaminants into the groundwater so as to reduce or eliminate further contamination. All applicable standards regarding groundwater protection and off-site waste management would be addressed under this proposal and complied with during the corrective measures implementation process.

12.0 PUBLIC PARTICIPATION

EPA solicits input from the community on the cleanup methods proposed in this document. The public is also invited to provide comment on alternatives not addressed in this *Statement of Basis*. EPA has set a public comment period from **Aug. 8, until midnight, Sept. 21, 2012,** to encourage public participation in the selection process. During the public comment period, EPA will accept written comments on the proposed action.
The public may submit written comments, questions and requests for a public meeting to the following address:

Jonathan Adenuga
U.S. Environmental Protection Agency

77 West Jackson Boulevard, LU- 9J
Chicago, Illinois 60604

The Administrative Record for the Ashland facility is available at the following locations:

Calumet City Public Library
660 Manistee Avenue
Calumet City, Illinois 60409
(708) 862-6220

Hours: Mon-Th	Fri – Sat	Sun (Sep - May)
10:00 a.m.- 9:00 p.m.	10:00 a.m. - 4:00 p.m.	12:00 noon - 4:00 p.m.

U.S. EPA, Region 5
Land and Chemicals Division Records Center
77 West Jackson Boulevard, 7th Floor
Chicago, Illinois 60604
(312) 353-5821
Hours: Mon-Fri, 8:30 a.m. - 5:00 p.m.

EPA will summarize and address all comments received during the public comment period in a *Final Decision and Response to Comments* document. The preferred remedy in the *Statement of Basis* is a preliminary determination. Should another option be selected as the remedy based upon public comment, new information, or a re-evaluation of existing information, any significant differences from the *Statement of Basis* will be explained in the *Response to comments*. The *Response to Comments* will be incorporated into the Administrative Record and made available to the public in the information repositories.