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EPA Superfund
Record of Decision:

MUSKEGO SANITARY LANDFILL
EPA ID: WID000713180
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MUSKEGO, WI
06/12/1992

DECLARATION

RECORD OF DECISION
SELECTED REMEDIAL ALTERNATIVE FOR
INTERIM ACTION SOURCE CONTROL OPERABLE UNIT
FOR MUSKEGO SANITARY LANDFILL

Site Name and Location:

Muskego Sanitary Landfill
Muskego, Wisconsin

Statement of Basis and Purpose:

This decision document presents the selected remedial action for the Muskego Sanitary Landfill located in Muskego, Wisconsin. The decision has been developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and in accordance with the National Oil and Hazardous Substance Contingency Plan (NCP). This decision is based on the Administrative Record for this site. The attached index identifies the items that comprise the Administrative Record, upon which the selection of the remedial action is based.

Assessment of the Site:

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

Description of the Selected Remedy:

The interim action source control operable unit addresses protection of ground water and exposure to soil contamination by reducing the risks posed by the site, through engineering and institutional controls. This remedy is consistent with the final remedy and overall clean-up of the site by addressing the principal threats posed by the site. The principal threats are direct contact to contaminated soils by workers or trespassers and ingestion of contaminated ground water at private wells. This remedy is described as follows:

- Deed restrictions and site controls that prevent access, excavation, and disturbance of the cap and installation of wells;
- Fence extension to contain areas not enclosed by currently existing fences;
- Cap installation over the portions of the site deemednecessary in the ROD according to Wisconsin Administrative Code NR 504 standards;
- Installation or upgrade of landfill leachate control systems at the site;
- Active landfill gas control and monitoring for the site;
- In-Situ(In-place) Soil Vapor Extraction at portions of the Non-Contiguous Fill Area of the site;
- Ground water monitoring of selected existing monitoring and private wells to be determined during the remedial design; and
- Operation and Maintenance of all systems.

State Concurrence:

The State of Wisconsin concurs with the selected remedy. The letter of concurrence is attached to the Record of Decision (ROD) package.

Declaration:

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technology to the maximum extent practicable for this site. Because this remedy will result in hazardous substances remaining on-site above health- based levels, a review will be conducted within 5 years after commencement of remedial action, to ensure that the remedy continues to provide adequate protection of human health and the environment.

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
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MUSKEGO, WISCONSIN

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SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
INTERIM ACTION SOURCE CONTROL OPERABLE UNIT

MUSKEGO SANITARY LANDFILL SITE
MUSKEGO, WISCONSIN

I. SITE NAME AND LOCATION

The Muskego Sanitary Landfill Superfund site occupies approximately 56 acres north of State Highway 24 (Janesville Road), and east of Crowbar Road in the City of Muskego, Waukesha County, Wisconsin. The site is located in Southeastern Wisconsin approximately fifteen miles southwest of the City of Milwaukee (see Figure 0). More specifically the site is southwest of the urbanized portions of the City of Muskego by roughly three miles. The Site includes three areas known as the "Old Fill Area", the "Southeast Fill Area" and the "Non-Contiguous Fill Area" (see Figure 1). The site also includes wastewater ponds associated with a former rendering plant complex (the "Anamax plant"). Those ponds are located east of the Non-Contiguous Fill Area. Portions of the property associated with the Anamax plant are also included in the Old and Southeast Fill Area boundaries. Directly north of the site is the Stoneridge Landfill, a closed and covered solid waste landfill, that is not part of the Superfund site. Land use to the west of the site is for sand and gravel excavation. To the south, east and north of the site, the land use is a combination of residential and agricultural. The area surrounding the Site is semi-rural, but is zoned to permit further development in the future. Several homes and businesses are in the vicinity of the property, and many were once served by individual private water supply wells. In the later 1980s, city water mains were extended into the area and several homes and businesses were connected. Currently, two residences southeast of the site are not connected to public water. These residences are indicated in Figure 1.

The Muskego Sanitary Landfill Site is situated on unconsolidated deposits that are up to 300 feet thick and are generally comprised of glacial till, outwash, and lacustrine deposits. Site investigative information and private well boring logs show layers

of fine-grained material (till and lacustrine deposits) south and east of the site to depths of about 70 to 200 feet and coarse grained material (outwash) below the till to depths of about 200 to 300 feet below land surface.

There are three principal sources of ground water in Waukesha County. In order of depth below the land surface they are; sand and gravel within the glacial drift, Niagara dolomite, and an underlying sandstone. In the Muskego area, a majority of the private wells are finished in the thick sand and gravel deposits. The water table for this shallow aquifer is approximately 20 to 40 feet deep and has produced yields as high as 2,000 gal/min. The depth of the upper glacial drift is about 300 feet which corresponds to the aquifer thickness. The ground water classification for this aquifer is Class IIA (i.e., is used for human consumption purposes and is not restricted).

In the Muskego area, ground water flow in the water table shallow aquifer is generally in an easterly to southeasterly direction. This is similar to the ground water flow at the site, which has two flow paths. The first is in a north to south direction under the eastern portion of the Old Fill Area where the basal clay unit separates the sand and gravel unit from the landfill. The second flow path is generally to the southeast under the Southeastand Non-Contiguous Fill Areas.

The site is located within the Fox River watershed, just south of a local surface divide. There are numerous wetlands in the area and the closest off site intermittent stream is located about three-quarters of a mile to the southeast. None of the wetlands are located within the site boundaries. Surface drainage at the site is divided between flow to the wetlands and the intermittent stream to the southeast. Surface water runoff from the Old

Fill Area is to the ditch along Crowbar Road or to the southeast through a small swale. The western half of the Southeast Fill Area also drains to this swale which eventually discharges to a small wetland north of an abandoned railroad right-of-way. Runoff from the neighboring Anamax property, the Non-Contiguous Fill Area, Stoneridge Landfill, and the eastern half of the Southeast Fill Area is toward the ditch along the service road to a small wetland southeast of the site and then through a culvert under Highway 24 to a larger wetland. The site is located within the 100 year floodplain.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Site History

The 38-acre Old Fill Area accepted material from the mid-1950s until 1977. An unknown amount of waste oils, paint products, and other wastes were deposited into the Old Fill Area during this time. The Southeast Fill Area which covers about 16 acres, accepted only municipal wastes during its operation from 1977 to 1981. The Non-Contiguous Fill Area includes a drum trench, north and south refuse trenches, and an L-shaped fill area. This Non-Contiguous Fill Area occupies approximately 4.2 acres northeast of the Old Fill Area. Based on information from workers employed during operation of the landfill, the L-shaped Fill Area is expected to contain waste similar to that in the Old Fill Area.

In response to deteriorating water quality at on-site ground water monitoring wells, sampling of off site private water supply wells was conducted in 1982 and 1984 by the site operator, Waste Management of Wisconsin, Inc. (WMWI), and Wisconsin Department of Natural Resources (WDNR). The results of these analyses indicated that several of the private wells may have been impacted by a source of contamination, which could have been the landfill and/or the Anamax wastewater lagoons. The results were based on elevated indicator parameters. The test for indicator parameters is a preliminary test completed to show signs of ground water contamination. In 1986 public water was extended to this area and private wells in the area were connected to this supply. The site was evaluated and ranked by the United States Environmental Protection Agency (U.S. EPA) and placed on the National Priorities List (NPL) on September 18, 1985.

In 1985, a partial methane extraction system was installed by WMWI along the western portion of the Old Fill Area to alleviate methane gas migration that was noted at the site. The extracted gas is destroyed through flaring.

B. Response Actions

During preparation of a portion of the Phase I Stoneridge Landfill area called Module III, which is due east of the Non-Contiguous Fill Area, buried drums were discovered in a pit. The drums and contaminated soils were excavated by Chemical Waste Management, Inc., under the supervision of WDNR, and transported to the Adams Center Landfill in Ft. Wayne, Indiana. Also liquid wastes from the excavation and drums were transported to the SCA Incinerator in Chicago, Illinois. The contaminated soils were excavated until contaminant concentrations in subsequent soil samples were below action levels established by WDNR.

During the Remedial Investigation (RI), a trench was discovered in a portion of the Non-Contiguous Fill Area that contained a large concentration of 55-gallon drums. The boundary of this Drum Trench area was further defined using a magnetometer metal detector. Through a Unilateral Administrative Order issued on January 4, 1991, U.S. EPA ordered WMWI to remove the drums and surrounding contaminated soils. WMWI proceeded to conduct this removal under U.S. EPA's supervision. Excavation of the drum trench began in April 1991 and was completed in May 1991. A total of 989 drums were excavated along with approximately 2,500 cubic yards of surrounding contaminated soil. The soils were excavated down to a depth of approximately 25 feet below the original surface elevation until ground water was encountered.

The drum trench was re-filled to a grade that allowed drainage away from the area. No final soil cleanup levels were established for this removal action since the excavation reached ground water. Soil samples were taken in areas above the water table at the base of the trench and contamination was found to be remaining. This remaining contamination will be addressed in this Interim Action Source Control Operable Unit (SCOU) Record of Decision (ROD).

Below is a list of contaminants that were found from a representative sample of liquid collected from excavated drums on the staging pad on April 17, 1991. The list below shows contaminants that were above detection limits. The detection limits for all contaminants were elevated due to sample concentrations.

Benzene	Chloroform	Ethyl Benzene
Toluene	Trichloroethene	Methylene Chloride

Some of the other contaminants that were sampled for and found but not quantified because of elevated detection limits include; vinyl chloride, tetrachloroethene, 1,2-dichloroethane, and 1,1-dichloroethene. Contaminants found within the drum trench are contaminants that are present in monitoring wells at the Site.

The liquids from the excavated drums were separated, bulked, and disposed of through either a fuels blending program or incineration. The soils were disposed of in a hazardous waste cell unit at the Calumet Industrial Design Landfill (CID) in Calumet City, IL. Solids remaining in the drums were tested, bulked and accepted at a fuels blending facility in April of 1992 for repackaging. The solids totaled approximately 15 cubic yards and were then sent to a facility in Texas for incineration. The disposal procedures occurred from October 1991 through April 1992.

C. Remedial Investigation/Feasibility Study (RI/FS)

On September 17, 1987, WMWI signed an Administrative Order on Consent with U.S. EPA to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the site. The purpose of the RI is to identify sources of contamination and to characterize the contamination at the site. The RI is currently not finalized but ongoing results have been periodically summarized in Technical Memoranda. The Final RI and Baseline Risk Assessment for the site have not been completed, although site investigation work was completed in September 1991. Since the Baseline Risk Assessment has not been finalized, this Operable Unit will be considered an Interim Action Source Control Operable Unit. A final remedy will be prepared for this Site that will include a Baseline Risk Assessment.

A Source Control Operable Unit FS was prepared in September 1991. The FS provides a detailed analysis of alternatives evaluated for this interim action operable unit. The alternatives developed in this FS are presented in the Description of Alternatives, Section VII.

III. COMMUNITY PARTICIPATION

The U.S. EPA released its Proposed Plan for the Site in November 1991, and has made it available for public review and comment. The Proposed Plan and supporting documents have been made available at the information repositories at the U.S. EPA Region V offices, the Muskego Public Library, and the Muskego City Hall. U.S. EPA has been placing relevant information in the repositories since 1987. Notice of the availability of the Proposed Plan was included in advertisements in the Muskego Sun and Waukesha Freeman in November 1991. Press releases were also sent to local media. Before reaching a final decision on how the site contamination would be addressed for this operable unit, U.S. EPA held a public meeting on December 12, 1991 at the Muskego City Hall. At this meeting, representatives for U.S. EPA and WDNR answered questions about the proposed remedy and accepted formal comments from the public on the Proposed Plan and remedial alternatives. U.S. EPA also accepted written comments during the comment period, which ran from November 18, to December 18, 1991. U.S. EPA, in consultation with WDNR, has modified, in this document, the recommended alternative

described in the Proposed Plan based on public concern. The public was mainly concerned about ground water contamination downgradient of the site. Therefore, this document specifies that ground water monitoring of selected, currently existing wells will be required until the final ground water operable unit ROD is completed. A response to all comments received during the public comment period in contained in the Responsiveness Summary, which is attached to this the ROD.

Other community relations activities were conducted prior to those associated with the Proposed Plan and FS. A comment period was held from August 28 to September 27, 1987 concerning the signing of the RI/FS consent order. Press releases announcing this comment period were sent to local media. A community relations plan was finalized in early 1988. A "kickoff" meeting to discuss the initiation of the RI was held at the Muskego City Hall on Aug. 25, 1988. Advertisements and press releases were sent to local media. A fact sheet was developed and sent to everyone on the U.S. EPA's mailing list. In June 1991, a press release concerning U.S. EPA's drum removal project was issued and a fact sheet was developed and sent to everyone on the mailing list.

IV. SCOPE OF INTERIM ACTION SOURCE CONTROL OPERABLE UNIT

As with many Superfund sites, the problems at the Muskego Sanitary Landfill are complex. Early site characterization activities conducted as part of the RI identified sources of contamination that could be addressed before full characterization activities were complete. Therefore, to accelerate the remediation of the sources of contamination, U.S. EPA, in consultation with WDNR, organized the work into two operable units (OUs). These are as follows:

- Interim Action Source Control OU (SCOU): Control and remediation of the sources of contamination, including landfill waste, contaminated soils, leachate and landfill gas.

- Ground Water OU (GWOU): Control and remediation of the contamination in the ground water aquifer.

The Interim Action SCOU addresses contamination movement into the ground water aquifer and soils from sources within the Old, Southeast, and Non-Contiguous Fill Areas. These areas pose a threat to human health and the environment because of the risks from possible ingestion of or dermal contact with contaminated soils located there or possible ingestion of or dermal contact with contaminated ground water at private residences downgradient of the Site. Based on sampling by the U.S. EPA in August 1991, there are no current impacts of Volatile Organic Compounds (VOCs) at private wells downgradient of the Site. However, the threat of future private well impacts exists since downgradient monitoring wells have shown contamination. The first purpose of this response is to prevent current or future exposure to the contaminated soils and to reduce contaminant migration into the ground water that is a current source of drinking water for local residents. The second purpose of this response is to prevent current or future exposure to landfill gas containing explosive and potentially toxic contaminants and to reduce the migration of landfill gasses to adjacent soils and structures.

The Ground Water Operable Unit (GWOU) is at the FS stage with a ROD expected in 1993. It is anticipated that the GWOU will be the final response action for this site and that it will address on-site as well as off-site ground water contamination concerns. The combination of these two OUs is intended to address the entire site with respect to the threats to human health identified, and to be identified in the RI, FS, and site Baseline Risk Assessment.

V. SITE CHARACTERISTICS

A. Geology and Hydrogeology

The site is located in an area of thick glacial drift overlying Niagara dolomite. The drift thickness varies from approximately 300 feet on the east edge of the site to 50 feet at a

location about 2,000 feet south of the site. The site overlies a deep valley in the bedrock that is part of the Troy Valley which trends to the east with a steep bedrock slope rising to the south.

The valley in the bedrock beneath the site is filled with sediments consisting of sand and gravel with a cover of glacial till. In general, fine-grained material (till and lacustrine deposits) south and east of the site extend to depths of approximately 70 to 200 feet. Below the till is coarse material (outwash) which extends to depths of about 200 to 300 feet below land surface.

At the northern portion of the site is the Upper New Berlin Formation which is a till deposit forming an east-west trending moraine. The New Berlin Formation contains two principal members, a lower sand and gravel unit and an upper till unit. The western portion of the site consists of the lower outwash sand and gravel unit that extends southwest from the site toward the Fox River. The upper unit is typically gravel, sand, loam till that averages about 58 percent sand, 29 percent silt, and 13 percent clay. The sand and gravel deposits are present east of Crowbar Road and south of the landfill access road, beneath the western edge of the site, and extend east to the boundary of the basal clay under the Old Fill Area (Figure 2).

Above the New Berlin formation is the Oak Creek Formation which consists of a much finer textured composition of fine-grained till, lacustrine clay, silt, and sand. This formation on an average consists of approximately an 85 percent clay-silt composition. The western limit of the Oak Creek Formation is the Valparaiso Moraine and ends within the Old Fill Area. The western extent of the clay till and other low permeability material is vertically and horizontally irregular. As a result, its extent cannot be accurately defined, nor can an edge of low permeability material of constant thickness be mapped with an acceptable degree of certainty. The approximate Basal Layer Boundary is outlined in Figure 2.

The glacial sediments in the area are underlain by the Silurianaged Niagara dolomite, at depths between 250 to 350 feet below land surface. The Niagara dolomite is sequentially underlain by Maquoketa shale, dolomites, sandstones, and igneous and metamorphic rocks. The Maquoketa shale in the Site area is documented by private well logs which indicate there is about 200 feet of shale below the Niagara Dolomite.

The ground water flow in the site area varies in direction due to the complex geological features. The general ground water flow for the region is from the northeast to the southeast. Within unconsolidated areas located at the northern and western edges of the site, the ground water moves in a southerly direction. However the geology by the Southeast and Old Fill Areas consists of consolidated clay layers. Therefore perched ground water conditions exist in these areas. Ground water flows radially in all directions from these areas as would be expected. (Figure 3) Ground water from the northern portion of the site near the old rendering plant lagoons is split by a low ground water divide in the sand and gravel deposits. One flow path moves generally along a Southeast route that is directed beneath the Non-Contiguous Fill Area, the Southeast Fill Area and the Anamax plant. The other flow path moves generally along a southern route that is directed under the Old Fill Area.

The water table in the site area varies due to consolidated areas, but in general is 20 to 40 feet deep. In areas where ground water is perched or leachate is held within the basal layer the water table is 20 to 30 feet deep.

Presently, the main aquifer in the sand and gravel unit is currently used for private water supply downgradient of the site in only two private residences. Public water was provided to the Site area in 1986 along Janesville Road to the South and Hillendale Avenue to the east, in 1986. The municipal well system is located a few miles east of the site and is not near, or is it affected, by the site.

Hydraulic conductivity varies throughout the site depending on the soil type. Within the clay till, the hydraulic conductivity ranges from 1.6 x 10[-6] centimeters per second (cm/s) to

5.1 x 10[-9] cm/s. However, the hydraulic conductivity of the sand and gravel deposits is much higher, ranging from 3.9 x 10[-2] cm/s to 1.2 x 10[-3] cm/s.

B. Nature and Extent of Contamination

The RI sampling of ground water, soil, sediment and leachate was predominantly conducted at on-site locations, with the exception of ground water sampling at monitoring wells and private wells located off-site. Sampling was conducted for organics, semi-volatile organics, polychlorinated biphenyls (PCBs), and metals.

1. Ground water

Ground water is the main pathway of concern for contaminant migration at the site. As mentioned above, there are two main ground water flow paths. The first one, known as the Southern flow path, runs from the northern section of the site under the Old Fill Area and continues to the south. The second or Southeast flow path, also moves from the northern portion of the Site, but is diverted to the southeast and flows beneath the Southeast Fill Area, the Non-Contiguous Fill Area and Anamax property. In addition, conditions exist where leachate accumulates in areas above these flow paths in perched or elevated conditions. (Figure 3)

Southern Flow Path - The Southern Flow Path is potentially affected by the former rendering plant lagoons, and the Old and Non-Contiguous Fill Areas. Two rounds of ground water sampling occurred at 12 downgradient wells at seven different locations. The results of the samples collected from these monitoring wells are summarized in Table 1; locations of the monitoring wells are shown in Figure 4.

Organic contamination located in the Southern Flow Path includes BETX (benzene, ethylbenzene, toluene, xylene), chlorinated ethene, and chlorinated ethane groups. Individual chemical concentrations and well locations are listed below.

Constituent	Concentration	Well Location
Benzene	1 ug/L	135A
Toluene	3 ug/L	123B
Ethylbenzene	3 ug/L	123B
Xylene	1-13 ug/L	123B, 96P
Tetrachloroethene	1 ug/L	123B
Trichloroethene	1-3 ug/L	123B, 135B, 138A
1,2-Dichloroethene	1-8 ug/L	135A-B, 137A-B, 96
Chloroethane	2 ug/L	135A
1,2-Dichloroethane	2 ug/L	135A, 137A
1,1-Dichloroethane	1-5 ug/L	135A-B, 137A-B, 95P, 96

Semi-volatile compounds and pesticides/PCBs were not detected in the Round I ground water samples collected from the Southern Flow Path. Therefore, Round 2 samples were not analyzed for these parameters.

Ground water monitoring wells were also sampled for Target Analyte List (TAL) metals and cyanide, and general ground water quality indicators. These analyses were used to assess chemical concentration trends within the aquifer to aid in the determination of ground water flow patterns, and contaminant fate and migration.

There are seven TAL constituents that were detected in one or more monitoring well sample(s) along the Southern or Southeastern Flow Paths at levels higher than those detected in the background wells E80 and TW75. All of these seven were detected along the Southern Flow Path at various wells. The constituents were as follows:

- Arsenic
- Barium
- Chromium
- Lead
- Manganese
- Nickel
- Zinc

Southeastern Flow Path - The Southeastern Flow Path which diverts from the Southern Flow Path in the northern area of the site, was characterized using 11 monitoring wells at six locations. The sampling from these wells are summarized in Table 1; locations of the monitoring wells are shown in Figure 5.

There are four organic contaminant groups that were detected onsite along the Southeastern Flow Path. These groups are BETXs, chlorinated ethenes, chlorinated ethanes, and phthalates. Individual concentrations and well locations are listed below. One organic contaminant, vinyl chloride, was found off-site, at levels in exceedance of Federal Maximum Contaminant Levels (MCLs) and WDNR Enforcement Standards (ESs) shown in Table 2. The vinylchloride contamination was found during ground water monitoring southeast of the Site at Well P64C.

Constituent	Concentration	Well Location
Benzene	1 ug/L	92A
Xylene	1 ug/L	92P
Trichloroethene	2-3 ug/L	92A
1,2-Dichloroethene	2-3 ug/L	92A
Vinyl Chloride	5-7 ug/L	64C
1,2-Dichloroethane	2 ug/L	92A
1,1-Dichloroethane	6-7 ug/L	92A

Additional organic compounds detected in this area include 1,2dichloropropane from monitoring well E92A at a concentration of 2 ug/L (Rounds 1 and 2); and methylene chloride (a common/probable laboratory contaminant), TW62 at a concentration of 2 ug/L (Round 1 only).

Phthalates were detected in one ground water sample from this area during Round 1 (E92-3 ug/L), and two samples from Round 2 (E94-4 ug/L, and TW623 ug/L). Constituent compounds detected were di-n-octyl phthalate and bis (2- ethylhexyl) phthalate.

As with the Southern Flow Path, pesticides/PCBs were not detected in Round 1 ground water samples collected from this area. Therefore, Round 2 samples were not analyzed for these parameters.

There are five TAL constituents that were detected in one or more monitoring well sample(s) along the Southeastern Flow Path at levels higher than those detected in the background wells E80 and TW75. These constituents are as follows:

- Arsenic
- Barium
- Nickel
- Zinc
- Manganese

Other areas - The Southern and Southeastern Flow Paths described above affect well locations primarily downgradient from the site as shown in Figures 4 and 5. Monitoring wells are also located in the Non-Contiguous Fill and Anamax plant areas as well as along the northern extent of the Old Fill Area (Figures 6 and 7). The highest concentration of organic contamination for the site was found at wells in the Non-Contiguous Fill Area. Specifically, monitoring well E136, located in the Non-Contiguous Fill Area, was contaminated with several VOCs at levels in exceedance of MCLs and WDNR Enforcement Standards (ESs).

Contaminant groups that were detected within the Non-Contiguous Fill, Anamax plant and northern boundary areas include BETXs, chlorinated ethenes, chlorinated ethanes, ketones, phenols, and polycyclic aromatic hydrocarbons (PAHs). Some of the individual concentrations and well locations are listed below.

Constituent	Concentration	Well Location
Benzene	1-21 ug/L	100A, 102A, 104 97P, TW74R, 87
Toluene	8-12,000 ug/L	102A, 136
Ethylbenzene	270-7,300 ug/L	102A, 136
Xylene	5-39,000 ug/L	102A, 136
Tetrachloroethene	3 ug/L	17R
Trichloroethene	1-7 ug/L	87, 100A, 104, TW74R
1,2-Dichloroethene	1-12 ug/L	100A, 102A, 104 TW74R, 87
1,2-Dichloroethane	3-9 ug/L	102A, 87
1,1-Dichloroethane	3-8 ug/L	100A, 102A, 104 87, 97P
Chloroethane	8 ug/L	97P
2-Butanone	9-2,400 ug/L	136, TW74R

Two additional volatile compounds were detected in wells along the northern boundary of the Old Fill Area. These included 1,2-dichloropropane at 5 ug/L from well E17R, and tetrahydrofuran from E48 at 41 ug/L.

Individual semi-volatile constituent compounds included phenol (870ug/L), 4-methylphenol (2,100 ug/L), and naphthalene (360 ug/L) from well E136; 4-methylphenol (5 ug/L) and benzoic acid (6 ug/L) from TW74R; and 2,4-dimethylphenol (2 ug/L) from E102A. Along the northern boundary wells, only di-n-butyl phthalate was detected from well 90 at 2 ug/L.

Pesticides/PCBs were not detected in Round 1 ground water samples collected from these areas. Therefore, Round 2 samples were not analyzed for these parameters.

There are TAL constituents that were found in one or more monitoring well sample(s) in these areas at levels greater than levels found in background wells E80 and TW75. These constituents are as follows:

- Arsenic
- Chromium
- Lead
- Manganese

Private Wells - Many of the private wells near the site have been sampled several times during the history of operation at the site. Sampling during pre-RI/FS activities by Warzyn, WMWI's contractor, on May 3, 1991 and by U.S. EPA on August 28, 1991, showed that nearby water supplies were not currently impacted by site-related contaminants. Locations of the nearby private wells are shown in Figure 8. All private well sampling results are included in Appendix K of the RI.

2. Soil/Sediment

Soil samples were conducted at locations in the Old Fill Area, Southeast Fill Area, North and South Refuse Trenches and the Drum Trench of the Non- Contiguous Fill Area (Figure 9). These samples were taken at the apparent base of fill material in these areas to determine the effect of contaminant movement in the soils under the waste. The soil samples varied in depth from 20 to 40 feet below surface level. The samples in the Old and Southeast Fill Areas were collected at leachate head well locations LH14, LH16, LH12, andLH17. The six Refuse and three Drum Trench samples were completed after excavation to the soil beneath the waste in these areas.

BETX and ketones were the predominant organic compound groups detected in the basal soil samples from the leachate head well borings. The primary constituents and their concentrations are listed below.

Constituent	Concentration
Benzene	160-13,000 ug/kg
Toluene	120-130,000 ug/kg
Ethylbeneze	40-24,000 ug/kg
Xylene	2-100,000 ug/kg
Acetone	13-7,100 ug/kg
2-butanone	3-13,000 ug/kg
4-methyl-2-pentanone	180-29,000 ug/kg
Isophorone	59-3,600 ug/kg

Other volatile organics found in soil samples included: trichloroethene (790 ug/kg) in the Drum Trench, tetrahydrofuran (1,900 ug/kg) in the Drum Trench and (21 ug/kg) in the Refuse Trench, and chloroform (520 ug/kg and 150,000 ug/kg) in the Drum Trench.

Total phenols and PAHs were the predominant semi-volatile organics in the Drum and Refuse Trench Areas. In addition, phthalates were also detected in these areas. The primary constituents and their respective concentrations are listed below.

Constituent	Concentration
Phenol	150-3,200 ug/kg
2-Methylphenol	430 ug/kg
4-Methylphenol	210-550 ug/kg
Benzoic acid	170 ug/kg
Naphthalene	100-5,600 ug/kg
2-Methylnaphthalene	72-1,300 ug/kg
Phenanthrene	110 ug/kg
Pyrene	82 ug/kg
Chrysene	81 ug/kg
Benzo(a)pyrene	110-140 ug/kg
Indeno(1,2,3-cd) pyrene	210 ug/kg
Dibenzo(a,h)anthracene	230 ug/kg
Benzo(g,h,i)perylene	190 ug/kg
Butylbenzyl phthalate	42-1,000 ug/kg
Diethylphthalate	98-150 ug/kg
Di-n-butyl phthalate	86-310 ug/kg
Bis (2-ethylhexyl)phthalate	300-440 ug/kg

PCBs were detected in one soil sample each from the Drum Trench and North and South Refuse Trenches. Pesticides were also detected in one or more samples from the North and South Refuse Trenches. The constituents and their concentrations are listed below.

Constituent	Concentration
Arochlor 1242	42-170 ug/kg
Arochlor 1248	200 ug/kg
Arochlor 1260	62 ug/kg
4,4'-DDT	22 ug/kg
4,4'-DDE	9.2-30 ug/kg
4,4'-DDE	8.2-33 ug/kg

The only trace elements that were not within the common regional range for natural soils based on U.S. EPA Publication Trace Chemical Element Content of Natural Soils (1983) and other publications were magnesium and cadmium. Magnesium was found in exceedance of the common range in the Southeast, Drum, and Refuse Trench areas. Cadmium was found in exceedance of the common range in the Old, Drum, and Refuse Trench areas. Nine TAL metals; aluminum, arsenic, cobalt, copper, iron, lead, mercury, sodium, and zinc exceeded the regional background soil levels at one or more basal soil sample locations.

In addition, a sediment investigation was conducted to assess the effects of surface water runoff from the fill areas and the Anamax property. Sampling was conducted at various locations on and off the site. However, concentrated efforts were conducted along a drainage swale on the east side of the Old Fill and Southeast Fill Areas (Figure 9). Below is a list of the constituents identified along with concentrations and locations.

Constituent	Concentration	Location
Acetone	180 ug/kg	SD4
1,1-Dichloroethane	11 ug/kg	SD4
2-Butanone	53 ug/kg	SD4
Toluene	2-190 ug/kg	SD1, SD3, SD4, SD8
Phenol	790 ug/kg	SD4
4-Methylphenol	570-960 ug/kg	SD1, SD4
Benzoic Acid	230 ug/kg	SD4
Naphthalene	210 ug/kg	SD4
2-Methylnaphthalene	96-200 ug/kg	SD1, SD4
Pyrene	110 ug/kg	SD3
bis(2-Ethylhexyl)phthalate	600-680 ug/kg	SD1, SD8
Di-u-butyl-phthalate	170 ug/kg	SD8

3. Air

Ambient air, leachate head well, and gas vent vapor samples were taken at the site during the RI. However, the results were found to be invalid due to the exceedance of recommended sample holding times. Since the investigation of the site began, the operator, WMWI, has agreed to implement the Wisconsin requirement, NR 506.08 Wisconsin Administrative Code (WAC) for landfill gas collection and treatment and has committed to the installation of a landfill gas management system as part of the overall remedy for the Site. This system should control any releases to the air from the waste material. Therefore, another round of air-monitoring was not required by U.S. EPA at the Site.

4. Surface Water

Topographic highs in the vicinity of the site consist of a large end moraine north and northeast, and two topographic highs created by the Stoneridge facility and the Southeast Fill Area. The natural topographic high acts as a surface water divide. The majority of the runoff from the site flows to the southeast to two wetland areas and to an intermittent stream. Runoff from the western portion of the Old Fill Area flows to Crowbar Road on the west end of the site.

Surface water is not a significant contaminant migration pathway at the site due to the lack of permanent surface water features and the presence of cover soils, which generally prevent contact of surface-water runoff with refuse. Sampling of surface water was not conducted during the RI.

VI. SUMMARY OF SITE RISKS

The Comprehensive Environmental Response Compensation and Liability Act (CERCLA) requires that U.S. EPA protect human health and the environment from current and potential exposure to releases of hazardous substances at or from the site. As part of the ongoing RI/FS at the site, a Baseline Risk Assessment is required in order to assess the current and potential future risks from the Site. The baseline risk assessment determines whether contamination at the landfill could pose an unacceptable health risk or environmental risk in the absence of any remedial action. Potential threats to public health are estimated by making assumptions about the manner, frequency and length of time a person could be exposed to site-related contaminants. However, for this interim action operable unit the baseline risk assessment has not been completed since the RI has not been finalized.

For the proposed SCOU, a qualitative risk assessment was prepared consistent with U.S. EPA policy, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," dated April 22, 1991. The qualitative risk assessment examined contaminants detected in ground water, leachate, and soils during the field investigation phase of the RI. These contaminants were evaluated with respect to their carcinogenicity, toxicity, and possible exposure pathways from and at the site.

The following is a representative list of contaminants detected in ground water, leachate, sediment, and soil at and near the site:

Benzene	Acetone	Mercury
Ethylbenzene	2-Butanone	Butylbenzylphthalate
Toluene	2-Hexanone	Diethylphthalate
Xylenes	Tetrahydrofuran	di-noctylphthalate
Chloroethane	1,4-Dichlorobenzene	PCBs
1,1-Dichloroethane	2-Methylphenol	Arsenic
1,2-Dichloroethene	4-Methylphenol	Barium
Styrene	Pentachlorophenol	Cadmium
Dichloropropane	Phenol	Chromium
Trichloroethene	Benzoic Acid	Copper
Vinyl Chloride		Cyanide
Bis(2-ethylhexyl)phthalate		Lead
		Nickel
		Zinc

The sand and gravel aquifer in the immediate area of the landfill is contaminated. The potential exists for this contamination to move with ground water flow toward private residences.

Exposure to landfill gas, through either methane migration in the soils or VOC migration in the air, is a concern at the Site. Inhalation of landfill gas is of concern due to the potential presence of unacceptable levels of VOCs that may cause a health risk. A potential health risk would exist until landfill gas controls are installed and operating to adequately manage potential exposure. WMWI has committed to managing landfill gas at the site in accordance with Wisconsin Administrative Code NR 506.08(6).

Direct exposure to contaminated soil or waste is currently not a concern at the site. All fill areas are covered by at least one foot of soil to limit the exposure potential. However, future exposure may be a concern if the cover is not adequately improved and maintained.

Continued leachate generation and the resulting additional ground water contamination is another potential concern at the site. Private wells to the Southeast and South of the Site were sampled by U.S. EPA for VOCs in August 1991, but no contamination was detected. Although most potential receptors of contaminated ground water are now on public drinking water supplies, some downgradient residents are still using private wells that may become impacted by site-related ground water contamination. Elevated leachate levels in the Old, Southeast and Non-Contiguous Fill Areas will result in continued ground water contamination until leachate generation is adequately controlled or most of the contaminants have been leached from the waste.

Of the chemicals in ground water, those with exceedances of Safe Drinking Water Act of WDNR NR 140 WAC ground water drinking standards are shown in Table 2. This Table compares the maximum ground water concentrations in the immediate landfill area with the MCLs, ESs and WDNR NR 140 Preventative Action Limits (PALs).

Based on toxicological studies, benzene and vinyl chloride are classified as U.S. EPA Group A - human carcinogens; while trichloroethene, tetrachloroethene and pentachlorophenol are classified as Group B2 - probable human carcinogens. Pending completion of the complete baseline risk assessment, exceedances of drinking water standards alone justify the interim

action operable unit remedial action. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VII. DESCRIPTION OF ALTERNATIVES

A. Remedial Action Objectives

Upon completion of the first phases of investigation work at the site, remedial action objectives were developed that address the source areas while considering the long-term goals of protecting human health and the environment and

meeting applicable or relevant and appropriate requirements (ARARs). Site-specific goals of limiting the potential for the release of contaminants to the ambient air, sub-waste soils, and ground water include the following:

- Minimize the migration of chemical constituents from soil/refuse transported by leachate to ground water that would contribute to ground water concentrations in excess of MCLs, ESs and PALs beyond the waste boundary;

- Control the seepage, migration and concentration of landfill gas generated by the refuse in the Old, Southeast, and Non-Contiguous Fill Areas, and in the soils or air at or beyond the property boundary;

- Minimize hazardous air contaminants that may be emitted from the Old, Southeast and Non-Contiguous Fill Areas, and comply with applicable air pollution control standards; and

- Minimize the potential for human exposure to waste and contaminated soils and for release of contamination to the environment.

Since this interim action operable unit addresses source control, site- specific cleanup standards for soils and ground water will not be necessary for the Old and Southeast Fill Areas, where containment provides the primary source control. However, a performance-based cleanup standard, which accounts for and incorporates ground water standards will be established for soils in a portion of the Non-Contiguous Fill Area, where the source area will be treated as well as contained. A cleanup standard would be established because of the more concentrated nature of the hazardous materials located in this specific area.

The performance-based cleanup standard would be applied to the area covered by the in-situ vapor extraction (ISVE) system. The cleanup standard will be based on residual soil-gas concentrations that are low enough to assure compliance with ground water cleanup standards, which will be specified in more detail (including compound specific standards) in the ROD for the GWOU for the Site. The relationship between soil-gas VOC concentrations and groundwater VOC concentrations would be modeled to determine the concentration of VOCs in the waste/subsoil that must be achieved in order to assure that, even if the remaining VOCs leach into ground water, the level of VOCs in the ground water will not exceed levels that are protective of human health and the environment. The model will incorporate data collected during a pilot-scale test, and the first two-year period of full-scale ISVE operation, as well as previous sampling and monitoring data collected at the Site. In accordance with the National Contingency Plan (NCP) 300.430(f)(5)(iii)(A), if waste is left in place at the conclusion of a response action, the specified ground water cleanup standards should be attained at the points of compliance identified in the GWOU ROD.

The ISVE system will operate until the concentration of VOCs in the waste/subsoil calculated by the model is achieved. This methodology would be superior to setting numerical reduction rates, based upon the percentage of VOC removal from the soil, because it directly corresponds to achieving ground water cleanup levels.

B. Development of Alternatives

Alternatives developed in the FS for the SCOU considered the Old, Southeast, and Non-Contiguous fill areas. As stated above, the remedial action objectives involve controlling landfill leachate and gas, limiting the potential for exposure to contaminants via inhalation, ingestion, and dermal absorption pathways, and minimizing impacts to ground water.

In developing alternatives, the FS takes into consideration previous removal work that has occurred. The remedial alternatives were assembled from applicable remedial technology options. The alternatives surviving the initial screening were evaluated and compared with respect to the nine criteria required by the NCP. In addition to the remedial action alternatives, the NCP requires that a no-action alternative also be considered for the site. The no-action alternative serves primarily as a point of comparison for other alternatives.

Two general strategies have been utilized to accomplish the remedial action objectives for the source control portion of this Site. The first strategy is to control the production of gas and leachate while minimizing potential exposure to waste or contaminated soil. The second is to manage gas and leachate after production. These strategies are evident within the forthcoming alternative descriptions.

C. Alternatives

Alternative 1 - No Action

Under Alternative 1 no additional corrective action would be taken at the site to address sources or potential sources of ground water contamination or direct contact threats. The limited removal of leachate by WMWI from the Southeast Fill Area would continue utilizing the current method of pumping from a portion of the existing collection system directly to the sanitary sewer.

Under a no-action scenario, contamination from the source areas in leachate or soils would not be prevented from reaching the ground water aquifer. This would result in continued off-site migration of contaminants in the ground water. Also, gas and air contamination would continue to migrate through soils off-site and/or into the atmosphere. Finally, the current cover over the source areas would degrade due to freezing and thawing. This would result in greater percolation of rainwater and more likelihood of contaminant transfer into the ground water.

A no-action remedy would allow the site to remain as it exists today with an incomplete fencing structure around the site. Therefore, direct contact to soils would be a greater likelihood for workers at the Stoneridge Recycling facility and trespassers. There would be no capital or operational costs associated with this alternative.

Alternative 2 - Limited-Action

The Limited-Action Alternative involves implementing measures to restrict access to the site and monitor gas migration. Site controls include a fence extension and deed restrictions for the site. Fencing would be extended across into the Anamax property to complete the enclosure of all fill areas and the wastewater ponds. Landfill gas monitoring would also be a component of this alternative to determine compliance with solid waste regulations.

As in the No-Action Alternative, this remedy would not prevent contamination currently in leachate or soils from reaching the ground water aquifer through percolation or direct leaking. This alternative also does not address the prevention of gas migration through soils nor does it prevent the current cover degradation through freeze-thaw cycles.

The limited-action scenario would deter direct contact to contaminated soils with the installation of a fence. In addition this action would hinder premature destruction or

disturbance of the current cover. The current cover does not contain any freeze-thaw protection layer of soil on top of the clay. This allows the clay layer to expand and contract from freezing conditions.

Capital cost for this alternative would be seventeen thousand four hundred dollars ($17,400). There would be no operational or maintenance costs.

Alternative 3 - Capping and Landfill Gas and Leachate Control

Alternative 3 consists of seven major components. The first three: deed restrictions, fence extension, and landfill gas monitoring and control are the same as Alternative 2. The additional four components are:

- Cap installation over the Old and Southeast Fill Areas in accordance with NR 504 WAC;
- Landfill leachate control in the Old Fill Area;
- Improvement of the existing leachate control system in the Southeast Fill Area; and
- Active landfill gas control in the Old and Southeast Fill Areas.

The first additional element of this alternative requires that a new soil cover system (cap) meeting the standards of section 504.07, WAC be constructed over the Old and Southeast Fill Areas. The cap would have the following profile (listed from the ground surface, downward):

- A minimum 6-inch topsoil layer;
- A minimum 18-inch to 30-inch thick rooting zone layer (exact thickness determined during the design); and
- A minimum 24-inch thick compacted clay layer, having a maximum hydraulic conductivity of 1x10[-7] cm/s.

A new cap may involve reusing (i.e., picking up and replacing) existing cover materials that meet the standards specified in Chapter NR 504, WAC presently covering the Old and Southeast Fill Areas. If existing material is not to be reused, or is insufficient, then new material will be brought in to cover the existing fill areas. The cap would be installed to meet minimum slope requirement specified in section NR 506.08(3)(c), WAC.

The second additional requirement of Alternative 3 entails the installation of a leachate control system over the Old Fill Area. Monitoring for the presence of leachate will be conducted as part of the installation of gas collection wells at the base of refuse. In areas of sufficient leachate levels, gas collection wells may be retrofitted for leachate collection. Collection wells will be installed to the base of the refuse and spaced appropriately, as determined in the remedial design, for leachate extraction. At that time, it will be determined by U.S. EPA, in consultation with WDNR, whether additional wells shall be constructed to increase leachate collection.

The existing leachate collection at the Southeast Fill Area is intermittent. The third additional portion of Alternative 3 would increase the effectiveness of leachate extraction by increased or maximized use of the current system and installation of additional extraction wells using the same procedure as in the Old Fill Area. Collection wells would be installed to the base of the refuse and spaced appropriately to influence and collect leachate from all areas where leachate can collect or build up (i.e., create a head of leachate). The exact design and spacing will be determined in the remedial design. The determination of the final configuration of wells would be made by U.S. EPA, in consultation with WDNR, during the remedial design activities.

The leachate extraction systems would be operated to maximize the amount of leachate withdrawn and minimize to the extent practicable, the amount of leachate accumulated on the

base of both fill areas.

Leachate and gas system condensate will likely be discharged to the sanitary sewer, provided pretreatment standards are met. It may be necessary to pretreat leachate before sewer discharge to meet pretreatment standards. Leachate may be treated along with groundwater as part of the subsequent GWOU. Effluent limits for possible discharge of treated ground water/leachate to surface and/or ground water will be determined for that action, if necessary. Sludge/residual from treatment/pretreatment may have to be managed as a hazardous waste if shown to be a Toxicity Characteristic Leaching Procedure (TCLP) characteristic hazardous waste. Wastes excavated or generated by the installation of extraction systems (i.e., drill spoils), may have to be managed as a hazardous waste if shown to be a TCLP characteristic hazardous waste. Sludge/residuals and/or other excavated/generated wastes, if shown to be a non-hazardous waste, may be managed at a solid waste landfill. The Land Disposal Restrictions (LDRs)would apply to any TCLP hazardous waste that is to be disposed of (i.e., placement of the waste occurs) on or off site. Certain nonliquid excavated/generated wastes may be re-buried at the site, in an appropriate location selected during the RD (likely at the Southeast Fill Area), under the new cover system when it is constructed. This would include some of the investigation-derived wastes now being stored in containers at the Site. U.S. EPA has determined that such reburial would not constitute placement, and would not trigger the LDRs. U.S. EPA has also determined that the substantive analysis required under the Wisconsin policy "Interim Policy (Guidelines) For Promoting In-State and On-Site Management of Hazardous Waste in the State of Wisconsin" should be performed for the management of any hazardous wastes from the Site. It may be possible to treat TCLP hazardous waste so it no longer shows the characteristic and manage it as a non-hazardous waste.

The final additional segment of Alternative 3 is an active landfill gas control system in the Old and Southeast Fill Areas. This system would work in conjunction with the leachate collection system to extract landfill gases in the Fill Areas. The extracted landfill gas would be destroyed by a ground flare consistent with Wisconsin NR 445 WAC requirements.

Alternative 3 is composed of several segments that address actual or potential contaminant migration from the Old and Southeast Fill Areas. Alternative 3 addresses, through containment and treatment, the reduction of contamination and the prevention of human exposure to contaminants.

The NR 504 WAC cap will reduce the percolation of rain water through contaminated waste material and into the ground water by providing an impermeable layer above the waste material. This decreased permeability will contain contamination within the Fill Areas and help prevent migration off-site. The cap will also provide added protection from direct contact by adding additional cover material. Added cover will also be installed to protect the cap integrity from freeze-thaw cycles consistent with the region's weather.

The installation of a gas extraction system would directly reduce and treat, through thermal destruction, landfill gas contaminants. The gas extraction system will also reduce the chance of cap cracking caused by internal pressure from gas formation.

Alternative 3 addresses contamination problems in the Old and Southeast Fill Areas but does not address contamination in the Non-Contiguous Fill Area except to the extent that area is included in the fencing and deed restrictions.

The capital cost for this alternative is estimated to be seven million dollars ($7,000,000). The operation and maintenance costs for Alternative 3 are one million seven hundred thousand dollars ($1,700,000).

Alternative 4 and Modified Alternative 4 (The Selected Remedy) Capping, Landfill Gas and Leachate Control, and In-Situ Treatment of portions of the Non-Contiguous Fill Area

Alternative 4 consists of all of the components contained in Alternative 3 with the addition of the following:

- Installation of a Wisconsin NR 504 cap over the Non-Contiguous Fill Area; and
- In-Situ Vapor Extraction (ISVE) in the Non-Contiguous Fill Area

Modified Alternative 4 (the selected remedy) is the same as Alternative 4, with the addition of:

- A ground water monitoring program conducted at selected existing monitoring and private wells approved by U.S. EPA, in consultation with WDNR, during Remedial Design (RD) and after implementation.

Alternative 4 is composed of several segments that address actual or potential contaminant migration from the Old, Southeast, and Non-Contiguous Fill source areas. Alternative 4 addresses, through containment and treatment, the reduction of contamination and the prevention of human exposure.

The NR 504 WAC cap will reduce the percolation of rain water through contaminated waste material and into the ground water by providing an impermeable layer above the waste material. This decreased permeability will contain contamination within the Fill Areas and help prevent migration off-site. In addition, the decreased permeability will increase the ISVE zone of influence and therefore the effectiveness of this system. The cap will also provide added protection from direct contact by utilizing added material cover. Added cover will also be installed to protect the cap from loss of integrity caused by the effect of freeze-thaw cycles on the soil.

ISVE in a portion of the Non-Contiguous Fill Area involves the installation of gas extraction wells connected to a blower by a gas header pipe system. The number of wells and well locations will be determined by a pilot test conducted during the Remedial Design (RD). Extracted gas would be treated, if necessary, by removal through activated carbon or thermal destruction with catalytic oxidation or other treatment method to be determined during design, and emitted to the atmosphere. Extracted vapor may be combined with existing and proposed landfill gas collected on the property, and treated by thermal destruction in the form of flaring. Any condensate generated by the ISVE system would be managed with the leachate (see the leachate management discussion in the description of alternative 3, above).

Alternative 4 addresses contamination problems in all of the source areas.

The selected remedy includes ground water monitoring to be completed at locations specified during the RD by U.S. EPA, in consultation with the WDNR. This ground water monitoring will be performed to contribute to the definition of the contamination plume and to measure the effectiveness of the implementation of the interim remedial measures. The program will include, at a minimum, semi-annual monitoring for Chapter NR 508 WAC indicator parameters and VOCs at low detection limits in selected monitoring wells along the south and southeast portions of the Site, in a selected background monitoring well, and in selected private wells. The monitoring and private wells would be selected based on well location, depth, past monitoring results, construction, etc. This alternative is the most comprehensive cleanup remedy of all of the alternatives.

Costs for Alternative 4 or the selected remedy would be approximately the same with slight variance in comparison to the capital and operational costs. The capital costs for Alternative 4 or the selected remedy are eight million dollars ($8,000,000). The operation and maintenance costs are one million nine hundred thousand dollars.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A. Introduction

U.S. EPA has established nine criteria that balance health, technical, and cost considerations to determine the most appropriate alternative. The criteria analyze the

selected remedy so that the remedy is protective of human health and the environment, attains ARARs, is cost effective, and utilizes permanent solutions and treatment technologies to the maximum extent practicable. The remedial alternatives developed in the FS have been evaluated and compared using the nine criteria set forth in the NCP. The nine criteria are set forth by U.S. EPA under NCP 300.430(e)(9)(iii). These nine criteria are summarized as follows:

OVERALL PROTECTION OF PUBLIC HEALTH AND THE ENVIRONMENT addresses whether a remedy provides adequate protection of human health and the environment and describes how risks are posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) addresses whether a remedy will meet all other Federal and State environmental statutes and/or provides grounds for invoking a waiver.

LONG-TERM EFFECTIVENESS AND PERMANENCE refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup standards have been met.

REDUCTION OF CONTAMINANT TOXICITY, MOBILITY, OR VOLUME through treatment is the anticipated performance of the treatment technologies a remedy may employ.

SHORT-TERM EFFECTIVENESS addresses the period of time needed to achieve protection, and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup standards are achieved.

IMPLEMENTABILITY is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

COST includes estimated initial capital, operation and maintenance (O&M) costs, and net present worth costs.

STATE ACCEPTANCE indicates whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative at the present time.

COMMUNITY ACCEPTANCE is based on comments received from the public during the public comment period. These comments are assessed in the responsiveness summary attached to this ROD.

B. Remedial Alternatives for Source Control

The following briefly describes how the selected alternative for source control compares to other alternatives using the nine criteria.

1. Threshold Criteria

The two most important criteria are statutory requirements that must be satisfied by any alternative in order for it to be eligible for selection. These two criteria are discussed below.

a. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternatives 1 and 2 are not sufficiently protective of human health and the environment due to the continuing potential exposure to waste and contaminants and continued ground water contamination.

Alternative 3 is more protective of human health and the environment than Alternatives 1 & 2. The combination of institutional controls, capping and leachate/landfill gas controls

effectively protect potential receptors from landfill contaminants as long as these systems are maintained. However, Alternative 3 is not very effective in controlling the sources of contamination in the Non-Contiguous Fill Area, where high levels of soil and ground water contamination are known to exist. Under alternative 3, this Area would continue to be a source of soils and groundwater contamination.

Alternative 4 provides additional protection by upgrading the cap and providing ISVE extraction for the Non-Contiguous Fill Areas. These additional measures will reduce the future potential for further soil and ground water contamination in, and arising from, this area.

The selected alternative adds a final element of protectiveness beyond what Alternative 4 provides by routinely sampling residential and monitoring wells most likely to be affected by contamination at the Site.

b. COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The Site was never an operating Resource Conservation and Recovery Act (RCRA) facility. Site records do not conclusively demonstrate that the materials disposed of at the Site during its operation were listed RCRA hazardous wastes. Therefore, RCRA closure requirements would not be applicable at this site. RCRA Land Disposal Restrictions (LDRs) are none the less applicable to the management of treatment residues and/or any other wastes managed as part of remedy implementation that are found to be characteristic hazardous wastes and are disposed of through placement of the waste on or in the land, on or off site.

Alternative 1 and 2 do not meet current State and Federal landfill closure requirements, which are applicable to this site.

Under NR 506.08(06) WAC, landfills containing over 500,000 cubic yards of waste that accepted municipal solid waste must have an active landfill gas recovery system to effectively control emissions of hazardous air contaminants to the air. Alternatives 3 and 4 include active landfill gas control systems that comply with those requirements for controlling methane migration and controlling emissions of hazardous landfill gas constituents.

The improved cap and additional leachate collection system in Alternatives 3 and 4 comply with Wisconsin solid waste closure (NR 506.08 WAC), ground- water quality requirements (NR 140 WAC), and landfill cover system design criteria (NR 504.07 WAC). Under Section NR 506.08(03) WAC, a site with chapter NR 140 WAC ground water standard exceedances is required to install a cover system meeting the standards in section NR 504.07, if such a system is necessary to abate such exceedances. The ISVE system in Alternative 4 will likewise be designed to meet ARARs. The ISVE cleanup standards will be developed in conjunction with the identification and compliance with ground water ARARs as part of the GWOU remedy.

2. Primary Balancing Criteria

Five primary balancing criteria are used to identify major tradeoffs between the remedial alternatives which satisfy the two threshold criteria. These trade-offs are ultimately balanced to identify the preferred alternative and to select the final remedy. Because Alternatives 1 and 2 do not satisfy the threshold criteria, they will not be evaluated by the primary balancing criteria.

a. LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives 3 and 4 and the selected remedy provide controls for a permanent and effective source control remedy.

Alternative 4 and the selected remedy provide good control of potential exposure to waste contaminants or continued leaching of waste contaminants by treating soils in the Non-Contiguous Fill Area, capping all identified source areas, and providing leachate and landfill gas controls in the landfill areas. The selected remedy provides additional

assurance of long-term effectiveness by monitoring nearby wells. Capping and leachate/landfill gas controls in Alternative 3 provides adequate controls for the areas addressed, but may provide less long-term effectiveness than Alternative 4 because it does not address the Non-Contiguous Fill Area. Institutional Controls and O&M further reduce the risks from direct contact under all alternatives.

b. REDUCTION IN TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Due to moist conditions in a portion of the Old and Southeast Fill Areas, the waste is being reduced in volume through biodegradation. However, biodegradation would not significantly reduce contamination and the time frame and uncertainties for such reductions would be much greater than for implementing a remedy.

Alternatives 3 and 4 and the selected remedy will reduce the toxicity, mobility, and volume of methane and other VOCs in the subsurface through actively extracting and treating landfill gas. Alternatives 3 and 4 will reduce the mobility and volume of leachate in the Old and Southeast Fill Areas by extracting leachate through a series of wells and constructing a low-permeability cap. The described cap option would allow some infiltration to enter the landfill, which will aid the natural biodegradation occurring within the landfill and reduce the time until the refuse is stabilized. The collected leachate will receive appropriate treatment and be properly disposed.

In addition, Alternative 4 and the selected remedy would also reduce the mobility and volume of VOCs at the Non-Contiguous Fill Areas using ISVE. VOCs in the waste and surrounding soils would be extracted through wells screened in the unsaturated zone and treated, if necessary, above ground.

c. SHORT-TERM EFFECTIVENESS

None of the alternatives would pose a substantial risk to the community, workers, and environment during remedial actions. Precautionary actions, through the remedial action health and safety plan, would address risks to on-site workers and potential off-site risks.

Capping, installation of a landfill leachate and gas extraction system, and installation of an ISVE system can be accomplished in one construction season. The risks of construction activities for Alternatives 3 and 4 and the selected remedy are adequately managed through dust suppression and the use of personal protective equipment for construction workers. The need for leachate extraction may decrease since the improved caps should result in reduced leachate generation.

d. IMPLEMENTABILITY

Implementation for any of the alternatives should not be difficult. Capping with an NR 504 WAC cap, a component of Alternatives 3 and 4, would be the most extensive remedial measure but still not difficult to implement, because this type of cap is common at Superfund and landfill sites.

A leachate extraction system, combined with an active landfill gas collection system, a component of Alternatives 3 and 4, is common at landfills. Implementation should not be difficult.

ISVE is also becoming a common cleanup technology at various Superfund sites and implementation would be technically practical. Although ISVE is a relatively new technology when specifically being implemented in a nonhomogeneous landfill mass, this should not impede the implementation since a similar technology is being applied at the Hagen Farm Superfund site in Wisconsin.

Implementability of institutional controls should not be difficult because no significant off-site controls should be necessary.

e. COSTS

The estimated costs of the four FS alternatives are listed below. The first column list the capital or construction costs for the project. The second column are the costs to operate the remedial system once it is constructed. The final column is the sum of the first two columns.

	Capital Cost	O&M	Total Cost
1.	0	0	0
2.	$17,400	0	$17,400
3.	$7.0 mil	$1.7-2.6 mil	$8.7-9.6 mil
4.	$8.0 mil	$1.9-2.8 mil	$9.9-10.8 mil

The selected remedy adds monitoring costs of approximately $20,000 to Alternative 4, but is in every other way identical. A range is given in the Total Cost figures to account for a 5% and 10% discount rate. The higher cost figure corresponds to the lower discount rate. The operation and maintenance for these alternatives is 30 years. In addition, Capital Cost figures are based on construction beginning immediately. The vast majority of these cost will not actually be incurred until after Remedial Design is completed. A more detailed description of the costs for Alternative 4 is provided in Table 3.

3. Modifying Criteria

a. STATE ACCEPTANCE

The WDNR has been the support agency for the RI/FS and has reviewed this ROD. The WDNR concurs with the selected remedial action. In addition, the WDNR does not feel that Alternatives 1 through 3 are protective or would attain ARARs; therefore, these alternatives are not acceptable to the State.

b. COMMUNITY ACCEPTANCE

Comments have been submitted by the community, local government officials, and potentially responsible parties (PRPs). In general, issues presented in the comments were directed toward the inclusion of ground water monitoring for the final remedy, and a delay in the capping of the Southeast Fill Area. Comments and responses to those comments are described in greater detail in the Responsiveness Summary attached to this ROD.

C. Summary

Based on a comparison of the nine criteria, Alternatives 1 and 2 do not provide protection from all of the potential risks at the site and do not comply with ARARs. They therefore do not meet the threshold test for selection of a remedy alternative at the site. Alternative 3 would be protective for a portion of the source areas of the Site, but would not provide protection from all of the potential risks at the site either. Alternative 4 would be protective of human health and the environment with respect to all source areas and would attain ARARs. The selected remedy adds a final element of protectiveness by periodically monitoring those existing wells more likely to provide potential representation of ground water contamination.

Alternative 4 and the selected remedy provide the greatest degree of long-term effectiveness and permanence because they provide the greatest degree of remediation and containment of the contaminants. The selected remedy adds a monitoring program to help provide assurance of long-term effectiveness. Alternatives 3, 4 and the selected remedy provide reduction of toxicity through destruction and treatment of contaminants, but Alternative 4 and the selected remedy encompass all source areas and utilize ISVE.

Implementation for any of the alternatives is not expected to pose any technical problems since similar remedies have been selected and constructed at other Superfund sites.

Alternatives 3 and 4 are more costly due to the scope of the work performed under each. Alternative 4 and the selected remedy are the most costly because they encompass capping and ISVE at the Non-Contiguous Fill Area. The incremental cost of this significant additional remedial activities, however, is rather small in comparison to the environmental benefit obtained.

The WDNR concurs with the selected remedy for the site, and does not consider Alternatives 1 through 3 to be protective or in compliance with ARARs, and therefore would not accept any of these alternatives. The community, local government officials, and PRPs that submitted public comments agree with capping the Fill Areas, although a question was raised as to the need for immediate capping of the Southeast Fill Area. These groups also concur that the leachate collection and ISVE portions of this interim action operable unit are necessary, valuable, and consistent with the final remedy.

IX. THE SELECTED REMEDY

Based on the evaluations of the alternatives, U.S. EPA and the State of Wisconsin believe that the selected remedy (Alternative 4 plus ground water monitoring of existing wells) will be protective of human health and the environment, comply with ARARs, be cost effective, and will utilize permanent solutions to the maximum extent practicable.

The selected remedy for the SCOU entails:

- Deed restrictions and site controls that prevent access, excavation, disturbance of the cap, and installation of wells;
- Fence extension to contain areas not enclosed by currently existing fences;
- Cap installation over the Old, Southeast, and Non-Contiguous Fill Areas according to Wisconsin NR 504 WAC standards;
- Installation of landfill leachate control in the Old Fill Area;
- Improvement of the existing leachate control system in the Southeast Fill Area;
- Supplemental leachate control in the Southeast Fill area;
- Active landfill gas control in the Old and Southeast Fill Areas and gas monitoring;
- ISVE in a portion of the Non-Contiguous Fill Area, specifically the drum trench, North and South Refuse Areas;
- Ground water monitoring of selected existing monitoring and private wells to be determined during remedial design; and
- Operation and Maintenance of all systems.

Site controls, including the extension of the fence to encompass the waste disposal portion of the Anamax property currently outside the fenced area, will minimize non-authorized access to contaminated areas, and deed restrictions will ensure that the land is not used for residential purposes in the future. Installation of a new cover system over the Old Fill, Southeast Fill and Non-Contiguous Fill Areas will remove the potential for people to come in contact with the landfill waste, through direct contact or inhalation of airborne particles, and will reduce the amount of leachate produced in those areas. Implementing leachate controls in the Old Fill and Southeast Fill Areas will prevent further ground water contamination by removal and disposal of contaminants prior to reaching the ground water.

Landfill gas controls in the Old Fill and Southeast Fill Areas will minimize releases of hazardous landfill gas constituents to the air. The use of an ISVE system will provide additional protection by removing VOCs before they can be leached into soil or ground water or emitted to the air.

The remedial action objectives and cleanup goals for this interim action operable unit remedy are presented in Section VII of this ROD. The remedial action objectives include:

- Minimize the migration of chemical constituents from soil/refuse transported by leachate to ground water that would contribute to ground water concentrations in excess of MCLs, ESs and PALs;

- Control the seepage, migration and concentration of landfill gas generated by the refuse in the Old, Southeast, and Non-Contiguous Fill Areas, to the soils or air at or beyond the property boundary;

- Minimize hazardous air contaminants that may be emitted from the Old, Southeast and Non-Contiguous Fill Areas, and comply with applicable air pollution control standards; and

- Minimize the potential for human exposure to waste or contaminated soils.

Table 4 lists a detailed cost summary for the selected remedy. U.S. EPA and the WDNR believe that the selected remedy will achieve the remedial action objectives for this operable unit remedy of the site.

X. STATUTORY DETERMINATIONS

A. Protection of Human Health and the Environment

The selected remedy provides adequate protection of human health and the environment through ISVE to treat waste and contaminated soil in portions of the Non-Contiguous Fill Area; capping to contain wastes and contaminated soils, alleviating threats from direct contact and minimizing leachate generation; collection, control and appropriate treatment of contaminants in landfill leachate; continued extraction of landfill gas to prevent migration, buildup and/or explosion; ground water monitoring to identify potential impacts of contamination on existing wells; and land use restrictions and fencing to limit direct exposure to contamination.

Any short term risks associated with excavation of trenches for ISVE will be minimized through good construction practices.

Wetlands are located southeast of the Site directly east of the Anamax facility entrance road. An intermittent creek flows over the Site and discharges into the wetlands area. Sediment samples taken in the intermittent creek area, specifically SD4, show contamination in this area. The levels were below surface water criteria levels for the contaminants with listed values in U.S. EPA water quality criteria (Quality Criteria for Water 1992). In addition, the cap portion of the SCOU will prevent contamination in soils from contacting surface water runoff. Therefore wetland affects from the Site will be mitigated.

The source control measures under the selected remedy, in combination with the ground water operable unit, will attempt to restore ground water to the State ESs and PALs and to Federal MCLs.

B. Attainment of ARARs

The selected remedy will be designed to meet all applicable, or relevant and appropriate requirements (ARARs) under federal, and more stringent state environmental laws. A list of ARARs for the site is contained in the alternative arrays section of the FS. The primary

ARARs that will be achieved by the selected alternative are:

1. Action Specific

Clean Water Act of 1977, as amended [33 U.S.C. 1317] 40 CFR 403 Pretreatment Standards. Require that waste waters to be discharged into a Publicly Owned Treatment Works (POTW) satisfy both general and specific requirements to protect against damage to POTWs. Any waste to be discharged to a POTW must, if necessary, be treated to satisfy these standards prior to discharge. These pretreatment requirements are administered under NR 211 and 108. The substantive requirements of these regulations will apply to collected leachate to be discharged.

Resource Conservation and Recovery Act, as amended [42 U.S.C. 6901 et seq.]; Wisconsin Environmental Protection Law, Hazardous Waste Management Act [Wis. Stat. 144.60-74]

Most RCRA requirements are administered under the State of Wisconsin's implementing regulations. U.S. EPA does not have sufficient evidence to demonstrate that listed RCRA wastes were disposed of at the site. RCRA requirements are therefore not applicable to the site, except to the extent that new hazardous wastes (such as treatment residuals) are generated during the course of the remedy. Several other RCRA regulations, although not applicable, address problems or circumstances very similar to those encountered at this site and are therefore relevant and appropriate. However, the remedy will comply with the following applicable requirements:

Wis. Admin. Code NR 605; 40 CFR 261 - Identification of Hazardous Wastes. Provide requirements for determining when a waste is hazardous. The substantive requirements of these regulations will apply to TCLP testing of treatment residuals and waste excavated at the site which may be disposed of off-site. Wis. Admin. Code NR 615; 40 CFR 262 - Standards Applicable to Generators of Hazardous Waste. Provides requirements for the shipment of wastes to treatment, storage or disposal facilities. These requirements may apply to off-site shipment of treatment residuals and other wastes.

Wis. Admin. Code NR 620; Department of Transportation Hazardous Materials Transportation Act [49 U.S.C. 1801]; 40 CFR 263 - Standards Applicable to Transporters of Hazardous Waste. Requires record keeping, reporting and manifesting of waste shipments. These requirements may apply to off-site shipment of treatment residuals and other wastes.

Wis. Admin. Code NR 630.10-17; 40 CFR 264, Subpart B - General Facility Requirements. Establishes substantive requirements for security, inspection, personnel training, and materials handling which are relevant and appropriate to on-site activities involving excavations and handling of hazardous soils and materials.

Wis. Admin. Code NR 630.21-22; 40 CFR 264, Subpart D - Contingency Plan and Emergency Procedures. Establishes substantive requirements for emergency planning which are relevant and appropriate for on-site activities involving excavation and handling of hazardous substances.

Wis. Admin. Code NR 675; 40 CFR 268 - Land Disposal Restrictions. Requires that hazardous wastes cannot be land disposed unless they satisfy specified treatment standards and imposes record keeping requirements on such wastes. These requirements apply to off-site disposal of any treatment residues or other hazardous wastes.

Wisconsin Environmental Protection Law, Subchapter IV-Solid Waste [Wis. Stat. 144.43-47]

Wis. Admin. Code NR 504.04, 506.08(6), 506.07, 508.04 - Landfill gas control. Establishes standards for landfill gas control and monitoring practices. These requirements apply to the landfill gas recovery operations at the site.

Wis. Admin. Code NR 506.08(3)(b) - Additional Closure Standards. Requires diversion and collection of surface water runoff from closed portions of a landfill. These requirements

are relevant and appropriate during construction activities at the site.

Wis. Admin. Code NR 504.07, 506.08, 514.07 and 516 - Landfill Closure Requirements. Establishes substantive requirements for design, operation and maintenance of landfill caps which are relevant and appropriate to installation and upgrading of caps at the site. The cap design and construction will comply with these requirements, which provide substantive requirements for cap design, implementation and documentation.

2. Chemical Specific

Clean Air Act [42 U.S.C. 7401 et seq.]; Wisconsin Environmental Protection Law, Subchapter III-Air Pollution [Wis. Stat. 144.30-144.426]

40 CFR 50; Wis. Admin. Code NR 404, 415-449 - Emissions Standards. Establishes standards for emission of pollutants into the ambient air and procedures for measuring specific air pollutants. Landfill gas emissions, handling of contaminated soils during excavation, and cap construction could cause air emissions of VOCs, particulates, fugitive dust or other contaminants which could adversely effect human health and the environment. The design of the remedy will reduce such emissions to acceptable levels or provide for treatment to satisfy these standards.

Safe Drinking Water Act [40 U.S.C. 300 et seq.]

40 CFR 141, Wis. Admin. Code NR 109 - Maximum Contaminant Levels (MCLs). MCLs establish drinking water standards for potential and actual drinking water sources. MCLs have been exceeded at the site in the shallow aquifer, which is classified as a potential drinking water source. The ISVE component of the remedy, in combination with the upcoming ground water operable unit, will achieve compliance with MCLs and non-zero Maximum Contaminant Level Goals.

Wis. Admin. Code NR 140 - Groundwater Quality Standards. Provides for groundwater quality standards including Preventive Action Limits (PALs), Enforcement Standards (ESs), and (Wisconsin) Alternative Concentration Limits (WACLs). The ISVE component of the remedy, in combination with the upcoming ground water operable unit, will achieve compliance with any applicable substantive groundwater quality standards.

Wisconsin Environmental Protection Law, Subchapter II-Water and Sewage [Wis. Stat. 144.02-27]

Wis. Admin. Code NR 102 and 105 - Surface water quality standards. NR 102 creates an antidegradation policy for all waters of the State and prohibits toxic substances in surface waters at concentrations which adversely affect public health or welfare, present or prospective water supply uses, or protection of animal life. The ISVE component of the remedy, in combination with the upcoming ground water operable unit, will achieve compliance any substantive requirements of these regulations that constitute ARARs.

Clean Water Act of 1977, as amended [33 U.S.C. 1314(a)(1)]

40 CFR 131 - Ambient Water Quality Criteria. Establishes pollutant concentration limits to protect surface waters. The source control remedy is intended to eliminate contaminated surface runoff at the site. To the extent contaminated runoff is channeled directly to a surface water body, however, that runoff must comply with any applicable concentration limits.

3. Location Specific

Clean Water Act of 1977, as amended [33 U.S.C. 1344]

Executive Order 11990 and 40 CFR 6 - Protection of Wetlands.

These requirements provide for protection against loss or degradation of wetlands. Contamination in surface water runoff will be controlled so that it does not have an adverse impact on nearby wetlands.

C. Cost Effectiveness

The selected remedy provides overall cost-effectiveness. ISVE adds a significant degree of permanence, as does the extraction of contaminants in leachate and landfill gasses. The substantial additional protection and permanence provided by the upgraded cap and ISVE under the selected alternative is achieved with only a minor (roughly 9%) increase in cost over the only other protective alternative. Moreover, by effectively addressing sources of ground water contamination, the selected interim action operable unit remedy may also reduce the cost of the ground water operable unit.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected alternative represents the best balance of alternatives with respect to the nine evaluation criteria described in Section VIII. An innovative treatment technology, ISVE, is used to permanently address the most highly concentrated source area of contamination. The selected alternative treats the principal source of ongoing ground water contamination and direct contact threats. The cap further retards the movement of residual contaminants to ground water by reducing the generation of leachate. The upgraded leachate collection system captures for treatment the leachate that is produced. Collected leachate will also be treated and disposed of. The land use restrictions will further assure protection to the public health and the environment.

E. Preference for Treatment As A Principal Element

By treating the most highly concentrated contaminated soil and leachate as required, the selected remedy satisfies the statutory preference for remedies that employ treatment of the principal threat to permanently and significantly reduce toxicity, mobility, or volume of hazardous substances.

The selected remedy reduces the likelihood that the source areas will continue to be a significant source of ground water contamination by use of ISVE, collection and appropriate treatment of leachate, and capping to reduce infiltration. The remaining existing contamination in ground water will be addressed through the second operable unit at the site. The cap, combined with institutional controls will also act to prevent exposure through direct contact.