Proposed Plan
For the
Groundwater Control Operable Unit

Master Disposal Service Landfill Site
Town of Brookfield
Waukesha County, Wisconsin

July 2007

The Public Comment Period for this Proposed Plan will run from

July 12, 2007 to August 10, 2007

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Glossary

Administrative Order on Consent (AOC)

A legal agreement under the authority of the Superfund law between the United States Environmental Protection Agency (EPA) and potentially responsible parties (PRPs). Under the agreement, the PRPs agree to perform or pay the cost of cleanup actions to be taken at the site. For the Master Disposal Service Landfill Site, EPA and the State of Wisconsin negotiated an Administrative Order on Consent with the PRPs, requiring them to perform a remedial design and remedial action.

Administrative Record

A file maintained by EPA that contains all information used by EPA to make a decision pursuant to its authority under the Superfund law. The Agency makes the administrative record available for public review. For the Master Disposal Service Landfill Site, the EPA Administrative Record is available at EPA Region 5 office in Chicago and at the Brookfield Public Library information repository.

Capping

A technology to address landfills which contain hazardous wastes. Capping involves placing clean materials over the contamination to isolate it from the surrounding environment. The cap materials are layered and constructed so that the cap is impermeable to rain or snow, thus restricting the contaminants from leaching into the groundwater.

Cleanup or Remedial Action (RA)

Actions taken to deal with a release or threatened release of hazardous substances that could affect public health or the environment. The term is often used broadly to describe various response actions or phases of responses.

Clean-up Levels

A set of clean-up target levels to be attained for specific contaminants when cleaning up the site.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act. The Acts, which can be found starting at Section 9601 of Title 42 of the U.S. Code, created a special tax that goes into a Trust Fund, commonly known as Superfund, which may be used to investigate and cleanup abandoned or uncontrolled hazardous waste sites. The special tax expired in 1995.

Hazard Index

A numerical index used to summarize all of the hazards of chemicals to which an individual may be exposed. A Hazard Index value of 1.0 or less than 1.0 indicates that no adverse human health effects (noncancer) are expected to occur. The index provides a cumulative assessment of potential or adverse health effects from a variety of chemicals having noncancer effects such as liver damage, neurotoxicity, reproductive toxicity, etc.

Monitored Natural Attenuation (MNA)

Natural attenuation is a variety of physical, chemical and biological processes that, under certain favorable conditions, can occur naturally to reduce the toxicity, mobility, volume or concentration of chemicals in groundwater. Monitored Natural Attenuation relies on these natural degradation processes within a carefully controlled and monitored approach to groundwater cleanup.

National Priorities List (NPL)

A federal roster of uncontrolled, contamination sites that actually or potentially threaten human health or the environment and are eligible for extensive, long-term investigation and cleanup under the Federal Superfund program.

Potentially Responsible Party (PRP)

Parties that have been found to be potentially legally responsible for contamination and/or cleanup at a site. Under Superfund, PRPs can include entities (persons or companies) that are owners or operators of Superfund designated sites or those who arranged for disposal of hazardous substances at a Superfund site or transported hazardous substances to a Superfund site.

Parts-Per-Billion (PPB)

A unit used to quantify the amount of a contaminant in the environment. The unit is commonly used to show the concentration level of a contaminant in water, soil, and sediment. In the case of water, one part-per-billion is equivalent to one microgram-per-liter (ug/L). For example, to express the concentration of benzene in water, one ppb of benzene is interpreted as one part of benzene for every billion parts of water. This can also be expressed as one microgram of benzene for every liter of water.

Proposed Plan

A document that describes the clean-up alternatives evaluated for a Superfund site and identifies the Preferred Alternative and the rationale for the preference. A public comment period and opportunity for a public hearing takes place after release of the Proposed Plan and before the Record of Decision.

Record of Decision (ROD)

A legal document signed by EPA that describes the final cleanup remedy for a Superfund site, why the remedial action was chosen, how much it will cost, and the public comments on the remedial action.

Remedial Investigation/Feasibility Study (RI/FS)

A two-part study of the site. The first part is the Remedial Investigation (RI), which studies the nature and extent of the problem. The second part is the Feasibility Study (FS), which evaluates different methods of dealing with the problem and recommends a method that will effectively protect public health and the environment.

Risk Assessment

A study conducted as part of the Remedial Investigation to determine the threats posed to human health and the environment if the site's contamination is left unaddressed. The study takes into account such factors as the contaminant's toxicity and the paths and likelihoods of exposure.

Sediments

Unconsolidated materials on the bottoms of rivers and lakes. Sediments consist primarily of clay, silt, sand, and gravel along with some organic material from decomposing plants and animals.

Superfund

The common name for the clean-up fund created by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). It is often also used to refer to the clean-up process under CERCLA.

Volatile Organic Compounds (VOCs)

Compounds composed primarily of carbon, oxygen, and hydrogen characterized by their tendency to evaporate easily and quickly. Examples of VOCs include: trichloroethylene, 1,1-dichloroethylene, methylene chloride, benzene, and vinyl chloride which may be chemicals in such liquids as dry cleaning fluid, lighter fluid, paint thinners, and components of gasoline.

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Proposed Plan
Master Disposal Services Landfill Site
Brookfield, Wisconsin

A. Introduction

The purpose of this Proposed Plan is to recommend a Preferred Alternative for contaminated groundwater in the aquifer at the Master Disposal Services Landfill and to provide the rationale for this preference. An interim source control remedy has been implemented at the Site. The interim remedy has already addressed contaminated soil, surface water, sediment, landfill gas, and to a large degree, the groundwater.

This document is issued by the U.S. Environmental Protection Agency (EPA), the lead agency for Site activities. The Wisconsin Department of Natural Resources (WDNR), the support agency, concurs with this Proposed Plan. EPA, in consultation with WDNR, will select a final remedy for the Site after reviewing and considering all information submitted during the 30-day public comment period. EPA, in consultation with WDNR, may modify the Preferred Alternative or select another response action based on new information or public comments. Therefore, the public is encouraged to review and comment on the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), and Section 300.430(f) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the 1990 Remedial Investigation and Feasibility Study (RI/FS) report, the 1990 Record of Decision (ROD), the 2005 Five-year Review report, and other documents contained in the Administrative Record file for this Site. EPA and WDNR encourage the public to review these documents to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted at the Site.

The Administrative Record file is available for review at the Brookfield Public Library, 1900 N. Calhoun Road, Brookfield, Wisconsin (Hours: Monday – Thursday, 9 AM – 9 PM; Friday – Saturday 9 AM – 5 PM). A copy is also at the U. S. EPA Region 5 office, 7th Floor Record Center, 77 W. Jackson Boulevard, Chicago, IL (Hours: Monday – Friday, 8 AM – 4 PM).

B. Site Characteristics

Physical Characteristics

The Master Disposal Site is an inactive industrial landfill located at 19980 West Capitol Drive (Wisconsin Route 190) in the town of Brookfield, Waukesha County, Wisconsin (see Figure 1). During the fall of 1966, the property was purchased by Master Disposal Incorporated and began operating as the Master Disposal Service Landfill. The city of Brookfield, a western suburb of the city of Milwaukee, is about three-quarters of one mile east of the Site. The Site occupies a 40-acre parcel of land, of which 26 acres comprise a presently inoperative landfill.

The Site lies in the marshy flood plain of the Fox River and is bounded by Wisconsin Route 190 to the south, and otherwise is surrounded by privately owned parcels of wetlands and drainage channels. The Fox River, which flows into Illinois, is located about 300 feet west of the Site. The landfilling operations at the Site have created a raised plateau, confined by perimeter berms, that is surrounded by flat-lying lowlands. The Site lies within a primary environmental corridor. The Southeastern Wisconsin Regional Planning Commission (SEWRPC) defines those areas in southeast Wisconsin with the highest concentrations of natural, recreational, historic, and scenic resources as "environmental corridors." A primary environmental corridor is further defined as being at least 400 acres in size, two miles in length, and 200 feet in width. Resources contributing to the area's ranking as a primary environmental corridor include the Fox River, the wetlands, and wildlife habitat areas. There are no known records of endangered or threatened animal or plant species in or surrounding the Site area.

The Site overlies a surficial sand/gravel and dolomite aquifer system, which was contaminated by on-site disposal activities. The shallow aquifer system is comprised of two aquifer units: the sand and gravel aquifer unit consisting of alternating clay, silt, and sand lenses in the glacial drift that lies directly beneath the Site. The thicknesses of the aquifer units vary between 20 and 60 feet and contain the A1 zone and the A2 zones described below. The Niagara aquifer unit (referred to as the A3 zone) is within the Niagara dolomite. The Niagara dolomite is reported to be 300 to 700 feet thick. The Maquoketa shale aquitard varies from 90 to 210 feet in thickness and lies between the Niagara dolomite and the deeper, confined sandstone aquifer. The Maquoketa shale is underlain by 1,100 to 2,000 feet of sandstone.

Groundwater at the Site flows primarily to the south-southwest toward the Fox River through both the shallow aquifer system composed of glacial deposits and dolomite bedrock (A1, A2, and A3 zones), and the deeper sandstone system. The A1 zone of the sand and gravel system is continuous at the top portion of the aquifer system and groundwater flow velocity is estimated to be from 9 to 30 feet per year. At the lower portions of the sand and gravel system the aquifer is discontinuous. These discontinuous portions of the shallow aquifer system comprise the A2 zone and appear to be limited to the southeastern corner of the Site. The groundwater flow velocity in A2 is estimated at one to two feet per year. Groundwater velocity in the A3 zone is less than one foot per year. The relationship between the A1, A2, and A3 zones is depicted in Figure 3.

The saturated soils vary in thickness and lateral extent. The A1 and A2 zones of the shallow aquifer system begin at 15 and 35 feet, respectively, below the ground surface. The deeper Niagara dolomite (A3 zone) beneath the Site is generally encountered at depths ranging from 35 to 60 feet deep.

The Niagara Dolomite Aquifer (A3 zone) is the primary source of water for most residential and small municipal/subdivision systems. The sandstone aquifer, which is artesian, is the principal source of water for municipal supplies, commercial/industrial users, and many subdivisions in Waukesha County. The general area is experiencing rapid growth. The city of Brookfield is a heavily urbanized area located approximately three-quarters of one mile east of the Site. A western suburb of Milwaukee, the city of Brookfield covers 26 square miles with a total population of about 39,000. As of the 2000 census, about 13,500 people live within a three-mile radius of the landfill. Over 2,350 persons are estimated to be served by private wells within a three-mile radius of the Site east of the Fox River. There are 21 private drinking water wells within 1 mile of the site. However, only one of the 21 wells is potentially subject to Site-related contamination because it is situated hydraulically downgradient of the Site about one-quarter mile away from the Site.

The city of Brookfield municipal water utility supplies drinking water to about 63 percent of the residents of Brookfield. Consisting of 23 wells, five towers, seven reservoirs and nine booster stations, its capacity is about four million gallons-per-day. Ten of the city wells are located within a three-mile radius of the Site. A number of the city wells draw from the Niagara Dolomite aquifer A3 zone. The city water utility is actively drilling for new wells on the south side of the city. The town of Brookfield water supply (Sanitary District No. 4) consists of six wells also drawing from the Niagara Dolomite Aquifer (A3 zone). The closest District well is located 2 miles south of the Site along Barker Road. The District provides an average of 1.2 million gallons-per-day of water to about 2,200 people. None of the town water supply lines reach the Site vicinity; hence, all water supplies within a one-mile radius of the Site are served by private wells. As mentioned, all but one of these private wells are hydraulically upgradient of the Site and not subject to Site-related groundwater contamination.

Land Resource Use

Forty acres of the Site property are classified by the county of Waukesha as undeveloped or open land. A 0.61-acre subparcel of the property fronting Capitol Drive was zoned residential at one time, but is currently zoned as transitional. The land immediately surrounding the property is wetland and defined as an environmental corridor.

The Site sits near the northwest corner of the city of Brookfield. The land use in this area is currently semi-rural, mixed-use land and includes commercial, residential, and light industrial uses. The Site is immediately surrounded by a conservancy area with abundant wetlands and drainage areas for the Fox River and Sussex Creek. These wetlands comprise the majority of land around the Site and fall within the 10-year flood line. Hence, it is unlikely that any future development could occur within this vicinity of the landfill.

An old concrete block building currently used to store automotive equipment sits within the Site perimeter fence on the 0.61-acre parcel. The building was used as a repair garage when the Site operated as a landfill. After the Site was placed on the NPL, the building was leased for the repair of vehicles. The building was slated for demolition in order to build an on-site groundwater treatment plant under the preliminary remedial design; however, a revised treatment scheme no longer included a treatment building. After the original owners passed away, the building and property on which it sits were maintained by the decedents' son.

C. Site Background and History

In late 1966, the Site was purchased by Master Disposal, Inc. and began its operation as the Master Disposal Services Landfill (MDSL). During the active life of the landfill (1967-1982), industrial and non-industrial solid wastes and drummed liquids were disposed on-site.

In April 1967, WDNR inspected the MDSL Site and found that the Site was located entirely in a swampy, peat area. The WDNR advised Master Disposal, Inc. to maintain adequate diking around the Site. The WDNR chose not to license the Site due to its poor setting, but routinely inspected the Site during its years of operation.

A WDNR inspection in August 1973 indicated that the on-site operations consisted primarily of industrial waste disposal. Foundry sands and slags were the largest class of wastes accepted for disposal. Some evidence of hazardous waste (including solvents, paints, adhesives, oils, sludges and other industrial compounds) reportedly was present at the Site. EPA and WDNR estimate about 1.4 million cubic yards of waste were disposed of at the Site between 1967 and 1982. The non-industrial waste consisted of general debris including service station waste, plastic, metal, paper, wood, tires, construction material, and miscellaneous garbage. The depths of the waste within the landfill varied from 10 to 25 feet.

In June 1977, the Site owner studied the feasibility of continuing disposal at MDSL and found that due to its poor location, the Site should be abandoned. The owner/operator attempted to cap the landfill in 1982; however, the cover materials used at that time eroded, re-exposing the waste materials. The only known wastes that were received after the 1982 closure were wood wastes that were burned in the air curtain destructor; the ash from the burning was disposed on-site. The owner ceased this activity and closed the MDSL in 1985.

On September 21, 1984, EPA placed the Site on the National Priorities List (NPL). In June 1986, approximately 20 PRPs entered into an administrative order on consent (AOC) with EPA and WDNR for performing a Remedial Investigation and Feasibility Study (RI/FS). The goal of the RI/FS was to determine the effect of the MDSL Site on the surrounding environment and to present cleanup alternatives for reducing the risks to human health and the environment.

During the RI, samples were taken from surface and subsurface soils, monitoring wells, residential and municipal wells, surface water, and sediment. Limited air and soil sampling were also performed. The primary contaminants or chemicals of concern (COCs) affecting the soil and groundwater were organic compounds, inorganics compounds, and metals. Specifically, the primary COCs, several of which are carcinogens, were identified as:

Inorganic	Organic
Arsenic	Methylene Chloride
Cadmium	1, 1-Dichloroethylene (1,1-DCE)
Chromium	Trichloroethylene (TCE)
Copper	Benzene
Lead	Toluene
Iron*	Xylenes
Nickel*	
Zinc*	

(* Not identified in the 1990 ROD but named as COCs in other Site documents)

Eighteen monitoring wells were installed at nine locations around the MDSL Site. Six wells were in each of the following depths: shallow (A1 zone wells), intermediate (A2 zone wells) and deep (A3 zone wells). Groundwater samples were collected from the eighteen monitoring wells, five existing monitoring wells, seven residential wells and two municipal wells. The results of the groundwater monitoring showed elevated concentrations of both organic and inorganic compounds in both the sand/gravel and the dolomite aquifers. The RI described groundwater movement as being generally to the south-southwest toward the Fox River, and noted that there were residential well users located approximately 1 to 2 miles downgradient of the Site, however no Site contamination was found in the seven residential and two municipal wells sampled. Modeling showed that over a 70-year period, the plume of contamination could

move as much as 1,500 feet south of the MDSL Site.

During the RI, the Fox River, dredge pond, and drainage channels surrounding the landfill were sampled twice to see whether site-related contaminants were present. A comparison of upstream river and drainage channel results to downstream locations showed that the Site has affected the surface water quality.

Site Risks

A risk assessment was performed during the RI/FS and concluded that the Site would pose a risk to human health if groundwater was consumed. The risk assessment considered both soil ingestion and skin contact for the adult populations, but did not take into account the use of the Site by children, as the Site was partially fenced. Dirt bike tracks were found at the Site during subsequent site visits, indicating that children may have gained access to the Site.

The reasonable worst case hazard index was calculated to be 1.2 for adults due to ingestion of groundwater, based primarily on the contributions from lead, cadmium, and 1,1-DCE. A hazard index of greater than one indicates an unacceptable systemic or noncarcinogenic risk. The reasonable worst case hazard index calculated for children at the Site was 4.0, also attributed to groundwater ingestion.

The cumulative carcinogenic risks for adults and children from the contaminant levels found at the Site were calculated to be $4x10^{-4}$ (four in ten-thousand) for adults and $1x10^{-3}$ (one in ten-thousand) for children. This means that if an adult were to be exposed daily to the contaminant levels at the Site under the expected exposures, then an estimated four in ten-thousand adults could develop cancer above and beyond the usual prevalence (background level) of the disease. The National Contingency Plan, 40 CFR Part 300 established acceptable levels of carcinogenic risk for Superfund sites at between one in ten-thousand and one in one-million excess lifetime cancer cases. This translates to a risk range of $1x10^{-4}$ to $1x10^{-6}$. These risks were similarly due to ingestion of contaminated groundwater, and driven by the contaminants 1,1-DCE and benzene.

When the RI/FS was completed in July 1990, EPA had determined that the Site posed unacceptable risks to human health due to the threat of: 1) direct contact exposure to surface soil contamination; and 2) exposure to contaminated groundwater that served as a potential source of drinking water.

Objectives of the 1990 Source Control Remedy

The chief exposure pathways at the Site were direct contact with the waste mass and ingestion of groundwater. The selected remedy addressed these threats by containing the plume of contaminated groundwater, and by halting deterioration of existing cover materials which could result in further exposure of the waste mass. Waste materials in contact with the groundwater would continue to impact the groundwater; thus, groundwater containment was a necessary part of the source control alternative.

The overall intent of the RA selected in the 1990 ROD was to contain the groundwater plume. The presence of the surrounding, environmentally significant wetlands posed a problem in that an overly aggressive groundwater restoration effort could dry out and destroy these wetlands. Thus, the RA's primary focus was to control the landfill source and any portions of the contaminated groundwater that

were possibly in direct contact with the landfill materials. As such, the 1990 selected remedy was an interim groundwater remedy. Attainment of federal and state groundwater criteria in the aquifer was not a goal of the 1990 operable unit. The purpose of this proposed final groundwater operable unit (OU2) is ultimately to define the groundwater remediation standards and to select a final remedy for addressing contaminated groundwater at the Site.

Source Control (Interim) Operable Unit (OU1)

At the conclusion of the RI/FS in September 1990, EPA, in consultation with WDNR, announced a Preferred Alternative. Since the MDSL Site is located within an environmentally significant wetland near the Fox River, the environmental problems involving water balance were complicated. Further, groundwater was believed to be in direct contact with the waste materials; the groundwater needed to be contained so that the contaminant plume would not spread. As a result, EPA organized the work into two distinct operable units.

The first operable unit (OU1), a Source Control Operable Unit, called for containing the waste mass by building a cap on the Site to prevent infiltration of water through the landfill. OU1 was an interim groundwater remedy. As such, meeting the federal and state groundwater quality levels was not a goal of OU1. Indeed, groundwater cleanup levels were not set forth in the OU1 ROD. The final groundwater remedy was deferred until a later time, allowing EPA a chance to evaluate the effects of the source control groundwater extraction measures on the surrounding wetlands and to establish appropriate groundwater cleanup criteria and a restoration timeframe.

The major components of OU1 were:

- Placement of a clay/soil cap over the fill material to prevent direct contact with landfill contaminants and to reduce infiltration into the waste mass. The cap was constructed in accordance with NR 504.07 and NR 506.08 Wisconsin Administrative Code[1] (WAC) and included an active landfill gas venting system to control landfill gas in order to meet air regulations;

- Installation of a groundwater extraction and treatment system to remove both organic and inorganic contamination from the sand and gravel aquifer unit (A1 and A2 zones) beneath the Site. The groundwater would meet the effluent limitations established by WDNR pursuant to its

[1]The Master Disposal Site received primarily industrial wastes of a non-hazardous nature. While such wastes contain hazardous substances, they are not RCRA hazardous wastes, and waste mass (landfill) contamination is at relatively low levels. Therefore, the selected remedy for the Site included a clay/soil cap over the waste mass with active gas venting and groundwater pump and treat systems to contain and treat groundwater as well as to prevent contaminants from leaving the Site in the shallow alluvium aquifer. In accordance with NR 504.07 and NR 506.08 Wisconsin Administrative Code, the cap system is composed of a minimum 2-foot thick clay cap to minimize water from infiltrating through the landfill; covered by a 1½ to 2 ½-foot thick soil frost-protection layer; covered by a layer of top soil at least 6 inches thick to promote vegetation growth. The cap is sloped to allow water runoff. An active venting system, complying with Wisconsin NR 504.05, was installed to reduce gas buildup from decomposition in the landfill and to monitor/control gas emissions.

National Pollution Discharge Elimination System (NPDES) authority before being discharged from the treatment pond to the drainage areas feeding the Fox River;

- Monitoring of groundwater and surface water hydrology and wetlands to assess the quality and quantity (water budget) of area groundwater, surface water and wetlands. This would determine if further action would be necessary and if any adverse impacts to the wetlands would result; and

- Impose site access restrictions such as fencing; and institutional controls including deed, land-use, and groundwater-use restrictions.

OU1 Remedy Implementation

On January 30, 1992, a Consent Decree[2] (CD) between EPA and the Potentially Responsible Parties (PRPs) for the completion of the Remedial Design and Remedial Action (RD/RA) for OU1 was signed. The Site capping, fencing, sign placement and landfill gas venting were completed in October 1994. The design plans for the source control groundwater extraction and treatment were approved on July 29, 1996. Construction of the groundwater extraction system was finished by the end of 1997. The groundwater extraction system consists of 11 extraction wells from which contaminated groundwater is pumped and discharged to the large pond on the western side of the Site (see Figure 2). The extraction well network capacity was designed to withdraw about 85 gallons-per-minute (gpm) of contaminated groundwater for treatment. The pumping rate was estimated based on a well performance test conducted in July of 1994. The rate of pumping for each well can be varied during operation.

The 1990 ROD found that treatment of the extracted groundwater would be achieved using one of four potential treatment technologies identified, i.e., air stripping, carbon adsorption, ion exchange, or chemical treatment. The ROD allowed the treatment technology to be selected during the remedial design (RD) stage, at which time treatment-specific data would be collected for groundwater. The RD studies determined that the groundwater contained significant levels of Biochemical Oxygen Demand (BOD) and ammonia for which the Best Available Technology Economically Achievable (BATEA) was determined to be biological treatment via an aerobic stabilization pond. Consequently, groundwater treatment includes biodegradation in a passive aeration pond system before discharge to the drainage creeks that feed the Fox River system. Because the groundwater treatment remedy, as implemented, differed from the four potential treatment options put forth in the 1990 ROD, the final ROD for OU2 will memorialize this change.

Treated groundwater meets WDNR standards for discharge to the Fox River. Treated waters are allowed to seep from the on-site pond through wetlands adjacent to the Site before discharging to the Fox River. If the discharge had been routed directly into the Fox River, the wetlands would have suffered a net loss of water. As specified in EPA-approved design reports, the extraction system typically shuts down from November through March, when pond water temperatures are too low for natural biodegradation to occur. The groundwater moves at a slow enough rate that contaminants remain under the system's influence even when the system is shut down for this time period.

A comprehensive site monitoring plan was finalized in July 1996 and was divided into the following three

[2] United States of America and the State of Wisconsin v. Brake, Clutch and Drum, et al.,1992

modules:

Module 1: Groundwater and Wetlands Monitoring Program consists of three components:

1) Quarterly containment monitoring of six piezometers and 11 extraction wells evaluates groundwater elevations between the landfill and the pond. These elevations and hydraulic gradients are used to determine the effectiveness of the groundwater capture and extraction system in preventing further migration of groundwater contaminants in the A1 and A2 zones.

2) Quarterly groundwater samples are collected from the A3 zone to characterize potential contamination. Annual groundwater samples are collected from the Al and A2 zones to characterize the nature and extent of groundwater contamination over time.

3) Annual vegetation surveys were conducted to detect potential hydrologic changes, vegetation stress, and species changes in the wetlands surrounding the Site.

Module 2: Extracted Groundwater and Surface Water Monitoring Program evaluates the water quality of discharges from the groundwater extraction system and the acute toxicity and water quality of pond discharges to the wetlands.

These results are also used to demonstrate compliance with the substantive requirements of the Wisconsin Pollutant Discharge Elimination System (WPDES). Monthly pond surface water and quarterly bioassays of the pond were conducted. Effluent discharge limitations for treated groundwater were calculated from state discharge statutes, and specified weekly averages for metal contaminants and monthly averages for VOCs, as well as maximum concentration levels. These limitations were included in the 1990 ROD.

Module 3: Landfill Gas Monitoring Program identifies and quantifies primary constituents present in the landfill off-gas and the volume of the off-gas generated.

The landfill gas from the venting system was sampled to determine if the mass emission rates of several constituents in the landfill gases exceeded the regulatory levels found in the applicable provisions of the National Emission Standards for Hazardous Air Pollutants (NESHAP) and the more stringent WAC Chapter NR 445.

The 1992 CD required monthly reporting by the PRPs and submission of a technical memo after the collection of data for two years following startup of the extraction system. At that point, the PRPs were allowed to petition for a reduction in the sample collection frequency. On May 6, 1999, the PRPs submitted a two-year evaluation technical memorandum which summarized results from the monitoring and recommended the following revisions to the monitoring regime:

1. Intensive piezometer water level monitoring should be performed in Spring during startup of the extraction system in order to distinguish the effects of the extraction system from natural shallow groundwater level fluctuations;

2. Monitor groundwater elevations at all on-site monitoring wells quarterly;
3. Groundwater quality monitoring of the shallow aquifer system (A1 and A2 zones) should be continued but reduce the A3 zone monitoring frequency from quarterly to annually;

4. Continued monitoring of pond surface water elevation and extracted groundwater and pond surface water quality. If acute toxicity bioassay results continue to be negative, the testing should be changed from quarterly to annually as of April 2000; however, the testing should occur in July after the system has been started up annually;

5. The landfill gas monitoring be discontinued after a year of quarterly sampling events showed no exceedances;

6. Discontinue the annual vegetation survey; the extraction system shows a negligible impact on groundwater levels in the surrounding wetlands and vegetation data do not argue for a change in remedial activities.

EPA, in consultation with WDNR, determined that reduced monitoring was appropriate for this Site in January 2000. The landfill gas monitoring was eliminated. Thirty monitoring wells and 11 extraction wells are monitored each quarter for water levels and 23 wells are sampled annually for the contaminants of concern. In September 2000, EPA also approved the elimination of the annual vegetation survey from the monitoring program.

Based on the relatively slow groundwater flow velocities and negligible changes in horizontal hydraulic gradients associated with the groundwater extraction system beneath most of the landfill area, the PRPs requested a probationary shutdown of the existing extraction system. The PRPs provided the requisite technical justification to show that a shutdown would not modify the local hydrogeologic flow system to result in adverse impact to human health and the environment. The PRPs conducted post-shutdown groundwater monitoring for one year to document that no adverse impact to human health and the environment resulted from the shutdown. The groundwater extraction system was shut down from October 2003 through October 2004 at which time, a full year of post-shutdown groundwater data was collected. The groundwater extraction system, though currently not operating, remains on-site should it need to be operated.

Implementation of Institutional Controls (ICs) and Other Measures

EPA determined that the necessary ICs required to effectuate the OU1 RA and to protect public health and the environment consist of the following land use restrictions and conditions:

1) No interference with construction, operation and maintenance (O&M), monitoring, and efficacy of any components or improvements resulting from the RA;

2) No extraction, consumption or other use of groundwater from beneath the Site, except for the work specified in the RA;

3) No agricultural, recreational, residential, commercial, or industrial use of the landfill cap area or other areas containing RA components. This includes excavation, grading, or other landfill capping operations and any construction of buildings, other than for the purpose of implementing the RA;

4) No construction, installation, or use of any buildings, wells, roads or structures on the facility

property that could affect the physical integrity, O&M, or efficacy of the remedy.

The types of ICs that are typically imposed at an NPL site include governmental controls, proprietary controls, and information devices. The PRPs were to secure deed restrictions incorporating the preceding four land use restrictions. The restrictions were to run with the land and bind any persons acquiring title or any legal interest in the property. At present, there are no deed restrictions pertaining to the Site property on file at the Waukesha County Register of Deeds.

In December 1985, the name of the property owner was changed from Master Disposal, Inc. to Western Disposal, Inc. In September 1993 Western Disposal, Inc. was administratively dissolved. According to Waukesha County Geographic Information System (GIS) maps, the 40-acre parcel (of which 26 acres is occupied by the landfill) was titled to Master Disposal Inc. A 2005 title commitment indicated that the current deed record holder is Western Disposal Landfill, Inc. The PRPs could not place a deed restriction directly on the MDSL Site property because they do not own the property.

A subparcel of the property (about 0.61 acres) fronts West Capitol Drive and contains a 6,160 square-foot garage building that was erected in 1980. There are no known wells on this subparcel area and no water or sewer utility services. According to the current county GIS data, the subparcel is zoned T-1 or transitional use. This zoning category is used when the rural landscape is quickly changing in order to provide for the pacing and shaping of development. In this case, the Town did not want to zone the land prematurely before EPA determined if the land use should be restricted. The surrounding parcels are classified as wetlands and are zoned as conservancy districts. Installation of groundwater wells on this subparcel could endanger human health due to its proximity to the groundwater contamination under the landfill. Pumping the groundwater could draw the contamination beyond the landfill under the subparcel. Therefore, installation of any well on this subparcel will be prohibited. The subparcel shall not be utilized in a way which adversely affects the remedial action anywhere else on the Site.

Site access controls are in place and consist of a continuous 6-foot high cyclone site perimeter fence and three locked and chained gates. The main gate is at the southeast corner of the property. Two other gates are located at the southwest and northwest corners of the landfill. The main gate is accessible from Capitol Drive. At EPA's request, the PRPs have upgraded the signage to larger signs with more visible and accurate information.

Remedial Action Performance

Based on a review of relevant documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of Site inspections, all portions of the ongoing source control remedy appear to be functioning as intended by the 1990 ROD and are expected to continue in this manner. The effectiveness and progress of the remedy has been tracked through the monitoring program. Site monitoring has been performed since October 1996. These data indicate that the Site presently does not pose an immediate threat to human health or the environment. However, if Site groundwater were to be used as a potable water source, then unacceptable risks would occur.

Vegetation surveys of wetland communities showed some changes in the composition and nature of wetland plant communities in the areas nearest the extraction wells. Fluctuations in water levels, which may be seasonal in nature, have been documented in several areas of the wetlands. However, because no

overall adverse impacts to the wetlands and vegetation were documented, EPA approved the elimination of annual wetland surveys for the MDSL Site in September 2000.

D. Scope and Role of Final Groundwater Restoration Operable Unit (OU2)

As mentioned**,** the goal of the RA selected in the 1990 ROD was to contain the contaminated groundwater. The surrounding wetlands are hydrologically connected to the groundwater aquifers. The wetlands were a major consideration of the RA because they could easily be destroyed if too much groundwater was pumped out of the aquifers in a short period of time. Thus, the primary focus of OU1 was to contain the landfill source, i.e., the principal threat to human health and the environment at this Site, and any portions of the groundwater that may be in direct contact with the contaminated landfill materials. This was achieved by controlling the extraction of groundwater so that contamination did not migrate beyond the Site boundary. Over the six-and-one-half years that the controlled pumping has occurred, contaminant levels have declined in the groundwater.

The 1990 RA was an interim groundwater remedy; a second operable unit for the remedy (OU2) was anticipated to define the remediation standards and the restoration time frame of the contaminated aquifer. Accordingly, the purpose of this OU2 is to set groundwater clean-up levels that are consistent with state and federal ARARs, and to restore the groundwater in both upper alluvium aquifer and underlying dolomite aquifers (A1-A3 zones) to these levels while minimizing impacts to the surrounding wetlands, the Fox River, and the environment.

In addition, the final ROD for OU2 will clarify any unaddressed Site issues or minor modifications made to the remedy since the 1990 ROD. This includes memorializing the groundwater treatment to reflect that groundwater was biodegraded in the passive aeration pond system on the western side of the landfill before it was discharged to the drainage creeks that feed the Fox River system. Treated groundwater meeting WDNR discharge standards was allowed to seep from the on-site pond through wetlands adjacent to the Site before discharging to the Fox River. Groundwater treatment was discontinued in October 2003, when the groundwater extraction system began its probationary shutdown period[3].

E. Summary of Current Site Risks

Currently the risks at the Site include: 1) potential risk from drinking contaminated groundwater in areas where cleanup levels have not yet been met, 2) the risk that Site groundwater contamination will migrate to aquifer areas currently used as a drinking water source, and 3) risk that the Site property may be used inappropriately, disturbing the integrity of the cap and causing a direct contact risk from Site contamination. Implementation of the institutional controls will address: 1) the current long-term risk that the Site cap will be disturbed resulting in a potential direct contact risk from Site contamination; and 2) the possibility that private drinking water wells will be installed in the area.
The interim remedy (OU1) has been operating for 10 years. During that time, the groundwater has been remediated through the groundwater extraction and treatment system for the first six-and-one-half years, and through monitored natural attenuation during the latter three-and-one-half years after the pump and treat system was turned off. All chemicals of concern at the Site, except for benzene, have either been

[3] Although EPA approved the probationary shutdown of the groundwater extraction and treatment system in June 2004, the actual one-year probationary period was retroactively begun in October 2003. This enabled the already ongoing winter shut-down period (November-March) for that year to be included as part of the probationary period.

cleaned up to levels below the groundwater cleanup criteria recommended for OU2 in this document, or as in the case of arsenic and iron, do not significantly differ from naturally occurring background levels in the regional groundwater. As previously mentioned, the risks posed by benzene from ingesting on-site groundwater could be significant because on-site benzene levels in groundwater exceed health-based groundwater criteria, such as the MCL of 5 ppb. There is no risk posed by benzene from ingesting groundwater off-site because it is being attenuated in the aquifer before reaching any existing downgradient private wells. Any benzene that may reside in shallow groundwater discharged to the intervening wetland between the Site and any downgradient wells would volatilize immediately.

Arsenic has not been detected above the WDNR Enforcement Standard of 50 micrograms-per-liter (ug/L) or parts-per-billion (ppb). In 2006, the WDNR reduced the arsenic Enforcement Standard to 10 ppb. Since October 2003, no exceedance beyond the ES of 10 ppb for arsenic has occurred outside the landfill boundary. A statistical comparison of upgradient to downgradient concentrations and trend analyses indicated that the presence of arsenic is likely to be a naturally occurring condition. Similar analyses for iron also produced the same conclusion. Both of these naturally occurring constituents produce negligible risk at the Site. A comparison of these levels to the federal and state groundwater cleanup levels are presented in Table 1.

It is EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this Site.

F. Remedial Action Objectives (RAOs) for OU2

The purpose of this proposed OU2 is to address any residual Site risks associated with future groundwater use. This will be achieved by defining the groundwater remediation standards that must be met at the Site. These standards must protect human health and the environment. The federal Safe Drinking Water Act specifies Maximum Contaminant Levels (MCLs) for drinking water contaminants measured at the point of use from public water supplies. In the case of the MDSL Site, the contaminant plume is in a groundwater supply which is used by private well users; hence, MCLs are not legally applicable, but are relevant and appropriate remediation goals for groundwater.

The State of Wisconsin has promulgated groundwater quality standards in Ch. NR 140, which the WDNR consistently applies to all facilities, practices and activities that may affect groundwater quality. These legally applicable, relevant and appropriate standards include Enforcement Standards (ESs) and Preventive Action Limits (PALs). PALs are contaminant-specific limits that signify a potential groundwater contamination problem. When PALs are exceeded for any constituent measured at a groundwater monitoring point, the WDNR is required to take action to manage or control the contamination so that the Enforcement Standard (ES) is not exceeded. The Wisconsin chemical-specific ES are set at the same concentration as MCLs.

The state ESs and MCLs will be the cleanup levels and the basis on which the groundwater restoration time frame and long-term monitoring criteria will be developed for the Site.

The RAOs of the proposed OU2 include:

1. Protect human health and the environment from exposure to contaminated groundwater via drinking and direct contact;

2. Protect existing and future residential water supplies from potential migration of contaminated groundwater;

3. Restore the groundwater to comply with state and federal groundwater standards within a reasonable time frame;

4. Optimize both groundwater restoration and wetlands vegetation preservation.

The Feasibility Study (FS) performed in1990 developed various remedial source control alternatives which were subjected to a detailed analysis using the following standard nine criteria recommended by EPA (see Section H of this document). Under the OU1 FS, containment/control of the contaminated groundwater plume, as well as the ability to achieve health protective cleanup goals consistent with ARARs in downgradient groundwater were evaluated during the selection of the OU1 remedy. The OU1 remedy included a groundwater containment and remediation component that has been operating since 1997. The subsequent development of OU2 is based on the OU1 FS (1990) as well as Site groundwater data collected since 1997.

G. Summary of Alternatives for OU2

The following three alternatives have been developed to address the RAOs for OU2. It must be remembered that under any and all circumstances, OU1 consisting of the landfill cap with active gas venting system, monitoring of ground and surface water hydrology to assess quality and quantity of the area groundwater, surface water, and wetlands remains in place and is not affected by the final selected groundwater remedy under OU2.

- Alternative 1: No Action

- Alternative 2: Monitored Natural Attenuation (MNA) with contingent groundwater extraction and on-site treatment

- Alternative 3: Single well groundwater extraction and on-site treatment

Consistent with the expectations set forth in Superfund law, none of the alternatives proposed for OU2 rely exclusively on ICs to achieve protectiveness. However, both Alternatives 2 and 3 include ICs as part of the remedy. Monitoring the groundwater at the Site boundary to ensure that contaminants do not migrate off-site is a component of Alternatives 2 and 3. Alternative 2, Monitored Natural Attenuation, includes a contingency for more frequent contaminant monitoring should increasing benzene or other contaminant trends be detected. Further, Alternative 2 calls for turning on the groundwater extraction system when a predetermined trigger level for benzene or other contaminants is exceeded in groundwater. Extracted groundwater would be discharged to the on-site pond for treatment. The contingencies of Alternative 2 allow for site-specific adjustments as the need arises. Alternative 3 specifies that a subset of the current on-site groundwater extraction system operate

continually at a low flow extraction rate in order to contain groundwater contaminants within the landfill boundary. Extracted groundwater would be discharged to the on-site pond for treatment. Under this alternative, monitoring of the water budget is necessary to ensure that the wetlands are not adversely affected or dewatered. Alternatives 2 and 3 also include the establishment of groundwater cleanup criteria, as referenced in the earlier 1990 ROD for the Site, and ICs. The ICs are to ensure that no extraction, consumption or other use of groundwater from beneath the Site occurs; no interference with construction, operation and maintenance (O&M), monitoring, and efficacy of any components or improvements resulting from the RA occurs; no inappropriate use of the landfill cap area or other areas containing RA components occurs; and that no construction, installation, or use of any buildings, wells, roads or structures on the facility property that could affect the integrity, O&M, or efficacy of the remedy occurs.

Alternative 1: No Action

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0
Estimated Construction Timeframe: None

Regulations governing the Superfund program generally require that the "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no further action at the Site concerning the groundwater beyond what has been provided for under the source control OU1 as currently operated, i.e., no active pumping and treating of the groundwater. Because extraction and treatment of the groundwater was an interim action component of the overall remedy under OU1, it is not considered a final groundwater remedy. The components of the OU1 remedy (i.e., landfill cap with landfill gas venting, groundwater monitoring, and institutional controls) would remain in place for all three alternatives presented herein. The ROD for OU1 (U.S. EPA, September 26, 1990) should be consulted for more details on OU1.

Alternative 2: Monitored Natural Attenuation with Contingent Groundwater Extraction and Treatment (EPA's Recommended Alternative)

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $21,000 - $27,000
Estimated Present Worth [4] Cost: $261,000 - $335,000
Estimated Construction Timeframe: None
Estimated Time to Achieve RAOs: Less than 5 years[5]
Under this alternative, the contamination in the groundwater would be allowed to clean itself up through natural physical, chemical, and biological processes known as natural attenuation. A critical component of natural attenuation is the monitoring of groundwater at certain locations at the Site boundary and downgradient of the landfill to ensure that contaminants do not move off-site via the groundwater. This alternative also includes the establishment of groundwater cleanup levels. Compliance with the chemical-specific groundwater cleanup levels in groundwater is determined at the edge of the landfill Site

[4] Present worth estimate is based on 30 years at a discount rate of seven percent.
[5] This time period is an estimate based on the current trend.

boundary; these levels do not have to be met throughout the landfill. Should monitoring indicate that a predetermined trigger level is exceeded for benzene or other contaminants at the edge of the landfill, a localized portion of the on-site groundwater extraction system will be reactivated to pull back the contaminated groundwater.

Under this contingency, the extracted groundwater would be discharged to the on-site pond on the west side of the landfill where contaminants are biologically degraded. The treated water is eventually discharged from the pond to the drainage system feeding the Fox River. Because of the sensitive wetland areas surrounding the Site, the water levels and the wetlands would need to be regularly monitored to ensure that the extraction of groundwater from the hydrological system does not dewater the wetland. A wetlands vegetation assessment would need to be conducted at regular intervals to ensure that the wetlands ecosystem has not been adversely affected.

The estimated time period to achieve RAOs is an estimate based on the monitoring results and trend analysis of one well. Though all of the monitoring wells in the network are tested, only one well (PZ-02) has shown benzene--the only COC that has been consistently detected due to past disposal activities at the Site. Over the last three years, benzene levels in the well have ranged from no detection to 9.6 ppb. Consistent with the state statute, since the benzene concentrations in groundwater exceed NR 140 Enforcement Standard of 5 ppb (see Table 1) the Site will be put onto an Internet accessible database, called the GIS Registry of Closed Remediation Sites (GIS Registry), after a complete closure request is submitted by the PRPs to the WDNR and approved by WDNR. As of the 2001 rule revisions, the GIS Registry replaced the requirement for groundwater use restriction on properties with residual groundwater contamination exceeding the ES.

Alternative 3: Pump and Treat the Groundwater with Biological Treatment before Discharge

Estimated Capital Cost: $30,000 -$50,000
Estimated Annual O&M Cost: $41,000 - $57,000
Estimated Present Worth Cost: $539,000 -$757,000
Estimated Construction Timeframe: 3-5 months
Estimated Time to Achieve RAOs: Within one year

This alternative specifies that a portion of the existing groundwater extraction system (EW-8), which has not been operating since 2004, be recommissioned to actively contain the groundwater contaminants within the landfill boundary at a low flow state, without aggressive groundwater removal from the overall hydrogeological system. The extracted groundwater would be discharged to the on-site pond on the west side of the landfill where contaminants are biologically degraded. The treated water is eventually discharged from the pond to the drainage system feeding the Fox River. As was the practice during the six-and-one-half-year period when the groundwater extraction system was operating, EW-8 would not be operating from November through March when the temperatures are too cold to support natural biodegradation in the treatment pond.
This alternative also includes the establishment of chemical-specific groundwater cleanup levels that comply with ARARs and must be achieved at the edge of the landfill Site boundary. Because of the sensitive wetland areas surrounding the Site, the water levels and the wetlands would need to be regularly monitored to ensure that the extraction of groundwater from the hydrological system does not dewater the wetland. In addition, a wetlands vegetation assessment would need to be conducted at regular intervals to ensure that the wetlands ecosystem has not been adversely affected.

As with Alternative 2, if the benzene concentrations in groundwater exceed NR 140 Enforcement Standard of 5 ppb (see Table 1) the Site will be put onto an Internet accessible database, called the GIS Registry of Closed Remediation Sites (GIS Registry), after a complete closure request is submitted by the PRPs to the WDNR and approved by WDNR.

H. Evaluation of Alternatives (OU2)

This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options being considered. State acceptance has been considered during the development of this Proposed Plan; community acceptance will be evaluated during the upcoming public comment period.

Threshold Criteria

1) **Overall Protection of Human Health and the Environment** addresses whether or not an alternative provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment and engineering or institutional controls.

2) **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether or not an alternative will meet all of the applicable or relevant and appropriate requirements or provide grounds for invoking a waiver.

Balancing Criteria

3) **Long-term Effectiveness and Permanence** refers to the ability of an alternative to maintain reliable protection of human health and the environment, over time, once cleanup objectives have been met.

4) **Reduction of Toxicity, Mobility, or Volume** is the anticipated performance of the treatment technologies.

5) **Short-term Effectiveness** involves 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 objectives are achieved.

6) **Implementability** is the technical and administrative feasibility of an alternative, including the availability of goods and services needed to implement the solution.

7) **Cost** includes capital costs, as well as operation and maintenance costs.

Modifying Criteria

8) **State Acceptance** indicates whether, based on its review of the RI/FS and Proposed Plan, WDNR agrees on the Preferred Alternative.
9) **Community Acceptance** indicates the public support of a given alternative.

Of these nine criteria, the final remedial action must meet the threshold criteria of protecting human health and the environment and complying with ARARs. If a proposed remedy meets these two criteria, then it is evaluated against the balancing criteria first and then the modifying criteria in order to arrive at a final recommended alternative.

1) Overall protection of human health and the environment

Alternative 1 would not be protective of human health and the environment. Taking no final action to address groundwater at the Site would allow unabated, unmonitored movement of contaminants. Extraction, treatment and some natural attenuation of the groundwater has occurred during the 10 years that OU1 has been operating. This source control remediation combined with the Site access restrictions has reduced potential exposures to contaminants and the associated risks. However, ingestion of groundwater on-site still poses an unacceptable risk due to the presence of benzene. Alternative 1 does not address this problem. Both Alternatives 2 and 3 protect human health and the environment because they require health protective groundwater cleanup levels to be established for the Site. Contaminants exceeding these cleanup levels would not be allowed to migrate off-site. Further, Alternative 2 would not adversely impact the surrounding wetlands because the critical water balance would be maintained.

2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The Superfund Amendments and Reauthorization Act (SARA) of 1986 requires that remedial actions meet the legally applicable or relevant and appropriate requirements (ARARs) of other environmental laws and any state law which has stricter requirements than the federal corresponding law. These laws may include for example, the Safe Drinking Water Act which provides the national primary drinking water regulations specifying MCLs. Under Alternative 1, no action would be taken at the Site. Therefore, no chemical-specific groundwater cleanup levels would be established. Hence, Alternative 1 does not comply with ARARs. Both Alternatives 2 and 3 go beyond the scope of the source control OU1 in that they would establish chemical-specific cleanup levels to be met in the groundwater at the appropriate boundary.

3) Long-term Effectiveness and Permanence

Alternative 1 would not be effective in the long term as it allows for the continued movement of groundwater contaminants, such as benzene, found to be present at the landfill boundary. Alternatives 2 and 3 are both effective in the long term, however, Alternative 2 would require a longer groundwater restoration time period than Alternative 3 due to the passive nature of the monitored natural attenuation remedy. Alternative 3 could potentially affect the wetlands because groundwater would be actively withdrawn from the hydrological system in the area. Monitoring would be needed to ensure that wetlands dewatering does not occur.

4) Reduction of Toxicity, Mobility, or Volume

Alternative 1 would not reduce the toxicity, mobility, or volume of the waste because it would allow the continued movement of contamination through the aquifer. Alternatives 2 and 3 would meet this criterion and achieve the same endpoint. Alternative 2 provides for natural degradation of the benzene and other contaminants remaining in the groundwater. Alternative 3 would reduce the toxicity, mobility and volume of the waste more quickly because it involves actively removing the contaminated groundwater and treating it. However, it does so at a higher potential risk to the wetlands due to the water withdrawal of the extraction wells.

5) Short-term Effectiveness

All three alternatives present little/no risk during the implementation period and have short estimated construction timeframes.

6) Implementability
Alternative 1 could be easily implemented since it involves no action. Alternative 2 is easy to implement; however, if groundwater extraction and treatment are ultimately indicated by exceedance of the benzene trigger level, then the relative implementability between Alternatives 2 and 3 will not be a consideration. Alternative 3 should be easily implementable since its components, such as extraction and treatment, are already on-site and available, although redevelopment of the selected subset of extraction wells will likely be necessary.

7) Cost
Alternative 1 is the least expensive alternative. On the surface, Alternative 2 appears to be about half the cost of Alternative 3 because most of the costs are for monitoring instead of active remediation as in Alternative 3. However, because Alternative 2 is a contingency remedy, future work may be indicated which could easily approach the costs of Alternative 3.

8) State Acceptance
WDNR has reviewed and agreed with the contents of this Proposed Plan and the Preferred Alternative as identified at the outset of the public comment period.

9) Community Acceptance
Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends, and will be described in the Record of Decision for the Site.

I. Preferred Alternative

EPA has determined at the start of the public comment period that the Preferred Alternative for cleaning up the groundwater (OU2) at the Master Disposal Services Landfill Site is Alternative 2 (Monitored Natural Attenuation with Contingent Groundwater Extraction and Treatment). The WDNR, as the support agency, concurs with EPA's Preferred Alternative. Components of this alternative include determining groundwater cleanup levels, and establishing a long-term groundwater monitoring program and levels for contaminants that, if exceeded, would trigger additional actions to ensure that human health and the environment remain protected. These additional actions include stepped-up monitoring frequency, activation of the groundwater extraction and treatment system with discharge to the surface water drainage system, and installing additional monitoring points for benzene immediately downgradient of the landfill boundary. If the groundwater extraction system is activated, then the wetlands water budget and vegetation surrounding the Site would need to be evaluated on a regular basis.

The Preferred Alternative was selected over the other alternatives because it is expected to achieve risk reduction by meeting Site remedial action objectives, i.e., protect human health and the environment from exposure to contaminated groundwater; protect existing and future residential water supplies from the potential migration of contaminated groundwater; restore the groundwater to comply with state and federal groundwater standards; and, optimize both groundwater restoration and wetlands vegetation preservation within a reasonable time frame and cost compared to the more active extraction and treatment alternative. Based on the information available at this time, EPA and WDNR believe that Alternative 2 will be protective of human health and the environment, attain the ARARs, and be cost-

effective. This action uses a permanent but passive solution to reduce waste volume, mobility, and toxicity via natural attenuation. Alternative 2 also provides a contingency system to actively remove and treat groundwater contamination should monitoring results indicate that contaminant levels have reached or exceeded a trigger level at the landfill boundary that is protective of human health and the environment downgradient of the landfill. Alternative 2 is more protective of the wetlands than Alternative 3 because the water balance in the area will not be affected if the contingency system is not activated.

A primary goal of the final groundwater restoration operable unit (OU2) is to establish chemical-specific groundwater cleanup levels that comply with federal and state ARARs. The State of Wisconsin has promulgated groundwater quality standards in Ch. NR 140, which the WDNR consistently applies to all facilities, practices and activities which are regulated by WDNR and may affect groundwater quality. These standards include Preventive Action Limits (PALs) and Enforcement Standards (ES). When PALs are exceeded for any constituent measured at a groundwater monitoring point, the WDNR is required to take action to manage or control the contamination so that the ES is not exceeded. An exceedance of a PAL does not necessarily trigger remedial action as long as protectiveness is maintained.

The Safe Drinking Water Act specifies Maximum Contaminant Levels (MCLs) for drinking water contaminants measured at the point of use from public water supplies. In the case of the MDSL Site, the contaminant plume is in a groundwater supply which is used for consumption by private well users; hence, contaminant-specific MCLs are not legally applicable but are relevant and appropriate to the groundwater.
The Wisconsin chemical-specific ES are set at the same concentration as MCLs. PALS are more stringent than ES and MCLs. The current MCLs, PALs and ESs for the Master Disposal groundwater contaminants of concern, along with the latest Site maximum groundwater contaminant levels, are listed in Table 1.

The well (PZ-02) has been the only well showing benzene detections above the ES and MCL so far and therefore, will be the focus of the monitoring efforts. Additional wells will enable EPA to determine whether natural attenuation is succeeding. Well PZ-02 is located within the design management zone (DMZ) of the landfill. The DMZ is designated as a zone 300 feet horizontally from the landfill perimeter or the property boundary. According to Wisconsin Administrative Code NR 507.28, ES exceedances within the DMZ require monitoring but not active remediation. The monitoring plan will include long-term monitoring wells to determine if the plume behavior is changing and performance evaluation wells to confirm that contaminant concentrations meet the groundwater ARARs.

The Preferred Alternative can change in response to public comment or new information.

Based on the information currently available, the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA Sect. 121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; and, (5) satisfy the preference for treatment as a principal element.

J. Community Participation

This proposal addresses only the final groundwater remedy (OU2) of the Master Disposal Service Landfill Site. The source control operable unit (OU1) was previously addressed. Past community relations activities for OU1 at the Site have included a public meeting held July 16, 1990 at the completion of the RI/FS process to present the results and the Proposed Plan for OU1 cleanup. Fact sheets were routinely distributed to update the community of the cleanup progress. EPA has also maintained an administrative record and Site information repository in the community throughout the cleanup process at the Brookfield Library, 1900 N. Calhoun Road, Brookfield, Wisconsin.

Share Your Opinions

EPA encourages the public to comment on any aspects of the final groundwater control remedy for the Master Disposal Services Landfill Site and will consider comments received during the public comment period. Your input helps EPA determine the best course of action. You may fill out and mail or fax the enclosed form, or use an electronic form on EPA's Web site. Mailed comments must be postmarked by August 10, 2007 (the last day in the comment period).

These comments will be addressed and evaluated in the selection process of the remedy. A summary of all comments received and EPA's responses will be contained in the Responsiveness Summary, which will be attached to the ROD. Comments may also be mailed to:

Bri Bill, Community Involvement Coordinator
U.S. Environmental Protection Agency, Mail code P-19J
77 West Jackson Blvd.
Chicago, IL 60604
Email: bill.briana@epa.gov

If there is sufficient interest, EPA will hold a public hearing on this proposed cleanup plan so that the public can provide comments orally. Contact Bri Bill by July 24, 2007 to request a hearing.

For More Information

Background material for the Master Disposal Service Landfill Site is available on EPA's Web page:

epa.gov/region5/sites/masterdisposal

An administrative record, which houses the legal documentation supporting EPA's proposal are available for review at the Brookfield Public Library, 1900 N. Calhoun Road, Brookfield, Wisconsin. A copy is also at the U. S. EPA Region 5 Office in Chicago at the 7th Floor Record Center. For further information on the Master Disposal Services Landfill Site, please contact:

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TABLE 1 - COMPARISON OF MAXIMUM GROUNDWATER CONCENTRATIONS WITH FEDERAL AND STATE GROUNDWATER CLEAN-UP CRITERIA

Contaminant of Concern	Maximum Detected Concentration in Site Groundwater	Sample Date and Source Well of Maximum	GROUNDWATER CRITERIA		
			MCL[1]	ES[2]	PAL[3]
Arsenic	34.7J	10/20/2000 B-05	10	10	1
Cadmium[4]	24.8	7/9/1997 B-51	5	5	0.5
Chromium, Total	11.2	10/29/2003 OB-07I	100	100	10
Copper[5]	14.9J	5/17/1999 GW-EXT-01	1,300	1,300	130
Lead[4,5]	6.4	11/25/1996 B-31	15	15	1.5
Iron	92,200	10/09/1996 OBS-07S	3,000	3,000	150
Methylene[4] chloride	49.74J	6/21/1999 EW-11	5	5	0.5
Benzene	10	5/13/1997 GW-EXT-01	5	5	0.5
Toluene	1.2	7/25/2001 GW-EXT-01	1,000	1,000	200
Xylenes	1	10/23/2001 B-44	10,000	10,000	1,000
TCE	2	10/18/2000 EW-11	5	5	0.5
1,1-DCE	1	10/15/1998 EW-11	7	7	0.7

Note: All units are reported in micrograms per liter (ug/L); "J" represents laboratory qualified estimated values. The sample collection dates for maximum detected concentration ranged from 1996 to 2006.

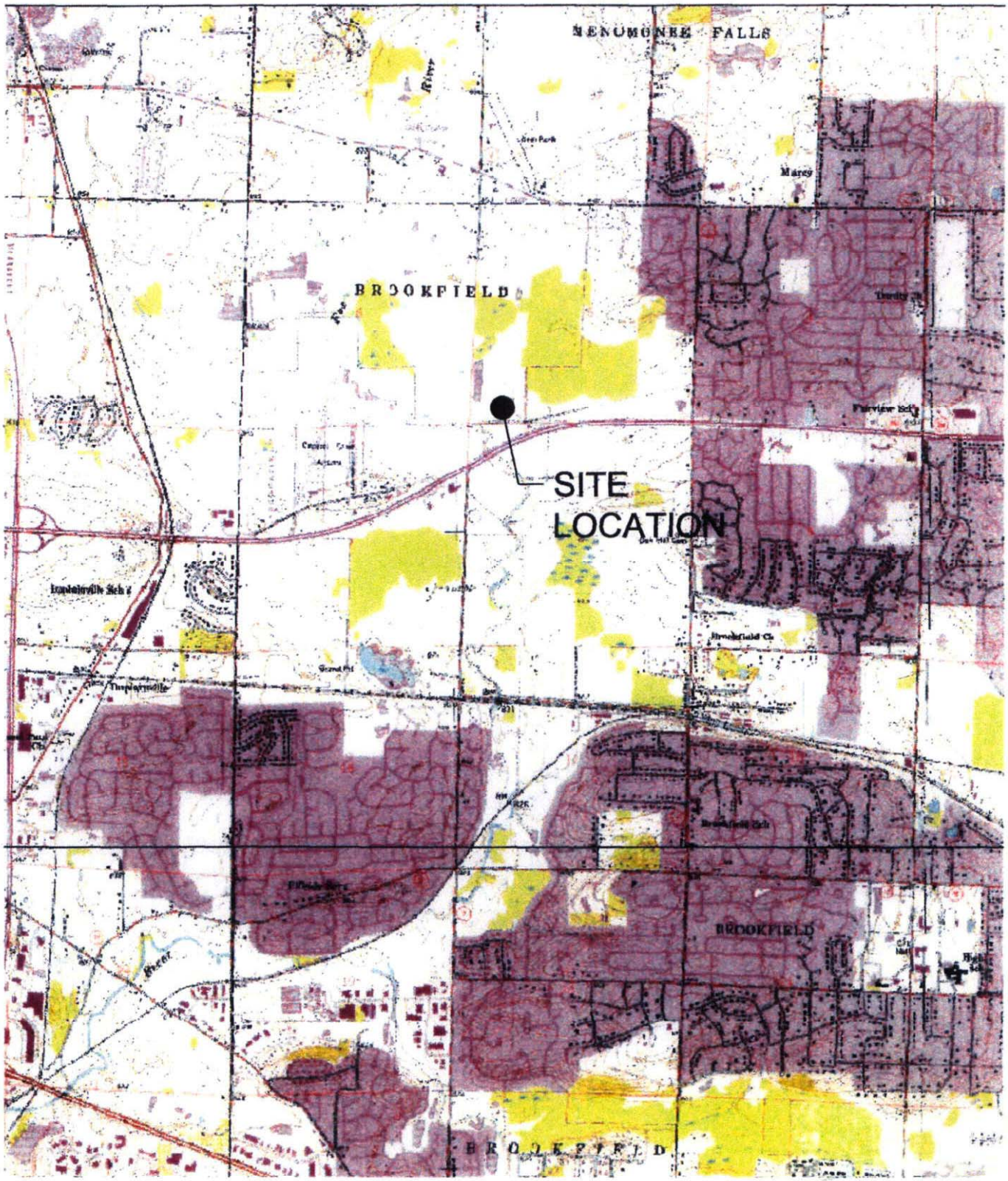
[1] Maximum Contaminant Levels (MCLs) are promulgated under the federal Safe Drinking Water Act, 42 U.S.C. Sect. 300ff et seq. MCLs specify safe levels for drinking water contaminants measured at the tap from public water supplies.

[2] Enforcement Standards (ES) are adopted under the Wisconsin State Code Section NR 140 as groundwater quality standards which the WDNR consistently applies to all facilities, practices and activities that may affect groundwater quality.

[3] Preventive Action Limits (PALs) are contaminant-specific limits which signify a potential groundwater contamination problem. When PALs are exceeded for any constituent measured at a groundwater monitoring point, the WDNR must take action to manage or control the contamination so that the ES is not attained.

[4] The concentrations shown are historical values. Sample results in the past two years for these constituents show negligible values near the detection limits.

[5] Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L.



STS CONSULTANTS
11425 W. Lake Park Drive
Milwaukee, WI 53224
414-359-3030
www.stsconsultants.com

SITE LOCATION
MASTER DISPOSAL SERVICE LANDFILL SITE
BROOKFIELD, WISCONSIN

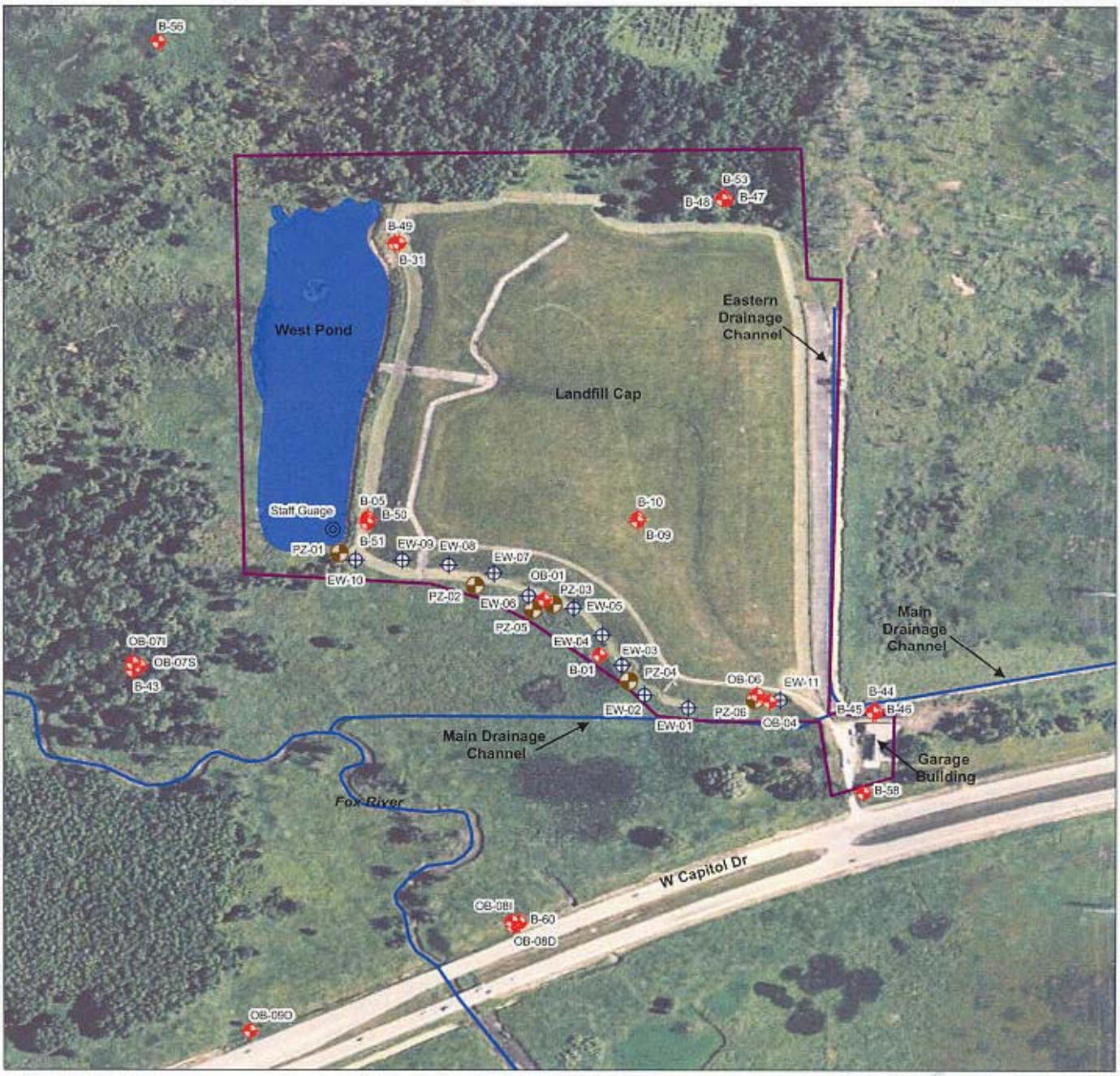
Figure 1

Well Locations

Superfund
U.S. Environmental Protection Agency

Master Disposal Service Landfill
Waukesha County, WI

WID980820070



Legend

- Master Disposal Property Line
- Water Areas
- Staff Gauge
- Monitoring Well
- Extraction Well
- Piezometer

0 300 600 Feet

N

GEOS
Groundwater Evaluation and Optimization System

Figure 2

Produced by Sarah Backhouse
U.S. EPA Region 5 on 7/6/07
Image Date: 2005

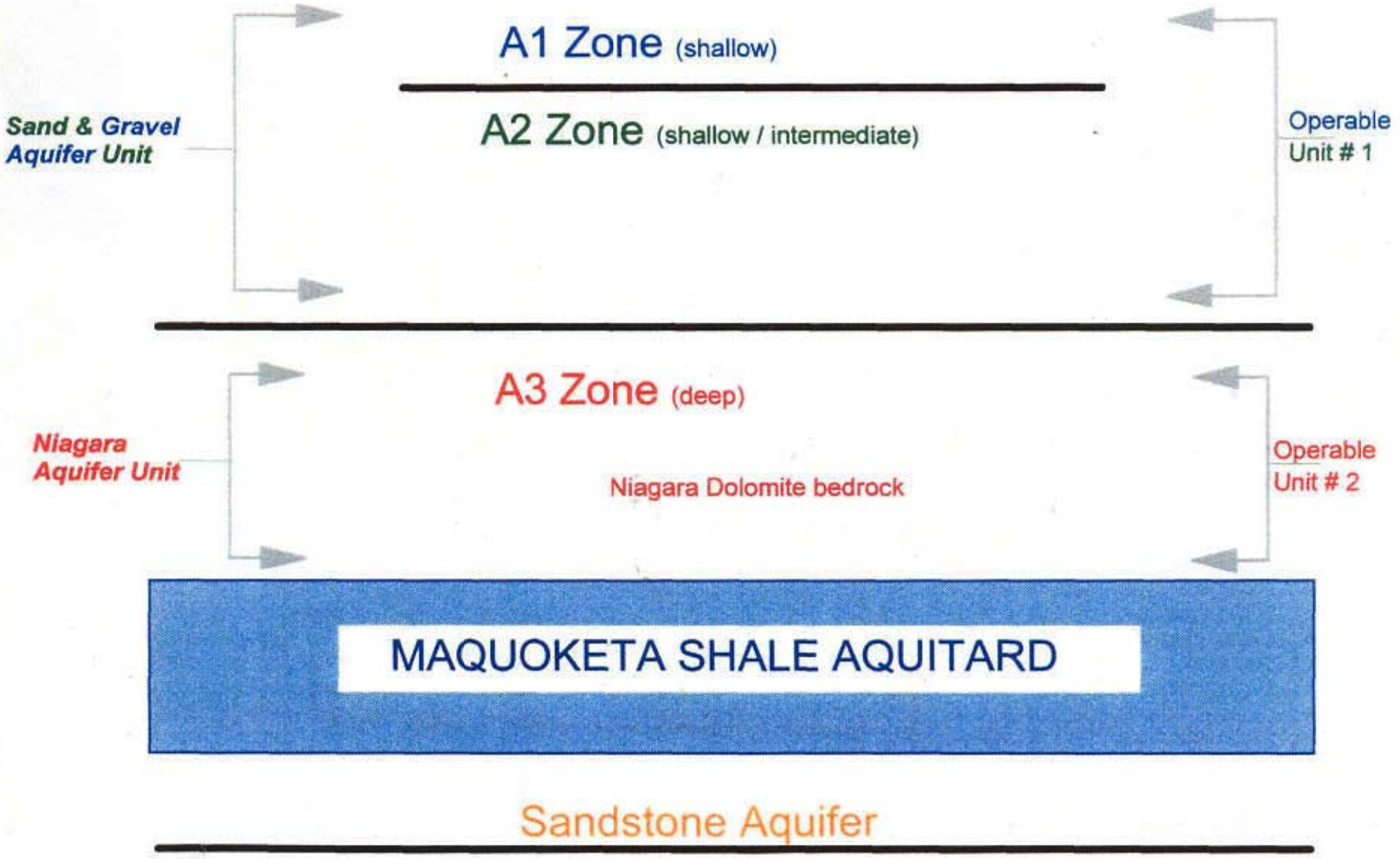


Figure 3

Figure 3 – Simplified Diagram of Groundwater Systems at the Master Disposal Service Landfill Site