Superfund Program United States Environmental Protection Agency, Region 2
Proposed Plan

Brick Township Landfill Superfund Site

July 2008

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the preferred alternative for addressing the Brick Township Landfill Superfund Site (Site). The Site is located in Brick Township, New Jersey, and is comprised of the Brick Township Landfill property (Property) and the contaminated groundwater emanating from the Property.

The United States Environmental Protection Agency's (EPA) Preferred Alternative is Alternative 2, installation of a New Jersey Department of Environmental Protection (NJDEP) solid waste landfill cap with institutional controls to prevent on-site exposures. A key element of the remedy will be groundwater monitoring.

EPA is issuing this Proposed Plan as part of its community relations program under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, or Superfund) 42 U.S.C. 9617(a). This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation and Feasibility Study (RI/FS) reports and other documents contained in the Administrative Record for this Site. EPA and NJDEP encourage the public to review these documents to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted.

This Proposed Plan includes summaries of the cleanup alternatives evaluated for use at the Site. This document is issued by EPA, the lead agency for Site activities, and NJDEP, the support agency. EPA, in consultation with NJDEP, will select the final remedy for the Site after reviewing and considering all information submitted during a 30-day public comment period. EPA, in consultation with NJDEP, may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. EPA relies on public input to ensure that the concerns of the community are considered in selecting the preferred alternative for each Superfund site. Therefore, the public is encouraged to review and comment on all of the alternatives presented in this document.

SITE DESCRIPTION

The Brick Township Landfill is located in the Herbertsville section of Brick Township, between the Garden State Parkway and Sally Ike Road. The Property is approximately 40.7 acres in size (Figure 1) and currently consists of mostly vegetated land. An area of contaminated groundwater associated with the Site is approximately 470 acres in size.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
August 22, 2008 – September 22 , 2008
EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING:
September 10, 2008
EPA/NJDEP will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at Brick Township Civic Plaza, 270 Chambers Bridge Road, Brick Township, NJ and will start at 7:00 pm.

For more information, see the Administrative Record at the following locations:

Brick Branch of the Ocean County Library
301 Chambers Bridge Rd
Brick, NJ 08723
(732) 477-4513
Hours: Monday-Thurs 9am to 9pm, Friday-Saturday 9am-5pm

U.S. EPA Records Center, Region II
290 Broadway, 18th Floor.
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday - 9 am to 5 p.m., by appointment.

The Site is situated in New Jersey's Coastal Plain physiographic province and overlies the unconsolidated sediments of the Kirkwood-Cohansey Aquifer. The sanitary landfill waste was covered by two feet of sandy fill in 1979 and has undergone subsidence and uneven settling. The permeability of the surficial deposits is

moderately rapid in the upper two feet and variable below

that depth. The sediments that extend below the base of the landfill include a fairly homogeneous, well-sorted sand unit, about 40 feet thick, a fine-grained sand unit with about 35 percent silt, also about 40 feet thick, and a silt unit with about 25 percent sand. The aquifers are mostly recharged by precipitation that infiltrates through the soils (and waste deposits) to the water table, by vertical leakage through hydrogeologic layers, and by seepage from surface-water bodies. Groundwater elevation measurements collected at monitoring wells show that groundwater flow across the Site is generally to the southeast, at an average rate of about 650 ft/year (1.8 ft/day).

SITE HISTORY

The Brick Township Landfill began operation in the late 1940s and operated for approximately 30 years as a disposal site for residential wastes, construction debris, vegetative wastes as well as sewage and septic wastes. The Site was originally operated as McCormick's Dump, then French's Landfill, before it was purchased by the Township of Brick (Township) in 1973. The Township ceased operations at the Landfill in 1979.

During the Landfill's operation, an undetermined quantity of labeled and unlabeled 55-gallon capacity drums were disposed at the landfill. Historic examples of drum labels identified by NJDEP included engine oil, lubricants, automatic transmission fluid, anti-freeze, resin, pesticides and herbicides. NJDEP and EPA estimate that a total of 63 million gallons of septic wastes were accepted at the Landfill from 1969 to 1979. Very little information is available regarding materials deposited prior to 1969.

In December 1980, the NJDEP conducted an extensive water analysis program that included the sampling of Landfill monitoring wells, septage pits, surface water and off-property monitoring and residential drinking water wells. A variety of contaminants were found in the soil and groundwater, both on and off the Landfill.

In March 1981, NJDEP conducted an inspection which revealed the presence of approximately 150 55-gallon drums, three empty 10,000-gallon storage tanks and three open pits once used for septage disposal. Sampling of off-property wells indicated the presence of trace contaminants including: chloroform, bromoform, 1,1-dichloroethane, and 1,1,1-trichloroethane. Sampling of the septage pits showed high levels of volatile organic compounds (VOCs), metals, and pesticides and herbicides. Based on the findings, NJDEP ordered the pits to be covered with soil.
In August 1982, NJDEP entered into an Administrative Consent Order (ACO) with the Township for the closure of the Landfill, which included construction of a clay cap and a gas venting system, removal of containers, and installation of monitoring wells. The Township removed the drums and containers by September 1982. In December 1982, the Landfill was placed on the Federal National Priorities List (NPL) 42 U.S.C. 9605 of hazardous waste sites.

In September 1983, NJDEP decided to stay the 1982 ACO in order to allow the Township to conduct an RI/FS. In December 1985, an amended ACO was issued, under the terms of which NJDEP would perform the RI/FS and be reimbursed by the Township. The RI/FS was completed in June 1992.

In 1992, NJDEP issued a Decision Document announcing a remedy for the Site. The remedy called for installation of a NJDEP Solid Waste Landfill Cap, consisting of, among other components, an impermeable layer and a methane gas venting system. The Decision Document also called for long-term monitoring of the groundwater contamination as part of a natural attenuation remedy for the contaminants in the groundwater. EPA did not concur on this Decision Document. Soon after the decision was made, the Township petitioned NJDEP to consider alternative remedial approaches for the Landfill.

In 1994, NJDEP reviewed the information related to the Site and determined that an impermeable cap was not necessary. NJDEP decided soil cover, fencing, and groundwater monitoring would be a sufficient remedy for the Site. In an October 4, 1994 letter from NJDEP to Senator Andrew R. Ciesla, the NJDEP Commissioner explained that the 1992 decision was rescinded because there were no records of hazardous waste disposal at the Site. Since a soil cover was placed on the property by the Township in 1979, the only actions remaining for the Site were to implement a groundwater monitoring program and install a fence around the entire Property. The fencing was installed in 1995, and the groundwater monitoring program was initiated in 1997. EPA did not review or concur on this action.

In 1996, NJDEP and EPA prepared an addendum to the 1992 Risk Assessment. The addendum showed that concentrations of contaminants in the groundwater exceeded the acceptable risk range as identified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). NJDEP subsequently informed the Township that further action for the groundwater would be required. As a first step, NJDEP directed the Township to re-sample the existing wells, which hadn't been sampled since 1991. Twenty-three of the wells were re-sampled in 1997. The analytical results showed exceedences of groundwater and drinking water quality standards for several compounds. Based on these results,

NJDEP began initiation of a Classification Exemption Area (CEA). A CEA is an institutional control put in place by NJDEP, which suspends designated aquifer uses in a specific area such as use as a drinking water source.

In 1998, NJDEP directed the Township to delineate the extent of the groundwater contamination so that the CEA could be put in place. The first round of the investigation was completed in 1999. After reviewing the 1999 findings, the Township imposed a Groundwater Use Restriction Area (GURA) which prohibited the use of private wells within one mile of the Landfill. This was a precautionary measure since by 1999, the only private wells within the GURA area were being used for irrigation, not as a drinking water source. The ban was later reduced to 0.5 mile after subsequent groundwater sampling allowed a more precise estimation of the extent of the groundwater contamination.

In 2000, the Agency for Toxic Substances Disease Registry reviewed data pertaining to the contaminated groundwater and concluded that the modified GURA was protective of public health. The GURA, which has been approved by the Ocean County Health Department and NJDEP, remains in place today.

Under the direction of NJDEP, fourteen rounds of groundwater samples were collected by the Township from 79 monitoring wells within and outside the area of contaminated groundwater between 2001 and 2007. The purpose of the sampling was to both monitor the contamination and to determine if the contamination was attenuating through natural processes.

The results of these sampling events, which can be found in the 2008 Remedial Investigation (RI) report, form the basis for the 2008 Feasibility Study (FS). The RI and FS report, which are being released concurrently with this Proposed Plan, can be found in the Administrative Record for the Site.

SITE CHARACTERISTICS

The Landfill investigation and initial groundwater investigations were performed by NJDEP from 1987 through 1992. During that period, soil, soil gas, and groundwater samples were collected and analyzed. The remainder of the groundwater investigations were performed by the Township, beginning in 1997, under NJDEP oversight.
The objectives of the Township's groundwater sampling program were to first determine the extent of the groundwater contamination and then to collect multiple rounds of samples to determine if natural degradation (*i.e.,* natural attenuation) of the contaminants in the groundwater was occurring. The groundwater sampling data were the basis of the RI/FS and were also used to implement and monitor institutional controls (*i.e.,* the CEA and the GURA).

Landfill Source Area:
The Landfill is roughly 41 acres in size and rises about 60 feet above the immediate surrounding area. It is covered with two feet of soil in which dense vegetation has grown. A chain-linked fence and locked gate control access to the property. The Landfill consists of three distinct areas: 1) the landfill cells (approximately 27 acres); 2) a borrow pit area (approximately 8 acres); and 3) a lowland wooded area (approximately 5.7 acres). Soil from the borrow pit was used for the landfill cover.

During the field investigations for the 1992 RI/FS, a total of 14 inorganic substances were detected in unsaturated or saturated soils collected at the Landfill. Organic compounds were also detected at low levels in the Landfill's soils. Analysis of landfill gas indicated that methane gas was not migrating from the Landfill into residential areas.

Based upon the known contaminants in the Landfill and the longitudinal and transverse cross sections through the area of contaminated groundwater, it is clear that the contamination originated at the Landfill.

Groundwater:
In May 1997, the Township collected groundwater samples from 23 monitoring wells that were previously sampled as part of the 1992 RI. The results showed a general increase in groundwater contamination between 1991 and 1997.

In response to these findings, the NJDEP directed the Township to install additional monitoring wells to determine the extent of the groundwater contamination. The Township installed seven new well clusters in 1998. Each new cluster consisted of three wells, one for the shallow (18 – 30 feet), intermediate (30 – 60 feet) and deep (60 – 100 feet) water bearing zones. The new wells were placed up-, side- and down-gradient of the Landfill.

Analytical results of the samples collected in 1998 showed that groundwater from 42 of 49 wells contained compounds that exceeded NJ Class II-A Groundwater Quality Standards, (NJGWQS). A comparison of wells sampled in 1991 and in 1998 again showed a general increase in the number and concentrations of contaminants in many wells. These data confirmed that despite the soil cover, the Landfill was still acting as a source of groundwater contamination. The results of the 1998 field work also showed that while the lateral extent of the groundwater contamination remained unknown, it was

clear that it was much larger than had been suspected.

In 1999, the Township used temporary well points to rapidly collect additional groundwater samples farther from the Landfill in an attempt to further assess the extent of the groundwater contamination. The results of the sampling allowed NJDEP to estimate the maximum lateral extent of the area of groundwater contamination as 3,500 feet south/southeast of the Landfill. Based on this estimate, NJDEP determined that an area of roughly 470 acres could be potentially impacted by the groundwater contamination and would therefore need to remain within the CEA. The estimate was largely confirmed after the installation and sampling of additional permanent monitoring wells in 2000 and 2001.

By 2001, there were 79 monitoring wells being sampled on an annual or more frequent basis. In 2001, 24 compounds found in groundwater samples from one or more wells had concentrations greater than NJGWQS. These compounds included vinyl chloride, 1, 2 dichloroethane, benzene, chlorobenzene, arsenic, mercury and thallium. By 2007, only nine compounds had concentrations greater than NJGWQS, including vinyl chloride (maximum concentration of 11.0 ppb), 1,2, dichloroethane (4.2 ppb), benzene (16.0 ppb), chlorobenzene (130 ppb), arsenic (6.3 ppb), mercury (12.7 ppb), and thallium (2.6 ppb).

A review of the results from the 14 rounds of sampling since 2001, including the most recent sampling event in 2007, shows that although elevated levels of a number of contaminants are in the groundwater, the distribution is sporadic and there is no clearly distinct plume for any specific contaminant. The data show that the number of NJGWQS exceedences has decreased, and the lateral extent of the contamination has remained relatively stable. The results also show that the concentrations of several compounds have increased. Therefore, the data do not support a conclusion that natural attenuation is occurring for all the compounds of concern. In addition, the data do not conclusively demonstrate that the Landfill is no longer acting as a source of groundwater contamination.

SCOPE AND ROLE OF THE ACTION

The long-term cleanup will be conducted in one phase, or Operable Unit (OU), which is the subject of this Proposed Plan. The OU will provide for implementation of a remedy to address the contaminated groundwater and the source of the contamination.

SUMMARY OF SITE RISKS

As part of the RI/FS, a baseline risk assessment was conducted to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land and groundwater uses. The baseline risk assessment includes a human health risk assessment (HHRA) and is available in the 2007 document titled "Human Health Risk Assessment – Brick Township Landfill, Brick Township, Ocean County, New Jersey" and the addendum.

The cancer risk and non-cancer health hazard estimates developed in the HHRA are based on current and future exposure scenarios and were developed by taking into account various estimates about the frequency and duration of an individual's exposure to chemicals of potential concern (COPCs), as well as the toxicity of these contaminants. Cancer risks and non-cancer health hazard indexes (HIs) are summarized below (please see the text box on the following page for an explanation of risk assessment terms).

Human Health Risk Assessment Findings

The Landfill, which is owned by the Township, is currently zoned industrial. Future land use is expected to remain industrial. The baseline risk assessment began by selecting chemicals of potential concern (COPCs) in the various media that would be representative of Site risks. Current and future off-property residents (adults and children) were evaluated based on the potential inhalation of the vapors from the shallow groundwater that could intrude into the indoor air at residents' homes. Future workers and residents who may use irrigation water from the aquifer were also evaluated for exposures through watering lawns and gardens and filling swimming pools.

The groundwater in the area is classified by the NJDEP as Class II-A, a potable drinking water supply. EPA prepared an addendum risk assessment to quantitatively evaluate future health risks to residents from ingesting water drawn from the Site's area of contaminated

WHAT IS RISK AND HOW IS IT CALCULATED?

Human Health Risk Assessment:
A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants in air, water, soil, etc. identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site and are referred to as Chemicals of Concern or COCs in the final remedial decision or Record of Decision.

groundwater. Currently, exposure to the contaminated groundwater is interrupted through institutional controls (the CEA and GURA) and through the use of a municipal water supply. The drinking water risk assessment was conducted assuming these controls were not in place, and the current residents were drawing contaminated groundwater from private wells as a drinking water source.

Risks to Residents Using Groundwater for Non-Drinking Water Purposes. Risk from hypothetical future adult and child residential exposures to irrigation water (*i.e.*, hose/sprinkler and swimming pool) and exposure to subsurface vapor were calculated. The risks were within or below the EPA's acceptable risk range for cancer of 10^{-4} (one excess incidence of cancer in ten thousand) to 10^{-6} (one excess incidence of cancer in a million) as established by the National Contingency Plan (NCP). The non-cancer hazards were also below the EPA's goal for protection (*i.e.*, a HI of 1 or less).

Risk to Future Residents Using Groundwater for Drinking Water - RME. Evaluation of the future risks to a "Reasonably Maximally Exposed" (RME) resident ingesting the Site's contaminated groundwater were 1.8 x 10^{-4} (approximately 1.8 in 10,000) and 7.5 x 10-^{5} (approximately 7.5 in 100,000) for adults and children, respectively. The combined risks for adult and child RME residents are 2.5 x 10^{-4}, which is above EPA's acceptable risk range. The main COPCs were vinyl chloride and arsenic. Evaluation of non-cancer health effects among RME adults and children found non-cancer HIs of 4.0 and 9.1, respectively. The HI for the RME exceeded EPA's level of concern (i.e., an HI of 1.0). The main COPCs for non-cancer health effects were chromium (total) and mercury. An evaluation of cancer risks and non-cancer hazards associated with showering were found to be below the risk range for the RME resident and child.

Risk to Future Residents Using Groundwater for Drinking Water – CTE. A separate analysis of the future risks to the "Central Tendency Exposure" (CTE) or average exposures was also calculated. The cancer risks to the CTE were 3.9 x 10^{-5} (approximately 3.9 in 100,000) and 4.6 x 10^{-5} (approximately 4.6 in 100,000) for adults and children, respectively. The combined risks for adult and child CTE residents are within EPA's acceptable risk range. The evaluation of non-cancer health hazards were 1.9 and 6.3 for adults and children, respectively. The non-cancer HI for the CTE exceeded EPA's level of concern (i.e, HI of 1 or less). The main COPCs were chromium (total) and mercury. Evaluation of cancer risks and non-cancer hazards associated with showering were below the risk range for the CTE.

Conclusions. A statistical analysis of groundwater

sampling data indicates that there would be an unacceptable risk and hazard to human health if the groundwater were used as a drinking water supply in the future. The COPCs were arsenic, vinyl chloride, total chromium and mercury. The concentrations of these COPCs found at the Site are associated with elevated lifetime cancer risks and non-cancer health hazards as described above. In addition, groundwater concentrations for these and other contaminants (such as benzene) exceeded Maximum Contaminant Levels (MCLs) and/or applicable groundwater standards.

Summary. It is EPA's and NJDEP's judgment that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health or welfare from actual or threatened releases of hazardous substances into the environment.

Screening Level Ecological Risk Assessment

As part of an RI/FS, a Screening Level Ecological Risk Assessment (SLERA) is often conducted to identify potential environmental risks associated with a site. Based upon a review of information regarding the environmental setting and chemical contamination at the Site, EPA determined that there are no completed pathways for ecological receptors.

REMEDIAL ACTION OBJECTIVES

The following remedial action objectives address the human health risks and environmental concerns posed by contaminated groundwater at the Site:

- Prevent or minimize potential current and future human exposures, including groundwater ingestion, that presents a significant risk to public health and the environment.

- Prevent human exposure to wastes remaining in the Landfill.

- Minimize the potential for migration of the contaminated groundwater.

- Restore the contaminated groundwater to NJ Groundwater Quality Standards.

There are currently no complete pathways to Site contaminated groundwater, because there are no known contaminated wells in use. However, if contaminated groundwater were to be used as a drinking water source in the future, human health risks would exist. Thus, remedial actions must minimize the potential for human exposure to contaminated groundwater.

The cleanup of this Site is based on interrupting existing sources of contamination while preventing exposure to the contaminated groundwater. The cleanup goal was selected to both reduce the risk associated with exposure to contaminants to a regulatory levels and to ensure minimal migration of contaminants.

SUMMARY OF REMEDIAL ALTERNATIVES

Potential applicable technologies were identified and screened using effectiveness, implementability and cost as the criteria, with the most emphasis on the effectiveness of the remedial action. Those technologies that passed the initial screening were then assembled into five remedial alternatives.

Except for the No Action Alternative (Alterative 1), each remedial alternative would be coupled with institutional controls to limit the potential exposure of the public to Site contamination. Institutional Controls are typically restrictions placed to minimize human exposure, while allowing continued monitoring to track contaminant migration. Institutional Controls are generally used in conjunction with other remedial technologies. Consistent with expectations set out in the Superfund regulations, none of the action alternatives rely exclusively on institutional controls to achieve protectiveness.

The time frames below for construction do not include the time for designing the remedy or the time to procure necessary contracts. Because all the alternatives result in contamination remaining on the Site above levels that would not allow for unlimited use and unlimited exposure, a review of the remedy will be conducted every 5 years (Five-Year Reviews).

Alternative 1 - No Action

The No Action alternative was retained for comparison purposes as required by the NCP, the regulation under which EPA implements CERCLA. No remedial actions would be implemented as part of the No Action alternative. This alternative does not include institutional controls.

Total Capital Cost	$0
Operation and Maintenance	$0
Total Present Net Worth	$0
Timeframe	0 years

Alternative 2 – NJDEP Solid Waste Landfill Cap with Institutional Controls

This alternative would consist of a complete closure plan for the Brick Township Landfill in accordance with the New Jersey Administrative Code (N.J.A.C.) 7:26-2A.9 landfill Closure and Post-Closure of Sanitary Landfills. In addition, this alternative provides for site fencing and

maintenance, institutional controls, ambient air monitoring, surface water runoff control, a passive venting system, and long-term groundwater monitoring.

The final system would consist of constructing an impermeable landfill cap, compliant with N.J.A.C. 7:26-2A.3 et seq., it is anticipated that the cap would incorporate a geo-membrane liner (or equally impermeable layer) plus an 18-inch low permeability soil layer and a 6-inch layer of earthen material.

This remedy would also include institutional controls (e.g., the existing CEA and GURA and a deed notice) to prevent exposure to contaminated groundwater and to restrict the Landfill to non-residential use. A long-term monitoring program will be developed to ensure the continued protectiveness of the remedy, and also to assess potential migration and degradation of the contamination in the groundwater.

Total Capital Cost $ 7,700,000
Operation and Maintenance $ 400,000 (for 30 years)
Total Present Net Worth$19,700,000
Timeframe 30 years

Alternative 3 - RCRA Subtitle C Landfill Multi-Layer Cap with Institutional Controls.
This remedial alternative incorporates the requirements of the Code of Federal Regulations (40 CFR 264.310(a)) for hazardous waste landfill cover design. This alternative incorporates a RCRA Subtitle C multilayered landfill cap. These caps are multi-layer, generally consisting of an upper vegetative (topsoil) layer, a drainage layer, and a low permeability layer. The low permeability layer for this type of cap would consist of a synthetic liner over 2 feet of compacted clay.

The groundwater component of this alternative is the same as Alternative 2, including institutional controls and long-term monitoring.

Total Capital Cost $ 8,620,000
Operation and Maintenance $ 400,000 (for 30 years)
Total Present Net Worth$20,620,000
Timeframe 30 years

Alternative 4 – NJDEP Solid Waste Landfill Cap with a Groundwater Pump and Treat System
Alternative 4 is the same as Alternative 2 except that it also includes the construction and implementation of a groundwater pump and treat system to treat localized "hot spot" areas of groundwater contamination near the source area. The system would actively remove groundwater contamination and also help to physically prevent further migration of groundwater contamination. New recovery wells would be installed within specific hot spot areas. Groundwater would be pumped from these wells to a centrally located treatment plant where it would be treated by air stripping to remove VOCs and filters designed to remove metals. The treated groundwater would be discharged to a Publicly Owned Treatment Works (POTW) or re-injected into the aquifer. Institutional controls and long-term monitoring would also be part of this remedy.

Total Capital Cost $15,750,000
Operation and Maintenance $ 912,000 (for 30 years)
Total Present Net Worth $43,110,000
Timeframe 30 years

Alternative 5 – NJDEP Solid Waste Landfill Cap with Biochemical Treatment of Groundwater Hot Spot Areas

Alternative 5 would incorporate the same type of landfill cap as described in Alternatives 2 and 4, and would be similar to Alternative 4 in that it would also include treatment of hot spots. It differs from Alternative 4 as hot spots would be treated through the in-situ injection of biochemical agents rather than a pump and treatment system. The agents would promote biological and chemical degradation of dissolved phases of the organic compounds. This remedy would include institutional controls and long-term monitoring.

Total Capital Cost $ 8,700,000
Operation and Maintenance $ 631,000 (for 30 years)
Total Present Net Worth$27,625,000
Timeframe 30 years

Evaluation of Remedial Alternatives

The alternatives were evaluated according to the following criteria:

Overall Protection of Human Health and the Environment
Alternative 1 would not provide protection of human health, since contamination would persist in groundwater and potential exposure to contaminated groundwater would not be restricted, nor would there be a mechanism to monitor the migration of the contaminated groundwater. In addition, there would be no interruption of the source of groundwater contamination (*i.e.*, the Landfill).

Alternatives 2 through 5 would interrupt the source area

through installation of an impermeable landfill cap. Alternatives 2 through 5 would also provide protection of human health through implementation of institutional controls to interrupt exposure to contaminated groundwater as well as long-term monitoring to allow modification of the institutional controls if the lateral extent of the groundwater contamination expands or contracts.

THE NINE SUPERFUND EVALUATION CRITERIA

1. Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

3. Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

4. Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

6. Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

8. State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

***9.* Community Acceptance** considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Concentrations of contaminants exist within the groundwater at the Site at levels above the applicable groundwater standards.

Those concentrations have been decreasing in recent years for many contaminants; however, some contaminants (e.g., chlorobenzene and benzene) have shown an increase in concentrations in some wells, while there has been no discernable trend for other contaminants in certain wells. Alternative 1 would not meet ARARs (i.e., groundwater standards). The other alternatives would comply with chemical specific ARARs in the long-term. Long-term groundwater monitoring, which is a component of Alternatives 2 through 5, would provide information to assess the degree of compliance achieved over time. All alternatives except Alternative 1, would comply with location and action-specific ARARs, including N.J.A.C 7:26-2A9.

Long-Term Effectiveness and Permanence

Alternative 1 would not be effective or permanent, since the groundwater contaminants would not be monitored and there would be no mechanism to prevent future exposure to contaminated groundwater. There would also be no mechanism installed to prevent continued contamination of the groundwater. Data collected over the previous decade indicate that if the source area (the Landfill) were interrupted, contamination in the groundwater would decrease. Through installation of an impermeable cap, Alternatives 2 through 5 would interrupt the contamination source, and therefore would be effective in the long-term when combined with institutional controls. Alternatives 2 and 3 would rely solely on natural mechanisms to reduce contaminant levels. Alternatives 4 and 5 would include active treatment, either in place (i.e., in-situ) or through removing and treating contaminants.

The effectiveness of these alternatives would be assessed through periodic groundwater monitoring and five-year reviews. The relative degrees of effectiveness and permanence associated with Alternatives 2, 3, 4 and 5 are comparable; however, Alternative 3 would provide for a more impermeable cap than the other alternatives, and it is feasible that Alternatives 4 and 5 would meet cleanup goals more quickly.

Reduction of Toxicity, Mobility or Volume Through Treatment

Alternative 1 would not reduce the toxicity, mobility and volume (TMV) through treatment as no active treatment

of contaminated groundwater occurs. The mobility, toxicity and volume of groundwater contamination is expected to eventually be reduced for Alternatives 2 through 5 by installation of an impermeable cap over the source area. Alternative 3 would be the most impermeable cap so would marginally reduce mobility of contamination from the source area into the groundwater. Alternatives 4 and 5 would also reduce the TMV through treatment of hotspot areas; this would allow TMV reduction to occur in a quicker timeframe. However, due to the sporadic nature of the groundwater contamination the effectiveness of treatment would be minimal. Alternatives 2 through 5 would achieve reduction of toxicity, mobility and volume in groundwater contamination in the long-term.

Short-Term Effectiveness

For Alternative 1, protection of the community and workers during remedial activities would not be applicable as no remedial action is occurring. For Alternatives 2 through 5, a temporary risk exists due to particulate emissions during construction of the caps that would be installed. Health and Safety Plans, which would include air monitoring, engineering controls and appropriate worker personal protective equipment (PPE), would be used to protect the community and workers for Alternatives 2 through 5.

Alternative 5 would have temporary impacts to the local area residents due to installation and operation of the injection wells. Alternative 4 would have the greatest short-term impacts to the community. The pump and treat system would be operated for a number of years in a residential area. This would entail significant construction, including installation of pipes to carry water from recovery wells to a treatment plant.

Implementability

Alternative 1 would be easiest to implement both technically and administratively. Alternatives 2 and 3 would be more difficult to implement; however, both types of caps have been used extensively in New Jersey. Also, the existing comprehensive groundwater monitoring program, which has been in place on the Site for a decade, is not expected to require significant modification under any of the action alternatives. Alternative 5 would require installation of injection wells, and therefore would be more difficult to implement than Alternative 2 or 3. Alternative 4 would be the most difficult to implement due to the need to construct and operate a groundwater treatment plant.

Cost

Alternative 1 incurs no cost but provides no protection to human health. Except for Alternative 1, Alternative 2 is the least expensive of the alternatives. Alternatives 4 and 5 are the most expensive alternatives. Their costs are highly dependent on the areas selected for treatment and the quantity of contamination treated. Also, since no obvious hot spots have been delineated, it's not clear whether hot spot treatment would be effective at all. If hot spots are delineated during the remedial design, and they are more extensive than assumed in the FS, actual costs for Alternatives 4 and 5 could increase significantly.

State/Support Agency Acceptance

The State of New Jersey concurs with EPA's preferred alternative for this Site as described in this proposed plan.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in Responsiveness Summery in the Record of Decision for this site. The Record of Decision is the document that formalizes the selection of the remedy for a site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The preferred alternative for the Brick Township Landfill Superfund Site is Alternative 2, installation of a NJDEP Solid Waste Landfill Cap with Institutional Controls, hereafter referred to as the Preferred Alternative.

The Preferred Alternative would consist of an impermeable landfill cap incorporating a geo-membrane liner. The Preferred Alternative would include institutional controls (e.g., the existing CEA and GURA and a deed restriction) to prevent exposure to contaminated groundwater. Also, as part of the Preferred Alternative, a long-term groundwater monitoring program would be implemented. The monitoring will assure that the remedy remains effective and protective of human health and the environment. If results clearly show that Site related contaminant concentrations in groundwater decrease to levels below applicable standards, then monitoring may be discontinued.

The Preferred Alternative would continue to prevent exposure to waste material and the contaminated groundwater, while acting to limit additional contamination of the groundwater. In addition, the Preferred Alternative's cap may be designed to potentially allow some future use of the property. The costs of the Preferred Alternative are consistent with closure of landfills throughout NJ. The cost of this alternative was also the lowest of the action alternatives assessed in the final FS. As contamination above acceptable risk levels will remain on the Site, Five-Year Reviews will be

performed.

COMMUNITY PARTICIPATION

EPA provided information regarding the cleanup of the Brick Township Landfill Superfund Site to the public through the Administrative Record file for the site and announcements published in the local newspaper. EPA encourages the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

For further information on EPA's preferred alternative for the Brick Township Landfill Superfund Site:

Jon Gorin Remedial Project Manager (212) 637-4361	Wanda Ayala Community Relations (212) 637-3676

U.S. EPA
290 Broadway 19th Floor
New York, New York 10007-1866

The dates for the public comment period; the date, the location and time of the public meeting; and the locations of the Administrative Record file are provided on the front page of this Proposed Plan.

GLOSSARY

ARARs: Applicable or Relevant and Appropriate Requirements. These are Federal or State environmental rules and regulations that may pertain to the Site or a particular alternative.

Carcinogenic Risk: Cancer risks are expressed as a number reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, EPA's acceptable risk range for Superfund hazardous waste sites is 1×10^{-4} to 1×10^{-6}, meaning there is 1 additional chance in 10,000 (1×10^{-4}) to 1 additional chance in 1 million (1×10^{-6}) that a person will develop cancer if exposed to a Site contaminant that is not remediated.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act. A Federal law, commonly referred to as the "Superfund" Program, passed in 1980 that provides for response actions at sites found to be contaminated with hazardous substances, pollutants or contaminants that endanger public health and safety or the environment.

COPC: Chemicals of Potential Concern.

SLERA: Screening Level Ecological Risk Assessment. An evaluation of the potential risk posed to the environment if remedial activities are not performed at the Site.

FS: Feasibility Study. Analysis of the practicability of multiple remedial action options for the Site.

Groundwater: Subsurface water that occurs in soils and geologic formations that are fully saturated.

HHRA: Human Health Risk Assessment. An evaluation of the risk posed to human health should remedial activities not be implemented.

HI: Hazard Index. A number indicative of noncarcinogenic health effects that is the ratio of the existing level of exposure to an acceptable level of exposure. A value equal to or less than one indicates that the human population is not likely to experience adverse effects.

HQ: Hazard Quotient. HQs are used to evaluate noncarcinogenic health effects and ecological risks. A value equal to or less than one indicates that the human or ecological population are not likely to experience adverse effects.

ICs: Institutional Controls. Administrative methods to prevent human exposure to contaminants, such as by restricting the use of groundwater for drinking water purposes.

Nine Evaluation Criteria: See text box on Page 7.

Noncarcinogenic Risk: Noncancer Hazards (or risk) are expressed as a quotient that compares the existing level of exposure to the acceptable level of exposure. There is a level of exposure (the reference dose) below which it is unlikely for even a sensitive population to experience adverse health effects. USEPA's threshold level for noncarcinogenic risk at Superfund sites is 1, meaning that if the exposure exceeds the threshold; there may be a concern for potential noncancer effects.

NPL: National Priorities List. A list developed by USEPA of uncontrolled hazardous substance release sites in the United States that are considered priorities for long-term remedial evaluation and response.

Operable Unit (OU): a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site.

Present-Worth Cost: Total cost, in current dollars, of the remedial action. The present-worth cost includes capital costs required to implement the remedial action, as well as the cost of long-term operations, maintenance, and monitoring.

Proposed Plan: A document that presents the preferred remedial alternative and requests public input regarding the proposed cleanup alternative.

Public Comment Period: The time allowed for the members of a potentially affected community to express views and concerns regarding USEPA's preferred remedial alternative.

RAOs: Remedial Action Objectives. Objectives of remedial actions that are developed based on contaminated media, contaminants of concern, potential receptors and exposure scenarios, human health and ecological risk assessment, and attainment of regulatory cleanup levels.

Record of Decision (ROD): A legal document that describes the cleanup action or remedy selected for a site, the basis for choosing that remedy, and public comments on the selected remedy.

Remedial Action: A cleanup to address hazardous substances at a site.

RI: Remedial Investigation. A study of a facility that supports the selection of a remedy where hazardous substances have been disposed or released. The RI identifies the nature and extent of contamination at the facility and analyzes risk associated with COPCs.

TBCs: "To-be-considereds," consists of non-promulgated advisories and/or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies.

USEPA: United States Environmental Protection Agency. The Federal agency responsible for administration and enforcement of CERCLA (and other environmental statutes and regulations), and final approval authority for the selected ROD.

VOC: Volatile Organic Compound. Type of chemical that readily vaporizes, often producing a distinguishable odor.