DECISION DOCUMENT
East Station Site
Washington, D.C.
EPA OU 01

Submitted To:

U.S. Environmental Protection Agency, Region III
Philadelphia, PA

By:

Washington Gas
Washington, D.C.

September 3, 1999

TABLE OF CONTENTS

1 DECLARATION 1-1
1.1 Site Name and Location 1-1
1.2 Statement of Basis and Purpose 1-1
1.3 Assessment of Site 1-1
1.4 Description of the Remedy 1-1
1.5 Declaration 1-1

2 DECISION SUMMARY 2-1
2.1 Site Location & Description 2-1
2.2 Site History 2-1
2.2.1 Gas Manufacturing and Byproducts 2-1
2.2.2 Environmental Investigations 2-2
2.3 History of Remedial Activities 2-4
2.4 Highlights of Community Participation 2-5
2.5 Scope and Role of Operable Units 2-5
2.5.1 Surface Soil 2-5
2.5.2 Subsurface Soil 2-6
2.5.3 Ground Water 2-6
2.5.4 DNAPL (Coal Tar) 2-6
2.5.5 Sediment 2-6
2.6 Summary of Site Characteristics 2-7
2.6.1 Geologic Features 2-7
2.6.2 Environmental Conditions 2-7
2.7 Summary of Human-Health Risks 2-10
2.7.1 Exposure Scenarios Posing Potential Threat to Human Health 2-10
2.7.2 Sources of Uncertainty 2-14
2.8 Summary of Ecological Risks 2-15
2.9 Description of Remedial Alternatives 2-16
2.9.1 Surface-Soil Alternatives 2-16
2.9.2 Subsurface Soil Alternatives 2-17
2.9.3 Ground Water Alternatives 2-18
2.9.4 DNAPL Alternatives 2-20
2.9.5 River Sediment Alternatives 2-20
2.10 The Selected Remedy 2-21
2.10.1 Surface Soil 2-22
2.10.2 Subsurface Soil 2-22
2.10.3 Ground Water 2-23
2.10.4 DNAPL (Coal Tar) 2-23
2.10.5 River Sediment 2-24

2.10.6 Five-Year Review 2-24
2.10.7 Statutory Determinations 2-24
2.10.8 Significant Changes Resulting from Public Comments 2-26
2.11 References 2-26
2.12 Figures and Tables 2-28

3 RESPONSIVENESS SUMMARY 3-1
3.1 Comment from Sharon Ambrose, Councilmember - Ward 6, Council of District of Columbia, Dated July 15, 1999 3-1
3.2 Comment from Deborah Jane Lindeman, Advisory Neighborhood Commission 6B06, Dated July 13, 1999 3-1
3.3 Comments from National Park Service, Dated June 1, 1999 3-2
3.4 Comments from Office of People's Counsel, District of Columbia, Dated July 16, 1999 3-7

4 APPENDIX A - COPIES OF COMMENTS RECEIVED ON PROPOSED PLAN

1. DECLARATION

1.1 Site Name and Location

East Station Site; 1240 "12th" Street, SE; Washington, D.C.

1.2 Statement of Basis and Purpose

This decision document presents the selected remedy for the East Station Site in Washington, D.C., chosen in accordance with CERCLA, as amended by SARA. This decision is based on the administrative record for this site. The selected remedy does not differentiate between the Washington Gas, National Park Service, Corps of Engineers, and District of Columbia properties. However, as described in Section 2. 10, the National Park Service, Department of Interior will issue a separate record of decision concerning the National Park Service property.

1.3 Assessment of Site

Actual or threatened releases of hazardous substances on and from this site, if not addressed by implementing the remedy selected in this decision document, may present a potential threat to public health or the environment.

1.4 Description of the Remedy

The selected remedy is to (1) eliminate human exposure to surface soil by covering exposed soil, during site development, with either one foot of clean soil stabilized with vegetation or impervious surface; (2) manage the risks to site development workers, current and future utility-maintenance workers, and future onsite office workers by applying institutional controls that minimize exposure; (3) protect ecological and human receptors from excessive influx of chemicals to the river by continuing to pump and treat ground water that otherwise would enter the river and by continuing to extract coal tar, a DNAPL, from areas where it accumulates above residual concentration and where it may enter the river; and (4) undertake or participate in additional environmental studies that might influence future remedial action at the site and in the Anacostia River.

1.5 Declaration

The selected remedy is protective of human health and the environment, complies with Federal and District of Columbia requirements that are legally applicable or relevant

and appropriate, and is cost-effective. This remedy utilizes some permanent solutions for the site through the application of ground-water pumping and treatment and extraction of DNAPL, but the principal approach is to manage rather than eliminate risks. The size of the site, the volume of contaminated soil, the type of chemicals and wastes found in the soil, and the physical properties of the soil preclude a cost-effective, permanent remedy whereby the impacted soil is removed and treated or the contaminants are treated in-situ or extracted and treated ex-situ.

Because this remedy will result in hazardous substances remaining underground on the site above health-based levels, a review will be conducted within five years after implementation of this remedial plan to ensure that the remedy continues to provide adequate protection of human health and the environment.

WASHINGTON GAS LIGHT COMPANY

Richard J. Cook/mgb

Richard J. Cook
Vice President
Construction and Technical Support

Sept. 9, 1999

Date

2 DECISION SUMMARY

2.1 Site Location & Description

The East Station Site is located in southeast Washington, D.C. adjacent to the Anacostia River, south of "M" Street and east of 11th Street (Figures 1 & 2). The site is defined as the terrestrial area that has been impacted by the residuals of gas manufacturing. The site covers an area of approximately 18.8 acres which includes property owned by Washington Gas (WG), formerly containing the East Station manufactured gas plant; the National Park Service (NPS); the District of Columbia (DC); and the U.S. Army Corps of Engineers (COE). The site drains into the Anacostia River, and the portion of the river opposite the site was also in vestigated during the remedial investigation/feasibility study (RI/FS) (Hydro-Terra, 1999).

The portion of the site owned by WG (East Station property) contains a two-story building which is used for office space and treatment of ground water pumped from the site (Figure 3). Immediately south of the building and also on the East Station property is a facility used for fueling vehicles with natural gas. A portion of the property is also used to store and process construction materials. The NPS property is used by DC to store roadway maintenance equipment and by ST Services (formerly Steuart Petroleum) to transport petroleum fuels via underground and above-ground pipelines from its offloading pier in the Anacostia River to a storage and distribution facility located immediately east of the East Station property. A pump house formerly used by WG is also present on the NPS property, and a small area of the property is used for recreation, mainly by a rowing club. The COE's quarter-acre property along the river is used as a staging area for crews removing floating debris from the Anacostia and Potomac rivers. The DC property contains public roadways.

A railway and freeway lie north of the East Station site in a 400-foot corridor. Land use north of the corridor is residential and commercial. The Washington Navy Yard is located west of the site and 11th Street. The Navy Yard is the administrative support center for Navy activities in the DC area. The Anacostia River lies south of the site, and Anacostia Park is located on the opposite shore of the river.

2.2 Site History

2.2.1 <u>Gas Manufacturing and Byproducts</u>

Manufactured gas was produced continuously on the East Station property from 1888 to 1948. In 1948, natural gas became available and manufactured gas was produced intermittently by the plant during periods of peak gas demand. Demolition of the gas manufacturing plant was completed in 1986, and the above-ground oil storage tanks on the property were removed in 1997.

Coal and oil were the principal gas-manufacturing feedstocks. Gasification byproducts were tar, oil, coke, and lampblack. Coke was the principal solid residual, and most of it was recycled as plant fuel or sold commercially. Coke was also used in filter beds to purify process-water, producing a solid residual of off-specification coke contaminated with tar and oil. Periodic cleaning of the filter beds produced a residual product some of which appears to have been placed as fill on the East Station Site.

By-product tar was sold commercially or used as a boiler fuel. Sampling evidence suggests some tar was mixed with solid waste and was placed as fill found on the site. Leakage from various plant structures is another probable source of the detected tar as well as oil found in soil above and below the water table. Leakage of oil from underground pipelines operated on the site by ST Services (formerly Steuart Petroleum) is also a source of oil found on the portion of the East Station Site lying along the Anacostia River.

Wood chips containing iron oxide were used in the purification of manufactured gas, and, when purification capacity was exhausted, some of the woodchips and absorbed tar were also placed as fill on the site.

2.2.2 Environmental Investigations

Beginning in 1983 and ending with the RI/FS in 1999 (Hydro-Terra, 1999), six major environmental investigations of the East Station Site have taken place. They are described below, and the results from the investigations constitute the majority of the administrative record for the site.

- Preliminary Contamination Investigation (Phase I). The investigation was voluntarily undertaken by WG and completed in 1983. The purpose of the work was to characterize subsurface environmental conditions on the portion of the site containing the manufactured-gas plant. A subsurface investigation was conducted, sampling of soil and ground water was performed, and environmental conditions were characterized (Hydro-Terra, 1983).

Contamination & Land-Use Study (Phase II). The Phase II investigation was voluntarily undertaken by WG and completed in 1989. The purpose of the work was to determine the suitability of the East Station property for use by the Washington Metropolitan Area Transit Authority (WMATA) as a bus storage and maintenance facility. A subsurface investigation of the entire East Station Site was performed. Sampling of soil, ground water, river sediment, river water, storm-sewer water, benthic invertebrates, soil gas, and atmospheric gas was also performed. Additionally, a human-health risk assessment was completed, and alternative remedial measures were evaluated (Hydro-Terra, 1989).

Additional Sampling & Ground-Water Recovery System Design (Phase III). The Phase III work was voluntarily performed by WG and completed in 1991. The purpose of the work was to perform additional work recommended as a result of the Phase II investigation and to prepare a conceptual design of a well field for use in extracting ground water from contaminated water-bearing strata under the site. A focused subsurface investigation was conducted, recommended recovery wells were installed, and sampling of soil and ground water was performed. The study area was the NPS property and the south end of the East Station property (GeoTrans, 1991).

Site Investigation for WMATA Facility. The investigation was conducted by WMATA and completed in 1994. The purpose of the work was to determine whether the East Station property was suitable for use as a bus maintenance and storage facility. Surface-soil, subsurface-soil, and soil-gas sampling was performed at possible building sites on the property. A human-health risk assessment was also performed (Engineering-Science, 1994).

Site Inspection of NPS/East Station Site. The inspection was conducted by the NPS and completed in 1995. The purpose of the work was to evaluate likely sources of contamination on the NPS property and to investigate the potential effect on human health and the environment. Limited surface-soil, subsurface soil, ground-water, and sediment sampling was conducted. The area of investigation was the NPS property, the south end of the East Station property, and the Anacostia River (Ecology and Environment, 1995).

Additional Remedial Investigation and Feasibility Study (Phase IV). The work was completed by WG in 1999. The purpose of the work was to complete an RI/FS in accordance with current USEPA guidance, to fill data and information gaps identified by the USEPA following its review of the preceding environmental investigations, and to locate areas of DNAPL concentration on the

site. Additional soil borings were completed and monitoring and recovery wells were installed. Sampling of surface soil, subsurface soil, ground water, runoff water, storm-sewer water, river water, and river sediment was performed. A human-health risk assessment and a screening-level ecological risk assessment were performed. Also, alternative remedial measures were screened and a preferred site remedial alternative was recommended. The study area was the entire East Station Site and the river (Hydro-Terra, 1999).

2.3 History of Remedial Activities

Beginning in 1976 and continuing to the present, voluntary actions have been taken by WG at the East Station site to remedy environmental conditions. The actions are described below.

- Initial Pump-and-Treat Program. In 1976, following the release to the river of oil of unknown origin, WG installed a 150-foot lateral ground-water interceptor drain (Trench Well) in fill near the river on the NPS and COE properties. Between 1976 and 1993, ground water containing tar and oil was pumped from the Trench Well and treated prior to release to the river under an NPDES permit. Since 1993, the treated ground water has been released to the publicly owned treatment works (POTW) under a discharge permit. Approximately 10,500 gallons of ground water are extracted from the Trench Well daily and treated.

- Soil Capping and Vegetative Stabilization. In 1990, WG placed a cover of soil on portions of the East Station property not covered by impermeable structures and stabilized the soil with turfgrass.

- Installation of New Ground-Water Treatment Facility. In 1993, a new ground-water treatment facility was installed on the East Station property that is capable of treating up to 36,000 gallons of water daily. The treatment process involves three steps: (1) sedimentation to remove tar, a dense nonaqueous phase liquid (DNAPL); (2) oil/water separation to remove floating oil and emulsified tar; and (3) air stripping to remove entrained organic gases prior to release of the effluent water to the public sewer under a discharge permit. The air and the entrained organic gases from the air stripper(s) are passed through two vessels containing activated carbon, and the effluent air is released to the atmosphere under an air-discharge permit.

- Installation of Three Total-Fluids Recovery Wells. In 1994, three total-fluids recovery wells were installed at the south end of the East Station property, two in the shallow fill covering the area and one in a deeper sand/gravel unit. Approximately 8,500 gallons of fluids per day are pumped from the three wells and treated, along with approximately 10,500 gallons of fluids extracted from the Trench Well, at the new ground-water treatment facility.

- Recovery of DNAPL from Wells. Starting in 1996 and continuing to present, WG has removed DNAPL that accumulates in some of the wells installed on the East Station Site. Extraction from two wells in the fill covering the NPS property was initiated in 1996; and in 1997 three additional wells on the NPS property, two in the fill and another in a deeper sand/gravel unit, became DNAPL-recovery wells. The DNAPL is periodically extracted from the wells, and stored awaiting proper disposal. Recovery rates have declined over time totaling approximately 50 gallons per month in July 1999.

2.4 Highlights of Community Participation

The Proposed Plan for the East Station site was released to the public on June 17, 1999 as part of the administrative record at two repositories, WG's headquarters in Washington, D.C. and the DC Public Library (Southeast Branch). The notice of availability for the Proposed Plan was published in the local newspaper, *The Washington Post*, on June 17, 1999. A public comment period was held from June 17, 1999 through July 16, 1999. A response to the comments received during the public-comment period is included in the "Responsiveness Summary," which is part of this Decision Document.

In addition to the formal public-participation effort, WG formed in 1996 a communications task force consisting of representatives of local community organizations and other stakeholders. WG has periodically met with the task force to report the status of environmental investigations and receive and respond to comments.

2.5 Scope and Role of Operable Units

The operable remedial units for the site are the five media of concern listed and described below. The remedial goals are risk-based, and the response action for the site is to prevent unacceptable risks to human health and the environment.

2.5.1 Surface Soil

The remedial goal for this operable unit is to prevent unacceptable dermal exposure of humans to chemicals of potential concern in the soil during future uses of the site and inhalation exposure to construction worker during development of the East Station and NPS properties. This is achieved by containing the contaminated surface soil under a cover of clean soil stabilized with vegetation or by covering the soil with buildings or pavement. During the development phase it is achieved by controlling dust generated by construction equipment and/or use of masks that prevent inhalation of dust.

2.5.2 Subsurface Soil

The remedial goal for this operable unit is to prevent unacceptable heath hazard due to inhalation exposure of construction and utility maintenance workers to airborne chemicals while performing earthwork or below-ground utility repairs. This is achieved by implementation of institutional controls that are protective of human health, such as ventilation of below-ground spaces, dust control and proper management of excavated materials.

2.5.3 Ground Water

The remedial goal of this operable unit is to restrict the movement of contaminated ground water into the river so that ambient river-water quality criteria are not exceeded and contaminants do not present a potential risk to human or ecological receptors. This is achieved by continuing to pump and treat ground water on the site.

2.5.4 DNAPL (Coal Tar)

The remedial goal of this operable unit is to prevent DNAPL from entering the river and to extract DNAPL from areas where it has been found at concentrations enabling the DNAPL to flow into wells under the force of gravity. This is achieved by ongoing direct extraction of DNAPL from wells and ongoing treatment of ground water containing DNAPL.

2.5.5 Sediment

The remedial goal of this operable unit is to participate in a USEPA-led watershed study of sediment contamination that will identify relative sources of contamination, associated risks, and effective remedial actions.

2.6 Summary of Site Characteristics

2.6.1 Geologic Features

Figure 4 illustrates geologic features present on the East Station Site. Fill covers most of the site and is composed of soil, solid residuals from gas manufacturing, and demolition debris. Extensive filling has occurred over former wetlands along the river south of Water Street, at the south end of the East Station property, and along a narrow band (formerly a stream channel) that extends northward along 12th Street and the west side of the East Station property (Figure 5). A silt unit underlies the wetland fill. Under a portion of the silt is a relatively thin deposit of sand and gravel deposited in an ancient stream channel. The sand/gravel unit continues under the Anacostia River. A thick deposit of clay (Arundel Clay) is exposed at the ground surface or present under fill on the portion of the-East Station Site not formerly containing wetlands. The clay also underlies the silt and sand/gravel under the former wetland area.

Surface drainage from the site enters the Anacostia River. Ground water in both the fill and sand and gravel units naturally drains into the Anacostia River. An artesian aquifer of regional significance (Patuxent Formation) lies beneath the Arundel Clay at considerable depth. The Arundel Clay is the confining bed and prevents downward migration of ground water from the impacted ground-water units above the clay.

2.6.2 Environmental Conditions

2.6.2.1 Sources of Contaminants

Known or suspected sources of contamination on the site are:

- DNAPL (Coal Tar) mixed with solid wastes from the gas plant placed as fill over the former wetlands
- DNAPL and oil released from gas-plant structures
- Oil released by ST Services in the river and on the NPS property
- Coke, cinders, ash, wood chips (purifier sponge), and building debris of unknown origin used as fill material
- Petroleum products released by DC Public Works on the NPS property.
- Upstream release to the river of semi-volatile organic contaminants by, others.

2.6.2.2 Chemicals of Potential Concern

The organic and inorganic chemicals of potential concern identified during the preliminary phase of the human-health risk assessment and during the screen-level ecological risk assessment are shown in Table 1.

Some of the metals of potential concern are common constituents of natural soil and are also found in coal-gasification by-products. The cyanides are thought to be associated with the disposed wood chips used to purify the manufactured gas. Many of the polynuclear aromatic hydrocarbons (PAHs) are commonly found in urban soils and have sources other than just manufactured gas plants.

More detailed information concerning sampling results and environmental conditions can be found in Section 6 (Volume 1) and Appendix A (Volume 2) of the RI/FS report (Hydro-Terra, 1999). Concentrations of chemicals of potential concern used in the human-health risk assessment are found in Section 2.7 of this document.

2.6.2.2 Presence and Movement of DNAPL & LNAPL

Free products detected in soils on the East Station site include DNAPL and oil, a light non-aqueous phase liquid (LNAPL). DNAPL was found over much of the site at a residual concentration, that is, at a concentration that does not allow it to move, as evidenced by its inability to collect in wells screened in soils known to contain DNAPL. At three locations on the site, DNAPL was found to accumulate at the base of the fill in quantities exceeding residual concentration (Figure 5). DNAPL collects in wells installed in these areas, and the DNAPL is extracted periodically from the wells. Evidence suggests that the DNAPL is not moving southward from the areas of accumulation. If the DNAPL were to move, it would become trapped, before reaching the river, in a large depression present at the contact of the fill and underlying silt aquitard. The depression, known as a stratigraphic trap, is located under Water Street and on the NPS property (Figure 6). Some doubt exists as to whether the stratigraphic trap extends under the area of DNAPL accumulation nearest the river (Figure 5), and, consequently, additional investigation of this area is proposed. Additional investigation to better determine the lateral extent of the area of accumulation at the south end of the East Station property also is proposed.

An accumulation of DNAPL exceeding residual concentration is also present in the sand/gravel unit underlying the silt. The DNAPL is believed to have entered the unit on the portion of the East Station property fronting on 12th Street where the silt probably was removed in order to stabilize building foundations. The DNAPL in the sand/gravel unit has migrated down onto the NPS property to a line short of the river shown on Figure 5. Long-term monitoring results suggest that the DNAPL is no longer moving due to

cessation in DNAPL recharge. Pumping of ground water containing DNAPL from the unit and also direct extraction of DNAPL from other wells in the unit is ongoing. Monitoring wells have been installed in the sand/gravel unit ahead of the forward edge of DNAPL migration and are monitored periodically.

LNAPL in significant quantities was- not found on the site; it was only observed as a sheen on the water column in many of the wells on the site.

2.6.2.3 Flow of Ground Water to River

Ground water in the fill unit naturally enters the river through the seawall. Ground water in the deeper sand/gravel unit under the site flows into the same unit found under the river. It is assumed that ground water from the sand/gravel unit eventually passes up through the silt and mixes with the river water. Protection of the river from an excessive flux of water-borne chemicals in ground water from the site, particularly PAHs, is an important concern.

Figure 7 is a map showing representative concentrations of total PAHs at the sampling points in the fill unit and concentration isopleths derived from the sampling data. Figure 8 shows isopleths of total PAHs in ground water from the sand/gravel unit. No DNAPL was found in the ground-water samples ahead of the 1,000 ppb isopleth and near the river, and the concentration of dissolved organic chemicals was relatively low. The sampling of ground water in both units took place while pumping and treating ground water from each unit.

The average flow of ground water from the fill to the river under natural conditions (i.e., when wells are not being pumped) was estimated to be 16,800 gallons per day and from the sand/gravel unit, 700 gallons per day. Using the flow rates and water-quality data from wells along the river, a determination was made of the effect of the influx of chemicals of potential concern on river-water quality after mixing the ground water with river water. Under the most conservative scenario (i.e., use of the maximum rather than average detected concentrations of chemicals detected in wells near the river), it was found that the concentration of chemicals in the ground water from the site would have to be 3.8 times greater than the measured concentrations in the ground water in order to exceed a surface-water quality criterion. The concentrations would have to be eight times greater for a more realistic scenario which considers the average concentration of each chemical entering the river.

2.7 Summary of Human-Health Risks

Potential routes of human exposure to chemicals are:

- Ingestion of soil
- Dermal contact with soil and river sediment
- Inhalation of VOCs and dust
- Ingestion of fish taken from the river

A total of 32 exposure scenarios were evaluated, covering current land uses, the transition period when the properties are converted to future uses, and future uses. Two future uses of the East Station property owned by WG were considered: commercial/industrial use and residential use. The future use of the NPS property along the river was assumed to be as a public park. The results from the evaluation of the 32 scenarios are shown in Table 2. Cancer risk of greater than one excess lifetime cancer, occurrence in a population of 10,000 people ($1 \times 1\ 0^{-4}$ or 1E-4) is, generally the highest risk acceptable to the USEPA. In the case of non-cancer (non-carcinogenic) health risk, a hazard index of 1.0 or greater is considered a potential threat. Those exposure scenarios found to have a potential risk above the threshold levels are identified and further described in Table 3 and below.

2.7.1 Exposure Scenarios Posing Potential Threat to Human Health

The following four exposure scenarios were found to exceed threshold risk levels. Only one of the four, inhalation of VOCs by utility personnel working in restricted underground spaces such as trenches, exists on the East Station Site under current land uses. The scenarios are described below including chemicals of potential concern, exposure assessment, toxicity assessment, and risk characterization. Additional
information on these scenarios and other scenarios is found in Section 8 (Volume 1) and Appendix D (Volume 2) of the RI/FS report (Hydro-Terra, 1999).

2.7.1.1 Dermal Exposure of Resident on East Station Property to Surface Soil

2.7.1.1.1 Chemicals of Potential Concern: Chemicals of potential carcinogenic concern determined form the screening-level assessment and their 95 percent upper confidence limit (95% UCL) concentrations in East Station surface soil are shown in Table 4.

2.7.1.1.2 Exposure Assessment: The amount of a chemical that the body takes in is determined by multiplying the 95% UCL concentration of that chemical by the human

intake factor (HIF) and then multiplying that product, in the case of dermal exposure, by the absorption factor (ABS). The HIF for this scenario is $3.03x10^{-5}$ day^{-1}. In the case of dermal exposure, the HIF is a function of the skin area in contact with the chemical, the adherence to the skin of the medium containing the chemical, the frequency of exposure, the duration of each exposure, the chemical-specific absorption factor, the body weight, and the averaging time.

In determining exposure, it was assumed that the person lived for 70 years and was exposed on the property to surface soil 200 times a year over a period of 30 years. For the first six years the body weight was 15 kilograms and the area of skin contact was 5,900 cubic centimeters, and during the remaining 24 years the weight was 70 kilograms and the area of skin contact,4,400 cubic centimeters.

2.7.1.1.3 Toxicity Assessment: The cancer potency slope (CPS), or cancer potency factor, for each chemical of potential concern is shown in Table 4. Benzo[a]pyrene's CPS was used, along with relative potency factors, to estimate carcinogenic potency for other carcinogenic PAHs.

The USEPA's Carcinogenic Assessment Group developed CPSs for estimating lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPSs are multiplied by the estimated intake of a potential carcinogen to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPS.

2.7.1.1.4 Risk Characterization: Excess lifetime cancer risk is determined by multiplying (for each chemical) the estimated intake of the chemical by the CPS and then summing the products. The risk is a plausible upper-bound probability of causing excess lifetime cancer cases in a specified human population. For example, a risk of 1×10^{-5} (also shown as 1E-5) indicates that an individual with a 70-year lifetime has a 1 in 100,000 chance of developing cancer as a result of site-related exposure to the carcinogen(s) under the specified exposure conditions at the site.

The potential cancer risk for this exposure scenario was determined to be 2.4 excess lifetime cancer occurrences in a population of 10,000 ($2.4x10^{-5}$), a risk requiring elimination of the carcinogens or their management.

2.7.1.2 Dermal Exposure of Juvenile to Surface Sod on NPS Property

2.7.1.2.1 Chemicals of Potential Concern: The chemicals of potential concern in surface soil on the NPS property and their 95% UCL concentrations are shown in Table 5.

2.7.1.2.2 Exposure Assessment: It was assumed that a juvenile weighing 43 kilograms uses the NPS property for recreation over a 12-year period 200 times per year, and that during each exposure event, 9,900 cubic centimeters of skin area are exposed to surface soil. The means of determining the amount of chemical exposure (exposure level) is described under Exposure Assessment in Section F.1.a above. The HIF use in the calculation was $2.16x10^{-5}$ day^{-1}.

2.7.1.2.3 Toxicity Assessment: The CPS for each chemical of potential concern is shown in Table 5. Benzo(a]pyrene's CPS was used, along with relative potency factors, to estimate carcinogenic potency for other PAHs. Use of the CPS in calculation risks is described Section F.1a above.

2.7.1.2.4 Risk Characterization: The potential cancer risk was determined to be three excess lifetime cancer occurrences in a population of 10,000 ($3X10^{-5}$), a risk requiring elimination or management. The methodology for calculating cancer risk is discussed under Risk Characterization in Section F.1.a above.

2.7.1.3 **Inhalation Exposure of Utility Worker to VOCs in Subsurface Soil**

2.7.1.3.1 Chemicals of Potential Concern : The volatile organic chemicals in subsurface soil that are of potential concern and their 95% UCL concentrations are shown in Table 6.

2.7.1.3.2 Exposure Assessment: The exposure to each chemical is determined by multiplying the exposure concentration by the HIF. In the case of inhalation exposure, the HIF is a function of the inhalation rate, exposure frequency, exposure duration, body weight, and averaging time. The HIF for this scenario was $2.74xl0^{-3}$. It was assumed that a worker weighing 70 kilograms is exposed to VOCs while working in confined spaces below the ground surface, five days per year over a period of 30 years. During
each event, it was assumed that the worker inhales 14 cubic meters of air containing the VOCs of potential concern.

2.7.1.3.3 Toxicity Assessment: The reference dose (RfD) for each VOC of potential concern is shown in Table 6.

RfDs have been developed by the USEPA for indicating thresholds of adverse health effects from exposure to chemicals exhibiting noncarcinogenic (non-cancerous) toxicity. RfDs are estimates of acceptable lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media can be compared to the RfDs. RfDs are derived from animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans) or from epidemiological studies. The uncertainty factors help ensure that the RfDs will not underestimate the potential for occurrence of adverse noncarcinogenic effects.

2.7.1.3.4 Risk Characterization: Potential concern for noncarcinogenic effects of a single chemical in a single medium is expressed as the hazard quotient (or the ratio of the estimated intake derived from the chemical concentration in a given medium to the chemical's RfD_i). The estimated intake of the chemical is determined by multiplying the chemical concentration in the medium of interest by the HIF. By adding the hazard quotients for all chemicals of potential concern in a medium to which a given population may reasonably be exposed, the Hazard Index (HI) is generated. The HI provides a useful reference point for gauging the potential significance of multiple chemical exposures within a single medium or across media.

The hazard index for this exposure scenario is 3.92, a value indicating a potential non-cancerous health risk requiring elimination or management. The potential health hazard is almost entirely attributable to the presence of benzene.

2.7.1.4 **Inhalation Exposure to Dust by Equipment Operator**

2.7.1.4.1 Chemicals of Potential Concern: The chemicals of potential concern and their 95% UCL concentrations are shown in Table 7.

2.7.1.4.2 Exposure Assessment : It was assumed that an adult weighing 70 kilograms would be exposed to the chemicals 60 times, eight hours per time, over a one year period while the East Station property is being converted to its future use. The disturbed soil was assumed to be a silt loam with moisture content of 15 percent and silt content of 20 percent. A dust cloud was assumed to envelop the equipment (bulldozer) operation half of the time, and to have dimensions of 10 meters long by 10 meters wide by ,3 meters high and hence a volume of 300 cubic meters. A wind speed of 3.4 meters per second sweeps the cloud away, even as more dust is being generated, removing the cloud (and replacing it) every 2.94 seconds. The concentration of the particulate cloud was calculated as 0.5 times the particle emission rate (kilograms per second) times the time to traverse the cloud area (seconds) divided by the cloud volume (cubic meters). For

calculations, refer to pages D-124 and D-125 in the Appendix D (Volume 2) of the RI/FS report (Hydro-Terra, 1999).

2.7.1.4.3 Toxicity Assessment: The RfDi and the calculated hazard quotient for each organic and inorganic chemical of potential concern are shown in Table 7. A description of RfD_is and their derivation is found under Toxicity Assessment in Section F.1.c above.

2.7.1.4.4 Risk Characterization: A description of the derivation and meaning of the hazard index is found under Risk Characterization in Section F.1.c above. The hazard index for this exposure scenario, as calculated and shown in Table 7, is 35, which is above the threshold value of less than 1.0, indicating a potential non-cancerous threat to human health requiring elimination of management. This potential health hazard is almost entirely attributable to the presence of manganese in the dust.

2.7.2 Sources of Uncertainty

The various media on the site were sampled for target chemicals specified by the USEPA. Although the lists of targeted chemicals cover the majority of the chemicals of potential concern, they may not include all the chemicals historically associated with a site. The precision of the laboratory in analyzing the samples can also result in uncertainty, and detection limits associated with certain analytical methods may be too high. The requirement to use one half of the detection limit in estimating the exposure concentration of a chemical leads to an unrealistically high estimate when the chemical is detected in only a very small number of samples.

Not all conceivable exposure scenarios have been analyzed, only those considered the more plausible. Also, parameters describing human characteristics and activities at best represent population means, but are frequently biased. For example, adult body weight is assumed to be 70 kilograms; whereas the majority of females weigh considerably less. In addition, an assessment depends to a great degree on the models and assumptions on which it is based. Some of the assumptions are based largely on the author's judgment, and even where the literature provides models and default values, these may be based on tenuous evidence.

Risk from exposure to a chemical can only be credibly quantified with reliable, appropriate toxicity values (RfDs and Cancer Potency Factors) for all routes and exposure periods. The USEPA's RfDs incorporate uncertainty factors, which reflect their author's conservatism or their doubts as to the applicability of the experimental data to the human targets of concern. In addition, there has been much criticism of the way in

which carcinogenic potency values are developed and used. This, in part, results from experimental methodology and the fact that there can be considerable differences between humans and the experimental animals owing to difference in anatomy, physiology, and susceptibility to certain types of cancer. As a result, unnecessarily conservative slope factors may have been adopted. Dermal absorption is especially difficult to quantify; the skin-to-skin dermal absorption factor is probably quite variable even for a single chemical applied to different parts of the body.

The interactive effects of exposure to a multiplicity of chemicals are unpredictable; one seldom knows whether they will be synergistic, antagonistic, or purely additive. Since exposure levels at the site are estimated to be low for all but four of the populations, it is likely that interactive effects in most instances will be minimal, and the toxicological uncertainty will be the sum of uncertainties related to the individual chemicals.

2.8 Summary of Ecological Risks

Potential ecological routes of exposure include:

- Ingestion of contaminated sediment by aquatic invertebrates and by vertebrates
- Ingestion of contaminated soil or plants by terrestrial vertebrates
- Root uptake by plants of contaminants in soil and soil water.

A screening-level ecological risk assessment consisting of three phases or steps was performed. The phases are problem formulation, analysis, and risk characterization. Identified in the problem-formulation phase were the potential stressors (chemicals), the potential receptors that may be effected, and the potential pathways to the receptors. The potential stressors are organic (VOCs and SVOCs) and inorganics (metal and cyanides) found in the upper two feet of soil and also in storm-water runoff, ground water, river water, and river sediment. The terrestrial receptors and exposure pathways are plants that could be exposed through their roots, earthworms and other soil invertebrates, the microbial community that could be exposed directly to chemicals in soil. Other possible terrestrial receptors and pathways are small rodents such as mice that could be exposed by ingesting soil or plants, and bioaccumulation through the food web, such as moles and birds eating earthworms and insect larvae, and raptors such hawks eating mice. Fish and invertebrate are the receptors in the river.

In the analysis phase, toxicological benchmarks were identified for the various exposure media, and background concentrations of chemicals in each media were estimated. In the risk-characterization phase, the benchmark concentration of each

chemical of' concern in each medium of concern was compared to the representative concentration of the chemical determined from sampling (either the 95% UCL concentration or the maximum detected concentration). This comparison was done by dividing the concentration of the chemical in the medium by the toxicological benchmark concentration for the chemical. The resulting numerical value is called the hazard quotient. A hazard quotient above 1.0 indicates that the chemical concentration at least one sampling location exceeds a benchmark at which toxicological effects have been observed. The chemicals in each medium of concern having a hazard quotient above 1.0 were identified as chemicals of potential concern. Table 8 identifies the chemicals of potential ecological concern in each media.

No critical habitats and no endangered species or habitats of endangered species are affected by the chemicals at the site. The Anacostia River has been affected by chemicals from the site and other sources in the watershed of the river. The USEPA recently began a study of sediment contamination in the river, and WG is participating in the study.

2.9 Description of Remedial Alternatives

The feasibility study evaluated remedial alternatives for managing potential risk associated with the following five media of concern, which are also the operable remedial units.

- Surface Soil
- Subsurface Soil
- Ground Water
- DNAPL (Coal Tar)
- River Sediment.

A four-step process was utilized for screening an initial set of potential technologies for each medium. The technologies remaining after the screening are identified in Table 9. A summary evaluation of each remaining technology, except river sediment, against CERCLA's seven threshold"and primary-balancing criteria is provided below and also included in the table. Additional information on these alternative technologies and those eliminated earlier in the evaluation process is found in Section 12 (Volume 1) of the RI/FS report (Hydro-Terra, 1999).

2.9.1 Surface-Soil Alternatives

The no-action alternative is appropriate for current uses of the East Station Site, in that health risks to humans do not exceed threshold levels established by the USEPA. No

action is not appropriate for future uses of the East Station and NPS properties due to potential health risks caused by exposure of humans to contaminated surface soil. No action is also not acceptable to the public or the USEPA.

Containment of the surface soil by covering with clean soil stabilized with turfgrass and/or other vegetation will accommodate future uses of the site by reducing, to an acceptable level, the potential unacceptable cancer risk posed by dermal exposure to the surface soil. It also reduces potential environmental risks. Covering portions of the East Station property with impermeable structures such as buildings and pavement will also protect against human contact with soil containing chemicals of potential concern. The alternative of removing the upper one-half inch to one foot of surface soil will not eliminate the risk, since the resulting surface soil would be more contaminated than the soil removed. Use of a vegetative soil cover of 12 inches on the East Station, NPS, and COE properties is acceptable to the public and the USEPA. The technology meets regulatory requirements concerning risk-based concentrations (RBCs) for surface soil on residential sites. RCRA requirements do not apply to in-place hazardous substances since the substances were released prior to the effective date of the RCRA regulations.

A large portion of the NPS property lies within the 100-year floodplain. In keeping with Federal floodplain management requirements concerning the protection of floodplains, soil capping on the NPS property would have to be preceded by the removal of existing soil equal to the thickness of the vegetative soil cover to be applied. Furthermore, in accordance with USEPA requirements the soil cover must be maintained in a manner that prevents wash-outs during flood events. The removed soil, if not hazardous, can either be disposed of elsewhere on the site under a cover of clean soil or hauled to an offsite disposal area. If hazardous materials are uncovered and cannot be made non-hazardous at the site, they would have to be disposed of in accordance with RCRA requirements.

Use of phytoremediation to reduce exposure to surface soil at a depth of 0 to 0.5 inches <u>may</u> be effective in the long-term, but will not be in the short term. For this application, phytoremediation is not a suitable alternative technology, only a potentially suitable supplemental technology to be used in conjunction with a vegetative soil cover.

2.9.2 <u>Subsurface Soil Alternatives</u>

No action is unacceptable in that it does not provide the protection against unacceptable exposure of utility workers to VOCs in the soil required by CERCLA as amended. Institutional control involves actions aimed at limiting and controlling exposure to chemicals in the subsurface soil. It would include deed provisions that

prevent construction of basements and require foundation ventilation under buildings having the first occupied floor at ground elevation. Institutional controls would also require specification concerning health/safety monitoring and training and, when necessary, use of protective clothing and equipment to limit exposure of workers in below-ground spaces to contaminants in the soil. Furthermore, institutional controls would include the identification and disposal of hazardous materials generated during site grading and excavation. The use of these institutional controls would provide compliance with OSHA requirements concerning health/safety protection of workers, USEPA's RBCs for ambient air, and RCRA requirements for disposal of hazardous materials. The institutional controls are acceptable to the public and the USEPA.

Excavation and removal of the three areas of DNAPL accumulation in the fill (Figure 5), or target-area excavation, would lessen the risk to utility workers in very limited areas of the site. However, this alternative would not, following excavation and backfilling, preclude the need for institutional controls when working in the target areas, since contaminated ground water will continue to migrate into these areas, and VOCs would invade from surrounding areas of contaminated soil. This alternative technology by itself would not comply with OSHA or USEPA requirements concerning the protection of human health and safety. As a supplementary practice, target-area excavation would probably be acceptable to the public; however, it would be less appropriate under CERCLA since it is not cost-effective.

Phytoremediation may be somewhat effective in the long term in eliminating risk, but would have no effect in the short term. The technology is best considered as an adjunct to institutional controls, with the purpose of reducing contaminant toxicity and volume in the long term. This technology would be retained for further study prior to the effectiveness-valuation to occur within five years following implementation of the selected remedy, a condition acceptable to the public and the USEPA.

2.9.3 Ground Water Alternatives

Contaminants in the ground water under the site do not now, nor should they in the future, adversely effect drinking-water supplies. The impacted ground water on the site does, however, naturally flow into the Anacostia River, a condition of ecological concern. An analysis of the effect on river-water quality due to the influx of ground-water chemicals of potential concern suggests that the no-action alternative would not result in a surface-water quality criterion (both DC and USEPA) being exceeded. However, due to a probable elevation in PAHs in river sediments opposite the site and insufficient long-term data on ground-water quality near the river, further water-quality monitoring and associated sediment sampling and a natural-attenuation study are required.

Monitored natural attenuation cannot be considered in the short term as a stand-alone alternative to other actions or technologies. Sampling results from wells near the river mostly show a dramatic drop in chemical concentration, suggesting the existence of natural-attenuation processes (biodegradation, abiotic oxidation, hydrolysis, and/or dilution caused by tidal fluctuation). However, there does not exist sufficient long-term monitoring of water quality and a study to confirm the existence of the natural-attenuation processes. Until it can be determined that natural attenuation is an effective deterrent, the application of other technology will be necessary.

Continuation of the ongoing ground-water pump-and-treat facility will result, based on past experience, in the treatment of an average of approximately 19,000 gallons of ground water daily.[1] This technology is partially effective in reducing contaminant volume on the site and in containing contaminated ground water that would, in the absense of pumping, flow into the river. The technology as applied meets the requirements of the Clean Water Act with respect to pretreatment of the water prior to release to the POTW and the Clean Air Act concerning the release of volatile contaminants to the atmosphere. Due to its inability to extract residual DNAPL trapped in soil pores, pump-and-treat is not an effective restoration technology. However, as both a treatment and containment technology, pump-and-treat does ensure that ambient surface-water quality criteria are not exceeded, a requirement of the Clean Water Act. This alternative is acceptable to the public, USEPA, and the District.

Biosparging would reduce the quantity of chemicals reaching the river. To the extent that it is effective in reducing the flux of chemicals to the river, it would aid in ensuring that ambient surface-water quality criteria are not exceeded. Biosparging is not a restoration technology due to its limited ability to effectively treat the DNAPL present in the soil.

Phytoremediation can reduce to some extent contaminant volume, toxicity, and mobility. Used by itself, it will not be effective in the short term in protecting the river and would have limited effectiveness over the long term. Use of phytoremediation as a supplementary technology to pump-and-treat or natural attenuation, if found to be reasonably effective, might achieve adequate protection of the river in the long term. If it

[1]From January 17, 1995 to January 2, 1996, the average concentration of volitile organic compounds found in 10 samples of the influent water was 8,755 ppb. The average concentration of semi-volatile organic compounds found in four samples of the influent water collected between January 9, 1995 and October 23, 1995 was 3,599 ppb.

can be adequately applied, phytoremediation would aid in ensuring that ambient surface-water quality criteria in the river are not exceeded.

2.9.4 DNAPL Alternatives

Protection of biota in the Anacostia River from an influx of DNAPL is the primary concern regarding the presence of DNAPL on the East Station Site. No action would be a reliable and effective technology in both the short term and long term if there is certainty that no DNAPL escapes to the river; however, it does not comply with the CERCA requirement of reduction in the volume of the contaminant. Monitoring data and the presence of a large stratigraphic trap at the base of the fill unit (Figure 6) confirm the inability of the DNAPL to move to the river at all locations on the site, except possibly near the river outfall of the 12th Street Sewer and between the Trench Well and the river (Figure 5). DNAPL is found above residual concentration in a small area near the sewer outfall, and further confirmation of the lack of DNAPL mobility at that location as well as opposite the Trench Well would be required in order to accept the no-action alternative.

Extraction of DNAPL is not needed in order to prevent its movement into the river from areas where it exists above residual concentration and cannot possibly move into the river. Also, the removal of the DNAPL from these areas via pumping would not significantly improve the quality of the ground water entering the river, since considerable residual DNAPL will remain within the areas of accumulation and elsewhere on the site. Nevertheless, continued extraction of recoverable DNAPL via ongoing pumping and treatment of total fluids and direct extraction from other wells in which it accumulates is a treatment technology that decreases the volume of DNAPL in the ground, which is to some extent, a permanent and effective solution. In furtherance of this effort, additional investigation to assess the effectiveness of DNAPL recovery from the areas of known accumulation at the south end of the East Station property and near the 12th Street Sewer outfall is warranted.

2.9.5 River Sediment Alternatives

Contamination of river sediment has been identified by the District as both an environmental and human-health concern. The chemicals of potential concern include chemicals not found on the East Station Site, and, of those chemicals found on the site, other sources exist within the watershed of the river. Consequently, sediment contamination is a watershed issue. Conducting a site-associated detailed evaluation of remedial technologies for river sediment was determined to be inadequate given the watershed-wide nature of the problems. This view is shared by the USEPA and the

Biological Technical Assessment Group (BTAG), and WG is participating, as appropriate, in a river-watershed. study of sediment quality involving a number of public and private parties.

2.10 The Selected Remedy

The selected remedy is the result of many months of co-operative effort between WG, NPS, USEPA Region III, and the DC Bureau of Environmental Health (formerly part of DCRA), which have worked together to study environmental conditions at the East Station Site and the actions necessary to protect human health and the environment. Because the RI/FS was organized around the five media of concern, the selected remedy outlined in this decision document is also organized according to media and does not in most instances differentiate between the WG, NPS, COE, and DC properties. This decision document sets forth the approved remedial action for all of the impacted properties except the NPS property. The National Park Service, Department of Interior, pursuant to its CERCLA lead agency status, will issue a separate proposed plan and record of decision with respect to remedial action for the NPS property.

The selected remedy is protective of human health and the environment. The remedy eliminates human-health risk associated with surface soil, manages human-health risk associated with subsurface soil, and manages ecological risk posed by ground water and potential DNAPL movement to the river. The selected remedy removes only some of the chemicals of potential concern and DNAPL from the site. The justification for not fully utilizing permanent solutions and other USEPA-preferred solutions is provided in Section 2.10.7.2.

The selected remedy is to (1) eliminate human exposure to surface soil by covering exposed soil, during development, with either one foot of clean soil stabilized with vegetation or impervious structures; (2) manage the risk to site-development workers, current and future utility-maintenance workers, and future onsite office workers by applying institutional controls that minimize exposure; (3) protect river biota from
excessive influx of chemicals by continuing to pump and treat ground water that otherwise would enter the river and by continuing to extract DNAPL from wells in areas where it accumulates above residual concentration and areas where it may enter the river; and (4) undertake or participate in additional environmental studies that might influence future remedial action at the site and in the Anacostia. The selected remedy complies with all applicable or relevant and appropriate requirements and is acceptable to the USEPA. It is also protective of public health and the environment.

The selected remedy will be implemented in the five media of concern. The remedial goals for each media of concern, which are also the operable units, are described in more detail below.

2.10.1 Surface Soil

The remedial goal of surface soil is to eliminate the potential carcinogenic risk due to dermal exposure to surface soil and to manage to an acceptable level non-carcinogenic risk due to dust inhalation during site development.

No action will be taken while current land uses exist. In conjunction with the conversion of properties on the site to future uses, a one-foot cover of clean soil, suitable for growth of vegetation, will be placed over all areas not covered by buildings or pavement. The soil cover will be stabilized with vegetation, and a deed restriction will be recorded requiring maintenance of a stabilized clean soil cover on all exposed ground. On the NPS property, placement of the clean soil cover will be preceded by the removal of surface soil to a depth of one foot and disposal of the excavated soil. Any excavated soil determined to be hazardous will be temporarily stored on the East Station property and then properly disposed of in accordance with RCRA requirements. A health/safety plan for all earthwork will be required and site workers potentially exposed to chemicals and hazardous substances in the soil will have to be trained and monitored in accordance with the Office of Safety and Health Administration (OSHA) requirements.

Use of phytoremediation as a supplemental remedy will be considered, and, if deemed to be effective, it will be integrated, to the extent feasible, into the ultimate use of the properties.

The selected remedy will achieve the remedial goal and is also cost-effective. The present-worth cost of the remedy is estimated to be $1,189,000.

2.10.2 Subsurface Soil

The remedial goal for subsurface soil is to reduce the non-carcinogenic health risk to construction and utility workers due to exposure inhalation of VOCs or dust to a level having a hazard index of less than one, the level to which the USEPA manages noncarcinogenic health risk.

Institutional controls will be implemented that protect utility and construction workers. Controls will include requirements for ventilating confined spaces below ground and wearing protective clothing and breathing equipment. Deed restrictions will

be recorded that preclude the construction of basements beneath buildings and require foundation ventilation under buildings having an occupied floor at ground level. Additionally, preparation of a health/safety plan for all earthwork will be required, as well as OSHA required training and monitoring of all construction workers potentially exposed to soil chemicals and hazardous substances during earthwork. Hazardous materials generated while completing earthwork will be temporarily stored onsite and properly disposed of in accordance with RCRA requirements.

The use of phytoremediation as part of the selected remedy will be considered, and, if deemed to be effective, it will be integrated, to the extent feasible, into the ultimate uses of the properties on the site.

The selected remedy is cost-effective and will achieve the remedial goal. The present-worth cost of the remedy is estimated to be $225,000.

2.10.3 Ground Water

The remedial goal is to protect the Anacostia River from an excessive influx of dissolved chemicals present in ground water.

Ongoing pumping and treatment of ground water will continue. WG will continue to monitor water quality in wells near the Anacostia River on a quarterly basis up to the time of the required effectiveness evaluation; after that time, monitoring will have to continue but probably on a more limited basis. Within the same timeframe, WG will also annually sample river sediment near the site. Concurrent with the ground-water and sediment sampling, WG will assess the existence of natural attenuation processes and their effectiveness in preventing contaminants from entering the river. The applicability of phytoremediation in conjunction with pump-and-treat or natural attenuation will also be evaluated, and, if found to be effective, it will be integrated, to the extent feasible, into the. future uses of the properties on the site.

The selected remedy is cost-effective and will achieve the remedial goal. The present-worth cost, not including supplemental phytoremediation, is estimated to be $860,000.

2.10.4 DNAPL(Coal Tar)

The remedial goal is to prevent DNAPL from entering the Anacostia River and to extract DNAPL, until no longer practical, from areas where it resides at concentrations above residual concentration.

Recovery of DNAPL directly from wells in which it naturally accumulates until no longer practicable will continue, as will recovery through the ongoing treatment of ground water pumped from areas of known or suspected DNAPL accumulation. A study will be performed to determine if DNAPL is moving towards the river near the 12th Street Sewer outfall and between the Trench Well and the river. If DNAPL is found to collect in the exploration wells, direct extraction of the DNAPL from the wells will be undertaken. river. Additionally,"sentinel wells" in both the fill and sand/gravel units will be monitored monthly for the presence of DNAPL until the time of the five-year effectiveness review, longer if necessary. If DNAPL is detected in one of these wells, direct extraction of the DNAPL at the well head will begin. Collected DNAPL will be disposed of in accordance with RCRA requirements.

The selected remedy is cost-effective and will achieve the remedial goal. The estimated present-worth cost is $300,000.

2.10.5 River Sediment

The remedial objective is to further investigate the extent of sediment contamination through participation, as requested by the USEPA and BTAG, in a USEPA-led watershed study of sediment quality. The ultimate cost to WG is unknown.

2.10.6 Five-year Review

Because the selected remedy will result in hazardous substances remaining on the site above health-based levels, a review will be conducted within five years after commencement of new remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

2.10.7 Statutory Determinations

The selected remedy is protective of human health and the environment. Compliance with other statutory requirements is addressed below..

2.10.7.1 Compliance with ARARs

The selected remedy complies with the following ARARs.

- RCRA Subtitle C: The RCRA requirements are met by proper disposal of hazardous substances generated during earthwork and DNAPL collected directly from wells and the ground-water treatment unit.

- Clean Water Act (Federal and DC Ambient Surface-Water Ouality Criteria): The requirements of the Clean Water Act are achieved by pretreatment of the pumped ground water prior to discharge to the POTW under a discharge permit and by preventing chemicals and wastes from entering the river and causing ambient water quality criteria to be exceeded.

- OSHA Standards: OSHA requirements are met by taking required measures during the performance of earthwork that protect the health of construction and utility-maintenance workers.

- Executive Order 11988 (Floodplain Management): Protection of the 100-year floodplain is provided by requiring that a one-foot thickness of existing surface be removed from the NPS property prior to placing one foot of clean soil fill, and by stabilizing the fill with vegetation and applying a deed restriction that requires the vegetated soil cover be maintained.

- Clean Air Act: The Clean Air Act is complied with by having an air-discharge permit requiring that the gases released to the atmosphere from the ground-water treatment facility not exceed air-quality standards and by monitoring air quality.

- Based Concentrations (RBCs): The USEPA Region III RBCs for residential or industrial soil are met by providing a one-foot thick cover of clean soil over all exposed soil remaining after site development.

2.10.7.2 Use of Permanent Solutions, Etc.

A permanent solution eliminating all of the identified risks would require complete removal and onsite treatment or offsite disposal of contaminated soil and ground water, which is not cost-effective. Excavation would involve removal and onsite treatment or offsite disposal and replacement of several hundred thousand cubic yards of soil from the 18.8-acre site, removal and replacement of roadways and utilities, shoring of the seawall and highway structures, and treatment of millions of gallons of water. Aside from the logistical difficulties associated with this alternative, protection of the river in the event of flooding and human exposure to chemicals on the site or released to the atmosphere would be major concerns. The application of the technology would cost several hundred million dollars.

Target-area excavation is also not cost-effective for similar reasons and would not be a permanent solution to ground-water contamination. It also would not preclude the need for institutional controls to protect workers and users of the developed properties.

Pumping and treatment of ground water and extraction of DNAPL are in accordance with the USEPA's preference for treatment that reduces toxicity, mobility, and volume. The removal of DNAPL found above residual concentration is a permanent solution that, in conjunction with the presence of the natural stratigraphic trap, achieves the goal of preventing DNAPL migration to the river.

The use of alternate treatment technologies to achieve total removal of contaminants from the soil and ground water (permanent solution) is not technically feasible. This is due to the presence of DNAPL over much of the 18.8-acre site, the presence of DNAPL associated PAHs in the soil and ground water that are difficult to degrade chemically or biologically, and the heterogeneous nature of the fill material.

2.10.8 Significant Changes Resulting from Public Comments

The following change to the Proposed Plan was made as a result of public comments.

- Placement of a one-foot thick cover of clean soil fill on all exposed ground after development is complete will apply to both the NPS and East Station properties.

- Sampling of river sediment near the site annually up to the time of the effectiveness evaluation. This change results from discussions with the District.

2.11 References

Ecology and Environment, 1995, *Site Inspection, National Capital Parks - East Station Site*, SE Washington, D.C.

Engineering-Science, 1994, *Site Investigation Report and Risk Assessment at Former Manufactured Gas Plant Site*, Washington, D.C.

GeoTrans, 1991, *East Station - Phase III Study, Groundwater Recovery System, Design and Results of Related Site Investigations*.

Hydro-Terra, 1983, *Preliminary Investigation of Possible Subsurface Contamination, East Station, Washington Gas Light Company.*

Hydro-Terra, 1989, *Contamination & Land Use Study, Phase II, East Station Property, Volumes I & II.*

Hydro-Terra, 1999, *Additional Remedial Investigation and Feasibility Study (Phase East Station, Washington, D. C., Volumes 1 & 2.*

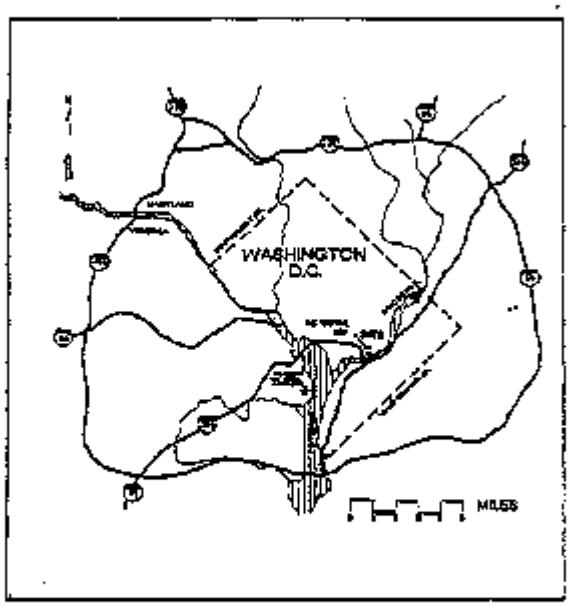


Figure 1. Location of East Station

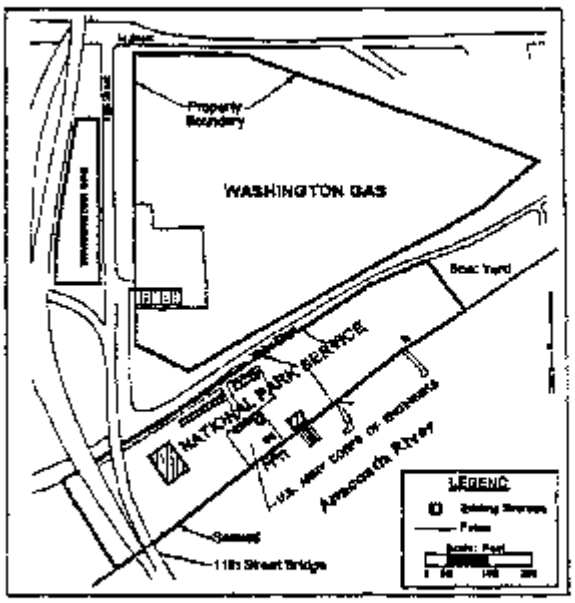


Figure 2. Site Layout

FIGURE 3
Aerial Photograph of Study Area in October 1997
Scale 1 inch = 300 feet

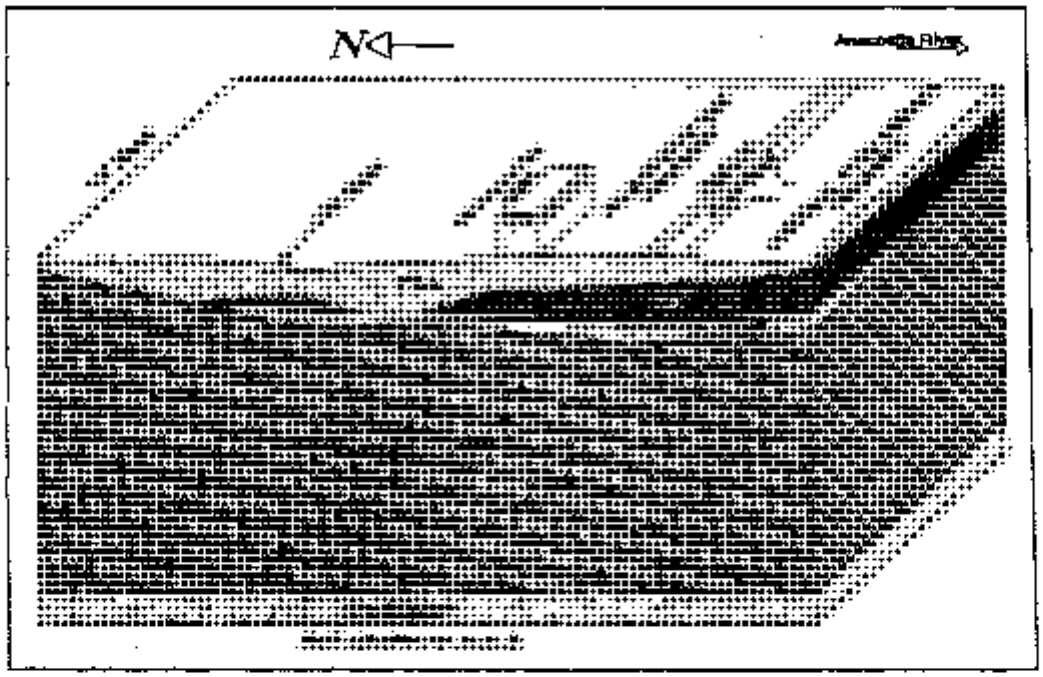


Figure 4. Model of Site Geology

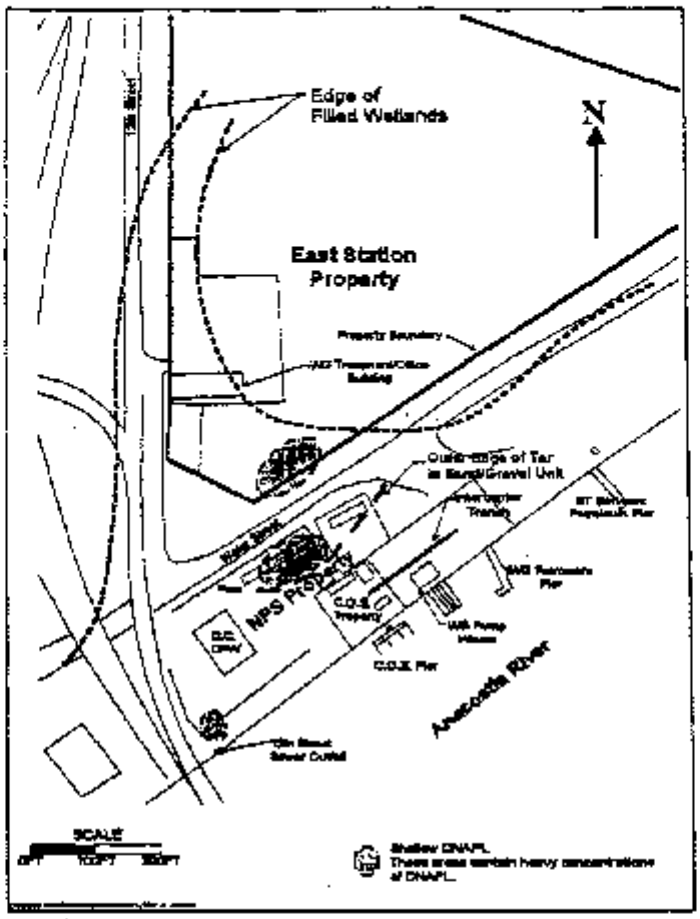


Figure 5. Location of Filled Wetland and Concentrations of DNAPL

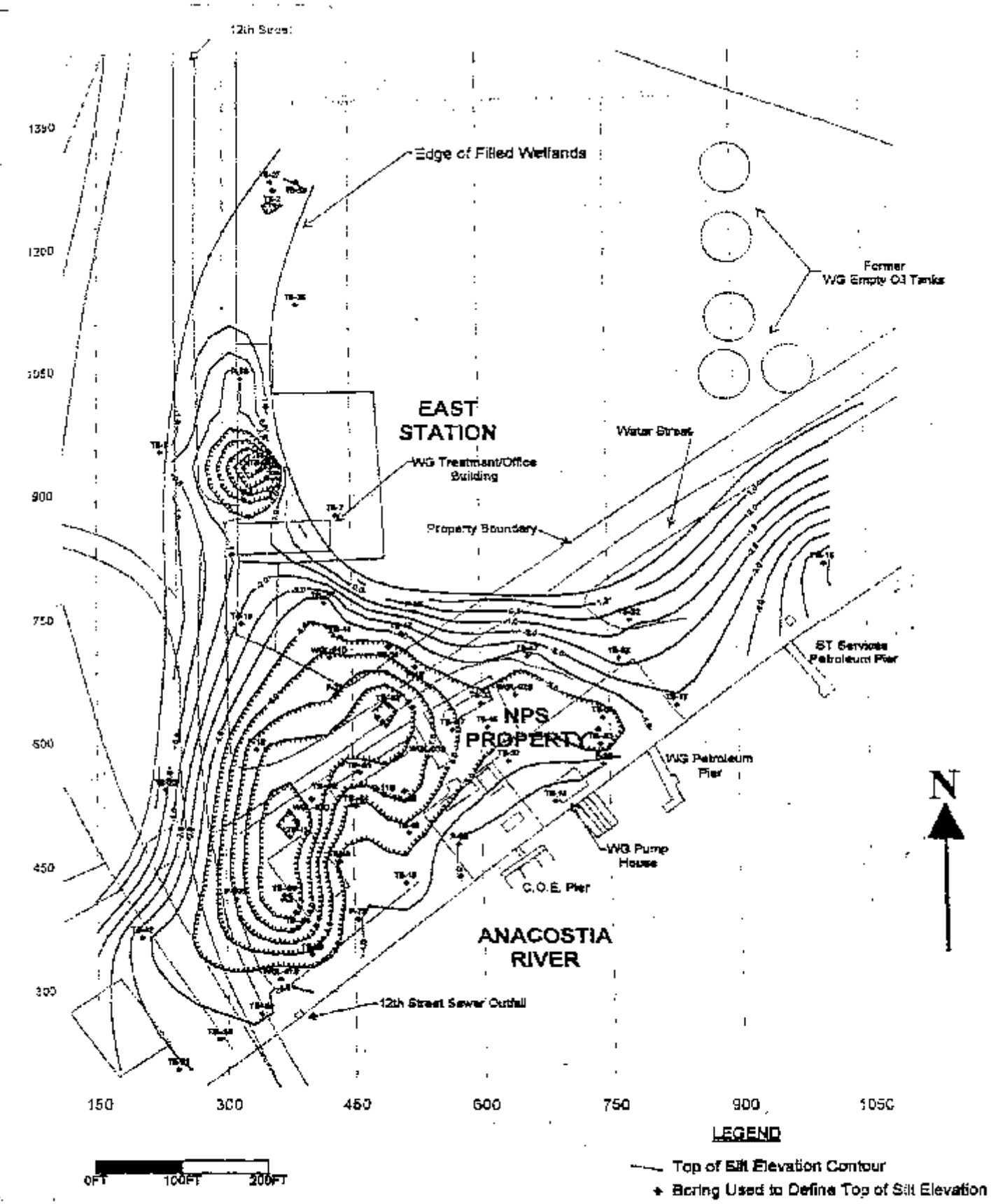
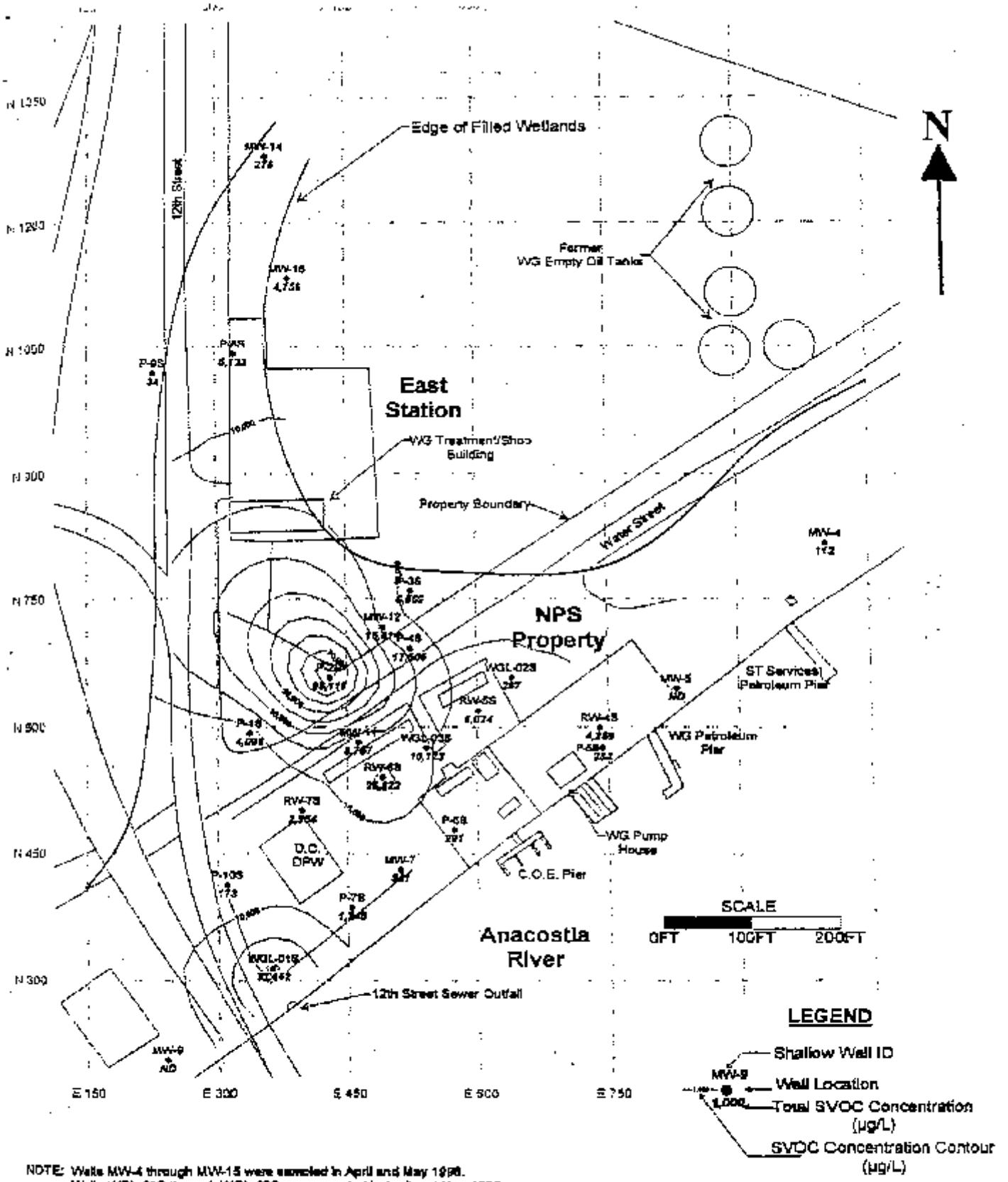


FIGURE 6

Contact of Fill with Silt Unit

Hydro-Terra

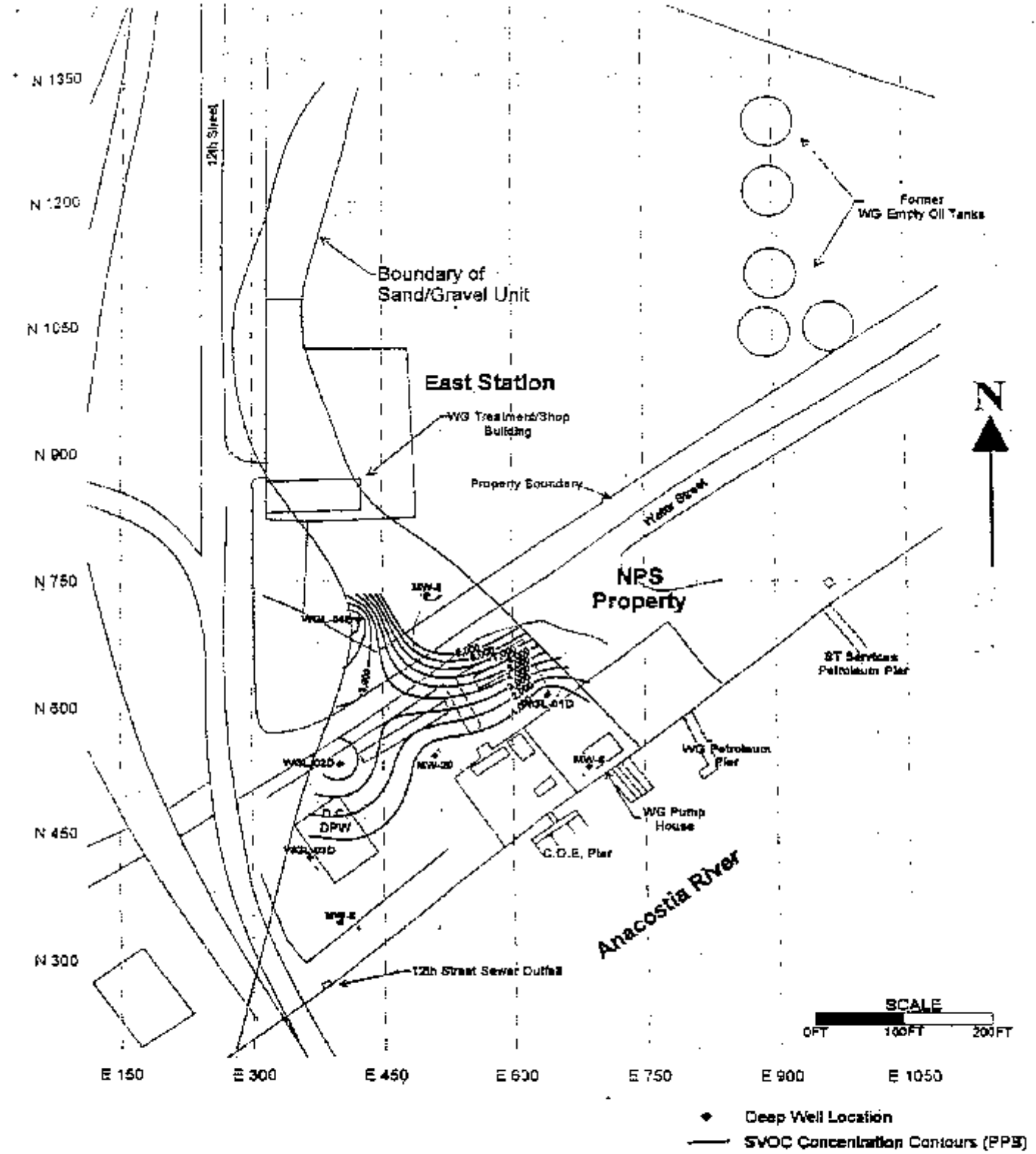


NOTE: Wells MW-4 through MW-15 were sampled in April and May 1996.
Wells WGL-01S through WGL-03S were sampled in April and May 1996.
Recovery Wells (RW-4S through RW-7S) were sampled in January 1997.
Piezometers (P-1S through P-10S) were sampled in October and November 1996.

BOX/SVOC in Fill GW.BRF (Fig.7 - 7/14/98)

FIGURE 7
SVOC Concentrations in Groundwater (Fill Unit)

Hydro-Terra



NOTE: All wells sampled in April & May 1996, except MW-20 which was sampled in January 1997.

FIGURE 8
Concentrations of SVOC in Groundwater (Sand and Gravel Unit)

Hydro-Terra

Table 1
Chemicals of Potential Concern

Chemical		Source of Potential Concern	
		Human Health	Ecological Screening
Metals			
Ag	(Silver)		X
Al	(Aluminum)	X	X
As	(Arsenic)[1]	X	X
Be	(Beryllium)[1]	X	
Cd	(Cadmium)[1]	X	X
Cr	(Chromium)[1]	X	X
Cu	(Copper)	X	X
Fe	(iron)	X	X
Hg	(Mercury)	X	X
Mn	(Mangane)	X	X
Ni	(Nickel)	X	X
Pb	(Lead)	X	X
Sb	(Antimony)	X	X
Se	(Selenium)		X
Tl	(Thallium)	X	X
V	(Vanadium)	X	X
Zn	(Zinc)		X
Other Inorganic Chemicals			
TCN		X	X
SVOCs			
PAHs[2]		X	X
DEHP		X	X
Dibenzofuran		X	X
VOCs			
Benzene[1]		X	X
Ethylbenzene		X	X
Toluene		X	
Xylenes		X	X

[1] - Known human carcinogen

[2] - PAHS include acenapthene, benzo[a]anthracene, benzo[a]pyrene[1], benzo[b]flouranthene, benzo[g,h,i]perylene, benzo[k]flouranthene, chrysene, dibenzo[a,h]anthrancene, flouranthene, flourene, indeno[1,2,3-cd]pyrene, 2-mythylnaphthalene, naphthalene, pyrene, anthracene, phenanthrene, and acenaphthylene

TABLE 2
SUMMARY OF HUMAN HEALTH RISK ASSESSMENT

Scenario No.	Population	Exposure Location	Exposure Route	Time Frame			HIF Table	Cancer Risk	Hazard Index
				Pres	Trans	Future			
1	Angler	Anacostia R.	Fish Ingestion	x	x	x	1	2.8E-07	4.8E-03
2	Swimmer/	Anacosta R.	Sediment Ingestion	x	x	x	2	9.7E-07	5.0E-03
3	Wader		Sediment Dermal	x	x	x	3	8.9E-06	7.6E-03
4			Soil VOC Inhalation	x	x	x	4	4.3E-09	4.3E-04
5	Offsite	Outside	Eroded Dust Inhalation	x	x		4	2.4E-09	9.2E-05
6	Resident	Study Area	Bulldozer Dust Inhalation		x		15	8.0E-07	7.4E-01
7			Excay. Soil VOC Inhalation		x		4	5.0E-08	4.8E-03
8			Soil VOC Inhalation	x	x	x	5	2.2E-10	1.1E-05
9	Offsite	Outside	Eroded Dust Inhalation	x	x		5	1.2E-10	2.3E-06
10	Office Worker	Study Area	Buldozer Dust Inhalation		x		14	3.4E-08	3.2E-02
11			Excav. Soil VOC Inhalation		x		5	1.6E-09	7.4E-04
12		East Station	Soil VOC Inhalation			x	5	9.6E-10	4.6E-05
13	Onsite	Property	Bulldozed Dust Inhalation		x		14	4.9E-07	4.5E-01
14	Office	NPS Property	Vehicular Dust Inhalation	x	x	x	5	2.8E-07	5.1E-03
15	Worker	East Station	Excav. Soil VOC Inhalation		x		5	2.3E-08	1.1E-03
16		Property	Soil VOC Inhal. Via Cracks			x	5	2.8E-10	1.4E-05
17			Soil VOC Inhalation			x	4	8.7E-09	8.6E-04
18	Onsite	East Station	Soil VOC Inhal. Via Cracks			x	4	2.5E-09	2.6E-04
29	Resident	Property	Surface Soil Ingestion			x	16	9.0E-05	9.7E-01
31			Surface Soil Dermal			x	18	2.4E-04	4.6E-01
19			Subsurface Soil VOC Inhal.	x	x	x	6	5.5E-05	3.9E+00
20	Utility Maint.	Study Area	Subsurface Soil Ingestion	x	x	x	7	2.8E-06	4.5E-03
21	Worker		Subsurface Soil Dermal	x	x	x	8	1.2E-05	6.4E-03
22			Soil VOC Inhalation			x	9	1.8E-08	2.2E-03
30	Juvenile	NPS Property	Subsurface Soil Ingestion			x	17	3.2E-05	2.2E-01
32	Recreation		Subsurface Soil Dermal			x	19	3.0E-04	3.5E-01
23			Soil VOC Inhaltion		x		10	1.1E-10	1.5E-04
24		East	Eroded Dust Inhalation		x		10	1.4E-10	8.2E-05
25*	Construction	Station	bulldozed Dust Inhalation		x		13	3.7E-05	3.5E+01
26	Worker	Property	Excav. Soil VOC Inhalation		x		10	2.5E-09	3.5E-03
27			Soil Ingestion		x		11	4.5E-07	3.8E-02
28			Soil Dermal		x		12	1.9E-06	2.7E-02

Shaded areas indicate an exceedance of acceptable risk levels:
Hazard Index > 1.0 Cancer > 1.0E-04

* Scenario 25 only applies to the bulldozer operator.

Table 3. Exposure Scenarios of Potential Concern

Scenario	Target Population	Route of Exposure	Location	Period	Exposure Medium	No. of Samples	Health Effect	Significant Chemical(s)
19	Utility Worker	Vapor Inhalation	Entire Site	Current Transitional Future	Subsurface Soil	45	Non-cancerous	Benzene
25	Bulldozer Operator	Particulate Inhalation	East Station Property	Transitional	Soil (dust)	30	Non-cancerous	Manganese
31	Onsite Resident	Dermal	East Station Property	Future	Surface Soil	21	cancerous	Benzo[a]pyrene Dibeno[a,h]anthracene
32	Juvenile	Dermal	NPS Property	Future	Surface Soil	5	cancerous	Benzo[a]pyrene dibenzo[a,h]anthracene Benzo[b]fluoranthene

Table 4. Dermal Exposure of Resident on East Station Property to Surface Soil

Chemical	95% UCL Conc. In Soil (mg/kg)	ABS Factor	CPS (kg • d/mg)	Cancer Risk
Benz[a]anthracene	5.422	0.1	0.73	1.20E-05
Chrysene	6.270	0.1	0.0073	1.39E-07
Benzo[b]fluoranthene	6.449	0.1	0.73	1.43E-05
Benzo[k]fluoranthene	4.201	0.1	0.073	9.29E-07
Benzo[a]pyrene	6.777	0.1	7.3	1.50E-04
Indeno[1,2,3-cd]pyrene	4.611	0.1	0.73	1.02E-05
Dibenz[a,h]anthracene	2.094	0.1	7.3	4.63E-05
Bis(2-ethylhexyl) phthalate	0.328	0.1	0.014	1.39E-08
Arsenic	5.33	0.032	1.5	7.75E-06
Beryllium	0.64	0.01	4.3	8.34E-07
			Total Cancer =	**4.0E-04**

Table 5. Dermal Exposure of Juvenile on NPS Property to Surface Soil

Chemical	95% UCL Conc. In Soil (mg/kg)	ABS Factor	CPS (kg • d/mg)	Cancer Risk
Benz[a]anthracene	8.000	0.1	0.73	1.26E-05
Chrysene	9.100	0.1	0.0073	1.43E-07
Benzo[b]fluoranthene	12.000	0.1	0.73	1.89E-05
Benzo[k]fluoranthene	6.300	0.1	0.073	9.93E-07
Benzo[a]pyrene	12.000	0.1	7.3	1.89E-04
Indeno[1,2,3-cd]pyrene	9.500	0.1	0.73	1.50E-05
Dibenz[a,h]anthracene	3.400	0.1	7.3	5.36E-05
Bis(2-ethylhexyl) phthalate	33.000	0.1	0.014	9.98E-07
Arsenic	6.10	0.032	1.5	6.32E-06
Beryllium	0.74	0.01	4.3	6.87E-07
			Total Cancer Risk =	**3.0E-04**

Table 6. Inhalation Exposure of Utility Worker to VOCs

Chemical	95 % UCL Soil Gas Concentration (mg/m^3)	RfD (mg/kg/d)	Hazard Quotient
Benzene	2.430	0.002	3.894
Totluene	0.500	0.114	0.012
Ethylbenzene	0.500	0.286	0.005
Xylenes	0.500	0.0857*	0.016
Sum of hazard quotients = hazard index =			**3.93E+00**

*Value for p-xylene.

Table 7. Inhalation Exposure of Heavy Equipment Operator to Dust

Chemical	95 % UCL Soil Gas Conc. In Soil (mg/kg)	RfD (mg/kg/d)	Hazard Quotient
Total PAHs	208.85	3.00E-02	1.19E-02
Bis(2-ethylhexyl) phthalate	0.340	2.00E-02	2.91E-05
Dibenzofuran	1.000	4.00E-03	4.29E-04
Aluminum	11,047	1.00E+00	1.89E-02
Antimony	0.16	4.00E-04	6.86E-04
Arsenic	5.10	3.00E-04	2.91E-02
Beryllium	0.61	5.00E-03	2.09E-04
Cadmium	0.89	5.00E-04	3.05E-03
Chromium	31.90	5.00E-03	1.09E-02
Iron	26,744	3.00E-01	1.53E-01
Manganese	285.94	1.43E-05	3.43E+01
Mercury	0.87	8.57E-05	1.74E-02
Nickel	31.80	2.00E-02	2.73E-03
Thallium	0.45	8.00E-05	9.64E-03
Vanadium	43.90	7.00E-03	1.08E-02
Total Cyanides†	3.8	2.00E-02	3.26E-04
Sum of hazard quotients = hazard index =			**35**

^ The RfD value used for Total Cysnides is for Free Cyanides (RfD = 2.0E-02). If the RfD value for Hydrogen Cyanide (RfD = 8.57E-04) was used the Hazard Quotient would be 3.89E-02 and hazard index would be the same.

Table 8
Chemicals of Potential Concern for Ecological Risk Assessment

Chemical	Soils		Site Water		Anacostia R.	
	Surface	0 - 2 ft	Runoff	Ground	Water	Seds.
Metals						
Ag		X				
Al	X	X	X		X	
As		X				X
Cd	X	X		X		X
Cr	X	X		X		X
Cu	X	X				X
Fe	X	X	X		X	
Hg (if MeHg)	X	X	X			X
Mn	X	X				
Ni	X	X				X
Pb	X	X	X	X	X	X
Sb		X				
Se		X				
Tl		X				
V	X	X				
Zn	X	X				X
Other Inorganic Chemicals						
TCN		X				
SVOCs						
PAHs	X	X				X
DEHP						X
Dibenzofuran						X
VOCs						
Benzene		X				
Ethylbenzene		X				
Xylenes		X				

Table 9. Detailed Evaluation of Remedial Alternatives

Alternative	Provides overall protection of human health and environment		Complies with ARARs	Provides long-term effectiveness and permanence	Reduces volume, toxicity, and mobility	Provides short-term effectiveness	Implementability	Cost
Surface Soil								
1. No Action	Human health: Environment:	No Yes	Yes for current use	Not effective for future use	No	Effective for current use of the properties	Yes	None
2. Containment (Vegetated Cover)	Human health: Environment:	No Yes	Yes	Effective for present and future, but will require maintenance	Reduces mobility of soil particles and prevents direct contact	Yes	Yes	$1,189,000
3. Phytoremediation	Human health: Environment:	Limited Limited	Maybe	May be effective	Some reduction in toxicity and mobility of chemicals	Probably not very effective in the short-term[1]	Maybe	$561,000[2]
Subsurface Soil								
1. No Action	Human health: Environment:	No No risks	No	Not effective	No	No	Yes	None
2. Institutional Controls	Human health: Environment:	Yes No risks	Yes	Effective for present and future	No	Yes	Yes	$225,000
3. Target-Area Excavation (Fill Unit)	Human health: Environment:	Yes No risks	Yes	Effective for fill unit and limited effectiveness for ground water	Effective in the Fill unit only	Presents risks to workers and nearby residents during excavation	Implementable, but may be impracticable[3,4]	$31,000,000[4]
4. Phytoremediation	Human health: Environment:	Uncertain No risks	Maybe	May be effective	Some reduction in toxicity and mobility of chemicals	Probably not very effective in the short-term[1]	Maybe	$561,000[2]

[1] Phytoremediation may not be very effective in the short-term due to the time required for plant growth.
[2] It is not possible to fully assess the cost for phytoremediation prior to sit-specific studies and design at the site. This cost would be in additon to the cost of constructing a vegetive cover much of the site.
[3] Target-Area Excavation would be impracticable due to environmental concerns caused the handling of a large volume of material containing a relatively high concentration of tar.

Table 9 (continued). Detailed Evaluation of Remedial Alternatives

Alternative	Provides overall protection of human health and environment		Complies with ARARs	Provides long-term effectiveness and permanence	Reduces volume, toxicity, and mobility	Provides short-term effectiveness	Implementability	Cost
Ground Water								
1. No Action	Human health: Environment:	No risks Maybe	Likely	May be effective	Uncertain	Uncertain	Yes	None
2. Monitored Natural Attenuation	Human health: Environment:	No risks Maybe	Likely	May be effective	Uncertain	Uncertain	Yes	$100,000[5]
3. Pump and Treat	Human health: Environment:	No risks Yes	Yes	Effective only as long as it is operating	Effective to an extent[6]	Yes	Yes	$760,000[7]
4. Biosparging	Human health: Environment:	No risks Yes	Likely	Effective	Results in reduction in toxicity and volume of chemicals	Yes	Implementable but difficult[8]	$1,720,000
5. Phytoremediation (Fill Unit)	Human health: Environment:	No risks Limited	Limited	Limited Effectiveness	Some reduction in toxicity and mobility of chemicals	Probably not very effective in the short-terms[1]	Maybe	$126,000[2]
DNAPL								
1. No Action	Human health: Environment:	Likely Likely	Maybe	Not effective	No	No	Yes	None
2. Recovery from Wells	Human health: Environment:	Likely Likely	Yes	Effective[9]	Yes	Moderately effective	Yes	$300,000

[4] assumes removal of approximately 64,000 cubic yards of soil, all which is a hazardous material; offsite disposal of the soil; re-touting of a high pressure gas line and a power line twice; removal and replacement of existing buildings on the NPS property; shoring a portion of the seawall; control and additional treatment of groundwater pumped from excavation; removal and replacement of a portion of Water Street; removal and replacement of existing monitoring wells; back-filling excavations with clean soil; and miscellaneous engineering, environmental, monitoring, safety control, and site restoration costs.

[5] Cost to conduct additional sampling and natural-attenuation study.

[6] Some quantity of contaminants will remain within the soil so that some dissolved contamination will always exist.

[7] Cost for three years of operation. Subsequent costs will need to be estimated after this period.

[8] The installation of biosparging trenches would be difficult because of the current infrastructure along the river. Building and other structures would most likely have to be displaced and large quantities of impacted soil would require disposal.

[9] Product recovery is only effective as long as the product in the soil will flow into the recovery wells. When the residual saturation point is reached, product will no longer flow into the wells, but will stay absorbed in the soil.

3. RESPONSIVENESS SUMMARY

Comments received from the public concerning the Proposed Plan and WG's responses to the comments are described in this section of the Decision Document. Comments were received from the National Park Service, Ms. Deborah Lindeman, ANC 6B Commissioner, Sharon Ambrose, District of Columbia City Councilmember for Ward 6, and the District of Columbia Office of People's Counsel. Copies of the four sets of comments are included in Appendix A of the Decision Document.

3.1 Comment from Sharon Ambrose, Councilmember – Ward 6, Council of District of Columbia, Dated July 15, 1999

Comment: I [Sharon Ambrose, Councilmember – Ward 6] am pleased to offer my support to WG's 'plan to address the environmental conditions at its Southeast, Washington, D.C. site, known as the East Station or, most recently, the Maritime Plaza. I am confident that the plan appropriately addresses the environmental issues at the site and will pave the way for an exciting project that has the potential to spark the redevelopment of the surrounding Ward 6 area.

As the City Councilmember for the site on which the property is located, I am committed to ensuring that the interests of the affected citizens are protected. It is my understanding that the Proposed Plan for East Station provides comprehensive protection to the public and I encourage the USEPA to finalize the Proposed Plan in a timely manner.

I am very supportive of federal and local programs that facilitate the safe and efficient redevelopment of under-utilized properties, such as that owned by WG, which are located in areas that sorely need economic development opportunities. As one of the largest privately owned, undeveloped areas in the District of Columbia, development of this site complements the economic growth that is already taking place in Ward 6 and throughout the city.

Response: The Proposed Plan is protective of public health and the environment.

3.2 Comment from Deborah Jane Lindeman, Advisory Neighborhood Commissioner 6B06, Dated July 13, 1999

Comment: On the basis of the information that WG provided at a recent briefing of the Communications Task Force, I (Deborah Jane Lindeman, ANC Commissioner 6BO6]

want to let you know for the record that I am in favor of the development that WG and Lincoln Development propose for the site [East Station property]. My support for the development is conditional, however. It rests on WG's assurances that the proposed development will not result in any new contamination or pollution of the Anacostia River. WG has indicated that there will be no pollution as a result of compression of the site caused by the weight of the buildings or through other sources.

Response: WG in conjunction with Lincoln Properties intends to develop the East Station property for commercial use. The Proposed Plan is protective of human health and the environment. It will not result in any new pollution of the Anacostia River. Development will not cause soil compression that will push contaminants into the river.

3.3 Comments from National Park Service, Dated June 1, 1999

Comment 1: The risk assessment showed that the exposure scenario for dermal exposure to surface soil by a juvenile exceeded U.S. EPA target range. Washington Gas indicates that "no action" provides effective prevention of harm for current use of properties. The wastes on the site, elevated levels of contaminants etc., were generated by past Washington Gas operations. The National Park Service (NPS) is not willing to accept the "no action" alternative under this scenario, nor are we willing to expose the public to a potential threat. The intended use of this site is to develop it in such a way that the public has access to it and the Anacostia River. Removal of the top foot of material would be considered appropriate with clean fill brought in along with a vegetative cover.

Response 1: The evaluation of exposure scenarios for <u>current uses</u> of the NPS property revealed no human-health risk in excess of USEPA threshold levels. Consequently, no action is the suitable surface-soil alternative for current uses of the NPS property. However, it is not suitable for the property's anticipated future use as a park and has not been selected for that use of the property.

All of the wastes and contaminants found on the NPS property are not due to WG's operations. Incidental petroleum spillage by the DC Public Works Department, which leases part of the NPS property, significantly influenced surface-soil quality; and ST Services (formerly Steuart Petroleum) has spilled petroleum products on the NPS property. The Proposed Plan calls for placing a one-foot cover of clean soil over the impacted portion of the NPS property and stabilizing the soil cover with vegetation.

Comment 2: The river sediment should be addressed by at least a summary statement of how serious the sediment problem is and why remediation can or should be postponed. WG should be part of the Anacostia River Initiative as a potential contributing source working towards a collective goal of improving the river's water quality.

Response 2: WG is aware of the contamination problem in the Anacostia River due to the presence of chemicals. WG has conducted limited sampling of river water and sediment on two occasions and the sediment results indicate an elevation in PAHs opposite the site. This finding was discussed in the RI/FS report. WG is also aware that there are chemicals of potential concern in the sediments that are not found on the East Station Site, and that there are other potential sources of PAHs near the site and elsewhere in the watershed. Since 1976, WG has pumped and treated contaminated ground water that would otherwise have flowed into the river and has monitored ground-water quality on the site since 1994.

The USEPA has determined that it is more appropriate to study sediment contamination on a watershed basis and has agreed that WG should participate in the watershed study rather than focusing on the portion of the river opposite the site. WG is currently an active participant, both in time and funding, in the USEPA-led investigation of sediment quality in the river.

Comment 3: The assessment that "No Action" and monitoring natural attenuation provide "uncertain short-term effectiveness in remediating groundwater", is untrue. They provide "no" short-term effectiveness. WG must continue to aggressively pump free product until both parties agree otherwise. Consideration to a review at the five-year period might be an acceptable time frame.

Response 3: WG will continue to aggressively extract DNAPL from wells in which it collects and pump and treat ground water containing DNAPL. Also, WG agrees that a review of extraction efforts should take place within five years. What was meant in describing short-term effectiveness is that natural attenuation processes, if occurring as suggested by water-quality data obtained in wells near the seawall, would be effective in the short term. However, since data does not currently exist with which to more confidently conclude that the processes are occurring, it is necessary to include the modifier, uncertain.

Comment 4: Similarly, the use of phytoremediation in the fill unit is described as "probably not very effective in the short term". This alternative may be very effective over the long term. This alternative should be addressed from this perspective and what recourse WG will take if it fails.

Response 4: For phytoremediation to be very effective, hundreds of trees would probably have to be planted. Considering the assumed future use of the NPS property as a park, phytoremediation would likely have to be considered as a technology that supplements pump-and-treat or, if demonstrated to be effective, natural attenuation. It is proposed that WG study the applicability of phytoremediation in light of NPS land-use considerations and the collection of additional data on ground-water quality on the NPS property. The findings will be presented to the USEPA within the five-year time span preceding performance review.

Comment 5: Off-site risks are not adequately addressed for both the NPS property and the river. This should be addressed and be part of the Anacostia River study in order to made a better determination.

Response 5: The RI/FS considered the NPS property to be onsite and the river to be offsite. The risk assessment addressed all of the exposure scenarios identified for the NPS property and also evaluated three identified exposure scenarios for the river. A risk assessment that considers exposure to <u>all</u> chemicals of potential concern in the river, such as pesticides and PCBs that are not found on the site, is not within the scope of the RI/FS. It is our understanding that the USEPA-led watershed study of sediment contamination will evaluate the spectrum of risks.

Comment 6: The document does not address the removal of the dock building or the relocation of the DPW off site. Both are necessary to complete the restoration of the site and to determine if there are any contaminant issues under the DPW building.

Response 6: Removal of WG's pump house and dock are issues outside the scope of this feasibility study. This activity needs to be addressed separately by WG and the NPS. Removal of other structures on the NPS property and relocation of DPW are also not within the scope of the RI/FS. We anticipate that the preferred remedial measures for surface and subsurface soil will apply to soils exposed following removal of buildings and pavement.

Comment 7: The issues of DNAPL are as follows

a. To make the statement that DNAPL is not moving to the river is speculative. Evaluation should be given to looking at the cumulative effects, long-term migration rates, etc. A determination needs to be made if material migrating is free phase or dissolved phase. This could be part of the Anacostia River Initiative study.

b. Containment was eliminated as an option stating "implementation complexities". This should be retained as a real and viable option as some assurance that contamination is contained. In particular, stabilization, repair, replacement of the seawall, which ever is applicable, to assure contaminants are remaining on the site.

c. Free product is not negotiable. Removal efforts must continue and expand into those areas where high levels of product were detected.

Response 7: Abundant evidence leads to the conclusion that DNAPL is not moving to the river in any area except possibly near the 12th Street Sewer outfall to the river and between the Trench Well and the river where additional investigation is proposed to confirm the conclusion. The Proposed Plan also calls for continued monitoring for the presence of DNAPL and water quality in wells near the river, and pumping of DNAPL if it is found in these sentinel wells. Dissolved-phase chemicals associated with the DNAPL are contained in ground water which WG collects and treats. The collected data will be available to researchers conducting the Anacostia River Initiative study.

Natural containment of DNAPL is provided by the large stratigraphic trap present at the contact of the fill and silt under Water Street and a major portion of the NPS property. Ongoing pumping and treatment of ground water and extraction of DNAPL are containment as well as treatment practices. Monitoring data suggest that DNAPL is not moving to the river and that, without pumping and treatment of ground water, the flux of chemicals of potential concern to the river do not, after mixing with the river water, result in a surface-water criterion being exceeded. Due to these findings and implementation difficulties, use of a slurry wall or other structural containment measures near the seawall were determined not to effective.

The Proposed Plan calls for continuation of DNAPL and water-quality monitoring, as well as extraction of DNAPL. It also calls for continued pumping and treatment of ground water, assessment of the role of natural attenuation processes in protecting the river, and further investigation of the potential for DNAPL migration to the river near the 12th Street Sewer outfall and between the Trench Well and the river. Use of alternative measures should be considered at the time of the effectiveness review, required by the USEPA within five-years, when additional long-term monitoring data are available.

The Proposed Plan calls for continued removal of DNAPL from areas where it is found at concentrations above residual concentration. Residual concentration is the DNAPL-holding capacity of the host soil, the concentration at which the DNAPL cannot migrate through the soil. Above residual concentration, DNAPL can flow into wells

under the force of gravity. During this investigation, considerable drilling and subsurface-soil sampling were performed for the purpose of locating areas where DNAPL might reside above residual concentration, and five wells were installed in areas identified as having anomalous concentrations of PAHs, possibly indicative of a high concentration of DNAPL. DNAPL collects in only one of the five wells, and it is regularly pumped from that well and other wells where it was previously found to collect. In addition to requiring continued pumping from current wells, the Proposed Plan calls for further investigation of the extent of DNAPL accumulation in two of the three identified areas where DNAPL exists above residual concentration (near 12th Street Sewer outfall and at south end of East Station property) and for an increase in the extraction effort, if found necessary.

Comment 8: Institutional controls on NPS property may be inappropriate for public park land. The park envisions the site being developed into a recreational area with public access to the river. Outdoor recreational activities such as picnic areas, walking/bike paths, boating access to the river via the site, restroom facilities are all possibilities. Any limitations to the site or restrictions as a result of the site contamination may result in compensation for lost or restricted uses

Response 8: Covering the impacted areas of the NPS property with one foot of clean soil fill stabilized with vegetation will accommodate the terrestrial uses described without adversely affecting human health and the environment. With regard to use of the river, WG analyzed the risks associated with dermal and ingestion exposures to sediment and with ingestion of fish. The cancer risks ranged from 2.8×10^{-7} to 8.9×10^{-6}, risk levels well below the threshold level of 1×10^{-4}. The hazard indices, indicative of non-cancer risk, ranged from 0.0048 to 0.0076, considerably less than the permissible range of up to 1.0. Also, no organic chemicals of concern were detected in river-water samples taken at locations opposite the site and near the seawall.

Institutional controls will be needed to protect utility workers on the rare occasion when excavation is needed to repair an underground utility and to ensure the integrity of the clean-soil cover. The matter of compensation is outside the scope of the Proposed Plan.

Comment 9: It is the NPS's position that contamination must be removed or aggressively pursued on NPS lands for clean-up. We understand that due to the nature of the contamination we are dealing with, unless a complete removal is undertaken, there will always be residual on site in the soils. However, all efforts must be made to diminish the contaminant levels and potential risks to the river and human health and the environment. The selected method(s) of contaminant reduction should be re-evaluated at

a five-year review period. Based on the review outcome, the NPS may want to revisit the removal alternative or any other new remedial technologies available to deal with the specific contaminant issues associated with this site.

Response 9: The Proposed Plan calls for removal of one foot of the impacted surface soil on the NPS property and placement with one foot of clean soil stabilized with vegetation. WG will also continue to pump and treat ground water that can flow into the river and extract DNAPL from areas where it has accumulated at concentrations enabling it to flow into wells. The selected remedy for the site is protective of human health and the environment on the NPS property, complies with ARARs, and is cost effective. Since the remedy leaves contaminants in the ground, the USEPA requires an assessment of effectiveness within five years of the implementation of the proposed remedy. If the remedy is found at that time not to be protective of human health and the environment, other measures will need to be considered.

Comment 10: There may be numerous controls that must be instituted as part of the process whether it is phytoremediation, use of restored wetlands, or removal and capping so that the NPS land is not rendered unusable.

Response 10: 1) WG has proposed the use of phytoremediation on the NPS property; it is expected that the applicability of this measure will be considered when the development plan for the NPS property is being formulated. 2) Deep soil excavation to restore wetlands on the NPS property presents greater logistical, environmental, and health/safety concerns than target-excavation, a subsurface-soil alternative that was evaluated. Principally due to these concerns and excessive cost, excavation to restore wetlands along the river is not considered a viable alternative. 3) Removal of the upper 12 inches of soil and replacement with the same thickness of clean soil fill is proposed for the NPS property. Also, institutional measures and controls will be specified that ensure maintenance of the clean soil cover and protection of utility personnel working below ground. Measures for dealing with hazardous material that may be uncovered when performing maintenance of underground utilities or when digging into the ground for other purposes will also be addressed, and continuation of the ground-water quality and DNAPL monitoring program will be required.

3.4 Comments from Office of People's Counsel, District of Columbia, Dated July 16, 1999

The first several pages of the Office of People's Counsel's (OPC) comments discuss OPC's authority for commenting on the Proposed Plan and participating in cases

before the District Public Service Commission to determine rate treatment of the costs Washington Gas incurs to address environmental conditions at East Station. Since these comments do not address specifics of the Proposed Plan they have not been repeated in the Responsiveness Summary; however, they are included within the full text of OPC's comments, along with WG's response to this jurisdictional issue, in Appendix A. OPC's technical comments related to the Proposed Plan are recorded below along with WG's responses.

3.4.1 Discussion

Section III (Discussion) of OPC's comments, pages 4-8, generally summarizes OPC's understanding of the scope of Proposed Plan and RIFS and CERCLA's requirements for conducting a RIFS. Only those portions of the discussion that comment on a technical subject not addressed in the analysis section below (3.4.2) have been extracted and responded to here.

Comment 1: Subsurface soil is defined as soil greater than a two-foot depth. The risk assessment for subsurface soil identifies unacceptable risks associated with a utility worker and construction worker (bulldozer operator) conducting intrusive activities at the site. It is apparent from the definition of surface soil that the soil interval between 2 inches and 2 feet is not accounted.

Response 1: The definition of surface soil in the human-health risk assessment is soil from 0 to 0.5 inches in depth, and for the ecological risk assessment the definition is soil from 0 to 2 feet in depth. Subsurface-soil sampling occurred in two-foot intervals of depth down to six feet; and the subsurface-soil sampling data used for human-health risk analysis varied between exposure scenarios. For example, the surface-soil data from 0 to 0.5 inches and also the subsurface-soil data for 0 to 2 feet were used in the risk analysis to determine inhalation exposure of a bulldozer operator to dust.

Comment 2: Ground water beneath the site is significantly contaminated, with contamination extending to geological units at least 40 feet deep. Contamination in the various geological units are believed to discharge directly to the Anacostia River, or travel below the river for some distance before seeping through the sediments into the river, or are captured by interim pump-and-treat system. The risk assessment does not evaluate human contact with ground water as a completed exposure pathway, and concludes that adverse effects on river-water quality and ecological receptors are not occurring.

Response 2: Ground-water pump-and-treat was not identified as an interim remedial technology. Treatment will occur as long as it is necessary to protect the river from adverse environmental impact.

Considering the depth to ground water on most of the site and restrictions to be placed on excavation, human exposure to ground water is unlikely, and, if it occurs, it would be of limited duration and frequency. The only population that could be exposed are utility workers. Trenches used by utility workers are dewatered, and, thus, the exposure would be to subsurface soil containing some water. This possibility was reflected in deeper subsurface-soil sampling results, and the results were used, along with data from shallower depths, in the human-health risk analyzes for utility workers.

When ground water enters the river it ceases to be ground water and becomes surface water or river water. Three exposure scenarios looked at potential human-health threats in the river due to release of chemicals of potential concern found. on the site and also released to the river elsewhere in the watershed. The scenarios were dermal and ingestion exposure of a swimmer or wader to chemicals in the sediment and ingestion exposure of an angler to chemicals in fish. None of the calculated risks exceeded the USEPA threshold level. The results from sampling of river water and the groundwater/river-water mixing model results when compared to the sediment sampling results, do not indicate a need to evaluate exposure to river water affected by ground water.

WG did not in its RI/FS report state conclusively that, in the absence of pump-and-treat, flow of ground water to the river would not have an adverse effect on river water quality and ecological receptors. WG concluded from its investigation that the sampling data suggests that adverse effects would not occur and that additional work is required to confirm this preliminary finding.

Comment 3: Dense non-aqueous phase liquid (DNAPL), exists at the site in the form of coal tar. DNAPL is heavier than water and moves downward as a separate phase until it encounters a relatively impermeable barrier where it tends to accumulate. DNAPL has been encountered as pockets of contamination in the fill zone, which is the uppermost geological unit on the NPS property and the East Station property (see Figure 6-19 of the Phase IV report and Figure 3 of the Proposed Plan). In addition, DNAPL is present in the deeper sand/gravel unit and extends to the limits depicted in Figure 3 of the Proposed Plan. Since DNAPL is part of the subsurface soil remedial unit, WG also discusses it as part of that unit. In addition, constituents in DNAPL leach into ground water and in that respect it is discussed with the ground water remedial unit. Finally, DNAPL can discharge as a separate phase directly into the Anacostia River.

Response 3: WG did not conclude that DNAPL can discharge into the Anacostia River. The results of the remedial investigation suggest that it is not moving into the river. WG has agreed to further confirm this conclusion by installing two additional wells near the river, one between WGL-01S and the river and the other between the Trench Well and the river.

3.4.2 Summary of Site Risks

Comment 1: The risk assessment (summarized in page 5-7 of the Proposed Plan) substantially underestimates the risks at the site.

The risk assessment considers future use of the site for residential and industrial purposes, as required under CERCLA. In the process of developing the site for these uses, workers involved in intrusive operations, such as excavating soil to construct building foundations, will come in contact with contaminated materials existing at and below the surface. While a construction worker's exposure is considered in the risk assessment, WG fails to evaluate onsite residents' and office workers' exposure to the excavated material that would be placed onsite. This is a significant omission and accounts for the unexpectedly low risks estimated for future occupants of the site. WG has included in its Proposed Plan a transitional phase, in between the current and future use scenarios. This is misleading in that the transitional phase and future use phase are not mutually exclusive and thus, should not be treated as separate phases for purposes of
risk assessment considerations. Additionally, the WG Proposed Plan does not quantify the existing danger of the contaminants at East Station to the environment.

Response 1: The risk assessment considered dermal and ingestion exposure of onsite residents to soil following development. The risk due to ingestion did not exceed threshold levels at which the USEPA manages risk. The lifetime dermal risk for onsite residents was 2.4×10^{-4}, which is higher then 10^{-4}, the highest carcinogenic risk permitted by the USEPA. Onsite office workers would have a considerably lower lifetime dermal or ingestion exposure to soil than onsite residents since office workers would spend only eight to nine hours a day onsite and nearly all their time indoors. Considering the relatively low lifetime dermal-exposure risk to a resident and the brief level of exposure to an office worker, the lifetime risk to an onsite worker under these conditions, even using conservative calculations, would be in the range acceptable to the USEPA. In addition, under current and future uses of the site, onsite office workers will not come in contact with the surface soil currently existing on the East Station property. However, the same exposure disparity does not exist for inhalation exposure to dust and VOCs, and, thus, these exposure routes were evaluated for onsite office workers as well as onsite residents. They were both well below (more protective) the acceptable risk range. It is

also important to note that WG will not develop the East Station property for residential use but is currently in the process of developing it for commercial use.

During the transitional (development) phase, exposure levels and durations are significantly different than in the future phase; and construction workers will only be exposed during the transitional phase. Consequently, the transitional phase was considered separate from the future phase. For those populations exposed to both phases, the Proposed Plan will not change whether they are considered separately or together.

A screening-level ecological risk assessment was performed at the request of the USEPA and the Biological Technical Assessment Group (BTAG). With respect to the river, the risk assessments intended to be part of a phased approach that will ultimately result, in coordination with the results of the USEPA-led watershed study of sediment contamination, in the characterization of ecological risks to the river. BTAG believes that current exposure to ecological receptors at the site (terrestrial area) are negligible due to reduced habitat quality and that the proposed remedy will further reduce the potential for ecological risk.

Comment 2: The feasibility study fails to discuss Principal Threat Waste.

The presence of Principal Threat Waste is a key factor influencing the entire feasibility study. The failure to consider this essential CERCLA concept significantly impacts the recommendations of the study. The risk assessment, revised as outlined above, should be used along with EPA guidance on identifying Principal Threat Waste to put into context the role of treatment versus containment as remedial technologies for the various remedial units. It is likely that materials contained in the subsurface soil would meet the definition of Principal Threat Waste.

Response 2: DNAPL is the principal waste of concern on the site but not the principal threat to public health. The principal threat to public health is contaminated surface soil; and the chemicals in the surface soil having the greatest influence on risk include both metals and organic compo unds. The threat associated with the presence of these constituents is addressed through the consiructionof a physical barrier (vegetative soil covered or impermeable structures) and implementation of institutional controls. DNAPL itself was not observed in the collected surface-soil samples; only constituents of DNAPL were present. Exposure of utility maintenance workers is to VOCs released from soil and from ground water in which they have been dissolved. The Proposed Plan calls for active treatment where it is practical, that is, pumping DNAPL from areas where it has been found at concentrations above residual concentration in accordance with the CERCLA preference for reduction in volume and mobility (treatment). Removal of

DNAPL by in situ treatment or by excavation of impacted soil on the 18.8-acre site has not been found to be either technically feasible or cost-effective. The identification of media of concern and the format of the RIFS were determined with input and approval from the USEPA and the District Environmental Health Administration throughout the process; reformatting or redoing certain aspects of the report is unnecessary and would not produce significantly different results or recommended remedial actions.

3.4.3 Summary Of Remedial Alternatives

Comment 1: Surface Soil

The preferred alternative for Surface Soil is unsupported and contains several internal inconsistencies. The preferred alternative cannot be considered acceptable in its current configuration.

Table 1 from the Proposed Plan presents the detailed evaluation of remedial alternatives. Alternative 2, containment, is WG's preferred alternative, details for which are presented in Table 13-2 from the Phase IV report.

The following observations apply to Table 1 and Table 13-2:

- Containment cannot be considered as a remedial alternative without institutional controls. In order to preserve the integrity of the cap, deed restrictions will have to be instituted that would prevent intrusive activities from occurring throughout the affected area. In the absence of institutional controls, the containment alternative cannot be considered protective of public health and the environment and would fail the threshold criteria.
- The assumption in Table 13-2 of covering 50% of East Station property with a 6-inch soil cover is inconsistent with the proposal of a 12-inch cover for the NPS portion and is not health protective. The future unrestricted use assumed for the East Station property requires that the cover be more (not less) protective than the cover for the NPS portion, where recreational use is assumed. In addition, a geomembrane. should be placed between native and the overlying soil cover. The basis for the assumption that 50% of East Station property requires a soil cover is not clear, when exposed soils cover a significantly greater portion of the property. Presumably the assumption is that building and paved surfaces will be constructed on the remainder of the site. If this is true, the CERCLA process requires that specific plans be provided during remedial design, and the implementation risks associated with building construction be evaluated in the feasibility study. Further support

will be necessary before this remedy can be considered to meet the "short-term effectiveness" criterion in Table 1.

- Page 10-2 of the Phase IV report indicates that a soil cover was placed over exposed soils on the East Station property in 1990. Further clarification is necessary as to whether another soil cover is being proposed over the existing soil cover, as well as the. circumstances under which the existing cover became contaminated.

Response 1: The Proposed Plan will be revised to require a minimum of 12-inch soil cover on the NPS property and on all exposed soil present at the time the commercial development on the East Station property is fully completed, even though the risk to onsite office workers on the East Station property does not require this level of protection. Considering the thickness of the cover, the obvious physical difference between the clean soil and underlying native fill or soil, and the likelihood that only utility workers will dig in the soil, use of a geomembrane as marker horizon is not considered necessary. A deed restriction preventing excavation below 12 inches without regulatory approval, except in emergency situations, will be recorded. The deed restriction will also require maintenance of the vegetative cover.

At the time that the cost for the soil cover on the East Station property was determined, a specific development plan for the site did not exist. However, future commercial development was assumed, and 50-percent coverage by buildings and pavement was included as a conservative assumption. The current preliminary plan for development of the property will expose considerably less soil. The remedial design will indicate that all soil not covered by impermeable structures on the East Station property be covered with sufficient clean soil to be protective of public health. The Proposed Plan restricts underground construction to that necessary for building foundations and installing utilities. The human-health risks associated with building construction, that is, working in impacted subsurface and surface soil, were evaluated, and methods to manage the potential risks are required and will be specified in the remedial design.

All soil exposed at the completion of development, including exposed areas currently having a soil cover, will be covered with 12 inches of clean soil stabilized with vegetation. The existing fill soil cover came from utility construction sites in DC and surrounding areas. It is possible that some chemicals, particularly PAHs, came in with the fill material. PAHs are commonly found in urban soils and construction materials such as asphalt. Poor surface drainage on part of the property, resulting in standing water during wet periods, could also have affected the quality of the fill soil. These wet areas will be properly drained when the property is developed.

Comment 2: Subsurface Soil

a. The Subsurface Soil remedial unit is inappropriately defined, which has biased the evaluation of remedial alternatives.

Subsurface soil has been defined to extend to indefinite depths, corresponding to the presence of contamination. It is more appropriate to define subsurface soil as 10-12 feet, representing the limits of excavation for utility work or building foundations. Under these circumstances, the volumes of soil and costs for target-area excavation will be much more reasonable.

b. The preferred alternative for the Subsurface Soil appears to be postponing remedial action until the site is developed. The preferred alternative for Subsurface Soils is unacceptable as presently configured.

Institutional controls in conventional terms involve the application of deed restrictions to prevent individuals from coming in contact with contaminated materials. The preferred alternative for Subsurface Soil implies the use of "institutional controls," but in reality is simply requesting the postponement of remedial actions until the site is developed, without accounting for the costs associated with the eventual remedial action that would be required. This remedial unit should not be part of the Proposed Plan if no remedial actions are being proposed, but simply postponed for later. If development of the site were to occur, the excavated soil would be considered hazardous waste and will require proper disposal. The costs associated with these remedial actions should necessarily be a part of this remedy, but have been incorrectly overlooked.

Response 2: Excavation to 10 or 12 feet would not be fully effective since considerable DNAPL and contaminated ground water would remain in the ground and would continue to impact ground water and utility workers through release of VOCs. For this reason and given that DNAPL and/or constituents of DNAPL are present in soil and/or ground water over much of the 18.8-acre site, excavation is not a cost-effective solution.

"Institutional. controls" is a remedial alternative that manages risks to protect human health and the environment; and it is not being postponed until development takes place. General institutional controls will be implemented as soon as the Decision Document is approved and will include deed restrictions on excavation and requirements for worker protection and proper soil handling practices when working in subsurface soil. More specific details will be part of the remedial design to be approved by the USEPA prior to conducting earthwork necessary to convert the properties to their future uses.

The cost of.$225,000 is only for institutional controls during current and futures uses of the properties. Not all of the excavated soil generated during either development or utility maintenance will be hazardous waste. The disposal of any excavated soil on the East Station property. that may be hazardous waste was considered a development cost since development or construction plans were not available at the time of costing. However, even if the costs of disposing of any hazardous waste from utility trenches and/or future building foundation excavations were known and were not considered a development cost, and even in the unlikely event that all of the excavated soil was hazardous, it still would not justify excavation of all contaminated soil. Any hazardous materials generated during earthwork will be disposed of in accordance with RCRA requirements.

Comment 3: Ground Water

> **The preferred alternative for Ground Water is ambiguous, but appears to postpone any additional remedial action, if necessary, until later.**

The Phase IV Report (pages 12-28) begins the discussion of the ground water remedial alternatives. WG states that the remedial objective for ground water is to prevent adverse effects on river-water quality and ecological receptors. The Phase IV report further demonstrates that the dilution afforded by the river effectively meets this objective, so contaminated ground water can continue to discharge into the river. Table 11-22 of the Phase IV report presents the volume of contaminated ground water discharging to the river, and the levels of contaminants in the discharged water. In essence, the Proposed Plan is requesting a permitted discharged of 17,500 gallon per day of water containing up to 2,752 ppb of benzene, 1957 ppb of naphthalene, etc. Such a request should be carefully considered along with other sources of contaminant discharges upstream and downstream of the discharge point, including the cumulative effect of these discharges on the ecology of the river. Although it is extremely unclear, the preferred alternative appears to be a hybrid of Alternatives 2 and 3. According to Table 13-2, alternative 2 is monitored natural attenuation and alternative 3 consists of installation of additional monitoring wells, further study, and continued operation of the existing pump and treat system for a period of 3 years. There is no basis provided for the 3-year time duration for operating the interim remediation system. Given the presence of DNAPL and other contaminants in subsurface soil, there is every indication that ceasing the pump and treat operation will result in an increase in contaminant concentration in ground water. An analysis of the impact of the proposal should be discussed and evaluated in the ecological assessment. Overall, the preferred remedy for Ground Water suggest that WG is not prepared to propose a remedy at this stage, and is requesting further study over the next three years before a final remedial action can be proposed. If

this is the case, inclusion of this remedial unit in the Proposed Plan is premature and further study should be conducted before attempting to address ground water.

Response 3: The Proposed Plan does not request discharge of 17,500 gallons of contaminated ground water to the river daily; this is the estimated amount of discharge to the river under non-pumping conditions. This discussion was included to show that modeling indicates that untreated discharge of water would not exceed water quality guidelines. However, this conclusion has not been confirmed through repeated sampling data. Therefore, the Proposed Plan proposes to continue to pump and treat ground water indefinitely and to monitor ground water quarterly for a long enough period to establish, more accurately, the potential impact to the river, and to conduct additional investigations to determine potential affects of natural attenuation and phytoremediation as remedial processes. Since the Proposed Plan is risk-based and allows hazardous substances to remain in the ground, USEPA requires that an evaluation of effectiveness be performed within five years after implementation of the selected remedy. The review period will occur from within three to five years. Monitoring of ground water will occur up to the time of the review. After that time, monitoring will probably have to continue, but possibly on a more limited scale. Ground water pumping and treatment will be continued beyond the date of the effectiveness review if the regulatory authority determines it is needed to protect the river-water quality and ecological receptors.

Comment 4: DNAPL

> **The Proposed Plan overlooks the fact that DNAPL is considered to be Principal Threat Waste.**

EPA has issued specific guidance for evaluating Principal Threat Waste. The discussion of DNAPL should be revised consistent with that guidance. The preferred alternative is inconsistent with EPA guidance that requires treatment of Principal Threat Waste, and a minimum of containment of DNAPL, when practicable. If treatment or containment is impracticable, specific EPA guidance exists for demonstrating impracticability, before resorting to the status quo of passive pumping of DNAPL as and when it flows into existing wells.

Response 4: Response 2 in Section 3.4.2 addresses this comment.

Comment 5: Sediments

> **There are no details provided concerning a river-wide study of sediment in the Anacostia River or the, cost implications of the study.**

Further details of the proposed study are required before an opinion can be rendered regarding the suitability of the remedial action.

Response 5: Since the East Station site is but one source of contaminants to the river, USEPA and BTAG have determined that the problem and solutions should be evaluated on a watershed rather than site-specific basis. A watershed study of sediment contamination, initiated by the USEPA, is currently in the first phase, that is, the collection and evaluation of existing data; the full scope of work is currently being finalized. Participants in the watershed study include various federal, state and local government agencies as well as private organizations and businesses. The USEPA has directed WG to participate in the study, both in time and funding, rather than evaluating at this time offsite (i.e., in the river) ecological risks due to site-associated chemicals of potential concern and remedial approaches if found necessary. The ultimate cost of the study and possible remediation is unknown.

Comment 6: Remedial Alternatives

There is no support provided for the costs presented in the Phase IV report for any of the remedial alternatives.

A detailed breakdown of costs is required for evaluating the remedial alternatives. There is no indication in WG's Proposed Plan as to the derivation of numbers presented as costs or procedures utilized for estimating costs associated with the remedial units.

Response 6: A breakdown of cost for each of the alternatives found in Table 1 of the Proposed Plan is provided in the following pages.

COST ANALYSIS - VEGETATIVE SOIL COVER

Construction

Item	Unit	Unit Cost	Quantity	Total Cost
Mob. & demob.	ls	$20,000	1	$20,000
Field control	ls	5,000	1	5,000
Erosion & sed. Control	ls	68,400	1	68,400
Strip exis. Vegetation	ac	585	9	5,265
Regrade	cy	10	1,000	10,000
Strip soil (NPS)	cy	3.25	5,160	16,700
Dispose of non-haz soil	ton	50	8,360	418,000
Six-inch fill (NPS)	cy	10	2,580	25,800
Six-inch topsoil	cy	15	7,180	107,700
Seeding	ac	1,300	9	11,700
		Subtotal		688,565
Eng. & admin. (10%)				68,857
Const. Mgemt (12%)				82,628
		Const. Subtotal		840,050
Contingency (15%)				126,008
		Total const. Cost		$966,058

Operation & Maintenance (30 yrs)

Annual O & M Cost

Inspection	$85/hr	40 hrs	$3,400
Analytical & repair			6,600
		Subtotal	10,000
Admin. (12%)			1,200
		Subtotal	11,200
Contingency (15%)			1,680
		Total Annual O & M	12,880
Present worth (30 yrs) (i = 4%)			$222,721

TOTAL COST **$1,188,779**

COST ANALYSIS – PHYTOREMEDIATION
OF SURFACE SOIL & SUBSURFACE SOIL

Total. Area = 9 acres

Capital Cost

Agronomic testing		$15,000
Tilling & fertilizer: 9 ac x $2,000/ac		18,000
Non-soil amendment: 14,520 cy x $8.00/cy		116,160
Trees (mulberry): 9 ac x 500 trees/ac x $25/tree		112,500
Chemical testing		25,000
	Subtotal	286,660
	Engineering (15%)	42,999
	Subtotal	329,659
	Contingency	49,449
	Total Capital Cost	$379,108

Operation & Maintenance Cost

Soil & foliar monitoring & analysis		$20,000/yr
Vector/weed control		10,000/yr
Tree maintenance: 9ac x $1,200/ac		10,800/yr
Inspection		10,000/yr
	Annual subtotal	$50,800
	Admin. (12%)	6,096
	Subtotal	56,896
	Contingency (15%)	8,534
	Total Annual O & M Cost	$65,430
	Present Worth (3 yrs, i = 4%)	$181,576

TOTAL COST **$560,684**

COST ANALYSIS - INSTITUTIONAL CONTROLS OF SUBSURFACE SOIL

Year 1

Legal and administrative costs for deed restrictions and negotiations with property owners		$60,000

Years 2 - 30

Annual cost of health and safety activities associated with subsurface disturbance, and public notices and education	$10,000	
Present Worth (i = 4%)		$163,306
TOTAL COST		**$223,306**

COST ANALYSIS – PUMP & TREAT
GROUND WATER

Capital Cost

Installation of 2 wells		$7,500
Labor for oversight & management		7,500
	Subtotal	15,000
	Engineering (15%)	2,250
	Subtotal	17,250
	Contingency	2,588
	Total Capital Cost	$19,838

Operation & Maintenance (3 yrs)

Annual 0 & M Cost

Pump-and-treat system		$125,000
Ground-water monitoring		
100 man-hours x $85/hr x 4		34,000
Analysis, 12 samples x 4 x $1,000/sample		48,000
	Annual subtotal	$207,000
	Admin. (12%)	24,840
	Subtotal	231,840
	Contingency (15%)	34,776
	Total Annual O & M Cost	$266,616
	Present Worth (i = 4%)	$739,886

TOTAL COST **$759,724**

COST ANALYSIS – BIOSPARGING OF GROUND WATER

Construction

1. Interceptor Trench		
Mob/demob. and site cleaning		$40,000
Excavation: 800 1f x 20 ft x 4 ft/27 = 2,400 cy		
2,400 cy x $21.32/cy		51,168
Site control		10,000
Gravel fill: 2,400 cy x $12/cy		28,800
Geotextile: 4,920 sf x $0.17/sf		840
Topsoil: 60 cy x $1.0/cy		600
Vegetation		3,500
Piping & valves		7,000
Blowers: 3 units x $5,000 ea		15,000
Soil disposal: 2,400 cy x $75/cy		180,000
	Trench Cost	$336,908
2. Wells		
Six-inch dia. wells (16)		
16 x 55 ft x $110/lf		$96,800
Valves & fittings		20,000
Piping & manifold		10,000
Blowers (6)		
6 x $5,000 ea.		30,000
	Well Cost	$156,800
	Subtotal	493,708
	Engineering (15%)	74,056
	Subtotal	567,764
	Contingency (15%)	85,165
	Total Capital Cost	$652,929

Operation & Maintenance (30 yrs)
Annual 0 & M Cost

Inspections		$5,000
Electrical		25,000
Maintenance & repairs		18,000
	Subtotal	48,000
	Admin. (12%)	5.760
	Subtotal	53,760
	Contingency (15%)	8,064
	Total Annual 0 & M Cost	$61,824
	Present Worth (i = 4%)	$1,069,061

TOTAL CAPITAL and 0 & M COST **$1,722,000**

COST ANALYSIS – PHYTOREMEDIATION OF GROUND WATER

Capital Cost

Cost for 9 acres = $379,108
(see Cost Sheet for Phytoremediation of Soil)

Cost for 1.5 acres = ($379,108 ÷ 9) x 1.5 =	$63,185

Operation & Maintenance Cost (3 yrs)

Annual cost for 9 acres = $50,800

Annual cost for 1.5 acres = ($50,800 ÷ 9) x 1.5 =		8,467
Quarterly ground-water sampling (2 wells)		
$1,000 x 4 x 2		8,000
Labor, 3 hrs; x $85/hr x 4 events		1,020
	Subtotal	17,487
	Admin. (12%)	2.098
	Subtotal	19,585
	Contingency (15%)	2,938
	Total Annual 0 & M Cost	$22,523
	Present Worth (3 yrs, i = 4%)	$63,506

TOTAL COST **$125,689**

COST ANALYSIS – NATURAL ATTENUATION OF GROUND WATER

Work plan and project initiation

Labor		
80 hrs x $130/hr		$10,400
40 hrs x $85/hr		3,400
12 hrs x $40/hr		480
Miscellaneous		720
	Subtotal	15,000

Sampling and field work

Labor		
58 hrs x $85/hr		4,930
Analytical		
40 samples x $500/sample		20,000
Miscellaneous		175
	Subtotal	25,105

Evaluation and modeling

Labor		
200 hrs x $130/hr		26,000
80 hrs x $85/hr		6,800
Other		
Computer usage, 75 hrs x S25/hr		1,875
Miscellaneous		200
	Subtotal	34,875

Reporting and meeting

Labor		
150 hrs x S130/hr		19,500
50 hrs x $85/hr		4,250
12 hrs x $40/hr		480
Other		
Travel		600
Reproduction		200
	Subtotal	25,030
	TOTAL COST	**$100,010**

COST ANALYSIS – DNAPL REMOVAL AND MONITORING

Year 1

Well installation, DNAPL removal & disposal, and monitoring

4 wells x $10,000 ea.		$40,000
Monitoring, removal & disposal Labor and equipment		50,000
Subtotal		$90,000

Years 2 - 30

Annual cost for removal & disposal	$50,000	
Annual cost for monitoring	10,000	
	$60,000	
Present Worth (i = 4%)		$209,418

TOTAL COST **$299,418**

COST ANALYSIS – TARGET-AREA EXCAVATION
(3 Identified Areas)

Site Preparation		$ 5,000
Excavation: 65,200cy x $10/cy		650,000
Reroute high-pressure gas line		
150 lf x $220/lf		33,000
Misc. controls & safety measures		5,000
Backfill excavations: 65,200 cy x $12/cy		782,400
Roadway replacement		
Gravel, 35 cy x $10/cy		350
Asphalt & seal, 200 sy x $8.43/sy		1,686
Revegetation		8,000
Disposal of excavated soils by incineration		
Disposal: 65,200 cy x $300/cy		19,560,000
Loading on trucks: 65,200 cy x $2.30/cy		149,960
Transport		
Tons: 65,200 cy x 0.833 = 54,333 tons		
Truckloads: 54,333 tons ÷14 tons = 3,882 loads		
Total miles: 300 mi x 3,882 = 1,164,600 mi		
Cost: 1,164,600 mi x 14 tons x $0.15/ton mi		2,445,660
Analytical testing		8,000
	Subtotal	23,649,056
	Engineering (15%)	3,547,358
	Subtotal	27,196,414
	Contingency (15%)	4,079,462
	TOTAL COST	**$31,275,876**

COUNCIL OF THE DISTRICT OF COLUMBIA

WASHINGTON, D. C. 20004

(202) 724-5072

SHARON AMBROSE
Councilmember-Ward 6

July 15, 1999

Ms. Mary Jean Brady
Washington Gas
6801 Industrial Road
Springfield, VA 22151

Dear Ms. Brady:

I am pleased to offer my support to Washington Gas's plan to address the environmental conditions at its Southeast, Washington, D.C. site, known as the East Station or, most recently, the Maritime Plaza. I am confident that the plan appropriately addresses the environmental issues at the site and will pave the way for an exciting project that has the potential to spark the re-development of the surrounding Ward 6 area.

As the City Councilmember for the site on which the property is located, I am committed to ensuring that the interests of the affected citizens are protected. It is my understanding that the Proposed Plan for East Station provides comprehensive protection to the public and I encourage the Environmental Protection Agency (EPA) to finalize the Proposed Plan in a timely manner.

I am very supportive of federal and local programs that facilitate the safe and efficient redevelopment of under-utilized properties, such as that owned by Washington Gas, which.are located in areas that sorely need economic development opportunities. As one of the largest privately owned, undeveloped areas in the District of Columbia, development of this site complements the economic growth that is already taking place in Ward 6 and throughout the city.

Sincerely,

Sharon Ambrose

Sharon Ambrose
Councilmember - Ward 6

cc: Ms. Betty Noel, Office of the People's Counsel

Advisory Neighborhood Commission

CAPITOL HILL — NEAR SOUTHEAST · 921 PENNSYLVANIA AVENUE, S.E. — SUITE 108

6B

PHONE: 543-3344 WASHINGTON, D.C. 20003

July 13, 1999

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EXECUTIVE DIRECTOR

Gottlieb Simon

Mary Jean Brady
Director of Enviromental Studies
Washington Gas
Springfield, Virginia

Dear ~~Ms. Brady~~ Mary Jean

I am writing as the current ANC Commissioner for Single Member District 6B06 and as the former Commissioner for SMD 6B09, which contains the East Station site. I am also writing as a concerned citizen of the District of Columbia.

On the basis of the information that Washington Gas provided at a recent briefing of the Communications Task Force, I want to let you know for the record that I am in favor of the development that WG and Lincoln Development propose for the site.

My support for the development is conditional, however. It rests on WG's assurances that the proposed development will not result in any new contamination or pollution of the Anacostia River. WG has indicated that there will be no pollution as a result of compression of the site caused by the weight of the buildings or through other sources.

Sincerely yours,

Deborah Jane Lindeman

Deborah Jane Lindeman
ANC Commissioner 6B06

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Region
1100 Ohio Drive, S.W.
Washington, D.C. 20242

IN REPLY REFER TO:

June 1, 1999

Ms. Mary Jean Brady
Head, Environmental quality Assurance
Washington Gas
6801 Industrial Road
Springfield, Virginia 22151

Dear Ms. Brady:

We have reviewed the "Proposed Remedial Action Plan For The East Station Site" and Provide you the following comments. The comments are the result of a collective review by the Park, our Regional office, and our contractor Ecology and Environment

1. The risk assessment showed that the exposure scenario for dermal exposure to surface soil by a juvenile exceeded U.S. EPA target range. Washington Gas indicates that "no action" provides effective prevention of harm for current use of properties. The wastes on the site, elevated levels of contaminants etc, were generated by past Washington Gas operations. The National Park service (NPS) is not willing to accept the "no action" alternative under this scenario, nor are we willing to expose the public to a potential threat The intended use of this site is to develop it in such a way that the public has access to it and the Anacostia River. Removal of the top foot of material would be considered appropriate with clean fill brought in along with a vegetative cover.

2. The river sediment should be addressed by at least a summary statement of how serious the sediment problem is and why remediation can or should be postponed. WG should be part of te Anacostia River Initiative as a potential contributing source working towards a collective goal of improving the river's water quality.

3. The assessment that "No Action" and monitoring natural attenuation provide "uncertain short-term effectiveness in remediating groundwater," is untrue. They provide "no" short term effectiveness. WG must continue to aggressively pump free product until both parties agree otherwise. Consideration to a review at the five year period might be an acceptable time frame.

4. Similarly the use of phytoremediation in the unit is described as “probably not very effective in the short- term.” This alternative may be very effective over the long term. This alternative should be addressed from this perspective and what recourse WG will take if it fails.

5. Off-site risks are not adequately addressed for both the NPS property and the river. This should be addressed and be part of the Anacostia River study in order to make a better determination.

6. The document does not address the rernoval of the dock building or the relocation of DPW off site. Both are necessary to complete the restoration of the site and to determine if there we any contaminant issues under the DPW building.

7. The issues of DNAPL are as follows:

    a. To make the statement that DNAPL is not moving to the river is speculative. Evaluation should be given to looking al the cumulative affects, long term migration rates etc. A determination needs to be made if material migrating is free phase or dissolved phase. This could be part of the Anacostia River Initiative study.

    b. Containment was eliminated as run option stating “Implementation complexities.” This Should be retained as a real and viable option as some assurance that contamination is contained. In particular stabilization repair, replacement of the sea wall, which ever is applicable, to assure contaminants are remaining on the
    site.

    c. Free product is, not negotiable. Removal effects must continue and expand into those areas where high levels of product were detected.

g. Institutional controls on NPS property rzay be inappropriate for public park land. The park envisions the site being developed into a recreational area with public access to the river. Outdoor recreational activities such as picnic areas, walking/bike paths, boating access to the river via the site, restroom facilities are all possibilities. Any limitations to the Site or restrictions as a result of the site contamination may result in compensation for lost or restricted uses

It is the NPS’s position that contamination must be removed or aggressively pursued on NPS lands for clean- up. We understand that due to the nature of the contamination we are dealing with, unless a complete removal is undertaken, there will always be some residual on site in the soils, However, all efforts must be made to diminish the contaminant levels and potential risk to the river and human health and the environment. The Selected method(s) of contaminant reduction should be re-evaluated al a five-year review period. Based on the review outcome, the NPS may want to revisit the removal alternative or any other new remedial technologies available to deal the specific contaminant issues associated with this site.

There may be numerous controls that must be instituted as part of the process whether it is phytoremediaton, use of restored wetland, or removal and capping so that the NPS land is not rendered unusable. If there are any questions please contact me at 202-619-7065 or the park Superintendent, Mr. John Hale at 202-690-5185.

Julia M. Hewitt
Environmental Protection Specialist

Cc: Jim Collier, DCDEH
Janet Beardon, DCDEH
Nick DiNardo, USEPA Region III

Office. of the People's Counsel
District of Columbia

1133 15th Street, NW g Suite 500 g Washington, DC 20005-2710
202.727.3071 g FAX 202.727.1014 g TTY/TDD 202.727.2876

Elizabeth A. No?l
People's Counsel

July 16, 1999

Ms. Mary lean Brady
Director of Environment
Washington Gas
6801 Industrial Road
Springfield, Virginia 22151

Re: Comments of the Office of the People's Counsel on the Proposed Plan for Addressing Environmental Conditions for the East Station Site; District of Columbia Public Service Commission Formal Case No. 922

Dear Ms. Brady:

Pursuant to D.C. Code § 43-406(d)(1998), and the directive [1]from the District of Columbia Public Service Commission in Order No. 10307, the Office of the People's Counsel hereby submits its comments on the Proposed Plan for the East Station Site as solicited in the Public Notice published in the Washington Post on June 17, 1999. These comments are submitted with due regard to the importance of the environmental and public health issues implicated by the Proposed Plan and the need to achieve tangible improvements in the environmental conditions at the site. It is OPC's understanding that public comments will be reflected in the record WG submits to the EPA.

The Office welcomes the opportunity to discuss questions the Company may have upon review of these comments and before such time as a Decision Document is submitted to the U.S.

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[1]The District of Columbia Public Service Commission in Order No. 10307, Formal Case No. 922, ordered the parties to the proceeding and Commission Staff to prepare specific proposals in Washington Gas' next rat proceeding on a mechanism whereby District of Columbia ratepayers will share in any net future revenues from the reuse of the East Station property.

Environmental Protection agency.

Sincerely,

Sandra Marravous-Frye
Deputy People's Counsel

cc: All parties of record, F.C. No. 922

COMMENTS OF THE OFFICE OF THE PEOPLE'S COUNSEL ON THE PROPOSED PLAN FOR ADDRESSING ENVIRONMENTAL CONDITIONS FOR THE WASHINGTON GAS EAST STATION SITE

The Office of the People's Counsel of the District of Columbia (OPC or Office), in furtherance of its mandate as the statutory legal representative of the ratepayers of the District of Columbia in utility proceedings hereby submits its written comments in response to Washington Gas' (WG) "Public Notice" and solicitation of comments regarding its "Proposed Plan to remedy environmental conditions at the East Station site."

I. JURISDICTION

1. Pursuant to D.C. Code Ann. § 43-406 (d) (1998), OPC is mandated to represent the interests of the people of the District of Columbia at hearings of the Public Service Commission and judicial proceedings as well as at proceedings before related federal regulatory agencies, commissions and federal courts when those proceedings involve the interests of users of the products of or services furnished by public utilities.[1]

2. On October 8, 1993, the PSC issued Order No. 10307, in Formal Case No. 922,[2] aspects of which addressed WG's East Station environmental remediation efforts. In its Order the PSC specifically directed WG to continue to monitor and assess the impact of the East Station cleanup. OPC was a party to that proceeding.

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[1]D.C. Code Ann. §§ 43-0406 (d) (1) and (2)(1998).

[2] Formal Case No. 922, *In the Matter of the Application of Washington Gas Light Company, District of Columbia Division, for Authority to Increase Existing Rates and Charges for Gas Service*, Order No. 10307 at 108-121 (Oct. 8, 1993).

3. On June 17, 1999, WG caused to be published in the Washington Post newspaper a Public Notice[3], soliciting "public" comments concerning its proposed plan. WG has prepared a Proposed Plan for the East Station property that summarizes the environmental conditions present at the site and proposes remediation alternatives. Pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 U.S.C. § 9600 *et seq.*, WG has solicited public review and comments as a precursor to the preparation of a final plan of remediation to be submitted to and approved by the U. S. Environmental Protection Agency (EPA). According to WG, public comments will be reflected in the record it submits to the EPA[4].

It is OPC's understanding that WG seeks EPA approval of the site so the Company can enter into an arrangement with a private developer to develop the site for use in an economic development venture. The Office welcomes the opportunity to comment on WG's Proposed Plan for the East Station Site.

II. OVERVIEW

OPC commends WG for undertaking an endeavor that has the potential to increase revenues for the District of Columbia government and revitalize a significant location in the southeastern quadrant of the City. The Office is cognizant of the importance of the environmental and public health issues implicated by the Proposed

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[3] *Public Notice*, Washington Post (June 17, 1999).

[4] On July 9, 1999, OPC representatives attended a presentation conducted by the Company explaining its future plans for the East Station site including its remediation proposal

Plan and the need to achieve tangible improvements in the environmental conditions at the site. As well, the Office understands that time is of critical importance to Washington Gas in its effort to develop the East Station site. For the reasons more fully explained below, however, OPC believes the Proposed Plan is flawed because it does not specify adequate treatment for the risk assessment identified in the feasibility study.

OPC's interest in WG's activities at East Station is not new. In Formal Case No. 922, the Office conducted a comprehensive review of WG's past and then current remediation activities at the site. At that time the Office concluded there was significant evidence of contamination at the site and public safety was a legitimate concern.[5] The Commission, noting OPC's recommendation that WG should conduct a "refined risk assessment" study of the East Station Site, concurred with OPC's concern and directed WG to continue to monitor and assess the environmental impact of the East Station cleanup.[6]

The Office remains concerned about the impact of WG's environmental remediation activities at East Station. The important public interest policy considerations as well as the residual rate and revenue implications for District of Columbia ratepayers remain of utmost concern to OPC. To this end, OPC will continue to look for opportunities to voice its view on behalf of its clients and to work with the Company

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[5] F.C. No. 922, Order No. 10307 at 111

[6] *Id* at 120, n.8 1.

toward what it believes is the ultimate common goal of providing a clean, safe, and healthy environment appropriately and prudently remediated at cost levels that are fair and equitable.

III. DISCUSSION

CERCLA established procedures for the investigation and characterization of contamination of the environment at sites throughout the United States. In addition, CERCLA requires an evaluation of the potential risk resulting from or associated with the contaminants identified at any given contaminated site. Of equal importance is the requirement for an assessment of remediation, including alternatives, in an effort to rectify the contaminant problem at the site.

Washington Gas' East Station property is the site of environmental contamination resulting from the former manufacture of gas and its by-products which date back to 1888. In 1948, WG converted to natural gas and the East Station was used primarily as a peaking facility until 1983. The East Station property comprises approximately 18.8 acres, inclusive of property owned by the National Park Service (NPS), Corps of Engineers (COE) and public lands along 12th Street and Water Street, S.E.

According to the provisions of 40 CFR § 300.430, the purpose of a feasibility study is delineated as assessing site conditions and evaluating alternatives with a view toward remediation. A feasibility study should include the following: project scoping, data collection, risk assessment, treatability studies and analysis of alternatives. In

undertaking the above mentioned, CERCLA further requires that the "scope and timing of these activities be tailored to the nature and complexity of the problem and the response alternatives being considered." 40 CFR § 300.430(2)

A. Basis for Remediation

The Proposed Plan addresses five remedial units identified by WG: surface soil; subsurface soil; ground water; dense non-aqueous phase liquid (DNAPL); and river sediment. These remedial units are further described below.

Surface Soil: Soil on the East Station property not covered by impermeable surfaces is found on approximately 10 acres of the 12-acre property to be remediated. An additional 4.5 acres of exposed soil exists on NPS, COE and other public property. For purposes of characterizing human risks associated with surface soil, WG identifies surface soil as constituting the top one-half inch of soil. The risk assessment for surface soil identifies unacceptable risks associated with future residential development of the East Station property and recreational use of the NPS property.

Subsurface Soil: Subsurface soil is defined as soil greater than a two-foot depth. The risk assessment for subsurface soil identifies unacceptable risks associated with a utility worker and construction worker (bulldozer operator) conducting intrusive activities at the site. It is apparent from the definition of surface soil that the soil interval between 2 inches and 2 feet is not accounted.

Ground Water: Ground water beneath the site is significantly contaminated, with

contamination extending to geological units at least 40 feet deep. Contamination in the various geological units are believed to discharge directly to the Anacostia River, or travel below the river for some distance before seeping through the sediments into the river, or are captured by an interim pump-and-treat remedial system. The risk assessment does not evaluate human contact with ground water as a completed exposure pathway, and concludes that adverse effects on river-water quality and ecological receptors are not occurring.

DNAPL: Dense non-aqueous phase liquid, (DNAPL), exists at the site in the form of coal tar. DNAPL is heavier than water and moves downward as a separate phase until it encounters a relatively impermeable barrier where it tends to accumulate. DNAPL has been encountered as pockets of contamination in the fill zone, which is the uppermost geological unit on the NPS property and the East Station property (see Figure 6-19 of the Phase IV report and Figure 3 of the Proposed Plan). In addition, DNAPL is present in the deeper sand/gravel unit and extends to the limits depicted in Figure 3 of the Proposed Plan. Since DNAPL is part of the subsurface soil remedial unit, WG also discusses it as part of that unit. In addition, constituents in DNAPL leach into ground w4ter and in that respect it is discussed with the ground water remedial unit. Finally, DNAPL can discharge as a separate phase directly into the Anacostia River.

River Sediment: River sediments could be affected by present and historical discharges from the site. WG has not completed the evaluation of this remedial unit,

therefore, it is unclear why this remedial unit is included in the Proposed Plan.

In the CERCLA context, remediation of the above individual remedial units is required if contaminant concentrations exceed risk-based cleanup goals or other applicable or relevant and appropriate requirements, also known as ARARs (e.g., standards imposed by regulatory agencies). Risk-based cleanup goals are developed based on the results of a baseline risk assessment. It is referred to as a baseline assessment because risks are assessed assuming the site is put to beneficial future use (as determined by evaluating the master plan for the area, discussions with local planning authorities, and a consideration of the land uses of the property and surrounding properties) in its current state without remediation. If the site is estimated to present an unacceptable risk, remedial actions have to be considered to remediate the site to render it acceptable for future use.

B. Process for Selecting a Remedy

If remediation is required, as is the case for the East Station site, various remedial alternatives are considered in the feasibility study and evaluated based on nine statutory criteria mandated under CERCLA. These criteria consist of: two threshold criteria (protection of public health and the environment, and achieving ARARs); five balancing criteria (shown in the attached Table 1 from the Proposed Plan, and includes effectiveness, implementability, cost, etc.); and two modifying criteria (state and public acceptance).

A remedial alternative must meet the threshold criteria to be considered for selection as a remedy for the site. The other criteria are used to differentiate between the various alternatives meeting the threshold criteria. In addition to these criteria, EPA provides guidance on the types of remedies that would be appropriate depending on the threat or risk posed by waste materials at a site. EPA expects to use treatment to address Principal Threat Wastes. Principal Threat Wastes are source materials, such as non-aqueous phase liquids (NAPLs), or soils containing highly toxic and/or mobile materials. Engineering controls, such as containment, would be appropriate for wastes that pose a relatively low long-term threat or where treatment is impracticable.

IV. ANALYSIS

A. Summary of Site Risks

1. The risk assessment (summarized in page 5-7 of the Proposed Plan) substantially underestimates the risks at the site.

The risk assessment considers future use of the site for residential and industrial purposes, as required under CERCLA. In the process of developing the site for these uses, workers involved in intrusive operations, such as excavating soil to construct building foundations, will come in contact with contaminated materials existing at and below the surface. While a construction worker's exposure is considered in the risk assessment, WG fails to evaluate onsite residents' and office workers' exposure to the excavated material that would be placed onsite. This is a significant omission and accounts for the unexpectedly low risks estimated for future occupants of the site. WG

has included in its Proposed Plan a transitional phase, in between the current and future use scenarios. This is misleading in that the transitional phase and future use phase are not mutually exclusive and thus, should not be treated as separate phases for purposes of risk assessment considerations. Additionally, the WG Proposed Plan does not quantify the existing danger of the contaminants at East Station to the environment.

2. The feasibility study fails to discuss Principal Threat Waste.

The presence of Principal Threat Waste is a key factor influencing the entire feasibility study. The failure to consider this essential CERCLA concept significantly impacts the recommendations of the study. The risk assessment, revised as outlined above, should be used along with EPA guidance on identifying Principal Threat Waste to put into context the role of treatment versus containment as remedial technologies for the various remedial units. It is likely that materials contained in the subsurface soil would meet the definition of Principal Threat Waste.

B. <u>Summary Of Remedial Alternatives</u>

1. Surface Soil

The preferred alternative for Surface Soil is unsupported and contains several internal inconsistencies. The preferred alternative can not be considered acceptable in its current configuration.

Table 1 from the Proposed Plan presents the detailed evaluation of remedial alternatives. Alternative 2, containment, is WG's preferred alternative, details for which are presented in Table 13-2 from the Phase IV report.

The following observations apply to Table I and Table 13-2:

- Containment cannot be considered as a remedial alternative without institutional controls. In order to preserve the integrity of the cap, deed restrictions will have to be instituted that would prevent intrusive activities from occurring throughout the affected area. In the absence of institutional controls, the containment alternative cannot be considered protective of public health and the environment and would fail the threshold criteria.
- The assumption in Table 13-2 of covering 50% of East Station property with a 6-inch soil cover is inconsistent with the proposal of a 12-inch cover for the NPS portion and is not health protective. The future unrestricted use assumed for the East Station property requires that the cover be more (not less) protective than the cover for the NPS portion, where recreational use is assumed. In addition, a geomembrane should be placed between native and the overlying soil cover the basis for the assumption that 50% of East Station property requires a soil cover is not clear, when exposed soils cover a significantly greater portion of the property. Presumably the assumption is that building and paved surfaces will be constructed on the remainder of the site. If this is true, the CERCLA process requires that specific plans be provided during remedial design, and the implementation risks associated with building construction be evaluated in the feasibility study. Further support will be necessary before this remedy can be considered to meet

the “short-term effectiveness” criterion in Table 1.

! Page 10-2 of the Phase IV report indicates that a soil cover was placed over exposed soils on the East Station property in 1990. Further clarification is necessary as to whether another soil cover is being proposed over the existing soil cover, as well as the circumstances under which the existing cover became contaminated.

2. Subsurface Soil

a. The Subsurface Soil remedial unit is inappropriately defined, which has biased the evaluation of remedial alternatives.

Subsurface soil has been defined to extend to indefinite depths, corresponding to the presence of contamination. It is more appropriate to define subsurface soil as 10-12 feet, representing the limits of excavation for utility work or building foundations. Under these circumstances, the volumes of soil and costs for target-area excavation will be much more reasonable.

b. The preferred alternative for the Subsurface Soil appears to be postponing remedial action until the site is developed. The preferred alternative for Subsurface Soil is unacceptable as presently configured.

Institutional controls in conventional terms involve the application of deed restrictions to prevent individuals from coming in contact with contaminated materials. The preferred alternative for Subsurface Soil implies the use of “institutional controls,” but in reality is simply requesting the postponement of remedial actions until the site is

developed, without accounting for the costs associated with the eventual remedial action that would be required. This remedial unit should not be part of the Proposed Plan if no remedial action is being proposed, but simply postponed for later. If development of the site were to occur, the excavated soil would be considered hazardous waste and will require proper disposal. The costs associated with these remedial actions should necessarily be a part of this remedy, but have been incorrectly overlooked.

3. **Ground Water**

The preferred alternative for Ground Water is ambiguous, but appears to postpone any additional remedial action, if necessary, until later.

The Phase IV Report (pages 12-28) begins the discussion of the ground water remedial alternatives. WG states that the remedial objective for ground water is to prevent adverse effects on river-water quality and ecological receptors. The Phase IV report further demonstrates that the dilution afforded by the river effectively meets this objective, so contaminated ground water can continue to discharge into the river. Table 11-22 of the Phase IV report presents the volume of contaminated ground water discharging to the river, and the levels of contaminants in the discharged water. In essence, the Proposed Plan is requesting a permitted discharged of 17,500 gallon per day of water containing up to 2,752 ppb of benzene, 1957 ppb of naphthalene, etc. Such a request should be carefully considered along with other sources of contaminant discharges upstream and downstream of the discharge point, including the cumulative

effect of these discharges on the ecology of the river.

Although it is extremely unclear, the preferred alternative appears to be a hybrid of Alternatives 2 and 3. According to Table 13-2, alternative 2 is monitored natural attenuation and alternative 3 consists of installation of additional monitoring wells, further study, and continued operation of the existing pump and treat system for a period of 3 years. There is no basis provided for the 3-year time duration for operating the interim remediation system. Given the presence of DNAPL and' other contaminants in subsurface soil, there is every indication that ceasing the pump and treat operation will result in an increase in contaminant concentration in ground water. An analysis of the impact of the proposal should be discussed and evaluated in the ecological assessment. Overall, the preferred remedy for Ground Water suggests that WG is not prepared to propose a remedy at this stage, and is requesting further study over the next three years before a final remedial action can be proposed. If this is the case, inclusion of this remedial unit in the Proposed Plan is premature and further study should be conducted before attempting to address ground water.

4. DNAPL

The Proposed Plan overlooks the fact that DNAPL is considered to be Principal Threat Waste.

EPA has issued specific guidance for evaluating Principal Threat Waste. The discussion of DNAPL should be revised consistent with that guidance. The preferred

alternative is inconsistent with EPA guidance that requires treatment of Principal Threat Waste, and a minimum of containment of DNAPL, when practicable. If treatment or containment is impracticable, specific EPA guidance exists for demonstrating impracticability, before resorting to the status quo of passive pumping of DNAPL as and when it flows into existing wells.

5. Sediments

There are no details provided concerning a river-wide study of sediment in the Anacostia River or the cost implications of the study.

Further details of the proposed study are required before an opinion can be rendered regarding the suitability of the remedial action.

6. Remedial Alternatives

There is no support provided for the costs presented in the Phase IV report for any of the remedial alternatives.

A detailed breakdown of costs is required for evaluating the remedial alternatives. There is no indication in WG's Proposed Plan as to the derivation of numbers presented as costs or procedures utilized for estimating costs associated with the remedial units.

V. CONCLUSION

Based on the foregoing, the Office of the People's Counsel requests that these

comments be given full consideration before final remediation measures are chosen due to the grave nature of the environmental concerns at the East Station Site.

Respectfully submitted,

Elizabeth A. Noël
People's Counsel
D.C. Bar No. 288965

Sandra Mattavous-Frye
Deputy People's Counsel
D.C. Bar No. 375833

OFFICE OF THE PEOPLE'S COUNSEL
FOR THE DISTRICT OF COLUMBIA
1133 15th Street, N.W., Suite 500
Washington D.C. 20005-2710
(202) 727-3071

DATED: July 16,1999

Washington Gas Response to Sections I and II of the OPC's Comments

The Office of the People's Counsel, District of Columbia (OPC has submitted comments on the proposed plan for addressing environmental conditions for the East Station site.[1] Washington Gas respectfully recognizes the statutory right of OPC to represent District of Columbia utility *ratepayers* before various courts and agencies when the matters at issue pertain to products of or services furnished by public utilities. Also, by statutory permission, the OPC may represent the people of the District of Columbia at proceedings before "related" federal regulatory agencies and commissions.[2] When used in context, it would appear that OPC's reach extends only to federal regulatory agencies and commissions with jurisdiction over "products of or services furnished by" utilities, such as gas, electric, telephone services and related products. WG respectfully submits that the matter now before the USEPA does not fall within the range of concerns for which the OPC has been given authority to represent District of Columbia ratepayers.

Washington Gas has solicited public comments concerning the proposed remediation plan. There is a crucial distinction between the "public interest" and the interests of " ratepayers". In matters affecting the environment, residents or organizations within the area impacted, elected representatives, environmental groups and the District of Columbia /Department of Health, Bureau of Environmental Health ("DCBEH") more appropriately represent the "public interest" before the EPA. In fact, the DCBEH has been very involved in the proposed remediation plan at issue here. The OPC's statutory grant of authority to represent District of Columbia ratepayers should not be construed as either a mandate, or even a right to represent the "public interest" (versus the interests of ratepayers on all matters that concern public utilities. This distinction, however, still provides OPC with a forum within which to raise its concerns about the East Station[2]

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[1]As more fully explained herein, in 1983, the District of Columbia Public Service Commission ("PSC" or "Commission") conducted extensive proceedings on whether or not District of Columbia ratepayers should bear some of the costs associated with the environmental remediation of East Station. That case, Formal Case No. 922, *In the Matter of the Application of Washington Gas Light Company, District of Columbia Division, for Authority to Increase Existing Rates and Charges for Gas Service*, Order No. 10307, resulted in an extensive order by the PSC on how the cost recovery aspects of WG's efforts at East Station should be handled. The Commission also requested that WG continue to monitor and assess the environmental impact of the East Station cleanup. However, the Commission did not grant OPC a role in that monitoring, and the comments provided by OPC now are not pursuant to any mandate or request by the Commission. Instead, the OPC will have a full and fair opportunity to raise any legitimate ratepayer cost-sharing concerns that it has, if and when Formal Cast 922 is reopened by the Commission.

[2]D.C.Code Ann. §§43-406(d) provide that The People's Counsel:

(1) Shall represent and appeal for the people of the District of Columbia at hearings of the Commession and in judicial proceedings in the District of Columbia courts when these proceedings and hearings involve the interests of users of the products of or services furnished by public utilities under the jurisdiction of the Commission;[and]

(2) May represent and appeal for the people of the District of Columbia at proceedings before related federal regulatory agencies and commissions and federal courts when those proceedings involve the interes of users of products of or services furnished by public utilities under the jurisdiction of the Commission. (Emphasis added).

property at the appropriate time, that is, the District of Columbia Public Service Commission ("PSC" or "Commission").

As the OPC has noted in its comments, the PSC is quite familiar with the East Station issues that directly affect ratepayers. In 1993, the Commission conducted protracted proceedings during which the OPC, the Commission staff, the District of Columbia and other interested parties had the opportunity to present testimony and other evidence on the WG's approach to the environmental issues at East Station. In a detailed decision, the Commission concluded that:

> "There are clearly advantages to District of Columbia ratepayers from the environmental remediation of the East Station property, including a cleaner river and the removal of potentially harmful compounds from soils and water underlying the site. Moreover, as Witness Huriaux points out, the sale or lease of the property may generate significant revenues for WG and it ratepayers. [3] Furthermore, he notes that the reuse of the property, following remediation, could increase tax revenues to the District of Columbia through higher assessment for real estate tax purposes. OPC also notes its concern with respect to the need to protect the environment at the East Station site. For all these reasons, therefore we believe it is important to encourage effective environmental remediation. efforts." (Exhibit references omitted).[4]

The Commission also determined that it would allow WG the recovery of environmental assessment and remediation costs when: (1) the costs are necessary; (2) the costs are prudently incurred; (3) the Commission has the opportunity to review the Company's actions during a general rate case; and (4) District of Columbia ratepayers have an opportunity to share in monetary benefits which may accrue from an environmental cleanup that enhances the value of the property. Accordingly and with due respect to its role, the OPC's concerns with how the East Station project will affect ratepayers can be addressed adequately by the Commission, a forum very familiar with ratepayer issues, at the appropriate time. Even though WG believes that OPC has exceeded its statuatory authority, we have responded to their technical comments in good faith.

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[3]Witness Richard D. Huriaux, at the time of the proceddings referenced herein, was the Director of Engineering for the District of Columbia Public Service Commission.

[4]Formal Case No. 922, *In the Matter of the Application of Washington Gas Light Company, District of Columbia Division, for Authority to Increase Existing Rates and Charge for Gas Service*, Order No. 10307 at 119.