DOE/NETL-2001/1131

The National Energy Technology Laboratory

Annual Site Environmental Report for Calendar Year 1999

October 2000

U.S. Department of Energy
National Energy Technology Laboratory
Pittsburgh, Pennsylvania
Morgantown, West Virginia

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Preface

This Site Environmental Report was prepared by the Environment, Safety, and Health Division at the National Energy Technology Laboratory (NETL) for the U.S. Department of Energy. The purpose of this report is to inform the public and Department of Energy stakeholders of the environmental conditions at the NETL sites in Morgantown, West Virginia, and Pittsburgh, Pennsylvania. This report contains the most accurate information that could be collected during the period between January 1, 1999, through December 31, 1999. As stated in DOE Orders 5400.1 and 231.1, the purpose of the report is to:

- Summarize environmental data to characterize site environmental management performance.
- Confirm compliance with environmental standards and requirements.
- Highlight significant programs and efforts.

A reader questionnaire/comment form is included on the following page to provide an opportunity for public input on current and future site environmental reports.

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Questionnaire
National Energy Technology Laboratory
1999 Site Environmental Report

Please answer the following questions and return to:

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If you are viewing the electronic version, you can email your response to george@netl.doe.gov

(1) Was the 1999 Site Environmental Report easy to read and understand? If not, please provide a brief explanation.

(2) Was the information contained in the report useful? Please provide a brief explanation.

(3) Do you feel the report contained all of the information that you would be interested in? If not, please provide a brief explanation.

(4) Do you have any comments or suggestions on how the current and future reports can be improved?

(5) Other comments or suggestions?

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Executive Summary

No environmental problems of significance were identified during 1999 at the National Energy Technology Laboratory (NETL) sites in Morgantown and Pittsburgh. Both sites currently maintain complete monitoring programs for groundwater, stormwater discharge, laboratory wastewater discharge, and meteorological data. In addition, an annual air emissions inventory is prepared for each site.

A comprehensive Directives Program aimed at environmental, safety, and health requirements and risks was initiated in 1997, continued throughout 1998 and 1999, and will be completed in 2001. The Directives Program will be used to identify and implement standards that will adequately protect workers, the public, and the environment. This program started with a careful and thorough analysis of risks confronting workers and the communities surrounding NETL sites. Following this analysis, requirements and best management practices were evaluated to determine how requirements could best be used to advance the mission of NETL. Teams of subject-matter experts analyzed the work assigned to determine potential hazards and identify ways to remove or control those hazards. In 1999, NETL developed or revised a series of directives in two major areas: safety analysis and review (SAR) processes and integrated safety management (ISM) directives. SAR directives were issued for research and development (R&D) operations, support operations, and facilities. ISM directives were released on management processes, such as standards maintenance, performance measures, assessments, corrective actions, lessons-learned, and training.

The primary objective of the program is to identify or develop a set of standards that, when implemented, provides reasonable assurance that the health and safety of the workers, public, and the environment will be protected during the performance of work. In conjunction with the Directives Program, the use of the voluntary environmental management system, ISO 14000, was evaluated. This includes the only environmental management standard to which an entity can be registered. NTEL is considering using the specifications and guidance from this standard to identify an effective environmental management system for the merged NETL sites.

A performance measurement system continued to be maintained during 1999 to assist in evaluating how effectively activities at NETL meet mission-critical goals and how well missions and strategies are connected in the DOE strategic plan. This system also provides data to assist in gauging performance against the DOE critical success factors, that is, performance against technical objectives. Various environmental milestones can be tracked to completion, thus giving the NETL measures by which to gauge the sites' goals of remaining in regulatory compliance and achieving best-in-class environmental performance.

1 Introduction

The National Energy Technology Laboratory (NETL) was established in December 1999. The center was formerly named the Federal Energy Technology Center (FETC), which was the result of a merger of the Morgantown Energy Technology Center and the Pittsburgh Energy Technology Center. NETL is a matrix organization; that is, employees located at the Morgantown and Pittsburgh sites operate organizationally under the same management team.

This Site Environmental Report is the fourth merged environmental analysis performed on these two sites. We have dedicated ourselves to achieving a seamless environmental program. However, since the sites are located more than 60 miles apart and in different states (West Virginia and Pennsylvania) with different regulatory agencies, some reporting and monitoring issues must be discussed separately in this report.

2 Compliance Summary

During 1999, NETL conducted numerous activities to comply with federal, state, and local regulations and internal requirements and Department of Energy (DOE) orders. This report provides information about activities and data related to compliance. This document does not address regulations where no action was required or there is no new information to report.

Programs were conducted in air, water, soil, waste, community "Right to Know," and other environmental issues. All hazardous wastes were managed and removed from the merged sites in accordance with allowable accumulation times specified in Resource Conservation and Recovery Act (RCRA) regulations. Table 1 is a summary of permits related to environmental activities conducted in 1999.

Table 1. Summary of Environmental Permits

Permit Type	Permit Number	Status
Air	MGN: R13-1768 061 0064 PGH: 7032056-000-00500 7032056-000-00501 7032056-000-0800	MGN: West Virginia Office of Air Quality issues the permits. Right to Construct and Right to Operate SynGas Generator/PDU. PGH: Allegheny County issues the permits. Natural gas boilers used for heating buildings and one gas-coal fired research unit.
Water (NPDES)	MGN: MUB Permit No. 012 WV0111457 PGH: Part I - PA0025844 Part II - 0297201	MGN: All monitored parameters were within permit limitations during 1999. PGH: Part I for a National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit issued by PaDEP. Part II for an industrial settling weir owned by NIOSH. All monitored parameters were within permit limitations during 1999.
Storage Tanks	PGH: 02-81183008A 02-81183009A 02-81183010A 02-81183012A	Aboveground storage tank permits issued by PaDEP.
Asbestos	PGH: PAA98-0657 PAA99-0001 PAA99-0292 PAA99-0293 PAA99-0294 PAA99-0373	Asbestos Abatement Permits Issued through the Allegheny County Pennsylvania, Health Department, Air Pollution Division.

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

The Morgantown and Pittsburgh sites had no CERCLA-related activity during 1999; however, the following sections describe CERCLA-related activity at remote sites in other areas of the United States that remain the total or partial responsibility of NETL. These areas continue to be monitored for appropriate environmental responses.

Rock Springs, Wyoming

In Rock Springs, Wyoming, the Rock Springs Oil Shale Retort site consists of 13 locations where in-situ shale fracturing and retorting research were conducted. As a result of research activities, groundwater was contaminated with organic compounds that must be cleaned up to standards set forth in the Wyoming Environmental Quality Act. Although the site was not listed on the Federal Agency Hazardous Waste Compliance Docket, NETL proactively tasked the Tennessee Valley Authority (TVA) to conduct a preliminary assessment (PA) of the site in 1993, in accordance with CERCLA, to determine if the site should be placed on the national priority list (NPL). After reviewing the PA, which resulted in a score of 2, U.S. Environmental Protection Agency (EPA) Region VIII classified the site as "site evaluation accomplished" (SEA) under the Federal Superfund Program and notified NETL that the site would not be evaluated further for inclusion on the NPL. As a result, DOE must satisfy Wyoming state requirements as defined by the Wyoming Environmental Quality Act.

Pilot demonstrations were designed and constructed at Sites 4/7, 9, and 12. Air injection and bioremediation actions were undertaken at each of the three sites, with a more aggressive air sparge system used at Site 4/7, minimal aeration/water extraction and injection with nutrient injection demonstrated at Site 9, and minimal air injection/water extraction and injection at Site 12. The demonstrations were conducted through August 1999, at which time an evaluation was conducted to determine the preferred remedial alternative. The Wyoming Department of Environmental Quality (WDEQ) concurred with the pilot demonstration actions and will be involved in determining the preferred remedial alternative for site cleanup.

As a result of evaluations following pilot demonstrations at Sites 4, 9, and 12, design for a remedial action, consisting of aeration with water extraction/injection, was initiated for Site 9. The well field will have approximately 30 air injection wells, with up to 8 wells acting as either injection or extraction wells. Two 100-horsepower (HP) electric compressors will deliver air to the Site 9 wells. The water movement caused by extraction and injection will enhance the bioremedial actions in the groundwater. Site 12 will continue to be observed for biological activity (aerobic as well as anaerobic), and a system will be designed in the third quarter of fiscal year (FY) 2001. The Site 4 pilot demonstration continued to operate through 1999 and will continue through May, 2000, at which time a remediation system will be designed and constructed.

Gillette, Wyoming

In Gillette, Wyoming, the Hoe Creek Underground Coal Gasification site consists of three locations where coal was gasified in situ. As a result of the field tests, coal tars remain underground in two coal

seams and in the channel sand overburden. Water flowing through the coal and the channel sand is leaching organic compounds from source materials into the groundwater, and contaminant levels have exceeded state regulatory limits. Annual pump and treat operations have been conducted during the summer months as an interim measure to minimize any contaminated groundwater movement out of the boundaries of the R&D permit area onto private lands. Contaminated groundwater has migrated onto one private landowner's property east of the permit area. From 1994 through 1996, in an attempt to contain the contamination on the permit area, approximately 14,127,000 liters (3,774,000 gallons) of water were pumped, treated by routing through activated carbon filters, and applied to the ground surface, by a spray system through atomizing nozzles,

The Hoe Creek site was listed on the Federal Agency Hazardous Waste Compliance Docket on June 1, 1991. A preliminary assessment of the Hoe Creek site was conducted in 1993, in accordance with CERCLA requirements, to determine if the site should be placed on the NPL. After reviewing the preliminary assessment with a score of 14, the EPA Region VIII Office classified the site as SEA under the Federal Superfund Program and notified NETL that the site would not be evaluated further for inclusion on the NPL. As a result, requirements imposed by the Wyoming Environmental Quality Act must be met.

On February 7, 1998, the air sparge/bioremediation system was completed at the Hoe Creek II area of the Hoe Creek site. Air is being injected into the Felix I and II aquifers through 64 wells that were completed during the construction phase. Two 75-HP electric compressors supply the air necessary for delivery to the groundwater system for air sparging actions. Groundwater samples were extracted three times per year, and occurred at 111 day intervals (Day 111, 222, 333). The balance of days per year are consumed by periods of shutdown prior to sampling, and start-up time periods before resumption of air sparging activities.

Construction of the Hoe Creek III air sparge/bioremediation system was initiated during October 1998, and completed in February 1999. Fifty air sparge wells were completed in the Felix I and II aquifers, with six wells installed as a sparge curtain down-gradient from the well field. Two 100-HP electric compressors supply the air necessary for delivery to the groundwater system for air sparging actions. Groundwater samples were collected three times per year, and occurred at Day 111, 222, and 333. We anticipate that the air sparge/bioremediation systems at Hoe Creek II and III will continue operation for up to 5 years. Groundwater remediation must continue until water quality is returned to baseline conditions or to a class of use through "best practicable technology," as required by the WDEQ.

Hanna, Wyoming

The Hanna Underground Coal Gasification site's experiments were conducted in the 1970's, and the WDEQ has approved groundwater restoration for the site. Revegetation of the site surface remains to be accomplished prior to the WDEQ giving a final release and allowing termination of the R&D permit area. A revegetation evaluation, conducted on reclaimed disturbed areas on the permit area in 1998, indicated vegetation density, productivity, and species diversity are close to satisfying the WDEQ requirements for final release.

Activities in 1999 consisted of the Annual Inspection by the WDEQ, and spraying Canada Thistle to reduce the infestations of noxious weeds on the R & D Permit area. Final bond release and termination of the Research and Development License are expected in FY 2003.

2.2 Superfund Amendment and Reauthorization Act (SARA)

Title III of the Superfund Amendment and Reauthorization Act (SARA) of 1986 is known as the Emergency Planning and Community Right-to-Know Act (EPCRA). This act requires owners or operators of facilities that have certain hazardous chemicals on site to provide information on the release, storage, and use of those chemicals to organizations responsible for emergency response planning. Executive Order 12856, signed by President Clinton on August 3, 1993, directs all federal agencies to comply with the requirements of EPCRA, including SARA 313 Toxic Release Inventory Program.

All EPCRA reporting requirements pertinent to NETL have been met at both the Morgantown and Pittsburgh sites. Table 2 identifies those requirements for which NETL has filed or will be required to report in the event of an occurrence.

Table 2. Emergency Planning and Community Right-to-Know Act Reporting

Reporting Requirements	Yes	No	Not Required
EPCRA 302-303: Planning Notification	X (PGH)		X (MGN)
EPCRA 304: EHS Release Notification	X		
EPCRA 311-312: MSDS/Chemical Inventory	X		
EPCRA 313: TRI Reporting			X

Note: Because of differences in the hazards at each site, the EPCRA reporting requirements for Section 302 and 303 are not the same at the two sites.

Section 302 of EPCRA requires the owner or operator of any facility at which an extremely hazardous substance is present in amounts equal to or greater than specified threshold planning quantities to notify the State Emergency Response Commission (SERC) that the facility is subject to the emergency planning requirements. Section 303 of EPCRA requires the facility to designate a facility representative to participate in local emergency planning as a facility emergency response coordinator. The Pittsburgh site has previously notified the emergency response commission under Sections 302 and 303 and periodically updates emergency contact information with revised Section 311/312 submittals. Both NETL sites fall under the requirements of EPCRA 304, and in the event of a release are subject to the emergency notification requirements under Section 103(a) of the CERCLA of 1980. No releases requiring emergency notification occurred during this 1999 reporting period.

SARA Title III requirements call for reporting of *all hazardous chemicals present at the facility during the preceding calendar year in amounts equal to or greater than 10,000 pounds or that are extremely hazardous substances present at the facility in an amount greater than or equal to 500 pounds (or 55 gallons), or the Threshold Planning Quantity (TPQ), whichever is less.* Table 3 lists those chemicals reported by NETL for 1999. Section 312 directs the owner or operator to prepare or have available a material safety data sheet (MSDS) for a hazardous chemical and submit an emergency and hazardous chemical inventory form by March 1 of each year if the amount of the chemical equals or exceeds the TPQ. NETL maintains an active inventory of all hazardous materials on site along with the MSDS for each of these substances. The state and local emergency planning committees and local fire departments have been advised of all materials, quantities, and their location at the NETL sites. MSDS information on all materials has been made available.

Table 3. SARA Title III, Tier II Chemical Inventory Reporting List

Chemical Name	Quantity (lb)	TPQ (lb)	Physical Hazards	Health Hazards
Nitrogen (MGN)	10,000+		Pressure	Acute
Hydrogen-Sulfide (MGN)		500	Fire Pressure Reactivity	Immediate (Acute) Delayed (Chronic)
Coal (MGN)	10,000+		Fire	Chronic
Alumina (MGN)	10,000+		Fire	Immediate (Acute) Delayed (Chronic)
Sulfur Dioxide (PGH)	2,612	500	Pressure	Immediate (Acute) Delayed (Chronic)

Submission of the Tier II Hazardous Chemical Inventory Form meets Section 312 requirements under the Pennsylvania Hazardous Material Emergency Planning and Response Act (Act 165). Section 313 of EPCRA, the Toxic Release Inventory (TRI) Reporting Program, requires the owner or operator of certain facilities that manufacture, process or otherwise use listed toxic chemicals above threshold amounts to submit to EPA and designated state officials annual toxic chemical release inventory forms (Form R) for such toxic chemicals released into the environment. NETL did not exceed the threshold amounts for the listed toxic chemicals and thus was not required to submit a Form R.

2.3 Clean Air Act (CAA)

Air pollutant emissions are regulated under the CAA as amended (42 USC 7401 through 7642). EPA's regulations are contained in 40 U.S. Code of Federal Regulations (CFR) 50 through 87.

West Virginia regulates ambient air quality through the West Virginia Department of Environmental Protection (WVDEP) Office of Air Quality. The West Virginia Air Pollution Control Regulations are located in Title 45 WV Code; and Series 1-7a, 10, 11, 13-15, and 17-26.

Pennsylvania regulates ambient air quality at the Pittsburgh site through the Allegheny County Health Department's Bureau of Air Quality Control in Pittsburgh, Pennsylvania. The Pennsylvania Air Pollution Control Regulations are located in 25 PA Code Chapters 123, 127, 131, 135, and 139. The Allegheny County regulations are located in the Air Pollution Control Article XXI.

NETL does not fall under the National Emission Standards for Hazardous Air Pollutants (NESHAP) for radionuclide emissions (40 CFR 61, Subpart H) at either the Pittsburgh or the Morgantown sites. Neither site reported any radionuclide dose equivalents in its 1999 annual report. Emissions at the sites do not appear to be significant as shown in Table 4. No significant increase in air emissions occurred from 1998 to 1999.

Table 4. Estimated Air Emissions for 1999

Pollutant	MGN	PGH
	(tons per year)	
Nitrous Oxides (NO_X)	8.52	2.54
Sulfur Dioxide (SO_2)	0.03	8.75
Carbon Monoxide (CO)	2.75	0.76
Volatile Organic Compounds (VOC)	5.31	0.40
Particulates	0.64	2.64

Air Permits

NETL held three air permits in effect during 1999 that were issued by the Allegheny County Health Department for the Pittsburgh site. One permit (number 7032056-000-00500) is for a 4,500,000 Btu/hr Cleaver Brooks Natural Gas Boiler located in Building 922. The second permit (number 7032056-000-00501) is for three RayPak Finned Coppertube Boilers, each having a 1,630,000 Btu/hr input rating, located in Building 922. Permit number 7023056-000-00800 is for the 500 lb/hr gas and coal-fired research unit located in Building 86. During 1999, the site continued to be a synthetic minor source under CAA Title V of synthetic gas derived from coal (fuel heat input rate = 100 million Btu/hr).

Air permits for the Pittsburgh site are obtained from the Allegheny County Health Department's Bureau of Air Quality Control in Pittsburgh, Pennsylvania. Allegheny County regulates the air program as outlined by EPA and PaDEP.

As part of Article XXI and to comply with Title V of the 1990 Clean Air Act Amendments, NETL submitted an application for one new plant-wide permit for the Pittsburgh site. A comprehensive annual

air emissions inventory was an integral part of the submittal. The site was notified that the application was accepted as administratively complete. NETL is currently awaiting the technical review of the application.

On May 1, 1995, the Morgantown site received air permit No. R13-1768 from the West Virginia Office of Air Quality (OAQ) and constructed an experimental syngas generator/hot gas desulfurization process development unit (PDU) at the site. NETL renewed the certificate to operate for the syngas generator/PDU (Certificate 061 0064) from July 1, 1998, through June 30, 1999. Integrated shakedown of the syngas generator and PDU is expected to occur in the later part of 2000, followed by test program operations that will be used to develop gas cleanup technologies for advanced integrated coal gasification combined-cycle power generation systems. Operating summaries required by the PDU permit are submitted quarterly.

Emission Source Inspections

EPA requires all major air sources to be inspected annually to ensure compliance with existing site air permits. An inspection of the Pittsburgh site's air emission sources was conducted by the Allegheny County Health Department's Air Quality Program Division. Results of the inspection showed that the site was in compliance.

The site maintains three 30-foot meteorological towers that monitor temperature, relative humidity, precipitation, and wind speed. Data are collected twice per week and utilized in the site's emergency preparedness program, heating, ventilation, and air conditioning (HVAC) maintenance program, and air monitoring program.

In addition, the site conducts a stratospheric ozone depletion program to recover and reclaim chlorofluorcarbons (CFC) from HVAC equipment. All CFC-containing equipment has been inventoried, and measures are being evaluated to phase out these materials.

In Morgantown, site air emissions are inventoried yearly to assess whether permit conditions are being met and whether any additional permits or permit modifications are needed. Emissions are either measured, estimated by EPA methods, or projected by combustion and mass balance calculations. The 1999 air emissions inventory revealed that site emissions continue to be extremely small and consistent with the estimated emissions for the previous year. The site is a minor source and no Title V permit is required.

Data from the 150-foot free-standing meteorological tower are used to report stormwater information and by the Emergency Operations Center to predict the effects of accidental and non-routine releases.

2.4 Clean Water Act (CWA) and the NPDES

Wastewater discharges are regulated under the Clean Water Act (CWA) (33 USC 1251 et seq.) and subsequent federal regulations (40 CFR Parts 121, 122, 125, 136, 405-471). Both West Virginia and

Pennsylvania are NPDES NPDES-authorized states. The West Virginia NPDES regulations are codified in Title 46-West Virginia Codes 1 and 2. The Pennsylvania NPDES regulations are codified in 25 Pennsylvania Code Chapters 16, 91-95, 97, 101, and 102.

In addition, Pittsburgh site wastewater placed into the sanitary sewer for subsequent treatment by the Pleasant Hills Authority (PHA) is regulated at the local level under the Pleasant Hills Industrial Sewer Use Permit Program (final implementation in 1999). Sanitary wastes were generated by approximately 1,000 employees representing three distinct federal agencies at the Bruceton Research Center during 1999. All sanitary waste from areas north of Wallace Road flows into the combined sanitary wastewater drainage systems that are tied into the Pleasant Hills, Pennsylvania, municipal sewer system, a publically owned treatment works (POTW), with no prior treatment or monitoring occurring at the Pittsburgh site.

All treated laboratory and process wastewater flows to the nearby Pleasant Hills Municipal Sewage Treatment Plant. The site maintains an onsite wastewater treatment facility (WWTF) where wastewater is collected and treated before discharge. Treatment consits of oil recovery, followed by flow equalization with subsequent neutralization through the addition of caustic soda or ferric chloride. Metals and particulates are removed by agglomeration in the flocculation tank coupled with solids separation in the plate separator and a filter press. A pilot-scale activated clay/activated carbon filtration unit was added to the WWTF in August to determine if this type of off-the-shelf treatment technology could ensure that the quality of the final treated effluent can be maintained within the Pleasant Hills Authority discharge limits. A pre- and post-filtration evaluation will be conducted after approximately 6 months of performance to determine if the add-on treatment is sufficient to provide a consistently high-quality treated effluent stream. A decision will be made at that time whether to purchase a full-scale filtration system. The effluent to the sanitary sewer is monitored and can be recirculated if additional treatment is needed. The PHA has agreed to accept the discharge. NETL submits monthly wastewater analysis data and submits an annual industrial waste survey report to Pleasant Hills.

In 1998, NETL was notified that the PHA was in the process of implementing an industrial sewer use permit program in compliance with EPA Clean Water Act requirements. NETL was informed that the concentration limits presently in place on some of the contaminants in NETL's treated laboratory and process wastewater would be lowered. The PHA indicated that they would provide NETL with an opportunity to comment on the draft permit being developed.

A program has recently been implemented to transfer the Building 141 laboratory wastewater from the lab waste holding tank to the WWTF to permit greater control over the quality of the treated effluent — especially in view of the installation of the additional filtration system. The analytical reports will continue to be submitted to the PHA's consulting engineering firm.

In a three-agency agreement with the U.S. Department of Interior (now identified as the National Institute for Occupational Safety and Health – NIOSH), and the U.S. Department of Labor Mine Safety and Health Administration, NETL jointly applied for an NPDES permit to discharge stormwater

associated with industrial activity into Lick Run in Pennsylvania. The joint NPDES permit (No. PA0025844) was issued to NETL during 1996. Monitoring at three outfalls is required. The North and South Outfalls (main outfalls to Lick Run) require quarterly discharge monitoring reports while an internal outfall maintained by NIOSH requires weekly monitoring and monthly reporting. During 1999, there were no exceedances. NETL also received a Part II permit (No. 0297201) for an industrial settling weir owned by NIOSH.

For the Morgantown site, NETL retained two (2) permits under the NPDES during 1999. One permit (Morgantown Utility Board [MUB] Permit No. 012), is issued by the MUB for the discharge of sanitary and pretreated industrial wastewater to the City of Morgantown's municipal sewer system POTW. This permit was renewed in June 2000. All monitored parameters were within permit limitations during 1999.

The other Morgantown permit issued under the NPDES was WV/NPDES Permit No. WV0111457, General Permit Registration No. WVG610042, issued by the West Virginia Department of Commerce, Labor and Environmental Resources Division of Environmental Protection, for the discharge of stormwater to Burroughs Run and West Run. As stated in the WV/NPDES permit approval letter, NETL is required under the terms and conditions of this permit to:

1. Monitor and report semiannually to the State of West Virginia from outfalls 002, 005, and 010.

2. Maintain a stormwater pollution prevention plan and a groundwater protection plan. These plans are to be retained on site and made available for review by the state at their request.

Table 5 shows the status of aboveground storage tanks at both Pittsburgh and Morgantown.

2.5 Resource Conservation and Recovery Act (RCRA)

RCRA (42 U.S. Code 6901 et seq.) regulates the generation and management of solid wastes at the federal level, including those designated as hazardous. EPA's hazardous waste regulations are codified in Title 40 CFR Parts 260-271. There were no external audits by DOE headquarters, PaDEP, or WVDEP performed during 1999.

2.6 Safe Drinking Water Act (SDWA)

Drinking water is codified under the SDWA (42 USC 300f through 330j - 11) and regulated in 40 CFR Parts 141 through 143. Since NETL does not provide treatment or storage of this water, the monitoring requirements of a public water supplier are not required; however, both sites conduct sampling and analysis programs at selected potable water locations and compare samples against the SDWA primary and secondary regulatory standards.

The Morgantown site receives its potable water supply from the city of Morgantown. SDWA standards were exceeded at isolated drinking water sources in 1997. Signs were posted to warn employees of the unacceptable water until the problem has been eliminated. Monitoring continued throughout 1998 and 1999 and no further drinking water issues have been discovered.

Table 5. Aboveground Storage Tanks

Location	Description	Capacity (U.S. Gallons)	Active or Inactive	Comments
NETL-PGH	Waste Oil Holding Tank	950	Inactive	Taken out of service in 1992.
NETL-PGH	Caustic Soda Tank	1,500	Active	
NETL-PGH	Ferric Chloride Tank	1,500	Active	
NETL-PGH	Heating Oil Tank	2,200	Inactive	Taken out of service in 1990.
NETL-MGN Outside B13	Diesel Fuel Storage (Double Tank)	50	Active	Used for research equipment.
NETL-MGN Outside B29	Diesel Fuel Storage (Double Tank, Bermed)	250	Active	Vehicle fuel.
NETL-MGN Outside B29	Gasoline Fuel Storage (Double Tank, Bermed)	500	Active	Vehicle fuel.
NETL-MGN Outside B34	Diesel Fuel Storage (Double tank)	50	Active	Emergency generator fuel.
NETL-MGN Outside Navy Facility	Diesel Fuel Storage (Double Tank)	1,000	Active	Emergency generator fuel.

The Pittsburgh site receives its water supply from the Pennsylvania American Water Company. Seventeen primary and secondary drinking water contaminants were sampled at seven representative locations in 1999. All of the results of the sampling were below the maximum contaminant levels, so no corrective actions were taken.

2.7 Toxic Substances Control Act (TSCA)

The management of polychlorinated biphenyls (PCBs), asbestos, and lead are codified in TSCA 15 USC 2601 to 2654. EPA regulations addressing PCBs and asbestos in conjunction with the TSCA are codified in 40 CFR 761 and 763, respectively. Asbestos is also regulated under CAA (40 CFR 61, Subpart M); U.S. Occupational Safety and Health Administration (OSHA) (29 CFR 1910.1001, and 1926.1101); and Allegheny County (PA) Health Department (ACHD) Article XXI.

A survey of all facilities for asbestos has been conducted and abatement is being performed as funding becomes available. NETL requested and received seven permits from the ACHD for asbestos abatement activities. These permits are issued annually by the Air Pollution Division. All permits were closed upon notice from the county health department that the air space had been effectively cleared of asbestos contamination. This resulted in 34 cubic yards of asbestos waste properly disposed in 1999.

At the Morgantown site, all abatement of asbestos and asbestos-containing materials (ACM) is conducted by West Virginia licensed asbestos abatement contractors. NETL-MGN disposes of all abated asbestos and ACMs in asbestos-approved landfills. All PCB transformers were removed from NETL-MGN during previous years.

NETL-MGN Procedure 5400.3-2, Asbestos Management, details the responsibilities and procedures to which NETL-MGN will adhere for site management of asbestos. A full asbestos survey of all Morgantown site facilities was completed during 1992. No known friable asbestos remains on the Morgantown site. The current management plan for asbestos at NETL-MGN is to abate asbestos and ACM only when it becomes necessary because of construction, renovation, or maintenance. Facility plans and work orders are reviewed during the planning stages for asbestos disturbance. Known ACM is labeled.

Various asbestos abatement activities were completed in 1999, primarily drilling holes through asbestos-content solid wall panels for new conduit or pipe runs. One small (less than 1 foot square) section of asbestos insulation was discovered above a drop ceiling in B1. It had not been disturbed, but was potentially friable and was therefore removed by a licensed asbestos abatement contractor.

A survey of lead-based paint at the NETL-MGN site was completed in early 1997. A priority list was made for lead paint removal projects, based on conditions of paint and proximity to workers. In 1999 the lead paint was removed from the 60 metal support posts of the Morgantown site's overhead pipe bridge system. A WV-licensed contractor did the abatement. The lead paint debris was disposed by the site support contractor hazardous waste personnel, who had it hauled to an approved landfill.

2.8 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

Pesticide requirements are codified under FIFRA 7 USCS §§136, *et seq*. EPA pesticide regulations are documented in 40 CFR, Parts 162, 166, and 171.

In order to minimize the potential for a spill of pest control products, all work statements for pest control contractors include a stipulation that the government will not furnish on-site storage for such materials and will not provide services for disposal of excess or waste materials. Pesticides are applied by qualified contractors using certified personnel. Pest control for buildings at the Morgantown site is performed monthly or as needed, and normally entails the spraying of interior baseboards and corners. No FIFRA-regulated materials are stored at NETL-MGN. The use of pesticides at NETL-MGN is limited to materials that are not classified by the EPA for restricted use. Compliance was verified by

comparing the MSDS that must accompany the material onsite, with the applicable standard. Pesticides are applied by qualified contractors using certified personnel. Pest control for buildings is performed monthly or as-needed and normally entails the spraying of interior baseboards and corners.

The only site personnel who apply pesticides are maintenance technicians who occasionally use over-the-counter sprays on nests that have been built in or on outside equipment; MSDS are obtained and kept for these sprays.

Policy and procedures regarding the use of insecticides, fungicides, and rodenticides at NETL-MGN are contained in NETL-MGN Order 5400.1, General Environmental Protection Program, of June 3, 1993.

Pest control for the cafeteria at the Pittsburgh site is performed on a monthly basis in compliance with ACHD regulations. Pest control for buildings is limited to "banding" (dispersing crystals on grassy surrounds of buildings and foundation spraying). Any indoor applications are performed on an as-needed basis. Also performed on an as-needed basis is pesticide/herbicide application for grounds maintenance purposes.

2.9 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA - 42 U.S.C. 4321 et seq.) established Federal policy for protecting environmental quality. Under this policy, an environmental impact statement (EIS) must be prepared to evaluate the environmental consequences of any major federal action that might have significant impact on the quality of the human environment. A record of decision is prepared to document the federal decision on a course of action determined subsequent to an EIS review. If the need for an EIS is not clear, if a proposed action has an uncertain potential for environmental impacts, etc., but does not meet DOE's criteria for preparation of an EIS, an environmental assessment (EA) is prepared. Subsequent to preparing an EA, either a decision would be made to prepare an EIS or a finding of no significant impact (FONSI) is issued if an EIS is determined to be unnecessary.

Certain classes of actions that do not have a significant effect on the environment, either individually or cumulatively, can be categorically excluded from more in-depth NEPA review (i.e., preparation of either an EIS or EA). DOE's NEPA implementing procedures (10 CFR 1021) identify those categories of excluded actions and the eligibility criteria for their application.

Performance

NETL conducts NEPA reviews of proposed onsite actions and proposed offsite Federal actions that are planned in cooperation with other governmental organizations, educational institutions, or private industry. During calendar year 1999, a total of 176 NEPA reviews resulting in the approvals of categorical exclusions were performed. All new onsite activities were covered by categorical exclusions.

During 1999, decisions were made to prepare EAs for the following offsite projects:

- Remediation of groundwater contamination at the Rock Springs oil shale retort site, Rock Springs, WY
- Atmospheric fluidized-bed combustor system at Cedar Lane Farms, Wooster, OH
- Co-utilization of coal with E-Fuel™ from the SlurryCarb™ process, South Kearney, NJ

An EA DOE/EA-1306) was completed for the project at Cedar Lane Farms in October 1999 and a FONSI was issued. Preparation of the other two EAs continued beyond the end of 1999.

The following four EIS preparation efforts were active in 1999:

- DOE/EIS-0284, low emission boiler system proof-of-concept project, Elkhart, IL
- DOE/EIS-0280, clean power from integrated coal/ore reduction (CPICOR), Vineyard, UT
- DOE/EIS-0282, McIntosh unit 4 pressurized circulating fluidized-bed demonstration project, Lakeland, FL
- DOE/EIS-0289, Jacksonville Electric Authority circulating fluidized-bed combustor project, Jacksonville, FL

Notices of intent were issued and public scoping meetings were completed for the CPICOR (EIS-0280) and Lakeland (EIS-0282) projects. A draft EIS was released for the JEA (EIS-0289) project and a public hearing was conducted in September 1999. Effort to prepare the draft EIS for the low emissions boiler system project (EIS-0284) was placed on temporary hold pending resolution of issues identified by the industrial participant.

2.10 Federal Facility Compliance Act (FFCA)

The FFCA is an amendment to RCRA that was initiated as a result of states protesting the perception that federal facilities are protected from fines or penalties. The congressional intent was to waive the sovereign immunity of federal agencies, requiring them to comply with the full range of enforcement tools available to all regulatory authorities. Under the FFCA, there is explicit authority to issue administrative compliance orders that are RCRA violations and requires EPA to conduct annual inspections of federal facilities with RCRA Part B permits.

FFCA also encourages federal facilities to seek voluntary resolution to environmental challenges. NETL sites are not currently under onsite consent agreements and are not RCRA Part B facilities. The sites do, however, conduct their environmental programs in accordance with applicable federal, state, and local regulations.

3 Other Major Environmental Issues and Actions

3.1 Directives Program

The directives process uses total quality management principles to identify and implement standards that will adequately protect workers, the public, and the environment. The starting point is a clear plan for the work to be performed (such as construction, operation, research, or remediation). A team analyzes the work plan to determine potential hazards and identify ways to remove or control those hazards. In addition to this team's analysis, input and suggestions are sought from stakeholders, including members of the public, employees, and union representatives regarding concerns or hazards that must be addressed and approached for ensuring adequate environmental protection. The primary objective of the process is to identify or develop a set of directives that, when implemented, provides reasonable assurance that the health and safety of the workers, public, and the environment will be protected during the performance of the work.

In 1996, NETL identified hazards at both the Pittsburgh and Morgantown sites through distribution of standard forms listing a wide range of possible hazards. Each division or operation was asked to identify possible hazards in their workplace and return the completed forms. The results were used to establish control requirements for all waste activities.

In 1999, the risks associated with the hazard identification process were addressed through the development and implementation of a comprehensive set of environment, safety, and health (ES&H) directives at NETL. Although this process is not expected to be completed until 2001, final directives for integrated safety management (ISM), ES&H reporting, ES&H requirements for offsite contractors, R&D SARS, life safety design criteria, and work control were completed during 1999. The development of many other directives were initiated and reviewed during 1999, a complete cycle from inception to final approval that often takes over a year to complete. Directives receive a rigorous internal review by all internal stakeholders prior to final approval by senior management.

3.2 Environmental Occurrences

Notification of environmental occurrences is required under a number of environmental statutes and regulations (federal, Pennsylvania, West Virginia, and local). DOE also requires notification of environmental occurrences as found in the 200 series of DOE orders, specifically, DOE Order 232.1A and DOE Manual 232.1-1A, Occurrence Reporting and Processing of Operations Information, DOE Order 231.1 Chg 2, Environmental, Safety, and Health Reporting, and DOE Manual 231.1-1 Environment, Safety and Health Reporting Manual. In addition, NETL has established procedures for notification of environmental occurrences based upon the federal, state, local, and DOE requirements through NETL Procedure 151.1-2, Occurrence Categorization and Reporting.

DOE Order 232.1A provides guidelines to facilities on categorizing and reporting environmental occurrences to DOE. The order divides occurrences into three categories: emergencies, unusual occurrences, and off-normal occurrences. NETL maintains an onsite emergency response organization (ERO) at the Pittsburgh and Morgantown sites that can be called upon 24 hours per day. The ERO is capable of cleaning up or mitigating small spills. If larger spills were to occur, the ERO procedures call for offsite assistance as needed. Once an incident has occurred, the ERO is responsible for categorizing the incident, notifying the proper regulatory agencies, and completing the DOE occurrence reporting.

There were zero environmental occurrences at NETL that required notification during 1999. There were two reportable occurrences during 1999 that were categorized as safety concerns but that had an environmental connection. The first of these safety occurrences involved the release of natural gas into the environment following a natural gas pipe rupture. The second safety concern involved the discovery of a damaged acetylene tank outside the fence line of the NETL facility. Neither of these incidents required federal, state, or local environmental notification, and were reported only to the DOE occurrence reporting and processing system (ORPS). There were no other environmental occurrences during 1999.

4 Environmental Management Information

The two NETL sites are staffed by ES&H professionals who review present and past activities to assure that the sites perform their activities in compliance with environmental laws and regulations. All onsite research projects and support activities are reviewed by ES&H staffs in conjunction with the safety analysis and review system (SARS). These activities are carefully reviewed for possible impacts, including impacts on air, surface water, groundwater, and soil. Applicable federal, state, and local regulations potentially affecting these activities are reviewed and compliance assured prior to approval by the ES&H staffs.

4.1 Environmental Monitoring and Surveillance

The sites currently monitor their groundwater, stormwater, industrial wastewater, drinking water, meteorological conditions, and air emissions (based on the scope of the research project) independently at each site. Analyses from several of the groundwater monitoring wells are supplied to the state as information only and are not the result of any consent agreement or permit requirement. A detailed discussion of groundwater monitoring is presented in Section 7.0. NETL monitors its local site outfalls as specified by the requirements of the NPDES permits, and its industrial wastewater discharges to the local POTW (Pittsburgh) in accordance with its permit. Both sites have received "generator only" status, which means that the sites may accumulate onsite hazardous wastes for no longer than 90 days. Pittsburgh filed a modified Notification of Hazardous Waste Activity in order to inform the State that we are now intending to perform elementary neutralization of waste laboratory acids and caustics in the wastewater treatment facility. Otherwise, no hazardous waste is treated, stored, or disposed at either Pittsburgh or the Morgantown sites.

NETL-PGH performs monthly sampling/analyses on the laboratory and process-related wastewater generated on the R&D plateau and placed into the sanitary sewer for subsequent treatment by the Pleasant Hills sewage treatment plant. In addition, the laboratory/process water generated in the coal preparation building and collected in the laboratory waste holding tank (LWHT) for flow equalization and neutralization is also discharged to the Pleasant Hills Sewage Treatment Plant for additional treatment. Consideration is being given to the feasibility of transporting the contents of the LWHT to the site wastewater treatment facility for additional treatment prior to its being placed into the sanitary sewer. The results of the monthly sampling and analysis are sent to the PHA consulting engineering firm.

4.2 Integrated Management Activities

In 1999, a formalized approach to performance measurement continued to be employed as part of an effort to address performance requirements, such as those mandated by the Government Performance

and Results Act. This approach included measurement elements covering management of ES&H risks associated with implementation of organizational missions. Goals and objectives for ES&H activities were established and specific performance targets addressing ES&H risks were included for measurement. Refinements of ES&H strategies and specific targets to meet the goals and objectives for 1999 were made, based on performance results from 1998 and changing organizational initiatives.

NETL performed a gap analysis to determine the status of the NETL integrated safety management system (ISMS) program and to identify any gaps in the implementation of the ISMS program in November 1998. Nineteen observations or "gaps" were identified during the four days of interviews and document review. In response to these identified gaps, NETL initiated a comprehensive corrective action program aimed at eliminating these identified gaps. Progress was made in closing these identified "gaps" throughout 1999.

NETL developed a set of ISMS directives during 1999 that were used to facilitate implementation of ISM at NETL. These directives included NETL Order 450.4, NETL Integrated Safety Management Program; NETL Operating Plan 450.4-2, NETL ISMS Processes; and eight NETL ISMS Procedures (NETL ES&H Standards Identification and Maintenance Process, NETL ES&H Assessments Process, NETL ES&H Performance Criteria and Measurement Process, NETL ES&H Corrective Action Process, NETL Lessons Learned Process, NETL ES&H Feedback Process, NETL Continuous Improvement Process, and NETL ES&H Training Process).

On a broader level, the DOE Office of Fossil Energy established an ES&H commitment in April 1997 that addresses environmental protection, pollution prevention, performance standards, tolerance levels for injuries and illnesses, accountability, worker and public participation, and integrated management. As part of the Fossil Energy organization, NETL is dedicated to supporting and implementing this commitment.

5 Environmental Radiological Program Information

The Atomic Energy Act (AEA) of 1954 and its amendments are the federal laws that mandate that DOE control radioactive materials to protect public safety and health. DOE orders and EPA and Nuclear Regulatory Commission (NRC) regulations are based on the AEA. Under the AEA as amended, DOE is responsible for establishing and maintaining an environmental, health, and safety protection program. Furthermore, although DOE facilities are generally exempt from NRC regulations, the facilities are to meet the intent of these regulations.

Currently, NETL does not generate, transport, process, treat, or have onsite permanent disposal of any radioactive waste. However, NETL does use, in the conduct of research, instrumentation that contains radioactive sources. Also, four phosphorescent exit signs are used in the Morgantown site's hazardous waste facility. An inventory of radiation sources is maintained by the radiation safety officer, indicating the item, isotope, quantity, custodian, location, status, and activity. Table 6 lists the 1999 source inventory. NETL does not release any radionuclides into the environment as all of its sources are sealed and are used in instrumentation.

The radiation monitoring currently performed at NETL consists of a limited number (less than 20) of personal dosimeter badges and rings supplied under a contract with Siemens Gammasonics, Inc. In addition, leak testing is conducted on all applicable sealed sources with analysis also performed by Siemens Gammasonics, Inc.

Table 6. NETL Radioactive Materials Inventory for 1999

Isotope	Quantity	Activity	Supplier/Source	Location
Kr-85	1	2 mCi	Model No. 3077 Serial No. 700T Thermo-Systems, Inc.	MGN
Kr-85	1	2 mCi	Model No. 3012 Serial No. 467T Thermo-Systems, Inc.	MGN
Kr-85	1	2 mCi	Model No. 3012 Serial No. 626T Thermo-Systems, Inc.	MGN
Kr-85	1	2 mCi	Model No. 3077 Serial No. 373T Thermo-Systems, Inc.	MGN
Kr-85	1	2 mCi	Model No. 3077 Serial No. 697T Thermo-Systems, Inc.	MGN
Ni-63	1	15 mCi	Model No. 6000204 Serial No. 533 Perkin-Elmer Corporation	MGN
Sc-46	1	0.065 mCi	University of Missouri *Source encapsulated by a nylon bead.	MGN
Sc-46	1	0.046 mCi	University of Missouri *Source encapsulated by a nylon bead.	MGN
Ra-226	1	9 FCi	Model No. B-5 Serial No. 11205 Mettler Corporation	MGN
Ra-226	1	21 FCi	Model No. M-5 Serial No. 17032 Mettler Corporation	MGN
Phosphate Rock	1	Consumer Product	Model No. 1080 Sun Nuclear Corporation	MGN
Ra-226	1	9 FCi	Model No. B-5 Serial No. 13805 Mettler Corporation	MGN
H-3	1	20 Ci	Model No. B100/U10 Serial No. 575263 SRB Technologies	MGN
H-3	1	20 Ci	Model No. B100/U10 Serial No. 574434 SRB Technologies	MGN

Table 6. NETL Radioactive Materials Inventory for 1999
(continued)

Isotope	Quantity	Activity	Supplier/Source	Location
H-3	1	20 Ci	Model No. B100/U10 Serial No. 574435 SRB Technologies	MGN
H-3	1	20 Ci	Model No. B100/U10 Serial No. 574436 SRB Technologies	MGN
Co-57	1	12 mCi	Model No. IPL CUS Serial No. EE661 Isotope Products Lab	MGN
Cs-137	1	1 FCi	Tele-Atomic, Inc.	MGN
Cs-137	1	10 FCi	Tele-Atomic, Inc.	MGN
Ba-133	1	1 FCi	Tele-Atomic, Inc.	MGN
Ba-133	1	10 FCi	Tele-Atomic, Inc.	MGN
TI-204	1	1 FCi	Tele-Atomic, Inc.	MGN
TI-204	1	10 FCi	Tele-Atomic, Inc.	MGN
Po-210	4	Consumer Product	Anti-Static Brushes	PGH
Cs-137	3	40 mCi (2) 20 mCi (1)	Ronan Engineering Company, Model 137 Level Density Gauge	PGH
Cs-137	4	30 mCi (3) 6 mCi (1)	Berthold Systems, Inc. Model LB-7400D Level Density Gauges	PGH
Assorted	80	Consumer Product	Smoke Detectors	PGH
Ra-226	1	10 mCi	LKB Wallac 1214 Rack Beta Liquid Scintillation Counter	PGH (Removed 12/99)
Co-57	1	50 mCi	Ranger Scientific, Inc. MS 1200 Mossbauer Spectroscopy	PGH
Ni-63	1	15 mCi	Gas Chromatograph Electron Capture Device	PGH

6 Environmental Non-Radiological Program Information

The nonradiological monitoring program at NETL is designed to meet permit requirements and to assess the effectiveness of ongoing waste minimization and pollution prevention programs. The 1999 monitoring program focused on industrial wastewater, stormwater, groundwater, hazardous waste, and soil. Specific monitoring and permit information is in Section 2.4 of this report.

6.1 Clarifier Effluent Monitoring

The Morgantown site is currently permitted by MUB to connect to the city's POTW and is required by that permit to conduct monthly monitoring of the clarifier effluent. Clarifier effluent monitoring parameters and the sampling results are presented in the appendix.

The Pittsburgh site's effluent water consists of a pre-treated industrial wastewater component that is combined with the sanitary wastewater stream. The primary objective of the industrial wastewater monitoring program is to comply with the Pleasant Hills, Pennsylvania, POTW pretreatment requirements. Table 8 in the appendix contains industrial wastewater effluent data for the NETL sites.

6.2 Stormwater Monitoring

The primary objectives of the stormwater discharge monitoring program are to comply with a multiple federal party NPDES permit at the Pittsburgh site, and a general storm water discharge permit at the Morgantown site. Quarterly samples are taken at the Pittsburgh site and semiannually at the Morgantown site. Pittsburgh storm water flows to Lick Run and ultimately to the Monongahela River. Morgantown storm water flows to Burroughs Run and West Run ultimately to the Monongahela River. Table 7 in the appendix contains monitoring data related to stormwater discharges for NETL's sites.

6.3 Waste Minimization

Quarterly hazardous waste generation rates for the past 6½ years have been, for the most part, significantly lower compared to the rates from prior years. This decrease is a least partially reflective of several waste minimization efforts and initiatives instituted over the last 6½ years. However, quarterly hazardous waste generation rates at NETL-MGN have historically exhibited wide variations since they are dependent upon many complex factors. These factors include, but are not limited to, project schedules and operational activities, facility management and maintenance activities, responses to

various audits or assessments (e.g., corrective action plan response to the tiger team assessment), the R&D nature of the facility, and significant management initiatives.

By monitoring the generation of solid low-level radioactive, hazardous, and/or mixed waste, NETL will be able to access the effectiveness of its waste minimization program. Reducing or minimizing the volume of waste generated will decrease waste management needs (e.g., storage, transportation, and disposal needs), thereby reducing the cost, environmental impact, and liability of such operations.

7 Groundwater Monitoring and Protection

In September 1985, the Secretary of Energy announced a series of initiatives designed to strengthen the ES&H programs and activities within the U.S. Department of Energy. As required by Chapter III of DOE Order 5400.1, General Environmental Protection Program, NETL developed groundwater protection management programs at the two sites. The purpose of this order was to establish environmental protection requirements, authorities, and responsibilities for DOE operations and to ensure compliance with applicable federal, state, and local environmental laws; executive orders; and DOE policies. The intent of DOE 5400.1 and the groundwater protection management program is to ensure that facility RCRA and CERCLA actions are addressed. Based on activities conducted at the sites, NETL is not subject to groundwater monitoring requirements as set forth under RCRA and CERCLA.

7.1 Groundwater Monitoring

To date, no significant contamination has been detected in samples collected from any of the groundwater monitoring wells. Results of groundwater monitoring are given in Tables 9 through 25 of the appendix.

7.2 Site Hydrology

Morgantown Site

Most of Monongalia County is underlain by rocks of low permeability, which consequently yield water at low rates. Wells nearest the Morgantown site typically have yields of 0.1 L/s (1.6 gallons per minute, gpm) or less. The principle aquifers are found in the Pennsylvanian-aged Conemaugh Group and the Pottsville Group. Aquifers of the Conemaugh Group outcrop at the Morgantown site and are the source of most of the domestic water supplies near the area under water table (unconfined) conditions. Aquifers of the Pottsville Group, which are quite deep but are regarded as the most important aquifers in the county, yield up to 250 gpm under artesian pressure but average about 45 gpm. The Pottsville Group aquifers are separated from the Conemaugh Group aquifers by several hundred feet of bedrock. There is no apparent communication between these aquifers. Two of the aquifers of the Conemaugh Group are sampled for possible contamination by monitoring wells at NETL, the Morgantown and Grafton sandstones. The recharge area for these two aquifers is east of Morgantown in the area of Chestnut Ridge, and both discharge regionally into the Monongahela River west of the site. The Morgantown sandstone outcrops around the perimeter of the NETL property along Burroughs Run, West Run, and the Monongahela River. There are small springs in a number of places along these creeks and the Monongahela River where water flows from fractures in the Morgantown sandstone. Although the Grafton sandstone outcrops along West Run below its confluence with Burroughs Run, no springs or seeps have been observed there. Most of the discharge from the Grafton aquifer is probably into the bottom of the Monongahela River.

Unconformably overlying the Pennsylvanian rocks at the site is up to 70 feet of Pleistocene-aged unconsolidated Lake Monongahela sediments. These consist of a basal clayey sand that ranges from 10 to 20 feet in thickness, informally named the "A" aquifer, overlying interbedded clays and clayey sands, informally named the “B-C” aquifer, and a predominately sand unit, the “D,” which occurs at the surface on the southwest corner of the site. These sediments were deposited in stream and lacustrine environments as a result of the glacial Lake Monongahela. The “A” and “B-C” units are water bearing under the developed part of the site and both are monitored for possible groundwater contamination at NETL. Both units extend off the site, and recharge is probably mostly from offsite, as the near-surface sediments are dominated by very low permeability clays in the developed area of the site. Both aquifers outcrop north of the developed area on the property and form springs and small creeks which drain into West Run. There are probably springs and seeps along the Monongahela River from this unit as well.

The groundwater monitoring program provides the following information:

- Baseline conditions of groundwater quality and quantity related to the site.
- Details of the groundwater/surface water relationship.
- Identification of potential sources of groundwater contamination.
- Data useful in the development an implementation of remedial measures for any NETL facilities/sites that could pose a concern to the environment.
- Measurement of petroleum hydrocarbons (diesel range organics) in groundwater at selected wells surrounding abandoned (or previously removed) storage tanks and oil spill areas, per state request.

Pittsburgh Site

There are currently 29 groundwater monitoring wells at various locations throughout the Pittsburgh site. The groundwater management plan implementation included groundwater monitoring well installation, well development, and sampling and analysis to be completed in two phases. Phase I activities occurred from November 16, 1992, through February 12, 1993, and consisted of the installation of 16 bedrock wells, two piezometer clusters, and two stream gauging weirs. Phase II occurred from November 17, 1993, through February 17, 1994 and consisted of 12 additional bedrock wells. A concrete stream gauging station was also constructed during Phase I. Finally, a supplemental well was installed in June 1995.

The Pittsburgh site has two groundwater flow patterns. Groundwater flowing in the shallow, weathered bedrock aquifer may percolate along the soil/bedrock interface and/or along near-vertical stress relief fractures and follows the general site topography, flowing from the tops of hills on the site, generally perpendicular to ground surface elevation contours. This flow is directed by the intervening valleys toward Lick Run Valley, where it joins the water-bearing unit located in the valley and adds to the baseflow of Lick Run itself. Some of this flow also discharge as springs on the hillsides or in the valleys.

The second flow pattern is associated with the deep aquifer. Groundwater in this zone generally flows east towards Lick Run Valley, where it is joined by the water of the shallow zone as it flows off the hillsides.

For purposes of groundwater monitoring, the Pittsburgh site is divided into three separate areas generally referred to as the main plateau area, the valley fill area (which includes the 900 area, building 141, and the 920 area, 2.1 acre, 2.2 acre, and 4.0 acre properties), and the building 167/triangle parking lot area. These areas were selected based on current operations and historical areas of contamination. During 1998, a semiannual groundwater sampling and analysis program involving two contamination detection programs was completed.

Tables in the appendix present the results of groundwater data collected. This analysis consisted of the following:

(1) Investigation for immiscible (light or dense) organic phases, continued measurement for specific constituents identified during the initial monitoring phase, RCRA (background year) sampling/analyses, and subsequent RCRA sampling/analyses with statistical comparisons of contamination indicator parameter data.

(2) Measurement of petroleum hydrocarbons (diesel range organics) in groundwater at selected wells surrounding inactive underground storage tanks and oil spill areas, per PaDEP request.

Results of laboratory analyses produce a variety of groundwater chemical constituent data that must be evaluated to determine whether the facility is contaminating the groundwater.

Downgradient contamination is indicated by one, or a combination of, the following conditions:

- Immiscible organic phases are detected downgradient and contaminant concentrations are substantively elevated compared to upgradient/background (or none detected upgradient) and substantively exceed drinking water standard maximum contaminant levels (MCLs).

- Dissolved hazardous waste appendix IX hazardous constituents are detected downgradient, and concentrations are substantively elevated compared to upgradient/background (or none detected upgradient), and substantively exceed MCLs (or human health evaluations identify a risk).

Statistical comparisons of semiannual contamination indicator data (upgradient and downgradient wells) are made against appropriate upgradient/background well data. If statistically significant downgradient differences exist (and are subsequently confirmed by immediate resampling and repeating of statistical analyses), then contamination will be indicated and a human health and ecological risk assessment and/or groundwater quality assessment program will be warranted. If no downgradient statistically significant differences are calculated, routine monitoring will continue.

Abbreviations and Acronyms

ACHD	Allegheny County (PA) Health Department
ACM	asbestos-containing materials
AEA	Atomic Energy Act
BOD	biological oxygen demand
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFC	chlorofluorohydrocarbans
CFR	U.S. code of federal regulations
CPICOR	clean power from integrated coal/ore reduction
CWA	Clean Water Act
DOE	U.S. Department of Energy
EA	environmental assessment
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERO	emergency response organization
ESA	Endangered Species Act
ES&H	environment, safety, and health
FETC	Federal Energy Technology Center
FFCA	Federal Facilities Compliance Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	finding of no significant impact
FY	fiscal year
HP	horsepower
HVAC	heating, ventilation and air conditioning
ISM	integrated safety management
ISMS	integrated safety management system
LWHT	laboratory waste holding tank
MCL	maximum contaminant level
MGN	NETL site at Morgantown WV
MSDS	material safety data sheet
MUB	Morgantown Utility Board
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
NIOSH	National Institute for Occupa-tional Safety and Health
NPDES	National Pollutant Discharge Elimination System
NPL	national priority list
NRC	Nuclear Regulatory Commission
OAQ	WV Office of Air Quality
ORPS	occurrence reporting and processing system
OSHA	U.S. Occupational Safety and Health Administration
PaDEP	Pennsylvania Department of Environmental Protection
PA	preliminary assessment
PCB	polychlorinated biphenyl
PDU	process development unit
PGH	NETL site at Pittsburgh PA
PHA	Pleasant Hills (PA) Authority
POTW	Publicly Owned Treatment Works
R&D	research and development
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SAR	safety and analysis review
SARS	safety and analysis review system
SEA	site evaluation accomplished
SERC	State Emergency Response Commission
TPQ	threshold planning quantity
TRI	toxic release inventory
TSCA	Toxic Substances Control Act
TSS	total suspended solids
TVA	Tennessee Valley Authority
WDEQ	Wyoming Department of Environmental Quality
WVDEP	West Virginia Department of Environmental Protection
WWTF	wastewater treatment facility

Appendix: Tables 7 — 25

Table 7. NETL 1999 National Pollutant Discharge Elimination System Storm Water Analysis Results

Constituent	Sample Date			
	2/12/99	5/13/99	9/07/99	12/10/98
North Outfall - PGH				
Flow	0.256 MGD	0.592 MGD	20.165 MGD	3.182 MGD
Suspended Solids	8 mg/L	120 mg/L	357 mg/L	135 mg/L
CBOD5	6 mg/L	27 mg/L	15 mg/L	46 mg/L
Oil and Grease	<1 mg/L	36 mg/L	<5 mg/L	< 5 mg/L
Aluminum	0.48 mg/L	0.40 mg/L	15.7 mg/L	3.17 mg/L
Iron	0.69 mg/L	1.88 mg/L	21.9 mg/L	3.65 mg/L
Manganese	0.32 mg/L	0.30 mg/L	0.85 mg/L	0.23 mg/L
Lead	<1 Fg/L	10 Fg/L	< 50 Fg/L	< 50 Fg/L
Mercury	< 2 Fg/L	< 0.4 Fg/L	0.8 Fg/L	< 0.2 Fg/L
pH	6.55 s.u.	7.37 s.u.	6.49 s.u.	8.41 s.u.
Ammonia Nitrogen	0.29 mg/L	1.36 mg/L	0.27 mg/L	0.47 mg/L
South Outfall - PGH				
Flow	0.403 MGD	0.780 MGD	7.860 MGD	3.652 MGD
Suspended Solids	52 mg/L	164 mg/L	230 mg/L	34 mg/L
Aluminum	7.65 mg/L	4.46 mg/L	18.3 mg/L	6.24 mg/L
Iron	2.07 mg/L	2.07 mg/L	23.6 mg/L	3.41 mg/L
Manganese	0.76 mg/L	0.33 mg/L	0.62 mg/L	0.18 mg/L
Lead	< 1 Fg/L	23 Fg/L	< 50 Fg/L	< 50 Fg/L
pH	7.27 s.u.	7.36 s.u.	6.84 s.u.	8.36 s.u.
Ammonia Nitrogen	1.78 mg/L	2.50 mg/L	0.31 mg/L	0.32 mg/L

MGD = millions of gallons per day; s.u. = standard units.

Table 7. NETL 1999 National Pollutant Discharge Elimination System Storm Water Analysis Results
(continued)

Outfalls - MGN			
Constituents	**Outfall 002**	**Outfall 005**	**Outfall 010**
Oil & Grease	<5 mg/L	<5 mg/L	<5.0 mg/L
pH	8.02	8.20	7.64 mg/L
Biochemical Oxygen Demand (Grab)	4.6 mg/L	<2 mg/L	<2 mg/L
Biochemical Oxygen Demand (Composite)	5.6 mg/L	<2 mg/L	<2 mg/L
Chemical Oxygen Demand (Grab)	25 mg/L	14 mg/L	<10 mg/L
Chemical Oxygen Demand (Composite)	15 mg/L	11 mg/L	<10 mg/L
Nitrate + Nitrite Nitrogen (Grab)	0.88 mg/L	0.41 mg/L	0.35 mg/L
Nitrate + Nitrite Nitrogen (Composite)	1.3 mg/L	0.51 mg/L	0.35 mg/L
Total Suspended Solids (Grab)	140 mg/L	52 mg/L	<5 mg/L
Total Suspended Solids (Composite)	80 mg/L	46 mg/L	<5 mg/L
Fecal Coliform Colonies per 100 ml			
Month	**Outfall 002**	**Outfall 005**	**Outfall 010**
January	No sample	No Sample	No Sample
February	1,245	200	300
March	<200	<200	<200
April	670	330	300
May	21,000	34,000	>60,000
June	68,000	66,000	42,000
July	103,000	78,000	270,000
August	15,000	23,000	23,000
September	94,000	26,000	12,300
October - December	No monthly data required by permit		

Table 8. NETL-PGH 1999 Wastewater Effluent Analysis (mg/L)

Constituent	Standard/Guideline	January	February	March	April	May	June	July	August	September	October	November	December
Sampling Date		01/26/99	02/23/99	03/26/99	04/27/99	05/27/99	06/29/99	07/27/99	08/26/99	N/S	10/28/99	11/22/99	12/15/99
Building 74 Wastewater Treatment Facility Effluent													
Aluminum	None	<0.1	< 0.1	0.17	0.14	< 0.1	0.16	0.38	<0.1	N/S	0.23	<0.1	<0.1
Cadmium	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	N/S	< 0.005	<0.005	<0.005
Chromium	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	N/S	0.01	<0.01	<0.01
Copper	0.5	0.13	0.07	0.08	0.04	0.03	0.07	0.11	0.03	N/S	0.08	0.01	0.03
Cyanide	0.5	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	N/S	< 0.005	<0.005	<0.010
TOX	None	0.181	0.118	0.166	0.077	0.064	0.067	0.236	N/S	N/S	0.083	0.123	0.124
Iron	7.0	0.64	0.75	0.87	1.70	0.52	1.06	1.25	3.27	N/S	6.49	1.38	0.56
Lead	0.1	0.005	<0.005	< 0.005	0.008	< 0.005	0.005	0.008	0.007	N/S	0.046	<0.005	<0.005
Mercury	None	0.0009	< 0.0002	0.0002	0.0002	< 0.0002	0.0006	0.0026	0.0005	N/S	0.0010	<0.0002	<0.0002
Nickel	1.5	<0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	N/S	< 0.02	<0.02	<0.02
Oil & Grease	None	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	N/S	11	<5	<5
pH (s.u.)	> 5.0	7.5	7.9	7.9	7.7	7.6	7.5	8.0	8.3	N/S	7.4	6.6	6.2
Phenolics	None	< 0.005	< 0.005	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	N/S	<0.005	<0.005	<0.005
TSS	None	< 5	< 5	< 5	11	< 5	7	10	17	N/S	12	<5	<5S
Tin	2.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	N/S	< 0.01	<0.01	<0.01
Trichloromethane	None	0.026	0.022	0.010	< 0.005	< 0.005	< 0.005	<0.005	N/S	N/S	< 0.005	<0.005	<0.005
Zinc	1.0	0.161	0.086	0.123	0.147	0.216	0.228	0.323	0.113	N/S	0.262	0.151	0.190
Sampling Date		01/22/99	02/23/99	NS	NS	NS	NS	07/09/99	NS	NS	NS	NS	NS
Building 141 Laboratory Wastewater Holding Tank													
Aluminum	None	< 0.1	<0.1	NS	NS	NS	NS	0.79	NS	NS	NS	NS	NS
Cadium	0.02	< 0.005	<0.005	NS	NS	NS	NS	< 0.005	NS	NS	NS	NS	NS
Chromium	0.5	< 0.01	<0.01	NS	NS	NS	NS	0.01	NS	NS	NS	NS	NS
Copper	0.5	0.05	0.05	NS	NS	NS	NS	0.20	NS	NS	NS	NS	NS
Cyanide	0.5	< 0.005	<0.005	NS	NS	NS	NS	< 0.005	NS	NS	NS	NS	NS
TOX	None	0.170	0.130	NS	NS	NS	NS	0.157	NS	NS	NS	NS	NS
Iron	7.0	5.06	1.21	NS	NS	NS	NS	23.5	NS	NS	NS	NS	NS
Lead	0.1	< 0.015	<0.005	NS	NS	NS	NS	< 0.015	NS	NS	NS	NS	NS
Mercury	None	< 0.0002	<0.0002	NS	NS	NS	NS	0.0008	NS	NS	NS	NS	NS
Nickel	1.5	< 0.02	<0.02	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS
Oil & Grease	None	< 5	< 5	NS	NS	NS	NS	11	NS	NS	NS	NS	NS
pH (s.u.)	> 5.0	7.5	7.3	NS	NS	NS	NS	7.7	NS	NS	NS	NS	NS
Phenolics	None	0.009	0.012	NS	NS	NS	NS	0.030	NS	NS	NS	NS	NS
TSS	None	35	8	NS	NS	NS	NS	75	NS	NS	NS	NS	NS
Tin	2.0	< 0.01	< 0.01	NS	NS	NS	NS	< 0.01	NS	N/S	NS	NS	NS
Trichloromethane	None	< 0.005	< 0.005	NS	NS	NS	NS	0.007	NS	NS	NS	NS	NS
Zinc	1.0	0.153	0.064	NS	NS	NS	NS	0.233	NS	NS	NS	NS	NS

NS = not sampled; TOX = total organic halide; TSS = total suspended solids; BOD5 = biological oxygen demand for 5-day period; s.u. = standard units.
Standard/Guideline - Pleasant Hills Authority Pretreatment Ordinance, November 16, 1998.

Table 8. NETL-MGN 1999 Wastewater Effluent Analysis (lb/d)
(continued)

Parameter		Limit	January	February	March	April	May	June	July	August	September	October	November	December
Flow (MGD)	Monthly Average	0.09	0.02	0.0009	0.0009	0.01	0.009	0.008	0.007	0.09	0.01	0.01	0.09	0.003
	Daily Maximum	0.15	0.04	0.014	0.02	0.03	0.06	0.08	0.068	0.15	0.07	0.02	0.15	0.007
BOD5	Monthly Average	None	1.2	0.019	0.17	ND	0.34	0.49	0.14	0.3	ND	0.3	0.5	ND
	Daily Maximum	None	2.3	0.029	0.37	ND	2.25	4.9	1.4	2.2	ND	0.5	2	ND
TSS	Monthly Average	None	ND	ND	ND	0.8	0.9	0.93	ND	ND	0.2	ND	0.6	ND
	Daily Maximum	None	ND	ND	ND	2.5	6	9.3	ND	ND	0.4	ND	3	ND
Arsenic	Monthly Average	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Daily Maximum	0.008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	Monthly Average	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Daily Maximum	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	Monthly Average	0.007	ND	ND	ND	ND	0.005	ND	ND	ND	ND	ND	ND	ND
	Daily Maximum	0.011	ND	ND	ND	ND	0.004	ND	ND	ND	ND	ND	ND	ND
Copper	Monthly Average	0.04	0.0042	0.0014	0.0013	0.0018	0.0035	0.0029	0.0005	0.0013	0.00038	0.0013	0.0023	0.0007
	Daily Maximum	0.06	0.0084	0.0022	0.0028	0.0053	0.024	0.029	0.0049	0.0093	0.00077	0.0025	0.01	0.0016
Cyanide	Monthly Average	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Daily Maximum	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead	Monthly Average	0.025	ND	ND	ND	ND	0.0007	0.00059	ND	ND	ND	ND	0.00049	0.00013
	Daily Maximum	0.038	ND	ND	ND	ND	0.005	0.0059	ND	ND	ND	ND	0.0022	0.0003
Mercury	Monthly Average	0.0006	ND	ND	ND	ND	ND	ND	0.00003	ND	ND	ND	ND	ND
	Daily Maximum	0.0009	ND	ND	ND	ND	ND	ND	0.0003	ND	ND	ND	ND	ND
Nickel	Monthly Average	0.01	ND	ND	ND	ND	0.0005	0.00035	ND	ND	ND	ND	0.00046	0.00013
	Daily Maximum	0.015	ND	ND	ND	ND	0.003	0.0035	ND	ND	ND	ND	0.002	0.0003
Silver	Monthly Average	0.011	ND	ND	ND	ND	0.00097	ND	ND	ND	ND	ND	0.00065	ND
	Daily Maximum	0.017	ND	ND	ND	ND	0.0065	ND	ND	ND	ND	ND	0.0029	ND
Zinc	Monthly Average	0.2	0.032	0.009	ND	0.01	0.0082	0.0055	0.0033	0.0084	0.0046	0.013	0.027	0.0048
	Daily Maximum	0.3	0.063	0.014	ND	0.03	0.055	0.055	0.032	0.058	0.0092	0.027	0.12	0.011
Iron	Monthly Average	None	0.073	0.023	0.035	0.033	0.09	0.057	0.0093	0.034	0.0063	0.035	0.057	0.0081
	Daily Maximum	None	0.15	0.035	0.077	0.098	0.6	0.57	0.091	0.24	0.013	0.065	0.25	0.019
Manganese	Monthly Average	None	0.011	0.0038	0.0083	0.01	0.015	0.006	0.0064	0.011	0.0034	0.0042	0.009	0.0098
	Daily Maximum	None	0.023	0.0058	0.018	0.03	0.1	0.06	0.062	0.076	0.0068	0.0083	0.04	0.0023
Phenolics	Monthly Average	None	ND	ND	ND	0.0014	ND	ND	ND	ND	0.00042	ND	0.0012	ND
	Daily Maximum	None	ND	ND	ND	0.0043	ND	ND	ND	ND	0.00084	ND	0.0053	ND
Total Organic Halogens														
	Monthly Average	None	0.014	0.0043	0.0083	0.0047	0.009	0.0067	0.0016	0.0073	0.0015	0.011	0.006	0.0023
	Daily Maximum	None	0.028	0.0067	0.018	0.014	0.06	0.067	0.015	0.051	0.003	0.022	0.027	0.0053
Organics	Monthly Average	None	NS	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS
	Daily Maximum	None	NS	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS
pH (s.u.)	Minimum	6.0	7.0	7.9	7.7	7.6	6.5	7.0	7.1	7.3	6.9	6.2	6.8	6.9
	Maximum	9.0	8.7	8.6	8.5	8.3	8.5	7.8	7.8	8.3	8.3	7.9	8.3	8.5

MGD = millions of gallons per day; NS = not sampled; ND = not detected; TSS = total suspended solids; BOD5 = biological oxygen demand for 5-day period; s.u. = standard units.

Table 9. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Main Plateau - Contamination Indicator Constituents

Constituents		Well													
		MPW-1		MPW-2		MPW-2-1	MPW-4		MPW-4-1	MPW-4		MPW-7		MPW-7D	
Week	Sample Event	Round 1	Round 2	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Week 1	**Sample Date**	6/08/99	9/28/99	6/08/99	9/28/99	N/A	6/08/99	9/28/99	N/A	6/08/99	9/28/99	6/09/99	9/27/99	6/09/99	9/27/99
	pH (standard units)	6.77	6.60	6.80	6.82	N/A	6.96	6.92	N/A	8.24	7.70	7.17	6.47	7.42	7.05
	Specific Conductance	3090	3660	2460	2650	N/A	1990	2400	N/A	750	920	1050	1320	1280	1540
	TOX (Fg/L)	100	1100	57	580	N/A	77	350	N/A	18	430	53	240	51	230
	TOC (mg/L)	7.0	1.8	1.3	1.7	N/A	1.1	1.7	N/A	1.8	1.3	2.2	2.8	1.2	1.3
Week 2	**Sample Date**	6/15/99	10/5/99	6/14/99	10/5/99	N/A	6/15/99	10/4/99	6/15/99	6/15/99	10/4/99	6/15/99	10/5/99	6/15/99	10/5/99
	pH (standard units)	6.78	6.95	6.70	6.71	N/A	6.96	6.49	6.96	8.02	7.31	7.22	6.84	7.17	7.03
	Specific Conductance	3460	4390	2690	3290	N/A	2520	2360	2520	980	880	1430	1230	1450	1640
	TOX (Fg/L)	110	1400	100	1200	N/A	32	490	56	19	210	51	350	60	610
	TOC (mg/L)	3.8	4.6	0.96J	1.4	N/A	0.96 J	1.1	0.96 J	1.2	1.0	2.4	2.2	2.1	1.6
Week 3	**Sample Date**	6/22/99	10/13/99	6/21/99	10/12/99	6/21/99	6/22/99	10/13/99	N/A	6/22/99	10/13/99	6/22/99	10/13/99	6/22/99	10/13/99
	pH (standard units)	6.74	6.97	6.92	6.78	6.92	6.93	6.97	N/A	7.92	7.77	7.12	6.85	N/S	7.15
	Specific Conductance	3780	3540	2750	2650	2750	2530	2430	N/A	980	930	1540	1060	N/S	1530
	TOX (Fg/L)	93	520	44	690	37	68	550	N/A	18	32 J	51	300	N/S	59
	TOC (mg/L)	1.1	0.86J	1.5	0.96 J	1.4	1.3	0.96 J	N/A	1.0	1.3	2.5	2.2	N/S	1.4
Week 4	**Sample Date**	6/29/99	10/19/99	6/28/99	10/18/99	N/A	6/29/99	10/19/99	N/A	6/29/99	10/19/99	6/29/99	10/19/99	6/29/99	10/19/99
	pH (standard units)	6.61	7.12	6.87	6.79	N/A	6.64	7.17	N/A	7.26	7.93	6.86	6.83	6.94	7.08
	Specific Conductance	3470	2780	2520	2590	N/A	2120	1960	N/A	820	890	1430	990	1360	1680
	TOX (Fg/L)	41	760	51	91	N/A	23	47	N/A	29	18	40	170	25	29
	TOC (mg/L)	1.0	1.8	1.3	0.89 J	N/A	1.4	1.2	N/A	1.2	0.88 J	2.5	1.9	1.9	1.4
1999 Range	pH (standard units)	6.60 - 7.12		6.70 - 6.92		N/A	6.49 - 7.17		N/A	7.26 - 8.24		6.47 - 7.22		6.94 - 7.42	
	Specific Conductance	2780 - 4390		2460 - 3260		N/A	1960 - 2530		N/A	750 - 980		990 - 1540		1280 - 1680	
	TOX (Fg/L)	41 - 1400		44 - 1200		N/A	23 - 550		N/A	18 - 430		40 - 350		25 - 610	
	TOC (mg/L)	0.86 - 7.0		0.89 - 1.7		N/A	0.96 - 1.7		N/A	0.88 - 1.8		1.9 -2.8		1.2 - 2.1	

Specific conductance unit = Fmhos/cm @ 25 EC; J = Quantitative estimate; N/A = Not applicable; TOX = total organic halide; TOC = total organic carbon

Table 9. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Main Plateau - Contamination Indicator Constituents
(continued)

	Constituents	Well													
		MPW-8		MPW-9		MPW-9-1	MPW-10		MPW-10-1	MPW-11		MPW-11-1	MPW-12		MPW-12-1
Well	Sample Event	Round 1	Round 2	Round 1	Round 2	Round 2	Round 1	Round 2	Rounds1, 2	Round 1	Round 2	Rounds 1, 2	Round 1	Round 2	Round 2
Week 1	Sample Date	6/8/99	9/29/98	4/29/98	4/29/98	N/A	6/9/99	9/28/99	6/9-9/28/99	6/8/99	9/28/99	N/A	6/8/99	9/27/99	N/A
	pH (standard units)	6.99	6.94	7.11	7.27	N/A	8.63	8.19	8.63/8.19	6.91	7.09	N/A	6.91	6.72	N/A
	Specific Conductance	2900	3860	620	720	N/A	630	700	630	1870	1610	N/A	3630	4000	N/A
	TOX (Fg/L)	72	990	51	360	N/A	11	260	15/51	54	65	N/A	82	490	N/A
	TOC (mg/L)	2.5	1.9	1.9	2.4	N/A	1.1	1.2	0.93 J/1.1	101	1.1	N/A	1.2	2.0	N/A
Week 2	Sample Date	6/15/99	10/5/99	6/15/99	10/5/99	10/5/99	6/15/99	10/5/99	N/A	6/14/99	10/4/99	N/A	6/14/99	10/5/99	N/A
	pH (standard units)	6.81	6.95	7.08	6.89	6.89	8.74	8.72	N/A	6.98	6.54	N/A	6.82	6.69	N/A
	Specific Conductance	3680	4690	810	870	870	780	860	N/A	1920	1550	N/A	3890	3790	N/A
	TOX (Fg/L)	140	820	42	250	160	37	670	N/A	54	72	N/A	59	250	N/A
	TOC (mg/L)	1.5	1.9	1.2	1.0	0.77 J	0.81 J	2.6	N/A	1.1	1.1	N/A	0.91 J	0.86 J	N/A
Week 3	Sample Date	6/22/99	10/13/99	6/22/99	10/13/99	N/A	6/22/99	10/13/99	N/A	6/21/99	10/12/99	10/12/99	6/21/99	10/12/99	N/A
	pH (standard units)	7.14	6.99	7.45	7.08	N/A	8.74	8.72	N/A	7.26	7.00	7.00	7.07	6.92	N/A
	Specific Conductance	3740	3900	810	730	N/A	760	710	N/A	1870	1620	1620	3580	3290	N/A
	TOX (Fg/L)	47	890	27	29	N/A	17	9.7 J	N/A	28	53	44	75	95	N/A
	TOC (mg/L)	1.6	1.8	1.4	0.86 J	N/A	1.0	0.91 J	N/A	1.2	1.1	0.91 J	0.91 J	2.1	N/A
Week 4	Sample Date	6/28/99	10/18/99	6/29/99	10/19/99	N/A	6/29/99	10/19/99	N/A	6/28/99	10/18/99	6/28/99	6/28/99	10/18/99	10/18/99
	pH (standard units)	6.87	7.01	6.92	7.17	N/A	7.82	8.38	N/A	7.25	6.9	7.25	7.07	6.78	6.78
	Specific Conductance	3270	3780	670	690	N/A	640	660	N/A	1680	1600	1680	2610	2900	2900
	TOX (Fg/L)	54	680	12	16	N/A	13	23	N/A	42	59	35	48	77	93
	TOC (mg/L)	1.7	1.3	1.4	1.0	N/A	1.2	0.78 J	N/A	1.5	1.2	1.3	1.4	0.89 J	0.79 J
1999 Range	pH standard units)	6.81 - 7.14		6.89 -7.45		N/A	7.82 - 8.74		N/A	6.54 - 7.26		N/A	6.69 - 7.07		N/A
	Specific Conductance	2900 - 4690		620 - 870		N/A	630 - 860		N/A	1550 - 1920		N/A	2610 - 4000		N/A
	TOX (Fg/L)	54 - 990		12 - 360		N/A	9.7 - 670		N/A	28 - 72		N/A	48 - 490		N/A
	TOC (mg/L)	1.3 - 2.5		0.86 - 2.4		N/A	0.78 - 2.6		N/A	1.1 - 1.5		N/A	0.86 - 2.1		N/A

Specific conductance unit = Fmhos/cm @ 25 EC; J = Quantitative estimate; N/A = Not applicable; TOX = total organic halide; TOC = total organic carbon

Table 10. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Valley Fill - Contamination Indicator Constituents

	Constituent	Well															
		VFW-1		VFW-1-1	VFW-2		VFW-2-1	VFW-3		VFW-3-1	VFW-4		VFW-5		VFW - 6		VFW - 7
Week	Sample Event	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1
Week 1	**Sample Date**	6/7/99	9/27/99	N/A	6/7/99	9/27/99	N/A	6/9/99	9/27/99	N/A	6/8/99	9/27/99	6/7/99	9/27/99	6/7/99	9/27/99	6/7/99
	pH (standard units)	7.82	7.64	N/A	6.86	6.49	N/A	6.80	6.87	N/A	6.78	6.79	6.86	6.95	7.02	6.93	6.66
	Specific Conductance	1150	930	N/A	2530	1970	N/A	1810	2230	N/A	1840	2110	2840	2930	3010	3110	3420
	TOX (Fg/L)	41	250	N/A	99	36	N/A	91	810	N/A	86	87	86	1200	74	100	62
	TOC (mg/L)	9.3	4.7	N/A	2.6	2.3	N/A	2.3	1.6	N/A	1.4	1.7	2.2	2.0	3.1	2.9	1.8
Week 2	**Sample Date**	6/14/99	10/4/99	N/A	6/14/99	10/4/99	N/A	6/15/99	10/5/99	6/15/99	6/14/99	10/4/99	6/14/99	10/4/99	6/14/99	10/4/99	6/14/99
	pH (standard units)	7.74	8.09	N/A	6.8	6.97	N/A	6.74	6.85	6.74	6.82	6.63	6.89	7.01	6.97	6.98	6.74
	Specific Conductance	830	1030	N/A	2410	1930	N/A	2140	2950	2140	1970	2050	3010	2900	3120	3050	3860
	TOX (Fg/L)	44	840	N/A	44	81	N/A	90	720	87	60	37	65	91	51	92	64
	TOC (mg/L)	9.2	3.2	N/A	2.0	2.1	N/A	1.6	1.3	1.6	1.2	1.2	2.2	2.3	2.7	3.2	1.7
Week 3	**Sample Date**	6/21/99	10/12/99	10/12/99	6/21/99	10/12/99	6/21/99	6/22/99	10/12/99	N/A	6/21/99	10/12/99	6/21/99	10/12/99	6/21/99	10/12/99	6/21/99
	pH (standard units)	7.93	8.36	8.36	6.86	6.69	6.86	6.79	6.73	N/A	6.77	6.77	7.01	6.83	6.98	6.85	6.74
	Specific Conductance	880	1090	1090	2360	1970	2360	2140	2350	N/A	1950	2070	3070	2920	3170	3040	3920
	TOX (Fg/L)	30	120	310	50	41	24	46	110	N/A	60	120	47	73	54	86	110
	TOC (mg/L)	7.1	3.5	3.2	1.8	3.4	1.6	1.8	1.7	N/A	1.3	1.5	2.2	2.5	2.7	3.0	1.8
Week 4	**Sample Date**	6/28/99	10/18/99	N/A	6/28/99	10/18/99	N/A	6/29/99	10/19/99	N/A	6/28/99	10/18/99	6/28/99	10/18/99	6/28/99	10/18/99	6/28/99
	pH (standard units)	8.16	8.08	N/A	7.01	6.74	N/A	6.73	6.78	N/A	6.93	6.83	6.89	6.81	7.04	7.01	6.93
	Specific Conductance	830	960	N/A	2120	1930	N/A	1770	2270	N/A	1870	2040	2870	2770	2960	2900	3630
	TOX (Fg/L)	4.1 J	37	N/A	12	57	N/A	46	66	N/A	40	77	41	94	84	110	69
	TOC (mg/L)	6.5	2.7	N/A	2.1	2.0	N/A	2.3	1.3	N/A	2.0	1.1	2.2	2.8	3.0	3.0	1.9
1999 Range	pH (standard units)	7.64 - 8.36		N/A	6.49 - 7.01		N/A	6.73 - 6.87		N/A	6.63 - 6.93		6.81 - 7.01		6.85 - 7.04		6.56 - 6.93
	Specific Conductance	830 1150		N/A	1930 - 2530		N/A	1770 - 2950		N/A	1840 - 2110		2770 - 3070		2900 - 3170		3420-3920
	TOX (Fg/L)	4.1 - 840		N/A	12.0 - 99		N/A	46 - 810		N/A	37 - 120		41 - 1200		51 - 110		62 - 620
	TOC (mg/L)	2.7 - 9.3		N/A	1.8 - 3.4		N/A	1.3 - 2.3		N/A	1.1 - 2.0		2.0 - 2.8		2.7 - 3.2		1.7 -2.5

Specific conductance unit = Fmhos/cm @ 25 EC; J = Quantitative estimate; N/A = not applicable; TOX = total organic halide; TOC = total organic carbon.

Table 10. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Valley Fill - Contamination Indicator Constituents
(continued)

Constituents		Well															
		VFW-7	VFW-7-1	VFW-9		VFW-10		VFW-10-1	VFW-11		VFW-11-1	VFW-12		VFW-12-1	VFW-14		VFW-14-1
Week	Sample Event	Round 2	Round 2	Round 1	Round 1	Round 1	Round 2	Round 1	Round 1	Round 2	Round 2	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1
Week 1	**Sample Date**	9/27/99	N/A	6/7/99	9/28/99	6/7/99	9/27/99	6/7/99	6/8/99	9/28/99	9/28/99	6/8/99	9/27/99	N/A	6/7/99	9/27/99	N/A
	pH (standard units)	6.56	N/A	7.19	6.71	6.97	6.69	6.97	6.91	6.80	6.80	6.92	6.54	N/A	6.83	6.79	N/A
	Specific Conductance	3680	N/A	890	1240	1840	2190	1840	1370	1560	1560	1770	2020	N/A	2280	2240	N/A
	TOX (Fg/L)	620	N/A	58	530	95	99	51	56	56	60	97	110	N/A	52	120	N/A
	TOC (mg/L)	2.5	N/A	1.8	1.5	1.7	2.8	1.7	1.5	1.2	1.2	3.9	4.1	N/A	1.8	2.1	N/A
Week 2	**Sample Date**	10/4/99	10/4/99	6/14/99	10/4/99	6/14/99	10/4/99	N/A	6/14/99	10/4/99	N/A	6/14/99	10/4/99	N/A	6/14/99	10/4/99	N/A
	pH (standard units)	6.69	6.69	7.17	7.22	6.78	NS	N/A	690	7.08	N/A	6.78	6.75	N/A	6.69	6.55	N/A
	Specific Conductance	3640	3640	1040	1180	2590	2080	N/A	1330	1470	N/A	1850	2100	N/A	2530	2350	N/A
	TOX (Fg/L)	120	120	49	47	42	76	N/A	57	64	N/A	82	80	N/A	54	860	N/A
	TOC (mg/L)	2.0	1.8	1.4	1.1	1.9	1.8	N/A	1.1	1.3	N/A	3.3	3.2	N/A	1.7	1.7	N/A
Week 3	**Sample Date**	10/12/99	N/A	6/21/99	10/12/99	6/21/99	10/12/99	N/A	6/21/99	10/12/99	N/A	6/21/99	10/12/99	N/A	6/21/99	10/12/99	N/A
	pH (standard units)	6.63	N/A	7.21	6.97	6.97	6.76	N/A	7.01	6.85	N/A	7.00	6.88	N/A	6.82	6.69	N/A
	Specific Conductance	3640	N/A	1080	1240	2480	2030	N/A	1400	1510	N/A	1860	2080	N/A	2490	2380	N/A
	TOX (Fg/L)	62	N/A	36	45	49	31	N/A	43	82	N/A	50	46	N/A	66	67	N/A
	TOC (mg/L)	2.0	N/A	1.5	1.3	1.6	1.9	N/A	1.3	1.1	N/A	2.8	4.5	N/A	1.9	1.9	N/A
Week 4	**Sample Date**	10/18/99	N/A	6/28/99	10/18/99	6/29/99	10/18/99	N/A	6/28/99	10/18/99	N/A	6/28/99	10/18/99	6/28/99	6/28/99	10/18/99	N/A
	pH (standard units)	6.86	N/A	7.39	6.99	6.71	6.88	N/A	7.10	6.85	N/A	7.07	6.72	7.07	6.89	6.75	N/A
	Specific Conductance	3640	N/A	920	1010	2570	2000	N/A	1310	1480	N/A	1750	2030	1750	2330	2340	N/A
	TOX (Fg/L)	81	N/A	26	33	37	42	N/A	31	31	N/A	50	28	25	15	34	N/A
	TOC (mg/L)	1.8	N/A	1.6	1.4	2.5	2.4	N/A	1.1	1.1	N/A	2.7	4.7	2.7	2.0	1.8	N/A
1999 Range	pH (standard unit)	N/A	N/A	6.71 - 7.39		6.69 - 6.97		N/A	6.80 - 7.10		N/A	6.54 - 7.07		N/A	6.55 - 6.89		N/A
	Specific Conductance	N/A	N/A	890 - 1240		1840 - 2590		N/A	1310 - 1560		N/A	1750 - 2100		N/A	2240 - 2530		N/A
	TOX (Fg/L)	N/A	N/A	26 - 530		31 - 99		N/A	31 - 82		N/A	28 - 110		N/A	15 - 860		N/A
	TOC (mg/L)	N/A	N/A	1.1 - 1.8		1.6 - 2.8		N/A	1.1 - 1.5		N/A	2.7 - 4.7		N/A	1.7 - 2.1		N/A

Specific conductance unit = Fmhos/cm @ 25 EC; J = Quantitative estimate; N/A = not applicable; TOX = total organic halide; TOC = total organic carbon.

Table 11. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Main Plateau - Groundwater Characteristics Constituents

	Well Number and Sample Date													
	MPW-1		MPW-2		MPW-2-1	MPW-4		MPW-4D		MPW-7		MPW-7-1	MPW-7D	
Constituent	6/8/99	9/28/99	6/8/99	9/28/99	9/28/99	6/8/99	9/28/99	6/8/99	9/28/99	6/15/99	9/27/99	9/27/99	6/9-15/99	10/5/99
Inorganics (Fg/L)														
Aluminum	190	130	210	240	210	50 U	100	61	210	190	50 U	N/A	190	110
Boron	130	56	110	71	58	98	69	190	210	130	89	N/A	160	100
Calcium	30,000	340,000	280,000	280,000	270,000	60,000	220,000	3,900	3,900	110,000	120,000	N/A	180,000	130,000
Iron	100	31	49	670	540	54	190	97	46	39	57	N/A	71	30 U
Magnesium	160,000	180,000	67,000	64,000	63,000	15,000	87,000	900	840	13,000	15,000	N/A	41,000	3,4000
Manganese	140	67	1,300	1,200	1,200	5.0 U	160	30	20	16	48	N/A	160	110
Nickel	450	900	34	91	91	28	260	12	16	310	360	N/A	460	370
Potassium	3,500	3,600	2,400	2,500	2,300	720	3,100	610	500 U	2,900	2,900	N/A	3,100	1,600
Silicon	3,100	3,000	3,500	3,300	3,400	2,900	3,200	3,100	3200	3,600	4,500	N/A	4,600	3,900
Sodium	69,000	84,000	160,000	180,000	170,000	63,000	68,000	180,000	210,000	130,000	120,000	N/A	85,000	73,000
Strontium	1,200	1,300	520	510	500	1200	840	110	140	230	230	N/A	1,900	1,100
Quality Parameters (mg/L)														
Chloride	910	1100	660	740	N/A	550	580	97	100	230	210	N/A	230	N/S
Fluoride	0.11	0.10 U	0.10 U	0.10 U	N/A	0.16	0.11	1.4	1.7	0.24	0.19	N/A	0.19	N/S
Nitrate	0.22	0.10	0.67	0.57	N/A	0.31	0.26	0.10 U	0.14	2.7	0.89	N/A	0.18	0.10 U
Sulfate	130	200	98	160	N/A	97	67	15	20	94	88	N/A	59	N/S
Total Dissolved Solids	2,700	NS	1,930	NS	N/A	2,070	NS	568	NS	831	NS	N/A	1,220	N/S
Total Alkalinity	186	201	137	167	N/A	201	187	320	331	181	241	N/A	244	N/S

N/A = not applicable; NS = not sampled; U = not detected.

Table 11. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Main Plateau - Groundwater Characteristics Constituents
(continued)

Constituent	Well Number and Sample Date												
	MPW-7D-1	MPW-8		MPW-9		MPW-9-1	MPW-10		MPW-11		MPW-11-1	MPW-12	
	6/15/99	6/8/99	9/27/99	6/8/99	9/28/99	6/8-9/28/99	6/9/99	9/28/99	6/8/99	9/28/99	6/8/99	6/8/99	9/27/99
Inorganics (Fg/L)													
Aluminum	N/A	62	50 U	50 U	230	51	90	320	76	78	N/A	34	85
Boron	N/A	70	43	110	110	94	170	170	120	110	N/A	120	70
Calcium	N/A	230,000	370,000	71,000	63,000	200,000	2,200	1,500	150,000	130,000	N/A	530,000	390,000
Iron	N/A	48	30 U	30 U	51	97	31	33	52	110	N/A	63	87
Magnesium	N/A	74,000	98,000	18,000	16,000	79,000	520	440	37,000	31,000	N/A	60,000	48,000
Manganese	N/A	80	360	5.0 U	13	270	5.0 U	7.5	44	35	N/A	29	53
Nickel	N/A	83	230	24	51	200	10 U	29	130	47	N/A	72	27
Potassium	N/A	3,400	5,200	880	700	2,500	500 U	500 U	3,200	2,600	N/A	3,700	3,300
Silicon	N/A	3,100	4,300	3,200	3,300	3,200	3,700	3,300	3,200	3,000	N/A	3,500	7,200
Sodium	N/A	160,000	230,000	67,000	74,000	88,000	180,000	180,000	160,000	140,000	N/A	570,000	450,000
Strontium	N/A	580	820	1,400	1,400	720	77	66	360	280	N/A	770	560
Quality Parameters (mg/L)													
Chloride	N/A	870	1,000	97	78	77	62	60	490	300	470	1,500	990
Fluoride	N/A	0.10 U	0.10 U	0.11	0.10	0.10 U	0.43	0.43	0.21	0.21	0.2	0.10 U	0.10 U
Nitrate	0.17	0.47	0.19	0.23	0.15	N/A	0.10 U	0.10 U	2.0	1.6	N/A	0.10 U	1.2
Sulfate	N/A	130	170	46	44	36	11	14	180	180	140	160	170
Total Dissolved Solids	N/A	2,620	NS	480	NS	N/A	472	NS	1,610	NS	1,630	3,710	NS
Total Alkalinity	N/A	69.3	232	193	250	265	296	113	104	113	102	122	133

N/A = not applicable; NS = not sampled; U = not detected.

Table 12. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Valley Fill - Groundwater Characteristics Constituents

Constituent	Well Number and Sample Date													
	VFW-1		VFW-1-1	VFW-2		VFW-3		VFW-4		VFW-5		VFW-5-1	VFW-5-6	
	6/7/99	9/27/99	9/27/99	6/7/99	9/27/99	6/9/99	9/27/99	6/8/99	9/27/99	6/7/99	9/27/99	6/7/99	6/7/99	9/27/99
Inorganics (Fg/L)														
Aluminum	50 U	96	N/A	110	50 U	72	50 U	170	50 U	130	50 U	N/A	110	50 U
Boron	260	230	N/A	190	190	93	34	91	140	280	200	N/A	160	220
Calcium	8,300	6,100	N/A	350,000	270,000	200,000	250,000	220,000	280,000	240,000	290,000	N/A	230,000	300,000
Iron	400	490	N/A	3,000	2,700	35	1,200	72	59	55	30 U	N/A	650	1,100
Magnesium	2,400	1,900	N/A	70,000	54,000	82,000	100,000	75,000	95,000	33,000	42,000	N/A	46,000	62,000
Manganese	51	24	N/A	2,600	1,900	25	110	23	13	8.0	41	N/A	450	690
Nickel	10 U	10 U	N/A	26	10 U	160	91	110	10 U	45	10 U	N/A	21	10 U
Potassium	1,300	1,000	N/A	9,800	14,000	3,800	3,500	3,200	3,600	4,200	4,400	N/A	7,000	10,000
Silicon	NS	4,700	N/A	NS	8,600	4,300	4,400	4,400	4,400	NS	7,300	N/A	NS	6,500
Sodium	220,000	230,000	N/A	140,000	140,000	84,000	93,000	18,000	22,000	370,000	350,000	N/A	320,000	310,000
Strontium	560	440	N/A	3,400	2,400	970	1,000	1,400	1,600	680	700	N/A	1,000	1,100
Quality Parameters (mg/L)														
Chloride	12	24	N/A	440	150	400	520	460	490	760	780	760	800	740
Fluoride	1.3	1.5	N/A	1.1	1,400	0.17	0.20	0.14	0.14	0.86	0.66	0.91	0.87	0.84
Nitrate	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	1.5	1.1	0.22	0.17	0.49	0.46	N/A	0.10 U	0.10 U
Sulfate	1.0 U	1.5	N/A	620	740	120	150	63	93	230	240	220	400	330
Total Dissolved Solids	907	NS	N/A	2,590	NS	1,440	NS	1,440	NS	2,710	NS	2,700	2,030	NS
Total Alkalinity	525	551	N/A	183	209	294	319	292	316	201	252	193	106	156

N/A = not applicable; NS = not sampled; U = not detected.

Table 12. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Valley Fill - Groundwater Characteristics Constituents
(continued)

Constituent	Well Number and Sample Date														
	VFW-6-1	VFW-7		VFW-7-1	VFW 9		VFW-10		VFW-11		VFW-12		VFW-12-1	VFW-14	
	6/7/99 and 9/27/99	6/7/99	9/27/99	6/7/99	6/7/99	9/28/99	6/7/99	9/27/99	6/8/99	9/28/99	6/8/99	9/27/99	9/27/99	6/7/99	9/27/99
Inorganics (Fg/L)															
Aluminum	50 U	110	89	140	100	200	86	98	120	150	95	130	N/A	420	190
Boron	210	120	58	83	66	39	110	140	66	41	280	290	N/A	160	92
Calcium	290,000	330,000	310,000	290,000	150,000	160,000	270,000	250,000	180,000	180,000	260,000	210,000	N/A	270,000	250,000
Iron	1,000	1,600	1,300	1,200	82	30 U	30 U	110	33	55	43	220	N/A	46	760
Magnesium	58,000	63,000	61,000	55,000	29,000	32,000	53,000	49,000	47,000	47,000	74,000	57,000	N/A	56,000	57,000
Manganese	680	1,400	1,300	1,300	11	21	2,300	2,600	69	150	440	410	N/A	1,200	1,900
Nickel	10 U	22	10 U	27	17	28	39	37	620	290	790	800	N/A	50	23
Potassium	9,900	5,000	5,900	5,600	2,200	2,100	11,000	13,000	1,900	1,400	3,700	3,500	N/A	3,900	2,800
Silicon	6,500	NS	3,900	N/A	NS	3,100	NS	6,300	2,600	3,100	4,600	5,200	N/A	NS	5,700
Sodium	310,000	380,000	390,000	340,000	41,000	36,000	180,000	210,000	36,000	35,000	120,000	110,000	N/A	180,000	130,000
Strontium	1,100	2,100	1,800	1,800	290	280	640	560	580	480	2,100	1,100	N/A	1,600	1,300
Quality Parameters (mg/L)															
Chloride	N/A	1,200	1,200	N/A	200	240	300	430	360	340	430	400	410	630	540
Fluoride	N/A	0.10 U	0.10 U	N/A	0.1 U	0.10 U	0.55	0.85	0.10 U	0.10 U	0.30	0.40	0.38	0.20	0.18
Nitrate	0.10 U	0.10 U	0.10 U	N/A	0.10	1.2	2.1	0.5	0.13	0.10 U	0.11	0.15	N/A	0.10 U	0.10 U
Sulfate	N/A	100	130	N/A	120	160	540	570	120	130	260	190	220	180	200
Total Dissolved Solids	N/A	3,050	NS	N/A	994	NS	1750	NS	964	NS	1540	NS	N/A	2,060	NS
Total Alkalinity	N/A	200	226	N/A	142	150	214	240	174	189	220	260	271	219	264

N/A = not applicable; NS = not sampled; U = not detected.

Table 13. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Main Plateau - Pesticides/PCB Constituents (Fg/L)

Constituent	Well Number and Sample Date									
	MPW-1		MPW-4		MPW-4D		MPW-4D-1		MPW-12	
	6/8/99	10/5/99	6/8/99	9/28/99	6/8/99	9/28/99	6/8/99	9/28/99	6/8/99	9/28/99
4,4'-DDD	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U
4,4'-DDE	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U
4,4'-DDT	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U
Aldrin	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
alpha-BHC	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
alpha-Chlordane	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
beta-BHC	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
delta-BHC	0.10 U	0.010 U	0.10 U	0.010 U	0.10 U	0.010 U	0.10 U	0.010 U	0.10 U	0.010 U
Dieldrin	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U
Endosulfan I	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U
Endosulfan II	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U	0.060 U	0.050 U
Endosulfan Sulfate	0.060 U	0.50 U	0.060 U	0.50 U	0.060 U	0.50 U	0.060 U	0.50 U	0.060 U	0.50 U
Endrin	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U
Endrin aldehyde	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U
Endrin ketone	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U	0.060 U	0.10 U
gamma-BHC (Lindane)	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
gamma-Chlordane	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Heptachlor	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Heptachlor epoxide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methoxychlor	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Toxaphene	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Aroclor-1016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1221	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1232	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1242	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1248	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U - Not detected; DDD = dichlorodiphenyldichloroethane; DDE = dichlorodiphenylethane; DDT = dichlorodiphenyltrichloroethane; BHC = benzene hexachloride.

Table 14. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples,
Valley Fill - Pesticides/PCB Constituents (Fg/L)

Constituent	Well Number and Sample Date	
	VFW-2	
	6/7/99	9/27/99
4,4 ft-DDD	0.060 U	0.10 U
4,4 ft-DDE	0.060 U	0.050 U
4,4 ft-DDT	0.060 U	0.10 U
Aldrin	0.050 U	0.050 U
alpha-BHC	0.050 U	0.050 U
alpha-Chlordane	0.10 U	0.10 U
beta-BHC	0.050 U	0.050 U
delta-BHC	0.10 U	0.10 U
Dieldrin	0.060 U	0.050 U
Endosulfan I	0.060 U	0.050 U
Endosulfan II	0.060 U	0.050 U
Endosulfan Sulfate	0.060 U	0.50 U
Endrin	0.060 U	0.10 U
Endrin aldehyde	0.060 U	0.10 U
Endrin ketone	0.060 U	0.10 U
gamma-BHC (Lindane)	0.050 U	0.050 U
gamma-Chlordane	0.10 U	0.10 U
Heptachlor	0.050 U	0.050 U
Heptachlor epoxide	1.0 U	1.0 U
Methoxychlor	2.0 U	2.0 U
Toxaphene	2.0 U	2.0 U
Aroclor-1016	1.0 U	1.0 U
Aroclor-1221	1.0 U	1.0 U
Aroclor-1232	1.0 U	1.0 U
Aroclor-1242	1.0 U	1.0 U
Aroclor-1248	1.0 U	1.0 U
Aroclor-1254	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U

U - Not detected; DDD = dichlorodiphenyldichloroethane;
DDE = dichlorodiphenylethane;
DDT = dichlorodiphenyltrichloroethane; BHC = benzene hexachloride.

Table 15. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples
Main Plateau - Semivolatile Organic Compounds Constituents (Fg/L)

Constituent	Well Number and Sample Date				
	MPW-1		MPW-7		MPW-7-1
	6/8/99	9/28/99	6/9/99	9/27/99	6/9/99
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U
2,4-Dinitrotoulene	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U
2-Methylphenol (o-Cresol)	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	50 U	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U
4,6-Dinitro-2-methlyphenol	50 U	50 U	50 U	50 U	50 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	20 U	20 U	20 U	20 U	20 U
4-Chlorodiphenyl ether	10 U	10 U	10 U	10 U	10 U
4-Methylphenol (p-Cresol)	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U

U = not detected

Table 15. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples
Main Plateau - Semivolatile Organic Compounds Constituents (Fg/L)
(continued)

Constituent	Well Number and Sample Date				
	MPW-1		MPW-7		MPW-7-1
	6/8/99	9/28/99	6/9/99	9/27/99	6/9/99
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U
Benzo(ghi)perylene	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethoxyl) methane	10 U	10 U	10 U	10 U	10 U
Bis (2-chloroethyl) ether	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroisopropyl) ether	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl) phthalate	10 U	12 B	130	59 B	10 U
Butyl benzyl phthalate	10 U	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	10 U	10 U	10 U	10 U	10 U
Di-n-octly phthalate	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U
Diethyl phthalate	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	50 U	50 U	50 U	50 U	50 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-propylamine	10 U	10 U	10 U	10 U	10 U
N-nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U
Phenol	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U

B = less than five times in the associated blank; U = not detected.

Table 16. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples
Valley Fill - Semivolatile Organic Compounds Constituents (Fg/L)

Constituent	Well Number and Sample Date				
	VFW-2		VFW-14		VFW-14-1
	6/7/99	9/27/99	6/7/99	9/27/99	9/27/99
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U
2,4-Dinitrotoulene	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U
2-Methylphenol (o-Cresol)	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	50 U	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U
4,6-Dinitro-2-methlyphenol	50 U	50 U	50 U	50 U	50 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	20 U	20 U	20 U	20 U	20 U
4-Chlorodiphenyl ether	10 U	10 U	10 U	10 U	10 U
4-Methylphenol (p-Cresol)	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U

U = not detected.

Table 16. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples
Valley Fill - Semivolatile Organic Compounds Constituents (Fg/L)
(continued)

Constituent	Well Number and Sample Date				
	VFW-2		VFW-14		VFW-14-1
	6/7/99	9/27/99	6/7/99	9/27/99	9/27/99
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U
Benzo(ghi)perylene	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethoxyl) methane	10 U	10 U	10 U	10 U	10 U
Bis (2-chloroethyl) ether	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroisopropyl) ether	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl) phthalate	33	19 B	43	16 B	24 B
Butyl benzyl phthalate	10 U	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	10 U	10 U	10 U	10 U	10 U
Di-n-octly phthalate	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U
Diethyl phthalate	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	50 U	50 U	50 U	50 U	50 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-propylamine	10 U	10 U	10 U	10 U	10 U
N-nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U
Phenol	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U

B = less than five times in the associated blank; U = not detected.

Table 17. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples
Valley Fill - TPH Constituents (mg/L)

Constituent	Well Number and Sample Date								
	VFW-2		VFW-4		VFW-4-1	VFW-7		VFW-9	
	6/7/99	9/27/99	6/8/99	9/27/99	9/27/99	6/7/99	9/27/99	6/7/99	9/28/99
TPH-DRO	1.0 U	1.0 U	< 1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Constituent	**Well Number and Sample Date**								
	VFW-10		VFW-11		VFW-12		VFW-12-1	VFW-14	
	6/7/99	9/27/99	6/8/99	9/28/99	6/8/99	9/27/99	6/8/99	6/7/99	9/27/99
TPH-DRO	1.0 U	1.0 U	< 1.0	1.0 U	< 1.0	1.0 U	< 1.0	1.0 U	1.0 U

U = not detected; TPH = total petroleum hydrocarbons; TPH-DRO = total petroleum hydrocarbons and diesel range organics.

Table 18. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Main Plateau - Volatile Organic Compounds Constituents (Fg/L)

Constituent	Well Number and Sample Date										
	MPW-1		MPW-7		MPW-7-1	MPW-7D		MPW-8		MPW-9	
	6/8/99	9/28/99	6/9/99	9/27/99	6/9/99	6/9/99	9/27/99	6/8/99	9/27/99	6/8/99	9/28/99
1,1,1-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	4.3 J	12	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (MEK)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Methyl-2-pentanone (MIBK)	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Acetone	23 J	100 U	2.4 J	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toulene	5.0 U	5.0 U	5.0 U	5.0 U	0.60 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Total Xylenes	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

J = quantitative estimate; U = not detected; MEK = methylethyl ketone; MIBK = methylisobutyl ketone.

Table 18. NETL-PGH 1999 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Main Plateau - Volatile Organic Compounds Constituents (Fg/L)
(continued)

Constituent	Well Number and Sample Date					
	MPW-10		MPW-11		MPW-12	
	6/9/99	9/28/99	6/8/99	9/28/99	6/8/99	10/5/99
1,1,1-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (MEK)	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	50 U	50 U	50 U	50 U	50 U	50 U
4-Methyl-2-pentanone (MIBK)	50 U	50 U	50 U	50 U	50 U	50 U
Acetone	100 U	100 U	100 U	100 U	100 U	100 U
Benzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	0.5 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5.0 U	5.0 U	3.9 J	5.0 U	2.6 J	5.0 U
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,2-Dchloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toulene	0.6 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Total Xylenes	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl chloride	10 U	10 U	10 U	10 U	10 U	10 U

J = quantitative estimate; U = not detected; MEK = methylethyl ketone; MIBK = methylisobutyl ketone.

Table 19. NETL-PGH 1999 Groundwater Detection Monitoring Program Results of Analysis - Groundwater Samples, Valley Fill - Volatile Organic Compounds Constituents (µg/L)

Constituent	Well Number and Sample Date								
	VFW-2		VFW-3		VFW-10		VFW-10-1	VFW-14	
	6/7/99	9/27/99	6/9/99	9/27/99	6/7/99	9/27/99	9/27/99	6/7/99	9/27/99
1,1,1-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (MEK)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Methyl-2-pentanone (MIBK)	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Acetone	100 U	100 U	3.0 J	100 U	100 U	100 U	100 U	100 U	100 U
Benzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	5.0 U	5.0 U	5.4	8.7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5.0 U	5.0 U	21	27	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toulene	5.0 U	5.0 U	5.0 U	5.0 U	0.80 J	5.0 U	5.0 U	5.0 U	5.0 U
Total Xylenes	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

J = quantitative estimate; U = not detected; MEK = methylethyl ketone; MIBK = methylisobutyl ketone.

Table 20. NETL-MGN March 1999 Groundwater Data for "Morgantown Aquifer"

Parameter	Sample Location			
	D1M	D2M	D3M	D4M
pH (s.u)	6.58	9.22	6.00	6.4
Specific Conductance (Fmhos)	379	688	490	331
Temperature (E C)	13.5	9.8	10.7	11.7
Arsenic (total, mg/L)	0.010	ND	ND	ND
Barium (total, mg/L)	0.19	0.16	0.80	0.34
Cadmium (total, mg/L)	ND	ND	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND
Iron (total, mg/L)	12	3.6	ND	2.0
Manganese (total, mg/L)	1.1	0.25	0.050	0.11
Sodium (total, mg/L)	5.8	130	32	16
Vanadium (total, mg/L)	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND
Chloride (mg/L)	11	ND	ND	28
Sulfate (mg/L)	29	ND	17	12
Nitrate Nitrogen (mg/L)	ND	0.31	0.07	0.65
Fluoride (mg/L)	0.06	0.46	0.13	0.15
Total Recoverable Phenolics (mg/L)	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND
Total Organic Carbon (mg/L)	1.4	1.3	1.3	ND
Naphthalene (Fg/L)	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 21. NETL-MGN March 1999 Groundwater Data for "A Aquifer"

Parameter	Sample Location												
	A	B	SP1-A	SP4-A	SP8-A	SP9-A	I	J	K	L	M	N	GAS-4
pH (s.u)	6.80	6.85	6.65	6.60	6.73	5.93	6.24	5.61	5.46	5.43	6.51	5.10	5.71
Specific Conductance (Fmhos)	322	224	715	293	338	390	515	692	988	794	319	724	274
Temperature (E C)	11.9	10.2	12.8	14.3	13.9	13.1	13.4	13.9	11.3	13.5	9.9	12.5	15.8
Arsenic (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium (total, mg/L)	0.35	0.23	0.15	0.030	0.30	0.18	0.36	0.19	0.087	0.070	0.035	0.13	0.28
Cadmium (total, mg/L)	ND	ND	ND	ND	ND	0.0006	ND	0.0006	0.0040	0.0024	ND	0.0012	ND
Chromium (total, mg/L)	ND	ND	ND	ND	ND	0.029	ND	ND	ND	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	0.007	ND	ND	ND	0.005	ND	ND	ND	ND	0.008
Mercury (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron (total, mg/L)	21	31	34	3.5	36	0.68	15	0.70	ND	2.0	2.7	1.3	47
Manganese (total, mg/L)	0.89	1.2	1.7	0.32	2.4	1.9	0.27	0.071	1.7	0.51	0.99	0.37	2.0
Sodium (total, mg/L)	6.4	4.8	12	7.0	6.8	120	25	43	110	68	19	41	15
Vanadium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	0.021	ND	ND	ND	ND
Chloride (mg/L)	ND	ND	ND	23	29	280	83	150	240	110	33	140	190
Sulfate (mg/L)	10	18	47	24	8	45	44	43	67	84	75	54	83
Nitrate Nitrogen (mg/L)	0.07	0.08	ND	0.12	0.11	1.1	0.05	0.68	0.97	0.55	0.21	0.57	ND
Fluoride (mg/L)	0.06	0.05	0.06	0.13	0.07	ND	0.06	ND	0.32	0.15	0.29	0.06	0.05
Total Recoverable Phenolics (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	1.4	1.3	1.9	1.1	1.4	1.3	1.5	ND	1.2	1.8	1.6	1.2	2.0
Naphthalene (Fg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 22. NETL-MGN March 1999 Groundwater Data for "B-C Aquifer"

Parameter	Sample Location				
	11	SP2-BC	32A	31	GAS-5
pH (s.u)	7.50	6.90	4.30	4.77	5.76
Specific Conductance (Fmhos)	189	532	963	730	1126
Temperature (E C)	9.7	13.6	12.9	15.2	14.7
Arsenic (total, mg/L)	ND	ND	ND	ND	ND
Barium (total, mg/L)	0.11	0.040	0.038	0.10	0.17
Cadmium (total, mg/L)	ND	ND	0.0011	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND	ND
Iron (total, mg/L)	24	0.67	0.20	0.68	63
Manganese (total, mg/L)	0.88	0.14	2.2	5.5	12
Sodium (total, mg/L)	3.9	4.3	110	56	110
Vanadium (total, mg/L)	ND	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND	ND
Chloride (mg/L)	6.0	5.4	190	160	210
Sulfate (mg/L)	11	15	100	53	89
Nitrate Nitrogen (mg/L)	0.07	0.15	0.52	ND	ND
Fluoride (mg/L)	0.06	0.09	0.14	0.05	0.07
Total Recoverable Phenolics (mg/L)	ND	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	1.1	1.5	2.0	1.3	2.7
Naphthalene (ug/L)	ND	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 23. NETL-MGN August 1999 Groundwater Data for "Morgantown Aquifer"

Parameter	Sample Location			
	D1M	D2M	D3M	D4M
pH (s.u)	6.30	8.90	6.81	7.42
Specific Conductance (Fmhos)	354	557	470	606
Temperature (E C)	17.2	15.6	15.9	15.6
Arsenic (total, mg/L)	0.007	ND	ND	ND
Barium (total, mg/L)	0.20	0.17	0.87	0.36
Cadmium (total, mg/L)	ND	ND	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND
Iron (total, mg/L)	12	4.9	0.11	0.21
Manganese (total, mg/L)	1.1	0.32	0.047	0.44
Sodium (total, mg/L)	6.8	130	36	13
Vanadium (total, mg/L)	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND
Chloride (mg/L)	12	ND	ND	32
Sulfate (mg/L)	28	5.0	17	10
Nitrate Nitrogen (mg/L)	ND	0.32	0.066	0.22
Fluoride (mg/L)	ND	0.62	0.12	0.09
Total Recoverable Phenolics (mg/L)	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND
Total Organic Carbon (mg/L)	2.1	1.7	1.4	1.0
Naphthalene (Fg/L)	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 24. NETL-MGN August 1999 Groundwater Data for "A Aquifer"

Parameter	Sample Location												
	A	B	SP1A	SP4-A	SP8A	SP9A	I	J	K	L	M	N	GAS-4
pH (s.u)	6.40	6.05	6.04	6.00	5.62	5.41	5.78	5.44	5.10	4.88	4.76	4.55	6.03
Specific Conductance (Fmhos)	285	230	304	282	363	1112	544	702	1172	924	332	716	236
Temperature (E C)	16.4	16.1	15.5	15.6	15.6	15.0	17.8	17.2	16.0	17.4	18.9	17.8	18.0
Arsenic (total, mg/L)	ND	ND	ND	ND	ND	ND	0.013	ND	ND	ND	ND	ND	ND
Barium (total, mg/L)	0.33	0.23	0.13	0.044	0.33	0.19	0.83	0.21	0.094	0.053	0.037	0.12	0.37
Cadmium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	0.0069	0.0046	ND	0.0018	ND
Chromium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	ND	ND	0.017	ND	ND	ND	ND	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron (total, mg/L)	20	30	36	2.8	39	4.0	42	0.84	0.30	ND	2.8	0.63	56
Manganese (total, mg/L)	0.88	1.2	1.5	0.466	2.5	1.7	0.37	0.079	1.8	0.60	1.0	0.36	2.4
Sodium (total, mg/L)	6.1	1.8	13	7.2	6.9	100	15	45	110	89	20	45	9.7
Vanadium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloride (mg/L)	ND	ND	ND	27	50	310	100	180	310	240	37	180	35
Sulfate (mg/L)	16	20	54	26	11	52	53	39	72	87	75	52	10
Nitrate Nitrogen (mg/L)	ND	ND	ND	ND	ND	0.84	ND	0.64	1.2	0.53	0.064	0.56	ND
Fluoride (mg/L)	ND	ND	ND	0.06	ND	ND	ND	0.05	0.46	0.17	0.12	0.07	ND
Total Recoverable Phenolics (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	1.5	1.4	2.7	1.6	2.5	1.4	2.4	1.4	1.8	2.3	2.0	1.5	2.6
Naphthalene (Fg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 25. NETL-MGN August 1999 Groundwater Data for "B-C Aquifer"

Parameter	Sample Location				
	11	SP2-BC	32A	31	GAS-5
pH (s.u)	5.75	6.44	5.70	4.63	6.39
Specific Conductance (Fmhos)	195	485	1349	675	1103
Temperature (E C)	17.2	16.1	17.3	19.0	17.7
Arsenic (total, mg/L)	ND	ND	ND	ND	0.010
Barium (total, mg/L)	0.15	0.053	0.044	0.095	0.17
Cadmium (total, mg/L)	ND	ND	0.0022	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND	ND
Lead (total, mg/L)	0.013	0.007	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND	ND
Iron (total, mg/L)	21	0.68	ND	0.28	66
Manganese (total, mg/L)	0.96	0.042	1.9	4.3	13
Sodium (total, mg/L)	12	3.7	130	54	110
Vanadium (total, mg/L)	ND	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND	ND
Chloride (mg/L)	ND	ND	360	190	260
Sulfate (mg/L)	10	18	91	50	93
Nitrate Nitrogen (mg/L)	0.082	0.12	0.93	ND	ND
Fluoride (mg/L)	ND	0.05	0.15	0.06	ND
Total Recoverable Phenolics (mg/L)	ND	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	1.3	2.9	2.0	1.6	2.6
Naphthalene (Fg/L)	ND	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND	ND

ND = not detected; s.u. = standard units.