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Environmental Survey
Preliminary Report

Pittsburgh Energy Technology Center
Pittsburgh, Pennsylvania

September 1988

MASTER

PREFACE
TO
THE DEPARTMENT OF ENERGY
ENVIRONMENTAL SURVEY PRELIMINARY REPORT
FOR THE PITTSBURGH ENERGY TECHNOLOGY CENTER

This report contains the preliminary findings based on the first phase of an Environmental Survey at the U.S. Department of Energy (DOE) Pittsburgh Energy Technology Center (PETC) located near Pittsburgh, Pennsylvania. The Survey is being conducted by DOE's Office of Environment, Safety and Health.

The PETC Survey is a portion of the larger, comprehensive DOE Environmental Survey encompassing all major operating facilities of DOE. The DOE Environmental Survey is one of a series of initiatives announced on September 18, 1985, by Secretary of Energy John S. Herrington, to strengthen the environmental safety and health programs and activities within DOE. The purpose of the Environmental Survey is to identify, via a "no-fault" baseline Survey of all the Department's major operating facilities, environmental problems and areas of environmental risk. The identified problem areas will be prioritized on a Department-wide basis in order of importance in 1989.

The preliminary findings are subject to modification based on results of the Sampling and Analysis (S&A) phase of the Survey. The preliminary findings are also subject to modification based on comments from PETC concerning their technical accuracy. The modified findings will be incorporated into the Environmental Survey Summary Report.

September 1988
Washington, D.C.

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Introduction

This report presents the preliminary findings from the first phase of the Environmental Survey of the U.S. Department of Energy (DOE) Pittsburgh Energy Technology Center (PETC) conducted December 7-11, 1987.

The Survey is being conducted by an interdisciplinary team of environmental specialists, led and managed by the Office of Environment, Safety and Health's Office of Environmental Audit. Individual team specialists are outside experts being supplied by a private contractor. The objective of the Survey is to identify environmental problems and areas of environmental risk associated with PETC. The Survey covers all environmental media and all areas of environmental regulation. It is being performed in accordance with the DOE Environmental Survey Manual. This phase of the Survey involves the review of existing site environmental data, observations of the operations carried on at PETC, and interviews with site personnel.

The Survey team developed a Sampling and Analysis (S&A) Plan to assist in further assessing certain environmental problems identified during its on-site Survey activities at PETC. The S&A Plan will be executed by the Oak Ridge National Laboratory (ORNL). When completed, the Plan's results will be incorporated into the PETC Survey findings for inclusion into the Environmental Survey Summary Report.

Site Description

PETC is located 13 miles south of the City of Pittsburgh within a 239-acre complex in Bruceton, Pennsylvania. The Bruceton Research Center (BRC) is occupied by three agencies of the Federal Government: DOE, Department of the Interior, and Department of Labor. The Department of the Interior, Bureau of Mines, occupies 178 acres or 74 percent of the complex. The DOE occupies approximately 59 acres or 25 percent, and the Department of Labor occupies approximately 1 percent of the land.

The two primary DOE areas are geographically separated on the site. The "plateau" area, located in the northeast sector of the complex and occupying 13.5 acres, contains the main administrative and process research facilities. It is bordered by Lick Run and Cochran Mill Road to the east, the main entrance road to the south, and Department of the Interior property to the north and west. The "valley-fill" area, so named because the area was a valley and later backfilled, is located in the southern section of the complex, bordered by Wallace Road to the north and the complex boundaries to the east, south, and west. This area contained the Synthane and Synthoil facilities from the mid-1970s to the early 1980s and currently houses the project management, technical and administrative, and maintenance support facilities for PETC's maintenance contractor.

PETC is responsible for the technical and administrative management of 12 lead mission research and development programs within DOE's Office of Fossil Energy. These lead mission programs are coal preparation, advanced combustion technology, alternative fuels utilization, fuel gas cleanup, coal liquefaction, magnetohydrodynamics (MHD), advanced research and technology development for direct utilization, advanced research and technology development of liquefaction, solids transport, university coal research, peat resources, and anthracite coal. PETC extended its project management efforts to three new programs in 1986: clean coal technology, jet fuels from coal-derived products, and space-based MHD power systems.

No state or Federal officials accepted an invitation to meet with representatives of the Survey team during the pre-Survey site visit to PETC held on November 12-13, 1987. However, a phone conversation was conducted with Samuel Harper of the Pennsylvania Department of Environmental Resources (PaDER), which detailed two concerns. These were spills at the old Synthane facility and laboratory discharges to the local publicly-owned treatments works (POTW).

The PaDER's concerns about spills at the old Synthane facility include:

- Potential impacts on groundwater near the facility.

- The facility was built on a massive fill over a stream culvert and contamination from spills has potentially entered the stream.

The PaDER was also concerned about laboratory discharges to the local POTW because the Pleasant Hills POTW is under a compliance order to reduce certain contaminants in order to meet state water quality requirements.

Summary of Findings

The majority of the environmental findings were due to general inattention to environmental management requirements and reflect the lack of investigations required under a number of statutes. The most significant findings involve: 1) disposal of untreated liquid wastewaters to POTWs and a nearby stream, and 2) evidence of historic drum storage which had not been investigated for potential leakage.

The major preliminary findings of the Environmental Survey at the PETC are:

- Untreated liquid wastewater discharged through the on-site sanitary and stormwater sewer systems are potentially interfering with the operation of a POTW, and possibly contaminating POTW sludge, as well as potentially contaminating surface water and sediment of an off-site stream;

- Improper handling, characterization, and segregation of potentially hazardous waste;

- There is a potential for friable asbestos entering the environment from numerous exterior sources located throughout the site; and

- Lack of environmental investigation: as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (inventory of potential inactive sites and past releases), the Resource Conservation and Recovery Act (RCRA) (underground storage tank inventory), Toxic Substances Control Act (TSCA) (annual polychlorinated biphenyl inventory notification), and DOE Order 5484 (substantive assessment of the annual environmental status of the site).

Overall Conclusions

The Survey found no environmental problems at PETC that represent an immediate threat to human life. The environmental problems identified at the PETC by the Survey team confirm that the site is confronted with a number of environmental problems which are by and large a legacy from past practices at a time when environmental problems were less well understood. These problems vary in terms of magnitude and risk, as described in this report. Although the sampling and analysis performed by the PETC Survey will assist in further identifying environmental problems at the site, a complete understanding of the significance of some of the environmental problems identified requires a level of study and characterization that is beyond the scope of the Survey. Actions currently underway or planned at the site will contribute toward meeting this requirement.

Transmittal and Follow-up of Findings

The findings of the Environmental Survey for PETC were shared with DOE's on-site management staff at the Survey closeout briefing held December 11, 1987. DOE Office of Environmental Guidance and Compliance (OEG) personnel were briefed on Survey findings in early January 1988. In addition, the DOE's Office of Fossil Energy was sent the Survey Status Report, also in early January 1988. By March 29, 1988, the PETC management staff had developed a draft action plan to address the Survey preliminary findings. The PETC staff presented this draft action plan to the Pennsylvania Department of Environmental Resources and the Allegheny County Health Department on March 2, 1988; and to the U.S. Environmental Protection Agency, Region III, on March 3, 1988. A final action plan addressing all the Survey findings cited herein will be prepared by PETC staff within 45 days after receiving this Preliminary Report. Those problems that involve extended studies and multiyear budget commitments will be the subject of the Environmental Survey Summary Report and the DOE-wide prioritization.

Within the Office of the Assistant Secretary for Environment, Safety and Health, the OEG has immediate responsibility for monitoring environmental compliance and the status of the PETC Survey findings. The Office of Environmental Audit will continue to assess the environmental problems through a program of systematic environmental audits that will be initiated toward the conclusion of the DOE Environmental Survey in 1989.

1.0 INTRODUCTION

The purpose of this report is to present the preliminary findings made during the Environmental Survey, conducted December 7 through December 11, 1987, at the U.S. Department of Energy (DOE) Pittsburgh Energy Technology Center (PETC), Pennsylvania. The Preliminary Report's contents are subject to revisions. Revisions to the preliminary findings based on PETC's technical review, the results of the sampling and analysis phase of the Survey, and other information that may come to the Survey team's attention will be incorporated into the Environmental Survey Summary Report. PETC is currently operated by DOE with support services provided by Gilbert Commonwealth (G/C) and Burns and Roe Service Corporation (BRSC).

The PETC Survey is part of the larger DOE-wide Environmental Survey effort announced by Secretary of Energy John S. Herrington on September 18, 1985. The purpose of this effort is to identify, via "no fault" baseline Surveys, existing environmental problems and areas of environmental risk at DOE facilities and to rank them on a DOE-wide basis. This ranking will enable DOE to more effectively establish priorities for addressing environmental problems and allocate the resources necessary to correct these problems. Because the Survey is "no fault" and is not an "audit," it is not designed to identify specific isolated incidents of noncompliance or to analyze environmental management practices. Such incidents and/or management practices will, however, be used in the Survey as a means of identifying existing and potential environmental problems.

The PETC Environmental Survey was conducted by an interdisciplinary team of technical specialists headed and managed by a Team Leader and Assistant Team Leader from the DOE Office of Environmental Audit. A complete list of Survey participants and their affiliations is included in Appendix A.

The Survey team focused on all environmental media, using Federal, state, and local environmental statutes and regulations, accepted industry practices, and professional judgment to make the preliminary findings included in this report. The team carried out its activities in accordance with the guidance and protocols in the DOE Environmental Survey Manual. Substantial use of existing information and of interviews with knowledgeable field office and site-contractor personnel accounted for a large part of the on-site effort. A summary of the site-specific Survey activities is presented in Appendix B and the Survey Plan is presented in Appendix C.

The preliminary Survey findings, in the form of existing and potential environmental problems, are presented in Sections 3.0 and 4.0. Section 3.0 includes those findings that pertain to a specific environmental medium (e.g., air, soil, surface water and groundwater), whereas Section 4.0 includes those that are non-media-specific (e.g., waste management, radiation, and quality assurance). Because the findings are highly varied in terms of magnitude, risk, and characterization, and consequently require different levels of management attention and response, they are further subdivided into four categories within Sections 3.0 and 4.0.

The criteria for placing a finding into one or more of the four categories are as follows:

Category I includes only those findings which, based on the information available to the Team Leader, involve immediate threat to human life. Findings of this type shall be conveyed immediately to the responsible Environmental, Safety and Health personnel at the scene or in control of the facility or location in question for action. Category I findings are those environmental problems where the potential risk is highest, the confidence in the finding, based on the information available, is the strongest, and the appropriate response to the finding is the most restrictive in terms of alternatives.

Category II findings encompass one or more of the following situations:

- Multiple or continuing exceedances, past or present, of a health-based environmental standard where there is immediate potential for human population exposure, or a one-time exceedance where residual impacts pose an immediate potential for human population exposure.

- Evidence that a health-based environmental standard may be exceeded, as discussed in the preceding situation, within the timeframe of the DOE-wide Survey.

- Evidence that the likelihood is high for an unplanned release due to, for example, the condition or design of pollution abatement or monitoring equipment or other environmental management practices.

- Noncompliance with significant regulatory procedures, i.e., those substantive technical regulatory procedures designed to directly or indirectly minimize or prevent risks, such as inadequate monitoring or failure to obtain required permits.

Category II findings include those environmental problems where the risk is high but the definition of risk is broader than in Category I. The information available to the Team Leader is adequate to identify the problem but may be insufficient to fully characterize it. Finally, in this category, more discretion is available to the Program Office as to the appropriate response; however, the need for that response is such that management should not wait for the completion of the entire DOE-wide Survey to respond. Unlike Category I findings, a sufficient near-term response by the Program Office may include further characterization prior to any action taken to rectify the situation.

Category III findings encompass one or both of the following criteria:

- The existence of pollutants or hazardous materials in the air, water, groundwater, or soil resulting from DOE operations that pose or may pose a hazard to human health or the environment.

- The existence of conditions at a DOE facility that pose or may pose a hazard to human health or the environment.

Category III findings are those environmental problems for which the broadest definition of risk is used. As in Category II, the information available to the Team Leader may not be sufficient to fully characterize the problem. Under this category, the range of alternatives available for response, and the corresponding timeframes for response, are the greatest. Environmental problems included within this category will typically require lengthy investigation and remediation phases as well as multiyear budget commitments. These problems will be included in the DOE-wide prioritization effort to ensure that DOE's limited resources are used effectively.

In general, the levels of pollutants or materials that constitute a hazard or potential for hazard are those that exceed some Federal, state, or local regulations for release of, contamination by, or exposure to such pollutants or materials. However, in some cases, the Survey may determine that the presence of some nonregulated material is in a concentration that presents a concern for local populations or the environment that is sufficient to be included as an environmental problem. Likewise, the presence of regulated materials in concentrations, even though below those established by regulatory authorities, that nevertheless present a potential for hazard or concern may be classified as an environmental problem. In general, however, conditions that meet regulatory or other requirements, where such exist, should not present a potential hazard and will not be identified as an environmental problem.

Conditions that pose or may pose a hazard are generally those which are violations of regulations or requirements (e.g., improper storage of hazardous chemicals in unsafe tanks). Such conditions present a potential hazardous threat to human health and the environment and should be identified as an environmental problem. Additionally, potentially hazardous conditions are those where the likelihood of the occurrence of release is high.

The definition of the term "environmental problem" is broad and flexible to allow for the wide differences among the DOE sites and operations. Therefore, a good deal of professional judgment must be applied to the identification of environmental problems.

Category IV findings include instances of administrative noncompliance and management practices that are indirectly related to environmental risk, but are not appropriate for inclusion in Categories I-III. Such findings can be based upon any level of information available to the Team Leader, including direct observations by the team members. Findings in this category are generally expected to lend themselves to relatively simple, straightforward resolution without further evaluation or analysis. These findings, although not part of the DOE-wide prioritization effort, will be passed along to the appropriate Program Office for action.

Based on the professional judgment of the Team Leader, the findings within categories are arranged in order of relative significance. Comparing the relative significance of one finding to another between media categories is not appropriate or valid. The categorization and listing of findings in order of significance within each media category in this report is only the first step in a multistep iterative process to prioritize DOE problems.

The next portion of the PETC Survey is the Sampling and Analysis (S&A) phase. Oak Ridge National Laboratory (ORNL), the S&A team for PETC, will begin taking samples in August of 1988. Prior to sampling, an S&A Plan will be prepared by DOE and ORNL in accordance with the protocols in the DOE Environmental Survey Manual. The results generated by the S&A effort will be used to assist the Survey team in further defining the existence and extent of potential environmental problems identified during the Survey, and to fill existing data gaps or weaknesses.

It is clear that certain findings and observations contained in this report, especially those in Category II, can and should be addressed in the near term (i.e., prior to the DOE-wide prioritization effort). It is also clear that the findings and observations in this report are highly varied in terms of magnitude, risk, and characterization. Consequently, the priority, magnitude, and timeliness of near-term responses will require careful planning to ensure appropriate and effective action. The information in this Preliminary Report will assist PETC in the planning of these near-term responses.

PETC submitted a draft action plan dated March 29, 1988, in response to the preliminary findings presented at the conclusion of the on-site Survey activities and summarized in the PETC Survey Status Report dated December 17, 1987, prepared for the Assistant Secretary for Environment, Safety and Health. The draft action plan for the PETC Survey has been reviewed by the Office of Environmental Guidance and Compliance (OEG), which has immediate responsibility for monitoring the status and overseeing the adequacy of corrective actions taken by PETC in response to the Survey findings.

As required in the December 2, 1987, memorandum from the Assistant Secretary for Environment, Safety and Health to the Operations Office Managers entitled, Follow-up of Environmental Survey Findings, PETC will prepare and submit a final action plan to the Deputy Assistant Secretary (DAS) for Environment within 45 days after receiving this Preliminary Report. The final action plan for the PETC Survey will address all of the preliminary findings cited herein and incorporate OEG's comments on the draft action plan.

2.0 GENERAL SITE INFORMATION

In 1910, the Federal Government established the Department of the Interior's Bureau of Mines (BOM) and purchased a 38-acre tract of land at Bruceton, Pennsylvania, to open an experimental mine for large-scale research on underground blasting, mine fires, and explosives. In 1948, the site was designated an energy research laboratory of the Office of Synthetic Liquid Fuels, BOM. The growing national concern with energy was reflected in the transfer of many of the BOM's energy research activities to the newly created Energy Research and Development Administration (ERDA) in 1975.

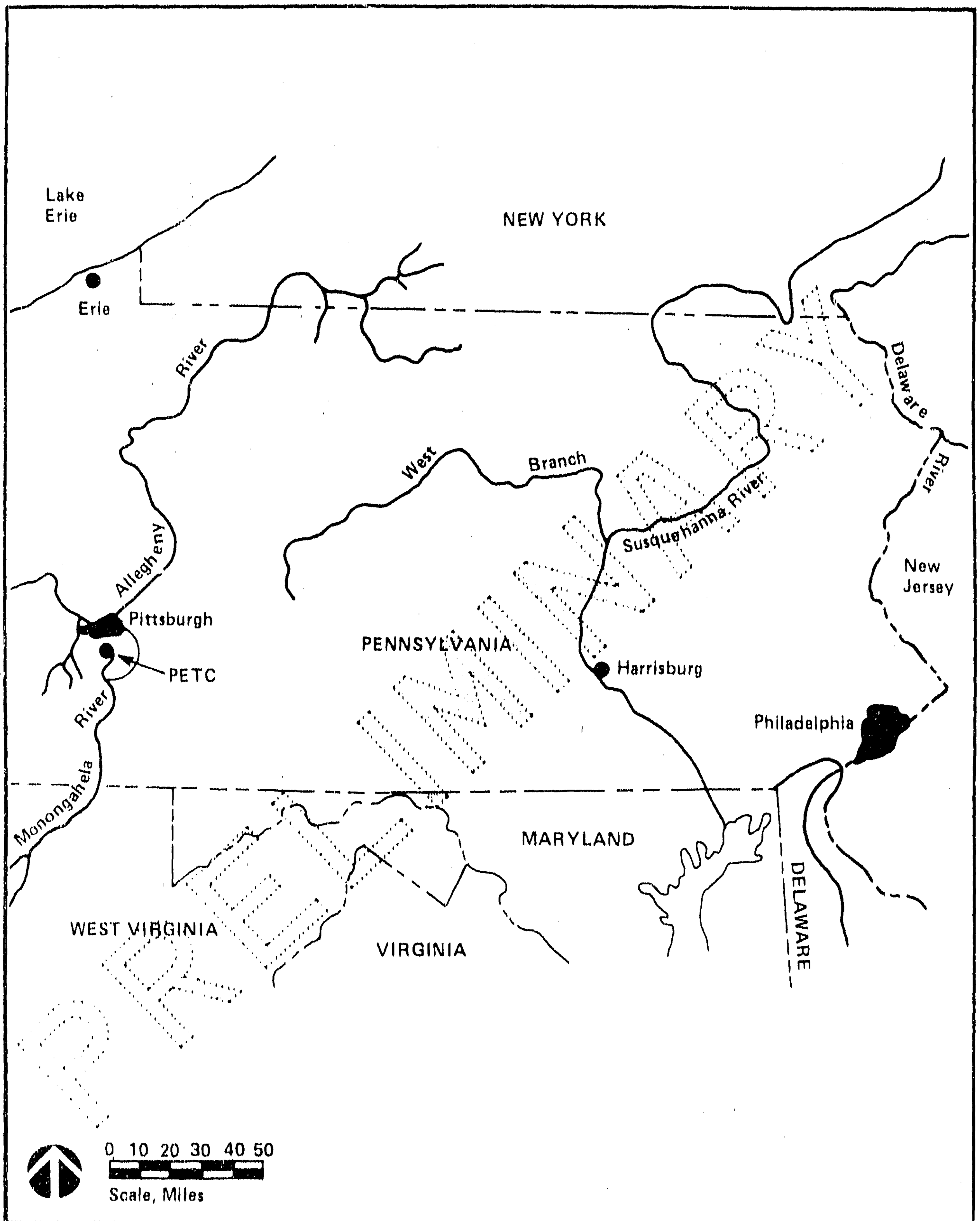
In 1977, the Energy Research and Development Administration was reorganized to form the U.S. Department of Energy (DOE). At that time the former ERDA facilities, certain BOM facilities, coal preparation, and a portion of the coal mining research activities at Bruceton came under the auspices of DOE. In 1979, the DOE's Pittsburgh Energy Research Center (PERC) changed its name to the Pittsburgh Energy Technology Center (PETC).

2.1 Site Setting

Location

PETC is located within a 239-acre complex in Bruceton, South Park Township, Allegheny County, Pennsylvania, and 13 miles south of the City of Pittsburgh (see Figures 2-1 and 2-2). The Bruceton Research Center (BRC) is occupied by three agencies of the Federal Government: DOE, Department of the Interior, and Department of Labor. The Department of the Interior occupies 178 acres or 74 percent of the complex. The DOE occupies approximately 59 acres or 25 percent, and the Department of Labor occupies approximately 1 percent of the land.

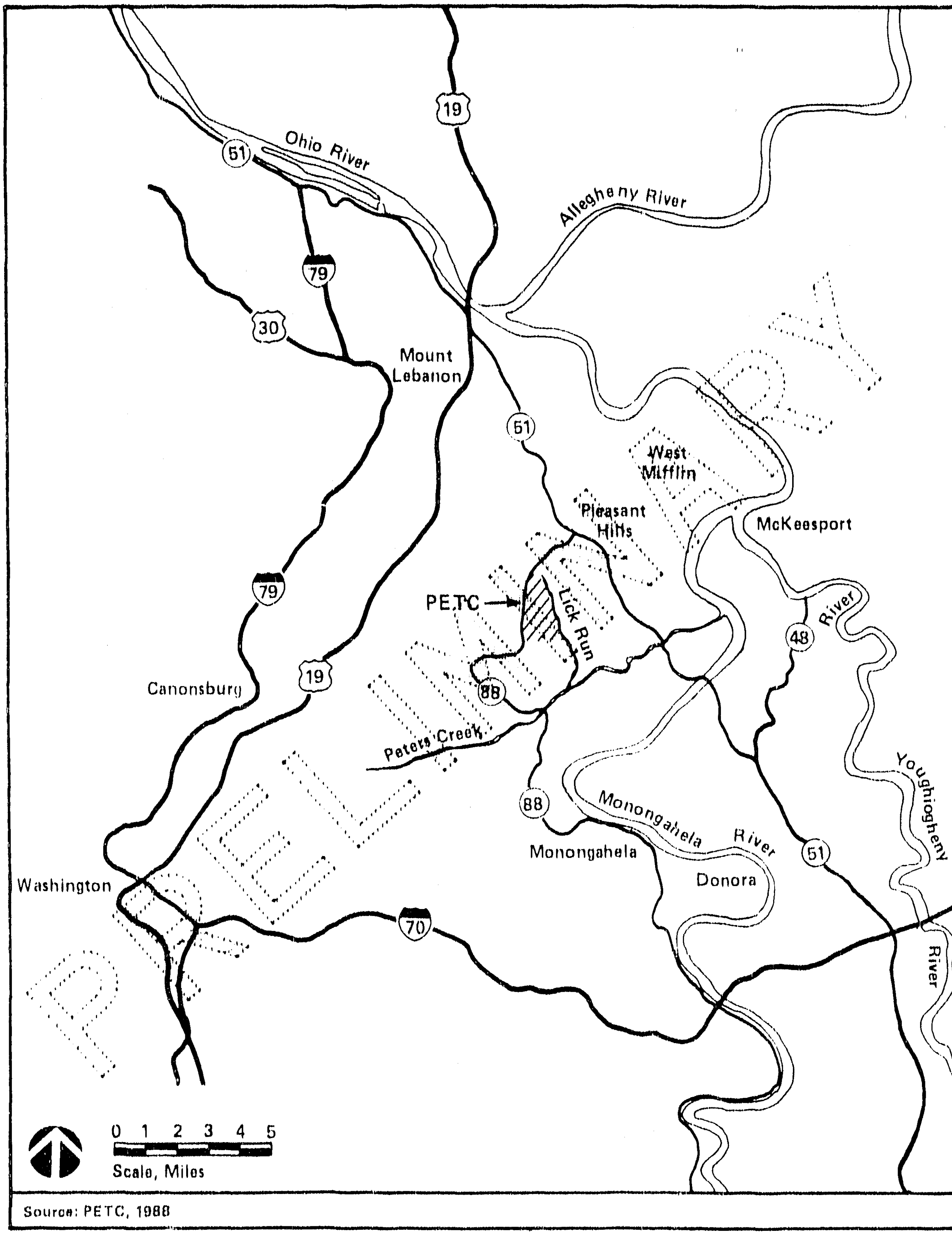
The two primary DOE areas are geographically separated on the site and are shown in Figure 2-3. The "plateau" area, located in the northeast sector of the complex and occupying 13.5 acres, contains the main administrative and process research facilities. It is bordered by Lick Run and Cochran Mill Road to the east, the main entrance road to the south, and Department of the Interior property to the north and west. The "valley-fill" area, so named because the area was a valley and later



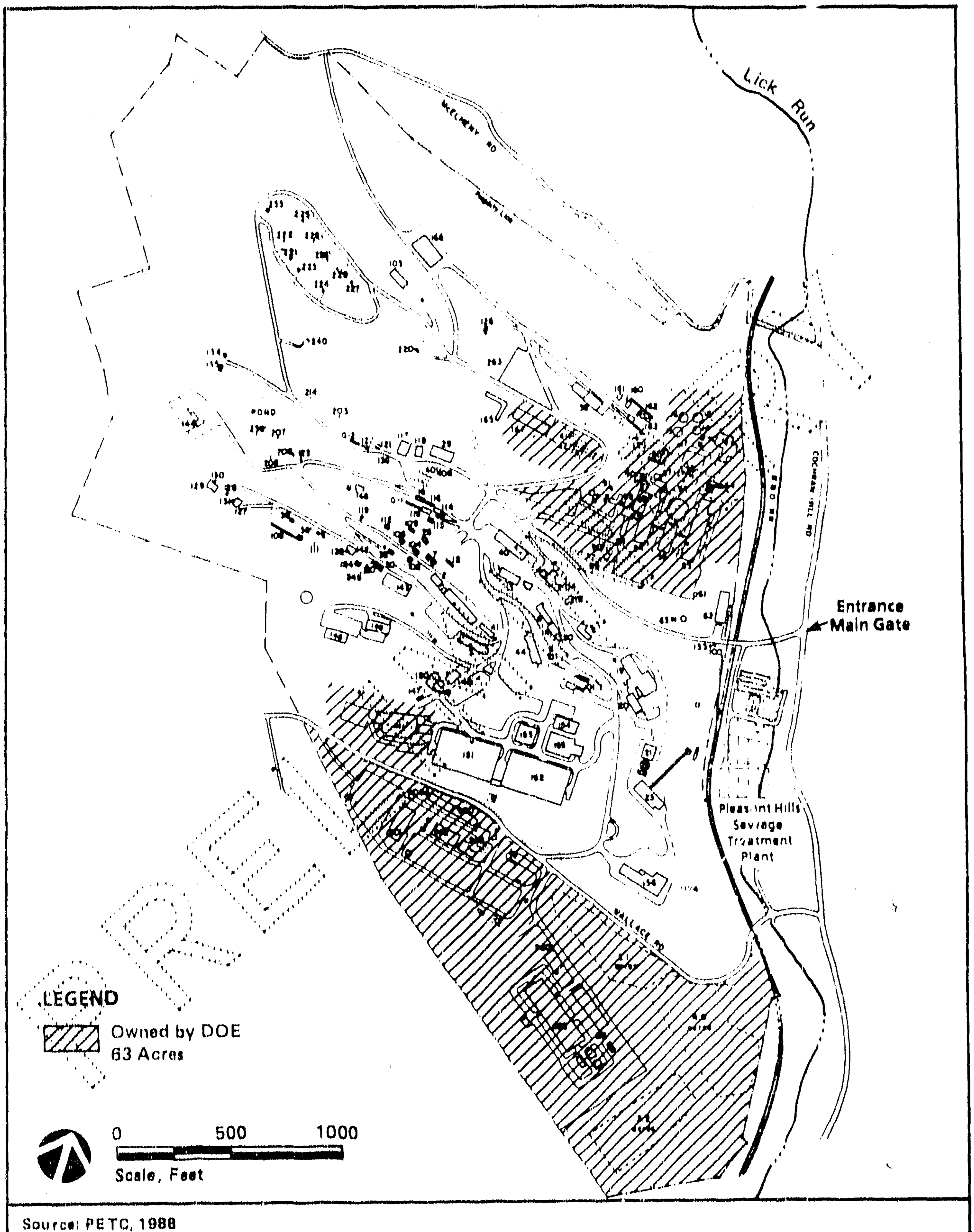
Source: DOE, 1978

LOCATION OF
PITTSBURGH ENERGY TECHNOLOGY CENTER (PETC)

FIGURE 2-1



REGIONAL MAP OF PITTSBURGH, PA FIGURE 2-2



DOE AREAS OF BRUCETON RESEARCH CENTER FIGURE 2-3 backfilled, is located in the southern section of the complex, bordered by Wallace Road to the north and the complex boundaries to the east, south, and west. This area of over 40 acres contained the Synthane and Synthoil facilities from the mid-1970s to the early 1980s and currently houses the administrative and maintenance facilities for PETC's maintenance contractor.

Site Population

The BRC employs over 1,000 people with PETC accounting for approximately 280 Federal employees and approximately 200 total contractor personnel including 120 employees of Burns and Roe and 80 employees of Gilbert Commonwealth. Approximately 65 Oak Ridge Associated Universities (ORAU) students are also on-site throughout the year.

Land Uses

Construction at the BRC was relatively modest until the mid-1940s when energy-related programs were instituted. New buildings were located on a plateau carved out of a hillside on the northeast portion of the site. This complex forms the hub of today's PETC activities.

Development of a pilot plant program for synthetic fuels began in the early 1970s with construction of the Synthane Plant and later Synthoil Coal Liquefaction facilities in the valley fill area. In the early 1980s, economic conditions were such that large scale research in coal conversion technologies was not feasible. The Synthane Plant, which was operational between 1975 and 1978, and the Synthoil Plant, which never operated, were both dismantled in 1982. The remaining structures have been utilized for support facilities and project and technical information management.

Table 2-1 summarizes the designation and use assigned to each building of PETC. Buildings 58 through 97 are located on the plateau area, Buildings 900 through 922 are located in the valley fill area, and Buildings 141 and 167 are interspersed among Department of the Interior facilities.

TABLE 2-1

PETC FACILITY INVENTORY

Bldg. No.	Building	Major Occupancy or Use
58	Administration Building	• Office of Administration • Office of Research and Development • Office of the Director
59	Maintenance Shop	Facility Support
64	Chemical Storage	Facility Support
65	Cylinder Storage	Facility Support
70	Switch House	Facility Support
71	Pump House	Facility Support
72	Switch House	Facility Support
74	Wastewater Treatment	Facility Support
83	Experimental Research	Office of Research and Development
84	Experimental Research	Office of Research and Development
85	Compressors	Office of Research and Development
86	Experimental Research	Office of Research and Development
87	Coal Sample Preparation	Office of Research and Development
89	Combustion Plant	Office of Research and Development
90	Compressors	Office of Research and Development
92	Chemical Storage	Facility Support
93	Combustion Test Facility	Office of Research and Development
94	Analytical Chemistry	Office of Research and Development
95	Safety & Environ.	Office of Administration
97	Coal Prep.	Office of Research and Development
141	Office, Labs	Office of Research and Development
167	Office, Labs	Office of Research and Development
900	Offices	Office of Administration
900A	Offices	Office of Administration
901	Maintenance Shop	Facility Support
902	Storage	Office of Administration
903	Office, Labs	Office of Administration
920	Offices	Office of Project Management
921	Offices, Storage, Labs	Office of Administration
922	Office, Labs	Office of Project Management
911	Guard House	Facility Support
907	Former Synthane Storage	Facility Support

TABLE 2-1

PETC FACILITY INVENTORY (Continued)

Bldg. No.	Building	Major Occupancy or Use
T-417	Trailer Office	Support Contractor
T-418	Trailer Office	Support Contractor
T-419	Trailer Office	Support Contractor
T-420	Trailer Office	Support Contractor
T-421	Trailer Office	Support Contractor
---	Gas Holders	Facility Support

Source: PETC, 1988

Topography

Topography at PETC is typical of this geographic area lying in the foothills of the Allegheny Mountains. It is characterized by moderately steep, sloping hills and valleys rising intermittently from a 905-foot benchmark low on the eastern border to a high of 1,220 feet on the west. Most physical facilities have been located at the apex of rises on sites that have required level grading of the naturally rounded topography. Most construction site elevations are in the 1,000-1,100-foot range.

Major Water Bodies

The major water body in the vicinity of PETC is Lick Run, which runs along the eastern boundary of the BRC. Lick Run flows into Peters Creek 2.6 miles downstream from the research complex, and Peters Creek empties into the Monongahela River approximately 6 miles further on its course.

Hydrology

Groundwater in the region is known to occur in the unconsolidated deposits in the stream valleys and in fractures and intergranular porosity in the consolidated rock layers (Johnson, 1928). In general, the groundwater moves downward and laterally from upland areas to lowland areas, where it is discharged in springs and streams. There are a number of springs at PETC that are wet at various seasons during the year.

Climate

The climate at PETC is described as humid, continental-type modified only slightly by its nearness to the Atlantic Seaboard and the Great Lakes. Precipitation is well distributed throughout the year. The average rainfall is 3 inches per month, with the greatest rainfall occurring in July. Average annual snowfall is 45 inches. January is the coldest month, with an average temperature of 28°F, while July is the hottest month, with an average temperature of 72°F. Average relative humidity ranges from 86 percent in August-September to 50 percent in May (PETC, 1988).

per hour (mph). The fastest recorded winds in the history of the area were 58 mph in 1967 and 52 mph in 1978. Thunderstorms occur on an average of 36 days out of the year. The tornado history of Allegheny County is moderate, with five tornadoes being reported throughout the period from 1952-1982 (PETC, 1988).

Biological Resources

Wildlife in the area includes various small birds common to the general geographic area, such as field sparrows, robins, and meadowlarks, and mammals common to the general geographic area, such as white-tailed deer, rabbits, squirrels, groundhogs, and skunks. No endangered plant or animal species have been observed in the area.

2.2 Overview of Major Site Operations

PETC is responsible for the technical and administrative management of 12 lead mission research and development programs within DOE's Office of Fossil Energy. These lead mission programs are coal preparation, advanced combustion technology, alternative fuels utilization, flue gas cleanup, coal liquefaction, magnetohydrodynamics (MHD), advanced research and technology development for direct utilization, advanced research and technology development for liquefaction, solids transport, university coal research, peat resources, and anthracite coal. PETC extended its project management efforts to three new programs in 1986: clean coal technology, jet fuels from coal-derived products, and space-based magnetohydrodynamic power systems.

Coal Preparation

PETC's coal preparation program entails planning, directing, and conducting in-house research and development for the enhancement of coal utilization. Research activities include characterizing coals with respect to their ability to be cleaned to different levels of ash, sulfur, and trace elements; and conducting laboratory-, bench-, and engineering-scale research and development on advanced coal preparation methods.

Advanced Coal Combustion

PETC's advanced coal combustion program focuses on advanced coal combustion design concepts, combustion of alternative fuel mixtures, and development of retrofit technologies. Program goals are to determine economically feasible combustion technologies employing alternative energy sources.

Alternative Fuels Utilization

The alternative fuels utilization program at PETC involves the use of coal slurries, coal/oil mixes, and coal/methanol mixtures in oil-designed boilers in order to increase coal utilization and decrease dependence on petroleum fuels.

Flue Gas Cleanup

PETC's flue gas cleanup program involves research and development into various technologies for removing airborne contaminants from combustion flue gases. Major projects include the fluidized bed copper oxide process, spray dryer and duct injection processes, advanced separations, NOXSO process, NO_x control technologies, and general flue gas cleanup.

Coal Liquefaction

PETC has the lead in DOE's coal liquefaction program. Liquefaction research at PETC is conducted in both direct and indirect liquefaction process technologies. Direct liquefaction entails the addition of hydrogen to the carbon-based structure of coal. Pulverized coal is fed to a reactor where it is mixed with hydrogen and a hydrogen-rich recycle oil. The resulting mixture is subjected to relatively low temperatures (800-1,000°F) and high pressures (2,000 pounds per square inch [psi]). At these conditions, the coal dissolves and combines with the hydrogen, while the ash along with the sulfur is separated.

The indirect liquefaction process first gasifies the pulverized coal using steam and oxygen at high temperatures (1,200°F) and low pressures (ambient to 1,000 psi) and then chemically recombines the gasified materials to form liquids.

Research activities include the development of more efficient process technologies, off-gas cleanup, and characterization of environmentally significant waste products from coal liquefaction processes.

Magnetohydrodynamics

PETC's MHD program focuses on the production of gaseous fuels from coal conversion processes and the utilization of these fuels to power MHD generators. Current research includes process and equipment development, process control and integration, and technology data base development.

Advanced Research and Technology Development (ARTD) - Direct Utilization

PETC's ARTD program for direct utilization includes laboratory-, bench-, and engineering-scale research and development, and mathematical modeling to develop improved technologies for direct coal utilization. Research includes the development of environmental control processes to control emissions from coal combustion processes and testing various combustors in order to develop economically and environmentally acceptable technologies.

Advanced Research and Technology Development (ARTD) - Coal Liquefaction

The ARTD program for coal liquefaction includes the investigation of advanced liquefaction processes, new process chemistries, process modeling, analytical and process control instrumentation, and the development of an advanced liquefaction technology data base.

Solids Transport

PETC's solids transport program focuses on the transport and handling characteristics of various coal/solvent mixtures. Solvents include water, methanol, oil and combinations of these. Research activities include the testing of dispersants, line pressure variability, and flow characteristics, and the measurement of the viscometric properties of coal/solvent mixtures.

University Coal Research

PETC sponsors a wide and dynamic range of coal research projects at numerous universities nationally and internationally. Research topics range from mining and storage to in-situ processing of coals not suitable for conventional processing.

Peat Resources

PETC's peat resources program involves fundamental research on the chemistry and physical properties of peat materials and potential utilization as feed materials for upgrading and hydrotreating.

Anthracite Coal

The anthracite coal program entails fundamental research on the utilization of high carbon-content (hard) coals. Chemical and physical properties research and the applicability of anthracite coals for liquefaction are major activities in this program.

2.3 State and Federal Concerns

No state or Federal officials accepted an invitation to meet with representatives of the Survey team on November 12-13, 1987, during the pre-Survey site visit to PETC. However, a phone conversation was conducted with Samuel Harper of the Pennsylvania Department of Environmental Resources (PaDER), which detailed two concerns. These were spills at the old Synthane facility and laboratory discharges to the local publicly-owned treatment works (POTW).

The PaDER's concerns about spills at the old Synthane facility include:

- Potential impacts on groundwater near the facility
- The facility was built on a massive fill over a stream culvert and contamination from spills has potentially entered the stream.

The PaDER was also concerned about laboratory discharges to the local POTW because the Pleasant Hills POTW is under a compliance order to reduce certain contaminants in order to meet state water quality requirements.

3.0 MEDIA-SPECIFIC SURVEY FINDINGS AND OBSERVATIONS

The discussions in this section pertain to existing or potential environmental problems in the air, soil, water, and groundwater media. The discussions include a summary of the available background environmental information related to each medium, a description of the sources of pollution and their control techniques, a review of the environmental monitoring program specific to each medium, and a categorization and explanation of the environmental problems found by the Survey team as they relate to each medium.

3.1 Air

3.1.1 Background Environmental Information

3.1.1.1 Regulatory Issues

The Pittsburgh Energy Technology Center (PETC) is located in Allegheny County, which is part of the Southwest Pennsylvania Intrastate Air Quality Control Region (AQCR) 197. This region is administered by U.S. Environmental Protection Agency (EPA) Region III and the Allegheny County Health Department for compliance with National Ambient Air Quality Standards (NAAQS) and Pennsylvania Air Quality Standards. Table 3-1 lists the NAAQS and the Pennsylvania standards for the regulated pollutants. The Federal standards establish limits for the protection of public health (Primary Standards) and welfare (Secondary Standards); Pennsylvania has adopted the Federal Standards and has additional standards for settled particulates, beryllium, sulfates, fluorides, and hydrogen sulfide. Pennsylvania also regulates emissions of fugitive particulates (Chapter 123.1), particulate emissions from combustion units (Chapter 123.11), and emissions of sulfur dioxide (Chapter 123.22).

The air quality in Allegheny County has been designated by EPA as either being better than the national standards or not classified for nitrogen dioxide concentrations (EPA, 1985). Allegheny County does not meet the primary standard for ozone, and portions of the county do not meet the primary standards for carbon monoxide, sulfur dioxide, and total suspended particulates. The areas exceeding the carbon monoxide standards are near the central business district of

TABLE 3-1

NATIONAL AND PENNSYLVANIA STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Type of Standard[a]	Averaging Time	Frequency Parameter	Concentration	
				μg/m³	ppm
Carbon monoxide	Primary and secondary	1 hr 8 hr	Annual maximum[b]	40,000 10,000	35 9
Lead	Primary and secondary	Calendar quarter	Arithmetic mean	1.5	--
Nitrogen dioxide	Primary and secondary	1 yr	Arithmetic mean	100	0.05
Ozone	Primary and secondary	1 hr	Annual maximum[c]	235	0.12
Total suspended particulate matter	Primary[d]	24 hr 1 yr	Annual maximum[b] Annual geometric mean	260 75	-- --
	Secondary	24 hr 1 yr	Annual maximum[b] Annual geometric mean	150 60	-- --
PM_{10}	Primary and secondary	24 hr 1 yr	Annual maximum arithmetic mean	150 50	-- --
Sulfur dioxide	Primary	24 hr 1 yr	Annual maximum[b] Arithmetic mean	365 80	0.14 0.03
	Secondary	3 hr	Annual maximum[b]	1,300	0.5
Settled Particulate	Pennsylvania	1 yr 30 day	Arithmetic mean Arithmetic mean	0.8[e] 1.5[e]	-- --
Beryllium	Pennsylvania	30 day	Arithmetic mean	0.01	--
Sulfates	Pennsylvania	30 day 24 hr	Arithmetic mean Maximum	10 30	--
Fluorides	Pennsylvania	24 hr	Maximum	5	--
Hydrogen sulfide	Pennsylvania	24 hr 1 hr	Maximum Maximum	7 140	0.005 0.100

Source: EPA, 1987a and Pennsylvania Department of Environmental Resources, 1986

a. Primary standards are for protection of health; secondary standards are for protection of welfare
b. Not to be exceeded more than once per year.
c. Expected exceedance to be less than one day per year.
d. Particulate NAAQS revised July 31, 1987 to PM_{10} standard.
e. Units are mg/cm².

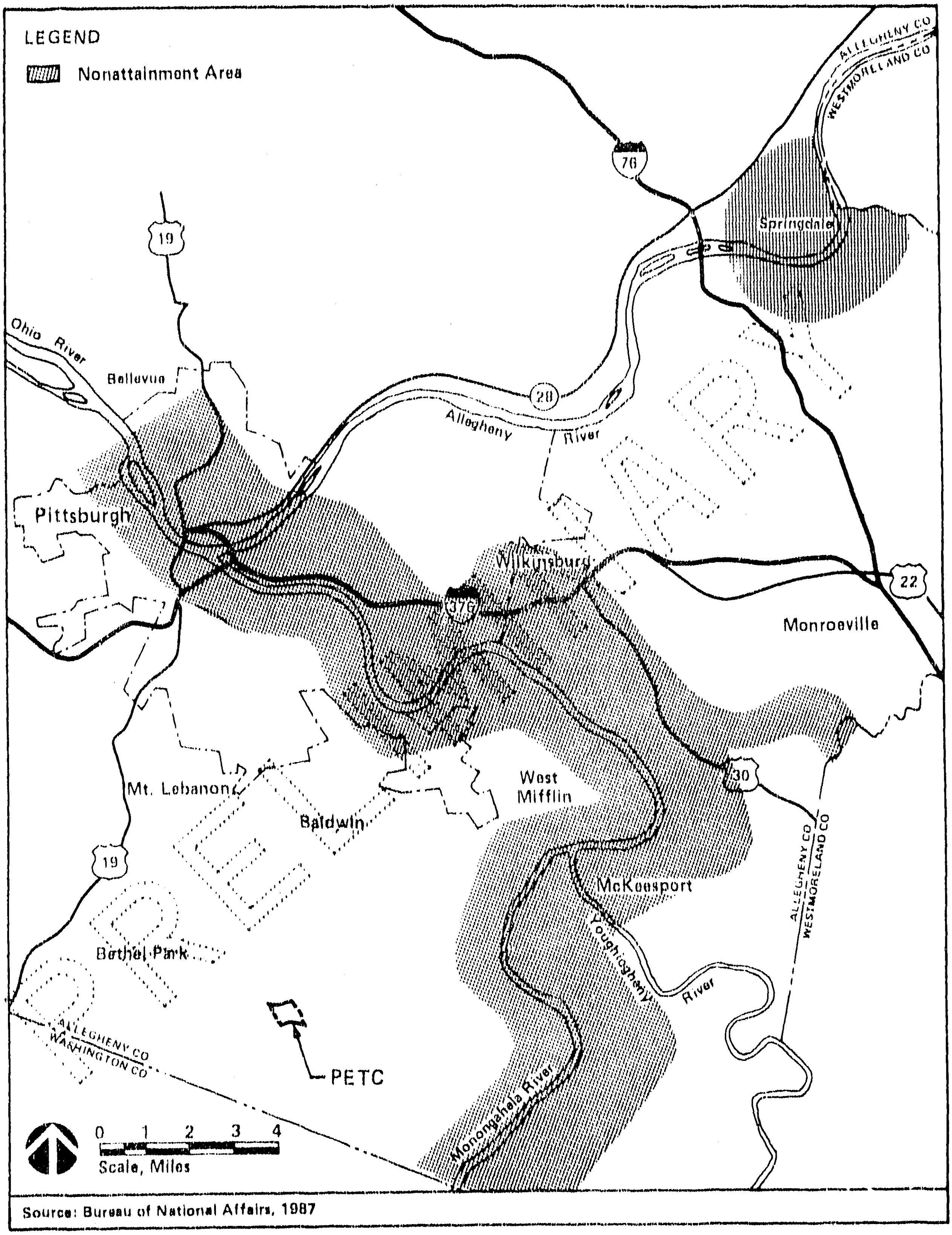
Pittsburgh (EPA, 1985). Figure 3-1 identifies the portions of Allegheny County that exceed either the primary or secondary particulate standards. The exceedance areas parallel the industrial sections along the Ohio and Monongahela Rivers. PETC is located approximately 3 miles west of the closest part of the particulate nonattainment area.

Figure 3-2 identifies those areas of the county that are classified as not meeting the primary standard for sulfur dioxide, and those areas that cannot be classified as either attaining or not attaining the national standards for sulfur dioxide. The unclassified area lacks sufficient air quality monitoring data to be categorized as either attaining or not attaining the national standards, and the area also contains, or is close to, sources of sulfur dioxide that could cause exceedances of the national standards. PETC is located at the boundary between the attaining and the unclassified area for sulfur dioxide.

On July 1, 1987, EPA promulgated a new NAAQS for particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (designated PM_{10}). The PM_{10} standards (listed in Table 3-1) will replace the total suspended particulate standards as the states revise their air quality implementation plans. EPA has established three categories of geographical areas based on their probability of exceeding the PM_{10} standards. Allegheny County has been listed as a Group II area (areas that have a probability of between 20 and 95 percent for exceeding the PM_{10} standard) (EPA, 1987b). The rest of AQCR 197 areas are Group III areas and are presumed to be in compliance with the PM_{10} standard unless future monitoring data indicate exceedances.

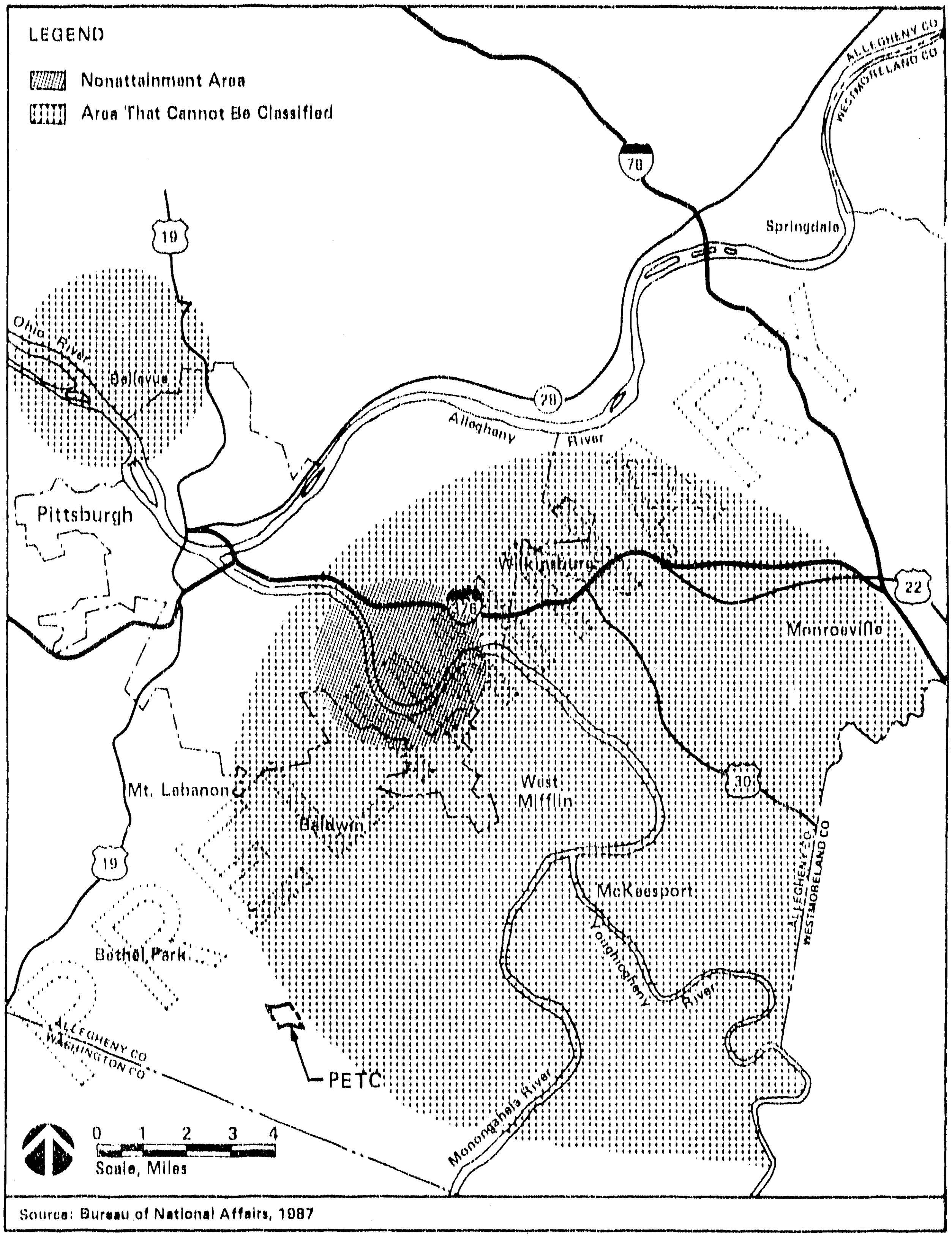
3.1.1.2 Air Quality

The Allegheny County Health Department operates a network of 37 monitoring stations within Allegheny County. Most of the stations are located near industrial areas within Pittsburgh or along the Monongahela River. The stations closest to PETC are in the industrial areas of Glassport and Liberty, which are approximately 6 miles east of PETC. However, these stations are not representative of the air quality conditions at PETC, which is in a rural/residential area and is generally upwind of the industrial areas (see Section 3.1.1.3). The closest representative station is located in McDonald, which is approximately 13 miles west of PETC (Savukas, 1987). Table 3-2



NONATTAINING AREAS FOR TOTAL SUSPENDED PARTICULATE AIR QUALITY STANDARDS ALLEGHENY COUNTY

FIGURE 3-1



NONATTAINMENT AREA AND AREA THAT CANNOT BE CLASSIFIED FOR SULFUR DIOXIDE AIR QUALITY STANDARDS ALLEGHENY COUNTY FIGURE 3-2

TABLE 3-2

1986 AMBIENT AIR QUALITY DATA FOR McDONALD, PA (SOUTH FAYETTE STREET STATION) AND APPLICABLE AIR QUALITY STANDARDS

Pollutant	Unit	Highest 24-Hour Values	24-Hour NAAQS	Annual Mean	Annual NAAQS
Total Suspended Particulates	µg/m³	92	150	34	75
PM_{10}	µg/m³	78	150	27	50
Lead	µg/m³	0.28	NA	0.07[b]	1.5[b]
Sulfates	µg/m³	29	30	12	NA
Sulfur Dioxide	ppm	0.07	0.14	0.014	0.03
Ozone	ppm	0.11[c]	0.12[c]	0.031	NA

Source: Savukas, 1987

a NA = Not applicable
b Maximum quarterly average
c Maximum 1-hour value

shows the summary data for 1986 from the South Fayette Street station in McDonald and lists the applicable NAAQS for comparison.

Both measures of airborne particulate matter, total suspended particulate and PM_{10}, are below their respective standards. Analyses of the particulate filters for lead showed just a trace amount. Sulfate deposition and ozone are problems throughout Allegheny County. The McDonald station had eight exceedances of the monthly sulfate standard during 1986, and the maximum 1-hour ozone concentration was just below the ozone NAAQS of 0.12 parts per million (ppm).

3.1.1.3 Meteorology

The Pittsburgh area has a humid, continental-type climate modified only slightly by its nearness to the Atlantic Seaboard and the Great Lakes. The predominant air masses have a polar, continental source in Canada and move in upon the Pittsburgh region by way of tracks which vary from almost due north from the Hudson Bay region to a long, westerly trajectory from the Rockies which progress eastward. There are frequent flows of air from the Gulf of Mexico during the summer season with resulting spells of warm, humid weather (NOAA, 1985).

The weather reporting station of the National Weather Service nearest the site is located at the Greater Pittsburgh International Airport, approximately 20 miles northwest of the site. Data recorded at this station are generally representative of the environmental conditions at PETC. January is the coldest month with an average temperature of 28°F; July is the hottest month with an average of 72°F.

Precipitation is well distributed throughout the year. During the winter months about a fourth of the precipitation occurs as snow, and there is about a 50 percent chance of measurable precipitation on any day. Average annual snowfall is 45 inches. Thunderstorms occur normally during all months except mid-winter and have a maximum frequency in mid-summer. Rainfall for the area averages three inches per month with the greatest rainfall occurring in July. Thunderstorms occur on an average of 36 days a year; hail appears on only two days.

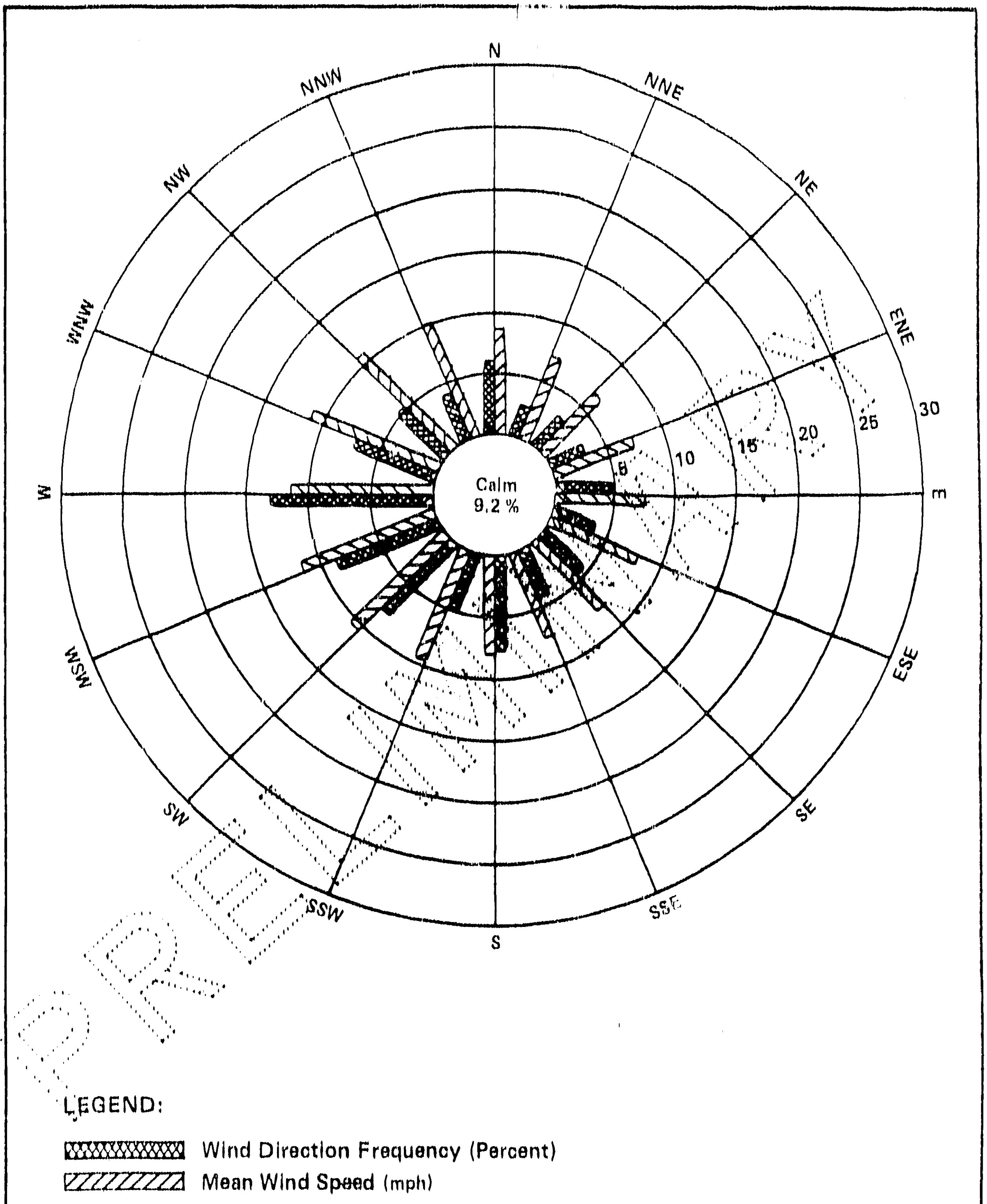
Prevailing winds in the area are west-southwesterly at an average speed of 9.4 miles per hour (mph). Figure 3-3 presents the Pittsburgh wind rose for the period 1976 through 1985.

3.1.2 General Description of Pollution Sources and Controls

The research programs at PETC concentrate on the development of liquid fuels from coal, the improvement of combustion conditions for these fuels and pulverized coal, and the testing of advanced pollution control methods for the resulting flue gases. There are several research facilities within PETC that emit the usual criteria pollutants due to the combustion of fossil fuels [i.e., sulfur dioxide, nitrogen oxides, carbon monoxide, and particulates]. At the time of the Survey, there were 10 combustion test facilities or test facilities that involve combustion prior to testing pollution controls. Additional sources of particulates include a coal preparation laboratory and a pulverized coal system. The coal liquefaction reactors also emit a small amount of pollutants. Table 3-3 lists the pollutant sources at PETC, their building location, and any available information on fuel consumption and pollution controls. Due to the research nature of the programs at PETC, most of the facilities operate infrequently, and some have not operated for several years. Additionally, each test cycle may alter one or more operating conditions, fuels, and pollution control conditions. Consequently, emission rates may be highly variable for each pollution source. Since the operation of the different test facilities is so infrequent, and since most exhaust gases pass through control equipment, the emissions from the PETC facilities are expected to have a negligible impact on the local air quality.

3.1.2.1 <u>700-HP Combustion Test Facility</u>

The 700-HP Combustion Test Facility in Building 93 consists of a watertube boiler that has been modified to burn coal/oil mixtures in the past (Pan, 1979), and more recently to burn coal/water mixtures. The coal/water slurry is typically 70 percent pulverized coal, 1 percent additives to reduce friction, and the remainder water (Wieczenski, 1987). In addition to the boiler, the test facility includes coal and oil storage tanks, coal preparation equipment, coal and oil mixing equipment, and a flue gas cleanup system. The flue gas leaving the boiler passes through a cooler that uses ambient air to cool the gas. A dry sorbent, sodium bicarbonate, is injected into the flue gas to reduce sulfur dioxide emissions (Pan, 1979). The reaction product,



Source: NWS, 1987

PITTSBURGH WINDROSE
1976 - 1985

FIGURE 3-3

TABLE 3-3

PETC AIR POLLUTION SOURCES

Test Facility	Bldg.	Fuel Type	Usage Rate	Emission Controls
700-HP Combustion Test Facility[1]	93	coal/water coal/oil	(30 MBtu/hr) 3,000 lb/hr	sorbent spray and baghouse
500-lb/hr Combustion Test Facility[2]	86	Pulverized coal	500 lb/hr	sorbent spray and baghouse
100-HP Combustion Test Facility[3]	93	Pul. coal coal/water	315 lb/hr	cyclone and baghouse
Macawber Pulverized Coal System[3]	NA	Coal	NA	baghouse
Cast Iron Boiler[4] (77 HP)	84	coal/water Fuel oil	(2.6 MBtu/hr) 4 gpm	cyclone and baghouse
Combustion Test Furnace[5]	89	coal/water pulverized coal	(2 MBtu/hr) 200 lb/hr	none
Radical Injector[6] (Slagging Combustor)	89	Fuel oil	2.6 gph	none
Dry Combined Flue Gas Cleanup[7]	84	Natural gas (fuel oil)	3.3 scfm	sorbent spray and baghouse
NOXSO Life Cycle System[6]	84	coal	40 lb/hr	baghouse and incinerator
Fischer - Tropsch Facility[6]	84	hydrogen and carbon monoxide	5 scfm	none
Residential Furnace[6]	86	coal	225,000 Btu/hr	none
Hydrotreater Reactors[8]	83	coal/water hydrogen	300 g/hr 4 scfh	none
Coal Preparation[9]	141	coal	NA	baghouse

Source: 1. Pan, 1979; 2. Yeh, 1985; 3. Longton, 1986; 4. Smouse, ND; 5. Longton, 1983; 6. Wieczenski, 1987; 7. Longton, 1985b; 8. Mathur, 1987; 9. Link, 1987

NA = not applicable

sodium sulfate, is collected on filter bags in the baghouse, along with the fly ash emitted from the boiler. The baghouse contains 120 fabric filter bags (Walbert, 1986). The dry powder mixture of fly ash and sulfate is removed from the baghouse periodically for subsequent disposal at a commercial landfill site. The test facility last operated in 1986, and was placed in dry storage (nitrogen filled). No testing was planned for 1988 (Wieczenski, 1987).

3.1.2.2 500-lb/hr Combustion Test Facility

The 500-pound per hour (lb/hr) Combustion Test Facility in Building 86 was designed to simulate the performance of an industrial or utility steam generator while burning pulverized coal. The flue gas exits the furnace at about 2,000°F, passes through a convective heat transfer section, and is then used to preheat the secondary air to the desired inlet temperature. By controlling the air through the air preheater, the flue gas temperature can be maintained in the range of 300° - 475°F. The flue gas produced by the test facility is used to evaluate different emission control parameters. Tests through 1985 passed the flue gas through a fluidized bed absorber to remove nitrogen oxides and sulfur dioxide in the "NOXSO" process (alumina impregnated with sodium carbonate). At the time of the Survey, the fluid bed chamber no longer contained an absorbent although the flue gas still passed through it to a spray dryer. A lime slurry is sprayed into the flue gas in the dryer to remove nitrogen oxides and sulfur dioxide gases (Yeh, 1985). Additional injection nozzles are placed along the external ductwork for spraying adsorbents into the flue gas. Copper oxide pellets have also been used as an adsorbent in the dryer. The fly ash and spent sorbent are collected in a baghouse before the flue gas is discharged from the stack on top of Building 89. The baghouse contains 57 Nomex fabric filter bags to remove the fly ash, which can accumulate at 170 lb/hr (Walbert, 1986).

3.1.2.3 100-HP Combustion Test Facility

The 100-horsepower (hp) Test Facility in Building 93 has been operated intermittently since 1978 for testing coal/oil mixtures, synthetic fuels, pulverized coal, and coal/water mixtures as well as No. 6 oil and natural gas. Typically, the boiler operates for one 16-hour run once a month. The boiler is a four-pass, firetube industrial boiler designed for oil firing, and manufactured by the Johnston Boiler

Company (Longton, 1986). At the time of the Survey, the boiler contained a Macawber pulverized coal burner, which contains an independent combustion air swirl device and a refractory chamber. Steam generated by the boiler is vented through a muffler to the atmosphere above the roof of Building 93. The flue gas generated, approximately 1,000 standard cubic feet per minute (scfm), is cleaned of particulates by a cyclone separator and a baghouse prior to being discharged. The baghouse has 28 bags of woven fiberglass with a 10 percent Teflon® coating that can collect up to 100 lb/hr of fly ash The fly ash is collected in drums for disposal.

The Macawber equipment for feeding the pulverized coal to the boiler is located in the courtyard formed by Buildings 84, 93, and 59. The system consists of a pulverized coal storage silo, baghouse, a lockhopper, and an injector hopper with a feedscrew. The baghouse prevents coal dust from being discharged during coal fillings. The silo and hoppers are purged with nitrogen, and the nitrogen is vented through the baghouse. The baghouse has nine polyester fabric bags rated to 275°F (Walbert, 1986).

3.1.2.4 Cast-Iron Boiler

The Cast-Iron Boiler Facility was designed to simulate a low-pressure, forced-circulation, hot-water heating system typical of commercial installations. The 77-hp unit is capable of burning light and heavy oils, natural gas, and novel coal forms (Smouse, ND). Recent tests have been with coal/water mixtures, but firings are infrequent. The flue gas from the boiler is ducted to the exhaust system for the 100-hp boiler, and the fly ash is removed by the cyclone separator and the baghouse (Longton, 1985a).

3.1.2.5 Combustion Test Furnace

The Combustion Test Furnace, or refractory box, on the third floor of Building 89, fires coal-water slurries or pulverized coals. At the time of the Survey, the furnace had not operated for several months, but was scheduled to operate in early 1988 (Wieczenski, 1987). At full load, the heat input is approximately 0.8 million British thermal units per hour (MBtu/hr). At this feed rate, the inlet temperature to the stack is 2,000°F which creates a natural draft for the furnace and the stack. The stack is insulated to contain the heat and prevent slagging in the stack. The stack discharges to the atmosphere above the roof of Building 89. When 10 percent ash coals are tested either as a slurry or as pulverized coal, up to 20 lb/hr of ash could be discharged to the atmosphere (Longton, 1983). Nitrogen oxides and sulfur dioxide will also be vented, but the amounts depend on the operating conditions.

3.1.2.6 Radical Injector

The other combustion test facility in Building 89 is the Radical Injector, or Slagging Combustor, located on the fifth floor. The unit fires No. 2 fuel oil while injecting radicals of common pollutants (sulfates, nitrates, etc.) into the flame. The flue gas is sampled to determine the slagging effect of the radicals and the amount of pollutants in the exhaust. The emission rate is relatively low since the fuel consumption rate is only 2.6 gallons per hour (gph) (Wieczenski, 1987).

3.1.2.7 Dry Combined Flue Gas Cleanup Pilot Desulfurization Unit (PDU)

In Building 84, a system comprised of a furnace, heat exchanger, and injection controls produces a synthetic flue gas. The flue gas is treated in a spray dryer where mixtures are tested on their ability to remove sulfur dioxide and nitrogen oxides. The synthetic flue gas is generated by burning natural gas, or fuel oil, and ammonia in the refractory lined furnace. The heat input at full load is 2 MBtu/hr (3.3 scfm of natural gas). The ammonia feed is manually controlled at 0.036 scfm to maintain approximately 800 ppm nitrogen oxides in the flue gas. Sulfur dioxide is fed into the flue gas as well at a rate of 1 scfm to maintain approximately 3,000 ppm of sulfur dioxide (Longton, 1985b). At the spray dryer, slurry of a sorbent compound such as sodium aluminate or lime is sprayed into the flue gas to remove the sulfur dioxide and nitrogen oxides. The resulting dried powders are collected in a baghouse where the temperature is to be maintained above 160°F. The baghouse contains six felt fabric filter bags to clean the 40 scfm of flue gas. The bags are cleaned by a pulse jet of reverse air (Walbert, 1986). The exhaust from the baghouse will contain some unabsorbed sulfur dioxide and nitrogen oxides, and is discharged approximately 12 feet above the roof of Building 84.

3.1.2.8 "NOXSO" Life Cycle System

At the time of the Survey, the "NOXSO" Life Cycle Test Facility was nearing completion of construction in Building 84. The facility will test the capabilities of various flue gas sorbents to absorb and desorb nitrogen oxides and sulfur dioxide over extended periods. The facility consists of a small coal-fired furnace (40 lb/hr) to generate flue gas, a fluid-bed absorber, a fluid-bed heater, a regenerator, and a fluidized-bed cooler. Flue gas exhaust from the absorber will pass through a baghouse to collect particulates. Offgases from the sorbent regenerator will pass through an incinerator before being vented to the atmosphere. The exhaust gas is expected to contain sulfur dioxide and to exit the incinerator at 800°F at a rate of 285 scfm (PETC Drawing MW-030-10). Estimated fuel usage for the test program was between 5 and 10 tons of coal, with all testing to be completed by June 1988 (Wiezcenski, 1987).

3.1.2.9 Fischer - Tropsch Facility

The two Fischer-Tropsch units in Building 84 convert a synthetic feed gas of hydrogen and carbon monoxide to hydrocarbons across a catalyst. Tests are conducted on the conversion efficiency of different catalysts under varying conditions of pressure and temperature. Feed gas of approximately 58 percent carbon monoxide and 42 percent hydrogen is fed at a rate of 2.5 scfh to each of the dual Fischer-Tropsch units. The feed gas is converted by catalytic action to produce between 10 and 40 percent carbon dioxide, between 1 and 10 percent hydrocarbons, and the remainder hydrogen and carbon monoxide (Wiezcenski, 1987). The units were vented to the old flare gas exhaust system at the time of the Survey. This system was installed in the late 1940s to handle waste gases from a synthesis gas plant that no longer exists. The gases were vented from a 100-foot-high stack. However, PETC plans to remove the stack and exhaust system and replace it with simple vents extending 15 feet above the buildings (PETC, 1986).

3.1.2.10 Residential Furnace

A small residential furnace is installed in Building 86 for testing coal firing characteristics under the short burning cycles required for home use. The heat input is approximately 225,000 Btu/hr. There are no emission controls, and the flue exhaust is vented directly to the atmosphere. The pollutants released from the furnace are expected to be mostly carbon monoxide that forms when the furnace is in the "off" part of the cycle and the coal is smoldering (Wieczenski, 1987). The hot air from the furnace, which would be used to heat a home in actual application, is exhausted directly to the atmosphere without being utilized.

3.1.2.11 Hydrotreater Reactors

Building 83 houses three small batch reactors on the second floor and four continuous-flow hydroprocessing units on the first floor. All of these test facilities are for the study of high-pressure extraction as a method for liquefaction of coal or coal-derived materials.

One reactor on the second floor is used for development of hydrotreating catalysts, one for aqueous liquefaction research, and the other for fractional separation. The hydrotreating catalyst unit consists of a 1-liter autoclave and ancillary equipment to produce conditions up to 450°C and 4,000 pounds per square inch (psi) for the catalyst. During the tests a continuous flow of water vapor, hydrogen sulfide, and ammonia can be generated in the exhaust. A 1-liter batch autoclave is also used to investigate aqueous slurries in coal liquefaction. The reactor may be operated at up to 5,325 psi at 510°C. The reactor is pressurized with nitrogen, hydrogen, or a hydrogen/hydrogen sulfide mixture which can be fed continuously to maintain system pressure as the gases are consumed by the reaction (Mathur, 1987).

The third unit, called the Fractional Destraction Unit, uses a 1-gallon autoclave to fractionate coal or coal-derived materials. A solvent, usually pentane, is heated under pressure and steady flow to separate the compounds in the fuel. Condensation of the less soluble material occurs on a packed bed in the upper portion of the vessel. The solvent transfers the lighter material as it flows from the vessel to the separator vessel, and the extract is collected in the cooler separator. The process is repeated with increasing pressure and flow to obtain another group of extracts. Most of the pentane is recovered in two chilled solvent recovery tanks and recycled, but a small amount is exhausted during depressurization of the system (Warzinski, 1982). Any escaping vapors are vented to the atmosphere by the building ventilation system.

The four continuous-flow hydroprocessing units, or hydrotreators (HTRs) on the first floor of Building 83 test the longevity and reliability of catalysts under varying conditions. The HTRs are capable of operating at 450°C and 4,000 psi. The reactor module of the units is designed for versatility in the number (up to three in series) and types of reactors employed. A wide range of feedstocks can be employed such as coal/oil slurries, heavy petroleum or coal-derived oils, and coal/water slurries. Feed rates range between 100 and 300 grams per hour. The units are also capable of feeding different reactant gases such as hydrogen, carbon monoxide/hydrogen mixtures, and hydrogen/hydrogen sulfide mixtures to a maximum of 3 percent hydrogen sulfide. Gas feed rate is approximately 4 scfh up to a maximum of 8 scfh. All unreacted gases and product gases are vented to the atmosphere from the roof of Building 83. Only one HTR is operated at a time. HTR-2 operates in 16-hour periods approximately 64 times a year. The other HTRs operate in 100-hour cycles, but usually operate only 3 to 12 times in a year (Smith, 1987).

3.1.2.12 Coal Preparation

Building 141 houses the coal analysis laboratories and bulk coal preparation equipment. Six laboratory areas conduct basic analyses of the coal used in the various test facilities. Ten hoods in these laboratories are vented to the atmosphere, and four of these are equipped with a water spray system. The spray systems were to wash down any perchloric acid that might be vented from these four hoods. However, the analyses performed in the laboratories no longer require perchloric acid. The coal crushing room has five different crushers, each with local vacuum hood to draw off the dust. There are also floor-level vacuum vents to withdraw any particles that reach the floor. A local vacuum cleaning system collects most of the dust generated in the crushing room. The building ventilation system exhausts through a baghouse of 84 bags. Approximately 2 pounds of coal dust are removed from the baghouse each month (Link, 1987).

3.1.3 Environmental Monitoring Program

3.1.3.1 Emissions Monitoring

Flue gas emissions from all the combustion test facilities at PETC are monitored during each test. Additionally, the effect of the various control systems on the flue gas is determined by monitoring the flue gas before and after the pollution control equipment. The control rooms for the 700-HP Test Facility and the 500-lb/hr unit contain analyzers for continuous monitoring of the pollutants carbon monoxide, sulfur dioxide, nitrogen oxides, and total hydrocarbons as well as carbon dioxide, oxygen, and opacity. The sample lines for the 100-hp boiler's analyzers can be switched to monitor the emissions from the cast iron boiler and the residential furnace as well, but only one source can be monitored at a time. Data are recorded on a Digital Equipment Corporation Model 1170 computer averaged over 1-minute intervals.

Building 84 contains several cabinets of gas analyzers that monitor the emissions from the "NOXSO" life cycle system and the other test facilities in the building. In total, there are 84 analyzers available in Buildings 84, 86, 89, and 93 to monitor the emissions from the various test facilities. Particulate samples are taken from a separate sample line or from ports in the stack wall at intervals in the testing program. Particulates are sampled isokinetically and passed through a cascade impactor of several stages to segregate the particle size distribution between 0.3 and 15 micrometers.

Although data on the emissions from the individual test facilities are collected routinely on a computer, they are not compiled for PETC either as an entity or as individual sources, and there is no tabulation or summary of the emissions data in the Annual Site Environmental Monitoring Report. DOE Order 5484.1, concerning requirements for reporting environmental information at DOE facilities, states that effluent monitoring data shall be reported if needed to demonstrate compliance with applicable emission standards. The only applicable standards are Pennsylvania emission limits on particulates and sulfur dioxide (see Section 3.1.1). However, Pennsylvania regulations regarding monitoring, and consequently reporting, of sulfur dioxide and particulates (opacity) from combustion sources are not applicable to the test facilities at PETC. Chapter 123.25 of the Pennsylvania Air Pollution Control Regulations excludes all but the largest sources in Allegheny County from monitoring sulfur dioxide emissions, and Chapter 123.46 requires opacity monitoring only for steam generators larger than 250 MBtu/hr input (Pennsylvania Department of Environmental Resources, 1986). All combustion sources at PETC have heat inputs much smaller than 250 MBtu/hr.

3.1.3.2 Ambient Air Monitoring

At the time of the Survey, there was no air monitoring program on or near PETC. During an 8-month study at PETC in 1976-1977, ambient air samples were collected and analyzed for suspended particulates and sulfur dioxide. The highest average particulate concentration was 58.9 microgram per cubic meter ($\mu g/m^3$), and the highest annual average concentration of sulfur dioxide was 16.6 $\mu g/m^3$. Particulate measurements at several locations on the site had geometric mean concentrations ranging from 50 to 58 $\mu g/m^3$ (DOE, 1978). The measurements indicate that the annual secondary NAAQS for particulates (60 $\mu g/m^3$) and the annual NAAQS for sulfur dioxide were not exceeded during the monitoring period. Insufficient information is provided in the monitoring report to determine compliance with the 24-hour standards. No monitoring data are available concerning concentrations of either carbon monoxide or nitrogen oxides, which are the other potential pollutants at PETC.

3.1.4 Findings and Observations

3.1.4.1 Category I

None

3.1.4.2 Category II

None

3.1.4.3 Category III

None

3.1.4.4 Category IV

None

3.2 Soil

3.2.1 Background Environmental Information

The Pittsburgh Energy Technology Center (PETC) is located within the Pittsburgh Plateau physiographic region of southwestern Pennsylvania. The area is characterized by a rolling terrain with uniform hilltop levels at about 1,200 feet, and streams generally occurring at about 600 feet. Soils are generally silty clays, but may include silty or stony loams, shale and other substances including mine tailing fill. The soils are considered to be moderately productive.

The 900 and 920 Areas of PETC are situated on fill used to level off the previous valley. Groundwater would be funneled toward the valley axis and ultimately discharge at the toe of the fill.

The Bruceton Research Center (BRC), which includes PETC, originally was densely forested, but now has been largely cleared for mining and suburban development. It now supports second-growth forest vegetation only. Vegetation currently consists of various species of pine, maple, oak, and sycamore, and assorted understory vegetation such as Virginia creeper and poison ivy.

3.2.2 General Description of Pollution Sources and Controls

Potential sources of soil contamination exist as a result of past operational practices. These potential sources include chemical leaks and spills; contaminants in waste storage/accumulation areas; and contaminants in disposal and landfill areas. A detailed discussion of soil contamination resulting from waste storage/accumulation practices as well as chemical spills and leaks is presented in Section 4.5

3.2.3 Environmental Monitoring Programs

PETC does not conduct a soil monitoring program. A statement of work was developed by PETC for a one-time soil sampling of the 2.1 acre site. This site is described in Section 4.5.1.3. The statement of work (PETC, 1985) provided for 25 surface soil samples to be taken from a 100 by 100 foot area in the northwest corner of the site and analyzed for total hydrocarbons. PETC environmental staff indicated during the Survey, however, that this sampling and analysis was never funded and not carried out.

3.2.4 Findings and Observations

3.2.4.1 Category I

None

3.2.4.2 Category II

None

3.2.4.3 Category III

None

3.2.4.4 Category IV

None

3.3 Surface Water

3.3.1 Background Environmental Information

3.3.1.1 Regional and Local Setting

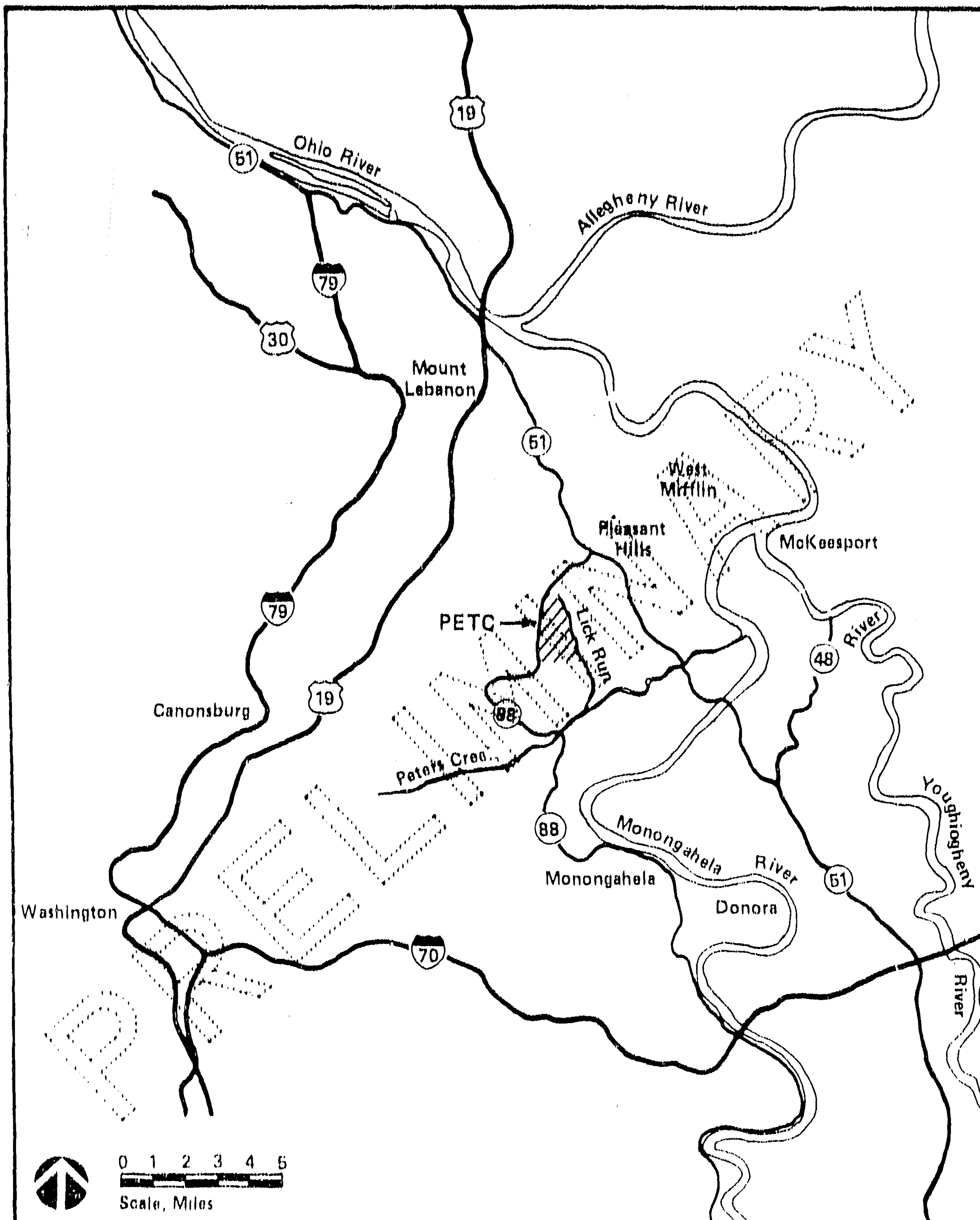
The major surface water bodies of interest include Lick Run, Peters Creek, and the Monongahela River (see Figure 3-4). Lick Run is adjacent to the eastern boundary of the PETC site and flows into Peters Creek 2.6 miles downstream of the site. Peters Creek is a tributary of the Monongahela River. The confluence of Peters Creek and Lick Run is approximately 6 miles upstream of the Monongahela River.

3.3.1.2 Utilities

All sanitary wastewater from the valley-fill area (i.e., 900 area) is discharged into a sanitary sewer system that is served by the Clairton Sewage Treatment Plant (STP). Stormwater runoff is discharged into a storm sewer system. As indicated in Figure 3-5, most of the storm sewer system discharges into Lick Run via the south outfall.

Since 1980, the Pittsburgh Energy Technology Center (PETC) has focused attention on the collection and treatment of laboratory wastewater and contaminated water from the site. Prior to July 1986, all sanitary wastewater from PETC facilities located in the Main Plateau Area and laboratory wastewater from Building 94 discharged into a sanitary sewer system. The sanitary sewer system discharged into the Pleasant Hills STP. Stormwater runoff, laboratory wastewater, cooling tower blowdown, noncontact cooling water, and boiler blowdown from the remainder of the plateau area discharged into the storm sewer system. The storm sewer system discharged into Lick Run via the north storm sewer (see Figure 3-5). The north storm sewer collected discharges from both the U.S. Bureau of Mines (BOM) facilities and PETC facilities.

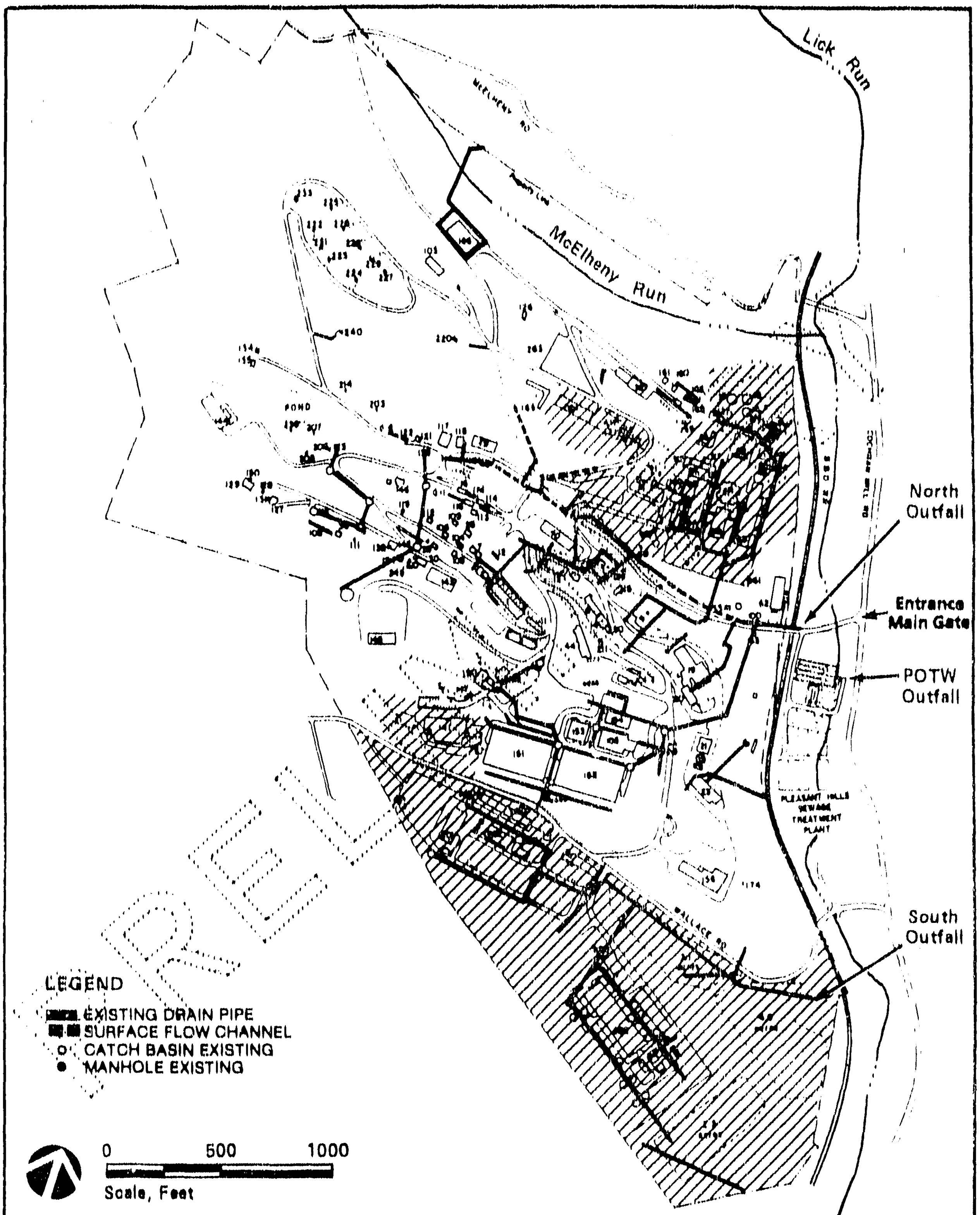
Since July 1986, wastewater treatment facilities (WWTFs) consisting of a laboratory wastewater collection system (LWCS) and a pretreatment plant were constructed to serve the Plateau Area. The LWCS receives laboratory wastewaters from Buildings 83, 84, and 94. The coal water clarifier tank in Building 93 was designed to be pumped into the LWCS. However, at the time of the Survey, the pumps were



Source: PETC, 1988

REGIONAL MAP OF PITTSBURGH, PA

FIGURE 3-4



Source: PETC, 1988

STORM SEWER SYSTEM LAYOUT

FIGURE 3-5

disconnected. The Building 93 boiler blowdown and water softener backwash and the Building 90 compressor cooling water are collected in the Building 93 main sump prior to being discharged to the main plateau stormwater sewer. The LWCS discharges to the pretreatment plant (Building 74). The pretreatment plant is capable of providing oil separation, equalization, precipitation of heavy metals, pH adjustment, coagulation, and sedimentation prior to discharging to the sanitary sewer system.

Since February 1987, laboratory wastewater from Building 141 is discharged into the sanitary sewer system that is served by the Pleasant Hills STP (Hebb, 1988a). Prior to 1987, laboratory wastewater was discharged to a holding tank. The holding tank was pumped out periodically and the contents hauled off-site for disposal. Building 141 is located adjacent to the valley-fill area.

PETC obtains potable water from the Western Pennsylvania Water Company, which uses the Monongahela River as the source of its water. Quality analyses for water from the intake at E. H. Aldrich station were performed in 1987. Aldrich station is located on the Monongahela River upstream of its confluence with Peters Creek. The analyses included pesticides, minerals, and metals. Results indicated that maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA) and Pennsylvania Department of Environmental Resources (PaDER) have not been exceeded for any of the contaminants (Kudaroski, 1987).

The potable waster distribution system at PETC is used for drinking water as well as a source of water for laboratory experiments and processes. Backflow preventers, to eliminate the possibility of siphoning of contaminated water back into the distribution system, are believed to be used in the coal combustion area. There is no sitewide requirement, however, to install backflow preventers when connecting to the potable water system, nor is there a listing of what buildings or rooms have backflow preventers installed.

3.3.2 General Description of Pollution Sources and Controls

Wastewater generated at PETC includes sanitary wastewater, contaminated wastewater, and noncontact cooling water. These wastewaters are discharged to the Pleasant Hills STP, the Clairton STP (sanitary wastewater from the 900 and 920

Areas), or the stormwater sewer system. The Pleasant Hills STP and Clairton STP are publicly owned treatment works (POTW). The Pleasant Hills STP discharges into Lick Run. The PETC stormwater sewer system also discharges into Lick Run. The Clairton STP discharges into the Monongahela River.

The PETC facility potentially discharges contaminants to surface waters from three categories of wastewater. Collection and treatment systems for each category are described in the following subsections. The three categories are defined as follows: "sanitary wastewater" - wastewater from restrooms, water fountains, cafeterias, etc., throughout the facility; "contaminated wastewater" - wastewater that is a mixture of laboratory wastewater, building washdown water, process cooling water overflow, and miscellaneous wastes discharged to floor drains; and "stormwater" - stormwater runoff.

3.3.2.1 Sanitary Wastewater

All sanitary wastewater from PETC facilities discharges into a sanitary sewer system. The Clairton STP receives sanitary wastewater from the 900 area, whereas the Pleasant Hills STP receives cooling tower overflow, laboratory wastewater, and effluent from the pretreatment plant (see Table 3-4). These potential sources of contaminated wastewater are discussed in Section 3.3.2.2.

The Pleasant Hills STP is a POTW operated by the Pleasant Hills Authority. The STP receives an average daily flow of approximately 2.5 million gallons per day (mgd) (Cuppett, 1987) from a service area that includes all of Pleasant Hills Township plus portions of Jefferson, Snowden, South Park, Bethel Park, Baldwin, and Whitehall townships. On December 8, 1987, the Survey team observed a flow of 3.4 mgd. Peak wet-weather flow is approximately 20 mgd. The entire Bruceton Research Center (BRC) discharges approximately 10,000 gallons per day (gpd) to the STP.

The STP has a design capacity of 3.0 mgd and provides secondary treatment. The plant consists of a comminutor, aerated grit chamber, primary settling tanks, aeration tanks, secondary clarifiers, and chlorine contact tank. Sludge is anaerobically digested and distributed to sludge drying beds. Dried sludge is landfilled. A free sludge distribution program was discontinued approximately 2 to 3 years ago due to the heavy metals content of the sludge (Cuppett, 1987).

TABLE 3-4

POTENTIAL SOURCES OF CONTAMINATED WASTEWATER DISCHARGED TO THE SANITARY SEWER SYSTEM[1]

Source	Building	Type of Discharge
Drain	71	Cooling tower overflow (2)
Pretreatment plant	74	Treated wastewater
Floor/sink drains	94	Lab wastewater
Floor/sink drains	141	Lab wastewater

Source: Derived by Survey team member

(1) Pleasant Hills STP only

(2) Building 94 cooling tower

The plant almost always meets current effluent discharge limitations. However, the plant has occasionally experienced operating problems as a result of receiving slugs of industrial discharges. In addition, the plant is bypassed occasionally due to high wet-weather flows (Cuppett, 1987). The plant is currently under a compliance order from PaDER to meet future effluent discharge limitations more stringent than the current secondary standards. The future limitations, which will take effect under the order on June 1, 1990, will require plant effluent to meet ammonia-nitrogen and dissolved oxygen standards that the plant is unable to achieve due to existing plant design. To meet future effluent limitations and provide additional hydraulic capacity, plans have been prepared to upgrade and expand the existing plant to 5.0 mgd, and to construct tertiary treatment facilities. The compliance order also allows a 2-year time limit on construction of these facilities. Construction began in February 1988.

3.3.2.2 Contaminated Wastewater

Contaminated wastewater includes the following:

- Laboratory wastewater generated by washing sample bottles and spilling samples or reagents;
- Floor drainage from analytical laboratories; and washdown from experimental research laboratories, garages, and spills;
- Cooling water and boiler blowdown from steam produced for experiments and general heating; and
- Cooling tower blowdown associated with cooling buildings and laboratories.

Past Operations

Prior to 1986, stormwater runoff, laboratory wastewater, cooling tower blowdown, noncontact cooling water, and boiler blowdown from the plateau area discharged into the storm sewer system. Laboratory wastewater from Building 94 discharged into a sanitary sewer system. The storm sewer system discharged into Lick Run via the north storm sewer (see Figure 3-6). The north storm sewer collected discharges from both the BOM facilities and PETC facilities.

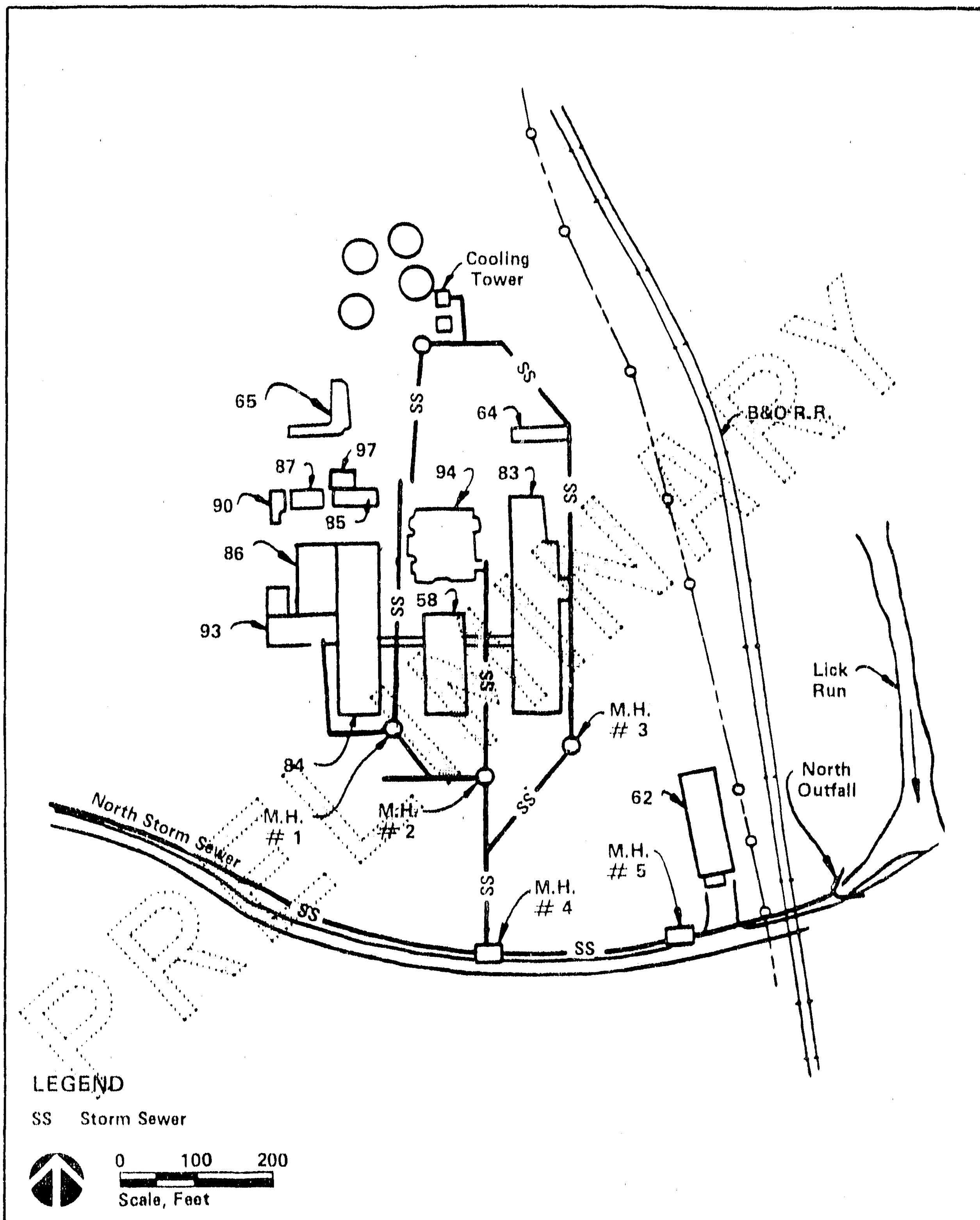
PETC's storm sewer discharges were sampled and analyzed in 1979 and 1980 as part of the Peter F. Loftus study. In 1982, as part of the Chester Engineers study, both laboratory wastewaters and storm sewer discharges were sampled and analyzed. The results of both sampling and analysis efforts are summarized in Tables 3-5 and 3-6. Tables 3-7 and 3-8 summarize sample results for the DOE laboratory complex outfall (manhole #4) and Lick Run, respectively.

The Chester Engineers reported that the laboratory wastewater pH ranged from 1.1 to 11.2 standard units and that periodic high concentrations of total suspended solids and halogenated organics were observed. Based on their analyses, the Chester Engineers identified the following contaminants as potential pollutants: pH, zinc, copper, mercury, phenols, total organic halogens, and suspended solids. The Chester Engineers recommended that WWTFs be constructed to collect and pretreat laboratory wastewaters, water softener backwash, coal dust washdown, and contaminated stormwater from Building 93 prior to discharge to the Pleasant Hills STP.

<u>Wastewater Treatment Facilities</u>

Since July 1986, WWTFs consisting of an LWCS and a pretreatment plant (Building 74) were constructed. The LWCS was constructed to eliminate untreated discharges of laboratory wastewater, water softener backwash, boiler blowdown, and clarified coal-water to the storm sewer system. Laboratory sinks and floor drains in Buildings 83, 84, 94, 97, and a portion of Building 93 were connected to the LWCS (see Table 3-9). The remaining laboratory sink drains, floor drains, overflow drains, and yard drains in or near Buildings 58, 59, 71, 85, 86, 87, 89, and 90 remain connected to the storm sewer system.

The LWCS consists of polypropylene sewer pipe and five sumps; namely, Building 83 sump, Building 84 sump, Building 85 sump, Building 93 sump, and Building 94 (east) sump. The LWCS receives laboratory wastewaters from Buildings 83, 84, and 94. In addition, clarified coal-water, boiler blowdown, and water softener backwash are



Source: Chester Engineers, 1983

STORM SEWER LAYOUT — FIGURE 3-6

TABLE 3-5

SUMMARY OF FLOWS

Location	Chester Survey (gpm)	Loftus Report (gpm)
North Outfall		
Cooling Tower Blowdown and Building 83 (MH 3)	7.5	-
Buildings 93 and 84 (MH 1)	60 - 70	-
DOE Complex Drain (MH 4)	70 - 102	109
BOM Drain (MH 4)	34 - 44	-
Boiler House Blowdown	18	3.5
TOTAL NORTH OUTFALL	122 - 164	170
South Outfall		
Sewage Treatment Plant	0.5 - 1.0	1.0
TOTAL SOUTH OUTFALL	10.0 - 12.5	100
Sanitary Sewer		
Building 94 Laboratory Discharges	25 - 40	-
Parshall Flume	107 - 167	-

Source: Chester Engineers, 1983

TABLE 3-6

COMPARISON OF NORTH OUTFALL MONITORING DATA

Parameter	Chester Surveys		Loftus Report	
	(mg/L)[1]	(lb/day)[1]	(mg/L)[1]	(lb/day)[1]
Flow Range (gpm)	122-164	--	117-196	--
Average Flow (gpm)	143	--	152.5	--
pH, Minimum (STD Units)	7.2	--	7.5	--
Aluminum, Al	0.26	.45	1.7	3.1
Alkalinity, Minimum as $CaCO_3$	97	--	47	--
Arsenic, As	--	--	<0.005	<.01
Chromium, Hexavalent, Cr	--	--	<0.01	<.02
Chromium, Total, Cr	<0.01	0.015	--	--
Copper, Cu	<0.02	0.029	0.05	0.09
Cyanide, Amenable	<0.025	0.0073	0.007	0.01
Cyanide, Unamenable	<0.005	0.0073	--	--
Fluoride, F	1.6	2.78	0.5	0.9
Iron, Fe	1.5	2.52	8.1	14.8
Iron, Dissolved, Fe	--	--	0.54	0.99
Lead, Pb	<0.005	0.0073	0.18	0.33
Manganese, Mn	0.13	0.23	0.3	0.55
Nickel, Ni	<0.01	0.015	0.05	0.09
Zinc, Zn	0.18	0.32	0.55	1.0
NO_2 and NO_3, N	--	--	1.3	2.38
Freon Extractables	1.2	2.05	8	16
Phenol, PhOH	0.008	0.014	0.008	0.035
TDS	335	575	585	1,072
TSS	15	26	48	88
Sulfates, SO_4	130	225	175	320
BOD_5	6.8	11.7	10	18.3
COD	22.2	36.1	65	119
Sulfur, S	--	--	74	135
TOC	10.2	17.6	6.7	12.2
Ammonia Nitrogen, N	--	--	0.12	0.22

Source: Chester Engineers, 1983

[1] Unless noted otherwise

TABLE 3-7

LABORATORY ANALYSIS REPORT, DOE LABORATORY COMPLEX OUTFALL

Source	DOE Laboratory Complex Outfall			
Log No: 82-	5261	5517	5532	5580
Date Collected	10/12/82	10/26/82	10/27/82	10/28/82
pH	7.7	7.4	7.0	7.1
Total Suspended Solids, mg/L	3	6	4	2
Total Dissolved Solids, mg/L	260	--	--	--
Total Organic Halogens, µg/L Cl	--	53	48	80
Total Carbon, mg/L C	10	--	--	--
Inorganic Carbon, mg/L C	6	--	--	--
Total Organic Carbon, mg/L C	4	--	--	--
COD, mg/L	9	--	--	--
Phenols, mg/L PhOH	--	0.070	0.011	0.023
Aluminum, mg/L Al	--	<0.1	<0.1	--
Chromium, mg/L Cr	--	--	<0.01	--
Total Fluorides, mg/L F	--	--	1.66	--
Iron, mg/L Fe	--	0.27	0.25	0.20
Manganese, mg/L Mn	--	0.12	0.04	<0.01
Zinc, mg/L Zn	--	0.15	0.21	0.16

Source: Chester Engineers, 1983

TABLE 3-8

LABORATORY ANALYSIS REPORT, LICK RUN

Source	Surface Water Drainage To BOM Discharge (North Outfall)	Storm Sewer East of Building 83	BOM Boiler Blowdown	Cooling Tower Blowdown	Lick Run Above North Outfall	Tap Water
Log No. 82-	5248	5253	5249	5250	5287	5257
Date Collected	10/12/82	10/12/82	10/12/82	10/12/82	10/13/82	10/12/82
pH	7.3	6.9	11.6	7.6	8.0	7.1
Total Solids, mg/L	--	--	--	--	678	--
Total Suspended Solids, mg/L	6	--	<1	--	1	--
Total Dissolved Solids, mg/L	1,040	--	1,340	320	612	212
Total Hardness, mg/L $CaCO_3$	--	--	--	--	352	--
Total Organic Halogens, µg/L Cl	--	--	--	--	--	21
BOD_5, mg/L	--	--	--	--	<1	--
COD, mg/L	--	--	37	--	8	--
Freon Extractables, mg/L	--	0.4	--	--	--	--
Sulfates, mg/L SO_4	223	--	--	--	226	105
Phenols, mg/L PhOH	--		--		0.015	<0.005
Total Cyanide, mg/L CN	--	--	--	--	<0.005	--
Aluminum, mg/L Al	--	--	--	--	0.1	--
Cadmium, mg/L Cd	--	--	--	--	<0.005	--
Chromium, mg/L Cr	--	--	--	--	0.01	--
Copper, mg/L Cu	--	--	--	--	0.01	0.01
Iron, mg/L Fe	3.1	--	0.70	--	0.06	0.08
Lead, mg/L Pb	--	--	--	--	<0.005	--
Manganese, mg/L Mn	--	--	--	--	0.05	--
Nickel, mg/L Ni	--	--	--	--	<0.01	<0.01
Zinc, mg/L Zn	--	--	--	--	0.02	0.19

Source: Chester Engineers, 1983

TABLE 3-9

POTENTIAL SOURCES OF CONTAMINATED WASTEWATER DISCHARGED TO THE LABORATORY WASTEWATER COLLECTION SYSTEM

Source	Building	Type of Discharge
Floor/sink drains	83	Lab wastewater
Floor/sink drains	84	Lab wastewater
Drain	93	Clarified coal-water
Drain	93	Boiler blowdown
Drain	93	Water softener backwash
Floor/sink drains	94	Lab wastewater
Floor drains	97	Pulverized coal washdown

Source: Derived by Survey team member

collected in the Building 93 sump and discharged into the LWCS (see Table 3-10). The LWCS discharges to the pretreatment plant (Building 74). A schematic flow diagram is given in Figure 3-7.

When the WWTF is not operated, the collection sump pumps are turned off. The Building 83 sump, Building 84 sump, Building 85 sump, and Building 93 sump will automatically overflow into the storm sewer system. The Building 94 (east) sump is bypassed and wastewaters are discharged directly into a limestone pit that discharges into the sanitary sewer system.

The pretreatment plant is capable of providing oil separation, equalization, precipitation of heavy metals, coagulation, and sedimentation prior to discharging to the sanitary sewer system. Pretreatment plant performance testing was conducted during the period of July 1986 to February 1987. Performance testing involved operating the plant as designed to determine treatment efficiency. On February 3, 1987, the supply of chemicals used to treat the wastewater was depleted and has not yet been replaced.

Since February 3, 1987, the plant has been "cycled" or operated intermittently to exercise equipment as a preventive maintenance measure. When the LWCS is operating, wastewater is discharged to the pretreatment plant equalization tank. The LWCS typically operates from 8:00 AM Monday through 3:00 PM Friday.

The plant typically cycles for a period of approximately 6 hours a day (8:00 AM through 2:00 PM), depending on the volume of wastewater collected in the equalization tank. At the time of the Survey, according to LWCS operators, wastewater influent bypassed the oil separation unit and discharged into the equalization tank, where it was mixed by aeration. As indicated in Figure 3-8, wastewater from the equalization tank is pumped to the neutralization tank. Plant design requires chemical addition to adjust the pH. However, no chemicals are added since none are available. After leaving the neutralization tank, the wastewater enters the flash mix and flocculation tanks, which are part of the inclined plate separator unit (liquid/solids separator). Plant design requires chemical addition to enhance solids settling. Although some solids settle out in the plate separator unit, no chemicals are added since none are available. Following solids separation, the wastewater enters a post-neutralization tank. Plant design requires

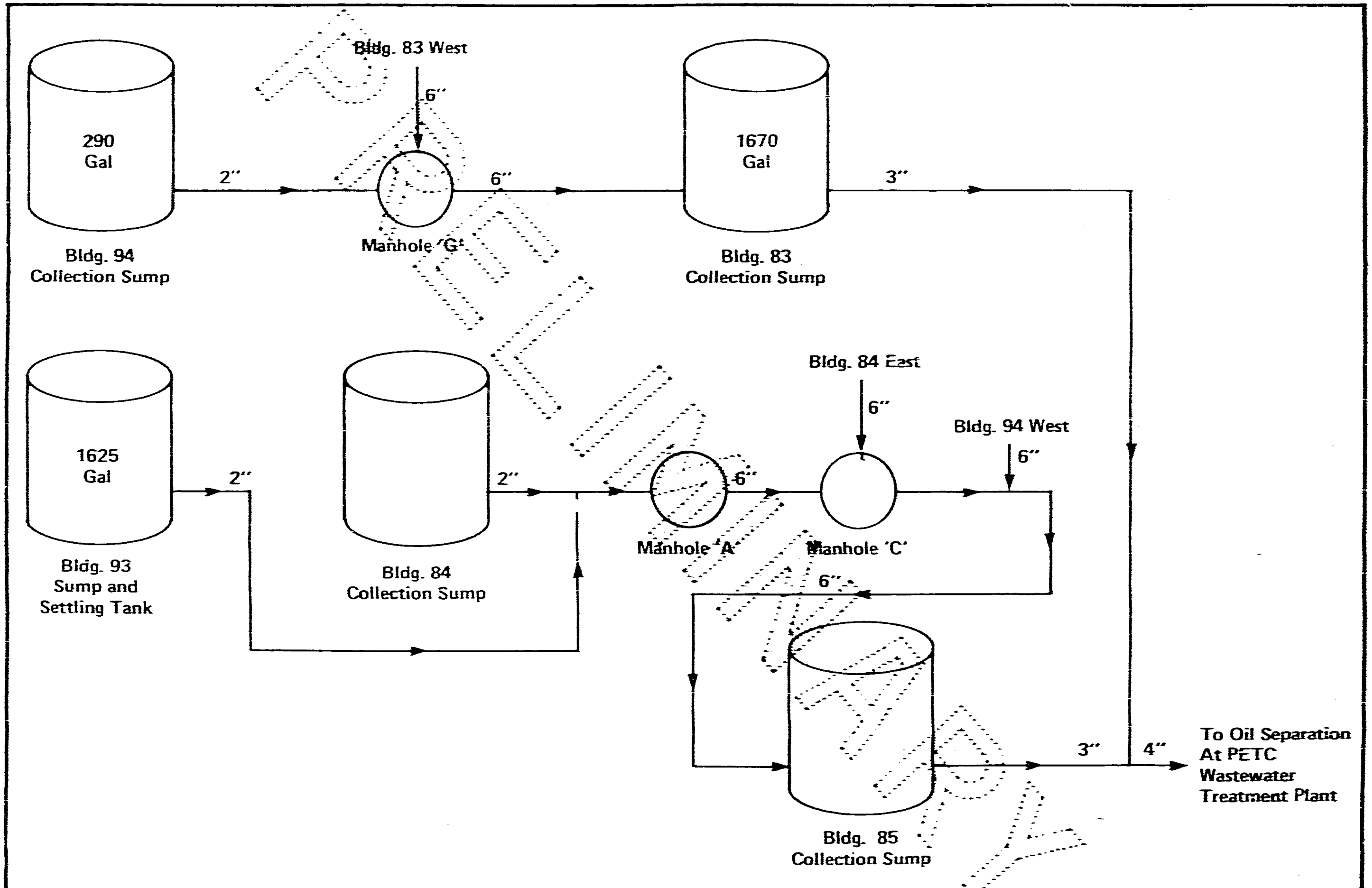
TABLE 3-10

SOURCES OF WASTEWATER FOR LWCS SUMPS

Sump	Source of Wastewater
Building 93 Sump	Building 93 - water softener backwash Building 93 - clarified coal-water* Building 93 - boiler blowdown
Building 84 Sump	Building 84 - lab wastewater
Building 85 Sump	Building 93 sump Building 84 sump Building 94 - lab wastewater (west side) Building 97 - pulverized coal washdown
Building 94 Sump	Building 94 - lab wastewater (east side)
Building 83 Sump	Building 83 - lab wastewater Building 94 sump

Source: Developed from Drawing D-7714, PETC, 1984 and Webster, 1988

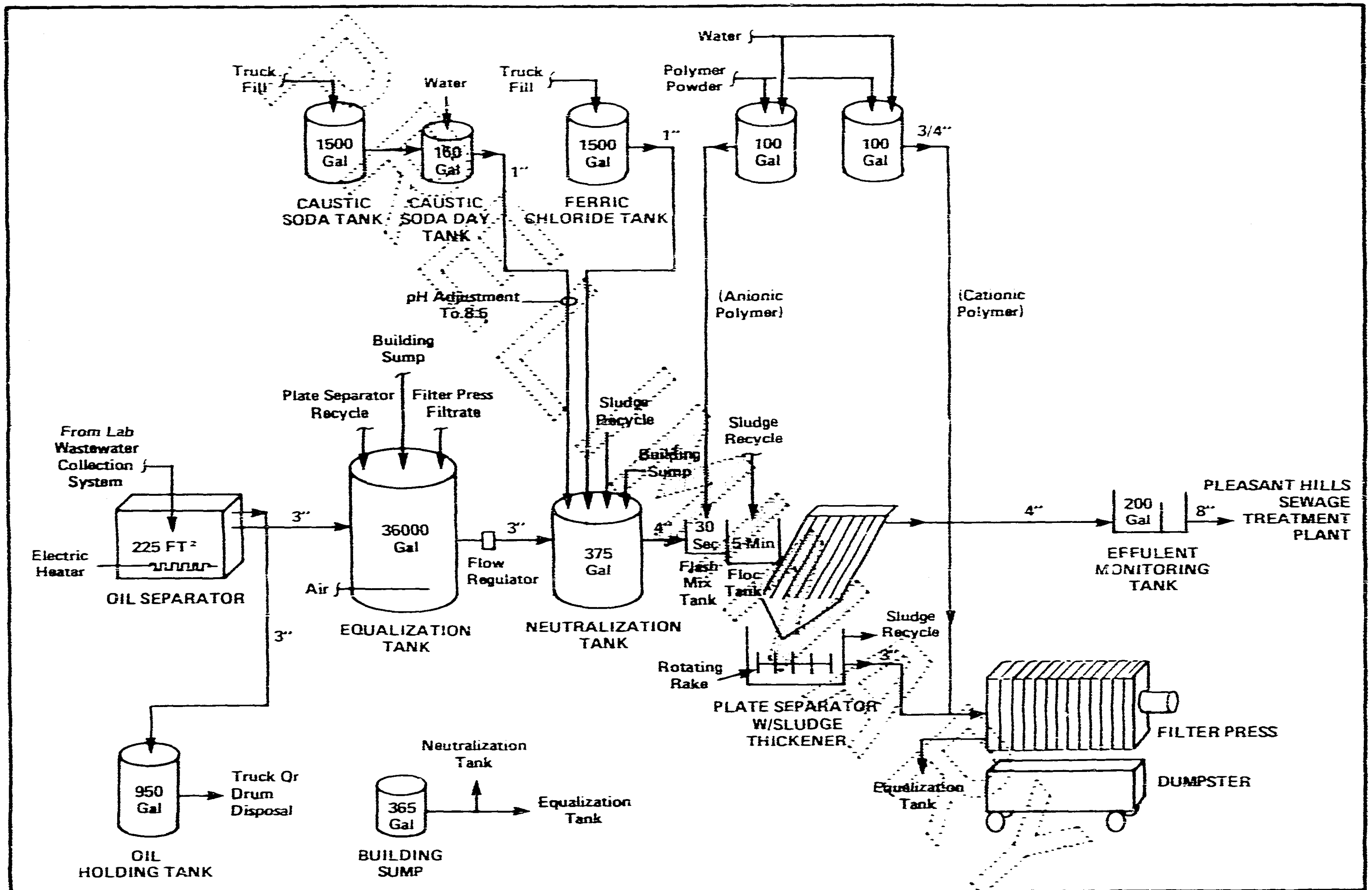
*Note: The coal water clarifier tank in Building 93 was designed to be pumped into the LWCS. However, at the time of the Survey, the pumps were disconnected.



Source: Chester Engineers, 1986

SCHEMATIC FLOW DIAGRAM
LAB WASTEWATER COLLECTION SYSTEM

FIGURE 3-7



Source: Chester Engineers, 1986

PRETREATMENT PLANT FLOW DIAGRAM

FIGURE 3-8

chemical addition to adjust pH. However, no chemicals are added since none are available. After post-neutralization, wastewater enters the effluent weir box and is discharged to the sanitary sewer system.

Since the pretreatment plant has been in operation, acid slugs have been received on three occasions. Acids slugs were received in December 1986 and January 1987 during performance testing. In addition, an acid slug was received at the WWTF in April 1987. During the April 1987 event, the initial influent pH was <2.0 units. Chemicals were unavailable to adjust the pH. Consequently the wastewater was recycled and diluted with fresh incoming wastewater over a period of 3 days to increase the pH above 6.0. In its current mode of operation, the plant would be potentially incapable of treating such slugs.

The pretreatment plant discharges to the Pleasant Hills STP. The Pleasant Hills Authority has established informal pretreatment requirements for laboratory wastewater discharges from PETC facilities. These requirements are summarized in Table 3-11.

Laboratory Wastewaters

Currently, laboratory wastewaters are discharged into the sanitary sewer system from three known sources, namely, Buildings 74, 94, and 141. The sanitary sewer system discharges to the Pleasant Hills STP.

Normally, laboratory wastewater from the east side of Building 94 is discharged into the limestone pit on weekends, holidays, and any other periods when the collection sump pump is turned off. During the on-site Survey, the laboratory wastewater from the east side of the building was being diverted to the limestone pit because a valve on the collection sump discharge pipe was being replaced. An inspection of the limestone pit revealed that there did not appear to be any limestone in the pit. It was reported that limestone has not been added to the pit during the last 5 years.

Laboratory wastewaters from the east side of Building 94 were sampled and analyzed by the Chester Engineers in 1982. A flow summary and summary of analysis results are presented in Tables 3-12 and 3-13, respectively. A composite mixture of wastewater from Buildings 94 (east) and 94 (west) was analyzed for

TABLE 3-11

PLEASANT HILLS WASTEWATER PRETREATMENT REQUIREMENTS

Parameter	Unit	Pleasant Hills Influent Criteria
pH	Standard units	7.0 to 9.0
Aluminum	mg/L	--
Copper	mg/L	<1.1
Cyanide	mg/L	--
Iron	mg/L	--
Lead	mg/L	<0.2
Nickel	mg/L	<1.3
Zinc	mg/L	<0.8
Freon Extractables	mg/L	--
Total Suspended Solids	mg/L	≤30
Phenolics	mg/L	<0.1
Mercury	mg/L	<0.01
Total Organic Halogen	mg/L	<0.5

Source: Ellingson, 1987

TABLE 3-12

FLOW SUMMARY
LABORATORY WASTEWATER DISCHARGES TO SANITARY SEWER (gpm)

Location	October 26	October 28	November 23	December 14	Average
Building 94 (West) Limestone Pit	9.7	8.5	8.0	8.6	8.7
Building 94 (East) Limestone Pit	16.0	32*	8.2	5.9	10.0
Sanitary Sewer Downstream of East Limestone Pit	17.8	17.3	--	--	
Parshall Flume (Total Sanitary Discharge Leaving PETC Site to Pleasant Hills STP)	167	107	--	--	

Source: Chester Engineers, 1983

* Dye was affected by low pH in limestone pit resulting in higher fluorometer readings.

TABLE 3-13

CONCENTRATIONS AND MASS LOADINGS FROM BUILDING 94 LABORATORY DRAINS[1]

Parameter	Lab Wastes from DOE Building 94 East		Lab Wastes from DOE Building 94 West		Total	
	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day
Average Flow (gpm)	13.6	13.6	8.7	8.7	22.3	22.3
pH	6.6	6.6	5.8	5.8		
Total Solids	1,774	289.7	257	26.9	1,182	316.6
Total Suspended Solids	3.8	0.62	3.2	0.33	3.5	0.95
Total Dissolved Solids	1,006	164.3	235	24.6	705	188.9
Acidity to PHT, CaCO3	3.7	0.60	5.7	0.60	4.5	1.2
Alkalinity to M.O., $CaCO_3$	14	2.29	15	1.57	14.4	3.86
Total Organic Halogens, Cl	561	0.092	699	0.073	0.62	0.165
Total Carbon, C	12.6	2.06	10.8	1.13	11.9	3.19
Inorganic Carbon, C	5	0.82	1	0.10	3.4	0.92
Total Organic Carbon, C	11.4	1.86	10.8	1.13	11.1	2.99
COD	24	3.92	22.5	2.35	23.4	6.27
Freon Extractables	0.2	0.033	0.9	0.094	0.47	0.127
Sulfates, SO_4	844	137.9	102	10.66	555	148.6
Phenols, PhOH	0.0178	0.0027	0.051	0.0053	0.030	0.008
Total Cyanide, CN	0.01	0.0018	0.009	0.00094	0.10	0.00274
Unamenable Cyanide, CN	<0.005	0.00082	<0.005	0.00052	<0.005	0.00134
Amenable Cyanide, CN	<0.005	0.00082	<0.005	0.00052	<0.005	0.00134
Aluminum, Al	0.1	0.016	0.13	0.014	0.11	0.03
Arsenic, As	<0.001	0.0016	<0.001	0.00010	<0.001	0.00026
Cadmium, Cd	<0.005	0.00082	<0.005	0.00052	<0.005	0.00134
Total Chromium, Cr	0.061	0.010	0.032	0.0033	0.05	0.0133
Hexavalent Chromium, Cr	0.02	0.0033	0.02	0.0021	0.2	0.0054
Copper, Cu	0.10	0.016	0.115	0.0120	0.1	0.028
Total Fluorides, F	1.86	0.30	3.84	0.40	2.6	0.7
Iron, Fe	0.33	0.054	0.735	0.077	0.5	0.131
Lead, Pb	0.018	0.0029	0.025	0.0026	0.002	0.0055
Magnesium, Mg	6.8	1.11	7.2	0.75	6.95	1.86
Manganese, Mn	0.01	0.0016	0.022	0.0023	0.014	0.0039
Mercury, Hg	0.031	0.005	0.0173	0.0018	0.025	0.0068
Nickel, Ni	0.02	0.0033	0.04	0.0042	0.028	0.0075
Zinc, Zn	0.36	0.059	0.465	0.049	0.4	0.108
Chlorides, Cl	23	3.76	49	5.12	33.2	88.8

Source: Chester Engineers, 1983

[1] Average of data collected October 26 - 28 and November 23, 1982

volatile contaminants (see Table 3-14). Table 3-12 shows that the discharge flows of laboratory wastewater were fairly equally split between the Building 94 east and west limestone pits. This table also shows that the total sanitary discharge flow leaving PETC en route to the Pleasant Hills STP varied from 107 to 167 gallons per minute (gpm) over a 2-day period. Table 3-13 shows the variance in contaminant concentrations and loadings between the east and west discharges from Building 94. While different in flow, both of these discharges are similar in the levels of contaminants present. Table 3-14, which lists analyses for volatile compounds performed on mixed Building 94 wastewater, shows that the only volatiles present were dichlorobromomethane and methylene chloride.

At the time of the on-site Environmental Survey, the Building 94 (east) sump was inoperable due to a design problem. Consequently, the sump was being bypassed into the sanitary sewer system, and flowed directly to the Pleasant Hills POTW.

Although laboratory research efforts sometimes continue during weekends and holidays, the WWTF is not operated during these times. Consequently laboratory wastewater from the east side of Building 94 discharges into the sanitary sewer system during these periods.

Laboratory wastewater from Building 141 is discharged into a fiberglass holding tank (capacity equals approximately 6,000 gallons). An analysis of the wastewater is summarized in Table 3-15. The tank has a water level monitor, pH monitor, and aeration system for mixing wastes. When the pH drops below 6.0 or rises above 9.0, the pH is adjusted by mixing the tank contents and adding potable water or caustic soda. The tank contents are discharged to the sanitary sewer system when the water level approaches 80 percent and the pH is between 6.0 and 9.0 units. No additional analyses of the tank contents are routinely performed.

3.3.2.3 Stormwater

As described in Section 3.3.2.2, stormwater runoff, laboratory wastewater, cooling tower blowdown, noncontact cooling water, and boiler blowdown from the plateau area discharged into the storm sewer system prior to July 1986. The storm sewer system discharged into Lick Run via the north storm sewer (see Figure 3-6). The north storm sewer collected discharges from both the BOM and PETC facilities.

TABLE 3-14

VOLATILE COMPOUNDS

Source	Mixture 60% Building 94 East 40% Building 94 West
Log No. 82	6416 and 6417
Date Collected	12/14/82
Acrolein, µg/L	< 100
Acrylonitrile, µg/L	< 100
Benzene, µg/L	< 10
Bromoform, µg/L	< 10
Carbon Tetrachloride, µg/L	< 10
Chlorobenzene, µg/L	< 10
Chlorodibromomethane, µg/L	< 10
Chloroethane, µg/L	< 10
2-Chloroethyvinyl Ether, µg/L	< 10
Chloroform, µg/L	17
Dichlorobromomethane, µg/L	25
1,1-Dichloroethane, µg/L	< 10
1,2-Dichloroethane, µg/L	< 10
1,1-Dichloroethylene, µg/L	< 10
1,2-Dichloropropane, µg/L	< 10
cis-1,3-Dichloropropene, µg/L	< 10
trans-1,3-Dichloropropene, µg/L	< 10
Ethylbenzene, µg/L	< 10
Methyl Bromide, µg/L	< 10
Methyl Chloride, µg/L	< 10
Methylene Chloride, µg/L	5,961
1,1,2,2-Tetrachloroethane, µg/L	< 10
Tetrachloroethylene, µg/L	< 10
Toluene, µg/L	< 10
1,2-Trans-Dichloroethylene, µg/L	< 10
1,1,1-Trichloroethane, µg/L	< 10
1,1,2-Trichloroethane, µg/L	< 10
Trichloroethylene, µg/L	< 10
Vinyl Chloride, µg/L	< 10

Source: Chester Engineers, 1983

TABLE 3-15

WASTEWATER ANALYSIS - BUILDING 141 HOLDING TANK

Parameter	Concentration	Concentration
Specific Gravity	0.99 g/mL	1.005 g/mL
pH	9.5	6.8
Normality	0.01N	-
% Acidity	-	-
% Alkalinity	-	
Aluminum	4.0	
Ammonia	strong positive	
Arsenic	< 2	0.004
Barium	< 2	< 2
Cadmium	< 0.2	0.24
Chromium (total)	1.2	6.2
Chromium (hexavalent)	< 0.05	-
Copper	1.4	1.2
Iron	75.0	45.0
Lead	1.0	2.4
Manganese	-	-
Mercury	0.063	0.038
Nickel	0.2	0.2
Selenium	≤ 1.0	0.050
Silver	< 0.2	0.02
Tin	-	-
Zinc	15.0	1.0
Cyanide	≤ 0.5	-
TOC	275 ppm	-

Source: Envirite, 1985

Note: Metals reported in mg/L

Since July 1986, an LWCS was constructed to eliminate untreated discharges of laboratory wastewater, water softener backwash, boiler blowdown, and clarifled coal-water to the storm sewer system. Laboratory sinks and floor drains in Buildings 83, 84, 94, 97, and a portion of Building 93 were connected to the LWCS. However, there are periods when the LWCS is not operated and, as a result, wastewater is discharged into the stormwater sewer system. (Refer to Section 3.3.2.2 for additional information.) The remaining laboratory sink drains, floor drains, overflow drains, and yard drains in or near Buildings 58, 59, 71, 85, 86, 87, and 90 remain connected to the storm sewer system. Table 3-16 summarizes all potential discharges to the storm sewer system.

Building 58 contains some laboratories. Laboratory drains and noncontact cooling waters discharge directly into the storm sewer system (Chester Engineers, 1983).

Building 59 is a garage where motor oils are handled. Oil was observed on the floor of the building. Although no oil was observed in the drain, building floor drains are connected directly to the stormwater sewer system, therefore oil could potentially enter the stormwater sewer.

Building 71 is the site of two cooling towers. Both systems are closed-loop systems. One tower provides cooling water for Building 94 while the other tower provides cooling water for the rest of the plateau. The Building 94 cooling tower has a bleed line that discharges into the sanitary sewer system and has an overflow sump that is pumped out and discharged into the sanitary sewer system. The plateau cooling tower has an overflow line that discharges into the stormwater sewer system. At the time of the on-site Survey, chromate-containing additives were being used as biocides in both cooling towers. Since that time, however, the use of chromate-containing additives has been discontinued. The following cooling tower additives are now in use (Hebb, 1988b):

Trade Name	Active Ingredients
Molygard 100	Molybdenum (200 mg/L)
Gluquest	Sodium Gluconate
Algene 2-2322	Disodium Cyanodithiomidocarbonate (4 2%) Potassium N-Methyldithiocarbamate (5 8%)
Dipol 2-0270	Polymer scale inhibitor
Bondicide 2-2320	N-alkyl Dimethyl Benzyl Ammonium Chloride (6.2%) N-alkyl Dimethyl Ethyl Benzyl Ammonium Chloride (6.2%) Bis (Tributyl Tin) oxide (3.1%)

TABLE 3-16

SOURCES OF POTENTIALLY CONTAMINATED WATER DISCHARGED TO THE STORMWATER SEWER SYSTEM

Source	Location/Building	Type of Discharge
Floor/sink drains	58	Lab wastewater
Floor/sink drains	58	Noncontact cooling water
Floor drains	59	Garage washdown
Drain	71	Cooling tower overflow (2)
Floor/sink drains	83	Lab wastewater (1)
Floor/sink drains	84	Lab wastewater (1)
Floor drains	85	Contaminated washdown
Floor drains	86	Pulverized coal
Floor drains	86	Coal slurry spills
Floor drains	86	Lime slurry spills
Yard drain	near 86	Cooling water
Yard drain	near 87	Oily wastewater runoff
Drain	90	Cooling water (3)
Floor drains	90	Compressor condensate
Yard drain	near 90	Contaminated stormwater runoff
Drain	93	Clarified coal-water (1)
Drain	93	Boiler blowdown (1)
Drain	93	Water softener backwash (1)

Source: Derived by Survey team member.

(1) Via overflow from the LWCS sump. Note: The coal water clarifier tank in Building 93 was designed to be pumped into the LWCS. However, at the time of the Survey, the pumps were disconnected.
(2) Building 94 cooling tower
(3) Via Building 93 sump

Building 85 houses compressors. Oily material and absorbent were prevalent on the floor of the building. However, it did not appear that the oily material was entering the floor drains.

Building 86 is the area where dry pulverized coal, coal/water slurries, and lime slurries are handled during experiments. These materials are normally contained in a process unit or 55-gallon drums; however, the materials are handled in areas that have floor drains that are probably connected directly to the storm sewer system. Consequently, spills could potentially enter the storm sewer system.

Building 87 has no floor drains. However, black, apparently oily wastewater was observed in the yard drain located south of Building 87.

Building 89 contains a test tunnel furnace and slag combustor unit. Dry pulverized coal and coal/water slurries are handled during experiments. These materials are normally contained in a process unit or 55-gallon drums; however, the materials are handled in areas that have floor drains that are probably connected directly to the storm sewer system. In addition, cooling water is used to cool hot gases in the slag combustor and is discharged to a yard drain that is connected to the storm sewer system. Sulfite and phosphate chemicals are added to the previously softened cooling water.

Building 90 houses compressors. Cooling water used in the compressors is discharged to the Building 93 sump, which discharges into the storm sewer system. Compressor condensate is discharged into floor drains that are suspected of discharging into the storm sewer system. No evidence of any contaminants entering the floor drains was observed during the on-site Environmental Survey. However, it appeared that waste materials were stored in an area north of Building 90. It is suspected that the waste materials were spilled in the area and that the soils are contaminated. Consequently potentially contaminated stormwater runoff from the area may enter yard drains that discharge into the storm sewer system.

3.3.2.4 Spill Prevention, Control and Countermeasure Plan

A Preparedness, Prevention and Contingency Plan of May 1983 prepared by Chester Engineers for PETC addresses spill prevention control and countermeasures (SPCC) as well as the Pollution Incident Prevention Plan, best management plan, and the hazardous waste contingency plan. This plan is a comprehensive document; however, since it was published, numerous changes in PETC have occurred. These include the construction of the coal processing facilities in Building 141 as well as the movement of several research functions between buildings on the Main Plateau Area. The plan therefore is not current.

3.3.3 Environmental Monitoring Programs and Data

PETC does not conduct regular environmental monitoring. An ecological characterization of Lick Run was conducted in the summer of 1978 for the Environment and Conservation Division of PETC. The purpose of the characterization was to determine if the discharge from the BRC outfall exhibits a deleterious effect on the stream environment. The outfall discharged stormwater runoff from the BOM and PETC facilities, as well as laboratory discharges from PETC. Based on the biota used to analyze water quality at six sample sites along Lick Run, it was concluded that the water quality was generally poor; however, such contamination was not entirely or primarily attributable to the BRC (L. Robert Kimball & Associates, 1981). Other specific sources of contamination were not named by the report, however.

3.3.4 Findings and Observations

3.3.4.1 Category I

None

3.3.4.2 Category II

1. Potential contamination of surface water and sediment from storm sewer discharges. Past and present storm sewer discharges containing polynuclear aromatics (PNAs), heavy metals, phenols, acids, and bases may potentially be

contaminating surface water and sediment in Lick Run. In addition, black, apparently oily wastewater, coal fines, and laboratory wastewater are likely being discharged untreated through the storm sewer system with the potential for surface water contamination in Lick Run.

Prior to July 1986, laboratory wastewaters were discharged directly into the storm sewer system. The storm sewers discharge to Lick Run via the "north outfall".

Since July 1986, laboratory wastewaters are discharged into a laboratory wastewater collection system (LWCS) consisting of gravity sewers, forced mains, and collection sumps. However, the collection sump pumps are periodically turned off, resulting in sump overflows to the storm sewer system. Although laboratory research efforts sometimes continue on weekends and holidays, the collection sump pumps are turned off because the wastewater treatment facilities (WWTFs) are not operated during these times.

The Chester Engineers report gives sampling and analysis results of laboratory wastewaters. From these analyses, the following contaminants were identified as potential pollutants: pH; zinc; copper; mercury; phenols; total organic halogens; and suspended solids.

In addition, laboratory wastewater is potentially discharged to the storm sewer system from Building 58. Oily wastewater and coal fines are potentially discharged to the storm sewer system via floor drains in Buildings 59, 85, and 86. During the on-site Environmental Survey, black, apparently oily wastewater was observed in the yard drain located south of Building 87, while coal fines were observed in the yard drain south of Building 85.

3.3.4.3 Category III

1. Potential contamination of Sewage Treatment Plant (STP) sludge from discharges of untreated laboratory wastewater. Untreated laboratory wastewaters consisting of acid slugs and potentially base slugs, polynuclear aromatics (PNAs), heavy metals, and phenols are being discharged from the plateau area to the Pleasant Hills STP. In addition, laboratory wastewaters

from Building 141 potentially consisting of PNAs, heavy metals, and phenols are being discharged to the Pleasant Hills STP. These contaminants might pass through the STP, interfere with operations of the STP, or cause contamination of the STP sludge.

Laboratory wastewaters are discharged into the sanitary sewer system from three sources; namely, Buildings 74, 94, and 141. The sanitary sewer system discharges into the Pleasant Hills STP.

Acid slugs have been received at the laboratory wastewater pretreatment plant (Building 74), on three occasions. Acid slugs were received at the plant in December 1986 and January 1987 during performance testing. In addition, an acid slug was received at the plant in April 1987. During the April 1987 event, chemicals were unavailable to adjust the pH. In its current mode of operation, the plant would be potentially incapable of treating such slugs.

Building 94 periodically discharges laboratory wastewater from the east side of the building to a limestone pit that discharges into the sanitary sewer system. The limestone pit was designed to adjust the pH of acidic wastewater. It is doubtful that any appreciable treatment actually takes place in the limestone pit because limestone requirements are not maintained.

Laboratory wastewaters from Building 141 are collected in a holding tank and discharged to the sanitary sewer system. Although the pH is checked to verify a pH of between 6.0 and 9.0, no treatment of the discharge or analyses for other contaminants occurs prior to discharge.

3.3.4.4 Category IV

1. No sampling and analysis of laboratory discharges to the publicly owned treatment works (POTW). Laboratory wastewater discharges from the Main Plateau Area and Building 141 are being sent to a POTW (Pleasant Hills Sewage Treatment Plant) without a formal pretreatment agreement and, with the exception of pH on the Building 141 discharge, without sampling and analysis to confirm compliance to any informal pretreatment standards.

2. <u>Inadequate spill prevention, control, and countermeasures (SPCC) plan</u>. The SPCC plan for the site is outdated and does not include important new facilities. An SPCC inspection program has not been implemented by DOE.

3. <u>Potential for contamination of the on-site potable water system</u>. Due to the lack of an inspection and maintenance program for backflow preventers, there is a potential for contamination of the on-site potable water supply.

3.4 Hydrogeology

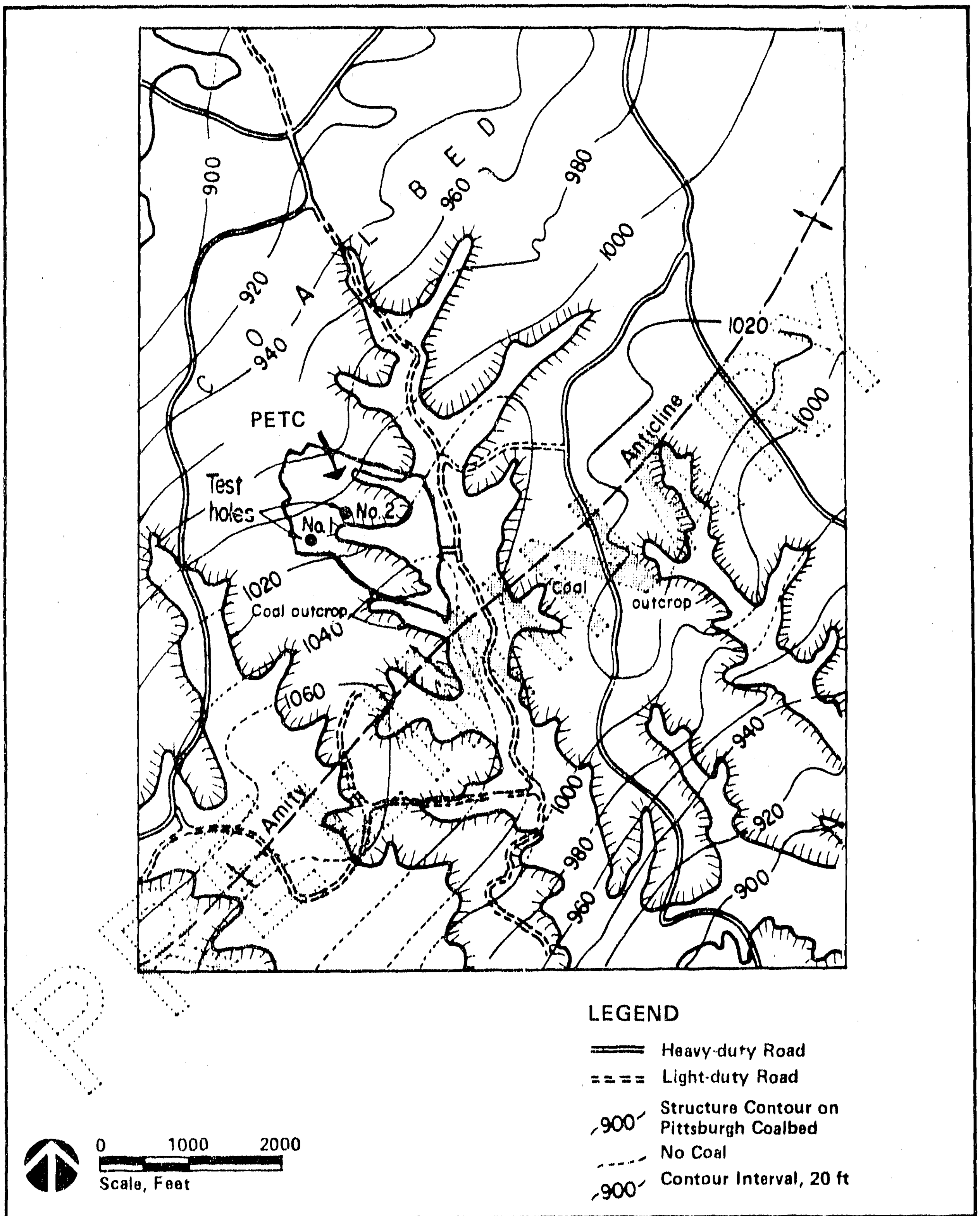
3.4.1 Background Environmental Information

3.4.1.1 Regional Geology

The Pittsburgh Energy Technology Center (PETC) is located in the Appalachian Plateau Physiographic Province about 10 miles south of the City of Pittsburgh. Local topography is characterized by steep hills and deep ravines. In some areas, streams and rivers have eroded broad valleys with low gradients. All the rocks in the area are of sedimentary origin and include sandstones, shales, limestones, coals, and alluvial deposits. During drilling of two test wells at the Bruceton Research Center (BRC) by the U.S. Bureau of Mines (BOM), the stratigraphic section that was penetrated included, in descending order, units of the Monongahela, Conemaugh, Allegheny, and Pottsville Groups of the Pennsylvania System and the Mauch Chunk Formation of the Mississippian System (Elder, 1977). In the vicinity of the BRC, which includes the PETC facilities, the Pittsburgh Formation, the basal member of the Monongahela Group, occurs in outcrops on the hillsides. The Pittsburgh coal seam, the basal member of the formation, has been extensively mined under and around the property. The outcrop locations of the Pittsburgh coal are shown in Figure 3-9.

Underlying the Pittsburgh Formation is the Casselman Formation of the Conemaugh Group. The Casselman consists of thinly bedded limestones interbedded with calcareous shales and sandstones. This formation outcrops in the valleys around the BRC. A geologic column is shown in Figure 3-10.

In the Pittsburgh geologic quadrangle there are two major anticlines and two major synclines. As shown in Figure 3-9, the axis of one of the anticlines, the Amity Anticline, passes southeast of PETC. As a result, the rock units under the site dip gently to the northwest at about a 10° angle. Locally, minor folding and faulting also occur.



Source: Modified from Elder and Irani, 1977

GEOLOGIC STRUCTURE AND PITTSBURGH COAL OUTCROP MAP FOR PETC

FIGURE 3-9

GROUP	FORMATION	DESCRIPTION
Alluvium		Sand, gravel, clay.
Terrace deposits		Sand, clay, gravel on terraces above present rivers.
DUNKARD	Greene	Cyclic sequences of sandstone, shale, red beds, thin limestones, and coals
	Washington	Cyclic sequences of sandstone, shale, limestone, and coal.
	Waynesburg	Cyclic sequences of sandstone, shale, limestone and coal.
MONONGAHELA		Cyclic sequences of shale, limestone, sandstone and coal; contains Pittsburgh coal bed at base.
CONEMAUGH	Casselman	Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.
	Ames	
	Glenshaw	Cyclic sequences of sandstone, shale, red beds, and thin limestone and coal.
ALLEGHENY	Vanport	Cyclic sequences of shale, sandstone, limestone, and coal.
POTTSVILLE		Sandstone and shale.
	Mauch Chunk	Red and green shale with some sandstone.
	Pocono	Sandstone and shale.

Source: Johnson, M.E., 1928

FIGURE 3-10

GEOLOGIC COLUMN FOR PETC

3.4.1.2 Site Hydrogeology

There is little site-specific information on the hydrogeology of the PETC property. Groundwater in the region is known to occur in the unconsolidated deposits in the stream valleys and in fractures and intergranular porosity in the consolidated rock layers (Johnson, 1928). In general, the groundwater moves downward and laterally from upland areas to lowland areas, where it is discharged in springs and streams. Within the BRC, which includes PETC, man-made influences may have significant impacts on groundwater movement. These man-made changes include surface and underground coal mining, cut-and-fill earth-moving for building construction, and modification of surface contours for roads and other facilities.

Throughout western Pennsylvania the Pittsburgh coal seam, which outcrops on hillsides at the BRC, has been extensively mined. The research mine at Bruceton operated by the BOM extends under significant portions of the facility. Other abandoned underground mineworkings are also known to occur on the property. Occasional subsidence and surface collapse into abandoned mineworkings have occurred, including one recent event immediately west of the PETC Main Plateau Area behind Building 91. Bureau of Mines personnel have filled that particular collapse feature several times in the last few years (Polling, 1987). This particular collapse is the same one that is referred to as a potential waste disposal location in Section 4.5.1.1 under the subheading "abandoned mineshaft sinkhole". A 1949 aerial photograph of the site was reviewed by Survey team members and the remains of surface-mining activity along the Pittsburgh seam outcrop were evident. Both types of mining activity could potentially affect shallow groundwater conditions. Underground workings that are left open would tend to drain water out of the overlying strata. In addition, subsidence and collapse into the tunnels would increase fractures in the overlying rock and further enhance drainage. The surface-mining activity along the flanks of the hills would also alter localized flow patterns.

Due to the high relief and steep slopes in the Pittsburgh area, considerable earth-moving has occurred at PETC to provide level building sites. This has included removal of material from hilltops and filling of valleys. Leveling hilltops generally reduces infiltration and promotes runoff from built-up areas. Filled valleys tend to funnel groundwater flow toward the valley axis where it is discharged as springs at the toe of the fill. This condition was observed at the southeast end of the property beneath the 920 Area at PETC. Other springs were observed in the 900 Area, the Main Plateau, and the 2.1-acre field.

3.4.2 General Description of Pollution Sources and Controls

Sources of potential groundwater pollution at PETC consist of various known and unknown releases of contaminants over time to other media. These releases subsequently may impact groundwater. Specific potential sources of groundwater contamination are discussed more completely under subsections of the Inactive Waste Sites section, 4.5.

In general, the major potential sources of groundwater contamination can be identified as:

- leaks and spills of hazardous materials stored at various locations within the Main Plateau Area of PETC. These materials are believed to have included solvents, coal liquefaction wastewaters, coal tars, ash from coal research, and miscellaneous laboratory wastes.

- leaks and spills of hazardous materials in the valley-fill area, which includes the 900 Area, the 920 Area, and the open fields adjacent to these areas. Materials potentially released include "char" water from the synthane process, coal liquefaction wastewater, and various chemicals from coal-preparation processes.

3.4.3 Environmental Monitoring Program and Data

PETC does not currently monitor groundwater conditions and has not done so in the past. In addition, no site-specific data are available for the site from other sources.

3.4.4 Findings and Observations

3.4.4.1 Category I

None

3.4.4.2 Category II

None

3.4.4.3 Category III

1. Potential groundwater contamination in the valley-fill area. Groundwater beneath the valley-fill area is potentially contaminated with phenols, polynuclear aromatic hydrocarbons, and other chemicals as the result of leaks and spills within the process areas as well as from improper handling of scrap and waste materials that were stored in the open fields.

   Known releases include the accidental discharge of wastewater from the "char" pond (see Section 4.5.1.5) and apparent leaks from drums stored in the 920 Area. Within the open fields adjacent to the 920 Area, both vertical and oblique aerial photographs indicate releases of coal-derived materials from drums and scrap materials stored in those areas. Any contaminants present in the groundwater in the fill material would tend to migrate down the valley axis and be discharged in springs and seeps at the toe of the fill. These springs and seeps may contribute to surface-water contamination.

2. Potential groundwater contamination in the Main Plateau Area. Groundwater beneath the Main Plateau Area is potentially contaminated with phenols, polynuclear aromatic hydrocarbons, and other chemicals as the result of leaks and spills from improper handling and storage of waste materials at various locations in the Main Plateau Area.

   Evidence of leaks and spills was observed by the Survey team at several locations, including between Buildings 65 and 87, adjacent to Building 64, and adjacent to Building 83. Any contamination present in the groundwater could migrate to the flanks of the plateau and be discharged to surface water from seeps and springs.

3.4.4.4 Category IV

None

4.0 NON-MEDIA-SPECIFIC FINDINGS AND OBSERVATIONS

This section discusses preliminary environmental findings and observations pertaining to waste management, toxic and chemical materials, radiation, quality assurance, and inactive waste sites and releases. These discussions do not include a background environmental information section because the areas addressed are not necessarily tied to one medium as was the case with the discussions in Section 3.0. The discussions include an environmental monitoring program section where appropriate and where information was available.

4.1 Waste Management

4.1.1 General Description of Pollution Sources and Controls

4.1.1.1 Hazardous Waste

Waste management activities at PETC include the generation, handling, temporary storage, and transportation (by contractor) of accumulated hazardous waste. These wastes include all those currently regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA).

Waste Generation

The mission and responsibilities of PETC encompass a diverse range of coal research and development activities including coal preparation, combustion, flue gas cleanup, liquefaction, and analytical methods development. Research and development activities are conducted based on program schedules, equipment availability, and research needs. The varied experimental activities and research timing leads to the generation of a waste stream composed of many chemicals in viable amounts each month.

Past studies have attempted to estimate the nature of possible PETC hazardous waste generation. A 1983 study (Argonne National Laboratory, 1983) identified 49 hazardous substances (including a number of wastes not considered as hazardous wastes) in 9 general categories and estimated an annual generation rate for the types of waste. Table 4-1 summarizes the waste stream by process. Coal/water

TABLE 4-1

HAZARDOUS WASTES GENERATED AT PETC IN 1983

Division	Laboratories	Type of Waste
Process Sciences	Laboratories	Coal derived liquids Organic solvents Alkaline wastes Toxic metals
Combustion Research	700-, 100-, 20-hp boilers	Methanol slurries Shale oil Coal-water mixtures Baghouse ash
	500-lb/hr furnace	Fly ash and slag Baghouse ash Coal wastes Lab. oil or grease
Analytical Chemistry	Molecular spectroscopy Analytical support	Coal liquids and solvents Organic liquids Toxic metals
	Coal analysis	Tar and compounds Acids
	Surface and solid analysis	Solid hydrocarbon samples
	Process monitoring	Coal liquids and solvents
Coal Conversion Engineering	Preheater PDU	Heat transfer liquid Coal derived oil Coal oil slurry Compressor oil

Source: Argonne National Laboratory, 1983 mixtures are the largest-quantity waste stream (625 drums/year) followed by baghouse ash (300 drums per year), and methanol slurries (120 drums per year). The combustion research activities using the 700-, 100-, and 20-hp boilers were the sources of the waste. A 1984 study (PETC, 1984) identified 31 major PETC laboratory hazardous wastes and 73 small volume wastes. The study did not estimate the generation rate for the wastes. PETC was revising the 1984 study at the time of the Survey but had not yet developed additional waste stream characterization and generation rate information.

The PETC Quarterly Hazardous Waste Generator Reports for 1987 identify 20 categories of hazardous waste that were generated or disposed of by PETC in 1987. Table 4-2 displays the waste type, hazard class, and approximate quantity generated. Laboratory wastewater was the highest-quantity waste stream, with 52,380 pounds of waste generated. The source of the wastewater was the Building 141 coal preparation laboratory waste tank. Waste corrosive liquid was the next highest-quantity waste stream, with 28,545 pounds of waste generated. The largest source of waste corrosive liquids is the neutralized caustic from the Combustion Test Facility.

Waste flammable liquids generated by many of the PETC analytical laboratories is the class of hazardous waste generated in the third highest quantity, at 8,800 pounds per year. PETC generates waste coal derived liquids through coal liquefaction studies. Discussions with PETC waste management personnel indicate the coal derived liquid wastes are disposed of as flammable hazardous waste. The remainder of the 1987 PETC hazardous wastes (other than trichloroethylene and methylene chloride solvents) were relatively small waste items typical of laboratories doing analytical and physical chemistry experimentation. Periodic campaigns to dispose of out-of-date chemicals generate small quantities of wastes typical of those listed in Table 4-2. A review of the PETC 1986 Quarterly Generator Reports shows many similarities to the 1987 wastes, including large quantities of corrosive and flammable liquids.

The Process Sciences Division engages in research and development studies related to the organic chemistry of coal in laboratories in Buildings 83, 58, and 84. The research activities in Building 83, Room 226, result in the generation of approximately 20 gallons per month of tetrahydrofuran, cyclohexane, and

TABLE 4-2

1987 PETC HAZARDOUS WASTE GENERATOR REPORT RESULTS

Waste Type	Quantity (pounds)
Laboratory Wastewater	52,380
Waste Corrosive Liquids	28,545
Waste Flammable Liquids	8,800
Waste Trichloroethylene	3,450
Waste Poison B	1,100
Waste Hazardous Liquid (NOS)	1,050
Waste Methylene Chloride	700
Waste Oxidizer	400
Waste Tetrachloroethane	210
Waste Mercury	200
Waste Asbestos	200
Waste Potassium Permanganate	90
Waste Phosphorous Pentoxide	25
Waste Sodium Metal	25
Waste Benzyl Chloride	10
Waste Cobalt Resonate	10
Waste Calcium Carbide	10
Waste Peroxide Solution	10
Waste Phosphorous Metal	10
Waste Potassium Metal	10

Source: PETC Quarterly Hazardous Waste Generator Reports, 1987 methylene chloride solvent waste. The laboratory in Building 83, Room 234, generates pyridine and the solvents mentioned above but generates approximately 40 gallons per month of waste solvent. The laboratory in Building 83, Room 256, generates 5 gallons per month of similar solvents and also generates one quart of pump oil per year.

The PETC combustion test facilities consist of nine processes, test units, and laboratories located in Buildings 84, 89, and 93 that generate coal-related wastes. These processes are as follows:

- Continuous "NOXSO" process* - The continuous "NOXSO" process is scheduled to start operation in 1988 and could produce a maximum of 60 drums of ash over a 6-month period. No analysis of the waste has yet been performed.

- Continuous life cycle process - The continuous life cycle process unit is located in Building 84 and generates less than 12 drums of coal waste per year. No additives are introduced to the unit other than coal, and the waste produced is not hazardous.

- 500-pound-per-hour dry pulverized coal unit. The unit is used to test the simultaneous removal of sulfur dioxide and nitrogen oxide from boiler emissions by lime sprayer used in conjunction with copper oxide pellet technology. The unit produces a maximum of 50-60 drums of lime slurry waste per year. The resultant waste has not been tested to determine if it is hazardous.

- Cast iron boiler - The boiler is used to test retrofit applications for burning alternative fuels. The unit produces approximately forty 55-gallon drums of waste per year. The waste has not been tested to determine if it is a hazardous waste.

*Note: NOXSO is a process name based on nitrogen oxides and sulfur dioxide removal.

- Test tunnel - Research and development related to ash deposition by pulverized coal and coal water slurries is conducted in the test tunnel in Building 89. The unit generates a maximum of 2 to 3 drums of solids per year. The waste has not been tested but due to the nature of the input material (i.e., coal and coal-water mixtures), it is not expected to be hazardous.

- Coal rheology laboratory - The coal rheology laboratory in Building 84, Room 303, produces a maximum of four drums of coal waste per year. The laboratory performs measurements and investigations on the physical properties of coals. The waste produced is coal dust and fragments.

- 700-horsepower water-cooled boiler - This unit was not run in 1986 or 1987. When run, it could generate a maximum of 90 drums of ash per year. The ash has not been tested to determine if it is hazardous.

- Residential test unit - The residential test unit is used to perform experiments on equipment sized for residential heating. The unit could produce a maximum of three drums of waste per year. The waste has not been tested to determine if it is hazardous but the nature of historic experiments makes it unlikely that hazardous waste was produced in the past.

- 100-horsepower boiler - The unit fires coal/water mixtures and micronized dry coal and generates a maximum of 40 drums of ash per year. The waste has not been tested to determine if it is hazardous.

The Coal Preparation Laboratory (Building 141) produces waste coal fines from coal sizing operations and air cleaning systems. The coal fines produced are a nonhazardous solid waste. In addition, laboratory wastewater, which includes solvent waste from laboratory sink drains, is accumulated in a 5,000-gallon underground tank. The tank has a pH monitor and the liquid waste is released to the Pleasant Hills Sewage Treatment Plant (STP) (see Section 3.3 for further discussion of tank operations). PETC personnel conducted a dye test of the effluent stream from Building 141 on May 31, 1988, and confirmed that it is discharged to the Pleasant Hills STP.

The Wastewater Treatment Plant was described in Section 3.3. At the time of the Survey, there were 5 drums of wastewater treatment sludge stored at the plant. Three of the drums were located on the loading dock at the east side of Building 74. The drums were uncovered. Two drums were located inside the building, one of which was attached to the waste hopper to collect sludge. The waste has not been tested to determine if it is hazardous.

Building 167 houses the Research and Development Contractor (Gilbert/Commonwealth) offices and project areas that are operated for research and development by the research and development contractor. At the time of the Survey, there were 38 unlabeled 30-gallon black plastic drums containing an unknown liquid. The time of storage of the drums at this location was not known by PETC waste management personnel.

The main analytical chemistry laboratories are located in Building 94. The laboratories collect waste solvents, reagents, and coal samples in safety cans or re-use empty reagent bottles to accumulate the waste prior to transport to the 64A pad. Discussions with Building 94 personnel indicate that coal liquids are occasionally disposed of in the solid waste trash containers and acids are occasionally disposed of to the sink drains.

PETC hazardous wastes are collected in red safety cans or empty reagent bottles in laboratory rooms throughout the site. However, some of the containers were observed at inappropriate locations. For example, one can was located on top of a floor drain in an analytical laboratory in Building 212 where leaks or spills could enter the drain. In addition, a 5-gallon glass container of Chromerge (chromic and sulfuric acids) has been stored for an extended period of time in a laboratory sink. The red safety cans are to have a yellow hazardous waste tag attached to them which lists the contents of the container. Work areas with large equipment that generate hazardous waste use 55-gallon drums to accumulate the waste prior to central storage and disposal.

Hazardous Waste Storage

Hazardous wastes are stored on the Building 64A storage pad, and in Building 92. Every Wednesday for a period of 3 hours, the Building 64A pad is opened and PETC services contractor (Burns & Roe) personnel are available to accept hazardous wastes. PETC personnel are responsible for transporting the small-quantity waste items such as reagent bottles, chemical packages, or sample bottles to the 64A pad. The waste items are accepted and stored in a series of cabinets and shelves. At the time of the Survey, open-ring-type 55-gallon drums were available for the accumulation of contaminated clothing, glassware, or similar items. PETC waste solvents are taken to Building 92 for storage (see below). There are no written acceptance criteria for waste received at the 64A pad and the contractor has been directed to accept all suspected hazardous waste. Some waste has arrived unidentified and has been stored for extended periods of time without analysis (PETC, 1987d).

The Building 64A pad (Figure 4-1) measures approximately 20 feet by 40 feet, is covered by a roof, and has chain-link fencing from the concrete pad to the roof. The floor is sloped to a concrete spill collection sump. There are 11 metal fire retardant cabinets and 3 metal shelves on the pad. Each cabinet has a waste inventory list attached to the door. The list is intended to provide a record of wastes stored on the pad and is used to update a computer data base of hazardous waste for waste accountability purposes. Each of the waste items in the cabinets and on the shelves was checked against the inventory list. Table 4-3 displays the items identified on the inventory and the actual contents of the cabinet or shelf. Eleven inventory lists differed from the actual contents of the cabinet or shelf. Unidentified, improperly identified, and chemicals stored in excess of 90 days were found in the cabinets and on the shelves. For example, Cabinet 7 contained a quart bottle of sulfuric acid waste which had no inventory number and was not recorded; the record for Cabinet 12 indicated it was empty but it contained 11 unlabeled, unknown chemical bottles, and the Shelf 9 inventory contained no entries but there were 6 waste insecticide, fungicide, and herbicide products stored here.

A portion of Building 92 serves as a liquid waste transfer center for PETC. The waste transfer room contains up to six 55-gallon drums for the accumulation of flammable and combustible waste. The facility is operated on each Wednesday for the transfer of solvent waste from laboratory safety cans to 55-gallons waste drums. When the drum is filled it is transported to the Building 92 storage pad. The Building 92 concrete storage pad is covered by a roof and can provide storage for a maximum of 288 drums. The southern portion of the pad is used for storage of flammable and

The Wastewater Treatment Plant was described in Section 3.3. At the time of the Survey, there were 5 drums of wastewater treatment sludge stored at the plant. Three of the drums were located on the loading dock at the east side of Building 74. The drums were uncovered. Two drums were located inside the building, one of which was attached to the waste hopper to collect sludge. The waste has not been tested to determine if it is hazardous.

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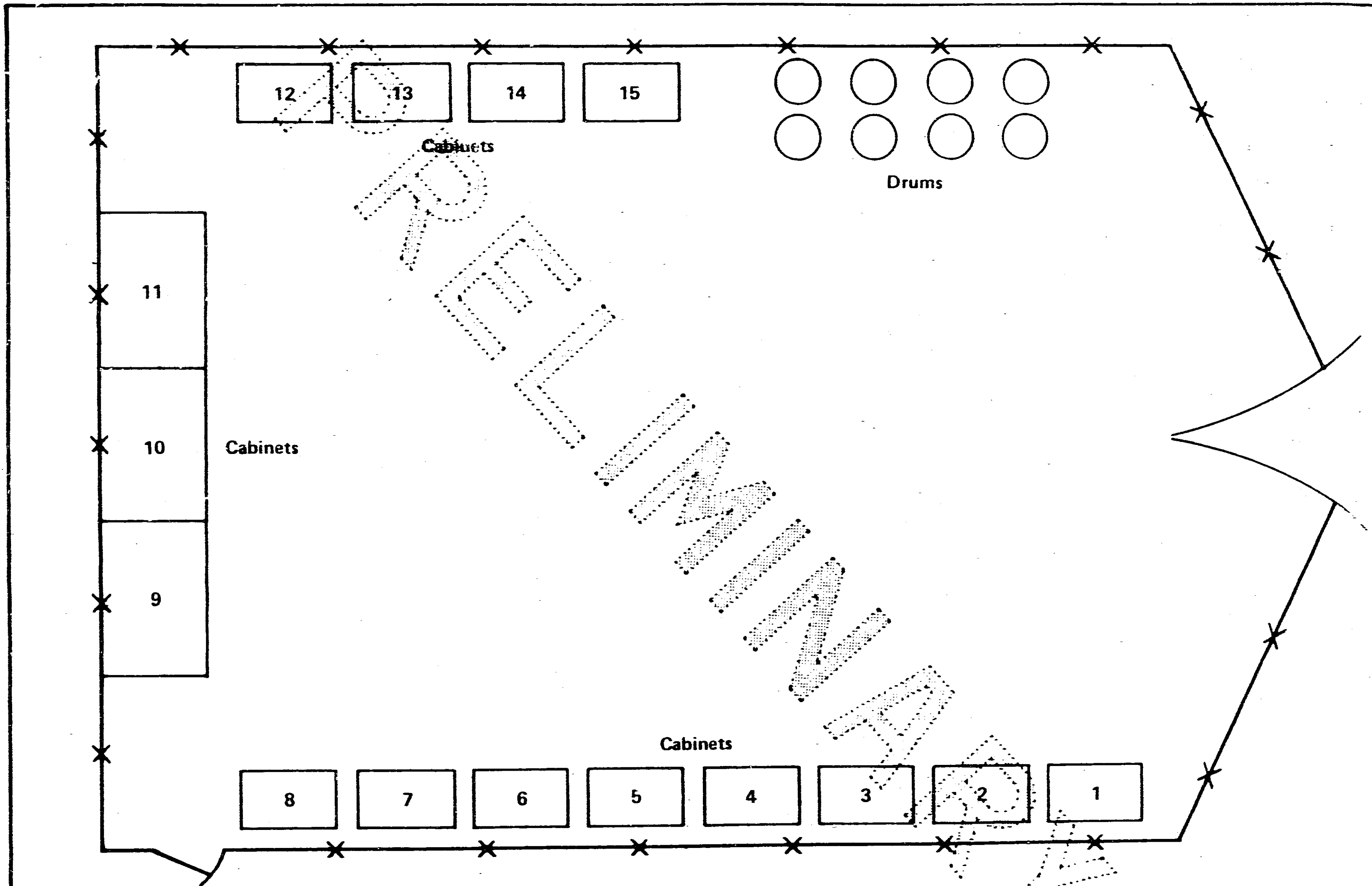


Source: DOE Survey Team, 1987

BUILDING 64A STORAGE PAD

FIGURE 4-1

TABLE 4-3

BUILDING 64A PAD INVENTORY RECONCILIATION

Cabinet or Shelf No.	Inventory List Entry	Additional Items
1	No. 461, 490, 10 gallons coal-derived liquids (no number)	2 unlabeled 100-mL flasks
2	No entries	No items in cabinet
3	No entries	No items in cabinet
4	No entries	No items in cabinet
5	Chemicals, cement	Methyl formate No. 413; Methyl formate No. 414; (has a February 1987 date)
6	Coal waste mixtures Nos. 441, 442, 446, 447	No. 456 not on cabinet inventory list
7	Nos. 443, 444, 445	Piece of duct tape on cabinet door denoting storage of 1500 mL of HNO_3; also contains an unrecorded quart of sulfuric acid - no number, no date
8	No. 451	Piece of duct tape on cabinet door denoting storage of two 5-gallon cardboard drums and one 5-gallon can of caustic
9 (shelf)	No entries	1 gallon super 808 insecticide 1 package fungicide (6 oz.) 1 package 5 percent DDT 1 quart chlordane 1 package fungicide (12 oz.) 1 bottle spent catalyst
10 (shelf)	No. 506	Unrecorded package of asbestos-like material wrapped in plastic bag
11 (shelf)	No entries	No items stored
12	No entries	Contains 11 labeled, unknown chemicals
13	No entries	2 bottles of unlabeled liquids
14	Nos. 452, 453, 454, 459, 484	2 additional items recorded on piece of duct tape on door
15	Nos. 433, 434	No additional items

Source: PETC, 1987d

combustible waste. The drums are stored here until removed for disposal by the hazardous waste contractor.

Hazardous Waste Disposal

PETC disposes of the majority of its hazardous waste through four hazardous waste contractors but has used and continues to use other disposal contractors on an as-needed basis. Each of these contractors has been used since 1982. PETC uses the services of Sterling Environmental Corporation of Amherst, New York, to assist in the disposal of hazardous waste. Sterling is a broker for waste treatment and disposal. It has no waste management facilities of its own, but it arranges for treatment, recycling, or disposal services for generators. Sterling has arranged for disposal of PETC wastes by Environmental Enterprises, Incorporated, of Cincinnati, Ohio; Battery Disposal Technology of Clarence, New York; and Envirotec of Tonawanda, New York. In addition, Envirite Corporation of Canton, Ohio, has been used to dispose of laboratory wastewater from Building 141. Battery Disposal Technology has received waste reactive metals from PETC. The other contractors are shipped the flammable, corrosive and solvent wastes generated by PETC.

4.1.1.2 Radioactive Waste

PETC does not generate radioactive waste. A discussion of radiation sources at PETC is contained in Section 4.3.

4.1.1.3 Solid Waste

PETC generates paper, cafeteria, and nonhazardous equipment-related waste throughout the site. The paper and cafeteria waste is placed in dumpsters for collection by Michael Brothers of Pittsburgh, the site solid waste contractor. Michael Brothers has been the solid waste disposal contractor since October 1984. Solid waste is collected on Tuesdays and Thursdays for disposal at a local landfill.

Nonhazardous equipment-related waste is generated by the Combustion Research Division. These wastes comprise baghouse ash, coal waste, fly ash and slag, coal dust, coal/water mixtures, and lime slurry mixtures. These wastes are accumulated at the point of generation and transported to the Building 92 pad prior to off-site disposal. The disposal of this waste is arranged on a case-by-case basis depending on the waste type and the arrangements for off-site transport.

A number of the solid waste dumpsters are located adjacent to process buildings. Two of the dumpsters were observed to contain paint cans and lacquer cans and waste machine oil cans. In addition, discussions with PETC personnel indicate that coal-derived liquids, epoxy hardeners, and waste solvents have been disposed of in the solid waste collection system. For example, Building 141 personnel indicated that epoxy hardeners (labeled as containing hazardous materials) have been disposed of to the solid waste trash in small quantities in the past.

4.1.2 Findings and Observations

4.1.2.1 Category I

None

4.1.2.2 Category II

1. Improper management of hazardous waste has resulted in the potential for mishandling and improper disposal. Due to lack of a characterization and segregation program for waste materials, potentially hazardous materials are being stored without adequate documentation. In addition potentially hazardous materials are being stored adjacent to sink and floor drains. Potentially hazardous materials are also being disposed of by the site solid waste contractor to a local municipal landfill without appropriate testing.

    - There is no systematic characterization and waste segregation program for waste material. There is no mechanism to ensure that suspected hazardous waste is chemically analyzed in a timely manner to ensure proper identification. For example, the wastewater treatment plant sludge may be a hazardous waste, but at the time of the Survey it was stored in open containers on the Building 74 loading dock. In addition, drums of waste coal-tar sludge were disposed of as nonhazardous waste in April of 1987, without chemical analysis.

- Discussions with PETC employees and Survey team observations indicate that laboratory and equipment operations result in the disposal of potentially hazardous materials such as solvents, lacquers, paints, epoxy hardeners, and coal-derived liquids to the solid waste landfill.

- There is a lack of accountability for some of the stored potentially hazardous waste at PETC. Waste is stored in Building 64A pad cabinet 12 and shelf 9 without tracking numbers, analysis of the waste, or records of its location. Waste could be removed, mixed, or custody could be lost without documentation to ensure appropriate management and proper disposal.

- Improper temporary storage of hazardous waste at accumulation points in laboratories and equipment areas has the potential to release hazardous substances into sink and floor drains. At the time of the Survey, three gallons of waste Chromerge (chromic and sulfuric acids) were stored in a laboratory sink in Building 83, Room 226, for 3 years. Two waste solvent safety cans were stored adjacent to a floor drain in Building 83, Room 234. One waste solvent can was located on a floor drain in Building 84, Room 212.

4.1.2.3 Category III

None

4.1.2.4 Category IV

1. Exceedance of time limit for hazardous waste storage. The maximum allowable time period for storage of hazardous waste at the PETC storage facility (i.e., 90 days) has been exceeded.

For example, hazardous waste has been stored in Cabinet 5 of the 64A pad facility since March 1987. In addition, a nearby cabinet contains 11 unlabeled waste items that have been stored since the facility started operations in early 1987. The exceedance of the 90-day storage requirement is a regulatory violation of the Resource Conservation and Recovery Act.

4.2 Toxic and Chemical Materials

4.2.1 General Description of Pollution Sources and Controls

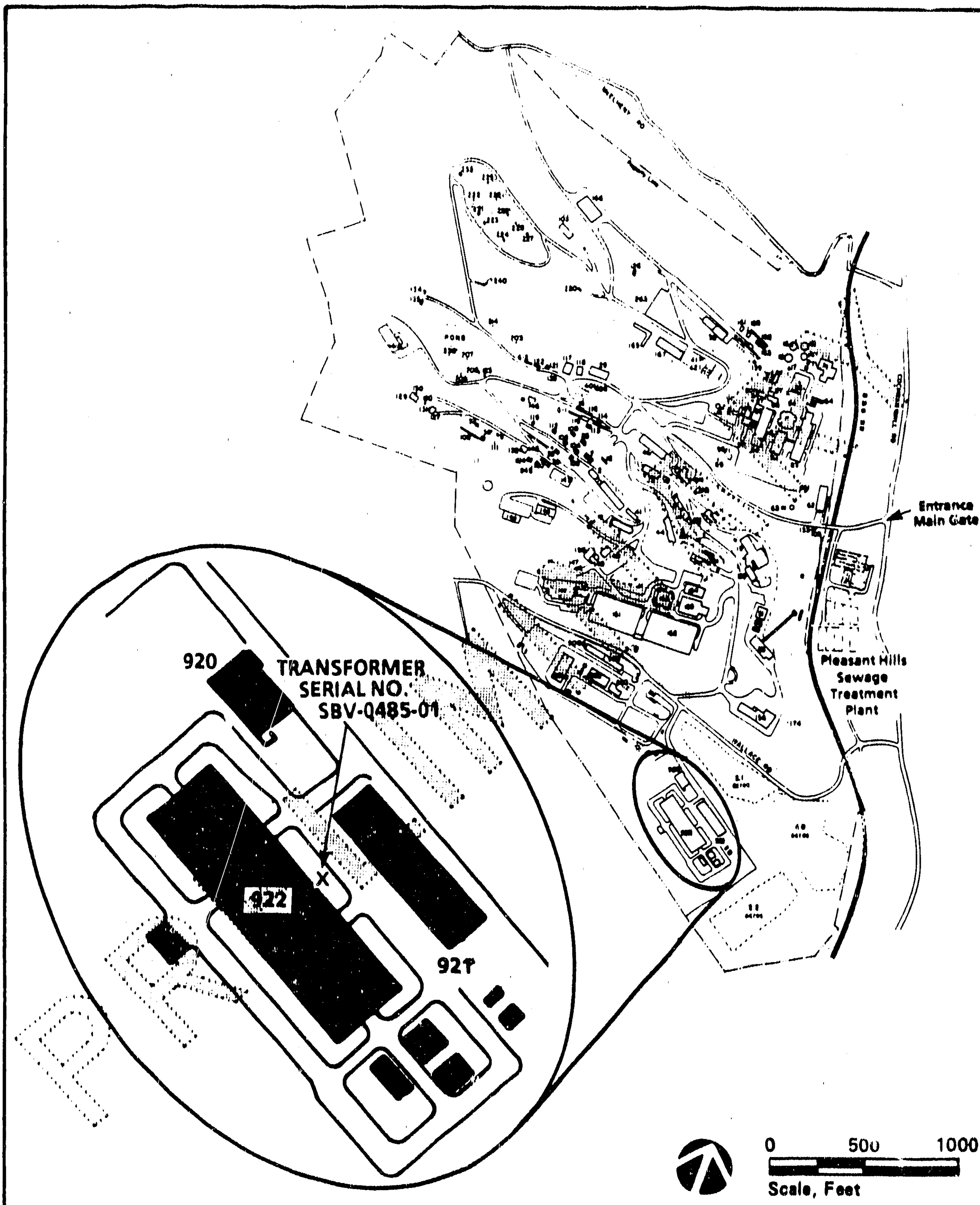
4.2.1.1 Polychlorinated Biphenyls

At the time of the Survey polychlorinated biphenyls (PCBs) were present in regulated concentrations at the Pittsburgh Energy Technology Center (PETC) in the dielectric fluid of one transformer unit. The unit (Serial No.-SBV 0485-01) has a PCB concentration of 3,900 parts per million (ppm) (PETC, 1987c), and is located northeast of and adjacent to Building 922. Figure 4-2 shows the location of Building 922 and the adjacent transformer. The transformer is on a concrete pad with a gravel apron, surrounded by an 8-foot chain-link fence. The fence is mounted on a 6-inch concrete berm. There was no evidence of previous dielectric fluid releases such as stains on the concrete pad or on the gravel surrounding the pad.

The transformers at the "plateau" area of PETC were tested for PCB content in September 1984 (Sunohio, 1984). Eighteen transformers were sampled and tested, with one transformer containing a regulated concentration of PCBs. Transformer serial No. 4792112, located at the Girddler Plant Substation (west of and adjacent to Building 64) had a PCB concentration of 120 ppm (Sunohio, 1984). This unit was retrofilled in August 1987 (Hoyle, 1987) and the PCB-contaminated oil was manifested and handled as a hazardous waste (Sunohio, 1987). A visual inspection of this transformer during the Survey revealed that the "PCB Contaminated 50-500" label was still on the unit and that oil stains were present on the pad around the unit. Figure 4-3 shows the location of transformer serial No. 4792112.

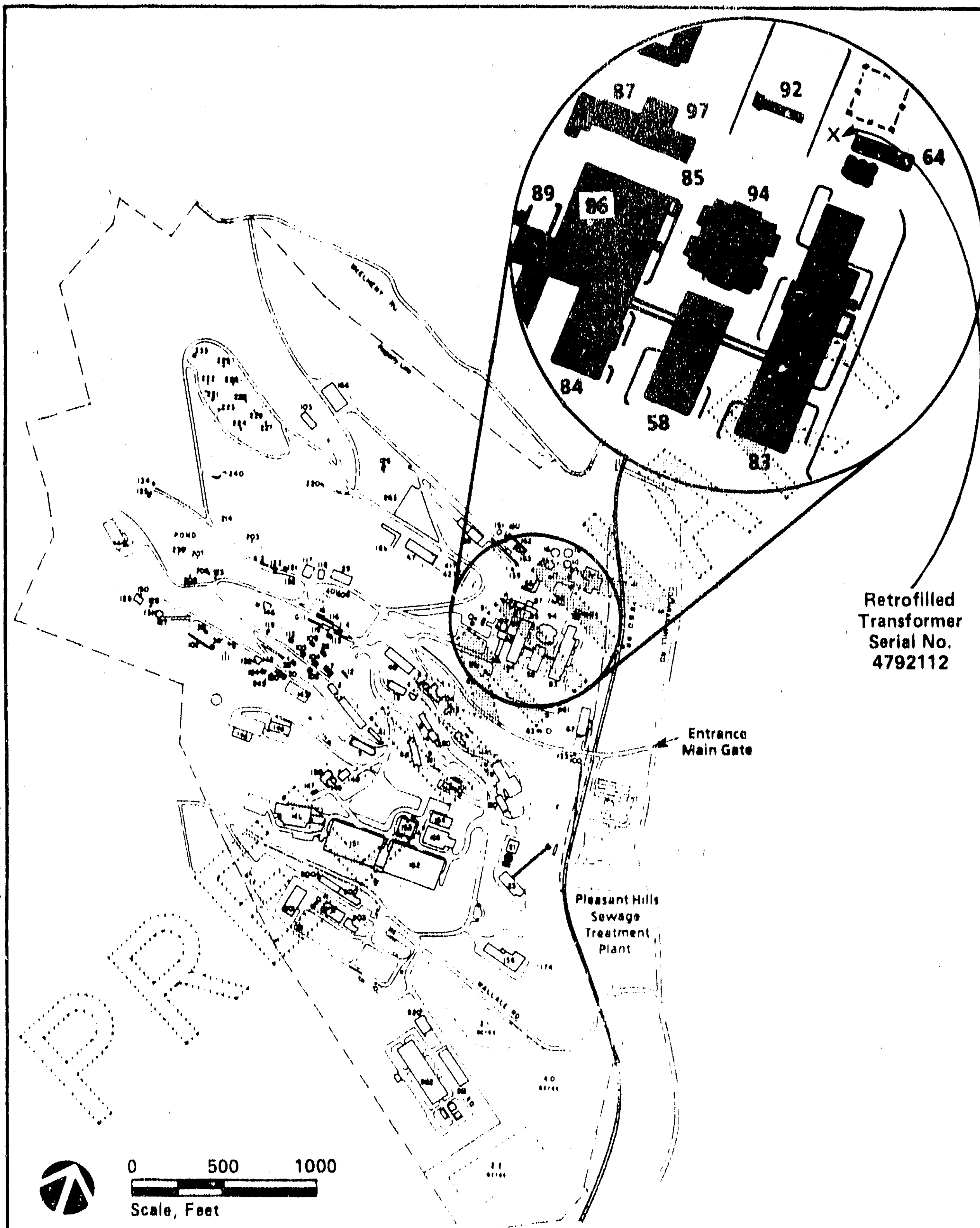
The transformers at the 900 Area of PETC had not all been tested at the time of the Survey. The active units located adjacent to Buildings 922 and 920 were sampled and tested in August 1987, while the inactive unit located adjacent to Building 903 was awaiting sampling and testing (PETC, 1987c) (see Figure 4-2).

The maintenance and inspection of transformers at PETC is the responsibility of Burns and Roe (B&R), the site maintenance contractor. Inspections are performed on the transformers every 6 months, but records have not been kept until the last series of inspections (Zigmond, 1987). In the event of a spill or release of PCB-



Source: Modified from PETC, ND

LOCATION OF PCB TRANSFORMER AT PETC FIGURE 4-2



Source: Modified from PETC, ND

LOCATION OF RETROFILLED TRANSFORMER AT BUILDING 64 AT PETC

FIGURE 4-3

contaminated fluid, B&R maintenance personnel would be the first to respond. The B&R maintenance personnel are not trained in PCB handling and containment practices and there are no standard operating procedures (SOPs) in place for the containment and remediation of PCB releases (Zigmond, 1987). The B&R maintenance personnel have never had to respond to release of fluid from a transformer.

PCB waste oils are drummed and stored in the waste storage area of Building 92. A detailed description of the waste storage area and Building 92 is presented in Section 4.1.

4.2.1.2 Asbestos

Asbestos-containing materials are present at PETC as insulation for scientific equipment and process piping, and as fire retardant coatings for structures. At the time of the Survey, B&R was responsible for overseeing projects relating to the removal and disposal of asbestos. Removal operations for any asbestos-containing materials from PETC were performed by qualified contractors or by trained B&R personnel (Hoyle, 1987).

B&R has a statement of work which is used as an SOP for the handling and removal of asbestos. This procedure stipulates the methods that an asbestos removal contractor must use to decontaminate a site, the procedures that the site Industrial Hygienist must use when monitoring the decontamination activities, and the documentation that must be maintained during removal activities (Hoyle, 1987). There is a standard stipulation in any asbestos removal contracts let by B&R that the contractor must dispose of the asbestos in a permitted landfill and that copies of the permits be on file at PETC. A review was conducted by the Survey team of the documentation on file concerning asbestos removal activities at PETC, and the files were complete and up to date.

A listing of the waste asbestos removed from PETC since 1982 by contractor or B&R personnel is presented in Table 4-4. Also included in this listing is the disposal contractor utilized and the disposal site.

TABLE 4-4

WASTE ASBESTOS SHIPPED OFF-SITE FROM PETC

Date	Quantity	Disposal Contractor	Disposal Site
09/82	500 lbs	American Recovery Company	Baltimore, MD
12/82	74 lbs	American Recovery Company	Baltimore, MD
03/84	1,000 lbs	American Recovery Company	Baltimore, MD
05/85	5-55 gal bags	American Environmental Consulting Co.	Monessen, PA
02/86	400 lbs	Environmental Enterprises, Inc.	Cincinnati, OH
04/86	2000 linear ft	American Environmental Consulting Co.	Fairmont, WV
06/86	200 lbs	Environmental Enterprises, Inc.	Cincinnati, OH
03/87	10 cu yds	Wayne Disposal	Belleville, MI
04/87	400 lbs	Environmental Enterprises, Inc.	Cincinnati, OH
07/87	200 lbs	Environmental Enterprises, Inc.	Cincinnati, OH
10/87	400 lbs	Environmental Enterprises, Inc.	Cincinnati, OH
10/87	1200 lbs	Modern Landfill, Inc.	Model City, NY
11/87	22 drums	American Environmental Consulting Co.	Clarksburg, WV
11/87	22 drums	Meadowfill Corp.	Clarksburg, WV
12/87	25 drums	Meadowfill Corp.	Clarksburg, WV

Source: Derived by Survey team member

An asbestos study was completed in November 1985, which included inspections of interior spaces and a listing of high-hazard areas (Cassar, 1985). This study was intended to provide PETC with a prioritized listing of locations in need of remediation. Exterior locations were not included, nor was asbestos-insulated research equipment included.

4.2.1.3 Herbicides/Pesticides

The use of herbicides and pesticides at PETC is limited to the application of non-regulated materials, as delineated in the contract between B&R and the U.S. Department of Energy (DOE) (Zigmond, 1987). B&R is responsible for selecting a qualified, licensed contractor and overseeing their on-site activities.

Pesticide applications are performed on a monthly or as-needed basis. Applications are usually scheduled for after business hours on Fridays and normally entail spraying interior base boards and corners. Documentation such as date of application, material applied, and quantity is not maintained by B&R (Zigmond, 1987). B&R does require the contractor to arrive on-site with pre-mixed hand spray applicators and to take any excess material off-site. A list of the pesticides used at PETC by the current contractor is presented in Table 4-5.

Herbicide applications at PETC are performed by B&R maintenance personnel as required by DOE. A list of the herbicides used at PETC at the time of the Survey is presented below. Documentation concerning herbicide applications at PETC is not maintained.

- Power I
- Power II
- Power "G"

4.2.1.4 Storage Tanks

Aboveground Storage Tanks

There are twelve aboveground storage tanks (ASTs) at PETC that contain toxic or hazardous materials. Table 4-6 presents a listing of the aboveground tanks at PETC.

TABLE 4-5

PESTICIDES APPLIED AT PETC

Dursban 2E	Borid
Diazinon 4E	Perma-Dust PT 240
Knox Out 2FM	A/C Formula 50
Ficam W	Rotol Tracking Powder
Safrotin	Contrac
Demon 40 WP	

Source: Depend-On Professional Exterminating, 1987

TABLE 4-6

ABOVEGROUND STORAGE TANKS AT PETC

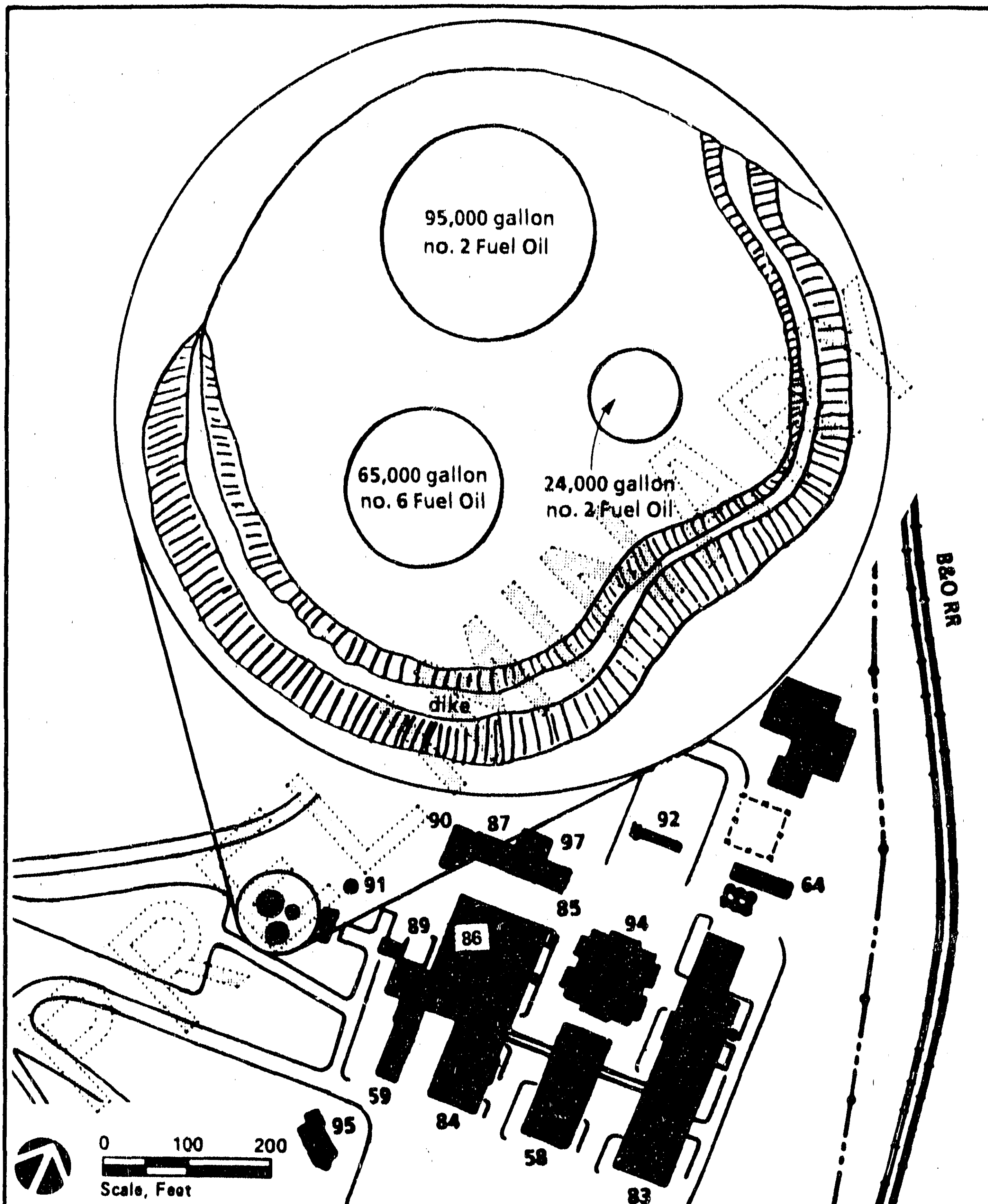
Bldg.	Active or Inactive	Material	Capacity (gal)	Construction	Containment
89	A	No. 2 Fuel Oil	95,000	Steel	Earthen berm
89	A	No. 6 Fuel Oil	65,000	Steel	Earthen berm
89	A	No. 2 Fuel Oil	24,000	Steel	Earthen berm
93	A	Fuel Oil	Unknown	Steel	Cinder block walls
59	A	SRC No. 1 Residual Oil Mix	3,500	Steel	Cinder block walls, hole in base of wall
84	A	SRC Solids	40 cu ft	Steel	None
84	A	Methanol/Coal	750	Steel	Within same
84	A	Synthetic Fuel	200	Steel	Cinder block containment
902	A	No. 2 Diesel Fuel	200	Steel	None
902	A	Gasoline	500	Steel	None
85	A	Diesel Fuel	100	Steel	None
59	A	No. 2 Fuel Oil	Unknown	Steel	None

Source: Derived by Survey team member

The largest tanks (24,000 to 95,000-gallon capacities) are located inside an earthen berm west of Building 89. The tank locations are presented in Figure 4-4. These tanks contain No. 2 and No. 6 diesel fuel to be used for specific combustion projects (PETC, 1983). The tank area is unfenced and set into a hillside. The earthen berm is sized to contain a catastrophic release from the largest tank plus 10 percent additional volume. Gilbert Commonwealth (GC), the site Process Operations contractor, is responsible for conducting semi-annual inspections of these fuel tanks (Valdisera, 1987). A review of the GC inspection reports by the Survey team revealed a concern by GC personnel about the overgrown vegetation surrounding the tank area and a concern that erosion may have diminished the total capacity of the berm area (PETC, 1987a). An inspection by the Survey team found the berm area free of vegetation, but several oil-stained areas were located. An active leak from the transfer line leading from the 65,000-gallon tank was also found. The leak area was in the berm. Solid sorbent was dispersed at the leak area in order to contain the release.

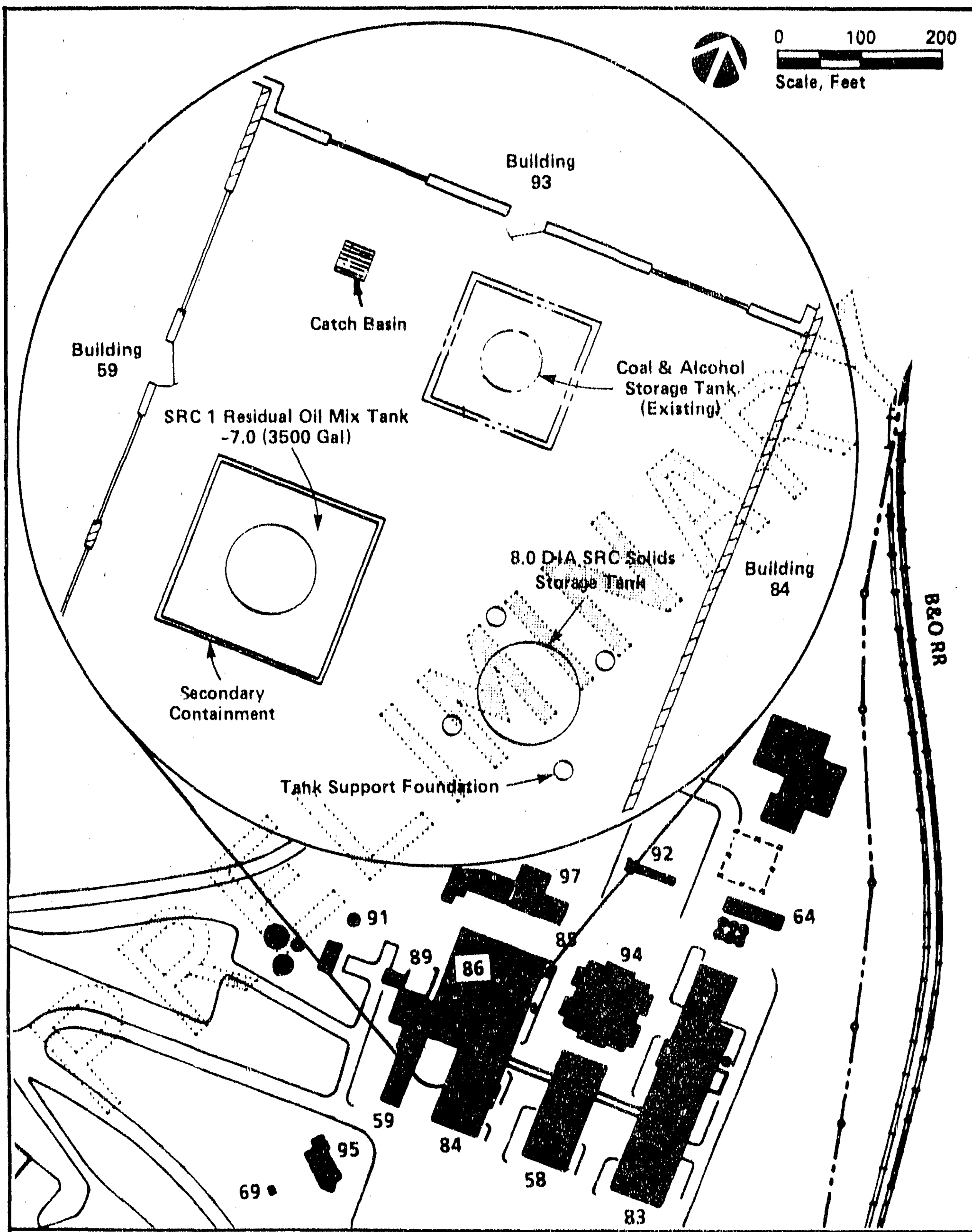
Four ASTs are located in the area between Buildings 59 and 84 as shown in Figure 4-5. The tanks, which contain the solvent refined coal (SRC) 1 residual oil mix and the coal/alcohol mix, have secondary containment consisting of three cinder-block walls and a removable steel plate that serves as the fourth wall. The secondary containment for the SRC 1 residual oil mix tank, which has a capacity of 3,500 gallons, had a hole at the base of the west cinder-block wall. This hole was to drain rainwater from the containment (PETC, 1987e). The SRC solids storage tank does not have secondary containment. These tanks are employed periodically whenever combustion tests require additional material storage capacity. Documentation concerning the testing of the secondary containment for leaks could not be located by the Survey team.

There are two forklift-portable ASTs on the plateau area of PETC that contain diesel fuel for emergency generators. One storage tank is adjacent to and north of Building 85 and the other is adjacent to and west of Building 59. The storage tank north of Building 85 is situated within a chain-link fence and atop a concrete pad. The storage tank adjacent to Building 59 is located on loose gravel. Neither storage tank has secondary containment or labels.



Source: Modified from PETC, ND

FUEL OIL TANKS WEST OF BUILDING 89 AT PETC FIGURE 4-4



Source: Modified from PETC, ND

ASTS BETWEEN BUILDINGS 59 AND 84 AT PETC FIGURE 4-5

B&R has two ASTs located southeast of Building 901. There is a 200-gallon tank for diesel fuel storage and a 500-gallon tank for gasoline storage. Both tanks are constructed of steel and are labeled as to contents. Neither tank has secondary containment.

Several ASTs were located at the Synthane and Synthoil areas of PETC and consequently removed when the facilities were dismantled. Table 4-7 presents a listing of the ASTs that were located at the Synthane area. A detailed discussion of spills or releases from these tanks is presented in Section 4.5.

Underground Storage Tanks

There is currently one operating underground storage tank (UST) at PETC. This UST is east of and adjacent to Building 141 as shown in Figure 4-6. The UST contains chemical and laboratory wastes generated from coal preparation studies ongoing in Building 141. The tank is constructed of fiberglass with a capacity of approximately 6,000 gallons. It was installed in 1984. A system for monitoring pH and liquid level in the tank has been operating since February 1987 (PETC, 1987b). A more detailed discussion of this UST is included in Section 3.3.

Several USTs have been abandoned in place due to the dismantling and removal of the Synthane and Synthoil facilities. Table 4-8 presents a listing of the USTs that have been abandoned in place and Figure 4-7 shows the locations of these USTs. The USTs associated with the Synthoil Plant, with the exception of TK104, were never used and were eventually backfilled with an inert material. TK104 was active from 1978 through 1981 and contained 25,000 gallons of fuel oil. An oil spill incident in 1981 is attributed to overfilling of this tank. Approximately 10 gallons of fuel oil was released to the North outfall. An American Petroleum Institute (API) oil-water separator was installed east of the Synthoil Plant but was never used and eventually was abandoned in place.

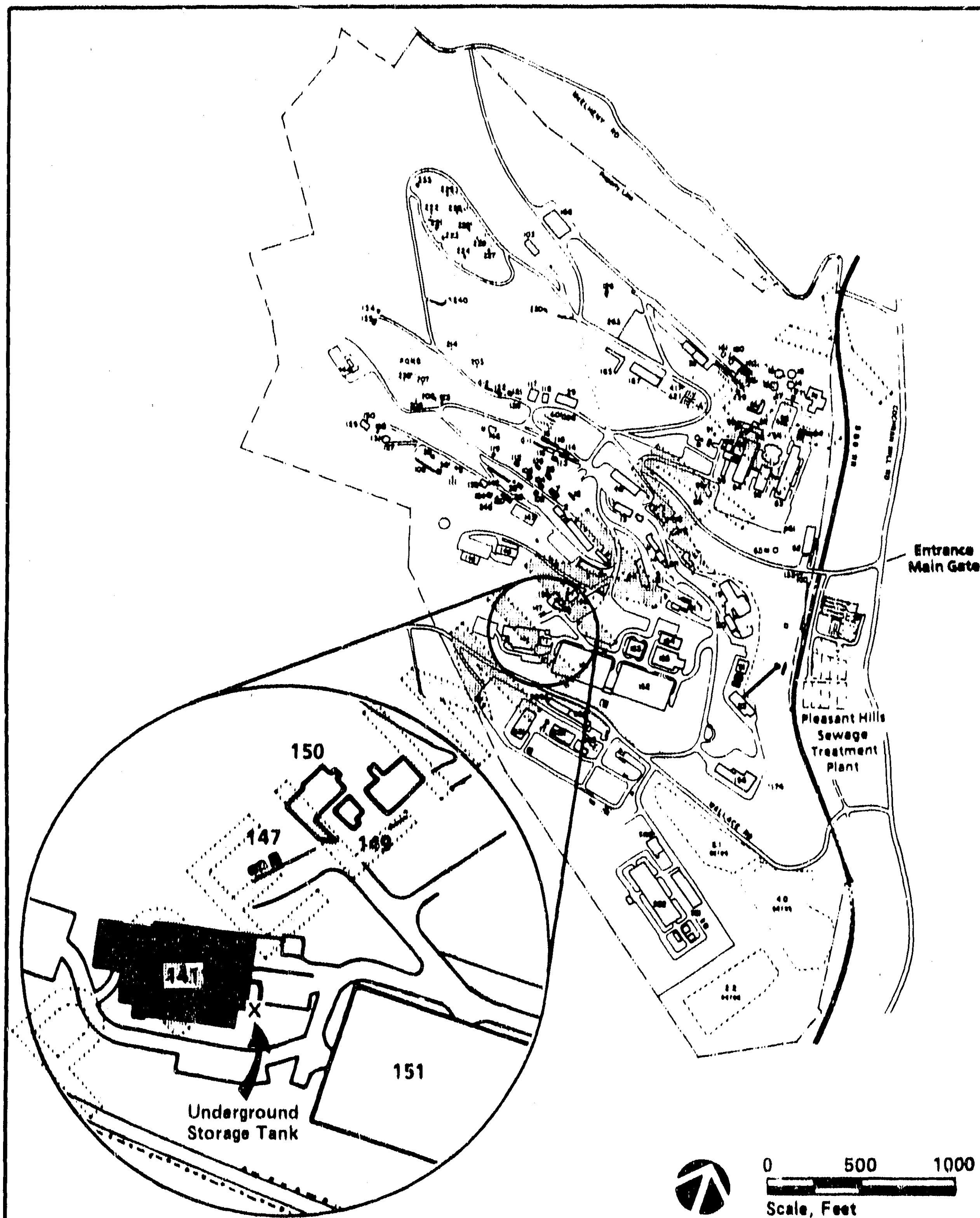
A 25,000-gallon UST for fuel oil, located adjacent to Building 902 and constructed of carbon steel, was backfilled with an inert material in 1982. This tank was operational for a period of approximately 1 year and was "sticked" daily to determine the liquid level. No loss of material from this tank was ever detected (Zigmond, 1987).

TABLE 4-7

ABOVEGROUND STORAGE TANKS REMOVED FROM SYNTHANE AREA OF PETC

Bldg.	Material	Capacity	Construction	Date Removed
902	Char	100,000	Carbon Steel	1982
902	Fuel Oil	25,000	Steel	1982
902	Effluent	Unknown	Unknown	1982
902	Effluent	Unknown	Unknown	1982
902	Process Water	Unknown	Unknown	1982
902	Process Water	Unknown	Unknown	1982

Source: Notich, 1987



Source: Modified from PETC, ND

LOCATION OF BUILDING 141 UST AT PETC

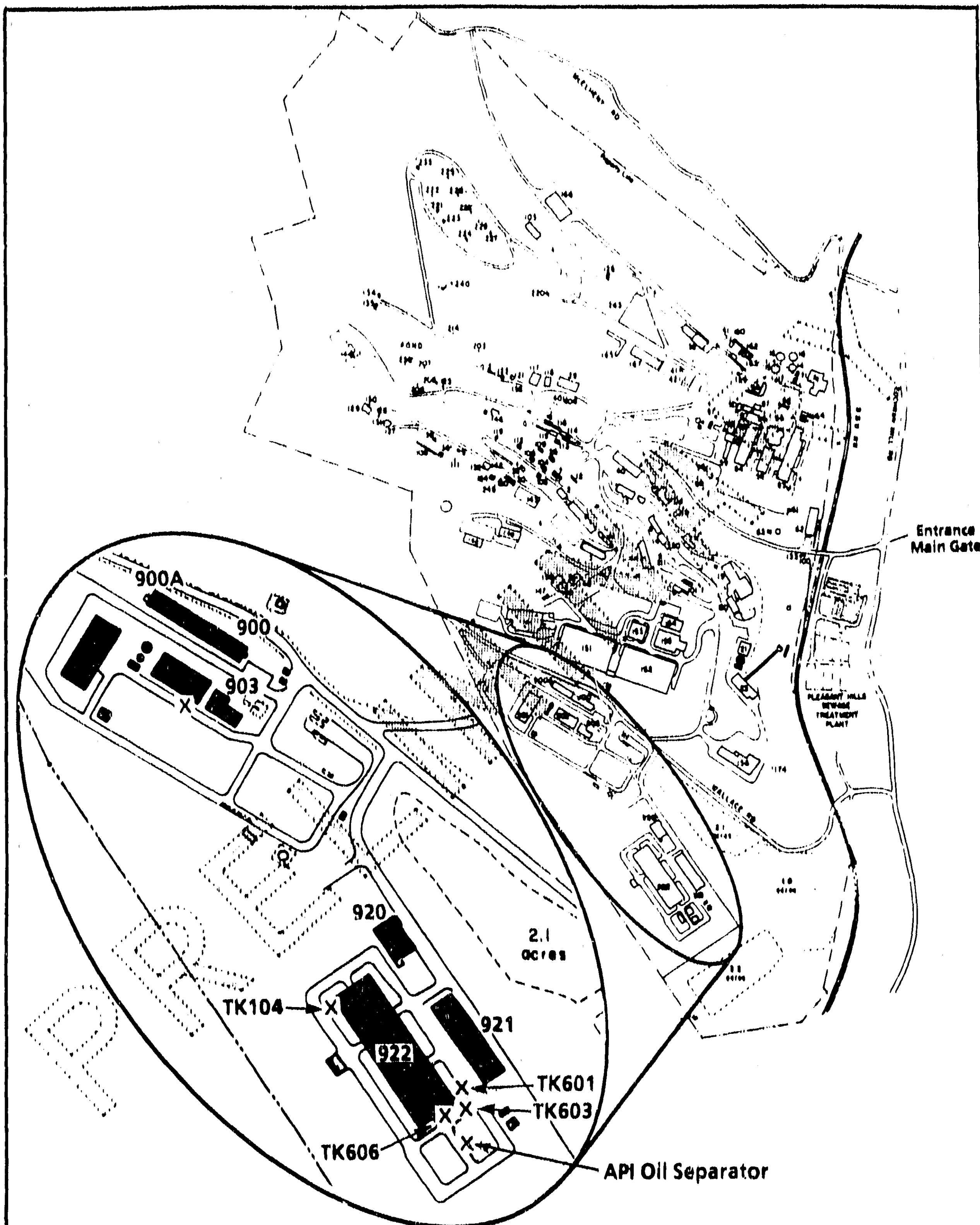
FIGURE 4-6

TABLE 4-8

INACTIVE UNDERGROUND STORAGE TANKS AT PETC

Bldg.	Tank No.	Material	Capacity	Construction	Inactive Date	Current Status
902		Diesel Fuel	25,000	Steel	1982	Backfilled
922	TK104	Diesel Fuel	25,000	Fiberglass	1982	Backfilled
922	TK601	Never used	Unknown	Stainless Steel	1982	Backfilled
922	TK603	Never used	Unknown	Stainless Steel	1982	Backfilled
922	TK606	Never used	Unknown	Stainless Steel	1982	Backfilled
922	API Oil Separators	Never used	Unknown	Concrete	1982	Backfilled

Source: Derived by Survey team member



Source: Modified from PETC, ND

USTS ABANDONED IN PLACE
AT 900 AND 920 AREAS OF PETC

FIGURE 4-7

A UST for gasoline was located on the east side of Building 59 in the plateau area of PETC from 1946 until it was excavated in approximately 1980 in order to facilitate additional site construction (King, 1987). No records or documentation, other than the 1946 engineering drawing, could be located concerning the utilization or maintenance of this UST.

4.2.1.5 Toxic and Process Chemicals

Toxic and process chemical acquisition, handling, and storage at PETC is the responsibility of DOE, B&R, and GC. The procedures and activities of each organization are presented below.

Department of Energy

Purchase requisitions from DOE personnel are processed by DOE's Purchasing Department at PETC. A purchase requisition can result in either a blanket order, which is accessible to local pickup by DOE personnel, or a direct order, which is shipped to the site and distributed. Materials purchased by DOE are received at Building 166, which is operated by the Bureau of Mines. DOE personnel distribute the materials to the requisitioner. DOE delivery personnel have chemical handling training, and spill response materials are on board the delivery vehicle. Toxic and process chemical usage by DOE personnel consists mainly of laboratory reagents and chemicals, with the majority of the chemicals being stored or utilized in Buildings 141, 64, 83, 84, 94, and 93 (NUS, 1987). Building 64, Hazardous Liquid Storage, contains drum quantities of solvents and reagents. These chemicals are kept in the Dispensing Area of Building 64, which was designed for this purpose. All flammable solvent drums are grounded and secured in dispensing racks. The drains in the Dispensing Area are plugged, but as a secondary precaution the drains lead to a 175-gallon retention sump. The doors leading to the Dispensing Area have ramp dikes and the floor has a 6-inch berm.

Smaller quantities of chemicals are stored on numbered shelves or in numbered cabinets in Building 64. Status reports on the quantity of chemicals in Building 64 are produced monthly. These reports consist of information such as shelf or cabinet number, chemical name, amount, date in, and date out (Daley, 1987). An overall site chemical inventory is produced annually by Burns and Roe as required in its contract with DOE (Cimino, 1987).

The Health and Safety Department at PETC is responsible for maintaining up to date Material Safety Data Sheets (MSDSs). In 1986, PETC initiated a system under which the chemical manufacturer has the responsibility to send the appropriate MSDSs. If an MSDS is not received at PETC, the Health and Safety Department has the responsibility to pursue the MSDS.

The Health and Safety Department does not require that an MSDS be on file prior to delivery of the chemical to the requisitioner (Ruzzi, 1987).

The chemicals used in the largest quantities by DOE at PETC are tetrahydrofuran, cyclohexane, and methylene chloride (Cimino, 1987).

Burns & Roe

A large majority of the chemicals purchased by B&R are for maintenance applications (Owen, 1987). B&R is also responsible for receiving all compressed gas cylinders shipped to PETC. The cylinders are stored at Building 65 until delivery to the requisitioner. All other chemical purchases by B&R are delivered to Building 901.

Any purchase requisitions for materials containing lead or asbestos are forwarded to the B&R Quality Assurance Coordinator for review (Owen, 1987).

Chemical materials will not be distributed by B&R until an MSDS is on file (Owen, 1987). It is the responsibility of the Maintenance Department to inform Purchasing if an MSDS is needed. The chemical materials are received and held in Building 901 until release to the requisitioner is authorized. Building 901 is located in the area in which the Synthane Plant was situated and is shown in Figure 4-7.

Gilbert Commonwealth

All purchase requests by GC personnel are reviewed for restricted materials by a Senior Buyer. If restricted materials are requested, the counterapproval of the GC

Safety Engineer is required. All purchase requisitions are also reviewed for MSDSs. Once the materials are received at Building 167, the purchase request is reviewed to determine if an MSDS was requested. The materials are released to the requisitioners if one is on file or included in the order. The materials are held at Building 167 if the MSDS has not been sent as requested. The material is held until the proper MSDS is on file (Mulholland, 1987).

GC personnel in Building 167 have had chemical handling training, and spill containment material is available. There have been occasional spills of chemicals in Building 167 but the materials were contained in the building (Longton, 1987).

4.2.2 Findings and Observations

4.2.2.1 Category I

None

4.2.2.2 Category II

1. Potential for suspected friable asbestos to enter the environment. There is a potential for suspected friable asbestos to enter the environment from equipment located throughout PETC exposed to the weather.

   There are several locations throughout PETC where suspected friable asbestos is exposed to the elements and potentially would be released to the atmosphere or via runoff through the storm sewers, to Lick Run. The sources include a discarded oven behind Building 90, the steam condensate tanks behind Building 90, and several areas along the jacketed overhead steam lines.

   The oven behind Building 90 was to be discarded and the side cover was damaged and partially removed. The exposed asbestos-like insulation was thoroughly wetted by rain and beginning to drop from the oven. It could not be determined how long the oven had been located there but rust was evident on the interior of the exposed portions.

Sections of the exterior metal skin on the steam condensate tanks behind Building 90 are missing, exposing suspected friable asbestos. It could not be determined how long the asbestos-like material had been exposed. The material was wet from precipitation, and pieces were on the pad below the exposed area. These pieces could enter the storm water system during periods of precipitation or dryout and become suspended in the wind.

The overhead steam lines are jacketed with suspected asbestos under an exterior coating of metal or treated fabric. In several areas along the lines the exterior coating is missing, exposing the asbestos insulation underneath. Precipitation could release asbestos from the lines to either be suspended by the wind or carried through the storm sewers to Lick Run.

The asbestos study conducted at PETC (Casser, 1985) did not include exterior sources. Further investigation could uncover additional exterior sources.

4.2.2.3 Category III

1. Potential for release due to inadequate secondary containment. There is a potential for an uncontained release of fuels as a result of inadequate secondary containment on several of the aboveground storage tanks on-site which could result in contaminants passing through the storm sewers to Lick Run. A catastrophic release of materials from either the fuel tanks west of Building 89, the fuel tanks in the 900 Area, or the tank between Buildings 59 and 84 could result in breaching of the secondary containment and subsequent release of materials to the storm sewers and, eventually, Lick Run.

Three tanks west of Building 89, the largest of which has a capacity of 95,000 gallons, are located within an earthen secondary containment structure. Inspection records state that erosion has occurred which may have changed the total capacity of the dike area (PETC, 1987a). This could impact the total volume of material that would be contained in the event of an uncontrolled release. Documentation concerning the repair of the dike could not be located by the Survey team. In addition, two fuel tanks (200 and 500 gallons capacity) in the 900 Area have no secondary containment and are located approximately 30 feet from a storm drain. One additional tank located between Buildings 59 and 84 has adequate secondary containment capacity; however, there is a hole in the containment wall.

4.2.2.4 Category IV

1. Annual Environmental Monitoring Report. PETC does not issue an Annual Environmental Monitoring Report that fully complies with DOE Order 5484. Chapter III-2(c) states that an environmental monitoring program shall be maintained at existing sites to determine the overall impact of DOE operations on the environment. Chapter III-4b(1) states that an environmental monitoring report shall be prepared annually to summarize and interpret levels of pollutants in the environs of DOE sites attributable to site operations.

2. Unknown underground storage tanks (USTs). PETC did not conduct a thorough investigation to identify unknown USTs and consequently did not issue a UST notification.

   Interviews with site personnel indicated that there has never been an effort to identify any previously unknown underground tanks. Neither a search of engineering drawings nor interviews with long-time employees was done. During the Survey, the Survey team performed a quick review of the engineering drawings, walked the site, and interviewed employees and did not locate any additional tanks.

3. PETC does not issue an annual polychlorinated biphenyl (PCB) report. PETC does not issue an annual PCB report as required by the Toxic Substances Control Act (TSCA). Regulation 40 CFR 761.180 requires that an annual report of the PCB inventory on-site be prepared, including such information as dates when PCBs and PCB items are removed from service, total weight in kilograms of PCBs removed from service, total number of PCB transformers, and the total quantity of PCBs in service at the end of the calendar year. PETC has compiled such information but has not developed it into the required format.

4. Improper labeling of PCB transformer. The transformer at Building 922, which contains 3,900 ppm PCBs, and the surrounding security fence are not properly labeled as required by the TSCA. In the event of a release or a fire, important

information concerning the transformer would not be available to emergency response personnel and, as a result, improper handling and disposal may occur.

5. Inadequate chemical requisition review and Material Safety Data Sheet (MSDS) procedures. The PETC-DOE Purchasing Office does not screen purchase orders for restricted articles and releases materials to the requisitioner prior to receipt of an MSDS. A release of material for which there is no MSDS potentially could result in improper handling of such chemicals.

6. Inadequate construction of drum storage area. The design of the drum storage area currently under construction at the southeastern edge of the former Synthoil area (920) is inadequate. A concrete pad is being constructed purportedly for use in drum storage in an area of historic drum storage. The pad has no curbing or cover and is shaped irregularly.

4.3 Radiation

4.3.1 General Description of Pollution Sources and Controls

The Pittsburgh Energy Technology Center (PETC) uses sealed radiation sources for measurement system purposes in laboratories. These are radiation sources enclosed within analytical equipment used for coal research investigations. In addition, PETC is storing 34 cesium-137 sources in a locked storage room of Building 902. The sources are available for future use by PETC scientists should the need arise. PETC has arranged for an annual inspection of the Building 902 radiation storage room by an off-site contractor (Applied Health Physics, Inc., of Bethel Park, Pennsylvania) to check the condition of the sources. Each source is examined and subjected to a swipe test for possible leakage by the contractor. None of the sources have been found to have leaked. Table 4-9 lists the sources and their radiation content.

4.3.2 Findings and Observations

4.3.2.1 Category I

None

4.3.2.2 Category II

None

4.3.2.3 Category III

None

4.3.2.4 Category IV

None

TABLE 4-9

CESIUM-137 SOURCES STORED IN BUILDING 902 RADIATION STORAGE ROOM

Leak Test#	Manufacturer	Isotope	Amount	Model #	Serial #
22	Kay-Ray	CS-137	200mCi	7050B	5454
27	Nuclear-Chicago	"	200mCi	5176	2335
24	Ohmart	"	50mCi	SH-100	73323
8	Kay-Ray	"	200mCi	7050B	5455
33	Kay-Ray	"	200mCi	7050B	6313
17	Kay-Ray	"	200mCi	7050B	6312
14	Kay-Ray	"	500mCi	7063	6521
4	Robt. Shaw	"	1000mCi	SH2	S1035
42	Robt. Shaw	"	1000mCi	SH2	S1034
3	Robt. Shaw	"	1000mCi	SH2	S1040
15	Robt. Shaw	"	1000mCi	SH2	S1036
30	Robt. Shaw	"	3500mCi	SSH2A	S1108
10	Ohmart	"	100mCi	ELG-10	65221
21	Nuclear-Chicago	"	1000mCi	5193	226
26	Nuclear-Chicago	"	1000mCi	5193	222
25	Nuclear-Chicago	"	1000mCi	5193	223
5	Nuclear-Chicago	"	1000mCi	5193	224
31	Nuclear-Chicago	"	1000mCi	5193	221
20	Nuclear-Chicago	"	1000mCi	5193	225
9	Kay-Ray	"	200mCi	7050B	8657
23	Robt. Shaw	"	1000mCi	SH2	S1038
16	Robt. Shaw	"	3500mCi	6082	B858
32	Robt. Shaw	"	1000mCi	4F6S	60403
18	Robt. Shaw	"	1000mCi	SH2	S1039
13	Robt. Shaw	"	1000mCi	SH2	S1033
19	Robt. Shaw	"	1000mCi	SH2	S1043
29	Robt. Shaw	"	1000mCi	SH2	S1042
1	Robt. Shaw	"	3500mCi	SSH2A	S1107
12	Robt. Shaw	"	1000mCi	SH2	S1037
11	Robt. Shaw	"	1000mCi	SH2	S1041
7	Robt. Shaw	"	1000mCi	SH2	S1032
6	Ohmart	"	150mCi	ED-4	63213
2	Texas-Nuclear	"	1000mCi	5191	B527
28	Texas-Nuclear	"	1000mCi	5191	B526

Source: Burns & Roe, 1987

4.4 Quality Assurance

4.4.1 General Description of Data Handling Procedures

The Pittsburgh Energy Technology Center (PETC) does not maintain an environmental monitoring program and does not perform any chemical analyses of environmental samples.

4.4.2 Findings and Observations

4.4.2.1 Category I

None

4.4.2.2 Category II

None

4.4.2.3 Category III

None

4.4.2.4 Category IV

None

4.5 Inactive Waste Sites and Releases

This section presents a description of potential and actual sources of environmental pollution that result from inactive waste disposal sites, and historic spills and releases of hazardous materials at the Pittsburgh Energy Technology Center (PETC). This review of possible sources of pollution was performed on the approximately 60-acre portion of the 237-acre Bruceton Research Center (BRC), that is under the control of the DOE. This includes the now mostly abandoned areas south of Wallace Road formerly utilized for the construction of Synthane and Synthoil Pilot Plants.

From the review conducted of the physical site, study of site records and aerial photographs, and on-site interviews with current and former employees, the following historical activities were investigated concerning hazardous wastes and toxic substances:

- Past waste disposal areas on-site that have been identified;
- Unidentified areas on-site where past undocumented disposal may have occurred;
- Areas on-site where leaks, spills, or inadvertent disposal by abandonment may have created ongoing sources of contamination or traceable plumes of surface or subsurface contamination.

Basic information about the disposition of hazardous wastes shipped off-site in the past is included.

4.5.1 General Description of Pollution Sources and Controls

4.5.1.1 Historical Solid Waste Disposal

The history of the PETC site dates from 1910 when the Federal Government established the Department of the Interior's Bureau of Mines (BOM) and purchased a 38-acre tract of land at Bruceton, Pennsylvania. The purpose of this acquisition was to open an experimental mine for large-scale research on underground blasting, mine fires, and explosions. In 1917, several new buildings were built at the center to house facilities for testing and approval of coal mine explosives. In the years between then and the Second World War, the center's land and buildings were continually expanded.

Following the passage of the 1944 Synthetic Fuels Act, an energy research laboratory was constructed in 1947 to 1948 by the BOM on land at the top of a knoll at the northeast corner of the present BRC. The original buildings of PETC, including Buildings 83, 84, and 58, were built at this time. From 1948 to the present, this energy research laboratory has conducted basic research into the development of liquid fuels from coal. Utilizing both BOM and German technology, demonstration plants were operated in Louisiana and Missouri by the center to produce liquid fuels (gasoline) from coal by hydrogenation and Fischer-Tropsch synthesis. These plants were discontinued due to increasing new oil discoveries in the United States and the Middle East and until the 1970s the energy research laboratory at BRC continued basic research and engineering in coal conversion processes.

In 1975, with the creation of the Energy Research and Development Administration (ERDA), energy research activities of the BOM were assumed by the new Agency. In 1977 the DOE was formed and began administering these activities and in 1979 the Pittsburgh Energy Research Center (PERC) changed its name to the Pittsburgh Energy Technology Center (PETC). Finally in 1977, two BOM groups for coal preparation and coal analysis were assumed by DOE (PETC, 1988).

All the Government-owned land south of Wallace Road became a part of ERDA in 1975. In this area, the Synthane Pilot Plant (900 Area buildings) was constructed and operated, and the Synthoil Pilot Plant (920 Area buildings) for coal liquefaction was constructed but never completed nor operated. In addition to the property on which these pilot plants were located, the remaining 13.5 acres on the eastern side of the parcel south of Wallace Road was also transferred to ERDA in 1975. This area is today unused except for a softball field for employees. It includes three separate areas which are referred to as the 2.1-acre property; the 4.0-acre property or softball field; and the 2.2-acre property.

The physical growth of buildings and employees provides information concerning possible changes in the quantities and locations of wastes historically generated at

PETC. Since 1948 however, the basic research work and the number of total employees at PETC have not been drastically altered, with the exception of the construction of the Synthane and Synthoil plants in the late 1970s. Throughout the period since 1948, it is believed that PETC has received numerous waste materials to be analyzed from off-site pilot plants (such as those in Louisiana and Missouri previously described) and experiments. Virtually no records exist summarizing these receipts although the waste materials are judged to be of the same types as generated by the Morgantown Energy Technology Center (METC) in Morgantown, West Virginia. These wastes are described later in this section and in Section 4.1.

The major construction of new buildings since 1948 includes:

- 1973-1975 Construction of Synthane Pilot Plant (900 Area)
- 1975-1976 Construction of Synthoil Pilot Plant (920 Area)
- 1977-1978 Construction of Building 167 (performed coal liquefaction, coal-derived liquids pilot plant studies)
- 1980 Construction of Building 94 - Analytical Chemistry, Coal Sciences Division (was formerly to have been called Buildings 81, 82, and 88)
- 1983 Demolition of Synthane Pilot Plant (900 Area)
- 1984-1985 Construction of Building 141 coal preparation

Off-Site Waste Disposal

The types of potentially hazardous wastes generated at PETC include spent laboratory chemicals and coal-derived waste tars and oils. These wastes are stored in 55-gallon drums prior to off-site disposal. The areas in which they are stored are described in Section 4.5.1.3. There is not now, and has never been any known on-site disposal of hazardous solid waste at PETC, at least for which written records or current employee knowledge exists. A complete description of the current wastes generated by PETC is provided in Section 4.1 (Table 4-1). A sitewide cleanup was conducted in 1981 to 1982 to dispose of approximately 1,740 drums of miscellaneous wastes that had accumulated in satellite parcels of vacant DOE or BOM property such as the 2.2-acre site and triangle parking lot (see Section 4.5.1.3 for further explanation). The disposal was contracted to Aqua Tech of Port Washington, Wisconsin. Table 4-10 contains a listing of the typical analyses of these wastes for use in the contract for disposal. It is probable that these wastes represent the types of wastes produced from the Synthane plant as well as the remainder of PETC. (Table 4-1 in Section 4.1 showing current waste generation would not include Synthane wastes, since the pilot plant is permanently closed.)

Historically, programs have been in place since the mid-1970s or before for off-site disposal of hazardous wastes and waste products from coal research including coal/water mixtures. A 1978 Environmental Impact Assessment (DOE, 1978) stated that solid waste is collected for off-site disposal by a private firm under contract with the BOM. These wastes included:

- Condensate water from coal gasification research containing phenols and cresols;
- Heavy tars, also from coal gasification;
- Compressor oils and solvents from coal hydrogenation;
- Organic solvents from laboratory analyses; and
- Various laboratory chemicals whose useful life had expired.

Contractors utilized at that time (1978) for off-site disposal included Rad Services, Inc., of Pittsburgh (incineration of organic solvents and burial in Batavia, Ohio, of expired chemicals); and Amo Pollution Services, Pittsburgh (coal and pyrolysis liquids which are sent to Erieway Pollution Company in Ohio). Current contracts for off-site disposal are discussed in Section 4.1. Some of the other off-site disposal companies utilized in the past include (Wieczenski, 1984):

TABLE 4-10
TYPICAL ANALYSIS OF WASTE MATERIALS 1981-82

Mixed Laboratory Chemicals	These would include substances such as pryidine; acetic acid; chloroform; thiocresol; solid inorganics, etc.
Organic Laboratory Solvents	These would include solvents such as pentane; hexane; tetrahydrofuran; benzene; methanol; octane; xylene; toluene; etc.
Coal-Oil Slurries	Approximately 70% recycle oil; 30% coal. Recycle oil is about 7-8% ash, 90% benzene soluble material. The coal is approximately 16% ash.
Condensate Water	This aqueous solution has a pH of 9.0. The typical composition contains chloride - 200 mg/L, suspended solids 500 mg/L, phenol - 7,000 mg/L, thiocyanate - 200 mg/L, cyanide - 0.2 mg/L, ammonia - 5 mg/L, chemical oxygen demand - 35,000 mg/L.
Oil and Emulsion	Water composition is the same as stated in Condensate Water in conjunction with coal tars and oils.
Coal Liquefaction Products	The typical composition of these products contain centrifuge liquid product and gross liquid product from liquefaction unit operations. The gross liquid product contains approximately 30% ash, benzene insoluble material, 70% soluble. Basic constituents are hydrogen, carbon oxygen, nitrogen, sulfur, and ash.
Coal Liquefaction Products	In liquid state in combination with 99% acetate, 99% stoddard solvent, 10% HF - 50% toluene - 40% pentane.
Caustic Waste	These would include ammonium hydroxide solutions, alkaline waste solutions, nitric acid solutions, etc.
Aqueous Solution	Typical composition contains 73-90% water, 2-8% methanol, 4-11% ethanol, 24% propanol, 2-4% butanol.
Oil & Oily Rags	Basically C_5 - C_{25} paraffins.

Source: PETC, 1981

- Merit Sanitation - Kelley Run Landfill (Coal fly ash, slag, and char)

- Applied Technology - a Landfill in Wyandotte, Michigan (coal and water)

- Safety Kleen - (recycling of spent solvents)

- Petro con - (rerefine waste oil)

- American Recovery - (miscellaneous chemicals)

- Ecology Chemicals - (solvent refined coal (SRC) solids, SRC oils, shale oil, and other oil mixtures)

- Kipin Industries - (coal/water mixtures)

- Catalytic, Inc. - (unused SRC solids and oils to be reused)

<u>Soil and Construction Demolition Debris Disposal</u>

A large landfill, operated by the BOM, is located at the northern edge of the BRC north and west of Building 166. This landfill has never been officially utilized by DOE. Interviews with BOM staff indicated that this landfill was used for an unknown period of several years for disposal of excess soil fill as well as construction debris from around the BRC. Use was discontinued 1-2 years ago although the landfill was never formally closed. The Survey team estimates the size of the landfill as approximately 6 acres. A physical inspection of the face of the landfill, adjacent to McElheny Creek, by Survey team staff revealed empty chemical bottles, drums, and other debris protruding from the landfill. This would indicate potential disposal of wastes other than construction demolition debris; however, no record as to the source of any such waste exists. At least one employee interviewed by the Survey team reported, however, observation of a truck dumping drums into the landfill approximately 5 years ago. These drums were reported to contain either laboratory-pack wastes, waste liquids, or waste solids. There are currently several drums (~50) stored on top of the landfill in an area across from Building 166. Many are empty, all are rusted or deteriorated, and some may contain wastes. It was reported by BOM employees that they conduct fire training near Building 166.

Abandoned Mineshaft Sinkhole

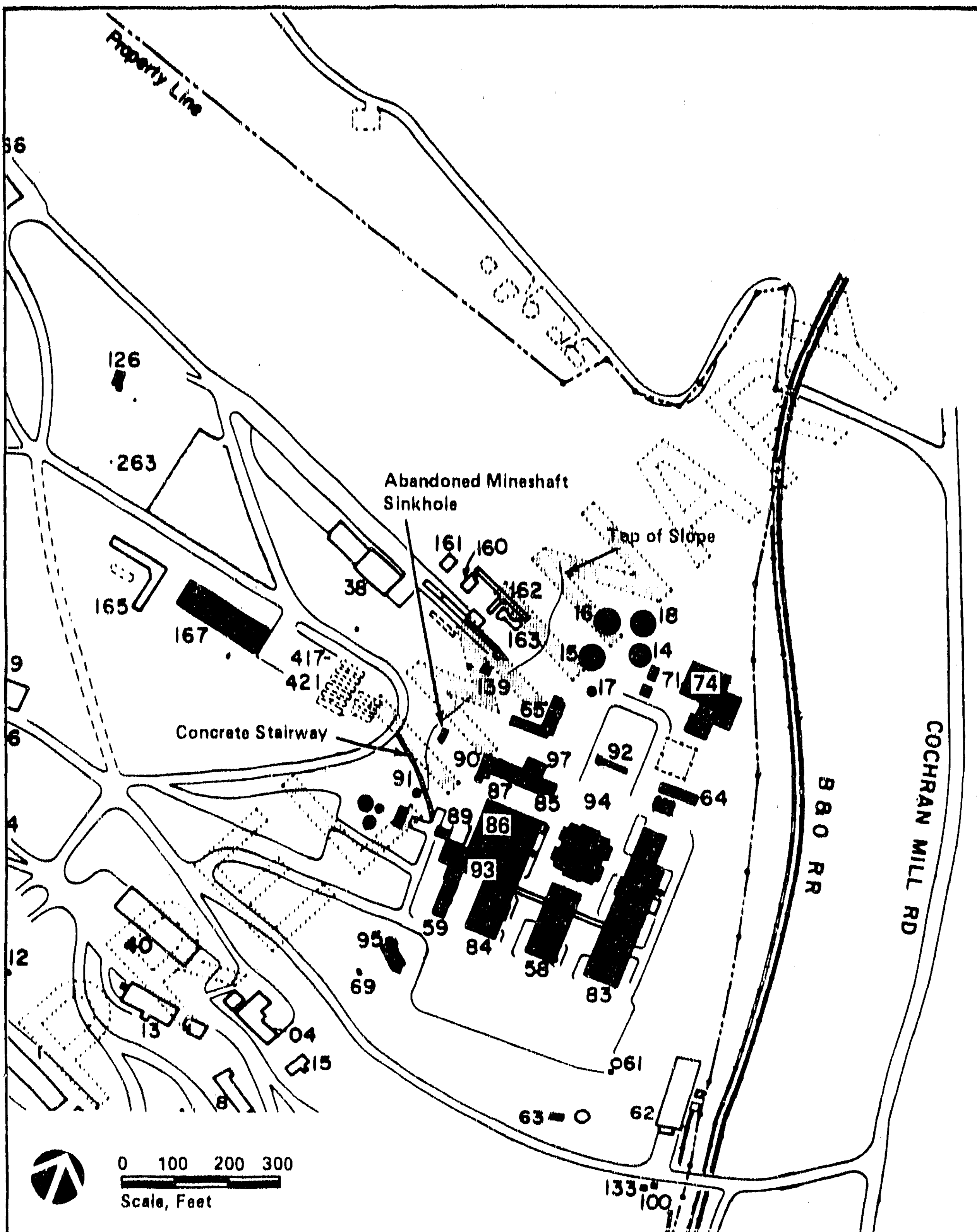
An employee interviewed during the Survey reported that a mineshaft sinkhole located on the hillside approximately 100 feet northwest of Building 90 had been used for disposal of waste "bottles" of chemicals in the late 1970s. Figure 4-8 shows the location of the sinkhole. The location was inspected by the Survey team and the sinkhole was noted to have been filled with large (12- to 24-inch) rocks so it was impossible to measure the bottom depth. The sinkhole had been filled in by the BOM and they reported, upon questioning, that they had filled it in several times over recent years due to continued subsidence. The sinkhole was approximately 10 feet in diameter. Its depth was estimated from historical maps of mineshafts in the area to be approximately 75 feet, although only a rough estimate could be made.

4.5.1.2 Historical Solvent Wastewater and Sludge Disposal

A chemical waste holding tank was constructed at Building 141-coal preparation (see Figure 4-10), when the building was built in approximately 1984 to 1985. The four laboratories located in the building are froth flotation, magnetic separation, float and sink, and agglomeration. These laboratories utilize the following process chemicals:

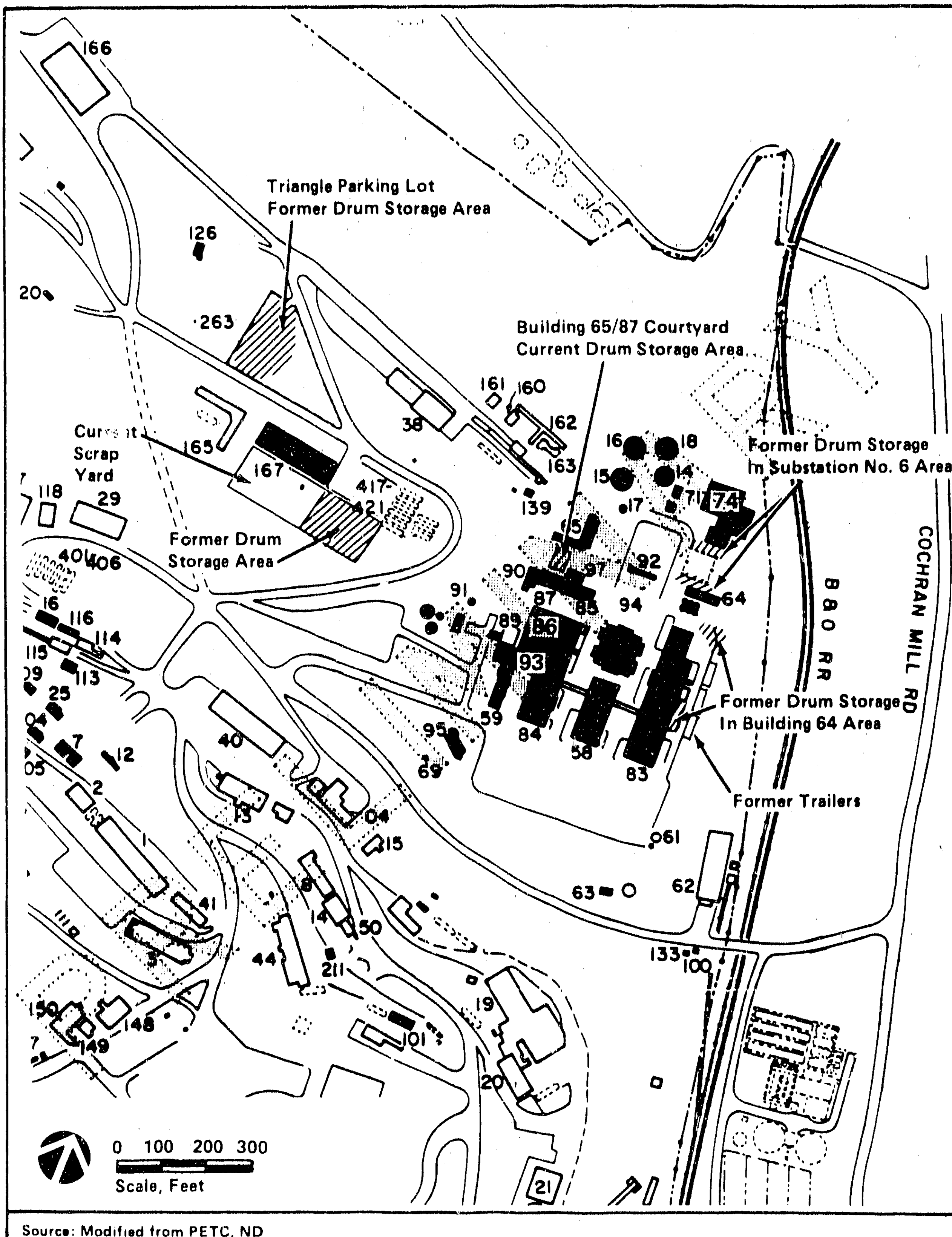
- Froth flotation laboratory - alcohols, acids, and high-molecular-weight flocculants
- Magnetic separation laboratory - water with magnetite
- Float and sink laboratory - certigraf (a compound of bromoform and perchloroethylene)
- Agglomeration laboratory - asphalt binders

The above laboratories have no floor drains. Sink discharges are collected in an underground chemical waste holding tank believed to be of approximately 6,000-gallon capacity. Although this tank was designed to be pumped out and the wastes disposed of off-site, it was built with an overflow to the Pleasant Hills Sewage



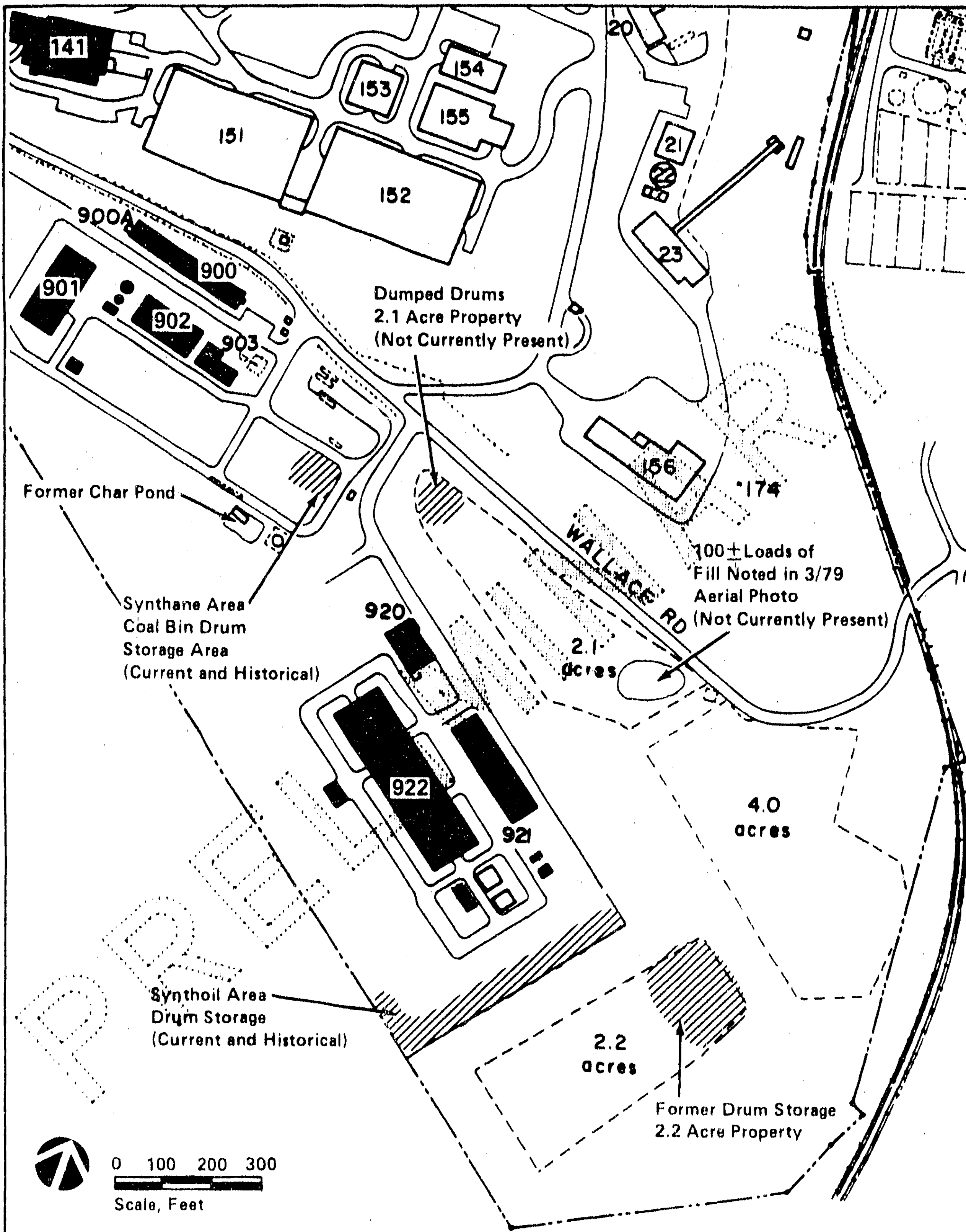
Source: Modified from PETC, ND

LOCATION OF ABANDONED MINESHAFT SINKHOLE FIGURE 4-8



Source: Modified from PETC, ND

WASTE STORAGE AREAS ON THE MAIN HILL FIGURE 4-9



Source: Modified from PETC, ND

WASTE STORAGE AREAS SOUTH OF WALLACE ROAD FIGURE 4-10

Treatment Plant (STP). It is believed that until an overflow alarm was installed in 1986, frequent overflow of wastewater containing the above solvents, coal fines, and associated sludge occurred.

4.5.1.3 Waste Product Handling and Storage

The current procedures for the storage and handling of hazardous and non-hazardous solid wastes are described in Section 4.1. The main concern with waste storage areas is past leaks and spills. Principal storage of these waste materials is in Buildings 64 and 92. Satellite storage of waste of unidentified composition is also presently conducted at the 900 Area, 920 Area, and in the area immediately north of Building 167. This storage is described in the paragraphs below. Historical storage of wastes, mostly in drums, at these and other locations described below was far greater than is currently occurring. Evaluation of aerial photographs from the late 1970s to the present, interviews with current employees, and examination of records indicate that much or possibly most of the potentially hazardous wastes at PETC between about 1975 and 1982 was stockpiled on-site at various outside locations. This accumulation culminated in a sitewide cleanup in 1981-82. Table 4-11 shows quantities and types of waste included in this cleanup. None of the locations utilized for storage were diked to contain spills, most were on bare gravel or directly on the ground, and photographs indicate that many drums were likely not stored on pallets for detection of leaks and slowing of bottom rusting. Leaks and spills were reported by at least one employee to have occurred at the 920 Area, 2.1-acre site, and 2.2-acre site although specific instances and dates could not be provided. Current and historical waste storage areas are shown on Figures 4-9 and 4-10.

Building 64 Area

During the 1970s and early 1980s, as shown by aerial photographs, and earlier as related by employee interviews, the area south of Building 64 and east of Building 83 was utilized for storage of product and waste materials (see Figure 4-9). Drums outside Building 83, visible from aerial photographs, were probably products to be used in laboratories and shops at PETC, as was material visible in tractor trailers. Drums stored around Building 64 were potentially waste materials however. Although the area is built on fill of slag and pieces of concrete, no disposal by burial

TABLE 4-11

QUANTITIES AND TYPES OF WASTES INCLUDED IN THE 1981-82 SITEWIDE CLEANUP

I. Removed From 2.2.-acre property as of October 23, 1981.	
Type of Waste	Number of drums
mixed lab chemicals	50
organic lab solvents	250
coal/oil slurries	30
condensate water	100
coal tar products	10
coal in drums	800
oily rags and other contaminated material	200
II. Remaining on-site as of October 23, 1981.	
Location	Number of drums
2.2 acre site	150
triangle parking lot	150
TOTAL	1740

Source: Webster, 1981

or dumping over the bank is evident. The bare gravel and slag on the surface is stained over a 20-foot-square area with oil and/or coal fines. Waste oil in drums was reported to have been stored in this area by employees, potentially including Dowtherm, which was widely used at PETC. Dowtherm is a heat transfer oil, some types of which in the past have contained polychlorinated biphenyls (PCBs).

Substation #6 Area

The current area of substation #6 (see Figure 4-9) was formerly utilized as a drum storage area as shown in aerial photographs. The substation was constructed in approximately the late 1970s. One photograph from the mid-1970s showed approximately 25-50 drums stored on the gravel in the area. There was no evidence in the photograph of leaks and the area gravel and soil are presently not stained.

Courtyard between Buildings 65 and 87

The courtyard between Buildings 65 and 87 (see Figure 4-9) is currently used for storage of drums believed to contain mainly coal/water mixtures. Some of the drums currently in storage are severely rusted and may potentially contain coal tars/oils or chemical contamination. Approximately twenty-five 55-gallon drums are presently in storage and the gravel in the courtyard is totally blackened by spilled coal fines and potentially coal tars or oils. Historic aerial photographs show much larger numbers of drums stored in this area.

Triangle Parking Lot

The area referred to as the triangle parking lot (see Figure 4-9) was utilized for storage of 100 or more drums of wastes between the late 1970s and early 1980s (see Table 4-11). This area is off DOE-controlled property. It was reported by employees that many of the drums contained Char-Oil Energy Development oil ("COED oil") or coal pyrolysis wastes from a project in New Jersey sponsored by PETC. These drums reportedly used to "spring leaks". They were believed to have been disposed of in the 1981 to 82 sitewide cleanup previously discussed. Also in this area, wastes from Building 167 may have been stored. Research on coal liquefaction was conducted there from about 1978 to 1981 or 1982. Wastes from this laboratory included approximately 20-50 drums per year of coal-derived liquids, kerosene waste, ethylacetate, cyclohexane, and pentane. There is currently no evidence of spills in the triangle parking lot.

Synthane Plant (900 Area)

Following the shutdown of the Synthane Plant in approximately 1978 and continuing through its demolition in 1983 to the present, the area of the plant's former coal bins has been used as a drum storage area for wastes. Currently, several dozen 55-gallon drums of coal wastes are in storage here. Previously, the area was used for storage of coal-derived oil and solvent refined coal (SRC) wastes, including centigraf, according to employee interviews. This area is shown in Figure 4-10. A spill of 50,000 gallons of phenol-contaminated wastewater in the Synthane area is discussed in Section 4.5.1.5.

Synthoil Plant (920 Area)

The Synthoil Plant was never completed and never operated. Construction was started in approximately 1975 and discontinued in 1978. Based on employee interviews and aerial photographs, the area at the eastern edge of the 920 Area plateau has been used as a drummed waste storage area. There are currently approximately 25 drums in storage at this location and in the late 1970s, aerial photographs show that up to 250 drums appear to have been stored here (see Figure 4-10). Employee reports and historical photographs from the early 1980s indicate that the drums in storage at this location were deteriorated and leaky. The area is currently under construction for use as an uncovered drum storage area.

2.1-Acre Property

An employee reported that an unknown number of drums of SRC wastes from Building 151 (Bureau of Mines) was dumped in the northwestern corner of the 2.1-acre property in the early 1980s and remained there for several weeks until they were moved to the 2.2-acre property. It is not known if these drums leaked or if any broke open, according to employee interviews. Also, a 1979 aerial photograph showed approximately 100 truckloads of fill or other dirt-like material dumped in the southern end of the 2.1-acre property (see Figure 4-10).

2.2-Acre Property

The 2.2-acre property was utilized for storage of up to 1,740 drums of wastes (see Table 4-11) during the late 1970s through 1982. Employee interviews indicate that this practice continued until 1984, although there are currently no drums or wastes stored in the area. The area of storage is currently gravel- and slag-covered and may have been covered with several inches of earth or gravel/slag after the drums were removed. The area has never been paved and is not currently visibly stained (see Figure 4-10).

4.5.1.4 Scrap Material Storage

Historically through the present, the BOM has operated a scrapyard south of Building 167 (see Figure 4-9). Earliest aerial photographs show the scrapyard present in 1979; however, employees indicated it was present much earlier. The area presently is used for storage of scrap metal, scrap non-PCB transformers, and usable excess parts such as pipe, metal, etc. The soil in the area is oil stained. Employees have reported that PETC wastes were stored at the BOM scrapyard prior to disposal. Aerial photographs from 1979 show accumulations of dozens of drums of unknown content in this area.

4.5.1.5 Spills and Leaks

Table 4-12 presents a summary of recent spills and leaks of petroleum and hazardous substances. This listing only covers a period of 1977-1982 since other records were unavailable. The majority of spills listed entered the wastewater or stormwater sewer system at BRC and impacted surface waters off-site including Lick Run, as described in Section 3.3. The only significant spill listed that may have created a source of ongoing contamination release from soils is the "char pond" spill of 1977 (see Figure 4-10). During this incident, about which no written record was found by the Survey, employees reported that approximately 50,000 gallons of phenol and coal-oil-contaminated water were released. An open pond called the char pond was used for storage of this wastewater from the Synthane process while it was awaiting carbon filtration treatment. The tank ruptured and its entire contents spilled, mostly into the creek running through the 900 Area draining southeast to Lick Run. Potentially, substantial soil in the area was contaminated.

TABLE 4-12

RECENT HISTORY OF SPILLS OF PETROLEUM AND HAZARDOUS SUBSTANCES

1.	September 17 1981	Coal fines from an unknown area to storm sewer.
2.	August 18, 1981	Suds into the north outfall.
3.	August 14, 1981	A spill from the concrete degreaser into the north outfall to Lick Run.
4.	August 6, 1981	Oil and white foamy substance into the north outfall to Lick Run.
5.	July-Aug. 1981	Spill of large volume of water into Lick Run via north storm sewer system.
6.	July 22, 1981	Oil in undetermined amount from unknown source into the north outfall to Lick Run.
7.	July 21, 1981	G.E. MATSCO - soap suds into creek.
8.	July 15, 1981	Residue from baghouse (main boiler house) reached the north outfall from main roadway.
9.	July 1, 1981	Coal dust flushed down drain at Building 20 - north outfall to Lick Run.
10.	June 24, 1981	G.E. MATSCO spilled CWM (coal/water mixture) into floor drain. Spilled dirty water during cleanup.
11.	Mid-June, 1981	Building 156 spilled detergent in parking lot - hosed down spill, resultant suds went out the south outfall to Lick Run.
12.	Mid-May, 1981	Coal/water slurry spill into Lick Run via north storm sewer system.
13.	April 1981	#2 Fuel oil into Lick Run from Building 921.
14.	February 21, 1981	G.E. MATSCO spilled 30-60 gallons #6 fuel oil out of north outfall to Lick Run.
15.	Oct. 13-14, 1980	G.E. MATSCO spilled 100 gallons #6 fuel oil out of north outfall to Lick Run.
16.	May 9, 1980	Concrete degreaser near MHD unit.
17.	1977	Synthane area char pond failure released approximately 50,000 gallons of phenol-contaminated wastewater to storm sewer and resultantly to Lick Run.

Source: Chester Engineers, 1983

No records exist and interviewed employees did not know if any soil cleanup was performed.

4.5.1.6 Identification and Initial Assessment of Inactive Waste Disposal Sites

DOE Order 5480.14 of 1985 requires that a Phase I Installation Assessment be performed by April 1986 "to evaluate site history and records, and to locate those inactive waste disposal sites that may pose a risk to health, safety, and the environment as a result of migration of hazardous substances." The Phase I Assessment format is spelled out in detail and includes a physical inspection and rating of nonradioactive sites with either the Hazard Ranking System (HRS) used by the U.S. Environmental Protection Agency (EPA) to rank sites, or the DOE's modified hazard ranking system. Additionally, by March 1987, the DOE Order requires that a Phase II Characterization Report be prepared following a detailed field investigation involving sampling and analyses at any sites found in the Phase I Installation Assessment.

The site had not conducted either a Phase I or Phase II investigation or any equivalent technical search at the time of the on-site Survey.

4.5.2 Findings and Observations

4.5.2.1 Category I

None

4.5.2.2 Category II

None

4.5.2.3 Category III

1. Potential soil contamination sites. Potential soil contamination that may be a source of ongoing contamination of surface-water runoff and groundwater exists at seven locations at PETC where spills and leaks of hazardous materials

may have resulted from improper storage of waste and research by-products. These areas include:

- 2.2-acre Property - Approximately 1,740 drums of potentially hazardous materials were stored for several months/years between the late 1970s and early 1980s in the open on unprotected soil. Materials stored included, among others, solvents, mixed laboratory chemicals, coal-tar wastes, coal gasification wastewater, and oily rags.

- 2.1-acre Property - In the early 1980s, an unknown number of drums or containers of solvent refined coal (SRC) wastes and waste solvent and bromoform were possibly dumped onto the northwestern corner of this property and remained there for several weeks. In the process, the containers may have spilled or leaked.

- 920 Area drum storage - Hundreds of drums of unknown materials were stored in the open with improper surface drainage control at the southeastern edge of the Synthoil area during the early 1980s. Spills onto soil and into the storm sewer may have occurred due to deteriorated containers and improper handling.

- Synthane Plant (900 Area) - Since the demolition of the Synthane Plant, hundreds of drums of possibly hazardous materials have been stored in the open near the coal bins. The area is currently being used to store drums of coal materials which may contain contaminants. These drums have not been tested to determine whether they contain any hazardous substances.

- Hillside of Building 64 - Drums of unknown materials have historically been stored outside the building at the top of a steep slope with no protective cover on bare gravel and soil.

- Substation #6 area - Prior to the substation construction in the mid-1970s, this area was used for storage of drums containing unknown materials.

- Courtyard between Buildings 65 and 87 - This area has been used for several years, and is currently being used, to store hazardous materials. The soils in the area are visibly stained.

2. Potential waste disposal in mineshaft sinkhole. Improper disposal of hazardous materials has been reported by employees to have occurred in the late 1970s in a mineshaft sinkhole opening northwest of Building 89.

   If this disposal occurred, this may potentially cause contamination of groundwater in the plateau area which may also surface in springs to the east of the plateau and result in contamination of Lick Run. The quantity of wastes purportedly disposed of in this manner is unknown. The mineshaft sinkhole has since been filled by the Bureau of Mines for safety reasons.

3. Potential waste disposal on Bruceton Research Center (BRC). Disposal and storage of hazardous materials and waste have potentially occurred off DOE-controlled property within the BRC.

   - At the Bureau of Mines landfill north of Building 166, employees have reported laboratory-pack wastes and drums of waste liquids or solids being dumped which originated from PETC. This landfill is intended to receive only soil and construction demolition debris. However, visual observations showed drums and laboratory bottles protruding from the edge of the fill and drums labeled as belonging to PETC stored on the surface.

   - Employees also have reported PETC wastes were stored at the Bureau of Mines scrapyard prior to disposal.

   - Between 100 and 200 drums of hazardous materials were stored in the Triangle Parking Lot north of Building 167 in the late 1970s/early 1980s.

4. Past releases of waste chemicals from Building 141. Past releases into the storm sewer from the chemical waste tank at Building 141 may have involved the discharge of potentially hazardous substances. Such releases may have contaminated soils and surface waters in the vicinity of the tank. There is the

potential for contamination by organic solvents such as perchloroethylene, 1,1,1-trichloroethane, bromoform, acids, and bases.

4.5.2.4 Category IV

1. No assessment or characterization of inactive waste disposal sites. A search and assessment of inactive waste disposal sites (including spills and leaks) has not been performed or reported in accordance with DOE Order 5480.14.

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APPENDIX A

SURVEY PARTICIPANTS

PITTSBURGH ENERGY TECHNOLOGY CENTER
SURVEY PARTICIPANTS
DECEMBER 7 - DECEMBER 11, 1987

DOE

Team Leader	Richard Aiken
Assistant Team Leader	George Detsis

CONTRACTOR PERSONNEL

Coordinator	Peter Alexandro (NUS Corporation)
Assistant Coordinator	Kevin Walter (NUS Corporation)
Air	Roger Andes (NUS Corporation)
QA/Toxics	Mark Notich (NUS Corporation)
Surface Water	David Misenhimer (NUS Corporation)
Waste Management	Peter Alexandro (NUS Corporation)
Inactive Waste Sites	Kevin Walter (NUS Corporation)
Hydrogeology	William Murray (NUS Corporation)

APPENDIX B

SITE-SPECIFIC SURVEY ACTIVITIES

B.1 Pre-Survey Preparation

The DOE Office of Environmental Audit, Assistant Secretary for Environment, Safety and Health, selected a Survey team for the Pittsburgh Energy Technology Center (PETC) in the fall of 1987. The site is operated by the DOE with support services provided by Gilbert Commonwealth (GC) and Burns & Roe Service Corporation (BRSC). Mr. Richard Aiken was designated the DOE Team Leader, and Mr. George Detsis the Assistant Team Leader. The remainder of the team was composed of contractor specialists from the NUS Corporation.

The Survey team members began reviewing the PETC general environmental documents and reports in November 1987. Messrs. Aiken, Detsis, Walter, and Alexandro conducted a pre-Survey site visit on November 12-13, 1987, to gain familiarity with key PETC personnel and to tour the site. Keith Owenby of the Oak Ridge National Laboratory (ORNL), who will be field sampling team leader, was also in attendance. A cursory review of the data generated in response to an information request of September 29, 1987, was also conducted during the pre-Survey site visit. The request listed environmental information of interest to the Survey team for planning purposes. The Survey team intensively reviewed the information generated during the pre-Survey visit, and during the week of November 16, 1987, prepared a Survey Plan for PETC. This plan discussed the specific approach to the Survey for each of the technical disciplines and included a proposed schedule of activities for on-site activities. The Survey Plan was transmitted to PETC on November 23, 1987.

B.2 On-site Activities

The on-site portion of the Survey of the Pittsburgh facility was conducted during the period of December 7 - December 11, 1987. The opening meeting held on December 7, 1987, at the site was attended by representatives from PETC and the Survey team members. Discussions during this meeting centered on the purpose of the Survey, logistics at PETC, and an introduction of the key personnel involved.

During the Survey, team members reviewed file materials, permits and applications, background studies, engineering drawings, accident reports, and operating logbooks. The production process was thoroughly analyzed to identify existing and potential pollutants. Site operations were observed. Extensive interviews were conducted with plant personnel regarding environmental controls, operations, monitoring and analysis, past operations, regulatory permits, and waste management.

Daily meetings of the Survey team members were held to report observations and compare findings. A representative from the Engineering and Environmental Support Division of PETC met daily with the DOE Team Leader and Assistant Team Leader to arrange for specific site personnel and facilities to be available, as needed, on the following day. PETC, G/C or BRSC personnel accompanied Survey team members on all field reconnaissances.

The Survey team members identified further Sampling and Analysis (S&A) requirements necessary to complete the Survey effort. The S&A requirements were discussed by the team on December 9, 1987, and the request package was presented to ORNL representatives on December 10, 1987. ORNL was designated by DOE to provide a sampling team for PETC and to perform the laboratory analytical services.

A site closeout briefing was held on December 11, 1987, where the DOE Team Leader and Assistant Team Leader presented the preliminary environmental findings of the Environmental Survey. These environmental findings were classified as preliminary, because additional research and, in some cases, additional field sampling were required to positively confirm the observations.

B.3 Sampling and Analysis

ORNL will perform the S&A portion of the Survey. ORNL evaluated the S&A requests made by the Survey team and determined logistics, costs, and schedules. The S&A Plan prepared by ORNL includes a quality assurance plan and a health and safety plan. The S&A Plan will be completed during spring of 1988 and the sampling team will begin work at the site in August 1988.

B.4 Report Preparation

An Environmental Survey Preliminary Report for PETC will be prepared to summarize the findings from the on-site Survey effort. This report will be provided to PETC for review. The findings presented in the Preliminary Report are considered preliminary and subject to modification until comments are received and S&A results are available. At that time, the findings will be modified and incorporated into the Environmental Survey Summary Report.

APPENDIX C

SURVEY PLAN

ENVIRONMENTAL SURVEY PLAN

PITTSBURGH ENERGY TECHNOLOGY CENTER

DECEMBER 7-11, 1987

PITTSBURGH, PENNSYLVANIA

1.0 INTRODUCTION

The Environmental Survey is a one time baseline inventory of existing environmental problems and environmental risks at DOE operating facilities. It will be conducted in accordance with the principles and procedures contained in the DOE Environmental Survey Manual of August 1987.

The Environmental Survey is an internal management tool to aid the Secretary in identifying current and potential environmental problems in all of DOE's facilities and in prioritizing these problems for appropriate corrective actions.

2.0 SURVEY IMPLEMENTATION

The Environmental Survey of the Pittsburgh Energy Technology Center (PETC) will be managed by the Team Leader, Richard Aiken and the Assistant Team Leader, George Detsis. Bruce Webster will serve as the PETC site contact person. Technical support will be provided by the following NUS Corporation personnel:

Peter Alexandro	Coordinator/Waste Management
Kevin Walter	Assistant Coordinator/CERCLA
Mark Notich	QA/TSCA
Dave Misenhimer	Surface Water
Roger Andes	Air
William Murray	Hydrogeology

2.1 Pre-Survey Activities

Members of the Survey team began reviewing PETC environmental documentation available at the DOE Office of Environmental Audit in November 1987. Messers Aiken, Detsis, Alexandro, and Walter conducted a pre-Survey site visit on November 12-13, 1987, to become familiar with the site, to identify any potential environmental problems, and to coordinate plans for the upcoming Survey. In addition, Keith Owenby of the Oak Ridge National Laboratory (ORNL), who will be the Sampling and Analysis Team Leader, was also in attendance. During the pre-Survey visit, the team met with representatives of DOE. In addition, the team toured the facility and discussed documents assembled by site personnel in response to the information request memorandum (September 29, 1987). This Survey Plan is based upon the information received by the Survey team as of November 19, 1987.

In addition, a telephone conversation between the Team Leader and Sam Harper of the Pennsylvania Department of Environmental Resources, Bureau of Water Quality Management, was conducted on November 13, 1987 to discuss any State issues or concerns in preparation for the Survey. A similar discussion was held on November 16, 1987 with the U.S. Environmental Protection Agency Region III representative, Francis Mulhern, to inform the Agency of the Survey objectives.

2.2 On-Site Activities and Reports

The Environmental Survey will be conducted from December 7 through December 11, 1987 for the Pittsburgh facility. The agenda for the on-site visit is shown on the attached table. Modifications to this agenda will be made during the conduct of the Survey. All modifications will be coordinated with the site officials designated as Survey contacts. The on-site activities of the Survey team will consist of interviews and consultations with, among others, environmental, safety, operations, waste management, purchasing, and warehousing personnel; a review of files and documents unavailable prior to the on-site portion of the Survey; and process-specific and area-specific tours of the facility.

A closeout briefing will be conducted on Friday, December 11, 1987, to present initial environmental findings on the on-site activities. A Preliminary Report of the Survey will be issued in summer, 1988. Subsequently, an Interim Report will be prepared by the Survey team following the completion of the Sampling and Analysis Report. The Interim Report will have the data from the sample analyses incorporated into the report. The findings from each of the Interim Reports from all scheduled Surveys will be updated as appropriate and included in the Environmental Survey Summary Report to the Secretary, DOE, which is scheduled for completion in 1989.

2.3 Sampling and Analysis

Based upon the results of the on-site portion of the Survey, the Survey team will identify any sampling needs. Sampling and analysis for the PETC Survey will be conducted by a team from ORNL in early summer of 1988. Mr. Keith Owenby will be the ORNL Sampling and Analysis (S&A) Team Leader. The ORNL S&A team will draft a Sampling and Analysis Plan based upon the sampling and analysis needs identified by the Survey team.

The Assistant Team Leader, George Detsis, will coordinate the review of this Sampling and Analysis Plan with the EPA's Laboratory at Las Vegas which has quality assurance responsibility for the Survey's sampling and analysis efforts. Sampling at most facilities takes between 3-5 weeks to complete, depending on the complexity of the sampling needs of each facility. Analysis of the samples will be conducted following protocols provided in the Survey Manual, supplemented by the PETC S&A Plan. Results of the sampling and analysis will be transmitted to the Survey Team Leader for incorporation into the Interim Report.

3.0 AIR

3.1 Issue Identification

The air-related Survey activities will involve an assessment of the air emission sources within the facility and of any administrative and technological emission controls applied to the sources. The emphasis of the Survey will be on operational and procedural practices associated with the emission sources and any emission control equipment. Fugitive sources of emissions, both within and outside the buildings, will be investigated also, as will any mitigative procedures to control fugitive emissions.

The general approach to the Survey will include a review of any existing air permits, pending applications, and standard operating procedures. Processes and control equipment will be investigated. The Survey will also review any emissions monitoring data for the different processes in the facility, evaluate any existing controls applied to the air contaminant emissions, and assess the need for additional monitoring or emission controls to characterize or reduce the environmental consequences of the emissions.

Areas of particular interest will include emissions of the criteria pollutants (i.e., particulates, sulfur oxides, nitrogen oxides, hydrocarbons, carbon monoxide and lead) from fuel burning facilities as well as regulated hazardous air pollutants (e.g., asbestos, hydrogen fluoride and mercury) and odors. In addition, the use of organic solvents will be assessed as a potential or actual source of emissions to determine if they are adequately characterized, monitored, and controlled.

3.2 Records Required

In addition to those documents reviewed prior to the Survey, the following records will be examined at PETC:

- Air permits (Registrations, Installation, and Operation);
- Source and emissions inventories (including any stack and vent inventory);

- Emission test data, emission calculations, etc.;
- Descriptive documentation on emission controls;
- Standard operating procedures for process and control equipment;
- Correspondence between regulatory agencies and any citizen's complaints relative to air issues;
- Reports on accidental or unplanned releases of airborne substances;
- Other records as determined on-site.

4.0 SURFACE WATER/DRINKING WATER

4.1 Issue Identification

A review of the present condition of the wastewater collection and treatment systems will be made. PETC process activities that generate wastewaters will be reviewed through a detailed process tour. Discrete process liquid discharge points will be identified and evaluated to develop an inventory of wastewater sources. Liquid waste treatment, collection and handling equipment will be examined and records of operations will be reviewed.

The surface water and hazardous waste review will be performed in unison for most buildings and activities due to a common need to review processes and waste discharge points. Buildings will be examined to view normal activities including maintenance activities generating process wastewaters and other liquid wastes. In addition, a record review session will be scheduled to review drawings and materials pertaining to wastewater and stormwater treatment operation and maintenance.

Extensive reviews will also be made of possible undetected sources of contaminants flowing to the storm and sanitary sewage systems. This will require review of most plant production schematic drawings, visits to the respective areas around production facilities and a thorough tour of plant buildings, yard areas, and grounds, particularly areas where the ground surface is or was known to be contaminated.

Other information sources and visitation points that will be examined are:

- The Pleasant Hills Sewage Treatment Plant will be visited to discuss wastewater discharges from the Bruceton Research Center with emphasis on PETC's contributions; any sampling and analysis of influent; and waste sludge treatment and disposal practices.

- It is planned to meet with the Bureau of Mines to discuss wastewater discharges/Permit(s), any environmental monitoring done by the Bureau, and any other environmental data that is pertinent to the PETC Environmental Survey.

- Spill protection provisions for fuels and hazardous materials storage units, including review of the Spill Prevention, Control, and Counter measures (SPCC) Plan and of such physical controls as tank containment dikes and runon/runoff drainage control for potential contaminants;

- Water quality information concerning domestic and process waters, with particular attention to such parameters as solvents and other organic chemicals, coliforms, chlorine residuals, and asbestos fibers;

- Basic design parameter information such as storm runoff coefficients and wastewater characteristics.

4.2 Records Required

In addition to those documents reviewed prior to the Survey, the following records will be examined at the PETC Facility:

- Bureau of Mines Application for NPDES Permit;

- Analytical data used for preparation of the NPDES application;

- Wastewater treatment plant effluent discharge requirements;

- Detailed drawings of the process, storm, and sanitary sewer systems and the domestic and process water systems both within buildings and in yard areas;

- Detailed drawings of the stormwater, sanitary, industrial, and contaminated wastewater treatment units;

- Detailed drawings of the domestic and process water supply distribution systems;

- Additional schematic diagrams and/or descriptions of all production processes;

- SPCC Plan on the site, covering all fuel and hazardous material storage units;

- Procedures for collecting wastewater samples;

- Reports on the potable water system;

- Records of drinking water quality both on and off-site;

- Sampling log books and laboratory tracking reports;

- Progress reports and/or final reports for previous or on-going waste characterization studies or evaluations of wastewater control and treatment options;

- Internal memos and correspondence relating to surface water/drinking water problems;

- Applicable water quality standards for Lick Run and Peters Creek;

- Complete sanitary and storm sewer layout plans;

- Reports on design of the industrial wastewater pretreatment plant;

- Reports and drawings on the modification of the on-site sewer system; and

- Other records as determined on-site.

5.0 WASTE MANAGEMENT

5.1 Issue Identification

The procedure for the waste management investigation is to review known sources or activities and identify any additional sources or activities which have the potential to result in contamination of environmental media.

The waste portion of the investigation will concentrate on those facilities with the potential to generate hazardous wastes and toxic substances, or mixed radioactive and hazardous wastes. Specifically, the sources of waste streams such as laboratory chemical waste, coal derived liquids, alkaline wastes, methanol slurries, coal-water mixtures, baghouse ash, heat transfer liquid, coal-derived oil, compressor oil and organic solvent wastes will be examined. In addition, the team will devote a significant portion of the time on-site to a detailed process-by-process investigation of possible additional hazardous waste generation, treatment, storage and release points.

Discussions will be held with individuals knowledgeable of current and past waste management practices. This will be accomplished during the process tour, and in the process of reviewing facility records and documentation. The objective is to develop an understanding of past and existing waste management activities that may serve as the basis for problem identification by the Survey team.

The methods of generation, collection, storage, and disposal of solid wastes will be reviewed to determine if they result in environmental problems.

5.2 Records Required

In addition to those documents reviewed prior to the Survey, the following records will be reviewed at PETC:

- Waste analysis plans;
- Waste analysis results;

- Inspection documentation, (State and Federal)
- Internal facility inspection documentation;
- Any release notification or occurrence documentation;
- Any enforcement action documentation;
- Any additional RCRA manifests;
- Correspondence with regulatory agencies on solid waste;
- Records dealing with the reuse/recycling of wastes; and
- Other records as determined on-site.

6.0 HYDROGEOLOGY

6.1 Issue Identification

The preliminary review of data indicates that few studies have been conducted to assess groundwater conditions. In addition, it is apparent that groundwater sampling is not included in environmental monitoring efforts. As a result of the limited information, the Survey will focus on identifying additional sources of information on such topics as basic hydrogeologic setting for the site and the surrounding area, aquifer properties, water table configuration, groundwater users in the vicinity, etc. In addition, potential sources of groundwater contamination at PETC will be reviewed. These may include active and inactive ponds or impoundments, known spills or releases of hazardous substances, waste and product chemical storage areas, etc.

6.2 Records Required

In addition to those documents reviewed prior to the Survey, the following records will be examined at PETC:

- Historic aerial photos (2 per year), as available;
- Well installation reports and boring logs for the Bruceton Research Center;
- Maps of domestic wells; and
- Other records as determined on-site.

7.0 INACTIVE WASTE SITES/RELEASES (CERCLA)

7.1 Issue Identification

The objective of this portion of the Survey will be to identify and summarize environmental problems at or emanating from PETC which are caused by the following historical activities concerning hazardous wastes and toxic substances, or mixed radioactive and hazardous wastes:

- Past waste disposal areas on-site that have been identified;
- Areas on-site where past undocumented disposal may have occurred;
- Areas on-site where leaks, spills, or inadvertent disposal may have created ongoing sources of contamination or traceable plumes of surface or subsurface contamination. This will include a review of the status of underground tanks.

This effort will also include a review of existing documentation concerning off-site areas that were used during the history of the facility. Based on the review of data available to the team prior to the on-site portion of the Survey, it is apparent that little is known and documented about buried hazardous and mixed waste and no locations of burial have previously been identified. Of concern, however, is the potential for continuing releases of pollutants from historical holding or staging areas for waste chemicals.

The CERCLA portion of the Survey, since it relates to past handling, as well as disposal of hazardous and mixed chemicals/waste, will be coordinated with the RCRA, toxics, and radiological portions. To a lesser extent, the water portion of the Survey will be included in this coordination to check for storm and surface drainage or unknown/unpermitted subsurface disposal of water that may form a migration pathway for any source of hazardous or mixed waste. Lastly, since subsurface water is the primary mode of migration for buried wastes, the CERCLA portion of the Survey will be coordinated with the groundwater portion.

7.2 Records Required

In addition to those documents reviewed prior to the Survey, the following records will be examined at PETC.

- Soil boring logs from the various buildings construction site;
- Historic aerial photos;
- Notifications and internal records of spills/releases;
- Site topography drawings;
- Records of facility expansion and building destruction;
- Subsurface and surface tank plans;
- Historical local files on waste handling/disposal; and
- Other records as determined on-site.

8.0 TOXIC SUBSTANCES AND QUALITY ASSURANCE

8.1 Issue Identification

The toxic Survey will include all raw materials and process-related chemicals used on the PETC site. Use, handling, and disposal of polychlorinated biphenyls (PCBs), asbestos, pesticides, and hazardous substances will be within the scope of this effort.

All toxic and hazardous substances purchased, used, or manufactured on the site will be evaluated. Tracking, control, and management of these substances will be reviewed. Records of usage will be evaluated to determine the potential for entering effluent streams.

The inventory of PCB and PCB contaminated electrical equipment in use at the facility will be reviewed for completeness. The condition of this equipment, its potential for leakage, and the quantity of contaminated fluids will be identified during the Survey. Obsolete or used PCB contaminated items in storage will be inspected for proper container/packaging, adequate storage protection requirements, and inventory controls. Disposal practices will be reviewed for current and past inventories to determine the method of disposal and location of disposal sites. Procedures for PCB analysis, removal, handling, and disposal will be reviewed. Inspection and reporting requirements for PCB transformers will be evaluated in an effort to focus the Survey team's attention on potential problem areas.

The use of asbestos at PETC as insulation or in processes will be reviewed to identify pathways of contamination. Also, asbestos removal and disposal practices will be evaluated, and disposal sites visited, to define potential areas of concern.

Pesticides usage on the site will be reviewed including application records, storage and disposal practices, and environmental monitoring to assess risk for environmental contamination.

Aboveground and underground storage tanks will be reviewed for physical appearance, capability with stored material, inspection or tightness records, inventory monitoring records and maintenance records.

Since PETC does not currently operate an environmental monitoring program there will be little information available on analytical QA. If, during the course of the Survey, analytical data from site effluents or releases comes to the attention of the Survey team, information concerning the quality assurance records for that data will be requested.

8.2 Records Required

In addition to those documents reviewed prior to the Survey, the following records will be examined at PETC.

- Toxic substances labeling and tracking system;
- Procedures for handling, control, and management of toxic substances;
- Inventory of toxic substances and purchasing records of chemical substances;
- PCB annual inventory documents;
- Inventory of current PCB-contaminated electrical equipment;
- Records of inspections of PCB transformers;
- Storage records of PCB items;
- Disposal records for PCB items;
- PCB handling, storage, and disposal procedures;
- Correspondence with fire department on PCB transformers;

- Locations of buildings containing asbestos, including usage;
- Asbestos disposal records, including method and location of disposal;
- Asbestos handling, removal, disposal procedures, and environmental monitoring;
- Records of asbestos use in process equipment and support facilities;
- Pesticide training, handling, storage, disposal records, and environmental monitoring;
- Standard operating procedures for pesticides;
- Storage tank inventory records;
- Storage tank maintenance records; and
- Other records as determined on-site;

9.0 RADIATION

9.1 Issue Identification

Normally, the radiation investigation involves an assessment of the facility wide radioactive emissions, emissions control and monitoring, and the associated impact on the environment. It includes discharges to the atmosphere, surface water, groundwater, soils, and off-site disposal.

PETC does not now, and has never in its history of operations, processed, treated or stored radiological materials (with the exception of small check sources). The radiation portion of the Survey will be a review of records to verify this information. This review will be performed by the Waste Management Specialist.

10.0 SAMPLING AND ANALYSIS

10.1 Issue Identification

The representatives of the ORNL Sampling and Analysis Team will be on-site during the last two days of the Survey (December 10-11, 1987) to ensure that the sampling effort will fully achieve the desired objectives. The purpose of the visit is to obtain a familiarity with the site, identify the security implications associated with the sampling portion of the Survey, identify any health and safety concerns for the Sampling and Analysis Team, and discuss logistical arrangements.

In addition, the Toxic Substances and Quality Assurance specialist from the Environmental Survey team will serve as the S&A team liaison and will coordinate sampling requests with the DOE Assistant Team Leader.

10.2 Records Required

The ORNL personnel have no records review requirements.

TABLE 1
ENVIRONMENTAL SURVEY ON-SITE AGENDA
PITTSBURGH ENERGY TECHNOLOGY CENTER, DECEMBER 7-11, 1987

	Air	Surface Water/ Drinking Water	Waste Management	Hydrogeology	Inactive Waste Sites/Releases	Toxic Substances and Quality Assurance
Monday 12/7						
A M	Orientation and facility tour	Orientation and facility tour	Orientation and facility tour	Orientation and facility tour	Orientation and facility tour	Orientation and facility tour
P M	Coal feed area-Bldg 97 Bldgs 86, 89, 93	Meetings w Bureau of Mines Bldg 74-Tour	Meeting w Bureau of Mines. Meeting w/ Burns & Roe - Waste Mgmt Personnel, review disposal records	Meeting w Bureau of Mines Review aerial photos & boring logs	Meeting Bureau of Mines Review aerial photos and boring logs	Bldg 64, 65, 92-Toxic chemical stores, purchasing
Tuesday 12/8						
A M	Bldg 83	Meeting w/ Pleasant Hills STP (with asst team leader). Bldgs 83, 84, 58, 93 & assoc wastewater treatment facilities	Bldgs 922, 920, 921 (with team leader) Bldgs 83, 84, 58, 93 points of waste generation	Field walk area around Bldgs 84, 58, 83, 167	Field walk areas around Bldgs 64, 58, 83, 167	Detailed process tour of pilot plants - Bldgs 83, 64, 93, 89
P M	Bldg 141	Bldg 141, Site-wide stormwater outfalls	Bldg 141	Field walk areas around Bldgs 922, 920, 921	Field walk areas around Bldgs 922, 920, 921	Above ground and underground Tanks
Wednesday 12/9						
A M	Bldgs 84 94	Bldgs 94, 167	Bldgs 64, 92, 94, 167 waste handling procedures	Review waste disposal, spill records and any groundwater data available for Bruceton	Review waste disposal, spill records	Meeting w/Burns & ROE - PCB's, asbestos, Herbicide & Pesticide storage & handling
P M	Develop and document Sampling and Analysis needs	Develop and document Sampling and Analysis needs	Develop and document Sampling and Analysis needs	Develop and document Sampling and Analysis needs	Develop and document Sampling and Analysis needs	Develop and document Sampling and Analysis needs
Thursday 12/10						
A M	Debrief Asst Team Leader, emissions & ambient data review	Visit sampling locations with S&A team	Records review	Visit sampling locations with S&A team	Debrief Asst Team Leader	Visit sampling locations with S&A team
P M	Bldgs 167, 62	Debrief Asst Team Leader records review	Debrief Asst Team Leader (Thurs. eve)	Debrief Asst. Team Leader	Attend individual team briefings w/ Asst Team Leader	Debrief Asst Team Leader
Friday 12/11						
A M	Revisits & records review	Revisits & records review	Revisits & records review	Revisits & records review	Revisits & records review	Revisits & records review
P M	Close-out briefing	Close -out briefing	Close-out briefing	Close-out briefing	Close-out briefing	Close-out briefing

APPENDIX D

LIST OF CHEMICAL SYMBOLS, ABBREVIATIONS, AND ACRONYMS

LIST OF CHEMICAL SYMBOLS, ABBREVIATIONS, ACRONYMS

AIHA	American Industrial Hygiene Association
API	American Petroleum Institute
AQCR	Air Quality Control Region
ARTD	Advanced Research and Technology Development
AST	aboveground storage tank
B&R	Burns & Roe
BOD	Biochemical Oxygen Demand
BOM	Bureau of Mines
BRC	Bruceton Research Center
BRSC	Burns & Roe Service Corporation
Btu	British thermal unit
°C	degree Centigrade
cc	cubic centimeter
CEARP	Comprehensive Environmental Assessment and Response Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFC	chlorofluorocarbon
cfm	cubic foot per minute
cfs	cubic foot per second
CO	carbon monoxide
COED	Char-Oil Energy Development
CWA	Clean Water Act
CWM	Coal Water Mixture
CWSS	Contaminated Wastewater Sewer System
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ERDA	Energy Research and Development Administration
°F	degree Fahrenheit

ft^2	square foot
ft^3	cubic foot
ft^3/yr	cubic foot per year
g	gram
gal	gallon
GC	Gilbert Commonwealth
gpd	gallon per day
gph	gallon per hour
gpm	gallon per minute
hp	horsepower
HRS	Hazard Ranking System
HW	hazardous waste
k	kilo (1000)
kg	kilogram
km	kilometer
L	liter
lb	pound
LWCS	laboratory water collection system
m	milli (1/1000)
MCL	maximum contaminant level
μ	micro (10^{-6})
μg	microgram (10^{-6} gram)
$\mu g/m^3$	microgram per cubic meter
mg	milligram (1/1000 gram)
mg/L	milligram(s) per liter
mgd	million gallons per day
MH	manhole
mL	milliliter
m^3	cubic meter
mph	mile(s) per hour
MSDS	Material Safety Data Sheet

MW	mixed waste
NAAQS	National Ambient Air Quality Standards
NBS	U.S. National Bureau of Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
O&G	oil and grease
ORNL	Oak Ridge National Laboratory
OSHA	U.S. Occupational Safety and Health Administration
PaDER	Pennsylvania Department of Environmental Resources
PCB	polychlorinated biphenyl
PDU	pilot desulfurization unit
PERC	Pittsburgh Energy Research Center
PETC	Pittsburgh Energy Technology Center
POTW	publicly owned treatment works
ppb	part(s) per billion
ppm	part(s) per million
PSD	Prevention of Significant Deterioration
psia	psi ambient
QA	quality assurance
QC	quality control
R&D	research and development
RCRA	Resource Conservation and Recovery Act of 1976
S&A	Sampling & Analysis
scfh	standard cubic feet per hour
scfm	standard cubic feet per minute
SDWA	Safe Drinking Water Act
SO_2	sulfur dioxide
SOP	standard operating procedure

LIST OF CHEMICAL SYMBOLS, ABBREVIATIONS, ACRONYMS

SPCC	Spill Prevention, Control, and Countermeasure Plan
SRC	solvent refined coal
STP	Sewage Treatment Plant
T	temperature
TCA	trichloroethane
TCE	trichloroethylene
TOC	total organic carbon
TOH	total organic halogens
TSCA	Toxic Substances Control Act
TSP	total suspended particulates
TSS	total suspended solids
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compound
WWTF	wastewater treatment facility
WWTP	wastewater treatment plant
yd^3	cubic yard

END
11-20-90