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Bettis - Pittsburgh Site Environmental Summary Report

Bettis Atomic Power Laboratory
West Mifflin, Pennsylvania 15122-0079

Prepared for the
U.S. Department of Energy
By Bechtel Bettis, Inc.
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BETTIS ATOMIC POWER LABORATORY

BETTIS-PITTSBURGH SITE

ENVIRONMENTAL SUMMARY REPORT

AUGUST 1999

Prepared by

Bechtel Bettis, Inc.
BETTIS ATOMIC POWER LABORATORY
West Mifflin, Pennsylvania

For the
U.S. Department of Energy

Document Number: B-RC/E(EE)EMR-0500

DISCLAIMER

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LIST OF ACRONYMS

ACHD	Allegheny County Health Department
Consent Order	Administrative Order of Consent
AEC	Atomic Energy Commission
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CMS	Corrective Measures Study
DCE	Dichloroethylene
DOE	U.S. Department of Energy
DOP	Dioctylphthalate
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-To-Know Act
FFCA	Federal Facility Compliance Act
HTTF	High Temperature Test Facility
IWIP	Inactive Waste Isolation Pit
IWS	Inactive Waste Site
LWBR	Light Water Breeder Reactor
MSL	Mean Sea Level
MEL	Materials Evaluation Laboratory
MWSF	Mixed Waste Storage Facility
N-MTR	N-Building Monitor Tank Room
NNPP	Naval Nuclear Propulsion Program
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
PADEP	Pennsylvania Department of Environmental Protection (Formerly Department of Environmental Resources)

LIST OF ACRONYMS (Continued)

PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene (Also known as Perchloroethylene)
PNR	Pittsburgh Naval Reactors Office
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SARA	Superfund Amendments and Reauthorization Act
SPCC	Spill Prevention Control and Countermeasure
TCE	Trichloroethylene
VOC	Volatile Organic Compound
VNGI	Valley National Gases, Incorporated
WERF	Waste Experimental Reduction Facility

1.0 OVERVIEW AND CONCLUSIONS

The Bettis Atomic Power Laboratory (Bettis-Pittsburgh) is owned by the U.S. Department of Energy (DOE) and was operated under Government contract by the Westinghouse Electric Company from 1949 to 1999. In February 1999, Bechtel Bettis, Inc. assumed contract operations. The Bettis-Pittsburgh site in West Mifflin, Pennsylvania conducts research and development work on improved nuclear propulsion plants for U.S. Navy warships and is the headquarters for all Laboratory operations (Section 4.0).

1.1 Background

For many years, environmental monitoring has been performed to demonstrate that the Bettis-Pittsburgh site is being operated in accordance with environmental standards as defined by law and regulation. The results of this monitoring have been published in annual reports provided to federal, state, and local officials. These reports document that Bettis-Pittsburgh operational practices meet and are often more strict than the requirements of applicable laws and regulations. The monitoring results confirm that Bettis-Pittsburgh has complied with environmental standards and guidelines and in most cases has exceeded compliance with significant margin.

1.2 Purpose

The purpose of this report is to describe the nature and environmental aspects of work and facilities at the Bettis-Pittsburgh site and provide a historical perspective of Bettis-Pittsburgh operations that is not provided by the annual reports. This report also provides background information, such as the geologic and hydrologic nature of the Bettis-Pittsburgh site, pertinent to understanding the environmental aspects of Bettis-Pittsburgh operations.

1.3 Conclusions

The following conclusions may be drawn from this report and the annual environmental monitoring results:

- Bettis-Pittsburgh has in place effective environmental control programs which meet or exceed the requirements of applicable laws and regulations. Bettis-Pittsburgh performance in radioactivity control is well established and the laboratory maintains levels of control that are far more stringent than Federal requirements (Sections 5.0, 6.0 and 7.0). The following examples illustrate this point:

  - Radiation exposure to any member of the public due to Bettis-Pittsburgh site operations is too small to be measurable. The maximum possible annual radiation dose to any member of the public resulting from current operations can only be calculated using very conservative assumptions of release and human uptake. The calculations show that the maximum dose is less than 0.003 Rem per year. This is less radiation than received from cosmic radiation during a round trip airline flight from Pittsburgh to the west coast of the United States (0.003-0.004 Rem). The calculations also show that the annual radiation exposures to people living adjacent to Bettis-Pittsburgh in all previous years were well below the annual regulatory limits established by the U.S. Environmental Protection Agency (EPA) and the DOE.

- There are no radioactive waste burial grounds at the Bettis-Pittsburgh site. There are minimal areas on the Bettis-Pittsburgh site where some radioactivity was released in the early days of site operations. The total amount of radioactivity currently in the affected onsite areas is estimated to be less than 72 curies. This is less than the amount of naturally occurring radioactivity in the top 2 feet of soil covering any local area of equal size to the Bettis-Pittsburgh site (Sections 5.2 and 7.0).

- In 1991 the Pennsylvania Department of Environmental Protection (PADEP) concluded that the levels of residual radioactivity on and immediately adjacent to the site were far below action levels and further remedial action would not be required.

- Bettis-Pittsburgh site practices for handling chemical materials and waste conform with established regulatory requirements. In the early decades of operation, chemical waste disposal was carried out in accordance with what were common industrial practices at the time. In addition, some chemicals may have been disposed of or spilled on the ground when the Bettis-Pittsburgh site was an airport. These practices resulted in small amounts of chemicals, such as degreasing solvents, being present in the soil in various locations around the site. Chemical residues have been found in the landfill on a steep hillside on the northwestern portion of the site where some waste chemicals were disposed of prior to 1964. Chemical residues have also been found at a separate landfill area on the northeast side and at a few other locations adjacent to buildings. Ground water monitoring at the site has shown that several chemical species are detectable in the ground water. However, since neither Bettis-Pittsburgh nor the public use this ground water that contains the chemical residues, and geologic conditions are likely to prohibit exposure of offsite receptors to ground water, the chemicals do not pose any health hazard to the public (Sections 5.2.4 and 7.0).

- An evaluation of the areas containing radioactivity and chemical residues at the Bettis-Pittsburgh site was conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (See Reference (1)). This evaluation determined that the risk presented by the site to the public health and environment was not significant. In addition, the evaluation indicated that the Bettis-Pittsburgh site did not qualify for the National Priority List under the National "Superfund" law. This evaluation has been reviewed by Region III of the EPA who assigned a hazard ranking score of zero. The EPA concluded that no further regulatory action was required under CERCLA. Bettis-Pittsburgh has continued actions to reduce any impact on the environment from residual chemical or radioactive materials by working within the bounds of federal, state, and DOE regulations (Sections 5.1 and 7.0).

- Bettis-Pittsburgh operates a hazardous waste storage facility under a Hazardous Waste Storage Permit issued in February of 1995 by the PADEP. During the period between June 1985 and February 1995, Bettis-Pittsburgh operated the hazardous waste storage facility under interim status. The Resource Conservation and Recovery Act

(RCRA) requires that sites having interim status and/or a final permit for hazardous waste treatment, storage or disposal address releases of hazardous waste to the environment. This matter was formalized in an Administrative Order of Consent (Consent Order) in August 1990. As part of the Consent Order, the EPA agreed that the conditions onsite do not require implementation of interim measures or immediate corrective actions since Bettis-Pittsburgh site conditions do not present an imminent substantial endangerment to human health or the environment. The Consent Order required that a RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) be performed to address the residual chemicals in the soil and ground water at the site. Bettis-Pittsburgh has completed the required RFI and CMS. The Final RFI Report, Reference (2), was approved by the EPA in August 1994. The Final CMS Report, Reference (3), was approved by the EPA in March 1995. The EPA issued its final decision and response to public comments in October 1997. The EPA terminated the Consent Order in November 1997 and stated that all requirements of the Consent Order had been met. Many corrective measures have been initiated voluntarily pending issue of a Corrective Measures Implementation Consent Order.

- Bettis-Pittsburgh operates a mixed waste storage facility under the interim status provisions of RCRA and Commonwealth of Pennsylvania rules and regulations. The storage facility is used to store mixed waste (waste classified as both radioactive and hazardous) prior to offsite shipment for treatment or disposal.

- A risk assessment was approved by the EPA as part of the Final RFI Report. The objective of the assessment was to determine the "reasonable maximum exposure" of onsite and offsite populations to environmental contamination at the site. The risk assessment concluded that chemical residues in the environment at the site do not pose significant health risks to potentially exposed populations using "reasonable maximum exposure" assumptions.

  Only one study area was found where the carcinogenic risk estimate exceeded the EPA comparison criterion of 1×10^{-6}. Valley National Gases, Incorporated (VNGI) was determined to have soil with a maximum carcinogenic risk of approximately 2×10^{-5}. However, exposure (dermal contact, ingestion, and inhalation) for 250 days/year for 25 years is required to achieve this risk. This risk is within the EPA post-remediation criteria of 1.0×10^{-4} to 1.0×10^{-6}. In addition, the estimated risk is highly conservative because the contaminated portions of VNGI property are infrequently accessed or are located in undeveloped areas. A more realistic estimate of the risk to exposed populations from VNGI soil is far less than 1.0×10^{-6} (Section 7.2).

- Bettis-Pittsburgh operations and environmental performance have always been subject to continuous oversight by Pittsburgh Naval Reactors Office (PNR) {the resident representatives of the Naval Nuclear Propulsion Program (NNPP) of the DOE (previously the Atomic Energy Commission (AEC) and the Energy Research and Development Agency)} and by periodic in-depth reviews and inspections by NNPP headquarters personnel (Section 8.0).

- In addition to Bettis-Pittsburgh and NNPP reviews and inspections, various aspects of Bettis-Pittsburgh environmental programs have been inspected by federal, state, and local agencies. These inspections have found Bettis-Pittsburgh operations to be in compliance with regulatory requirements (Section 8.0).

In conclusion, in over fifty years of operation, there has been no *significant* impact from Bettis-Pittsburgh operations on the environment, the community, public, or employees. The Bettis-Pittsburgh site has a well-defined environmental program in place to monitor current operations and address past activities.

2.0 THE BETTIS ATOMIC POWER LABORATORY, BETTIS-PITTSBURGH SITE

The Bettis Atomic Power Laboratory is owned by the DOE and was operated under Government contract by the Westinghouse Electric Company from 1949 to 1999. In February 1999, Bechtel Bettis, Inc. assumed contract operations.

2.1 Bettis-Pittsburgh Site History

The Bettis-Pittsburgh site was originally used as Pittsburgh's first airfield. The Pittsburgh-McKeesport Airdrome opened in 1925 but was later renamed Bettis Airfield in honor of Lieutenant Cyrus Bettis, a famous aviator. In 1940, most commercial traffic moved to nearby Allegheny County Airport because the Bettis airfield could not handle the increasingly larger, modern aircraft. Private aviators used the field until 1948.

The newly formed Westinghouse Atomic Power Division bought the Bettis airfield tract in early 1949 and purchased adjacent properties in 1952. The land was acquired according to a contract between Westinghouse and the AEC whereby Westinghouse was assigned certain responsibilities for engineering, design, procurement, and construction work for the prototype of the first Naval nuclear reactor plant. Later, in 1957, the AEC (now DOE) exercised its contractual option to purchase the site and has held title since then. The Bettis-Pittsburgh site has evolved into a development, engineering, and design facility for Naval nuclear propulsion work. All Naval nuclear propulsion work has been and remains under the sole technical direction of the NNPP. The NNPP operated initially as an element of both the Department of the Navy and the AEC, and now operates as a joint Navy and DOE organization.

2.2 Significant Accomplishments

The technology developed at Bettis-Pittsburgh is among the most valuable and sensitive military technologies in the United States. It is a critical element of the Nation's defense, making possible the extraordinary capabilities of U.S. nuclear-powered warships which today comprise about 40% of the Navy's combat fleet. Key achievements of Bettis-Pittsburgh include the development of the power plants for the first nuclear-powered submarine, the NAUTILUS; the first nuclear-powered surface ship, the cruiser LONG BEACH; the first nuclear-powered aircraft carrier, the ENTERPRISE; as well as the newest, technologically advanced submarine, the SEAWOLF.

Under the NNPP DOE authority, Bettis-Pittsburgh designed and developed the first full-scale nuclear power plant for civilian use, the Shippingport Atomic Power Station. Later, Shippingport was also the site of the first Light Water Breeder Reactor (LWBR), an advanced reactor system developed to significantly improve the utilization of fuel in nuclear reactors. Bettis-Pittsburgh has also developed advanced nuclear propulsion plants and long-lived reactor cores for modern nuclear-powered ships including attack submarines and ballistic missile submarines. Work continues today on further advances in Naval nuclear propulsion technology.

3.0 DESCRIPTION OF SITE

3.1 Site Location

The Bettis-Pittsburgh site is located in the Borough of West Mifflin, Allegheny County, Pennsylvania approximately 8 miles southeast of central Pittsburgh. The site, shown in Figure 1, consists of approximately 202 acres of land.

The developed portion of the Bettis-Pittsburgh site consists of laboratories, offices, warehouses, workshops, and a boiler house for centralized heating of several buildings. This developed section consists of 20 acres of buildings and 17 acres of parking area. Water for domestic, fire protection, and cooling purposes is supplied by the Pennsylvania-American Water Company. Electrical power is furnished by Duquesne Light Company. Domestic sewage from the site is discharged into the local publicly owned sewage treatment plant.

3.2 Land Use and Demography

The land use of the region surrounding the site is largely industrial and residential. The section of West Mifflin Borough in which the site is located is zoned as Heavy Industrial. The total population within a 50 mile radius of the site is approximately 3,000,000.

A heavily wooded area borders the site on the east. Most of this property is owned by the Borough of West Mifflin. Some of this West Mifflin owned property has been developed into the West Mifflin Community Park. A fence has been erected to prevent inadvertent access to the site property from the park area. An industrial district is located along the northern boundary of the site. Commercial and residential developments border the site on the south and west. Two public roadways run along the length of the southern perimeter of the property and a railroad runs along the northern end.

3.3 Topography, Geology, and Seismology

Allegheny County, Pennsylvania is situated within the Allegheny Plateau physiographic province of North America. Physiography refers to the natural physical landforms of an area. Stream erosion of a formerly raised plateau produced the present rugged land surface at the Bettis-Pittsburgh site. The geologic formations are generally flat-lying or gently folded and inclined.

The number of streams and the percentage of the land found in slopes decrease with distance from the major waterways, such as the Monongahela River.

The site is located approximately 6000 feet west of the Monongahela River. The maximum elevation at the site is approximately 1200 feet above mean sea level (MSL). The minimum elevation, approximately 975 feet above MSL, occurs on the northern site boundary. The normal pool elevation of the Monongahela River near the site is approximately 720 feet above MSL. The developed portions of the site are approximately 480 feet above the surface of the Monongahela River.

Surface drainage at the site is primarily toward the east, discharging into Bull Run Stream and its tributaries. A narrow, mostly sloped area that includes a small developed portion of the site drains northwest directly into Thompson Run Stream.

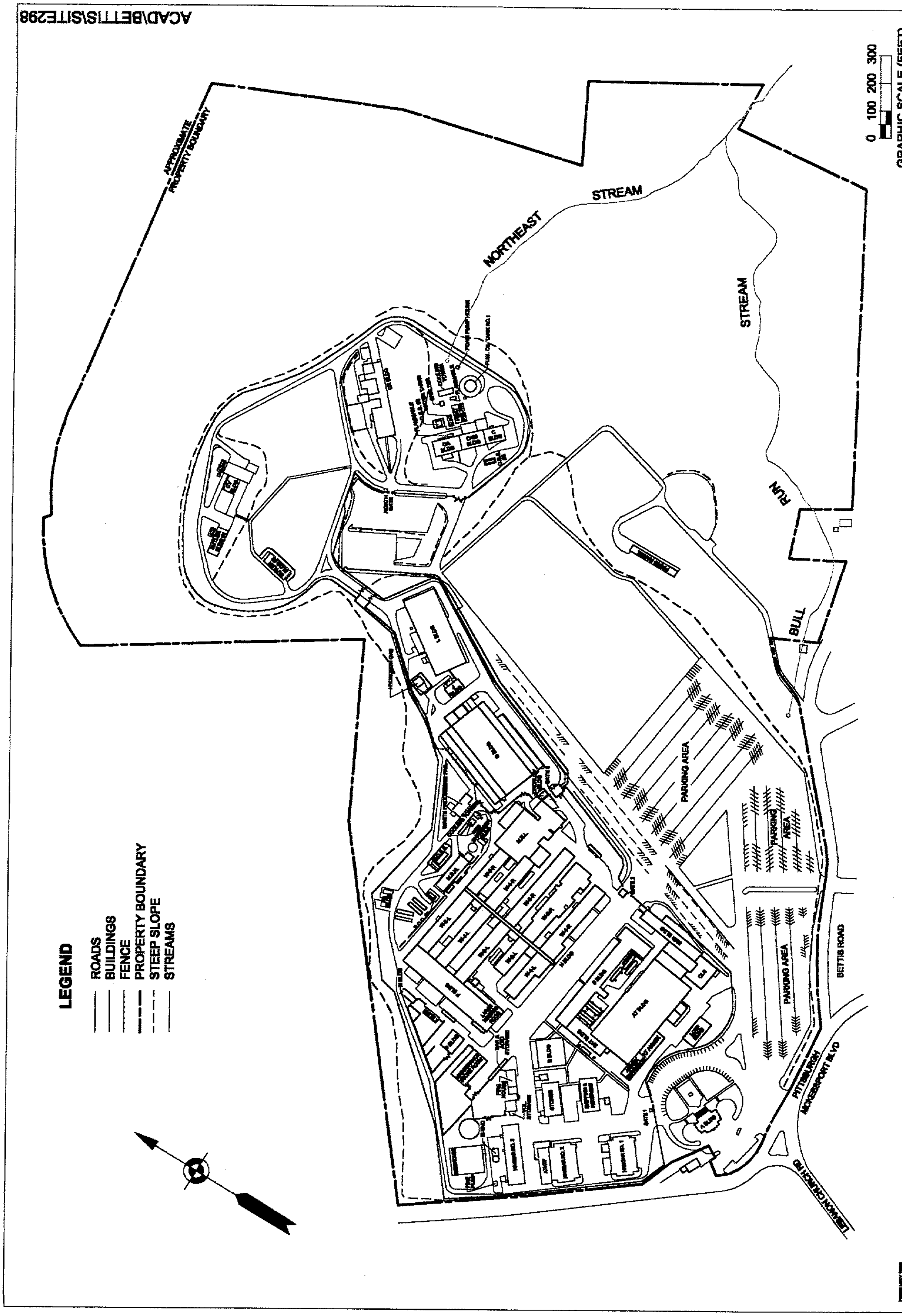

FIGURE 1 BETTIS SITE PLOT PLAN

The soils at the site are residual in origin, having been formed by weathering of the underlying Monongahela Group bedrock or are the result of filling operations. None of the site land is utilized for agrarian purposes. The soils onsite are classified as the Culleoka and Urban Land-Guernsey soils. The Culleoka soils are characterized as moderately deep, well drained soils formed from shale and fine grained sandstone bedrock. They generally occur on upland slopes, have moderate permeability, and normally a water table below four feet throughout the year. The surface soil can be described as dark brown, granular silt loam, while the subsoil is yellowish-brown, blocky silt loam to channery clay loam. The substrata consists of yellowish-brown, massive, very channery clay loam.

The Urban Land-Guernsey soils are described as variable consisting of disturbed land resulting from cut and fill operation and subsequent coverage with urban works. These soils occur in a complex pattern with Culleoka soils which are described above. The Urban Land-Guernsey soils are characterized as deep, well drained soils with a low permeability and a winter water table within 1 or 2 feet of the surface. This soil type is formed from interbedded clay shale, shale, and limestone bedrock.

The geologic formations that underlie the portion of Allegheny County in which the site is located are part of the Pennsylvania System. The Monongahela, Conemaugh, and Allegheny Groups are all part of the Pennsylvania System and underlie the site. The Monongahela Group, the uppermost group, includes beds of limestone, variable shales, discontinuous layers of sandstone and coal beds. Several of these coal beds had significant economic importance. The base of the Pittsburgh Coal marks the base of the Monongahela Group.

Some of the important beds in the Monongahela Group are the Uniontown Limestone, Benwood Limestone, Sewickley Sandstone, Fishpot Limestone, Pittsburgh Sandstone, and the Redstone and Pittsburgh Coal. Core borings taken onsite confirm that the bedrock consists of layers of limestone, shale, and sandstone.

Extensive mining of the Pittsburgh Coal seam has occurred to the west and south as well as under the site. The Pittsburgh Coal seam lies about 200-250 feet below the active portion of the site. Most of the Pittsburgh Coal that can be mined has been removed. There are no current coal mining activities in this area.

Bettis-Pittsburgh is located in a landslide and mine subsidence prone area of western Pennsylvania. The developed area of the site is considered free of landslide hazards. While the steep slopes on the eastern and northern edge could be affected by landslides, these areas are stabilized with vegetative growth. The probability of mine subsidence is considered very low because the mines are located approximately 200-250 feet below the site.

The seismic risks for the region in which the Bettis-Pittsburgh site is located are judged to be minimal. This conclusion is supported by the U.S. Coast and Geodetic Survey of 1947 which placed the site within a zone where earthquake damage has been minor and where intensities are normally below the threshold of structural damage.

3.4 Hydrology

3.4.1 Surface Water Description and Uses

Surface water flow at the Laboratory, including stormwater management, is primarily toward the east, discharging into the Bull Run Stream and its tributaries. A narrow, mostly sloped area that includes a small portion of the developed area of the site drains northwest into the Thompson Run Stream.

The waters in the Bull Run Stream, which originates on the site, include municipal, once-through, non-contact cooling water, stormwater runoff, and some dilute process waste water. Springs and seeps also discharge to the stream from various locations onsite including the discharge of treated ground water from the Springwater Intercept System. Approximately 52 million gallons of water were discharged into the Bull Run Stream from the Bull Run and Northeast Area outfall monitoring stations in 1998; these outfalls are National Pollutant Discharge Elimination System (NPDES) permitted outfalls #001 and #002, respectively. A significant portion of this discharge was precipitation runoff collected by the site storm sewer system. The Bull Run Stream flows about 1.4 miles before joining Thompson Run Stream which empties into the Monongahela River in Duquesne. There are no known uses of the Bull Run and Thompson Run Streams. Thompson Run is known to contain mine drainage and occasionally some raw sewage, neither of which comes from the Bettis-Pittsburgh site.

An aquatic biology survey of Bull Run Stream by representatives of the PADEP in 1995 indicated the stream maintains a diverse, sustainable population of macro-invertebrates. This condition indicates good water quality in Bull Run Stream.

Because of the location and elevation of the site, flooding from local streams or rivers is not possible. Some minor bank overflowing from Bull Run Stream may occur downstream from the site during heavy rainfall. There were a minimal amount of identified wetlands onsite associated with springs.

Some water from offsite enters the site storm sewer system through a manhole located west of Hangar #1. This offsite flow consists mainly of precipitation runoff from an offsite road and has been shown, on occasion, to have an elevated pH and/or to contain high levels of suspended solids. The constituents of this water can influence the water quality of the Bull Run Outfall (#001) effluent and have resulted in one documented case of an NPDES non-compliant situation. Bettis-Pittsburgh has informed the PADEP and the Pennsylvania Department of Transportation of this condition.

3.4.2 Ground Water Description and Use

Bettis-Pittsburgh has performed an extensive assessment of the hydrogeologic (ground water flow) conditions at the site. The results of this assessment are provided in Reference (2).

There are no wells or springs onsite or in the local, hydraulically downgradient area which are known to be used for drinking water, industrial, or irrigation purposes.

The site is underlain by the geologic units of the Pennsylvanian Monongahela Group. The Monongahela Group is not an important local aquifer. Well yields from the Monongahela Group range from less than 1 to 30 gallons per minute.

The topographic features of the area such as high hills cut by major stream valleys greatly affect the direction and depth of water tables. There may be subregional ground water regimes where the discharge of the ground water is to local streams. In cases where the stream channels lie below the water table, some aquifers may discharge on valley slopes. Based on data obtained through rock coring, monitoring well drilling, geophysical logging, and ground water elevation monitoring, the ground water under the site was determined to be in five different water-bearing zones. These water-bearing zones, in descending order, are the Perched zone, Benwood Limestone zone, Sewickley Sandstone zone, Pittsburgh Sandstone zone, and Pittsburgh Coal zone. The Pittsburgh Coal water-bearing zone represents the bottom-most ground water flow studied at the site.

Several springs, which are surface manifestations of ground water, discharge on the site property. The largest springs were on the eastern, undeveloped portion of the site. These were permanent springs with varying flows that were reflective of the seasons. A few of these springs contained trace levels of degreasing solvents from historical operations. In 1997, the Springwater Intercept System was installed to collect and treat the ground water discharging from these springs.

3.4.3 River Water Use

Along with its role as a navigable waterway, the Monongahela River is a significant recreational source and it supplies water for domestic and industrial purposes. There is a public water supply intake (Becks Run) located about 8 miles downstream of the confluence of Thompson Run Stream with the Monongahela River. The Becks Run intake is operated by the Pennsylvania-American Water Company and services residential and industrial customers, including Bettis-Pittsburgh, in the metropolitan area surrounding Pittsburgh.

3.5 Cultural Resources Management

An evaluation of the Bettis-Pittsburgh cultural resources has been conducted. This evaluation indicated that there are no historic or archaeological properties eligible to be listed in the National Register of Historic Places at the Bettis-Pittsburgh site. This evaluation has been documented in a Commonwealth of Pennsylvania, Department of Environmental Protection, General Environmental, Social and Economic Information, Module No. 9 required as part of the Bettis-Pittsburgh RCRA Part B Permit application for the storage of hazardous waste. This module was also provided as an Appendix in Reference (1).

4.0 DESCRIPTION OF OPERATIONS

4.1 Past Operations

In 1951, the Navy awarded the Bettis Atomic Power Laboratory a contract to build the power plant for the world's first nuclear-powered submarine, the NAUTILUS. Much of the assembly work on the NAUTILUS nuclear reactor core was done at the Bettis-Pittsburgh site.

Since the NAUTILUS, advanced technology for submarine and surface ship nuclear reactor plants has constituted a major portion of the work program. Bettis-Pittsburgh's work on the prototype nuclear propulsion plant for a surface ship, and successful operation of the prototype at the Naval Reactors Facility in Idaho Falls, Idaho, led to the development of the first nuclear-powered surface ship, the cruiser LONG BEACH, and the first nuclear-powered aircraft carrier, the ENTERPRISE. The ENTERPRISE was launched in September 1960.

Under the AEC Division of Naval Reactors, Bettis-Pittsburgh also worked on the design and development of the first full-scale nuclear power plant for civilian use. This was the Shippingport Atomic Power Station located in Shippingport, Pennsylvania. Subsequently, Bettis-Pittsburgh designed and developed the first LWBR core which was placed in the Shippingport reactor vessel in 1977 and was operated until October 1982. The LWBR reactor core was assembled at Bettis-Pittsburgh. This advanced reactor system was developed to improve significantly the utilization of fuel in nuclear reactors. The technology developed for the Shippingport program has been made available to industry for commercial application.

Research to support the above accomplishments was conducted in the areas of material development, fuel element fabrication, high and low temperature testing of reactor components, and nuclear physics.

The design, development, and operation of nuclear propulsion plants for the propulsion of submarine and surface ships for the Navy was and still is the cornerstone of Bettis-Pittsburgh operations.

4.2 Present Operations

Much of the work at Bettis-Pittsburgh does not involve chemicals or radioactivity but is conducted in office and computer spaces employing scientists and engineers in propulsion plant design, operator training development, and procedure preparation activities. Physical work involving the development of improved materials and components for Naval nuclear propulsion plants is conducted in several Bettis-Pittsburgh facilities which are described below and shown in Figure 2.

<u>Chemical Laboratories</u>

The chemical laboratories consist of several individual laboratories for mass spectrometry, corrosion testing, chemical analysis, radiochemistry, and other related analytical and developmental functions. Most of the chemistry laboratory work involves non-radioactive materials and is confined to appropriate containment areas such as hoods. For radioactive work, the containment areas are provided with high efficiency filtered and monitored ventilation exhaust systems. Liquids that are generated are collected for processing.

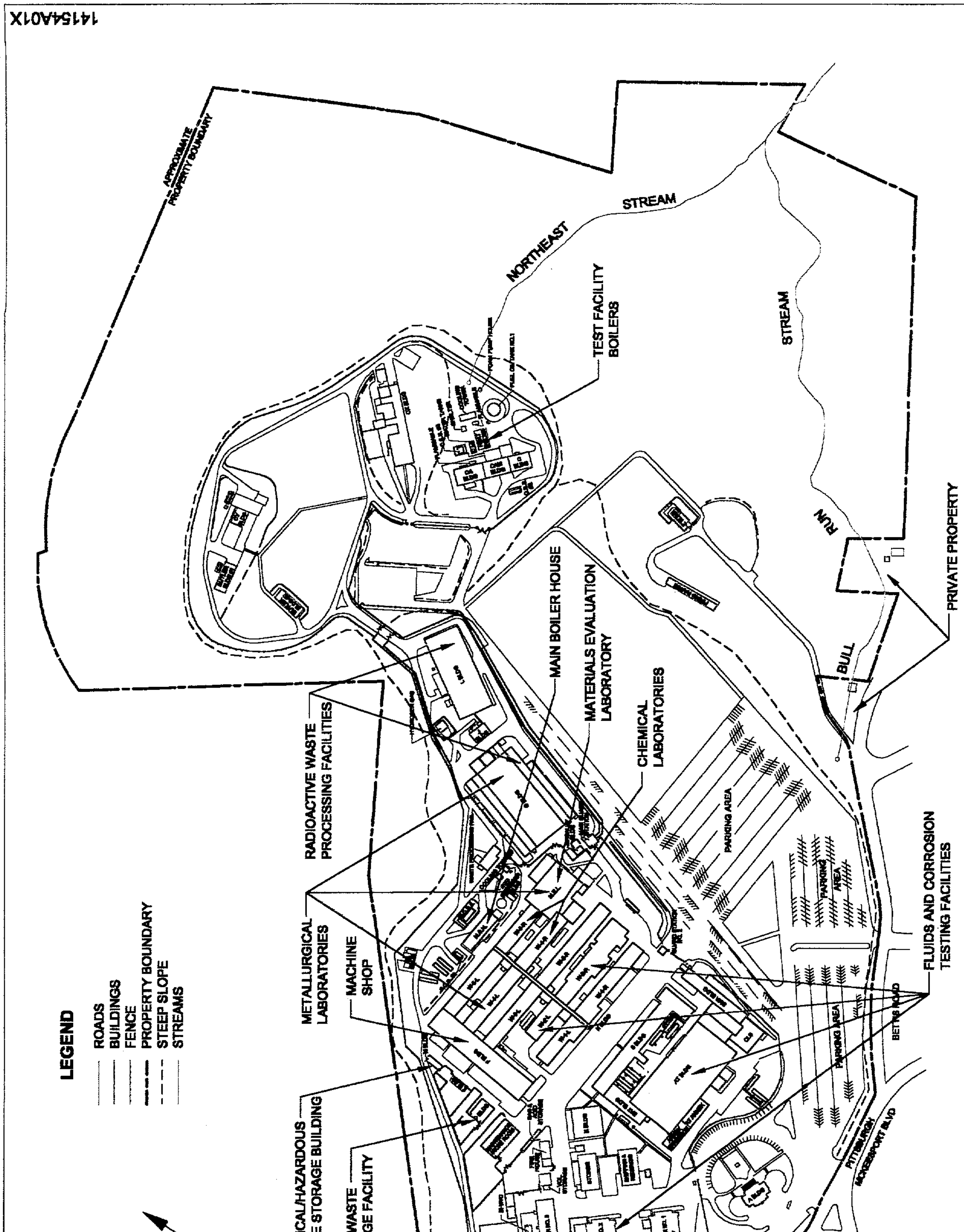

FIGURE 2 SITES OF MAJOR PRESENT OPERATIONS

Fluids and Corrosion Testing Facilities

Fluids testing facilities are used to conduct power plant component testing. Both high and low pressure and temperature facilities are operated to support materials and equipment development work. Except for non-contact once-through cooling waters, waste liquids from these test facilities are collected, processed, and tested prior to disposal. Radioactive materials are not used in any of this test work.

Metallurgical Laboratories

These laboratories are operated to provide services related to the development, fabrication, testing, and inspection of materials for use in Naval reactors. Similar to the other laboratories, most of the work is on non-radioactive materials. Radioactive work involving easily divisible materials is confined to containments serviced by high efficiency filtered and monitored ventilation systems and radioactive liquids are collected for processing.

Materials Evaluation Laboratory

The Materials Evaluation Laboratory (MEL) consists of a metallurgical laboratory as described above and support facilities for testing of low level radioactive material specimens. Routine physical, chemical, and metallurgical testing of highly radioactive materials was discontinued in 1993 and support facilities are undergoing decontamination. The facility is designed to ensure complete containment of the radioactivity within shielded rooms equipped with high efficiency exhaust air filters that filter airborne radioactivity. Air is continuously monitored and radiation and contamination surveys are performed frequently to verify the integrity of the shielded containment rooms and the effectiveness of the air handling systems.

Machine Shops

Machine shop facilities are used to perform machining operations such as turning, milling, and drilling on a variety of metal products including non-radioactive metals, fuel specimens, and other radioactive materials. The facilities for work on radioactive metals are segregated from the other work areas and are provided with special containments and high efficiency filtered ventilation exhaust systems when the possibility for radioactive contamination resulting from the process exists.

Fuel Storage Vault

Fissile materials for use in reactor development are stored in a fuel storage vault with special safety and security provisions. The storage vault is equipped with radiation monitors. Personnel involved in the handling of these materials are specially trained in nuclear and radiological safety and security.

Support Facilities

In addition to the technical facilities described above, there are a number of support facilities necessary to sustain Bettis-Pittsburgh operations. These facilities include office buildings which house the scientists and engineers, a library, a computing center, administrative centers, and the following service facilities.

Main Boiler House

The Main Boiler House provides steam heat and hot water for the majority of the onsite buildings. The Boiler House also contains the circulating water pumps which supply chilled water for building and equipment needs and emergency fire service pumps which supplement fire line pressure upon demand. Auxiliary support facilities in the building include feedwater treatment components, such as softeners, and a secondary water chemical addition tank for treatment of boiler blowdown water. Boiler blowdown water is treated and discharged to the sanitary sewer system. Combustion gases from onsite boilers, including boilers and hot water heaters discussed below, are discharged through stacks.

The Boiler House has four large boilers, each with approximately 20 million BTU/hr input. The boilers are operated in accordance with the Allegheny County Health Department (ACHD) air pollution control requirements. Two of the boilers operate on natural gas and the other two boilers operate on either natural gas or No. 2 fuel oil. The fuel oil is stored in a diked, above ground tank adjacent to the Main Boiler House. The fuel oil storage tank has a Spill Prevention Control and Countermeasure (SPCC) Plan prepared in accordance with federal regulations.

Satellite Boilers

There are ten smaller boilers that provide heat to individual buildings or make hot water. These boilers, located throughout the site, are operated in accordance with applicable ACHD air pollution control requirements. All of these boilers operate on natural gas. Boiler blowdown water from each of the boilers is collected and treated in the same manner as the Main Boiler House.

Test Facility Hot Water Heaters

There are five hot water heaters, each with an approximate 17 million BTU/hr input, used to provide a heat source for thermal and hydraulic testing. The heaters are operated in accordance with the ACHD air pollution control requirements. The heaters are capable of operating on either natural gas or No. 2 fuel oil which is stored in a large revetted storage tank near the boilers. The storage tank has an SPCC Plan prepared in accordance with federal regulations.

Demineralized Water Production Facilities

Demineralized water or pure water is produced at several locations throughout the Bettis-Pittsburgh site. Pure water is generated by pumping city water through a series of anion and cation resin beds to remove impurities. The resin beds are either regenerated onsite using an acid-base regeneration system or are sent offsite for regeneration. The onsite regenerating solutions are collected and neutralized prior to discharge to the sanitary sewer.

Cooling Towers

There are five forced-draft and five induced-draft cooling towers at the Bettis-Pittsburgh site that are used to dissipate the heat generated by computer, air conditioning, and other operations.

During operation, blowdown of the cooling water occurs automatically to control the concentration of solids that are naturally present in the supply water. The small quantity of blowdown water is directed into the stormwater drainage or sanitary sewer system.

Petroleum Storage Tanks

Bettis-Pittsburgh operates petroleum storage tanks that service onsite facilities and equipment. The four largest storage tanks are: a 400,000-gallon above ground fuel oil tank to support test facility hot water heaters, a 10,000-gallon above ground fuel oil tank at the Main Boiler House, a 1,000-gallon above ground fuel tank for the L-Building emergency generator, and a 4,000-gallon underground gasoline tank. Petroleum storage tanks are managed in accordance with applicable federal and state regulations governing such tanks.

Photographic and Printing Facilities

Photographic and printing services to facilitate the preparation of design documents are provided onsite. Offsite vendors handle most photographic processing. Minor amounts of photographic processing are performed onsite to support other operations and the wastes are shipped offsite to permitted treatment and disposal facilities. Printing operations generate waste materials that are either recycled or disposed as municipal waste.

Radioactive Waste Management

Radioactive waste processing facilities collect and process water containing small amounts of radioactivity and collect, process, package, and ship solid radioactive waste. The processing facilities for liquid and solid wastes are monitored for radiation and contamination and are serviced by filtered and monitored exhaust systems. In 1998, construction was completed on a building that is being used as a centralized facility for the staging of containers of radioactive waste materials generated at various onsite locations pending shipment offsite for disposal. See Section 5.1 for a more complete description of current waste management programs.

Chemical/Hazardous Waste Management

The Chemical/Hazardous Waste Storage Building is operated under a PADEP Hazardous Waste Storage Permit. The facility structure and operation are maintained in compliance with applicable federal and state regulations. This facility is used for temporary storage of chemical waste prior to shipment offsite to permitted treatment and disposal facilities. The facility is divided into five (5) revetted areas to separate containers of incompatible chemicals. The storage facility has the capacity to store up to ninety 55-gallon drums and 225 gallons of waste in smaller containers.

Mixed Waste Management

The Mixed Waste Storage Facility (MWSF) is operated under the interim status provisions of RCRA and Commonwealth of Pennsylvania rules and regulations. Wastes that are both chemically hazardous and radioactive are stored in the MWSF in accordance with the applicable federal and state hazardous waste regulations and the Consent Agreement and Consent Order agreed to by the EPA and PNR. The MWSF is used to store mixed waste prior to shipment offsite to permitted treatment and disposal facilities. The MWSF is also used for temporary storage of small quantities of residues from offsite treatment of NNPP mixed wastes. These residues are stored temporarily at the MWSF until shipment to a commercial disposal site is arranged or DOE program-wide mixed waste disposal arrangements are established. The MWSF contains revetments to prevent the release of wastes to the environment. Incompatible chemicals are separated and stored in separate containments.

5.0 WASTE GENERATION AND CONTROLS

The Bettis-Pittsburgh site is not a manufacturing facility. Previous production efforts were limited to pilot projects such as building the NAUTILUS and LWBR cores. As a consequence, the total quantities of chemical and radioactive materials handled on the Bettis-Pittsburgh site have been small.

For example, during the period 1996-1998, the quantity of chemically hazardous wastes produced by routine site operations averaged 7 tons per year. At Bettis-Pittsburgh, this waste consists mainly of waste batteries, chemistry analysis wastes, and expired reagent chemicals. In this same time period, an additional 25 tons of hazardous wastes were generated as a result of non-routine operations. Of the 25 tons, 94% resulted from the excavation of solvent contaminated soil during facility renovations. The remaining 6% consists of various remediation materials including hazardous wastes generated during polychlorinated biphenyls (PCBs) and asbestos remediation operations, and hazardous wastes generated through environmental sampling.

When sufficient quantities are accumulated, mercury, excess lead metal, and lead-acid batteries are shipped offsite for reclamation.

Several of the current site buildings were formerly used as airport hangars and probably served as airport maintenance areas. It is likely that degreasers and solvents common to aircraft maintenance were used in these early operations. There are no available records that show whether or how much of such materials were used or where or how they were discarded. However, it is possible that spent solvents and degreasers may have been discarded on the site by airfield personnel and may have contributed chemical residues which are currently detectable in site soil and ground water.

The amount of radioactive materials managed at the site is also small and consists of irradiated test specimen residues, special nuclear materials, and a number of components with small amounts of radioactivity on their surfaces. Consequently, the amount of radioactive waste material generated by current operations is small.

A discussion of current and past waste management operations follows.

5.1 Current Waste Management Programs

5.1.1 Current Radioactive Waste Management

Liquid and solid radioactive wastes are generated and controlled in site operations. The Laboratory has maintained a vigorous radioactive waste control and minimization program for many years. The generation processes and the minimization program are described below.

Radioactive Liquid Waste

Regulations applicable to commercial nuclear industries in the U.S. permit discharge of low-level radioactive liquids if they meet concentration standards established by the Nuclear Regulatory Commission (NRC). DOE regulations also permit similar discharges of low-level radioactive liquids. Bettis-Pittsburgh has operated to a far more conservative standard for nearly two decades. Water containing low levels of radioactivity is collected and processed to remove the radioactivity. When the water has no remaining detectable radioactivity, it is normally discharged to the West Mifflin

Borough, Thompson Run Sewage Treatment Plant. The processing system includes collection tanks, particulate filters, and mixed-bed ion exchange columns to remove inorganics. On occasion, small amounts of radioactive liquids containing higher levels of radioactivity are solidified. The filters, ion exchange media, and solidified liquids are disposed offsite in approved DOE radioactive solid waste disposal sites.

Radioactive Solid Waste

Solid radioactive wastes are generated at the Bettis-Pittsburgh site as a result of research and development and decontamination/decommissioning operations. Included in this waste are such radioactive items as process system filters, expended resin, metal scrap, glass, cloth, wood, concrete, insulation, plastics, paper, ceramic or brick materials, roofing debris, sludges, asbestos, sampling planchettes, filter papers, swipes, and towels resulting from radiochemistry and radiation monitoring operations, ventilation filters, and solidified liquid wastes. The majority of this waste is from the decontamination of facilities no longer needed at the site.

When practicable, solid radioactive waste is compressed to reduce the volume that must be shipped offsite for disposal. Solid radioactive wastes are packaged and shipped in accordance with the requirements of the U.S. Department of Transportation. These wastes are disposed only in land disposal sites owned by the DOE. All such sites are outside of Pennsylvania. The annual solid radioactive waste volume generated and dispositioned during 1996, 1997, and 1998 totaled 350, 726, and 566 cubic meters, respectively, from routine and decontamination/ decommissioning operations.

Radioactive Recyclable Metal

During 1997 and 1998, approximately 104,000 lbs of radioactive scrap metal were shipped to a commercial radioactive material processing facility for radioactive metal recycling. The total includes heavy metal bearing equipment that consisted of non-radiologically contaminated lead encapsulated by externally contaminated stainless/carbon steel.

Bettis has initiated a program for the recycling of radiologically contaminated scrap lead. The first shipment of 7500 pounds of radiologically contaminated lead for recycling was made in 1998.

Radioactive Airborne Effluents

Exhaust systems that service radiological facilities are designed and operated to prevent the discharge of potentially contaminated air to the environment. Most systems include high efficiency filters for the removal of particulate radioactivity from the exhaust air. A few systems, in minor radiological facilities, utilize water scrubbers to remove acid fumes and particulate radioactivity from the exhaust air.

The exhaust systems are tested periodically to ensure that design flow rates are maintained and that the filtration media provide the proper collection efficiency. All high efficiency particulate air filters that discharge to the environment are tested in-place after installation and periodically thereafter. The testing is performed using 0.7-micron diameter dioctylphthalate (DOP) smoke particles. The installation must exhibit an overall collection efficiency of 99.95 percent or higher to be accepted.

In addition, all radiological, forced-air exhaust systems are continuously monitored for particulate radioactivity. Systems servicing major radiological facilities are provided with continuous monitoring equipment that will alarm if the exhaust air contains levels of radioactivity that are greater than normal but still much less than the allowable Federal environmental standards at the site boundary. Periodically, samples are also evaluated for Radon-220 gaseous radioactivity. Monitoring results are reported annually to federal and state agencies.

Radioactive Waste Minimization

Bettis-Pittsburgh has maintained a radioactive waste minimization program for many years. The program includes work to identify and eliminate sources of radioactive waste generation and identify means to compact or concentrate wastes to the minimum practicable volumes. The quantity of radioactive waste produced is much less than one percent of the low level radioactive waste generated by all DOE sites.

5.1.2 Current Non-Radioactive Waste Management

Bettis-Pittsburgh operations produce a variety of industrial waste products including once through cooling water, process rinse water, waste oils, chemical wastes, boiler exhaust gases, and other such products typical of a large laboratory. All such waste products are controlled in accordance with various federal, state, and local laws and regulations. Bettis-Pittsburgh has a hazardous waste minimization program as required by the regulations.

The following is a discussion of the non-radioactive waste management practices and the hazardous waste minimization programs.

Non-Radioactive Liquid Wastes

The small quantity of industrial waste liquids from site operations is controlled by several methods depending on the volume and nature of the waste. Methods used to ensure the safe disposal include: (1) local collection and storage; (2) transfer of wastes that contain hazardous materials or recyclable oils and liquids to licensed subcontractors for reclamation, *incineration*, or treatment at a licensed facility; (3) careful monitoring and control of chemical constituents to ensure that concentrations in effluent water comply with applicable standards and guidelines; and (4) extensive employee training in waste management requirements. Chemical wastes defined as hazardous are managed in accordance with a PADEP Hazardous Waste Storage Permit issued to the Laboratory in February 1995.

Liquid effluents discharged into the site storm sewer system are controlled and monitored in accordance with an NPDES permit issued by the PADEP. A total of seven outfalls are permitted. Two of the outfalls are permitted to discharge process waste water, rinse water, and storm water. Four outfalls are permitted to discharge storm water only. One outfall is permitted to discharge treated ground water.

Some water from offsite enters the site storm sewer system through a manhole located west of Hangar #1. This offsite flow consists mainly of precipitation run-off from an offsite road and has been shown, on occasion, to have an elevated pH and/or to contain high levels of suspended solids. The constituents of this water can influence the water quality of the Bull Run Outfall (#001) effluent and has resulted in one documented case of an NPDES non-compliant situation. Bettis-Pittsburgh has informed the PADEP of this condition.

Sanitary Waste Discharges

Sanitary waste from the site is discharged to the West Mifflin Borough, Thompson Run Sewage Treatment Plant. This plant uses the activated sludge process to treat the sewage. The plant is operated under a permit issued by the PADEP to the Borough of West Mifflin.

During 1998, approximately 32,000 gallons of water generated from ground or subsurface water collection and sampling efforts were discharged to the sanitary sewer for treatment at the Thompson Run Sewage Treatment Plant. The water contained traces of volatile organic compounds including tetrachloroethylene and trichloroethylene that were within limits acceptable to the treatment plant. The Borough of West Mifflin, the EPA and the PADEP have been notified of such discharges, as required by applicable regulations.

Polychlorinated Biphenyls

All known transformers, capacitors and other such electrical equipment containing PCBs have been removed from service at the Bettis-Pittsburgh site. PCB items at the site are controlled in accordance with EPA regulations issued pursuant to the Toxic Substances Control Act.

Non-Radioactive Solid Waste

Non-radioactive demolition debris and other similar materials as well as cafeteria waste are disposed in a licensed sanitary landfill. None of this waste is disposed at the Bettis-Pittsburgh site.

In accordance with state and local requirements, Bettis-Pittsburgh has a program to recycle many non-radioactive solid waste materials. One trash compactor has been dedicated to compacting boxes and other corrugated paper that is taken to a local recycler. Bettis-Pittsburgh collects glass and aluminum food and beverage containers for recycling. The Laboratory has a longstanding program to collect scrap metal and sell it to a local scrap metal dealer. Bettis-Pittsburgh also has a program to collect and recycle high quality office paper. During 1998, approximately 58% of the municipal waste generated at Bettis-Pittsburgh was recycled. This exceeds the PADEP goal of recycling 25% of municipal wastes.

Chemically hazardous solids are controlled in accordance with the requirements of RCRA. No chemically hazardous wastes are sent to the municipal sanitary landfill (Section 4.2).

Non-Radioactive Airborne Effluents

The combustion gases from the 14 Bettis-Pittsburgh heating plant steam generator boilers and 5 thermal and hydraulic testing hot water heaters are discharged through elevated stacks. Bettis-Pittsburgh applied to the ACHD, in 1995, for an Air Pollution Operating Permit for the entire site. The ACHD has not issued the permit, however, Bettis-Pittsburgh is operating in accordance with all current regulations and conditions identified in the permit application.

Operation of the boilers is conducted in accordance with ACHD regulations. While natural gas is the primary fuel, No. 2 fuel oil, containing <0.5% sulfur, may be used in two boilers in the Main Boiler House and in the five hot water heaters used for thermal and hydraulic testing.

Other sources of non-radioactive airborne effluents include fume hood exhausts from various Laboratory operations. These operations have been identified, as appropriate, in the site Air Pollution Operating Permit application.

Non-Radioactive Waste Minimization

In accordance with RCRA, Bettis-Pittsburgh has a chemical waste minimization plan. The plan requires specific actions to identify and minimize waste producing operations. These actions are accomplished by establishment of strict procurement procedures, substitution of non-hazardous materials where practical, and other similar measures.

Typical actions taken in recent years include:

- Careful control of type and quantity of chemical acquisitions;

- Maximizing use of unused or partially used reagents through the Bettis-Pittsburgh Chemical Exchange Program;

- Training of employees in the hazards and proper control of the materials used in their jobs;

- Segregation of non-hazardous and hazardous wastes at the point of generation;

- 27 tons of lead acid batteries were shipped offsite for recycling from 1986 through 1998;

- 194 tons of non-radioactive lead scrap were shipped offsite to the lead reclaimer from 1986 through 1998; and

- 1066 pounds of mercury waste have been shipped offsite for recycling since 1983.

Over the past several years, metals recovery, recycling, incineration, stabilization, secure landfilling, and waste water treatment have been the primary methods of offsite treatment and disposal for Bettis-Pittsburgh-generated hazardous wastes.

In addition to recycling chemical wastes, Bettis-Pittsburgh recycles other materials that result in benefit to the environment. Examples of other materials sent offsite for recycling include:

- 2634 tons of carbon and stainless steel from 1991 through 1998;

- 442 tons of corrugated paper from 1991 through 1998;

- 31 tons of copper from 1991 through 1998;

- 24 tons of aluminum from 1991 through 1998; and

- 1391 tons of high grade office paper from 1994 through 1998.

5.1.3 Current Mixed Waste Management

Bettis-Pittsburgh site operations have resulted in the generation of small volumes and various types of mixed waste. These waste streams include oils, soil and debris, chemical analysis solutions, and process wastes.

The NNPP has agreed to apply Pennsylvania hazardous waste requirements to the hazardous constituents of mixed waste prior to Pennsylvania being delegated mixed waste regulatory authority by the EPA. Bettis-Pittsburgh manages all mixed waste in accordance with the Bettis-Pittsburgh Mixed Waste Management Plan which was concurred with by the PADEP in September 1995 and last revised in December 1998. In addition, in accordance with the Federal Facility Compliance Act (FFCA), the EPA and DOE signed a Consent Agreement and Consent Order, in October 1995, that binds the DOE to treat Bettis-Pittsburgh mixed waste in accordance with the Site Treatment Plan which was approved by the EPA.

In 1996, 90 cubic feet of radiologically contaminated lead waste was shipped to Envirocare of Utah, Inc. for treatment and disposal.

Also, in 1996, Bettis-Pittsburgh initiated the onsite treatment of small amounts of mixed wastes as allowed by the Mixed Waste Management Plan. Characteristically hazardous mixed wastes, such as radiologically contaminated zirconium and hafnium chips, or corrosive and toxic chemical wastes generated from the analysis of radiologically contaminated samples, are treated to remove their hazardous characteristics in accordance with a waste analysis plan that is on file at Bettis-Pittsburgh. After treatment, the non-hazardous treatment residue is disposed as radioactive solid waste. Since 1996, the

Laboratory has treated less than one cubic meter of characteristically hazardous mixed waste and disposed of it as radioactive solid waste.

During 1997, 141 cubic feet of incinerable mixed waste was shipped by Bettis-Pittsburgh to the Idaho National Engineering and Environmental Laboratory Waste Experimental Reduction Facility (WERF) for treatment. The Bettis-Pittsburgh mixed waste was combined with similar wastes from other NNPP sites and incinerated in the WERF mixed waste incinerator. With approval of the PADEP, residuals from this treatment campaign are temporarily stored at Bettis-Pittsburgh pending arrangements for offsite disposal. As additional mixed waste treatment facilities come online, Bettis-Pittsburgh will continue to ship mixed waste offsite for treatment and disposal in accordance with the Site Treatment Plan and implementing the Consent Agreement and Consent Order.

Minimization of Mixed Waste

Because of the difficulties and limited availability to treat and dispose of mixed waste, Bettis-Pittsburgh uses every means practical to eliminate and minimize the generation of mixed waste. These methods include:

- Radioactive materials are sorted, processed or otherwise handled to segregate the radioactivity from materials or liquids which are subject to hazardous waste requirements;
- To the extent practicable, radioactive materials are not mixed or adulterated with products which could cause the resulting waste to be subject to hazardous waste requirements;
- Any new process that could result in the generation of mixed waste is reviewed prior to performing the process; and
- Radiologically controlled metals containing hazardous constituents are recycled or reused whenever feasible.

5.2 Past Waste Management Practices

Radioactive waste management practices have evolved over the years consistent with advances in technology and changes in regulatory requirements. Typically, Bettis-Pittsburgh has maintained an environmental program substantially more strict than the rules in effect at the time.

Non-radioactive waste management practices evolved in a similar manner. Land disposal of chemicals onsite was conducted until 1964. Current Bettis-Pittsburgh practices incorporate all of the strict controls required by federal and state regulations. Each of these areas is discussed below.

5.2.1 Past Radioactive Waste Management

Bettis-Pittsburgh has always been involved in handling radioactive materials and has therefore always had management programs for radioactive materials and wastes. Disposal practices appropriate to each waste form (i.e., solids, liquids, gases) were developed and implemented. Requirements for the treatment and disposal of these wastes were established. For example, retention tanks and evaporators for liquid waste, facilities for storage of solid waste, and air cleaning systems (such as high efficiency particulate filters) were incorporated into the facilities.

The following is a description of the practices employed in the management of these materials.

Radioactive Liquid Waste

Operations which began at the Bettis-Pittsburgh site in 1949 have resulted in the generation of radioactive liquid wastes. These radioactive liquid wastes were a consequence of fuel research and development and the inspection and analysis of irradiated materials specimens. These operations were all performed in controlled areas within Bettis-Pittsburgh.

Prior to 1981, water, which potentially contained low-level radioactivity from the washing of laboratory glassware, decontamination hand sinks, and various laboratory areas which processed radioactive materials, was collected in retention tanks and analyzed for radioactivity. If the radioactivity level of the water was below the established limits, the water was released to the storm sewer. If the water failed to meet the release limits, it was processed to remove the radioactivity. The purified water was then reused in operations or released to the storm sewer after confirmation that activity levels were below the limits.

Higher radioactivity-level liquid wastes were normally evaporated to dryness. The radioactive sludges resulting from these processes were disposed offsite as solid wastes. Occasionally, some liquids were solidified and disposed offsite as radioactive solid waste.

During the 50 years of Bettis-Pittsburgh operation, less than 7 curies of Bettis-Pittsburgh-generated radioactivity have been released in water effluents. All releases were well within the applicable release limits. Only one percent of this activity has been released in water effluents since 1969. The water effluents are the source of the residual low-level radioactivity that remains in a few locations along the Bull Run Stream (Section 5.2.2).

Radioactive Solid Waste

The offsite disposal of solid waste materials was made in accordance with the requirements established by the AEC and the Energy Research and Development Agency, the forerunners of the DOE. The solid waste included rags, plastic bags, contaminated materials, evaporator slurry, and filters.

In the years prior to 1961, combustible solid radioactive waste was incinerated in a specially designed incinerator. The ash and noncombustible wastes were solidified in concrete and then shipped for disposal to AEC-approved areas.

In later years, the waste was packaged in the Radioactive Waste Processing Facility according to the regulations in effect at the time. No radioactive solid waste was buried on the Bettis-Pittsburgh site. Solid wastes were shipped to an AEC-licensed disposal site for disposition.

Radioactive Airborne Effluents

After passing through cleaning systems, where necessary, to ensure compliance with existing radiation protection guides, ventilation air from radiological facilities was discharged to the atmosphere. The air cleaning systems included high efficiency particulate filters and wet scrubbers as appropriate for the process being served.

Monitoring of exhaust air has been accomplished through the collection and analysis of samples of the effluent. The sampling technique used was dependent on the physical and chemical nature of the radioactivity and included filter paper sampling.

Overall, an estimated 1000 curies of radioactivity with half-lives greater than one day have been contained in air emissions during the 50 years Bettis-Pittsburgh has operated. Most of this radioactivity was in air emissions in the earlier years of operations. The majority of the radioactivity consisted of the inert gas krypton-85 and shorter lived iodine-131. Krypton-85 is an inert gas that does not deposit on surfaces and is readily dispersed in the atmosphere. Iodine-131 has a half-life of 8 days and decays rapidly upon release. Smaller amounts of other beta-gamma emitting fission products and trace quantities of alpha emitting particulates comprised the remaining amount of the long-lived radioactivity in air emissions. Since 1993, radioactivity in air emissions with greater than a one day half-life has averaged less than 7 microcuries per year.

Since LWBR core development began, Bettis-Pittsburgh air emissions have also included the radioisotope radon-220. Radon-220 is an inert gas that is readily dispersed in the atmosphere and decays very rapidly (half-life of 55 seconds). The concentration of the short-lived radon-220 at the location of the nearest offsite receptors has always been far below the Federal limits for air in uncontrolled areas. For perspective, radiation doses to offsite individuals from radon-220 emissions have been too low to measure. Conservative calculations using EPA standard methods estimate doses to be less than 0.001 Rem per year to the maximally exposed individual.

Bettis-Pittsburgh has employed calculational techniques that conservatively estimate potential exposures. These methods consider inhalation, ingestion, and direct radiation exposure pathways. Bettis-Pittsburgh conservatively estimates that the maximum possible annual radiation exposure to any member of the public resulting from current operations is less than 0.003 Rem per year. This is less radiation than received from cosmic radiation during a round trip airline flight from Pittsburgh to the west coast of the United States (0.003-0.004 Rem). The calculations also show that in all previous years, the annual radiation exposures to people living adjacent to Bettis-Pittsburgh were well below the annual regulatory limits.

5.2.2 Residual Radioactivity in Soil, Ground Water, Surface Water and Sediment

Not withstanding the waste management operations described above, some site soil contains residual radioactivity. In the discussions which follow, levels of radioactivity in soils are discussed in terms of picocuries per gram (pCi/g) of soil. For comparison, a typical home smoke detector contains about 1,000,000 pCi of radioactivity. The areas described below are shown in Figure 3. Additional discussion of the areas containing residual radioactivity can be found in the "Preliminary Assessment and Site Inspection Report for the Bettis Atomic Power Laboratory," - Revision 1, dated January 1990, Reference (1).

Inactive Waste Isolation Pit

Soil beneath the MEL in the vicinity of the Inactive Waste Isolation Pit (IWIP) contains some low levels of radioactivity. The IWIP (identified in Figure 3) consists of two small underground concrete vaults containing tanks and equipment that were used for collecting and processing radioactive liquids generated in the MEL. The radioactivity originated due to the overflow of radioactive liquid from collection tanks into the vaults and leakage to the surrounding soil. The system operated from 1956 until 1964.

In 1977, core bore soil samples were collected from inside and outside of the MEL in the area of the IWIP down to bedrock. About half of the samples contained levels of radioactivity detectable above background with the major radionuclide being strontium-90. The majority of the radioactivity was found in one core bore hole immediately adjacent to the IWIP, under the floor of the MEL.

In 1983, the soil around the IWIP with the highest levels of radioactivity was removed. The soil volume removed was approximately 420 cubic feet and extended to bedrock at a depth of about 9 feet.

Between 1983 through 1994, approximately 1410 cubic feet of additional soil and backfill material were removed from the areas east and south of the IWIP. It was initially

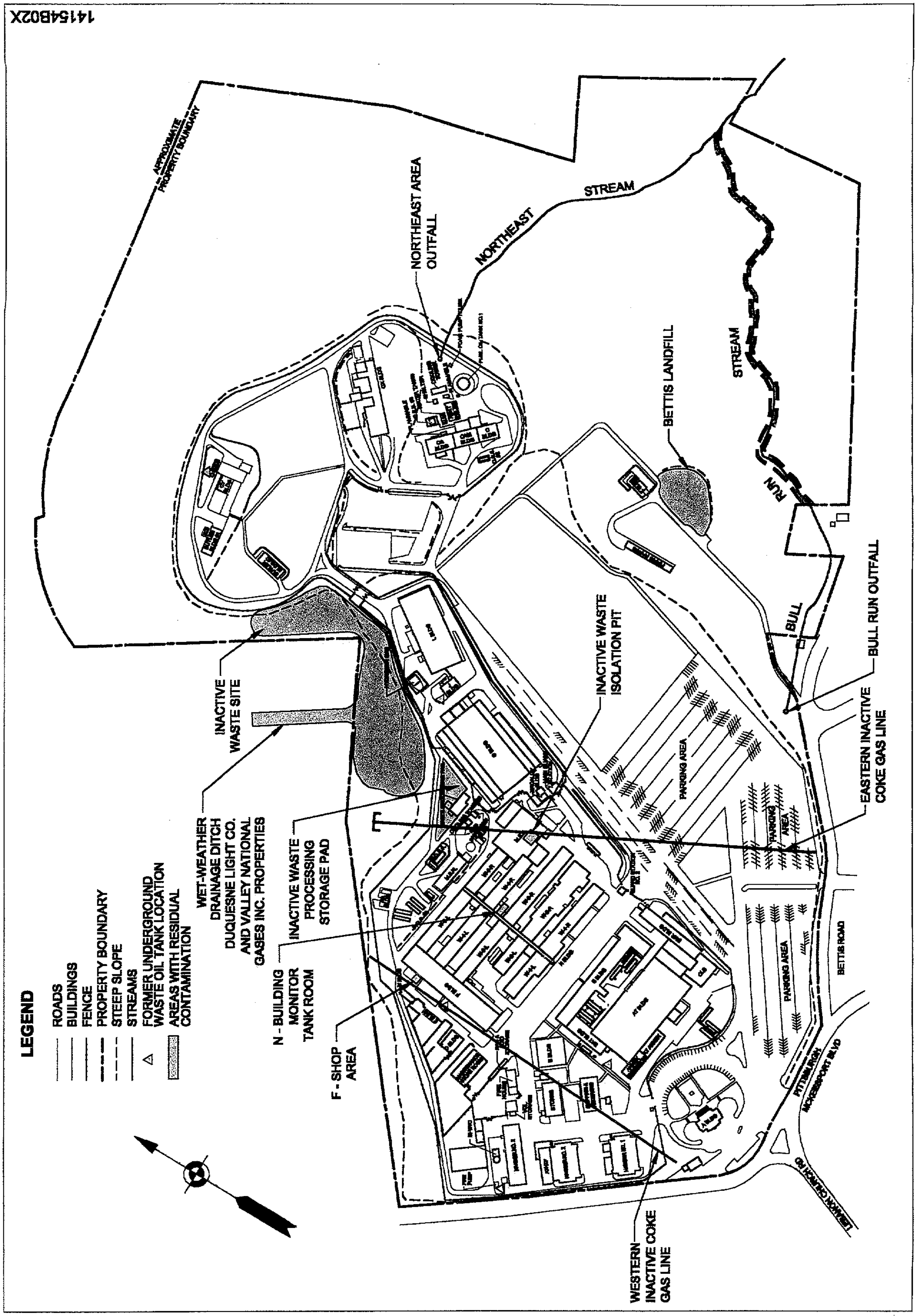

FIGURE 3 KEY AREAS WITH RADIOACTIVE AND/OR CHEMICAL RESIDUES

estimated that about 59 curies remain in the soil surrounding the IWIP. However, core bore samples taken in the soil surrounding the IWIP suggest that the amount of radioactivity that remains in the soil around the IWIP may be much lower than previously estimated.

Surface water that accumulates in an inactive section of the storm drain system adjacent to the MEL and IWIP is transferred and processed to remove radioactivity as discussed in Section 5.1.1.

N-Building Monitor Tank Room

Bedrock beneath the floor of the N-Building Monitor Tank Room (N-MTR), identified in Figure 3, contains low levels of radioactivity. The N-MTR was installed in 1950 to process radioactive liquid waste and operated until 1975. The radioactivity originated from spills of water containing low levels of radioactivity during water processing operations and subsequent seepage of the water through cracks in the N-MTR floor.

After operations of the N-MTR had ceased, decontamination efforts were undertaken. These efforts included removal of the floor and the fill material which supported the floor. In 1980, Bettis-Pittsburgh completed removal of the soil down to shale bedrock. This resulted in the removal of about 99% of the radioactivity. This material was disposed at a federal radioactive waste disposal site. Less than 0.04 curie of radioactivity remains at the location.

Associated with the N-MTR were two outside storage tanks which were used to store radioactive water for processing. Due to leakage of these tanks, soil beneath these tanks contained residual amounts of radioactivity. After the tanks were removed, core bore samples were collected from the vicinity of the tanks. The average cobalt-60, cesium-137, and strontium-90 results of the core bores were 0.6, 14.5, and 8.2 pCi/g, respectively.

Waste Processing Building Storage Pad

The storage pad behind the inactive Waste Processing Building has residual low-level radioactivity as a result of leaks in containers of radioactivity which were stored on the pad. The storage pad was a 14,900-square-foot pad located north and west of the Waste Processing Building where radioactive waste was processed prior to shipment of the waste to an approved, offsite disposal site. The triangular shaped pad is identified in Figure 3.

In the spring of 1972, 3,000 square feet of the concrete pad were removed along with soil beneath the pad to a depth of approximately 18 inches. The removed material was disposed of at an approved offsite disposal facility and the excavation was backfilled with clean soil and repaved with asphalt. In 1978, the remainder of the pad and underlying soil was removed and disposed of in the same manner. These two actions removed most of the radioactivity from the location. Samples taken throughout the pad area exhibited very low levels of radioactivity. Less than 0.02 curie of radioactivity remains at this location.

Inactive Waste Site

A portion of the hillside north of the inactive Waste Processing Building has residual low-level radioactivity due to operations conducted prior to 1969. This area is in the southwestern portion of the area referred to as the Inactive Waste Site (IWS), identified in Figure 3. The radioactivity originated from leaks in containers of radioactive waste which had been stored outside on the Waste Processing Building Storage Pad. Precipitation carried some activity to a nearby storm sewer which discharged onto the hillside.

Over 95% of the radioactivity on the IWS that originated from the Waste Processing Building Storage Pad was removed by excavation of soil and removal of the storm sewer. The contaminated soil was shipped to a licensed radioactive waste burial site and the area restored.

Currently, the hillside still contains some residual, low-level contamination, with less than 1.9 curies of activity remaining in the area contaminated by runoff from the Waste Processing Building Storage Pad. Radiation levels in the area are, for the most part, equal to background. While background is typically 10 μR/hr (0.00001 Rem/hr), small areas exhibit radiation levels of 15 to 18 μR/hr with a few localized areas of up to approximately 40 μR/hr.

Bull Run Stream Basin

As shown in Figure 3, the Bull Run Stream originates on the Bettis-Pittsburgh site as a wet-weather drainage ditch. When there is no precipitation runoff, the primary source of flow in the stream is from the Bettis-Pittsburgh storm sewer outfalls and consists of city water that was used for cooling purposes. The stream runs approximately one-third of a mile on the Bettis-Pittsburgh site, roughly parallel to the eastern site boundary. The stream passes through two small private properties indented along the boundary. After the Bull Run Stream leaves Bettis-Pittsburgh property, it passes through the West Mifflin Park and continues on to join Thompson Run Stream which flows into the Monongahela River. Neither Bull Run Stream nor Thompson Run Stream are known to be used as a source of water for human consumption.

In the first decades of site operation, water effluents from Bettis-Pittsburgh to the Bull Run Stream contained small amounts of radioactivity at concentrations below applicable federal limits. Over 99 percent of the radioactivity contained in the effluent water was released prior to 1969.

Although not required by federal or state regulation, Bettis-Pittsburgh began monitoring the Bull Run Stream basin in the early 1960s. The results of this monitoring were initially reported to and published by the U.S. Public Health Service in their journal "Radiological Health Data and Reports." Subsequently, the results have been provided in annual environmental monitoring reports to the EPA and PADEP. These documents indicate that, in addition to the presence of naturally occurring radioactivity in Bull Run Stream, very low levels of residual radioactivity from the earlier Bettis-Pittsburgh releases are detectable. A detailed presentation of residual radioactivity in the Bull Run Stream basin was provided to the PADEP; a summary of this information was provided in the Preliminary Assessment Report (Reference (1)) of the Bettis-Pittsburgh site, developed pursuant to CERCLA.

During the winter of 1976-77, most of the residual radioactivity along the Bettis-Pittsburgh portion of the stream basin was removed and disposed of at a licensed burial facility offsite (392 cubic meters of soil and approximately 90% of the radioactivity was removed). Soil samples taken after the removal effort indicated that only a small fraction of the residual radioactivity remained, with low, but still detectable levels observed. Most of this residual material is located along the lower two-thirds of the onsite Bull Run Stream basin in small, localized areas.

Radiation levels measured in surveys prior to the 1976-77 soil removal varied from natural background levels of approximately 10 μR/hr, to approximately 100 μR/hr at approximately waist level in isolated onsite locations, and from approximately 10 to 22 μR/hr in offsite areas; the offsite survey area included an area about 1400 feet downstream of the site boundary. Detailed surveys of the onsite Bull Run basin performed since 1976-77 show that the waist-level radiation readings are less than

20 μR/hr. The average radiation level in this area is about 13 μR/hr at waist level, which is only slightly above background.

As part of its detailed survey efforts, Bettis-Pittsburgh has also taken samples of the soil along the stream basin and measured the concentration of residual radioactivity with sensitive laboratory instruments. In addition to the naturally occurring radioactivity found in the soil, low levels of cesium-137 are detectable. The typical cesium-137 concentration along the stream basin is much less than 20 pCi/g, although a few, small spots contain cesium-137 to about 200 pCi/g. The maximum cesium-137 concentration measured to date was found in 1982 in a small, isolated spot at a level of 460 pCi/g; a subsequent sample in the immediate area contained 9.6 pCi/g of cesium-137.

During April 1993, Bettis personnel and a representative of the PADEP performed an environmental radiation survey of a portion of the Bull Run Stream basin in the West Mifflin Community Park. This portion of the basin was selected because it represents the only segment of Bull Run Stream in the West Mifflin Park area that contains low levels of Bettis-generated radioactivity above natural background levels in the soil. Radiation measurements were taken and recorded on a 10 foot by 10 foot grid system at approximately three feet above the ground surface. The area within each 100 square foot grid section was scanned.

The measured radiation levels varied from background, about 10 μR/hr, to a maximum of 27 μR/hr. These slightly enhanced, yet still very low, radiation levels are due to the presence of low levels of radioactivity, primarily cesium-137, from early site operations. These levels and locations are consistent with previously measured and reported values and indicate that there has been no migration or buildup of radioactivity into or from the area since circa 1976.

Soil samples were also collected from the surface down to rock at ten locations to determine the radioactivity profile in the soil. The sample results confirm that the primary radionuclide present is cesium-137. Cesium-137 radioactivity ranged from background to 120 pCi/g. As a measure of the significance of soil containing 120 pCi/g of cesium-137, an individual would have to consume 27 pounds of soil to receive a dose of 100 millirem which is the NRC dose limit for an individual member of the public per year. The data shows low levels of natural uranium in the soil. The data indicate the majority of the low level radioactivity is found in the top one foot or less of the soil. This profile is consistent with deposition from flooding of the area and the affinity of cesium-137 for soil particles.

The very low levels of residual radioactivity in the Bull Run Stream basin do not present a hazard to the public. Sensitive instruments must be used to detect the variations in radiation levels in the stream basin. The radiation levels detected are, on the average, a few microrem per hour above background. Since individuals have not been routinely observed in the onsite Bull Run Stream area, the likely radiation dose from the Bettis-Pittsburgh generated radioactivity in the onsite Bull Run Stream is 0 (zero) millirem (mrem). However, based on a conservative estimate that an individual would spend as much as one hour per day for the entire year along the onsite stream bank in the area with radiation levels above background, the annual hypothetical dose received would be less than 2.2 mrem. This potential radiation dose to an individual in the onsite Bull Run Stream area is well below the most restrictive dose limits of the NRC or of the DOE, and is less than 1% of the radiation exposure a person receives from naturally occurring radiation in the environment (300 mrem per year).

Inactive Systems

Bettis-Pittsburgh has inactive systems such as tanks, sumps, and underground lines associated with the processing of low level radioactive liquids. Radioactive contamination still exists in the remaining systems. In addition, some of the systems contain small quantities of residues and some systems contain ground water. These inactive systems are included in plans for eventual removal.

These underground radioactive liquid waste drain systems were installed in the 1950s. After more than 10 years of operation, the underground systems were deactivated. Since then, most of the accessible piping and adjacent soil containing low levels of radioactivity, due to leakage from the piping, have been removed and disposed as solid radioactive waste. The inaccessible sections of pipe were hydrostatically tested and capped to maintain system integrity. The remaining capped sections of pipe total approximately 7000 feet. The internal surface of this piping is expected to contain very low levels of radioactivity.

There are a few additional locations at Bettis-Pittsburgh where soil potentially contains low levels of radioactivity due to past minor breaches in containers or spills. Bettis-Pittsburgh has excavated soil from many of these areas to remove the radioactivity, but some very small amounts of radioactivity still remain in the soil.

Ground Water Radiological Monitoring Results

The ground water radiological monitoring program results show that Bettis-Pittsburgh operations have not had a significant effect on the quality of the ground water at the site.

This program has been maintained for more than 10 years and includes ground water samples from seeps, springs, and monitoring wells. Samples are collected regularly and analyzed for gross alpha, gross beta, and specific *radionuclides* associated with past or current Bettis-Pittsburgh operations, such as cobalt-60, cesium-134, cesium-137, and strontium-90. In addition, samples are also taken at remote sites for comparison of the levels of radioactivity naturally occurring in the environment in southwestern Pennsylvania with the Bettis-Pittsburgh site results. While the specific results from both onsite and offsite sampling vary from sample to sample and year to year, the results of the monitoring indicate that the gross alpha and beta radioactivity levels in the ground water at the Bettis-Pittsburgh site are consistent with the naturally occurring radioactivity levels found at remote locations.

Ground water monitoring well data in the IWS area indicate that, for the most part, gross alpha and beta radioactivity levels in the ground water are equal to background levels found in ground water remote from the Bettis-Pittsburgh site. However, a few ground water samples collected from monitoring wells near the middle of the hillside area have contained limited amounts of non-naturally occurring radioactivity.

Low levels of radioactivity have been identified in the surface soil and surface water down grade and west of the IWS hillside, off Bettis-Pittsburgh property. The gross alpha and beta radioactivity levels in the water and soil are consistent with naturally occurring levels. Specific radionuclide analysis revealed the presence of radioactivity in the soil and water. The radiation dose that could be incurred from this residual radioactivity in the soil is less than the exposure a person would receive from natural cosmic radiation during an average cross-country airline flight. The levels in the water are below both the federal limit for water in unrestricted areas and the limit for drinking water.

Ground water monitoring wells have been installed around the MEL to monitor the migration of residual radioactivity from under the MEL. Low levels of strontium-90 have been detected in these wells. The data has not shown an increase in the radioactivity levels since the monitoring began. The levels of strontium-90 found in the wells are much less than the limit for water in unrestricted areas.

The radioactivity data for the Pittsburgh Coal water-bearing zone wells are consistent with natural background levels with two possible exceptions. There are two Pittsburgh Coal water-bearing zone monitoring wells located on an adjacent property within a few feet of each other. The results from these two wells indicated the presence of low levels of strontium-90. The highest detected concentration was one-tenth the federal drinking water limit which is the most restrictive strontium-90 limit for water. In addition, the levels of strontium-90 detected are similar to levels of strontium-90 which have been detected in ground water around the country and attributed to past atmospheric nuclear weapons testing. Strontium-90 is present in the soil in the IWS from past site operations and higher than background levels of strontium-90 have previously been detected in surface drainage from the IWS. It is not clear what part of the strontium-90 detected in the wells is due to the presence of strontium-90 from past atmospheric nuclear weapons testing (Reference (5)).

5.2.3 Past Non-Radioactive Waste Management

Over the years, Bettis-Pittsburgh has generated a variety of chemical wastes. In the first few decades of laboratory operation, disposal methods included common industrial practices such as discharge to sanitary and storm sewers, placement in municipal landfills, evaporation, and onsite land disposal. In 1983, Bettis-Pittsburgh initiated efforts to identify and define areas onsite that may have been used to dispose of chemicals.

5.2.4 Chemical Residues in Soil, Ground Water, Surface Water, and Sediment

The past waste management methods described above resulted in some chemical residues in soil. A detailed discussion of the areas containing chemical residues can be found in the Final RFI Report, Reference (2), and the Final CMS Report, Reference (3).

<u>Inactive Waste Site</u>

The IWS (identified in Figure 3) was used from the late 1950s to approximately 1964 to dispose of mainly plant rubbish and excavation materials. The area was also used to dispose of some waste chemicals, such as solvents, oils, and various metal-containing sludges. Asbestos-containing materials were also deposited in the area. The site was covered with dirt from onsite excavation and construction jobs, with the last use occurring in 1972. The IWS is approximately 3.5 acres in size and is located on the hillside on the northwest portion of the site away from areas frequented by the public. The maximum depth of the fill materials is estimated to be 28 feet.

In 1985, Bettis-Pittsburgh drilled a series of borings in the IWS. The principal chemical in soil samples collected from the borings was tetrachloroethylene, (also known as perchloroethylene or PCE) a commonly used dry cleaning agent which was used at Bettis-Pittsburgh for degreasing metal parts.

There are no odors or visual evidence of environmental damage or stress, such as dead vegetation, in the area of the IWS. The vegetative growth, which consists of grasses, crown vetch, and small trees and bushes, limits direct contact with the materials and airborne releases. Asbestos air sampling and organic vapor sampling indicated levels consistent with ambient. Sampling for PCBs using a standard Occupational Safety and Health

Administration method indicated levels less than 1% of worker limits.

The results of the soil, water, and air samples collected in 1992 and 1993 during the RFI confirmed the types and levels of chemical residues previously detected at the IWS.

In 1989, surface soil and water samples collected down grade from the IWS on adjacent industrial properties owned by Duquesne Light Company and VNGI showed the presence of very low levels of PCBs and volatile organic compounds (VOCs) in the soil and VOCs and asbestos in the water. These samples were collected in a wet-weather ditch located in an undeveloped, limited access portion of VNGI property. Subsequently, additional soil and surface water samples have been collected from this area during the RFI and as part of annual monitoring. The PCB levels found in the soil, with one exception, have been less than 10 parts per million. The levels of VOCs in the surface water and soil are the result of migration from the IWS. The fiber sizes of the traces of asbestos found in the water were smaller than those considered to be a health risk from ingestion. The results have been discussed with and provided to the Duquesne Light Company and VNGI. The results of soil and water sampling performed in 1992 and 1993 during the RFI generally confirmed the types and levels of chemical residues previously detected on Duquesne Light Company and VNGI properties. During the 1992 and 1993 sampling, additional constituents were analyzed for and some low levels of polynuclear aromatic hydrocarbons (PAHs) were detected. These levels of detected PAHs are consistent with background levels for the area surrounding Bettis-Pittsburgh and, as such, do not pose any risk unique to Bettis operations. Bettis-Pittsburgh is continuing a sampling program to monitor for migration of residues from the IWS and Duquesne Light Company and VNGI are aware of the presence of these residues.

Soil Surrounding Underground Waste Oil Tanks

In about 1960, Bettis-Pittsburgh installed 10 steel underground storage tanks for the collection of waste oil. The tank volumes ranged from 65 to 550 gallons. Their function was to serve as collection points for used oil from which a vendor could pump the oil for offsite disposition. In 1979, use of the tanks was terminated and the tanks emptied except for minor amounts of residual material. In 1986, Bettis-Pittsburgh reopened the tanks and sampled the residuals remaining in the tanks and the soil around the tanks. Several of the soil analyses showed the presence of residues of the same products found inside the tanks.

Each of the tanks has been removed, cleaned, and reclaimed as scrap metal. The boundary of the affected soil around the tanks was not established in 1986 but was during 1992 and 1993. Samples of soil collected from the underground storage tank excavation areas in 1992 and 1993 during the RFI revealed that, for the most part, only trace levels of residues remain in these areas. The source of the oil and solvents is thought to be from spillage when oil was added to the tanks rather than tank leakage. This is supported by the fact that all but one of the removed tanks appeared to be intact. The quantity of affected soil is estimated to be on the order of less than 30 cubic meters.

All tank areas are inside the plant security fence, limiting contact by outside persons. The excavated holes have been lined with plastic and filled with clean sand. The sites are not being used for any purpose by plant personnel.

Petroleum Storage Tanks

In addition to the waste oil tanks, two underground gasoline tanks, an underground airport fuel tank, and an underground diesel fuel tank have been removed. These removal actions were conducted in accordance with applicable federal and state regulations.

F-Shop Area

This area (identified in Figure 3) is located immediately outside a building, the F-Shop, that at one time contained two tanks used for vapor degreasing of metals. A soil sample collected in the area from a two-foot layer of soil above bedrock contained 1.15 ppm of PCE. The source of the solvent is thought to be from the disposal of small quantities of solvents used in the F-Shop degreasing units.

The total quantity of solvent deposited in this approximate 1600-square-foot area is estimated to be a few gallons. This area is located within the plant security fence. There are no physical signs of the solvents, such as odors, nor is there any visual evidence of environmental damage.

Samples collected in 1992 and 1993 during the RFI confirmed the previously detected levels of VOCs in this small area.

Bettis Landfill Area

There are currently no landfills in use at the Bettis-Pittsburgh site. From approximately 1960 until 1987, Bettis-Pittsburgh operated a landfill area to dispose of soil and concrete removed from site excavation and construction activities. The landfill was not used for disposal of radioactive waste.

In the fall of 1987, auger borings were drilled into the fill and soil samples were collected for analysis. The soil analysis revealed the presence of PCE, trichloroethylene (TCE), trans-1,2-dichloroethylene (DCE), and PCBs. The areas of the highest chemical concentrations appeared to be centered around two of the borings located in an older portion of the fill. The chemicals were found at depths of 5 feet or greater. The exact quantity of these chemicals in the landfill is unknown but is likely to be a few hundred gallons.

The total surface area of the Bettis Landfill is approximately 1.5 acres with a maximum fill depth of approximately 20 feet. The area of the highest chemical concentration is approximately a quarter of an acre in size. There are no odors at the landfill surface or in the area surrounding the fill nor are there any visual indications of environmental stress at the landfill. Air sampling for asbestos and organic vapor indicated levels consistent with ambient. PCB sampling indicated trace amounts are detectable, but at levels less than 1% of worker limits.

This area is isolated from the developed portion of the site and the general public. The results of soil and air samples collected in 1992 and 1993 during the RFI confirmed the types and levels of previously detected chemical residues at the Bettis Landfill.

Coke Gas Lines

Bettis-Pittsburgh investigated two 40-inch diameter abandoned gas lines dating from the early 1900s that transect the Bettis-Pittsburgh site. The gas lines were used to transport coke oven gas between steel mills in the valleys of western Pennsylvania. The lines have been inactive for many years, but the investigations have found that some sections of the lines contain residual sludge and water. This sludge and water contains coal tar derivatives and other hazardous constituents such as benzene. Actions to address the coke gas lines are provided in the Final CMS Report (Reference (3)).

Storm Sewer System

The developed portion of the site is serviced by a storm sewer system which discharges primarily to the Bull Run and Northeast Area Streams. Historically, some chemicals were disposed of by discharging to the storm sewer system. Sampling of manholes in certain sections of the storm sewer system has resulted in the detection of chemical residues, including VOCs and PCBs in the sediment. These chemical residues have leaked into the soil/fill surrounding the storm sewer system in some locations. The VOCs in these areas have leached into the upper water-bearing zones. In 1992 and 1993 during the RFI, extensive sampling of the storm sewer system was performed. This sampling confirmed the presence of low-level residues in certain portions of the storm sewer system. These residues pose an insignificant risk to human health. However, in 1997, a program was completed to remove the sediment that had accumulated in select manholes around the site.

<u>Other Onsite Areas</u>

Other areas onsite were investigated in 1992 and 1993 during the RFI for the presence of chemical residues. The investigations included the collection of soil and soil gas samples. Only trace quantities of chemical residues were identified in a few areas and they pose an insignificant risk to human health and the environment.

In 1996, following completion of the RFI, small bead-like polyethylene particles, which contain approximately 7% lead by weight, were discovered in an outdoor area on Bettis property. An investigation of the area was conducted and a report of the results submitted to the EPA. The report concluded that lead contamination was restricted to the top few inches of soil in the area where the beads were observed on the surface. An evaluation of the impact of the lead-contaminated soil on ground water concluded that, although the lead contamination was not a threat to ground water, removal of the beads and entrained soil for proper disposal offsite is a viable and prudent corrective measure. The beads and entrained soil have been removed for disposal.

<u>Old Bettis-Pittsburgh Airfield Operations</u>

It is possible that small quantities of spent solvents and degreasers common to aircraft maintenance may have been discarded in some areas during the time period when Bettis-Pittsburgh was a privately owned airfield. Bettis-Pittsburgh investigations to date have failed to identify any specific disposal areas from airfield operations.

<u>Surface Water and Sediment</u>

The results of analyses for VOCs in surface water samples collected during 1992 and 1993 from onsite and offsite streams confirm the data previously obtained through historical sampling and analysis. The only surface water samples that contained site-related VOCs were collected from Bull Run Stream downstream of the confluence with the discharges from Buono and other springs within the property boundary. VOCs associated with site operations were not detected in water samples collected from the Bull Run and Northeast Stream outfalls, the Northeast Stream, or the inactive High Temperature Test Facility (HTTF) drainage channel located in the northwest portion of the Bettis-Pittsburgh site. VOCs were not detected in surface water samples collected offsite from Thompson Run Stream. Sampling and analysis of surface water demonstrated that no other chemicals were present at measurable levels.

The discharge of low levels of VOCs occurred primarily between Buono Spring and the confluence of the Bull Run Stream and Northeast Stream. The presence of VOCs in Bull Run Stream water was attributed to the continuous discharge of water to the stream from various springs and seeps discharging from a VOC impacted water-bearing zone. The springs and seeps represented a continuous source of VOC discharge to Bull Run Stream. Surface water sampling and analysis at onsite locations downstream of the Bull Run Stream/Northeast Stream confluence and offsite locations were normally near or below the analytical method detection limit of 0.005 parts per million. These results indicated that VOCs in Bull Run Stream surface water were not migrating offsite to a measurable degree. However, based on the findings of the RFI and CMS, Bettis-Pittsburgh proactively undertook measures to further reduce the potential for VOCs to migrate offsite. In late 1997, the Springwater Intercept System was installed to collect and remove the VOCs prior to discharge to Bull Run Stream through a newly established NPDES outfall. Monitoring results for treated ground water discharged from the Springwater Intercept System indicate that the system is effective in removing the VOCs.

VOCs associated with site operations were not detected in sediment samples collected from Thompson Run Stream, the Northeast Stream, or the inactive HTTF drainage channel. Sediment samples collected from Bull Run Stream and the Buono Spring discharge flow path contained VOCs. PCE was the only VOC detected in Bull Run Stream sediment. The primary source of PCE in the sediment was the discharge of water from springs and seeps that contained low levels of PCE. The Buono Spring and several other springs and seeps are now tied into the Springwater Intercept System. Therefore, PCE concentrations in the Bull Run Stream sediment are likely to decline. The results of sediment sampling and analyses at onsite locations downstream of the Bull Run Stream/Northeast Stream confluence and offsite locations during the RFI were well below screening concentrations identified by EPA Region III for risk assessment thresholds. These levels indicated that PCE in Bull Run Stream sediment was not migrating offsite to a measurable degree.

The presence of PCBs in onsite stream sediment and the inactive HTTF drainage channel is likely associated with historic disposal of wastes containing small quantities of PCBs to the storm sewer system and subsequent discharge to the various streams and the drainage channel. PAHs detected in onsite stream and spring sediments are comparable to those present in local stream sediments unaffected by site discharges and are not associated with any site-specific operations, past or present. Sampling conducted during the RFI detected only trace amounts of one pesticide and this was found in comparable concentrations in both Thompson Run and Bull Run sediments and was not associated with site activities.

<u>Ground Water and Well Water Monitoring Results</u>

Extensive ground water monitoring has been conducted at the Bettis-Pittsburgh site. This ground water monitoring program includes sampling wells, springs, and seeps. The chemicals in the ground water include the solvent PCE and its degradation products TCE and DCE. The results for PCB, PAH, and pesticide monitoring did not reveal the presence of these materials in ground water. The results of the well water analyses also revealed the presence of certain inorganic species such as iron, manganese, sulfates, and chlorides that were slightly above primary and secondary drinking water maximum permissible levels in a few cases. There are no uses for the ground water at Bettis-Pittsburgh. The iron, manganese, and sulfates are inorganic species that are commonly found in the ground water in western Pennsylvania either naturally occurring or from man-made activities such as mining. The elevated chloride levels in the well samples may be reflective of winter deicing activities onsite.

The results of the site ground water investigations indicate that ground water quality has been impacted by the release of chemical constituents at the site. Ground water quality impacts are evident in the Perched, Benwood, and Sewickley water-bearing zones and, to a much smaller degree, in the Pittsburgh Sandstone water-bearing zone. Ground water data from wells in the Pittsburgh Coal do not show evidence of chemical constituents associated with operations at the site. The ground water quality impacts in the Perched water-bearing zone are primarily related to the past practice of discharging effluents containing chemicals into the onsite storm and sanitary sewer systems and the resultant discharge of these materials into the ground water through leaks in these systems. Ground water quality impacts in the Benwood Limestone and Sewickley and Pittsburgh Sandstones are related to the release of contaminants from the IWS, Bettis Landfill, and other areas that contain chemical residues and, to a limited extent, the migrations of the chemical residues from the overlying water-bearing zones. In general, other areas of soil contamination do not appear to have had a significant effect on ground water quality. The water quality of springs that discharged from the water-bearing zones reflected the water quality obtained from the wells within those zones.

The investigation of the ground water flow path at the site, Reference (2), concludes that there is no risk to the general public from Bettis ground water migration.

5.3 Decontamination and Remedial Programs

5.3.1 Decontamination and Remedial Programs for Radioactivity

In September 1977, a long-term program was initiated by Bettis-Pittsburgh to decontaminate and reduce the number of facilities and areas requiring radiological controls and to provide efficient use of space to support current operations. This program is in progress and to date, the program has accomplished the following:

- Decontaminated for productive use nearly 7500 square meters of building floor space;
- Removed more than 3100 meters of pipes containing residual radioactivity;
- Removed over 400 cubic meters of soil with low levels of radioactivity from several regions onsite;
- Removed over 100 deactivated radiological ventilation systems; and
- Removed approximately 8700 linear feet and 21,000 square feet of radiologically contaminated asbestos building materials.

The Bettis-Pittsburgh decontamination program has concentrated on decontaminating facilities and removing contaminated equipment and structures, rather than soil. Small quantities of soil containing residual radioactivity are removed in conjunction with construction and renovation activities.

The areas with residual soil radioactivity, discussed in Section 5.2, are monitored to ensure that there is no potential for significant radiation exposure to workers or the public. There is no nationally recognized standard for radioactivity in soil. Removal of soil with low concentrations of residual radioactivity is evaluated on a case by case basis. When a national standard for radioactivity in soil is established, additional soil removal will be considered. Further, if the site were ever decommissioned as a Federal laboratory, actions would be taken to release all facilities and land for unrestricted use in accordance with all applicable requirements.

During 1991, the PADEP completed a review of radiological environmental data for the site. The PADEP concluded that the levels of residual radioactivity on and immediately adjacent to the site were far below NRC action levels and that further remedial action would not be required.

5.3.2 Remedial Programs for Chemical Residues

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires Federal facilities at which hazardous substances are located to be evaluated for potential risks to public health and the environment. This evaluation is completed by the facility or agency using an EPA-generated ranking system used to identify facilities requiring prompt remedial action. The EPA, in consultation with states, has the responsibility to review the evaluation and officially establish the ranking. Facilities with high rankings are considered for placement on the National Priority List. Otherwise, sites are addressed in accordance with individual state requirements or the requirements of other Federal laws such as RCRA. Bettis-Pittsburgh completed an evaluation for potential risks to public health and the environment and submitted the results to the EPA and the Commonwealth of Pennsylvania in Reference (1). Bettis-Pittsburgh concluded that the site has a ranking value which is well below the cutoff for listing on the National Priority List. This evaluation has been reviewed by the EPA who assigned a hazard ranking score of zero and concluded that no regulatory or remedial actions were required under CERCLA.

However, under the requirements of RCRA, sites having interim status or a final permit for hazardous waste storage must address releases of hazardous constituents to the environment from past operations. This matter was formalized in a Consent Order issued under Section 3008(h) of RCRA, and signed by PNR and the EPA in August 1990. As part of the Consent Order, the EPA agreed that the conditions onsite do not require implementation of interim measures or immediate corrective actions since site conditions do not present an imminent substantial endangerment to human health or the environment.

The Consent Order required a RCRA Facility Investigation (RFI) and Corrective Measure Study (CMS) be conducted. The RFI was conducted to characterize the site and the CMS was conducted to determine site-specific remediation alternatives. The RFI work plans were approved by the EPA in 1991. Ground water monitoring well installation and the ground water, surface water, soil, sediment and air sampling specified in the RFI work plans were completed in 1993. The Final RFI Report, Reference (2), was approved by the EPA in August 1994.

The purpose of the CMS was to evaluate and recommend, where needed, corrective measures that would protect human health and the environment. The need for corrective measures was based on the carcinogenic risks and the noncarcinogenic hazards to human health potentially posed by the chemical contaminants of concern. A risk assessment, which was included in the Final RFI Report, demonstrated that the chemical residues in the environment at the site do not realistically present a significant risk or hazard to human health. Therefore, extensive corrective measures are not considered necessary now or in the foreseeable future.

The Final CMS Report, Reference (3), proposed to the EPA several actions to ensure the conclusions of the Final RFI Report remain accurate in the future, to limit potential migration of chemical residues, and to reduce the chemical residues in the environment to as-low-as-reasonably-achievable. These actions included the collection and treatment of select spring and seep water, removal of some coke gas line residues, continued environmental monitoring, and maintenance of existing health and safety requirements for accessing areas that contain residual chemicals. The Final CMS Report was approved by the EPA in March 1995.

The EPA issued its preliminary recommendations for corrective measures in November 1995 and requested public comment on the recommendations. The EPA responded to public comments and issued final recommendations for corrective measures in October 1997. The EPA terminated the Consent Order in November 1997 and stated that all requirements of the Consent Order had been met. Although EPA is expected to issue a new Consent Order for implementation of corrective measures, no date has been established for this action. Bettis-Pittsburgh has proactively implemented several of the final recommended corrective measures.

Voluntary Remedial Programs

Bettis-Pittsburgh has actively addressed areas shown or suspected to contain chemical residues. Some examples of major voluntary efforts include the following. In the mid-1980s, Bettis-Pittsburgh removed ten underground waste oil storage tanks. Leaking gasoline storage tanks have been removed and replaced with a new tank with sophisticated leak detection systems. An old airport fuel tank and a site underground fuel oil tank for an emergency generator have been removed. Soil in the immediate vicinity of the tanks that contained chemical residues due to small spills or overfilling was removed and properly disposed. Also, approximately 200 tons of soil that contained lead from a closed outdoor firing range was removed and disposed at an offsite licensed landfill. In addition, the Springwater Intercept System was installed to collect and treat ground water containing trace levels of VOCs. Bettis-Pittsburgh has removed sediment that had accumulated in selected manholes around the site. Polyethylene beads, containing a small amount of lead, and entrained soil have been removed for disposal from an outdoor area onsite. Work has been initiated on the coke gas lines to remove sludge and water in select areas, to remove portions of a line, and to monitor the lines.

Although not required by law, Bettis-Pittsburgh has been actively engaged in the removal of friable asbestos containing materials from the Laboratory. In the past, this effort was directed to the removal of small quantities associated with repairs or renovation activities. In June 1991, a planned program to remove friable asbestos containing materials was initiated. This program has resulted in the removal of approximately 66,000 linear feet and 31,000 square feet of friable asbestos containing material thus far. This program has removed most of the non-radiologically contaminated friable asbestos containing material at Bettis-Pittsburgh. Asbestos work performed since October 1, 1994 has focused on the removal of the approximately 8,700 linear feet of radiologically contaminated asbestos.

Non-friable asbestos containing building materials such as floor tiles and roofing materials are removed during normal operations and maintenance work or as part of construction and prior to demolition activities. Although not required by law, Bettis-Pittsburgh has stopped using asbestos containing building materials.

6.0 MONITORING PROGRAMS

Bettis-Pittsburgh maintains a comprehensive environmental monitoring program covering all aspects of Bettis-Pittsburgh operations. This program includes routine environmental monitoring of outfalls and of the Bull Run and Northeast Area streams, including sediment and vegetation, gaseous and particulate airborne effluents, sanitary effluents, ground water, and environmental radiation levels. Evaluation of the environmental data indicates that the operation of the Bettis-Pittsburgh site continues to have no significant effect on the environment. The program is described in detail in the annual environmental monitoring reports. In addition to the routine monitoring, Bettis-Pittsburgh has conducted extensive special monitoring of areas of the site potentially affected by chemical and radiological residues. Examples of special monitoring efforts are described in the following sections.

6.1 Aerial Radiation Survey

Convincing evidence that Bettis-Pittsburgh does not represent a significant radiological problem comes from the results of an aerial radiation survey of the site and the surrounding areas, conducted in July 1983. The aerial radiation survey over the Bettis-Pittsburgh site covered a 100-square-mile area. The survey area included West Mifflin, McKeesport, and other nearby communities. The results of the survey for the Bettis-Pittsburgh site indicated radiation readings of background with the exception of minor elevations of the readings in the immediate vicinity of the buildings where radiological work is undertaken. No changes in radiological conditions have occurred at the site that would affect the conclusion of the 1983 aerial survey.

6.2 Ground Water Monitoring

There are no wells or springs onsite or in the local, hydraulically downgradient area which are known to be used for drinking water, industrial, or irrigation purposes. Nonetheless, Bettis-Pittsburgh monitors the ground water under the site to determine what, if any, effects the operations at the site have had on the quality of the ground water. This program has involved the installation of over 100 ground water monitoring wells. Selected wells and various springs onsite are monitored for both chemical and radiological parameters. These analyses are used to evaluate the impacts on the ground water. The results of the ground water monitoring are discussed in Section 5.2.4.

7.0 ASSESSMENT OF HUMAN HEALTH IMPACTS

The impact of Bettis-Pittsburgh operations on the environment can be assessed separately in terms of radioactive and non-radioactive effects.

7.1 Radiological Assessment

With respect to radioactivity, Bettis-Pittsburgh has been monitoring discharges of radioactivity to the environment from the site in liquid and airborne effluents. Effluent discharges of radioactivity have been at levels below limits prescribed by applicable federal, state, and local authorities.

Bettis-Pittsburgh has never maintained a radioactive waste burial ground. However, activities in the past have resulted in small amounts of radioactive material deposited in localized areas of soil onsite. There are five primary locations onsite where such releases occurred: Inactive Waste Isolation Pit, N-Building Monitor Tank Room, Waste Processing Storage Pad, Inactive Waste Site, and the Bull Run Stream Basin. Bettis-Pittsburgh is continuing with a program to monitor and, where appropriate, clean up and remove those structures and adjacent soil where the radioactivity exists. At the present time, the estimated total quantity of manmade radioactivity in the soil at the Bettis-Pittsburgh site is less than 72 curies, which is no more than the amount of naturally occurring radioactivity in the top 2 feet of soil in a local area the size of the Bettis-Pittsburgh site.

The comprehensive site radiation monitoring program, which is described in the annual environmental monitoring report, shows that the radiation dose to persons offsite is too small to be measured. Bettis-Pittsburgh has employed calculational techniques that conservatively estimate potential exposures. These calculational techniques consider inhalation, ingestion, and direct radiation exposure pathways. The most recent assessment for 1997 shows that the maximum potential radiation exposure to a member of the public was less than 0.003 Rem for the entire year. The calculations also show that in previous years, the annual radiation exposures to people living adjacent to Bettis-Pittsburgh were well below the annual regulatory limits.

7.2 Non-Radiological Assessment

Regarding non-radiological environmental effects, Bettis-Pittsburgh monitors effluent water, ground water, sanitary discharges, sediment, and surface water to ensure that they meet the requirements of applicable federal and state environmental standards. The annual environmental monitoring report shows that Bettis-Pittsburgh operations have no significant effect on the environment around the site or the general public.

Hazard ranking calculations done in accordance with guidelines for judging the significance of waste areas containing chemical and radioactive residues have been conducted in accordance with Federal law (see Reference (1)). The calculation concludes that the Bettis-Pittsburgh site scores well below the values which would make the site a candidate for placement on the National Priority List. The calculations and supporting documentation have been reviewed by the EPA who assigned a hazard ranking score of zero. The EPA concluded that no action was required under CERCLA.

A site specific risk assessment was prepared as part of the Final RFI Report. This assessment was prepared using the Superfund related methodology outlined in Reference (4). The detailed assessment, presented in the Final RFI Report (Reference (2)), is summarized below.

The objective of the assessment was to determine the reasonable maximum exposure of onsite and offsite populations to environmental contamination at the site. The media containing chemical residues are soil, ground water, surface water (springs and streams), and sediment. Residues whose concentrations exceeded the EPA Region III risk-based screening levels were evaluated. The main residues evaluated were VOCs, PCBs, and PAHs.

Risks were evaluated for present and future realistic industrial land-use scenarios. EPA exposure default parameters were used for offsite commercial/industrial workers. Site-specific exposure parameters were used for pathways where standard EPA values were not available or were not appropriate. All exposure pathways judged to be complete now and in the future were quantified. Ground water exposure was not quantified because the onsite and offsite populations that are hydraulically downgradient receive municipal water and this is unlikely to change for the foreseeable future because the municipal water supply is convenient, reliable, and safe.

The risk assessment quantified carcinogenic risk and noncarcinogenic hazard for four potentially exposed populations:

- Onsite construction workers exposed to chemical residues in soil;
- Offsite commercial/industrial workers exposed to chemical residues in soil;
- Trespassing children exposed to chemical residues in water and sediments in springs and streams; and
- Offsite children exposed to chemical residues in water in a spring and sediment in a stream.

Based on EPA criteria, the calculated carcinogenic risk and noncarcinogenic hazard values were compared with the values of 1.0×10^{-6} and 1.0, respectively, which represent acceptable risk levels. The non-carcinogenic hazard value of 1.0 indicates that overall non-carcinogenic hazards are not of concern. Remedial actions are generally not required until the hazard value exceeds 10.0.

In summary, the risk assessment concluded chemical residues in the environment at the site do not pose significant health risks to potentially exposed populations using reasonable maximum exposure assumptions. The only study area with a carcinogenic risk estimate exceeding the comparison criterion is VNGI soil, with a maximum carcinogenic risk of approximately 2×10^{-5}. However, exposure (dermal contact, ingestion, and inhalation) for 250 days/year for 25 years is required to achieve this risk. This risk is within the EPA post-remediation criteria of 1.0×10^{-4} to 1.0×10^{-6}. In addition, this risk is highly conservative because the contaminated portions of the VNGI property are in infrequently accessed or undeveloped locations. In reality, the risk at VNGI is less than 1.0×10^{-6} because the realistic exposure is much less than that used in the calculations. Non-carcinogenic risks were all significantly less than the comparison criteria of 1.0.

Bettis-Pittsburgh will continue actions to preclude any impact on the environment from the remaining residual chemical or radioactive materials at the site in accordance with federal, state, and DOE requirements.

8.0 AUDITS AND REVIEWS

Bettis-Pittsburgh uses training, surveillances, controls, checks and cross-checks, audits, and inspections of numerous kinds to maintain high standards of environmental control. Examples include:

- Each worker is specially trained in the appropriate controls as they relate to their job.
- Written procedures must be followed in many cases.
- Supervisors oversee environmental monitoring and related work.
- Engineering and environmental staff are available to assist area personnel.
- Bettis-Pittsburgh maintains an independent audit program that covers environmental requirements and includes in-depth audits of specific areas.
- The NNPP maintains an onsite resident office with a technical staff that reports directly to the Director, NNPP in Washington, D.C. Several personnel in this office are assigned full time to audit and review environmental controls. NNPP headquarters personnel also conduct periodic in-depth inspections of these areas.

In addition to the above controls, various aspects of the Bettis-Pittsburgh environmental program are reviewed by other Government agencies. For example, both the PADEP and the EPA have conducted onsite inspections of RCRA programs as illustrated by Table 1. None of these EPA, state, or local inspections have ever detected a significant item of non-compliance in operations. Only minor administrative shortcomings have been noted and these have been corrected.

During negotiation of the Consent Order, Bettis-Pittsburgh received a Notice of Violation (NOV) from the PADEP concerning the presence of residual chemicals in the ground water at Bettis-Pittsburgh due to past practices as previously identified to the state in the evaluations discussed in Section 7.0. PNR and Bettis-Pittsburgh are working with the PADEP to resolve the NOV. A draft Consent Order requiring operation of the Springwater Intercept System has been submitted to the PADEP for review and consideration. It is expected that this Consent Order would resolve the issues raised in the NOV.

TABLE 1
ENVIRONMENTAL INSPECTIONS OF THE BETTIS-PITTSBURGH SITE

TOPIC	DATE	AGENCY
RCRA	September 12, 1989	EPA-Region III
	June 12, 1990	PADEP
	September 12, 1990	EPA-Region III
	May 29, 1991	PADEP
	August 16, 1991	EPA-Region III, PADEP
	August 26, 1992	PADEP
	August 16, 1993	PADEP
	September 9, 1994	PADEP
	August 11, 1995	PADEP
	July 11, 1996	PADEP
	July 23, 1997	PADEP
	September 10, 1998	PADEP
Asbestos	August 16, 1991	EPA-Region III
	September 27, 1991 (2)	EPA-Region III
	October 4, 1991	ACHD
	October 23, 1991	ACHD
	November 1, 1991 (3)	EPA-Region III
	November 15, 1991	EPA-Region III
	December 20, 1991 (2)	EPA-Region III
	February 14, 1992	EPA-Region III
	April 5, 1992	ACHD
	May 17, 1992	ACHD
	May 29, 1992 (3)	EPA-Region III
	September 4, 1992 (2)	EPA-Region III
	September 18, 1992	EPA-Region III
	October 13, 1992	EPA-Region III
	January 22, 1993	EPA-Region III
	March 12, 1993 (6)	EPA-Region III
	April 7, 1993	EPA-Region III
	August 6, 1993 (2)	EPA-Region III
	October 29, 1993 (2)	EPA-Region III
	November 19, 1993 (3)	EPA-Region III
	December 10, 1993	DOLI
	December 22, 1993	EPA-Region III
	March 1, 1994	EPA-Region III
	March 28, 1994	DOLI
	May 2, 1994	EPA-Region III
	July 8, 1994 (3)	EPA-Region III
	April 6, 1995	DOLI
	April 19, 1995	ACHD
	May 19, 1995	ACHD
	May 24, 1995	DOLI
	June 8, 1995	ACHD
	June 21, 1995	ACHD
	July 3, 1995	ACHD
	July 6, 1995	ACHD
	July 17, 1995	ACHD
	July 26, 1995 (2)	ACHD
	August 15, 1995	ACHD
	September 12, 1995	ACHD
	October 6, 1995 (2)	ACHD
	November 7, 1995	ACHD
	November 13,1995(3)	ACHD
	November 16, 1995	ACHD
	November 28, 1995	ACHD
	December 8, 1995	ACHD
	December 15, 1995	ACHD
	December 21, 1995	ACHD
	January 30, 1996	ACHD
	March 15, 1996	ACHD
	March 29, 1996	ACHD
	April 8, 1996	ACHD
	May 20, 1996	ACHD
	May 23, 1996	ACHD

TABLE 1
ENVIRONMENTAL INSPECTIONS OF THE BETTIS-PITTSBURGH SITE (cont'd)

TOPIC	DATE	AGENCY
	June 20, 1996 (2)	ACHD
	June 24, 1996	ACHD
	July 15, 1996 (2)	ACHD
	July 19, 1996	ACHD
	July 30, 1996	ACHD
	September 22, 1996	ACHD
	October 8, 1996 (2)	ACHD
	November 5, 1996 (2)	ACHD
	December 20, 1996 (4)	ACHD
	January 8, 1997	ACHD
	January 27, 1997	ACHD
	February 7, 1997	ACHD
	June 18, 1997	ACHD
	July 24, 1997	ACHD
	August 20, 1997 (2)	ACHD
	August 27, 1997	ACHD
	September 22, 1997	ACHD
	October 6, 1997	ACHD
	October 10, 1997	ACHD
	November 12, 1997 (2)	ACHD
	December 11, 1997	ACHD
	February 19, 1998	ACHD
	April 2, 1998 (3)	ACHD
	April 16, 1998 (2)	ACHD
	April 28, 1998	DOLI
	May 15, 1998	ACHD
	May 26, 1998 (2)	ACHD
	June 15, 1998 (3)	ACHD
	June 18, 1998	ACHD
	July 13, 1998	ACHD
	July 23, 1998 (2)	ACHD
	July 28, 1998	ACHD
	August 21, 1998 (2)	ACHD
	August 27, 1998	ACHD
	September 9, 1998 (2)	ACHD
	September 18, 1998 (4)	ACHD
	October 5, 1998 (5)	ACHD
	October 23, 1998 (2)	ACHD
	November 5, 1998	ACHD
	November 20, 1998 (2)	ACHD
NPDES	November 20, 1995	PADEP
	December 7, 1995	PADEP
	March 12, 1996	PADEP
	August 9, 1996	PADEP
	March 13, 1997	PADEP
	December 3, 1998	PADEP
Air	March 31, 1993	ACHD
	September 27, 1996	ACHD
	April 2, 1998	ACHD
	September 18, 1998	ACHD

NOTES:

This table identifies inspections conducted during the period of 1989 through 1998.

When more than one inspection was performed, the number of inspections is shown in ( ).

EPA - U.S. Environmental Protection Agency
PADEP - Pennsylvania Department of Environmental Protection
ACHD - Allegheny County Health Department
DOLI - Pennsylvania Department of Labor and Industry

9.0 REGULATORY MATTERS

Bettis-Pittsburgh always responds promptly and effectively to meet new federal, state, and local requirements. Bettis-Pittsburgh maintains a program to review changes in regulatory requirements to ensure operations remain in compliance with applicable laws and regulations.

Resource Conservation and Recovery Act (RCRA)

This Act establishes requirements for the proper treatment, storage, and disposal of chemically hazardous wastes. Currently, Bettis-Pittsburgh operates in accordance with its Hazardous Waste Storage Permit which was issued by the PADEP in February 1995. The Hazardous Waste Storage Permit includes specific details regarding operations and management practices for safe control and storage of hazardous wastes. The permit application has been amended to include the Mixed Waste Storage Facility, currently operated under interim status.

During 1990, a Consent Order issued under Section 3008(h) of RCRA was signed by PNR and the EPA. Details of the requirements and compliance status of the Consent Order are provided in Section 5.3.2.

Federal Facility Compliance Act (FFCA)

This Act requires the DOE to prepare Site Treatment Plans to address treatment of mixed radioactive and hazardous waste for each DOE site which generates and stores mixed waste. These plans were approved by the states (or the EPA in cases where the state has not been delegated authority to regulate mixed waste). The Bettis-Pittsburgh Site Treatment Plan was provided to EPA Region III and was approved by the EPA in October 1995. In addition, PNR and the EPA Region III entered into a Consent Agreement and Consent Order which implements the Site Treatment Plan.

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

This Act, commonly known as Superfund, establishes requirements for the identification of areas where hazardous materials may be present in the environment and for the evaluation of possible risks from these contaminants to the public health and the environment. Bettis-Pittsburgh has prepared and submitted to the EPA and the Commonwealth of Pennsylvania the documentation concerning such areas at the site (discussed in Section 5.0) as is required by CERCLA (Reference (1)). The submittal includes hazard ranking calculations conducted in accordance with EPA methods. The ranking calculation concludes that the Bettis-Pittsburgh site scores well below the value which could place the site on the National Priority List. The EPA reviewed the submittal and assigned a hazard ranking score of zero and concluded that no further action was required under CERCLA.

Superfund Amendments and Reauthorization Act (SARA)

This Act, more commonly known as SARA, is a five-year extension of the programs established under Superfund (CERCLA) to clean up hazardous releases at past hazardous waste sites. In addition, SARA created a separate fund for the cleanup of leaking underground petroleum storage tanks and defined a new regulatory program known as the Emergency Planning and Community Right-to-Know Act (EPCRA). As part of the requirements of EPCRA, Bettis-Pittsburgh has submitted details on the amounts, locations, and potential health hazards associated with onsite hazardous materials to state and local emergency planning groups.

Clean Air Act (CAA)

This Act, as amended in 1990, established requirements for the control of air emissions. The regulations promulgated pursuant to the CAA also govern use of ozone depleting substances, the use and removal of asbestos containing materials, and the emission of radionuclides to the environment. For the Bettis-Pittsburgh site, most of the non-radiological air programs are administered by the ACHD through its Article XXI regulations. In 1995, Bettis-Pittsburgh submitted an Air Pollution Operating Permit application in accordance with updated CAA and ACHD requirements. The ACHD has not issued the permit, however, Bettis-Pittsburgh is operating in accordance with all current regulations and conditions identified in the permit application. Radiological air emissions at Bettis-Pittsburgh are monitored and reported annually to the EPA in accordance with the requirements of the National Emission Standards for Hazardous Air Pollutants.

Clean Water Act (CWA)

The Clean Water Act requires facilities that discharge pollutants to navigable waters to obtain authorization for their discharges by acquiring an NPDES permit. NPDES permits specify the discharge limitations and monitoring requirements for selected parameters in a facility's effluents. The Bettis-Pittsburgh site received its first NPDES permit, which was issued by the Commonwealth of Pennsylvania, in 1977. The site NPDES permit has been renewed several times and currently covers seven outfalls. Two outfalls discharge storm water, process water, and once-through non-contact cooling water. Four outfalls discharge only storm water. The most recently permitted outfall discharges treated ground water from the Springwater Intercept System.

Other Laws and Regulations

Bettis-Pittsburgh also operates in compliance with other federal, state, and local environmental regulations. The PCB program onsite is managed in accordance with Toxic Substances Control Act regulations. Compliance with Commonwealth of Pennsylvania laws and regulations that regulate waste, water, and tanks is also maintained.

REFERENCES

(1) Preliminary Assessment and Site Inspection Report for the Bettis Atomic Power Laboratory, Revision 1, January 1990.

(2) Final Resource Conservation and Recovery Act Facility Investigation (RFI) Report for the Bettis Laboratory, West Mifflin, Pennsylvania, June 1994.

(3) Final Corrective Measures Study (CMS) Report for the Bettis Laboratory, West Mifflin, PA, January 1995.

(4) Risk Assessment Guidance for Superfund (RAGS) Volume I (Part A), Human Health Evaluation Manual, USEPA, 1989.

(5) 1997 Environmental Monitoring Report for the Bettis Atomic Power Laboratory, West Mifflin, Pennsylvania, August 1998.

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