UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

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DECLARATION FOR THE RECORD OF DECISION

PETERSON/PURITAN, INC. SITE
OPERABLE UNIT 1
CUMBERLAND/LINCOLN, RHODE ISLAND

STATEMENT OF PURPOSE

This Decision Document presents the selected remedial action for the Peterson/Puritan, Inc. Superfund Site, Operable Unit 1, in Cumberland and Lincoln, Rhode Island, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. §§ 9601 et seq. and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as amended, 40 C.F.R. Part 300. The Region I Administrator has been delegated the authority to approve this Record of Decision (ROD).

The State of Rhode Island has concurred with the selected remedy.

STATEMENT OF BASIS

This decision is based on the Administrative Record which has been developed in accordance with Section 113(k) of CERCLA and which is available for public review at the Cumberland Public Library, 1464 Diamond Hill Road, Cumberland, and the Lincoln Public Library, Old River Road, Lincoln, Rhode Island, and at the Region I Waste Management Division Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix E to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from Operable Unit 1, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to the public health or welfare or to the environment.

DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for Operable Unit 1 which includes both source control and management of migration components to obtain a comprehensive remedy.

Major Components of the Selected Remedy

Operable Unit 1 contains two remediation areas. The CCL remediation area, a source of volatile organic contamination, includes the former Peterson/Puritan, Inc. facility, which is the Site's namesake (currently the CCL Custom Manufacturing facility, and referred to as CCL). Adjoining the CCL facility to the south is an undeveloped parcel known as the O'Toole property, which is included as part of the CCL remediation area. The PAC remediation area includes the Pacific Anchor Chemical Corporation (PAC) facility (formerly the Lonza and Universal Chemical Company facility), which is a source of arsenic and volatile organic contamination. Each remediation area is further split into source and downgradient area components, respectively. The components of the selected remedy include:

CCL remediation area:

- Excavation (manholes and catch basins),
- Capping,
- Soil venting of source area soils,
- Source area ground water extraction, treatment and discharge to POTW via the sewer,
- Downgradient area ground water extraction with the untreated ground water discharged to the POTW via the sewer,
- Natural attenuation of ground water at the Quinnville wellfield,
- Institutional controls throughout the CCL remediation area, and
- Environmental monitoring.

PAC remediation area:

- Excavation and disposal of contaminated leach fields and related soils,

- In-situ oxidation treatment of the soils in the PAC source area,
- Natural attenuation of the PAC downgradient ground water,
- Institutional controls throughout the PAC remediation area,
- Focussed investigation of other potential sources of contamination in the PAC downgradient area, and
- Environmental monitoring.

Excavation: Excavation at the CCL area will consist of removing soils at manholes and catch basins. Excavation of these soils will remove a portion of the continuing source of ground water contamination. Excavation at the PAC remediation area includes removal of leachfields #1 and #2 and surrounding soils to a depth of approximately nine feet. Excavation will remove the source of contaminants to ground water in addition to removing organic material contributing to the mobilization of arsenic. The excavation soils which are contaminated with volatile organics and arsenic will be transported off-site for disposal at a RCRA-approved disposal facility.

Capping: Source area soils at the CCL remediation area will be capped to enhance the soil venting system operation (see below), limit infiltration through the soil and reduce the potential for direct contact of source area soils. An estimated 14,000 square foot area of the tank farm will be capped with concrete and an estimated 12,000 square feet of the O'Toole property will be paved.

Soil Venting and Vapor Treatment: A soil venting system (also known as Soil Vapor Extraction (SVE)), consisting of wells, blowers, and a Granular Activated Carbon (GAC) adsorption/regeneration off-gas treatment system, will be installed at the CCL source area. It is estimated that the SVE system will result in 99 percent removal of VOCs above the ground water table (vadose zone) in the vicinity of the CCL tank farm.

Source Area Ground Water Extraction: A multi-well recovery system in the CCL source area will capture and treat ground water within and immediately downgradient of the source to prevent migration of contaminated ground water from the source. Wells within the tank farm area will capture the grossly contaminated ground water and depress the ground water table in the source area. This depression will extend the vadose zone and allow further recovery of residual contamination at and below the static water table by the SVE system. Wells on the O'Toole property will cut off the source area from the downgradient plume.

A diffused air stripper will be used to treat the extracted ground water. Compared to other options considered in the FS, this process option will be less susceptible to fouling and reduced efficiencies from naturally occurring inorganics in the ground water, such as iron and manganese, due to the higher water velocity traveling through the system. The inorganics travel through the treatment system as suspended solids and will be discharged with the treated water to the POTW via the sewer. The VOC contaminated air passing through the stripping process will be treated by the GAC adsorption/regeneration system.

The GAC adsorption/regeneration off-gas treatment system will treat the contaminated air stream exiting the SVE system and the air stripper. The GAC system will regenerate the spent activated carbon on-site using steam. The concentrated chemical solutions from the steam stripping process will be temporarily stored on-site prior to off-site treatment and disposal.

In-situ Oxidation: In-situ (in place) oxidation, an innovative technology, has been selected to reduce the mobility of the arsenic in ground water migrating from the leachfields at the PAC remediation area. The leachfields will be replaced with perforated pipe and stone backfill to be used as an infiltration gallery. Clean water, amended with a chemical additive, will reduce the mobility of the arsenic by chemically changing the more soluble arsenite to arsenate, which will precipitate or sorb to soil particles.

Downgradient Ground Water Extraction and Discharge: Recovery of the ground water plume that has migrated from the CCL source area will be accomplished by installing a multi-well recovery system. This extracted ground water can be directly discharged to the POTW sewer without pretreatment. Monitoring of the influent to the sewer will ensure continued compliance with POTW requirements.

Institutional Controls: Institutional controls will be required for all remediation areas, including the Quinnville wellfield and the PAC downgradient area. These controls will function to prevent the use or hydrologic alteration of ground water throughout OU 1, and prevent direct contact to, or exposure to, contaminated soils in areas where such soils exceed EPA's risk range.

Environmental Monitoring: Environmental monitoring is incorporated into the remedy to measure the rate of reduction of contaminants and evaluate the effectiveness of the components of the remedial action, including the natural attenuation processes acting on the contaminated media throughout OU 1.

Natural Attenuation: Natural attenuation is a process of naturally occurring biodegradation, oxidation, adsorption and dilution which reduces contaminant concentrations. This process will be the sole means of remediation at two areas of OU 1: the Quinnville wellfield and the PAC downgradient area. A focussed investigation will gather information on other potential sources impacting ground water at the PAC downgradient area.

DECLARATION

The selected remedy is protective of the human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this remedial action, and is cost-effective. This remedy satisfies the statutory preference for remedies that utilize treatment as a principal element to reduce the toxicity, mobility, or volume of hazardous substances. In addition, this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Sept 30, 1993
Date

Paul Keough
Paul G. Keough
Acting Regional Administrator
U.S. EPA, Region I

RECORD OF DECISION
PETERSON/PURITAN, INC. SITE
OPERABLE UNIT # 1,

REGION I

September 30, 1993

RECORD OF DECISION SUMMARY
PETERSON/PURITAN, INC., SITE
OPERABLE UNIT #1

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RECORD OF DECISION SUMMARY
PETERSON/PURITAN, INC. SITE
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September 30, 1993

I. SITE NAME, LOCATION AND DESCRIPTION

The Peterson/Puritan, Inc. Superfund Site is located within the towns Lincoln and Cumberland, in Providence County, Rhode Island. The Site is situated within the Blackstone River Valley, south of the RI Route 116 overpass, extending approximately two miles down the Valley and as much as one-half mile to the northeast and to the southwest of the Blackstone River. The Site includes the extent of contamination that has impacted wellfields in the towns of Cumberland and Lincoln, Rhode Island. The Site, investigated by EPA under a Remedial Investigation (RI) in February 1990, includes the industrial facilities in the vicinity of Martin Street, the J.M. Mills Landfill, State and town recreational areas, interspersed woodlands and grass meadows, wetlands, the River and adjoining canal, and the affected municipal water supply wellfields in the towns of Cumberland and Lincoln; specifically, the Quinnville wellfield in Lincoln and the Martin Street and Lenox Street wells in Cumberland. These wells are now out of service; the Martin Street well house now functions as the town dog pound.

The Blackstone Valley is the most prominent geographic feature in the Site. The Blackstone River flows in a southeasterly direction through the valley on a comparatively flat floodplain between river terraces. The main channel of the river is approximately 150 feet wide and extremely variable in depth and flow. Through much of the Site, the River marks the boundary between the towns of Lincoln to the west and Cumberland to the east. The Blackstone Canal parallels the river on the Lincoln side. The canal originates where drainage is diverted from the Blackstone River north of the Site and rejoins the river south of the Site. The canal is no longer in use but remains hydraulically connected and historically significant to the area. The Blackstone River Heritage Park is being developed by the State along the canal and river route, through the Site, predominately on the Lincoln side of the river. All of the industrial facilities within the Site are located on the Cumberland side of the river. Figure 1 of Appendix A depicts the Site.

On September 9, 1983 the Site was listed on the National Priorities List (NPL) of hazardous waste sites to be investigated and remediated under the Federal Superfund program.

Because of the expansive Site area and the number of identified areas of concern, EPA, in 1990, divided the Site into operable units, allowing for resources and response actions to be focussed in a phased approach. As a result, a second, more focussed phase of study was commenced at Operable Unit 1 (OU 1). This study included a Feasibility Study which presented remedial alternatives for this operable unit. This Record of Decision (ROD) addresses the response actions to be taken at OU 1.

OU 1 contains two principal contaminant sources. The first source is the former Peterson/Puritan, Inc. facility, which is the Site's namesake (currently the CCL Custom Manufacturing facility, and referred to in this document as the CCL facility). Adjoining the facility to the south is an undeveloped parcel known as the O'Toole property. The second source is the Pacific Anchor Chemical Corporation (PAC) facility, formerly the Lonza and Universal Chemical Company facility. The PAC facility and the CCL facility are each located in Cumberland, off of Mendon Road and Martin Street, respectively. From these source areas OU 1 extends down the river valley to approximately 2,000 feet south of the CCL facility along the east bank of the river. The Blackstone River and the Quinnville wellfield are primary receptors of the contaminated ground water migrating from OU 1.

OU 1 is mainly comprised of industrial and commercial parcels with predominantly residential property to the west and mixed commercial and residential properties to the east. Recreational areas are noted by the presence of ball fields located on Martin Street and the Blackstone River Heritage Park along the river. EPA estimated that over 100 residences are located within a one mile radius of OU 1. Figure 2 depicts the boundaries of OU 1.

Within OU 1, the Blackstone Valley aquifer is classified by the State of Rhode Island as GAA Non-Attainment. This classification denotes that ground waters classified as GAA are those ground water resources designated to be suitable for public drinking water without treatment. Non-attainment areas are those areas that have pollutant concentrations greater than the ground water quality standards for the applicable classification. The goal for non-attainment areas is restoration to the ground water quality consistent with the standards of the applicable class (i.e. GAA). The Blackstone River is classified as Class C denoting a recreational, industrial process and cooling water use, and fish and wildlife habitat. According to Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency (FEMA), the 100-year floodplain encompasses approximately two-thirds of OU 1. However, the principal source areas, the CCL and PAC facilities, are not located in the floodplain, but are elevated 15 to 20 feet above it.

A more complete description of OU 1 can be found in the Peterson/Puritan, Inc. Site, Lincoln and Cumberland, Rhode Island Revised Final Remedial Investigation Report, Primary Source Area (OU 1), June 1993, in Section 1 of Volume 1. Further information regarding the description of the Site can also be found in the following documents: Peterson/Puritan, Inc. Site, Cumberland, Rhode Island Draft Remedial Investigation Report, February 1990, in Section 1 of Volume 1, and the Lincoln/Cumberland Wellfield Contamination Study, March 1982, Sections 1 and 2.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. History and Response

The Blackstone Valley was settled in the seventeenth century, and became one of the earliest sites of the Industrial Revolution in America. Regionally, the river provided power, supplied water, and served as a conduit for waste water discharge.

Ground water from the Blackstone Valley aquifer was first developed as a municipal water supply source in OU 1 in 1950 when the Town of Cumberland installed the Martin Street well. The Lenox Street well was added to the Cumberland system near the southern end of the Site in 1964. Until approximately 1967, these two wells supplied most of Cumberland's water needs. By 1967, the Martin Street well was no longer in service due to iron and manganese and by 1979 the Lenox Street well was the source of only 4 percent of the town's water supply. Most of Cumberland's water by that time came from surface sources and from the Manville wells located several miles up-valley from the site.

According to reports, in 1972, Peterson/Puritan pumped out its septic systems and was connected to the municipal sewer system. The facility eliminated its wastewater discharge to Brook A (see Figure 4) in 1975 and relocated its storage of hazardous materials to contained storage areas. In 1976, an explosion occurred at the plant which required new construction and modifications to the facility. It was reported that the incident did not affect the tank farm or cause any substantial releases. In 1983, Peterson/Puritan, Inc. installed engineering changes to plant chemical and wastewater piping systems. In response to contamination detected on its property, Peterson/Puritan implemented a contaminated ground water recovery well program in 1984 which operated for approximately eight years.

The Town of Lincoln installed its first supply well in the Quinnville wellfield in 1957. In 1970 and 1975 Lincoln installed two more wells at this location. By 1979, the Quinnville wellfield was supplying Lincoln with approximately 45 percent of its water.

During routine statewide sampling of wells in 1979, the Rhode Island Department of Health (RIDOH) discovered volatile organic compounds (VOCs), some at levels exceeding EPA drinking water guidelines, in three Quinnville wells and the Lenox Street well. The primary contaminants were 1,1,1-trichloroethane (TCA) and tetrachloroethylene (PCE) at concentrations ranging from 27 to 166 parts per billion (ppb) in all four wells tested. Trichloroethylene (TCE) was also detected at 14 ppb at Quinnville well #1. All wells were closed, and the Town of Lincoln constructed two new wells in the Blackstone Valley aquifer, one north and one south of the Quinnville wellfield beyond the area of the Site. The Town of Lincoln later took measures to connect to the Providence water system. Cumberland's water shortfall was offset by other town-owned water resources, including the Sneech Pond reservoir and municipal supply wells in the Abbott Run

watershed and within the Blackstone Valley aquifer north of the Site. The Town also purchases water from Pawtucket.

Local industrial use of ground water began in the nineteenth century. Such uses included process water and fire protection. With the exception of the Okonite facility, the industrial use of ground water in OU 1 was discontinued by the early 1970's. The supply well at the Okonite facility was closed in 1981, when VOCs were detected during preliminary site investigations conducted by EPA.

There are no known residential wells currently operating as a drinking water supply in the Blackstone Valley Aquifer in the vicinity of OU 1.

In 1981, in response to the contamination detected in the Lenox Street and Quinnville wellfields, EPA undertook a hydrogeologic study of the portions of the Blackstone Valley aquifer underlying the river in Lincoln and Cumberland, Rhode Island. EPA reviewed available data, investigated a number of potential sources and developed a ground water flow model to ascertain the nature and extent of contamination at the Site.

The study identified the Peterson/Puritan (P/P), Inc. facility as a major source of the ground water contamination found in the Quinnville wells. Similar contamination found in the Lenox Street well also suggested a potential link to the Peterson/Puritan source.

Information obtained at that time indicated that the Peterson/Puritan, Inc. facility was the only facility known to use, store and dispose of halogenated volatile organic compounds. Plant operations involved the packaging of a variety of aerosol products such as perfumes, oven cleaners, pesticides, hair sprays, deodorants, and window cleaners. Before 1976, chlorofluorocarbons and methylene chloride propellants were used in many products. On August 4, 1981, a sample of runoff discharging from pipes located in the northwest corner of the Peterson/Puritan building into a culvert known as Brook A was found to contain methylene chloride and 1,1,1-trichloroethane. Tabulated data showed that six of the seven contaminants found at the Lincoln wellfield were typical components of products packaged by the Peterson/Puritan facility. Three compounds were identified by Peterson/Puritan as used at its facility; 1,1,1-TCA, PCE, and trichlorofluoromethane.

Through later investigations conducted in November, 1990, during the RI, EPA learned that in July, 1974, a release of PCE occurred from a railcar which was off-loading product to the Peterson/Puritan tankfarm. An estimated 6200 gallons of PCE spilled onto the ground along the rail spur in close proximity to the tank farm at the Peterson/Puritan facility. This spill, along with historical releases of volatile organic compounds into manholes and catch basins associated with the facility's sewer system, is the primary source of contamination at the CCL facility. Figure 3 depicts the CCL facility and associated tankfarm (formerly Peterson/Puritan, Inc.).

A July 24, 1981 RCRA inspection of the PAC facility revealed no halogenated volatile organic compounds. However, the inspection revealed the existence of on-site septic tanks and a leach field. A portion of the facility's wastewater and non-contact cooling water, while not containing halogenated compounds, did discharge to a culvert known as Brook A (Figure 4). Samples taken from the facility indicated the presence of acetone, 2-propanol, toluene, ethylbenzene and methyl isobutyl ketone (MIBK). Samples of the facility's wastewater taken in 1981 (reported to the Blackstone Valley Sewer District) and in 1984 (collected by RIDEM) contained high concentrations of arsenic, associated with chromium and nickel, and tetrachloroethylene and xylene, respectively.

The facility continues to discharge non-contact cooling water to Brook A under a Rhode Island Pollution Discharge Elimination System (RIPDES) permit. The facility manufactures general industrial chemicals and specialty chemical materials for use in detergents, cosmetics, agriculture and food.

Information obtained from PAC indicates that there are three leachfields located on the PAC facility which were in use at various times. The two main leachfields, designated as Leachfield #1 and #2, were installed in approximately 1973 and were shut down in 1985. The third field, designated as Leachfield #3, is known to have been in use in 1972, and may have been installed as early as 1962. Although the exact use of this third leachfield is not known, it is still in use today as a sole sanitary system. Figure 5 shows the locations of each of the PAC leachfields.

An important source of contamination at the PAC facility is the discharge of VOCs, primarily acetone and isopropanol, to on-site septic systems and leachfields. Arsenic, another important source of contamination in ground water at the PAC facility, has been detected in PAC facility wastewaters. Furthermore, naturally occurring arsenic, normally bound to subsurface soils, can be liberated to ground water due to the biological activity which occurs in a reducing (non-oxidized) environment. A reducing environment in ground water at the PAC facility may be contributing to arsenic contamination at the PAC source area.

A more detailed description of the Site history can be found in the Revised Final Remedial Investigation Report, June 1993, Sections 1 and 5 of Volume 1.

B. Enforcement Activity

From 1981 through 1986, EPA negotiated with Peterson/Puritan, Inc. to enter into an Administrative Order By Consent under which it would agree to conduct a Remedial Investigation/Feasibility Study (RI/FS). During this period of time, Peterson/Puritan further investigated the contamination at the Site and submitted its findings to the Agency in two technical reports. The Agency did not formally accept these reports as an RI/FS performed pursuant to the NCP since Peterson/Puritan had declined to enter into an

Administrative Order By Consent and the Agency had been unable to confirm the veracity of information contained in those reports. However, the technical reports were used as supporting data in the development of subsequent studies.

By 1986, EPA had decided to conduct the RI/FS itself and in January, 1987, EPA initiated its RI. Shortly thereafter, EPA received a request from Peterson/Puritan to take over the RI/FS.

In May 1987, Peterson/Puritan signed a Administrative Order on Consent (AOC) requiring it to perform an RI/FS for the entire Site area and reimburse EPA's oversight costs during this process. Also in 1987, Peterson/Puritan was sold to Hi-Port Industries, Inc. Its former parent, CPC International, Inc., (CPC) assumed, Peterson/Puritan's responsibilities under the AOC. This RI/FS work has to date included the takeover (with EPA oversight) of investigations which commenced in 1987 and ended February, 1990 and a second phase of the RI, initiated in March, 1992, to better define the nature and extent of contamination within OU 1. The second phase led to the development of the OU 1 Feasibility Study. CPC has been active in the study of OU 1.

EPA conducted a Baseline Risk Assessment and Ecological Assessment under a federal lead contract and maintained oversight of the PRP-lead RI/FS. The final Ecological Assessment and Baseline Risk Assessment were submitted on May 21, 1993 and June 2, 1993, respectively.

CPC International, Inc. (CPC) submitted a Revised Final RI for OU 1 on June 8, 1993 and an FS report for OU 1 on June 28, 1993. These documents are part of the Administrative Record which forms the basis for this Record of Decision.

On March 10, 1992, in response to PRP concerns, EPA amended the 1987 Administrative Order to clarify the language concerning the PRP reimbursement of oversight costs and cost documentation.

In June, 1992 EPA notified approximately seven (7) parties of their potential liability with respect to the Site. This group of potentially responsible parties (PRPs) includes CPC. Several of these PRPs have been active in the remedy selection process for OU 1. EPA mailed a copy of the proposed plan for OU 1 to the PRPs in July 1993. Technical comments presented by PRPs during the public comment period are included in the Administrative Record. A summary of these comments as well as EPA's responses, which describe how these comments affected the remedy selection, are included in the Responsiveness Summary, Appendix C of this document.

To date, EPA remains in contact with these parties in preparation for negotiations concerning the implementation of the selected remedy and future response actions to be conducted at other portions of the Site.

III. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been minimal. EPA has kept the community and other interested parties apprised of Site activities through informational meetings, fact sheets, press releases and public meetings.

In January, 1987, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. On January 15, 1987, EPA held an informational meeting at the Ashton elementary school in Cumberland, Rhode Island to describe the plans for the Remedial Investigation and Feasibility Study.

A fact sheet was issued in June, 1993 which discussed the findings of the Remedial Investigation, Risk Assessment, Ecological Assessment and opportunities for public involvement.

EPA issued a public notice and brief analysis of the Proposed Plan in the Pawtucket times and Woonsocket Call on July 1, 1993 and made the plan available to the public at the Lincoln and Cumberland town libraries. On July 6, 1993, EPA made the administrative record available for public review at EPA's offices in Boston and at the above referenced local information repositories.

On July 15, 1993, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan. Also during this meeting, the Agency answered questions from the public.

From July 6, 1993 to August 5, 1993, the Agency held a 30 day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public.

On July 29, 1993, the Agency held a public hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting with the comments received and the Agency's response to comments are included in the attached responsiveness summary.

All supporting documentation for the decision regarding OU 1 is placed in the Administrative Record for review. The Administrative Record is a collection of all the documents considered by EPA in choosing the remedy for OU 1. It was made available at the EPA Records Center, at 90 Canal Street, in Boston, MA, and at the Cumberland and Lincoln public libraries. The Cumberland public library is located on Diamond Hill Road in Cumberland, Rhode Island. The Lincoln public library is located on Old River Road, in Lincoln, Rhode Island. An index to the Administrative Record for OU 1 is provided as Appendix E.

IV. SCOPE AND ROLE OF THE OPERABLE UNIT RESPONSE ACTION

Response activities at the Site have been divided into operable units. OU 1 addresses contamination emanating from the CCL and PAC facilities. A second operable unit will address contamination at the J.M. Mills landfill as necessary.

The OU 1 remedy will reduce the VOCs in soil and arsenic in ground water at the source areas, prevent continued release and further migration of hazardous substances to the ground water (and surface water at the Blackstone River which is a receptor of OU 1 contamination), restore contaminated ground water to drinking water standards, and provide for continued environmental monitoring at OU 1. The remediation of OU 1 is not expected to adversely impact any future response actions at other operable units at the Site. The remedy will provide for active restoration of all portions of OU 1 that are outside of EPA's acceptable risk range and will employ permanent treatment technologies to reduce contaminants while undertaking a cost effective approach to meeting EPA's remedial response objectives.

This remedial action will address the following principal threats to human health and the environment posed by OU 1: 1) the threat of future potential ingestion of ground water contaminated from OU 1; and 2) the threat of ingestion or contact with contaminated soils.

V. SUMMARY OF SITE CHARACTERISTICS

Section 1.0 of the Feasibility Study contains an overview of the Remedial Investigation. The Remedial Investigation consists of a February, 1990 Draft Remedial Investigation Report for the entire Site (referred to in that report as the Site Study Area). Subsequently, a June, 1993 Revised Final Remedial Investigation Report presented data focussed on a portion of the Site identified herein as OU 1 (referred as the Primary Source Area in that report.) The Feasibility Study further subdivides OU 1 into two remediation areas: the CCL remediation area and the PAC remediation area. This division was based on the two principal contaminant source areas identified in the RI/FS; the CCL and PAC source areas and their respective downgradient areas. Figure 6 depicts OU 1 and the principal source areas within it. The significant findings of the Remedial Investigation relating to OU 1 and the two remediation areas are summarized below.

The Blackstone River is the most prominent water feature in the Site and borders OU 1 to the west. The main channel of the river is approximately 150 feet wide, highly variable in depth, and meanders slightly. The Blackstone River canal parallels the river to the west throughout the Site. Under normal flow conditions, the river is recharged by ground water with an average discharge rate of 729 cubic feet per second. Upstream, the river flow is hydraulically controlled by dams as it passes through Woonsocket, RI. According to Flood Insurance Rate Maps prepared by FEMA,

the 100-year floodplain encompasses approximately two-thirds of OU 1. However, the principal source areas, the CCL and PAC facilities, are not located in the floodplain, but are elevated 15 to 20 feet above it.

A small drainage channel, referred to in the RI as Brook A, originates at Mendon Road and is sustained by periodic runoff from Mendon Road and the PAC and CCL properties, and on a more regular basis, by industrial non-contact cooling water discharge from the PAC facility. Average daily discharge from the PAC facility is approximately 200,000 gallons per day. Brook A follows an almost entirely artificial channel between the PAC and CCL facilities to the Providence & Worcester (P&W) railroad tracks where it is diverted south along the tracks to Martin Street. Brook A is predominantly 10 to 25 feet above the water table along its course to Martin Street. Here the flow enters a storm sewer and is piped to its discharge point at a headwall south of the Martin Street Bridge at the Blackstone River.

The Blackstone River valley occupies a bedrock trough filled with glacial kame terrace deposits and post-glacial alluvium. Kame terrace deposits are composed of homogeneous, well-sorted fine to coarse sand and gravel. The alluvial sediments are reworked glacial sand and gravel, and exhibit little to no variation in composition or structure from the kame terrace deposits. These unconsolidated deposits are relatively thin (10 to 20 feet) in the northwestern portion of OU 1 where the bedrock valley narrows. Deposits thicken to greater than 130 feet to the southeast as the trough widens. Deposits pinch out along the steep bedrock valley walls to the east and west. An esker deposit was mapped by the USGS in the vicinity of the PAC facility. This deposit may account for a higher percentage of gravel in this area. However, surface expression of the esker deposit is no longer visible due to land development and construction. Till is found in the base of the bedrock trough and is primarily dense with a high silt content and more sandy in some locations. The till also contains boulders up to five feet in diameter. The bedrock is composed primarily of a very hard quartzite and to a lesser extent, a softer schist. The quartzite varies from highly fractured to little fracturing and water bearing fractures are known to exist. The schist is generally more fractured and weathered with water bearing fractures also occurring. Comparison of rock core logs indicates that there is a high variation of fracture density and orientation within the Site and that only localized preferential fracture patterns appear to be exhibited.

The majority of the ground water flow in the Blackstone River valley occurs in highly transmissive outwash sand and gravel deposits. This flow is minimally augmented by till and bedrock seepage, all of which eventually discharges to the river.

A. Soil

1. CCL Source Area

The CCL facility is situated on a kame terrace along the eastern valley wall of the Blackstone River, in close proximity to bedrock outcrops. Grain-size analysis indicative of the majority of soils encountered during the drilling program at CCL was 71% sand, 29% fines (silts and clay), and 0% gravel.

Events and activities at the CCL facility constitute a significant source of VOCs in OU 1. Soils in the vadose zone (i.e. above the permanent ground water level) of the CCL tank farm have retained a substantial quantity of VOCs associated with solvent releases. Monitoring wells installed in the tank farm confirm the presence of residual contamination in the tank farm soils. Soil gas samples were obtained from 49 stations at a depth five feet or less in 1988. Concentrations in soil vapor ranged up to 6,070 ug/l trans-1,2-DCE; up to 336 ug/l TCE; and non-detect to 898 ug/l PCE/acetone. The highest concentrations of soil gas (PCE/acetone) from the upper five feet of soil were in the tank farm area on the southwest perimeter of the plant. Significantly lower concentrations were found along the southeast, northeast, and northwest sides of the building.

In 1990, boring locations were chosen to intercept a reported railroad tank car spill area within the tank farm and to determine background soil conditions. Table B-1 of Appendix B summarizes the VOCs detected. Findings from the 1990 investigation indicated that residual contamination of the vadose zone was more widespread than previously believed.

In May and June of 1992, ten additional borings and four additional wells were installed in and immediately downgradient of the tank farm to better define the extent and distribution of CCL soil contamination. (The area immediately downgradient of the tank farm is also identified in the RI/FS and this document as the O'Toole property. See Figure 4.) The results of this investigation are presented in Tables B-2 and B-3 which summarize the distribution of total, selected VOCs within the vadose zone in and adjacent to the tank farm. Selected VOCs include PCE, TCA, TCE, 1,2-DCE (total) and 1,1-DCE. PCE is the predominant compound detected in the vadose zone.

In summary, soil samples (Photo-ionization Detector (PID) screening and laboratory analyses) from borings advanced into the unsaturated zone in the vicinity of the tank farm revealed significantly elevated levels of chlorinated solvents. The nature and extent of these chemicals in the soils suggests that they are largely derived from a common source. Their location underlying the railroad spur indicates that the reported tank car spill is a significant cause of CCL source area contamination. The vertical distribution of the contaminants in the tank farm shows that the highest concentrations are at a depth of about 20 feet. (See Figure 7.)

However, soil data indicates that other sources of VOCs have released

contaminants to soils between the facility building and the tank farm. The sources of these VOCs are a manhole and catch basins associated with sanitary and storm sewers. The VOCs detected in this vicinity include PCE, TCA, and methylene chloride.

Semivolatile organic compounds (SVOCs), pesticides, and PCBs were detected in soils at the CCL source area. The majority of the SVOCs detected were polyaromatic hydrocarbons (PAHs) detected in surface soils. A total of eight pesticides were detected at low concentrations. A single PCB (aroclor-1254) was detected in a subsurface sample at a concentration of approximately 0.093 mg/kg.

Regarding inorganics in soil at the CCL source, analytes most notably detected were lead at 262 mg/kg and vanadium at a concentration of 236 mg/kg. Analytes such as aluminum, chromium, iron, lead and manganese were detected at each subsurface sampling location while vanadium was detected at a single location.

2. PAC Source Area

The PAC facility is located in close proximity to an esker deposit comprised of fine to course silty sands and gravel. Grain-size analysis of samples taken at the PAC facility indicate 32-98% sand, 2-14% fines, and 0-54% gravel. In the area of the PAC facility, bedrock outcrops to the east along Mendon Road.

Acetone, Isopropyl Alcohol (IPA), nickel, chromium and arsenic were historically detected in Lonza facility wastewater discharges. Specifically, high concentrations of arsenic were reportedly discharged to the subsurface via the leachfield(s). Prior to hookup to the municipal sewer system, facility wastewater was discharged to on-site leachfields which the RI identifies as potential sources of subsurface contamination.

In June of 1992, a comprehensive Site investigation of the PAC facility was completed. The program consisted of a soil gas survey, a soil boring and sampling program, and the installation of monitoring wells for the sampling of ground water at the facility. Soil borings were focussed on leachfield #1 as a potential source identified with the soil gas survey. VOCs detected in PAC soils during the June 1992 soil gas and boring investigations were acetone ranging from 0.022 to 4.4 mg/kg, IPA at 30 mg/kg, MIBK ranging from 0.029 to 0.044 mg/kg, toluene ranging from 0.013 to 1.6 mg/kg, ethylbenzene ranging from 0.032 to 1.5 mg/kg, styrene at 0.075 to 0.079 mg/kg, xylene at 0.026 to 5.5 mg/kg, and chlorobenzene being detected only once at a single location at 0.011 mg/kg.

Acetone and IPA were not detected in surface soils (0 to 1 ft. below ground surface). Acetone was detected in three borings located at leachfield #1, and detected in soil (16 to 18 ft. below ground surface) between the leachfield and well # AW-2, where the highest concentration of acetone was recorded in ground water. In addition to acetone and IPA, the list of

compounds found in the three leachfield borings includes toluene, ethylbenzene, styrene, and xylene. These same six compounds were also detected in ground water from leachfield #1 at well AW-01R.

Acetone is the primary contaminant detected in PAC soils, with a peak concentration occurring below grade (>2 ft. below ground surface) in borings advanced through leachfield #1. Acetone is a miscible compound and will not likely remain in the permeable, unsaturated soils underlying the PAC facility. IPA is likely a parent compound responsible in part for the presence of acetone.

The limited distribution of acetone in soils suggests that leachfield #1 and the immediate subsurface area is the source of acetone detected in ground water. Acetone readily degrades in both aerobic and anaerobic environments. Its persistence in ground water at the PAC facility suggests residual acetone or IPA is present in leachfield piping or soils. Furthermore, the leachfield(s) may be a source of other previously detected VOCs.

Eleven SVOCs were detected within the PAC source area. The highest concentrations of SVOCs were detected in borings B-02 and B-301 at the ground surface, each containing eight compounds, with no single contaminant concentration exceeding 2.2 mg/kg.

Eleven pesticides were detected in soils on the PAC property in relatively low concentrations. Samples from borings B-04 and B-301 revealed at least seven pesticides, with no single contaminant concentration exceeding 0.08 mg/kg. No PCBs were detected.

Inorganics including arsenic, chromium, lead, and occasionally nickel were found throughout the PAC vadose zone and background surface soils. It is uncertain to what extent these inorganic detections in soil are indicative of PAC facility contamination or of mineral composition of native deposits.

B. Ground Water

1. CCL Source and Downgradient Areas

Ground water flows southwesterly from the CCL facility to the Blackstone River. In the direction of flow, the saturated deposits increase in thickness from less than 30 feet at the facility to approximately 100 feet south and west to the boundary of OU 1. The aquifer is highly transmissive, ranging from 75,000 to 300,000 gpd/ft. with an average hydraulic conductivity of 1,000 gpd/ft., or 134 ft/day. A recovery well located downgradient of the tank farm indicates a hydraulic conductivity of approximately 97 ft/day.

Chlorinated solvents have consistently been identified in ground water samples from wells immediately downgradient of the CCL property. Ground water data collected for the RI from directly below the CCL tank farm

clearly indicate that the sources of VOC contamination lie within the tank farm area. Both PCE and TCA were detected in ground water in 1992 from overburden well MW-201A at concentrations of 110,000 ug/l and 120,000 ug/l respectively. The concentration of PCE detected in ground water at this location is very close to the compound's solubility of 150 mg/l. Likewise, the concentration of TCA approaches 10 percent of the compound's solubility of 1,400 ug/l. While dense non-aqueous phase liquids (DNAPLs) were not identified at OU 1 during any investigation phase, DNAPLs may exist at the CCL source area, based on the solubility values for the contaminants as presented above. If pockets of DNAPLs are present at the CCL source area, they may continue to be a long-term source of contamination in the aquifer.

Upgradient of the tank farm, TCE was detected at 120 ug/l in ground water from a single well location (MP-7), and is considered to be residual contamination from a former leachfield located in that vicinity. Upgradient of both PAC and CCL facilities, background conditions have been established at well MW-301 in that no VOCs were detected in ground water at this location.

Figure 8 presents a cross-sectional view of the 1992 select VOC data along a representative flowline from the CCL tank farm downgradient to the Blackstone River. RI data indicate that both the plume and ground water flowlines have a distinct southwest orientation. Flowlines at the valley wall initially move downward and then generally flow along the base of the aquifer. Under natural aquifer (non-pumping) conditions, the plume discharges to the Blackstone River in the vicinity of wells MP-10 and -11, across from the Quinnville wellfield. In a southerly direction from the CCL source area, concentrations of VOCs diminish in both shallow and deep portions of the aquifer. At well MW-106B, benzene was detected at concentrations of 9 and 5 ug/l in June and August of 1989, respectively. Nonetheless, well MW-106 may mark a boundary for the southeasterly distribution of the OU 1 plume since (with benzene in June and August, 1989 as the sole exception) no VOCs were detected within the well triplet in four separate sampling events.

Degradation compounds of PCE and TCA have been detected at near-source, transitional, and downgradient wells. In immediate proximity to the tank farm, degradation compounds were detected in ground water, primarily 1,2-DCE (total) and to a lesser extent TCE; but combined, the degradation products comprise a small percentage of the total VOCs detected. Ground water from transitional wells contains a higher percentage (50 percent or more) of degradation compounds, primarily 1,2-DCE followed by TCE. Downgradient of the transitional zone, PCE and TCA are not detected; the primary component of the plume is 1,2-DCE followed by TCE, 1,1-DCA and 1,1-DCE. Chloroethane is detected furthest from the source, deep in the aquifer, and is considered to be a near-complete degradation compound of TCA at greater distances from the source. During the June 1992 sampling round, vinyl chloride, another degradation compound, was only detected in two transitional wells (GZ-2-1 and MW-103) at 830 and 9 ug/l, respectively. Historically, vinyl chloride has been detected at the transitional zone and

points farther downgradient.

Bedrock contamination was found at two well locations (MW-103, west of the CCL tank farm at the corner of Martin Street and the railroad tracks, and MW 105C, south of the CCL tank farm and across Martin Street). Each well displays characteristic contaminants from the CCL source containing total VOCs at MW-103 and MW-105 at approximately 96 ug/l and 633 ug/l, respectively.

Ground water monitoring wells, located south of Martin Street (near the Health-Tex facility) reported detectable levels of inorganics during the 1992 field investigation. Cadmium, chromium, and lead were detected in well 442 (installed by USGS) at concentrations above their respective MCLs reported as total (unfiltered) results. Copper and mercury were also detected, but at concentrations below MCLs. The results of well 442 are suspect, due to the construction of this well, which includes a steel casing. None of the five metals were detected during the corresponding analyses for dissolved (filtered) metals. These metals were not detected in upgradient wells located on the Health-Tex or Okonite properties or in well 102A, B & C located on the north side of Martin Street.

Copper and cadmium were detected in well MP-10B at concentrations of 2,550 and 7.6 ug/l, respectively. The corresponding MCLs for these metals are 1,300 and 5 ug/l. The detected copper is anomalously high since copper was not detected in any other downgradient well at concentrations above 208 ug/l during 1992 sampling. The detected cadmium concentration is less than two times the cadmium MCL. No metals were detected in the corresponding dissolved metals analysis for this well.

Cadmium was detected in well MP-11C at 6.1 ug/l (total), which is slightly above the MCL of 5 ug/l. Arsenic was detected in well MP-11B at 71 ug/l (total) which exceeds the corresponding 50 ug/l MCL. During both the June and August 1989 sampling events, dissolved (filtered) arsenic was reported for the same well at 72 ug/l. The occurrence of total and dissolved arsenic detected at well MP-11B appears to be an isolated case. MP-11C showed a marked decrease in total arsenic (below the MCL) deeper in the aquifer at the same location while other wells upgradient of MP-11 location detect no arsenic in either filtered or unfiltered samples. While the cause of elevated arsenic levels at well MP-11B is unclear, this result is believed to be limited in extent.

It is believed that the aquifer downgradient of the CCL facility is primarily an oxidized environment, and therefore does not produce detectable quantities of dissolved metals. The difference between the total and the dissolved metals noted above, with the exception of dissolved arsenic at well MP-11B, is most likely related to entrainment of suspended solids during sampling. It is not likely that water pumped from an extraction well or public supply well would entrain suspended solids to the extent experienced during monitoring well sampling.

2. PAC Source and Downgradient Areas

Three types of VOCs have been detected in ground water at the PAC remediation area: ketones, chlorinated solvents, and aromatic compounds.

Of the ketones detected in the ground water at the PAC source, acetone is most prevalent. In 1987, acetone was detected at very high concentrations (approx. 1,700,000 ug/l in June 1987). Low concentrations of other ketones such as methyl ethyl ketone (MEK), 2-hexanone, and MIBK were reported in ground water from well AW-2 in 1989.

In 1992, additional monitoring wells were installed to further delineate the acetone plume previously identified in wells AW-1 and AW-2. Acetone was detected in AW-1 at 51,000 ug/l and also downgradient from this well at MW 304 (49 ug/l). However, acetone was not detected in wells downgradient of AW-2 and the concentration of acetone in AW-2 dropped significantly since its initial detection (1,700,000 ug/l in 1987 to 150 ug/l in June 1992).

IPA is a likely parent compound responsible, in part, for acetone. IPA was detected on the PAC property at wells AW-1 (78 to 96 mg/l) and MW 304 (33 J ug/l).

Acetone will degrade aerobically to carbon dioxide and water. It will also degrade anaerobically to carbon dioxide and water and possibly methane. Either or both mechanisms is likely occurring in the former leachfield soils and in aquifer material below the water table. These reactions explain the marked decrease of acetone detected in ground water from well AW-2.

The former leachfield #1 at the PAC facility acts as a continuing source of IPA and acetone. Given that acetone is miscible in water, the concentrations detected in ground water in proximity to this leachfield are relatively small, and not necessarily indicative of a significant mass of contaminant. However, since the concentration of acetone remained relatively constant at this location from 1987 to 1992, it appears that acetone continues to be released from the former leachfield by some mechanism.

The chlorinated solvents PCE and TCA were detected in concentrations of 17 to 73 ug/l, and 10 ug/l, respectively in five of nine wells located on the PAC facility in June 1992.

Aromatic compounds such as toluene, ethylbenzene, styrene, and xylene were identified in the soil gas survey and were detected in ground water below the PAC facility. Benzene was not detected in any media on the PAC property. Ethylbenzene was detected in five wells on the PAC property and downgradient at well 308 at concentrations ranging from 23 to 830 ug/l. Xylene and toluene were detected less frequently at lower concentrations, and styrene was detected once at 13 ug/l in ground water at AW-2.

Additional sampling data concerning the PAC remediation area, was submitted to EPA by Lonza in June, 1993. In this report, the detection of chlorinated solvents was limited to MW 302B with 1,2-DCE, trichloroethene, estimated at 1, and 4 ug/l, respectively and carbon disulfide at approximately 2 ug/l. Well MW-307 was found to have significant concentrations of VOCs where in 1992 there were none detected.

The Lonza report also states that acetone concentrations remain relatively consistent with that of the RI findings with two exceptions: acetone was not detected above the detection limit at well AW-2 and was detected in two PAC downgradient wells (MW 305B and 305C) at a concentration of 9 (estimated) and 57 ug/l, respectively. Aromatic compounds such as toluene, ethylbenzene, and xylene were also detected in four of nine PAC facility wells. Ethylbenzene was the most prominent compound detected with the highest concentration found at well AW-1R (1200 ug/l).

Based upon the sampling conducted in June, 1992 for the RI, it is unlikely that the VOCs detected in PAC source area ground water are presently migrating in significant concentrations to downgradient areas. Compared with the PAC source area, PAC downgradient wells MW 305 and 306 show a marked increase in chlorinated solvents, such as TCA ranging from 15 to 23 ug/l, TCE ranging from 18 to 150 ug/l and 1,2-DCE ranging from 16 to 130 ug/l. Aromatic hydrocarbons such as benzene, ethylbenzene, and xylene are also present. Chlorinated solvents were not detected in PAC soils or soil vapor during the RI investigations. However, TCA was detected in PAC ground water during the August 1988 sampling event. Historic wastewater and ground water sampling at PAC does indicate the release of these compounds including PCE, which degrades to TCE and 1,2-DCE. With the exception of benzene, aromatic hydrocarbons have consistently been detected at the PAC source area. Furthermore, acetone, a PAC source contaminant detected at the PAC leachfield, was recently detected in the PAC downgradient area at the MW 305 well location in June, 1993. Taken as a whole, this data indicates that historic waste disposal practices at the PAC source area have contributed to the contamination presently detected in the PAC downgradient area, although the PAC source area is now diminished as a source of VOCs for the PAC downgradient area.

Based on June, 1992 RI data for the PAC remediation area, arsenic, nickel, and lead concentrations (total/unfiltered) in ground water exceeded Rhode Island and/or federal Maximum Contaminant Levels (MCLs) in monitoring wells at the PAC source and downgradient areas. Total chromium also exceeded the Rhode Island MCL in ground water immediately downgradient of the PAC facility, on CCL property. Total chromium was detected elsewhere on the PAC property, below state and federal standards. Arsenic, chromium and nickel were reported as being detected historically in facility wastewaters disposed on-site.

As previously stated, the difference between the total and the dissolved metals analyses, with the exception of arsenic, is most likely related to entrainment of suspended solids during sampling. Therefore, the total

metal concentrations for nickel, lead and chromium may not accurately indicate an exceedance of MCLs at these groundwater locations since water pumped from an extraction well or public supply well is not expected to entrain suspended solids to the extent experienced during monitoring well sampling.

However, total arsenic was detected in ground water within the PAC source area at concentrations that approach tenfold background levels detected at MW 301. Historically, total arsenic has been detected in PAC wells, with peak concentrations ranging from 290 ug/l (AW-2; August 1989) to 921 ug/l (AW-1; August 1988). Concentrations of both total and dissolved arsenic are similar to and above the MCL of 50 ug/l historically for AW-2. In 1992, MW-303 and MP-2 reported total and dissolved concentrations of arsenic at 83 and 73 ug/l, and 136 and 110 ug/l, respectively.

The distribution of arsenic, particularly dissolved arsenic, is consistent with reported historic handling of wastewater containing arsenic. The concentrations of arsenic in wastewater were on occasion much greater than that recently been detected in ground water (10,000 ug/l; Lonza wastewater analysis, 1981). Records indicate that from 1981 to 1985 wastewaters were discharged to the leachfields.

Although arsenic was discharged to the leachfields at PAC, the presence of dissolved arsenic detected in wells downgradient of the former leachfields may also be due to the presence of organic material (acetone, IPA, fatty acids and other available organic carbon) derived from the leachfields. Under strongly reducing conditions, arsenic will desorb from mineral soils into solution. The biodegradation of organic materials creates a reducing environment which tends to liberate and mobilize arsenic from native soils as well as from the arsenic enriched deposits derived from the leachfields. In the presence of chelating agents, such as organic molecules, arsenic forms soluble organic complexes even in a mildly reducing environment where iron is abundant.

Total arsenic exceeds the MCL at nine locations sampled. At six of nine locations, dissolved arsenic also exceeds the MCL. In general, the highest concentration of arsenic was found in the vicinity of the leachfields. The difference between total and dissolved arsenic is significant at wells MW-301 and MW-101C positioned upgradient of the former leachfields. Total arsenic concentrations at these two locations were 115 ug/l (estimated) and 580 ug/l (estimated), respectively, whereas dissolved arsenic was not detected. The total arsenic may likely be a reflection of concentrations indicative of native soils. The absence of dissolved arsenic reflects the absence of reducing conditions and chelating agents in the background environment upgradient of the PAC facility.

C. Surface Water and Sediments

Two VOCs, chloroform and acetone, were detected in Brook A surface water samples in OU 1. Chloroform was detected most frequently at concentrations

ranging from 12 to 37 ug/l from three locations along Brook A in the October 1987 sampling event and from a single location in the June 1992 sampling event. Acetone was detected at three locations during the October, 1987 sampling round with a peak concentration of 4020 ug/l at location SW-06. SW-06 is the only surface water station located on the Blackstone River within OU-1 to detect a VOC (i.e. trichlorofluoromethane at 2.9 ug/l).

No semivolatile organic compounds, pesticides or PCBs were detected in surface water.

Copper was detected in surface water in 1987 at a concentration of 0.2 mg/l in Brook A at station SW-007(SW-04). Zinc was detected in 1988 at 38, 45, and 43 ug/l at stations SW- 006, -005, -007 (SW-03, 3A, and 04), respectively. Six inorganic analytes were reported in the June 1992 surface water samples. Zinc was reported at concentrations ranging from 142 to 290 ug/l with the highest concentration at SW-007. All other inorganics were found at concentration ranges typically found in the natural environment.

Sediment samples collected along Brook A were analyzed for VOCs, SVOCs, pesticides/PCBs and inorganics. SVOCs and inorganics were the most prevalent analytes detected. The only VOC detected in sediment along Brook A was 1,1,2,2-tetrachloroethane at trace levels from SD-006(SW-03) during the August 1988 sampling round. SVOCs and pesticides/PCBs were detected more frequently in the sediment samples as compared with the number of these compounds detected in corresponding surface water samples. SD-001, -003, and -006 each had at least six SVOCs during the June 1992 sampling round while SD-002, -003, and -006 were the stations detecting pesticides and PCBs. No pesticides were detected in the October 1987 and August 1988 sampling rounds. Still, the identification of these compounds along the Brook were sporadic and did not indicate the presence of a significant source.

A complete discussion of OU 1 characteristics can be found in the Revised Final Remedial Investigation Report, June, 1993, in Sections 3, 4, 5 and 6 of Volume 1. A complete discussion of Site characteristics is contained in the Draft Remedial Investigation Report, February, 1990.

VI. SUMMARY OF SITE RISKS

A Risk Assessment (RA) and Ecological Assessment (EA) were performed under a Federal-lead contract to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with OU 1. The results of the human health risk assessment for OU 1 are discussed below followed by the conclusions of the ecological assessment.

A. Baseline Risk Assessment

The risk assessment followed a four step process: 1) contaminant identification, which identified those hazardous substances which, given the specifics of OU 1 were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at OU 1, including carcinogenic and non-carcinogenic risks.

Forty-four contaminants of concern, listed in Table B-4 were selected for evaluation in the RA. These contaminants constitute a representative subset of the more than 75 contaminants identified at OU 1 during the Remedial Investigation. The 44 contaminants of concern were selected to represent potential OU 1 related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. (See Tables B-5 through B-10). A summary of the health effects of each of the contaminants of concern can be found in the risk assessment at Appendix A.

Potential human health effects associated with exposure to the contaminants of concern were estimated quantitatively through the development of the following hypothetical exposure pathways:

- Future potential use of ground water as drinking water,
- Ingestion of and dermal contact with the Blackstone River during recreational use,
- Ingestion of and dermal contact with sediments in Brook A by trespassers,
- Ingestion of and dermal contact with soils by workers during construction and by future residents.

For each pathway evaluated, an average and a reasonable maximum exposure estimate was generated corresponding to exposure to the average and the maximum concentration detected and estimated exposure in that particular medium.

1. Ground Water

Ground water is currently not being used as a drinking water source. Therefore, only a future residential use scenario was evaluated. Ingestion of 2 liters per day over 30 years lifetime was assumed for both average and maximum exposure estimates. Separate risk evaluations were performed for the following four areas of the contaminated ground water:

- CCL source area,
- PAC source area,
- CCL downgradient area,
- PAC downgradient area.

These four areas are depicted in Figure 6.

2. Surface Water - Blackstone River

Ingestion and dermal contact with surface water while swimming or wading in the Blackstone River were evaluated as potential current and future exposure scenarios. The current and future use exposure scenarios were considered to be equivalent. Exposure frequency was estimated at 5 times per year for an adult residing in the area for 30 years and 10 times per year for a child (aged 6 to 17 years) over 12 years.

3. Sediments - Brook A

Ingestion and dermal contact with sediment while wading in Brook A were evaluated as potential current and future use exposure scenarios. Exposure was based on the assumption that children aged 6 to 17 would wade 10 times per year over 12 years.

4. Soils

Ingestion and dermal contact with soil were evaluated under two potential future exposure scenarios. One scenario was based on the assumption that residences would be built within each source area. Exposure to children aged 0 to 6 years and adults residing on the site for 30 years was evaluated. The other scenario evaluated exposure to subsurface soils by construction workers over one year. These scenarios were evaluated separately for the following two areas:

- CCL source area (including tank farm and O'Toole property),
- PAC source area,

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with the chemical specific cancer factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g. 1×10^{-6} for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure as defined to the compound at the stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

The hazard index was also calculated for each pathway as EPA's measure of the potential for non-carcinogenic health effects. A hazard quotient is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects for an individual compound. Reference doses have been developed by EPA to protect sensitive individuals over the course of a lifetime and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The hazard quotient is often expressed as a single value (e.g. 0.3) indicating the ratio of the stated exposure as defined to the reference dose value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given compound). The hazard quotient is only considered additive for compounds that have the same or similar toxic endpoint and the sum is referred to as the hazard index (HI). (For example: the hazard quotient for a compound known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage).

B. Summary of Baseline Risk Assessment

Tables B-11 through B-27 depict the carcinogenic and non-carcinogenic risk summary for the contaminants of concern in each exposure pathway described above.

1. Ground Water

CCL source area

The average and reasonable maximum exposure case carcinogenic risks associated with the potential future ingestion of ground water were approximately 2×10^{-2} and 2×10^{-1}, respectively. 1,1 Dichloroethene, tetrachloroethene and vinyl chloride comprise the majority of the risk for both the average and reasonable worst case scenarios. Other chemicals which contributed a risk of greater than one in one million (1×10^{-6}) were benzene; 1,1 dichloroethane; methylene chloride; 1,2 dichloroethane; methylene chloride; 1,1,2 trichloroethane, trichloroethene, bis(2-ethylhexyl)phthalate, chlordane and arsenic.

For noncarcinogenic effects, the average and reasonable maximum exposure case Hazard Indices exceeded one for the toxic endpoints of liver, skin and kidney. 1,2 Dichloroethene, methylene chloride, tetrachlorethene, 1,1,1 trichloroethane and chlordane were major contaminants for the liver. Acetone and cadmium were the major contaminants for the kidney. Arsenic was the major contaminant for the skin.

PAC source area

The average and reasonable maximum exposure case carcinogenic risks associated with the potential future ingestion of groundwater were

approximately 6×10^{-3} and 1×10^{-2}, respectively. Arsenic was the major contributor to the risks. One other contaminant, tetrachloroethene, contributed a risk greater than one in one million.

For noncarcinogenic effects, the average and reasonable maximum exposure case Hazard Indices exceeded one for the toxic endpoints of liver and skin. Acetone and arsenic were the major contributors to the liver and skin Hazard Indices, respectively.

CCL downgradient area

The average and reasonable maximum exposure case carcinogenic risks were approximately 4×10^{-4} and 2×10^{-3}, respectively. Tetrachloroethene, vinyl chloride and arsenic contributed to the majority of the risks. Benzene, 1,2 dichloroethane, trichloroethene and bis(2-ethylhexyl)phthalate each contributed a risk greater than one in one million.

For noncarcinogenic effects, the average Hazard Index exceeded one for the toxic endpoint of skin based on the presence of arsenic. The maximum Hazard Indices were exceeded for the toxic endpoints of liver, skin and gastrointestinal tract. 1,1 Dichloroethene and tetrachloroethene were the major contributors to the liver Hazard Index, and arsenic and copper to the skin and gastrointestinal endpoints, respectively.

PAC downgradient area

The average and reasonable maximum exposure case carcinogenic risk were approximately 1×10^{-4} and 4×10^{-4}, respectively. Arsenic contributed to the majority of the risk. Benzene and trichloroethene each contributed a risk greater than one in one million.

For noncarcinogenic effects, the average Hazard Index did not exceed one. For the reasonable maximum exposure case, the Hazard Index exceeded one for the toxic endpoint of skin based on the presence of arsenic.

2. Surface Water - Blackstone River

The reasonable maximum exposure case carcinogenic risks associated with the potential current and future recreational use were approximately 1×10^{-7} and 1×10^{-6}, respectively.

For noncarcinogenic effects, the Hazard Index was well below one.

3. Sediment - Brook A

The average and reasonable maximum exposure case carcinogenic risks associated with exposure to Brook A were approximately 1×10^{-6} and 3×10^{-6}, respectively.

For noncarcinogenic effects, the Hazard Index was well below one.

4. Soil

CCL source area - tank farm

The average and reasonable maximum exposure case carcinogenic risks associated with exposure to the soils for future residents was approximately 3×10^{-3} and 3×10^{-2}, respectively. Tetrachloroethene in subsurface soils was the major contributor to the risk.

For noncarcinogenic effects the Hazard Indices for the average and reasonable maximum exposure scenario for future residents were 35 and 382, respectively. Tetrachloroethene was the major contributor to the Hazard Index.

The average and maximum carcinogenic risks associated with the adult worker were approximately 3×10^{-5} and 3×10^{-4} respectively. The average and maximum Hazard Indices were 4.7 and .43, respectively.

CCL source area - O'Toole Property

The average and reasonable maximum exposure case carcinogenic risks associated with exposure to the soils for future residents were 8×10^{-5}, and 6×10^{-5}, respectively. The risks to workers was approximately 3×10^{-7} for both the average and maximum cases.

For noncarcinogenic effects, the Hazard Indices for the average and reasonable maximum exposure were well below one for all potentially exposed populations.

PAC facility

The average and reasonable maximum exposure case carcinogenic risks associated with exposure to soils for future residents were approximately 1×10^{-4} and 4×10^{-5}, respectively.

For noncarcinogenic effects, the Hazard Indices for the average and reasonable maximum exposure for future residents were well below one for all potentially exposed populations.

In summary, predicted carcinogenic health risks assuming the future use of ground water, fell outside EPA's risk range at three of the four areas evaluated : CCL Source, PAC Source and CCL Downgradient. Unacceptable Hazard Indices were also estimated at these three areas.

The maximum predicted carcinogenic risk and Hazard Index for the Blackstone River are within EPA's acceptable range.

The maximum predicted carcinogenic risk and Hazard Index for Brook A are

within EPA's acceptable range.

The predicted carcinogenic risks and Hazard Index for contact with soils fell outside EPA's risk range at the CCL Facility. The maximum predicted carcinogenic risk and Hazard Index for the other two soils areas evaluated (PAC Facility and O'Toole Property) are within EPA's acceptable range.

Actual or threatened releases of hazardous substances from OU 1, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. Specifically, the potential future use of contaminated ground water throughout OU 1, including the Quinnville wellfield, and exposure to soils at the CCL source area pose threats to public health.

C. Ecological Assessment

Measured concentrations of compounds in ground water, surface water and sediments were compared to benchmark criteria (i.e. protective guidelines). Due to the limited number of surface water samples collected from the Blackstone River within the OU, this comparison for the river was evaluated using contaminant concentrations in ground water wells adjacent to the river. Ground water concentrations for several volatile organic compounds (VOCs) and inorganics exceeded the respective benchmark criteria. However, dilution by the river water is likely to decrease actual surface water concentrations to levels below benchmark criteria. The results of the Ecological Assessment (EA) are listed in Tables B-28 through B-31.

The primary objective of the EA was to characterize, qualify and quantify the current and potential environmental risks associated with exposure to OU 1 derived contamination of soil, sediment and surface water, if no remedial action is taken within OU 1.

The EA is comprised of five major components: 1) Hazard Identification (Problem Formulation), 2) Exposure Assessment, 3) Toxicity Assessment, 4) Risk Characterization, and 5) Uncertainties and Limitations. EPA selected 39 contaminants, detected throughout OU 1, which either occurred in ground water discharging to the Blackstone River, Brook A surface water and sediments or surficial soils. These contaminants were of concern in addressing environmental risk at OU 1. Indicator species were selected based upon previous reports, literature searches, and field observations. A qualitative evaluation of risks to indicator species was completed based on the integration of OU 1 sampling data, habitat, feeding and behavioral characteristics of indicator species, potential relationships between these species, the exposure assessment, and toxicity information.

Concentrations of a number of contaminants of concern detected in Brook A sediments exceeded the benchmark criteria. However, Brook A does not provide likely or valuable habitat for ecological receptors based on its location and ephemeral nature.

A qualitative risk description for upland soils was completed. While potential upland habitat is located within OU 1, it is comprised of a few small separated parcels located in an industrial setting, thus reducing the habitat potential and value. In addition, the locations of these small parcels do not overlap known or suspected soil contaminated areas. Home ranges for receptors inhabiting these parcels may minimally overlap for small mammals or would be used infrequently by larger species.

In conclusion, based on this assessment, it is not likely that the contaminants found within OU 1 will cause significant impacts to terrestrial or aquatic populations.

VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed to aid in the development and screening of alternatives. These remedial action objectives were developed to mitigate existing and future potential threats to public health and the environment. These response objectives were:

1. Minimize/mitigate the mass of contaminants at the source,
2. Prevent further migration of contaminants from the sources to potential receptors and downgradient areas, including the Blackstone River,
3. Prevent ingestion/contact of ground water contaminated with carcinogens at levels in excess of Maximum Contaminant Levels (MCLs) and a total excess cancer risk of greater than 1×10^{-4} to 1×10^{-6},
4. Prevent ingestion of/contact with ground water contaminated with noncarcinogens at levels greater than MCLs, health-based Applicable or Relevant and Appropriate Requirements (ARARs) and a

total hazard index greater than 1,

5. Restore the contaminated ground water in the aquifer, from the source to the outer boundary of the contaminant plumes, to a level protective of human health and the environment as soon as practicable,
6. Prevent the leaching of contaminants from the soil that would result in ground water contamination in excess of health and risk-based ARARs, and
7. Ensure a coordinated remediation between all points of source contamination, such that restoration of OU 1 is achieved as soon as practicable.

In response to the remedial action objectives, general response actions were identified. These actions for ground water and soil at OU 1 included the following: No Action, Limited Action, Containment, In-situ Treatment, Collection/Removal, Treatment, and Discharge/Disposal.

Although the river is a receptor of OU 1 contamination, remediation of the Blackstone River itself is not a remedial action objective under this Superfund action. Historically, the river has been subjected to contamination from various non-site related sources, as evidenced by its current Class C designation. Such contamination is beyond the scope of any OU 1 remedial action. However, low levels of OU 1 contaminants currently discharge into the river. The evaluation of alternatives in the FS considered technologies for OU 1 which will mitigate, to the extent practicable, this discharge by extracting CCL downgradient ground water contaminated with VOCs, thereby reducing the discharge of OU 1 contaminants to the river.

Similarly, the Quinnville wellfield is a receptor of OU 1 related contamination. However, no active restoration/remedial action is contemplated at the Quinnville wellfield. Prior to closure in 1979, pumping of the wellfield drew OU 1 contaminants under the Blackstone River. Since its closure, residual contamination at the wellfield has been naturally attenuating to health-based standards, based on the 1988 ground water quality data. Active restoration at the wellfield may draw contaminants from the nearby J. M. Mills Landfill (designated as OU 2). Therefore, the evaluation of alternatives for OU 1 included a monitoring program to ensure that the observed natural attenuation continues, and institutional controls to ensure that there is no use or hydrologic alteration of ground water at the wellfield until risks at the nearby J.M. Mills Landfill are identified and addressed.

B. Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for OU 1.

With respect to source control response actions, the RI/FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. These alternatives included options that remove or destroy hazardous substances to the maximum extent feasible, thereby eliminating or minimizing, to the degree possible, the need for long term management. These alternatives also included options that, while treating the principal threats posed by OU 1, vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed. These alternatives also included those that involve little or no treatment but provide protection through engineering and institutional controls, and a no action alternative.

With respect to groundwater response actions, the RI/FS developed a limited number of remedial alternatives that attain OU 1 specific remediation levels within different timeframes using different technologies, and a no action alternative.

As discussed in sections 3, 4 and 5 of the FS, the FS identified, assessed and screened technologies based on implementability, effectiveness and cost. Approximately 60 technologies were determined to be potentially applicable to the remedial response objectives. This assessment retained certain technologies and led to the development of a number of process options which were further evaluated in the FS.

In order to assemble alternatives, section 6.1 of the FS assembled remedial technologies and process options into remedial alternative elements for both the CCL and PAC remediation areas. Seven remedial alternative elements were developed for each of the remediation areas. These remedial alternative elements were screened based on implementability, effectiveness and cost, as described in Section 300.430(e)(4) of the NCP. The remedial alternative elements for each remediation area that were retained from the screening process were then combined to form remedial alternatives for the entire operable unit, addressing source control and management of migration considerations.

From this screening and combination process, six alternatives were retained for detailed analysis. Table B-32 identifies these alternatives, which are also discussed in section VIII., below.

VIII. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each alternative evaluated. A detailed tabular assessment of each alternative can be found in Table 8-1 of the Feasibility Study.

A. Alternative 1: No-Action

- Environmental monitoring.

This alternative was evaluated in detail in the FS as required by CERCLA, to serve as a baseline for comparison with the other remedial alternatives under consideration. Under this alternative, there would be no remedial action of any of the contaminated media found at OU 1; however, the no-action alternative would include long-term monitoring of existing ground water monitoring wells located within the CCL and PAC remediation areas and the Quinnville wellfield.

The objectives of the environmental monitoring program are to evaluate whether the natural attenuation processes of biodegradation, oxidation, and dilution within the aquifer are reducing contaminant concentrations and to monitor the migration of contamination from the source areas.

This alternative would rely solely on natural attenuation to reduce contaminant concentrations at OU 1. While natural attenuation is occurring to some extent at OU 1, it is not known if these natural processes will reduce the concentrations of OU 1 contaminants to levels that are protective of human health and the environment throughout OU 1. The alternative could be implemented easily at a relatively low cost, but would maximize the amount of time needed to achieve remedial action objectives for ground water because contaminant leaching from soil would act as a continuing source of contamination.

Estimated Time for Design and Construction:	0 years
Estimated Time for Restoration:	30+ years for entire OU 1
Estimated Capital Costs:	$0
Estimated Operation and Maintenance: (net present worth)	$980,000
Estimated Total Costs: (net present worth, assuming 7% discount rate)	$980,000

B. Alternative 2: Limited Action

- Environmental monitoring,
- Institutional controls, and
- Focussed investigation.

This alternative would include the long-term environmental monitoring of ground water as described in Alternative 1, and would establish institutional controls to prevent its future use, as well as prevent direct contact or exposure to contaminated soils, and provide a focussed investigation to further characterize the extent and source of VOC contaminants detected in the PAC downgradient area.

Institutional controls would be required to prevent the use or hydrologic alteration of ground water throughout OU 1, including the Quinnville wellfield, and prevent direct contact to or exposure to contaminated soils in areas where such soils exceed EPA's risk range.

The focussed field investigation of the PAC downgradient area would include installation of new monitoring well clusters, sampling and analysis of ground water, and investigation of potential contaminant sources impacting the PAC downgradient area. Based on the findings of the investigation, further response actions may be required.

Estimated Time for Design and Construction:	1 year
Estimated Time for Restoration:	30+ years for entire OU 1
Estimated Capital Costs:	$119,000
Estimated Operation and Maintenance Costs: (net present worth)	$1,154,000
Estimated Total Costs: (net present worth, assuming 7% discount rate)	$1,273,000

C. Alternative 3: Source Control

CCL remediation area:

- Excavation (manholes and catch basins),
- Capping,
- Soil venting of source soils and treatment,
- Source area ground water extraction,
- Ground water treatment and discharge,
- Institutional controls throughout the CCL remediation area, and
- Environmental monitoring.

PAC remediation area:

- Excavation and disposal of leachfields soils,
- Institutional controls throughout the PAC remediation area, and
- Focussed investigation.

This alternative involves source control actions to limit the migration of contaminants. Source control at the CCL remediation area would include excavating contaminated soils in two catchbasins and one manhole, capping source soils, venting vadose zone soils, and extracting and treating source area ground water via an air stripping process with discharge of the treated ground water to the Narragansett Bay Commission (NBC) Privately-Owned Treatment Works (POTW) via the local sewer interceptor located on-site.

Source control at the PAC remediation area would consist of excavating the two leachfields and conducting a focussed investigation of the PAC downgradient area.

Like Alternative 2, this alternative would include the long-term environmental monitoring of ground water and institutional controls to prevent the future use of ground water, as well as prevent direct contact

or exposure to contaminated soils, and provide a focussed investigation of VOC contaminants detected in the PAC downgradient area. Remediation of ground water downgradient of the CCL and PAC source areas would rely on natural attenuation of the contaminants.

Estimated Time for Design and Construction:	2 years
Estimated Time for Restoration:	
4 years at PAC source, 6 years at PAC downgradient, 12 years at CCL source, 12 years at CCL downgradient	
Estimated Capital Costs:	$1,614,000
Estimated Operation and Maintenance Costs: (net present worth)	$4,638,000
Estimated Total Costs: (net present worth, assuming 7% discount rate)	$6,252,000

D. Alternative 4: Enhanced Source Control

CCL remediation area:

- Excavation (manholes and catch basins),
- Capping,
- Soil venting of source soils and treatment,
- Source area ground water extraction,
- Ground water treatment and discharge,
- Institutional controls throughout the CCL remediation area, and
- Environmental monitoring.

PAC remediation area:

- Soil excavation, disposal and leachfield reconstruction,
- In-situ oxidation treatment of ground water,
- Environmental monitoring,
- Institutional controls throughout the PAC remediation area, and
- Focussed investigation.

The enhanced source control alternative would include all the remedial actions described in Alternative 3 for the CCL remediation area; however, at the PAC remediation area, this alternative would combine the source control remedial actions described in Alternative 3 with in-situ treatment of ground water. In-situ oxidation would be used to reduce the mobility of arsenic in ground water migrating from the PAC leachfields. Institutional controls, environmental monitoring, and a focussed investigation would be conducted as described in Alternative 3.

Estimated Time for Design and Construction:	3 years
Estimated Time for Restoration:	

1 year at PAC source, 6 years at PAC downgradient
12 years at CCL source, 12 years at CCL downgradient
Estimated Capital Costs: $1,676,000
Estimated Operation and Maintenance Costs: $4,859,000
(net present worth)
Estimated Total Cost: $6,535,000
(net present worth, assuming 7% discount rate)

E. Alternative 5: Enhanced Source Control and CCL Area Management of Migration

CCL remediation area:

- Excavation (manholes and catch basins),
- Capping,
- Soil venting of source area soils,
- Source area ground water extraction, treatment and discharge to POTW,
- Downgradient area ground water extraction with direct POTW discharge,
- Natural attenuation of the Quinnville wellfield,
- Institutional controls throughout the CCL remediation area, and
- Environmental monitoring.

PAC remediation area:

- Excavation, disposal and reconstruction of the leachfields,
- In-situ oxidation treatment of the PAC source,
- Natural attenuation of the PAC downgradient ground water,
- Institutional controls throughout the PAC remediation area,
- Focussed investigation of the PAC downgradient area, and
- Environmental monitoring.

Alternative 5 includes the remedial elements described in Alternative 4 for the PAC and CCL remediation areas. Alternative 5 also includes extraction and treatment of the CCL downgradient ground water. Recovery of the ground water plume that has migrated from the CCL source area toward the Blackstone River would be accomplished by a multi-well recovery system south of Martin Street. Because ground water monitoring of downgradient wells has indicated that downgradient concentrations of total VOCs are below levels required for discharge to the POTW, this recovered ground water would be directly discharged without pretreatment to the POTW via the sewer.

Estimated Time for Design and Construction: 3 years
Estimated Time for Restoration:
1 year at PAC source, 6 years at PAC downgradient
12 years at CCL source, 6 years at CCL downgradient
Estimated Capital Costs: $1,901,000

Estimated Operation and Maintenance Costs: $5,350,000
(net present worth)
Estimated Total Cost: $7,251,000
(net present worth, assuming 7% discount rate)

F. Alternative 6: Enhanced Source Control and CCL/PAC Area Management of Migration

CCL remediation area:

- Excavation (manholes and catch basins),
- Capping,
- Soil venting of source area soils,
- Source area ground water extraction and treatment
- Downgradient area ground water extraction with direct POTW discharge,
- Natural attenuation of the Quinnville wellfield,
- Institutional controls throughout the CCL remediation area, and
- Environmental monitoring.

PAC remediation area:

- Excavation, disposal and reconstruction of the leachfields,
- In-situ oxidation treatment of the PAC source,
- PAC downgradient ground water extraction and direct POTW discharge,
- Institutional controls throughout the PAC remediation area,
- Focussed investigation, and
- Environmental monitoring.

This alternative would combine the remedial action elements of Alternative 5, with additional extract ion and direct discharge of PAC downgradient ground water to the POTW via the sewer. A multi-well system would be used to pump contaminated ground water in the PAC downgradient area pending the results of the focussed investigation. Based on previous monitoring results, this extracted ground water could be discharged directly to the POTW via the sewer without pretreatment. Cleanup timeframes for the PAC downgradient area would be reduced to three years, as opposed to six years under natural attenuation.

Estimated Time for Design and Construction: 3 years
Estimated Time for Restoration:
1 year at PAC source, 3 years at PAC downgradient
12 years at CCL source, 6 years at CCL downgradient
Estimated Capital Costs: $1,969,000
Estimated Operation and Maintenance Costs: $5,465,000
(net present worth)
Estimated Total Cost: $7,434,000
(net present worth, assuming 7% discount rate)

IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the National Contingency Plan articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select an OU 1 remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP.

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARS)** addresses whether or not a remedy will meet all of the ARARs of other Federal and State environmental laws and/or provide grounds for invoking a waiver.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria.

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alter-natives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used on the final evaluation of remedial alternatives generally after EPA has received public comment on the RI/FS and Proposed Plan.

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

A detailed tabular assessment of each alternative according to the nine criteria can be found in Table 7-2, 7-5, 7-8, 7-11, 7-14, and 7-17 of the Feasibility Study.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in Table 8-1 of the Feasibility Study.

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis.

1. Overall Protection of Human Health and the Environment

Alternative 1 is not protective, in that it provides for no remedial action, and does not impose institutional controls throughout OU 1 to prevent potential future exposures to contaminants. The remaining alternatives all include institutional controls. Each of these remedies is more protective than Alternative 1 to the extent that the necessary institutional controls are acquired and maintained for the time necessary

to restore the soils and ground water under each alternative. Institutional controls will not prevent the further migration of contaminants throughout OU 1 or beyond its boundaries. The typical institutional controls, such as deed restrictions on excavation and use of ground water, must be readily enforceable by both private parties and governmental agencies to be effective. Such controls also depend on cooperation of adjacent property owners, which make their acquisition and maintenance questionable at OU 1. Considering the magnitude of risk at the PAC and CCL source areas, and the geographic extent of the CCL downgradient area, institutional controls, by themselves, are questionable in their ability to provide adequate protectiveness at OU 1. Therefore, alternatives 2, 3, and 4, which rely solely on institutional controls and natural attenuation in areas where risk is demonstrated to be outside EPA's acceptable risk range, are less protective than Alternative 5 and Alternative 6, which actively restore the soils and ground water in all areas where these media are outside the risk range. The active response measures in these two alternatives greatly reduce the amount of time for which institutional controls must be relied upon at OU 1.

Alternative 6 also calls for active restoration at the PAC downgradient area. The risk at the PAC downgradient area is currently within EPA's acceptable risk range, when EPA's risk management factor for arsenic is incorporated (see notation on Table I). As such, the additional measures proposed at the PAC downgradient area under Alternative 6 do not provide for quicker attainment of EPA's remedial response objectives at OU 1. Therefore, Alternative 5 and Alternative 6 are equally protective under this criterion.

2. Compliance with ARARs

Alternatives 1 and 2 would not meet ARARs because they would allow contamination throughout OU 1 to continue to spread to downgradient areas, resulting in further exceedances of chemical-specific ARARs. Alternative 3 allows exceedances of chemical-specific ARARs to continue and spread at the PAC remediation area and the CCL downgradient area until such time as natural attenuation restores the soils and ground water in these areas. In Alternative 4, such exceedances are limited to the CCL downgradient area and the PAC downgradient area.

Alternative 5 and Alternative 6 both attain all Federal and State ARARs. Alternative 6 provides that ground water at the PAC downgradient area would be restored to MCLs in three years, as opposed to six years under Alternative 5; however, the risk at the PAC downgradient area is currently within EPA's acceptable risk range, considering the Agency's risk management factor for arsenic. Therefore, the required timeframe for Alternative 5 to attain ARARs at the PAC downgradient area is acceptable to EPA.

3. Long-term Effectiveness and Permanence

Each alternative provides for reduction of risks at OU 1 at the completion of the remedial action; however, under Alternative 1, the risks at OU 1 are present until such time as natural attenuation restores soils and ground water within OU 1. Alternative 2 mitigates these risks solely through institutional controls. Alternatives 3 and 4 further reduce risks through active restoration of the CCL and/or PAC source areas; however, the CCL downgradient risks are not addressed, except through institutional controls. Alternative 5 reduces contaminants as soon as practicable in all areas of contamination within OU 1 that are currently known to be exceeding EPA's risk range. While Alternative 6 provides for faster cleanup in the PAC downgradient area, it does not restore this portion of OU 1 to EPA's acceptable risk range any faster than Alternative 5, since the risk at the PAC downgradient area is within EPA's acceptable risk range, considering the Agency's risk management factor for arsenic.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

With the exception of Alternatives 1 and 2, all the alternatives evaluated in the FS would provide for the reduction of toxicity, mobility or volume of site contaminants through treatment since all would employ some degree of treatment prior to discharge or disposal. Alternative 3 includes treatment only at the CCL source area. Alternative 4 provides for treatment at both the CCL and PAC source areas. Alternative 5 and Alternative 6 provide for no further treatment than Alternative 4. Alternative 5 and Alternative 6 provide for further recovery of contaminated ground water in the CCL or CCL and PAC downgradient areas, respectively; however, such ground water would not require pretreatment prior to POTW discharge.

5. Short-term Effectiveness

Alternative 1, which consists solely of natural attenuation, provides for no protection of the community until cleanup levels are achieved. Alternative 2 provides for more protection of the community only to the extent that institutional controls are effectively implemented and maintained. Alternatives 3 and 4 are more protective of the community during remedial actions, because their active restoration processes at the source areas provide for a shorter time period when risks are unacceptable; however, both these remedies continue to rely solely on institutional controls to reduce risks for portions of OU 1 where risks are outside EPA's acceptable risk range. Alternative 5 and Alternative 6 provide for maximum reduction of risks to the community, by implementing institutional controls and providing for the quickest practicable restoration of those contaminated areas that are outside of EPA's acceptable risk range. Since the risk presented at the PAC downgradient area is within EPA's acceptable risk range, considering the Agency's risk management factor for arsenic, any additional risk reduction provided by Alternative 6 is not required to achieve levels that are protective of human health and the environment.

Because of the potential for release of contaminants during the excavation activities, engineering precautions would be taken to minimize the potential for contaminant releases to ensure short-term protection of site workers, nearby industries' workers, and area residents during cleanup related activities.

6. Implementability

All aspects of Alternative 5's source control and management of migration are implementable and have been used successfully at other hazardous waste sites. In-situ oxidation is innovative in environmental cleanups, and pilot testing will ensure optimal treatment. The technologies required for Alternative 5 and alternatives 3, 4 and 6, which involve on-site air stripping, soil vapor extraction, carbon adsorption, and pumping of ground water, are readily implementable, and have been successfully used at other Superfund sites.

Alternatives 3, 4, and 6, and Alternative 5, all involve discharge to the local POTW via the sewer located on-site. Discharge to the POTW will involve connecting to the Narragansett Bay Commission (NBC) sewer interceptor, located in the immediate vicinity of the CCL remediation area, and will be treated at Bucklin Point Wastewater Treatment Facility in East Providence, Rhode Island. Based on current information obtained from RIDEM, the Narragansett Bay Commission treatment facility is in compliance with state regulations. Based on information presented in the FS, NBC indicated that the discharge rates would likely be acceptable and would not exceed the design capacity of the interceptor or the treatment facility, pending submittal of design specifications. Therefore, discharge to the POTW is considered to be fully implementable.

7. Cost

A comparison of the estimated total present worth costs (based on a 7 percent discount) for each alternative is as follows:

Alternative	Total Capital	Total Operation & Maintenance	Total Costs
#1	$ 0	$ 901,000	$ 980,000
#2	$ 119,000	$ 1,154,000	$ 1,273,000
#3	$ 1,614,000	$ 4,638,000	$ 6,252,000
#4	$ 1,676,000	$ 4,859,000	$ 6,535,000
#5	$ 1,901,000	$ 5,350,000	$ 7,251,000
#6	$ 1,969,000	$ 5,465,000	$ 7,434,000

8. State Acceptance

The Rhode Island Department of Environmental Management (RIDEM) has been actively involved with the Site, and particularly OU 1, during the

development of the RI/FS and this Record of Decision.

RIDEM submitted comments on EPA's Preferred Alternative during the public comment period. In summary, RIDEM generally supports the alternative selected by EPA. RIDEM expressed concern that the focussed investigation in the PAC downgradient area should not foreclose the possibility of any future RIDEM action in this portion of OU 1. RIDEM also favors "triggering" mechanisms that would describe the circumstances under which active restoration may be required at the PAC downgradient area.

A summary of these and other RIDEM comments, and EPA's responses, are included in the Responsiveness Summary, attached as Appendix C to this ROD.

RIDEM has reviewed this document and concurs with the alternative selected for the remedy as documented in the attached Declaration of State Concurrence (Appendix D).

9. Community Acceptance

The comments received by the community, potentially responsible parties, and local governments, are summarized and responded to in the Responsiveness Summary attached to the ROD as Appendix C.

The Town of Cumberland, a citizen, two citizen organizations, and three potentially responsible parties submitted comments. Major comments are summarized below:

- The Town of Cumberland expressed concerns about the reconstruction of the Martin Street well field and requested further studies on contamination impacting the Lenox Street well.
- One citizen was concerned about worker safety issues at the CCL plant.
- The Blackstone Valley Tourist Council stated a preference for Alternative 6.
- Save the Bay supported Alternative 5, while expressing a preference for Alternative 6, if, after the results of the focussed investigation are understood, the PAC downgradient area is found to be outside of EPA's acceptable risk range.
- CPC, International stated a preference for Alternative 3 (source control), and stated that the preferred alternative would be unable to achieve cleanup levels. CPC further stated that the EPA risk assessment was flawed.
- Lonza Inc. believes that the in-situ oxidation at the PAC facility should be attempted on a pilot basis before EPA commits to full scale implementation. Lonza further stated that the PAC

downgradient area should be treated as a separate source and also took issue with EPA risk assessment assumptions.

- PAC, while concerned about business impacts of remedial actions on its property, generally favored the preferred alternative.

X. THE SELECTED REMEDY

The remedy selected to address the contamination identified in Operable Unit 1, of the Peterson/Puritan, Inc. Site is Alternative 5, Enhanced Source Control and CCL Area Management of Migration. The remedy includes the following components: the excavation and off-site disposal of source area soils, venting with treatment of source area soils, extraction and treatment of the contaminated ground water, natural attenuation of the PAC downgradient area and the Quinnville well field, institutional controls for ground water use/hydrologic alteration and contact with contaminated soils, environmental monitoring and focussed investigation of contamination at the PAC downgradient area.

The selected remedy is comprehensive in that it provides for both source control and management of migration components to be implemented at OU 1. The approximate cleanup timeframes for the selected remedy are as follows: 12 years in the CCL source area, six years for the CCL downgradient area, six years to naturally attenuate contaminants at PAC downgradient area, and one year for source control measures at the PAC source. The Quinnville wellfield ground water, currently estimated to be within acceptable contaminant levels under non-pumping conditions, is expected to continue to attenuate throughout the duration of the cleanup.

A. Interim Ground Water Cleanup Levels

Interim cleanup levels have been established in ground water for all contaminants of concern identified in the Baseline Risk Assessment found to pose an unacceptable risk to either public health or the environment. Interim cleanup levels have been set based on the ARARs (e.g., Drinking Water Maximum Contaminant Level Goals (MCLGs) and MCLs) as available, or other suitable criteria described below. Periodic assessments of the protection afforded by remedial actions will be made as the remedy is being implemented and at the completion of the remedial action. At the time that Interim Ground Water Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs which call into question the protectiveness of the remedy have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on the residual ground water contamination to determine whether the remedial action is protective. This risk assessment of the residual ground water contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by the ingestion of ground water and exposure to soils at OU 1. If, after review of the risk assessment, the remedial action is not determined to be protective by

EPA, the remedial action shall continue until either protective levels are achieved, and are not exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final cleanup levels for this Record of Decision and shall be considered performance standards for any remedial action.

Because the aquifer under OU 1 is a Class IIB aquifer, which is a potential source of drinking water, MCLs and non-zero MCLGs established under the Safe Drinking Water Act are ARARs.

Interim cleanup levels for known, probable, and possible carcinogenic compounds (Classes A, B, and C) have been established to protect against potential carcinogenic effects and to conform with ARARs. Because the MCLGs for Class A & B compounds are set at zero and are thus not suitable for use as interim cleanup levels, MCLs and proposed MCLs have been selected as the interim cleanup levels for these Classes of compounds. Because the MCLGs for the Class C compounds are greater than zero, and can readily be confirmed, MCLGs and proposed MCLGs have been selected as the interim cleanup levels for Class C compounds. When neither a MCL or a non-zero MCLG exists, EPA has considered proposed MCLS or proposed non-zero MCLGs in setting the interim cleanup level.

Interim cleanup levels for Class D and E compounds (not classified, and no evidence of carcinogenicity) have been established to protect against potential non-carcinogenic effects and to conform with ARARs. Because the MCLGs for these Classes are greater that zero and can readily be confirmed, MCLGs and proposed MCLGs have been selected as the interim cleanup levels for these classes of compounds.

In situations where a promulgated State standard is more stringent than values established under the Safe Drinking Water Act, the State standard was used as the interim cleanup level. In the absence of an MCLG, an MCL, a proposed MCLG, proposed MCL, State standard, or other suitable criteria to be considered (i.e., health advisory, state guideline) an interim cleanup level was derived for each compound having carcinogenic potential (Classes A, B, and C compounds) based on a 10^{-6} excess cancer risk level per compound considering the ingestion of contaminated ground water at OU 1. In the absence of the above standards and criteria, interim cleanup levels for all other compounds (Classes D and E) were established based on a level that represents an acceptable exposure level to which the human population including sensitive subgroups may be exposed without adverse affect during a lifetime or part of a lifetime, incorporating an adequate margin of safety (hazard quotient = 1) considering the ingestion of contaminated ground water at OU 1. If a value described by any of the above methods was not capable of being detected with good precision and accuracy or was below what was deemed to be the background value, then the practical quantification limit or background value was used as appropriate for the Interim Ground Water Cleanup Level.

Table I below summarizes the Interim Cleanup Levels for carcinogenic and non-carcinogenic contaminants of concern identified in ground water.

TABLE I: INTERIM GROUND WATER CLEANUP LEVELS

Carcinogenic Contaminants of Concern (class)	Interim Cleanup Level (ug/l)	Basis	Level of Risk
CCL Facility Source Area			
Benzene (A)	5	MCL	$2x10^{-6}$
1,2-Dichloroethane (B2)	5	MCL	$5x10^{-6}$
1,1-Dichloroethene (C)	7	MCL	$5x10^{-5}$
Methylene Chloride (B2)	5	MCL	$4x10^{-7}$
Tetrachloroethene (B2)	5	MCL	$3x10^{-6}$
1,1,2-Trichloroethane (C)	5	MCL	$3x10^{-6}$
Trichloroethene (B2)	5	MCL	$7x10^{-7}$
Vinyl Chloride (A)	2	MCL	$5x10^{-5}$
Bis(2-ethylhexyl)phthalate (B2)	6	MCL	$1x10^{-6}$
Chlordane (B2)	2	MCL	$3x10^{-5}$
Arsenic (A)*	50	MCL	$1x10^{-4}$
		SUM	$1x10^{-4}$
PAC Facility Source Area			
Tetrachloroethene (B2)	5	MCL	$3x10^{-6}$
Arsenic (A)*	50	MCL	$1x10^{-4}$
		SUM	$1x10^{-4}$
CCL Facility Downgradient Area and Quinnville Wellfield			
Benzene (A)	5	MCL	$2x10^{-6}$
1,2-Dichloroethane (B2)	5	MCL	$5x10^{-6}$
Tetrachloroethene (B2)	5	MCL	$3x10^{-6}$
Trichloroethene (B2)	5	MCL	$7x10^{-7}$
Vinyl Chloride(A)	2	MCL	$5x10^{-5}$
Bis(2-ethylhexyl)Phthalate (B2)	6	MCL	$1x10^{-6}$
Arsenic (A)*	50	MCL	$1x10^{-4}$
		SUM	$1x10^{-4}$

TABLE I: INTERIM GROUND WATER CLEANUP LEVELS (cont'd.)

PAC Facility Downgradient Area

Benzene (A)	5	MCL	$2x10^{-6}$
Trichloroethene (B2)	5	MCL	$7x10^{-7}$
Arsenic (A)*	50	MCL	$1x10^{-4}$
		SUM	$1x10^{-4}$

* EPA Risk Management Factor for Arsenic
Recent studies indicate that many skin tumors arising from oral exposure to arsenic are non-lethal and that the dose-response curve for the skin cancers may be sublinear (in which case the cancer potency factor used to generate risk estimates may be overestimated). It is Agency policy to manage these risks downward by as much as a factor of ten. As a result, the carcinogenic risk for arsenic at this Site has been managed as if it were one order of magnitude lower than the calculated risk. Consequently, the risk level for arsenic in the above table reflects a risk management factor.

Non-carcinogenic Contaminants of Concern (class)	Interim Cleanup Level (ug/l)	Basis	Target Endpoint Toxicity	Hazard Quotient
CCL Facility Source Area				
Acetone (D)	3700	HQ	Liver	1
1,1-Dichloroethene (C)	7	MCL	Liver	0.02
1,2-Dichloroethene (D)	70	MCL	Liver	0.2
Methylene Chloride (B2)	5	MCL	Liver	0.002
Tetrachloroethene (B2)	5	MCL	Liver	0.01
1,1,1-Trichloroethane (D)	200	MCL	Liver	0.06
Chlordane (B2)	2	MCL	Liver	0.9
Arsenic (A)	50	MCL	Skin	5
Cadmium (D)	5	MCL	Kidney	0.3
			HI Liver	2.2
			HI Skin	5
			HI Kidney	0.3
PAC Facility Source Area				
Acetone (D)	3700	HQ	Liver	1
Arsenic (A)	50	MCL	Skin	5
			HI Liver	1
			HI Skin	5

TABLE I: INTERIM GROUND WATER CLEANUP LEVELS (cont'd.)

CCL Facility Downgradient Area and Quinnville Wellfield					
Arsenic (A)	50	MCL		Skin	5
Copper (D)	1,300	PMCL	GI	Irrit.	1
				HI Skin	5
			HI GI	Irrit.	1
PAC Facility Downgradient Area					
Arsenic (A)	50	MCL		Skin	5
				HI Skin	5

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While these interim cleanup levels are consistent with ARARs or suitable TBC criteria for ground water, a cumulative risk that could be posed by these compounds may exceed EPA's goals for remedial action. Consequently, these levels are considered to be interim cleanup levels for ground water. At the time that these Interim Groundwater Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs which call into question the protectiveness of the remedy have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on the residual ground water contamination to determine whether the remedial action is protective. This risk assessment of the residual ground water contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by the ingestion of contaminated ground water. If, after review of the risk assessment the remedial action is not determined to be protective by EPA, the remedial action shall continue until either protective levels are achieved and are not exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final cleanup levels for this Record of Decision and shall be considered performance standards for any remedial action.

All Interim Groundwater Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs which call into question the protectiveness of the remedy and the protective levels determined as a consequence of the risk assessment of residual contamination, must be met at the completion of the remedial action in all ground water within OU 1, including the Quinnville well field. EPA has estimated that these ground water cleanup levels will be obtained within twelve years throughout all of OU 1.

B. Soil Cleanup Levels

Based upon data developed in the RI and the Baseline Risk Assessment, remedial measures to address risk associated with possible exposure to source soils are not warranted because present and future risks are within or below EPA's acceptable carcinogenic risk range or for the non-carcinogens generally below a Hazard Index of one. However, available data suggest that area soils are a primary source of release of VOCs to ground water. This phenomenon may result in an unacceptable risk to those who consume contaminated ground water. Therefore, cleanup levels for soils were established to protect the aquifer from potential soil leachate. The Summers Model, described in Section 1.4.2.3 of the Feasibility Study was used to estimate residual soil levels that are not expected to impair future ground water quality. The interim cleanup levels for ground water were used as input into the leaching model. If the predicted protective soil level was not capable of being detected with good precision and accuracy, then the practical quantification limit was selected as the cleanup level for soils. The table below summarizes the soil cleanup levels required to protect public health and the environment through restoration of the aquifer and were developed for the ground water contaminants of concern detected above the interim ground water cleanup levels.

TABLE II: SOIL CLEANUP LEVELS
FOR THE PROTECTION OF HUMAN HEALTH AND THE AQUIFER
BASED ON THE SUMMER'S MODEL

Carcinogenic Contaminants of Concern (class)	Soil Cleanup Level (mg/kg)	Basis for Model Input	Residual Ground Water Risk
CCL Facility Source Area (Uncapped Soils)*			
1,1-Dichloroethene (C)	0.028	MCL	$5x10^{-5}$
Methylene Chloride (B2)	0.004	MCL	$4x10^{-7}$
Tetrachloroethene (B2)	0.146	MCL	$3x10^{-6}$
Trichloroethene (B2)	0.039	MCL	$7x10^{-7}$
		SUM	$5x10^{-5}$
PAC Facility Source Area			
Tetrachloroethene (B2)	0.03	MCL	$3x10^{-6}$
		SUM	$3x10^{-6}$

TABLE 2: SOIL CLEANUP LEVELS (cont.)

Non-carcinogenic Contaminants of Concern (class)	Soil Cleanup Level (mg/kg)	Target Endpoint Basis/Toxicity		Residual Ground water Hazard Quot.
CCL Facility Source Area (Uncapped Soils)*				
1,1-Dichloroethene (C)	0.028	MCL	Liver	0.02
1,2-Dichloroethene (D)	0.214	MCL	Liver	0.2
Methylene Chloride (B2)	0.004	MCL	Liver	0.002
Tetrachloroethene (B2)	0.146	MCL	Liver	0.01
1,1,1-Trichloro-ethane (D)	1.4	MCL	Liver	0.06
			HI Liver	0.3
PAC Facility Source Area				
Ethylbenzene (D)	4	MCL	Fetotox.	0.2
Styrene (C)	0.6	MCL	Liver	0.1
Toluene (D)	3	MCL	Liver	0.1
Tetrachloroethene (B2)	0.03	MCL	Liver	0.01
Xylenes (D)	33	MCL	CNS	0.1
			HI Fetotox.	0.2
			HI Liver	0.2
			HI CNS	0.1

* Values obtained from FS at p.1-18 and Appendix A; CCL source area values assume "uncapped" value to ensure protectiveness if integrity of cap fails over time.

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These cleanup levels in soils are consistent with ARARs for ground water, attain EPA's risk management goal for remedial actions, and have been determined by EPA to be protective. These cleanup levels must be met at the completion of the remedial action at the CCL source area (tank farm and O'toole property) and the PAC source area.

C. Description of Remedial Components

The following is a description of the remedial components of the selected remedy for OU 1. As previously described, OU 1 is comprised of the CCL and PAC remediation areas; these are further broken into the CCL source and downgradient, and PAC source and downgradient areas, respectively.

The components of the CCL remediation area include:

- Excavation (manholes and catch basins),
- Capping,
- Soil venting of source area soils,
- Source area ground water extraction, treatment and discharge to POTW via the sewer,
- Downgradient area ground water extraction with direct POTW discharge via the sewer,
- Natural attenuation of ground water at the Quinnville wellfield,
- Institutional controls throughout the CCL remediation area, and
- Environmental monitoring.

The components of the PAC remediation area include:

- Excavation and disposal of the leachfields and related soils,
- In-situ oxidation treatment of the PAC source area,
- Natural attenuation of the PAC downgradient ground water,
- Institutional controls throughout the PAC remediation area,
- Focussed investigation of the PAC downgradient area, and
- Environmental monitoring.

Excavation: Excavation at the CCL area will consist of removing soils at manholes and catch basins. These soils are contaminated with solvents and will be transported off-site for disposal at a RCRA-approved disposal facility. Excavation of these soils will remove a portion of the continuing source of ground water contamination.

Excavation at the PAC remediation area includes removal of leachfields #1 and #2 and surrounding soils to a depth of approximately nine feet. Excavation will remove the source of contaminants to ground water in addition to removing other organic material contributing to the conditions which cause arsenic to become more soluble. Excavated soils will be sampled and analyzed to determine the most appropriate off-site disposal option. It is estimated that approximately 1,000 cubic yards of soil will be excavated and disposed of at a RCRA-approved disposal facility.

The excavation of soils and associated debris from the PAC leachfields and the CCL manholes and catchbasins will be performed in accordance with established performance specifications to be determined during remedial design.

Capping: Source area soils at the CCL remediation area will be capped to enhance the soil venting system operation (see below) by: 1) eliminating the potential inflow of clean air through the ground surface and from around the vent well casing in the immediate vicinity of operation, thereby increasing the area affected by each vent well, 2) limiting the infiltration through the soil, and 3) reducing the potential for direct contact of source area soils. An estimated 14,000 square foot area of the tank farm will be capped with concrete and an estimated 12,000 square feet of the O'Toole property will be

paved. The steep slope between the two areas will not be capped because minimal precipitation could infiltrate into the sloped surface. In addition, the influx of clean air through the side slope is expected to assist in flushing VOCs from the vadose zone soils in the CCL tank farm by encouraging lateral air movement through the zone where soils are heavily contaminated.

Soil Venting and Vapor Treatment: A soil venting system (also known as Soil Vapor Extraction (SVE)) consisting of an estimated 12 wells, blowers, and a Granular Activated Carbon (GAC) adsorption/regeneration off-gas treatment system will be installed at the CCL source area. It is presently estimated that the system will operate for a period of two years. It is estimated that the SVE system will result in 99 percent removal of VOCs above the ground water table (vadose zone) in the vicinity of the CCL tank farm. Due to the persistence of chlorinated solvents in the soil medium, residual contamination may remain after maximum soil venting has occurred. This residual contamination could continue to leach into the ground water by infiltration; however, EPA believes that an effective soil venting program, combined with an effective surface cap (described above) will minimize leaching, and ground water extraction (described below) will minimize contaminant migration so that cleanup levels in ground water will be achieved in approximately 12 years.

The GAC adsorption/regeneration off-gas treatment system will treat the contaminated air stream exiting the SVE system. The system will consist of an estimated two GAC vessels, an automated air stream switching device, and steam boiler. The contaminated air stream collected from the SVE system will be cycled through one of two vessels such that while one vessel was in operation, the second will be regenerated (cleansed) using steam. The unit will automatically direct the air stream influent to a new GAC vessel when the first vessel reached a pre-determined VOC adsorption capacity, triggering the steam regeneration of the spent vessel. The VOCs in the steam will be decanted and the recovered water reused in the regeneration process. The concentrated chemical solutions from the steam stripping process will be temporarily stored on-site prior to off-site treatment and disposal.

Source Area Ground Water Extraction: A multi-well recovery system in the CCL source area will capture and treat ground water within and immediately downgradient of the source to prevent migration of contaminated ground water from the source. Wells within the tank farm area will capture the grossly contaminated ground water and depress the ground water table in the source area. This depression will extend the vadose zone and allow further recovery of residual contamination at and below the static water table by the SVE system. Wells on the O'Toole property will cut off the source area from the downgradient plume. The total pumping rate will be about 90 gpm.

A diffused air stripper will be used to treat the extracted ground water. Air stripping is a process that induces the mass transfer of VOCs from water to air by applying a forced air stream through the water column. Estimating a 100-gpm influent flow rate from CCL source area recovery wells, the diffused aeration system will consist of four tanks in series. Compared to other options considered in the FS, this process option will be less susceptible to fouling and reduced efficiencies from naturally occurring inorganics in the ground water, such as iron and manganese, due to the higher water velocity traveling through the system. The inorganics will travel through the treatment system as suspended solids and will be discharged with the treated water to the POTW via the sewer. The VOC-contaminated air passing through the stripping process will be treated by the GAC adsorption/regeneration system as described above.

In-situ Oxidation: In-situ (in place) oxidation will be used to reduce the mobility of the arsenic in ground water migrating from the leachfields at the PAC remediation area. The leachfields will be replaced with perforated pipe and stone backfill to be used as an infiltration gallery. Clean water, amended with a chemical additive, will infiltrate the soils at about four gallons per minute (gpm) through the infiltration gallery. As this water moves through the aquifer, it will reduce the mobility of the arsenic by chemically changing the more soluble arsenite to arsenate, which will precipitate or sorb to soil particles. In-situ oxidation is considered to be an innovative technology which will require pilot testing to ensure optimum treatment. Removal of the organic material in the old leachfields (as described above) is expected to enhance the effectiveness of the in-situ oxidation technology.

Downgradient Ground Water Extraction and Discharge: Recovery of the ground water plume that has migrated from the CCL source area toward the Blackstone River and Quinnville wellfield will be accomplished by installing a multi-well recovery system. The system will include approximately six to nine wells south of Martin Street, which will be about 100 to 120 feet deep and pump a total of approximately 100 gpm, and will be sufficient to capture the deep ground water plume. Because ground water monitoring of downgradient wells has indicated that downgradient concentrations of total VOCs are below levels requiring treatment prior to discharge to the POTW, this ground water can be directly discharged to the POTW via the sewer without pretreatment. Monitoring of the influent to the sewer will ensure continued compliance with POTW requirements.

Institutional Controls: Institutional controls will be required for all remediation areas, including the Quinnville wellfield and the PAC downgradient area. These controls will function to prevent the use or hydrologic alteration of ground water throughout OU 1, including the Quinnville wellfield. These controls will also function to prevent direct contact to, or exposure to, contaminated soils in areas where

such soils exceed EPA's risk range (i.e. CCL source Area). These controls may include the registration of deed restrictions prohibiting 1) excavation of source area soils, and 2) use of ground water throughout the remediation areas and the Quinnville wellfield. These restrictions would not apply to excavation and use that is within the scope of any authorized response action. Deed restrictions shall function, in part, to inform future purchasers that those properties within OU 1 are within a Superfund site. While in themselves institutional controls are not a permanent solution by which to solely manage exposure risks to contaminants, the controls, when applied with other components of the remedy, do provide an additional measure of protection. Institutional controls will be implemented at the CCL remediation area to prevent the future use or hydrologic alteration of contaminated ground water throughout the entire CCL remediation area (source area and downgradient area) and to prevent the direct contact or exposure to contaminated soil at the CCL source area. Similarly, institutional controls will be implemented at the PAC remediation area to prevent the future use or hydrologic alteration of contaminated ground water throughout the entire PAC remediation area (source area and downgradient area). Institutional controls will be implemented at the Quinnville wellfield to prevent the future use or hydrologic alteration of contaminated ground water. The restrictions will be maintained until OU 1 is determined not to pose a threat to human health and the environment, and at the Quinnville wellfield will be maintained until risks at the nearby J.M. Mills Landfill are identified and addressed.

Environmental Monitoring: The objectives of the environmental monitoring program will be to evaluate the rate and measure the success of the components of the remedial action, including natural processes acting on the contaminated media, and to monitor the migration and reduction of contamination at the PAC and CCL remediation areas and at the wellfield. The program will include the sampling of environmental media, including monitoring of a) ground water; b) treated and direct discharges from the ground water remediation systems to the POTW interceptor (i.e. sewerline); and c) the injection of chemically amended waters as a component of the PAC remedy. The reporting of such results for periodic evaluation shall continue until cleanup levels are met or OU 1 is determined not to pose a threat to human health and the environment. Long-term monitoring of the treated and direct discharge to the POTW via the sewer intercepter shall ensure that the discharge is not adversely affecting the POTW and that ARARs are being met.

The environmental monitoring program will also include a) a soil monitoring program to demonstrate compliance with soil cleanup levels; and b) a performance monitoring program for the soil vapor extraction (SVE) system to determine if the SVE system is working effectively to remove the VOCs from the CCL source area soils.

Natural Attenuation: Natural attenuation is a process of naturally occurring biodegradation, oxidation, adsorption and dilution which reduces contaminant concentrations. This process is occurring within portions of the remediation areas and the Quinnville wellfield. This process will be the sole means of remediation at two areas of OU 1: the Quinnville wellfield and the PAC downgradient area. Natural attenuation, coupled with monitoring and institutional controls (as discussed above) will be implemented at the Quinnville wellfield. Natural attenuation with a focussed investigation, monitoring, and institutional controls, will be implemented at the PAC downgradient area. The focussed investigation will be required because VOCs were detected in monitoring wells in the PAC downgradient area. The investigation will include the installation of new monitoring well clusters, sampling and analyses of ground water, and investigation of potential contaminant sources impacting this area. Based on the findings of the investigation, further response actions may be required.

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The goal of this remedial action is to restore the ground water to its beneficial use, which is, at OU 1, a potential drinking water source. Based on information obtained during the remedial investigation, and the analysis of all remedial alternatives, EPA believes that the selected remedy may be able to achieve this goal. Although not detected during the RI, Dense Non-aqueous Phase Liquids (DNAPLs), i.e., undissolved chemicals, may be present at OU 1. If present, DNAPL could serve as a long-term source of contamination to ground water at the CCL source area. This could impact the ability of the remedial action to achieve cleanup levels at all points throughout the CCL source area in a reasonable time period.

Based on current data, EPA estimates that the ground water will be restored to its beneficial use in approximately 12 years after implementation of the ground water component of this ROD. During operation, the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

a) at individual wells where interim ground water cleanup levels have been attained for a period of three years, pumping may be discontinued,

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and encourage absorbed contaminants to partition into ground water,

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume; and

e) periodic revaluation of remedial technologies for ground water restoration.

If, following a reasonable period of system operation, EPA determines that the selected remedy cannot meet cleanup levels, EPA may consider contingency measures as a modification to the selected remedy. Such contingency measures may include the following:

a) engineering controls such as physical barriers, including enhancements to cap impermeability or long-term gradient control provided by pumping, as containment measures;

b) ARARs may be waived for the cleanup of the relevant portions of the aquifer based on the technical impracticability of achieving further contaminant reductions and revised cleanup levels may be established for the relevant portions of the aquifer,

c) institutional controls may be maintained until such time as the remedy is determined to be protective by EPA to 1) prevent hydrologic alteration or use of ground water that remains above health-based levels; and 2) ensure the impermeability and integrity of the cap at the CCL source area;

d) continued monitoring of specified wells;

e) periodic reevaluation of remedial technologies for ground water restoration; or

f) such other measures as EPA determines are necessary to further reduce the mass of contaminants and to ensure that the remedy remains protective of human health and the environment.

The decision to invoke any or all of these measures may be made by EPA during a future review, following a reasonable period of operation of the selected remedy. If EPA determines that such contingency measures are necessary, and are significant or fundamental modifications to the remedy, such changes will be documented in a future decision document.

D. Other Components of the Selected Remedy

To the extent required by law, EPA will review OU 1 at least once every five years after the initiation of remedial action at OU 1, if any hazardous substances, pollutants or contaminants remain at OU 1, to assure that the remedial action continues to protect human health and the environment. EPA will also review the Site before the Site is proposed for deletion from the National Priorities List.

XI. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the first operable unit of the Peterson/Puritan Site is consistent with CERCLA and, the NCP. The selected remedy is protective of human health and the environment, attains ARARs and is cost effective. The selected remedy also satisfies the statutory preference for treatment which permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element. Additionally, the selected remedy utilizes alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at OU 1 will permanently reduce the risks posed to human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through treatment, engineering controls, and institutional controls. Specifically, the risk presented by OU 1 is the future ingestion of contaminated ground water. Therefore, the selected remedy uses a SVE system to treat soils that are contaminated with VOCs and thereby eliminate the migration of VOCs from soils to ground water. The selected remedy also uses in-situ oxidation, excavation, and pumping and treatment of ground water to contain and reduce the levels of contamination throughout the ground water plume. Engineering controls, such as adding enhancements to the SVE, or modifying the ground water pump and treat system, will be implemented as warranted to ensure the effectiveness of the remedial action technologies. Institutional controls will be required for all remediation areas, including the Quinnville wellfield and the PAC downgradient area. These controls will function to prevent the use or hydrologic alteration of ground water throughout OU 1, including the Quinnville wellfield, until cleanup levels have been met.

Moreover, the selected remedy will achieve potential human health risk levels that attain the 10^{-4} to 10^{-6} incremental cancer risk range and a level protective of noncarcinogenic endpoints, and will comply with ARARs and "to be considered" criteria. At the time that the Interim Ground Water Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs which call into question the protectiveness of the remedy have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on the residual ground water contamination to determine whether the remedial action is protective. This risk assessment of the residual ground water contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by ingestion of ground water. If, after review of the risk assessment, the remedial action is not determined to be protective by EPA, the remedial action shall continue until protective levels are achieved and have not been exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final

cleanup levels for this Record of Decision and shall be considered performance standards for any remedial action.

B. The Selected Remedy Attains ARARs

This remedy will attain all applicable or relevant and appropriate federal and state requirements that apply to OU 1. Environmental laws from which ARARs for the selected remedial action are derived, and the specific ARARs include:

Chemical Specific

Federal Standards

- Resource Conservation and Recovery Act (RCRA), Identification and Listing of Hazardous Waste; [40 CFR Part 261]
- Safe Drinking Water Act (SDWA), Maximum Contaminant Level Goals (MCLGs); [40 CFR Part 141]
- Safe Drinking Water Act (SDWA), National Primary Drinking Water Standards, Maximum Contaminant Levels (MCLs); [40 CFR Part 141]

State Standards

- Rhode Island Rules and Regulations Pertaining to Public Drinking Water; July, 1991
- Rhode Island Rules and Regulations for Groundwater Quality; July, 1993

Location Specific

Federal Standards

- Protection of Wetlands Executive Order No. 11990; [40 CFR Part 6]
- Floodplain Management Executive Order No. 11988; [40 CFR Part 6]

State Standards

- Rhode Island Rules and Regulations Governing the Enforcement of the Freshwater Wetlands Act - August, 1990

Action Specific

Federal Standards

- Clean Air Act (CAA), National Emission Standards for Hazardous

Air Pollutants (NESHAP);[40 CFR Part 61]

- RCRA Air Emissions Standards [40 CFR Part 264, Subparts AA and BB
- CWA, National Pretreatment Standards; [40 CFR Part 403]
- RCRA, Standards Applicable to Generators of Hazardous Waste; [40 CFR Part 262]
- RCRA, General Facility Standards; [40 CFR Subpart B, 264.10-264.18]
- RCRA, Preparedness and Prevention; [40 CFR Part 264, Subpart C]
- RCRA, Contingency Plan and Emergency Procedures; [40 CFR Part 264, Subpart D]
- RCRA, Releases from Solid Waste Management Units; [40 CFR Part 264, Subpart F]
- RCRA, Closure and Post-Closure; [40 CFR Part 264, Subpart G]
- RCRA, Use and Management of Container;[40 CFR Part 264, Subpart I]
- RCRA, Tanks; [40 CFR Part 264, Subpart J]
- RCRA, Miscellaneous Units [40 CFR Part 264, Subpart X, 264.600-264.999]
- RCRA, Interim Status TSDF Standards; Chemical, Physical, and Biological Treatment [40 CFR 265, Subpart Q, 265.400-265.406]
- RCRA, Land Disposal Restrictions; [40 CFR Part 268]

State Standards

- Rhode Island Pretreatment Regulations - June, 1984
- Rhode Island Underground Injection Control Regulations - June, 1984
- Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 1 - Amended 1977
- Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 7 - July, 1990
- Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 9 - March, 1993

- Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 13 - October, 1982

- Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 15 - January, 1993

- Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 17 - February, 1977

- Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 22 - October, 1992

- Rhode Island Rules and Regulations for Solid Waste Management Facilities - June, 1992

- Rhode Island Hazardous Waste Rules and Regulations - Section 8

- Rhode Island Hazardous Waste Rules and Regulations - Section 9

The following policies, criteria, and guidances will also be considered (TBCs) during the implementation of the remedial action:

Chemical Specific

- USEPA Health Assessment Documents, Acceptable Intake, Chronic (AIC) and Subchronic (AIS)

- USEPA Human Health Assessment Cancer Slope Factors (CSFs)

- USEPA Office of Drinking Water, Health Advisories

- USEPA Reference Doses (RfDs)

Location Specific

- (None Identified)

Action Specific

- Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites; [OSWER Directive #9355 0-28]

- USEPA Region I Memo from Louis Gitto to Merrill Hohman-July 12, 1989

- RCRA Air Emissions Standards [40 CFR Part 264, Subpart CC

A full description of each ARAR or TBC, its application to the selected remedy, and actions necessary to attain each ARAR or TBC, can be found at Table B-33.

C. The Selected Remedial Action is Cost-Effective

In the Agency's judgment, the selected remedy is cost effective, i.e., the remedy affords overall effectiveness proportional to its costs. In selecting this remedy, once EPA identified alternatives that are protective of human health and the environment and that attain, or, as appropriate, waive ARARs, EPA evaluated the overall effectiveness of each alternative by assessing the relevant three criteria--long term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short term effectiveness, in combination. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs. The costs of this remedial alternative are specified in Table B-34.

Of all the alternatives evaluated in the FS, the selected remedy is the most cost effective approach to ensuring the necessary level of protectiveness. EPA evaluates cost-effectiveness only in selecting a remedy from among protective alternatives. Alternatives 1, 2, 3, and 4, in the FS are all less costly than the selected remedy. However, each of those alternatives allows some portion of OU 1 to continue to pose an unacceptable risk for an excessive time period in the Agency's view. This is because each of these alternatives relies solely on institutional controls and natural attenuation in areas where risk is demonstrated to be outside EPA's acceptable risk range. Since these alternatives are not sufficiently protective, their cost effectiveness cannot be analyzed.

Alternative 6 in the FS is more costly than the selected remedy. Alternative 6 is not cost effective. Any enhanced protectiveness provided by Alternative 6 is not proportional to its additional costs, since Alternative 6 would require immediate active restoration in the PAC downgradient area, where risks are currently within EPA's acceptable risk range, considering the Agency's risk management factor for arsenic. The Agency believes it is more cost effective to conduct a focussed investigation, with monitoring and institutional controls, in the PAC downgradient area. Further response actions may be required based on these activities. This approach is incorporated into the selected remedy. Thus, the Agency believes that, when comparing Alternative 6 and the selected remedy, the selected remedy is more cost effective since it provides for protectiveness throughout OU 1 and does not require the expenditure of an estimated $183,000 on active restoration in the PAC downgradient area unless deemed necessary by EPA based on results of the focussed investigation. The actual costs of any active restoration at the PAC downgradient area will not be known until the results of the focussed investigation are analyzed.

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as

appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4)implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives. This analysis was performed with respect to Alternative 6 and the selected remedy, the only two alternatives that comply with ARARs and are fully protective of human health and the environment.

The Agency believes that the selected remedy and Alternative 6 compare similarly in terms of long term effectiveness and permanence, and reduction of toxicity, mobility, or volume through treatment. Both alternatives would effectively maintain reliable protection of human health and the environment over time once cleanup levels have been met. Under either alternative, residual risks remaining at OU 1 after the completion of the remedial action would be within EPA's acceptable risk range.

The selected remedy and Alternative 6 both provide for identical reduction of contaminants through treatment. While Alternative 6 would immediately extract contaminants from the groundwater in the PAC downgradient area, such contaminants would not require treatment prior to discharge to the POTW.

Both the selected remedy and Alternative 6 are fully implementable. Neither option involves off-site land disposal of untreated waste. Since the risk presented at the PAC downgradient area is within EPA's acceptable risk range, considering the Agency's risk management factor for arsenic, any additional risk reduction provided by Alternative 6 is not required to achieve levels that are protective of human health and the environment. However, Alternative 6 would require the added expenditure of approximately $183,000 for immediate active restoration at the PAC downgradient area. The actual costs of any active restoration at the PAC downgradient area will not be known until the results of the focussed investigation are understood. This added cost is significant, considering that Alternative 6 does not provide any appreciable advantage in terms of utilizing permanent solutions and alternate technologies.

As described in more detail in the Responsiveness Summary, State and community comments generally support EPA's choice of the selected remedy, especially as it compares to Alternative 6. Considering such support, and based on the above analysis of statutory criteria, the Agency believes that

the selected remedy utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.

E. The Selected Remedy Satisfies the Preference for Treatment Which Permanently and Significantly reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal elements of the selected remedy are source control and management of migration. The primary threats at the OU 1 are the threat of future potential ingestion of ground water contaminated from OU 1 and the threat of ingestion or contact with contaminated soils. The selected remedy addresses these threats by treating contaminants in both the CCL and PAC source areas, thereby providing significant reduction in the toxicity, mobility and volume of contaminants at OU 1 through treatment. Therefore, the selected remedy satisfies the statutory preference for treatment as a principal element.

XII. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA presented a Proposed Plan for OU 1 of the Peterson/Puritan Superfund Site on July 6, 1993.

The components of the preferred alternative included:

CCL remediation area:

- Excavation (manholes and catch basins),
- Capping,
- Soil venting of source area soils,
- Source area ground water extraction, treatment and discharge to POTW,
- Downgradient area ground water extraction with direct POTW discharge,
- Natural attenuation of the Quinnville wellfield,
- Institutional controls, and
- Environmental monitoring.

PAC remediation area:

- Excavation, disposal and reconstruction of the leachfields,
- In-situ oxidation treatment of the PAC source,
- Natural attenuation of the PAC downgradient ground water,
- Institutional controls,
- Focussed investigation of the PAC downgradient area, and
- Environmental monitoring.

The Proposed Plan describes that soil venting, also described herein as soil vapor extraction (SVE), will be employed to remove contaminants from the soils at the CCL source area. The selected remedy described in this

document also contains this technology. Additionally, the selected remedy provides that during operation, the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. These adjustments are described in detail in Section X, above.

The selected remedy also provides that if, following a reasonable period of system operation, EPA determines that the selected remedy cannot meet cleanup levels, EPA may consider contingency measures as a modification to the selected remedy. Such contingency measures are also described in detail in Section X, above. EPA believes that these enhancing and modifying technologies provide that the CCL source area systems will be implemented most effectively based on actual data received during operation.

These changes regarding EPA's possible enhancement of soil vapor extraction, and modifications and contingency measures with respect to ground water extraction at the CCL source area, are logical outgrowths of the technologies presented in the Proposed Plan. The overall waste management approach presented in the selected remedy remains the same as that presented in the Proposed Plan. While EPA believes that these changes are significant, they do not radically alter the remedy from the form in which it was presented in the Proposed Plan. Thus, these changes are of such a nature that they could have been reasonably anticipated, considering the inherent uncertainties associated with waste management technologies. Therefore, EPA does not believe that these changes require a revised Proposed Plan and new public comment period.

XIII. STATE ROLE

The Rhode Island Department of Environmental Management has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessment and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State Environmental laws and regulations. The State of Rhode Island concurs with the selected remedy for the first operable unit at the Peterson/Puritan Site. A copy of the declaration of concurrence is attached as Appendix D.

PETERSON/PURITAN, INC. SITE
OPERABLE UNIT 1
ROD SUMMARY

APPENDIX A

FIGURES

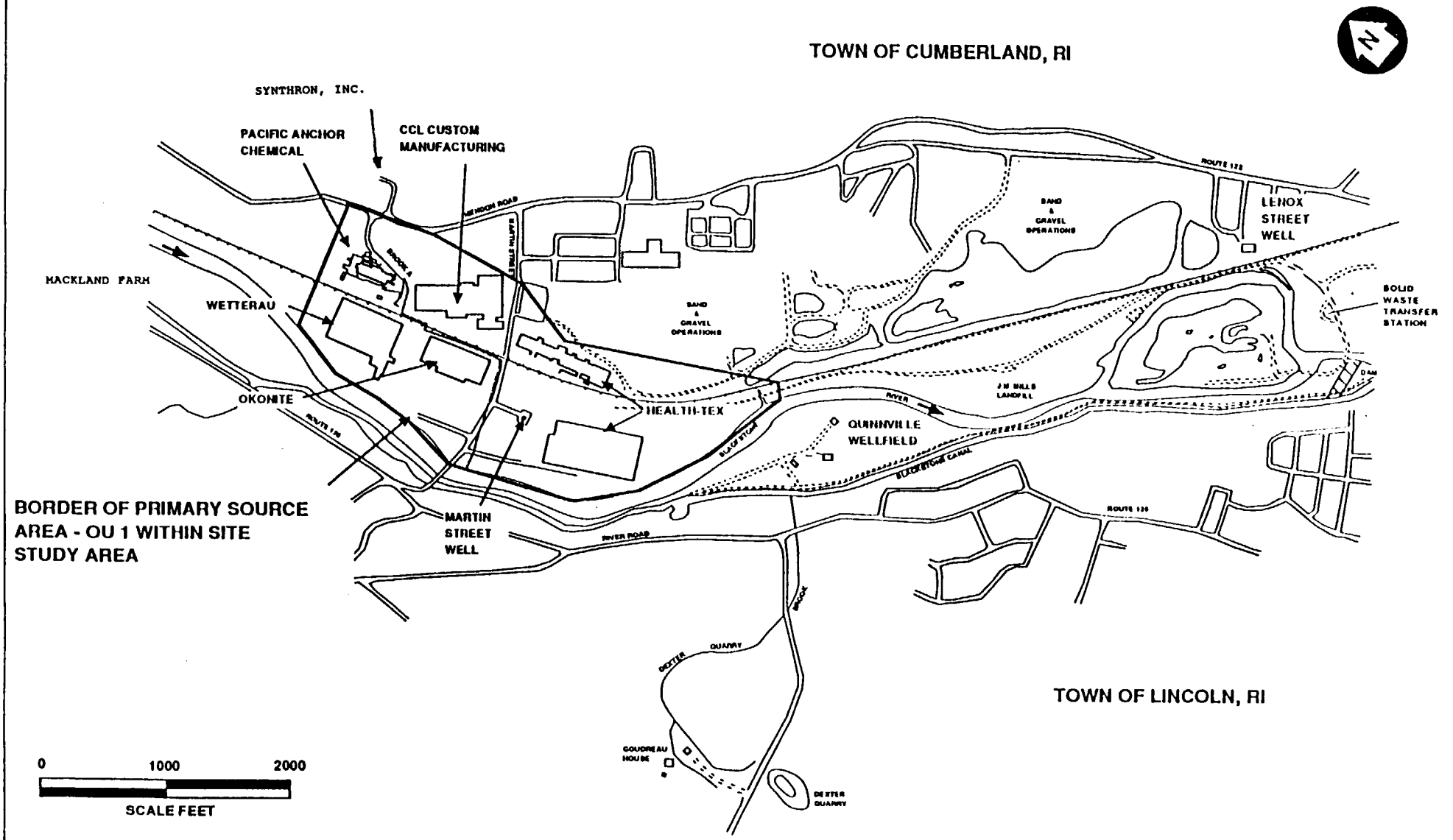

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FIGURE 1
SITE STUDY AREA
PETERSON/PURITAN, INC. SITE - OU 1

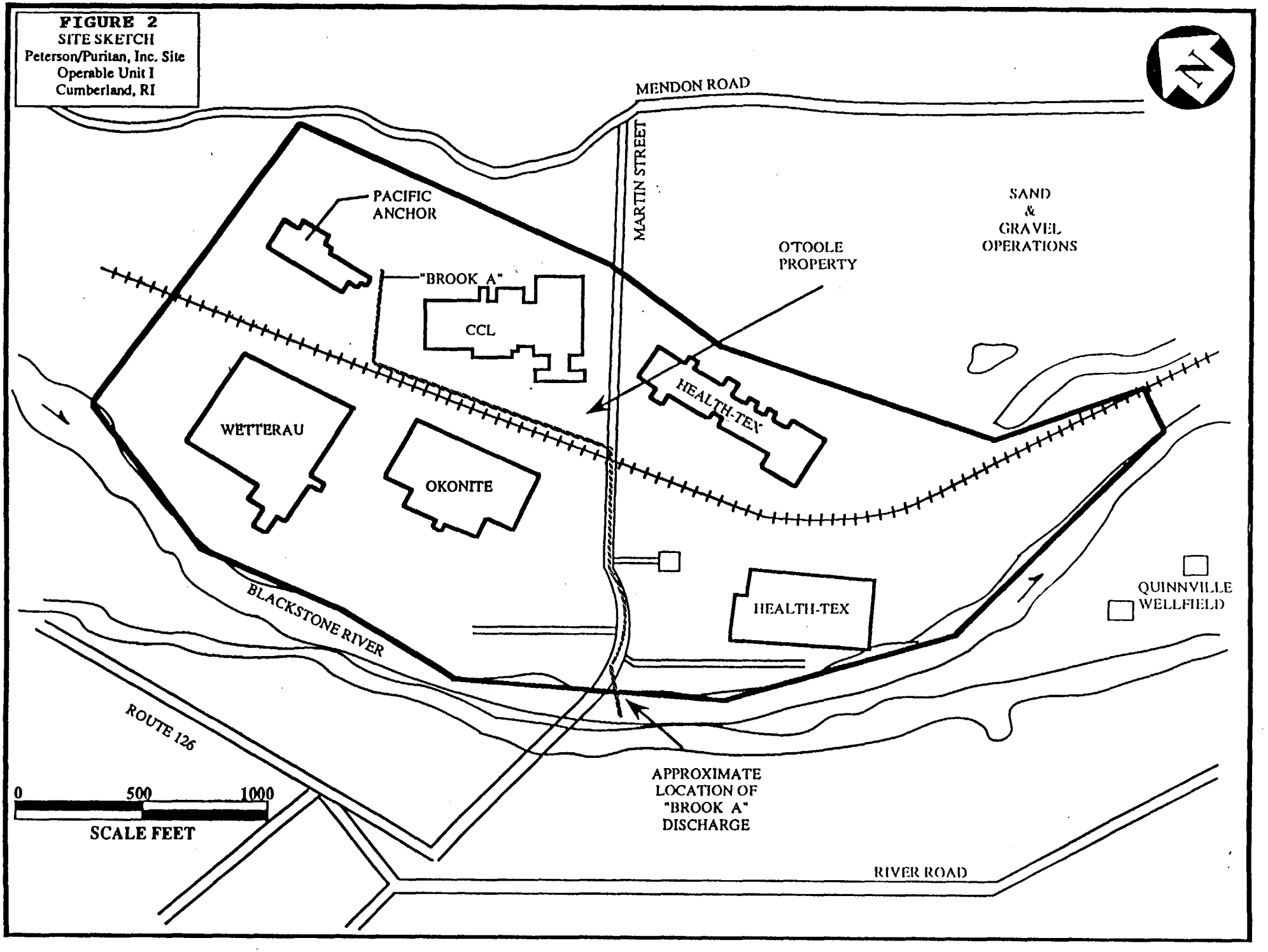


FIGURE 2
SITE SKETCH
Peterson/Puritan, Inc. Site
Operable Unit I
Cumberland, RI
MENDON ROAD
MARTIN STREET
PACIFIC ANCHOR
"BROOK A"
CCL
WETTERAU
OKONITE
OTOOLE PROPERTY
SAND & GRAVEL OPERATIONS
HEALTH-TEX
HEALTH-TEX
QUINNVILLE WELLFIELD
BLACKSTONE RIVER
ROUTE 126
APPROXIMATE LOCATION OF "BROOK A" DISCHARGE
RIVER ROAD
0
500
1000
SCALE FEET

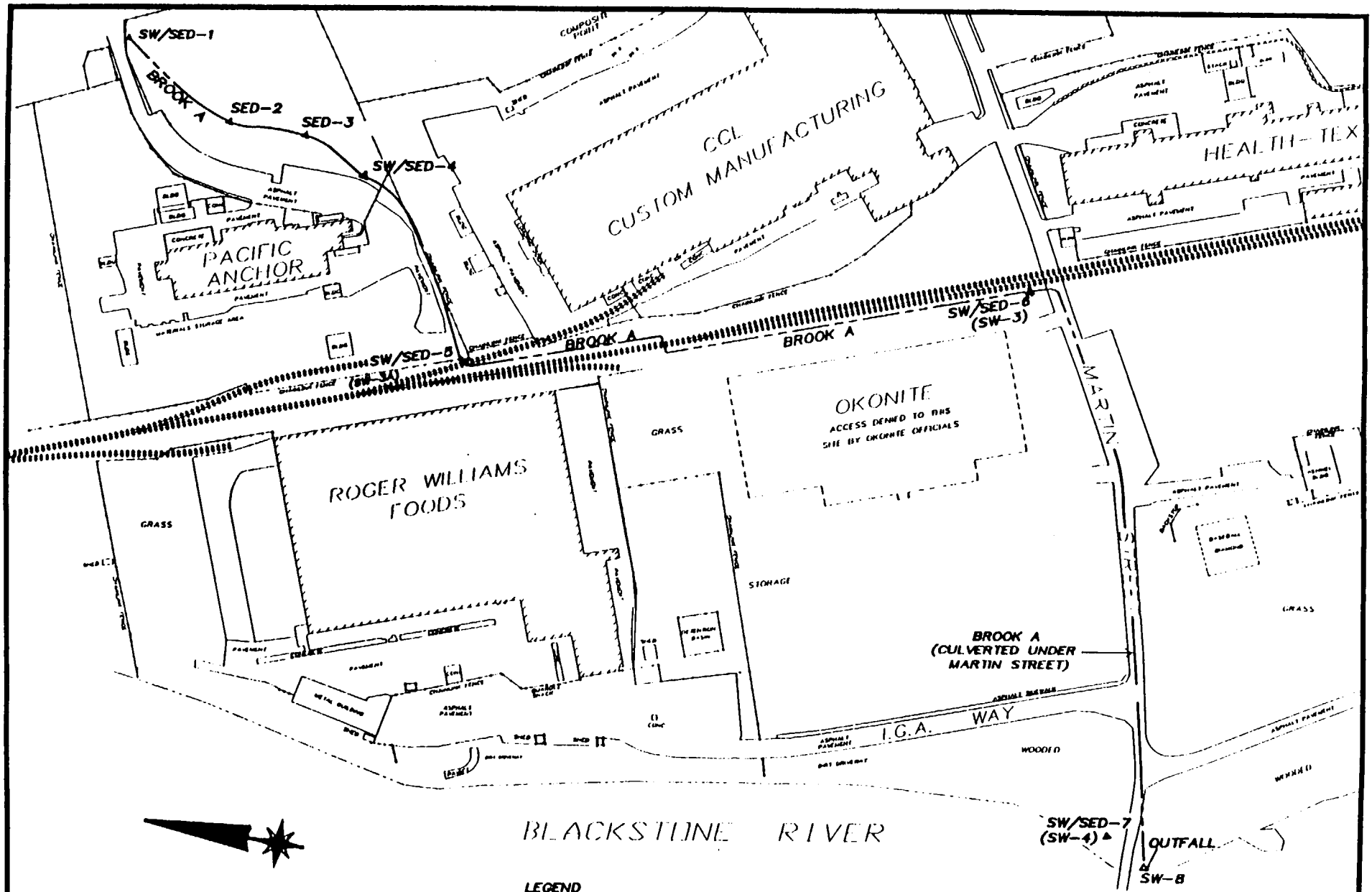


FIGURE 3

SURFACE WATER/SEDIMENT SAMPLE LOCATIONS
PETERSON/PURITAN, INC., SITE OU 1
ABB ENVIRONMENTAL SERVICES, INC.

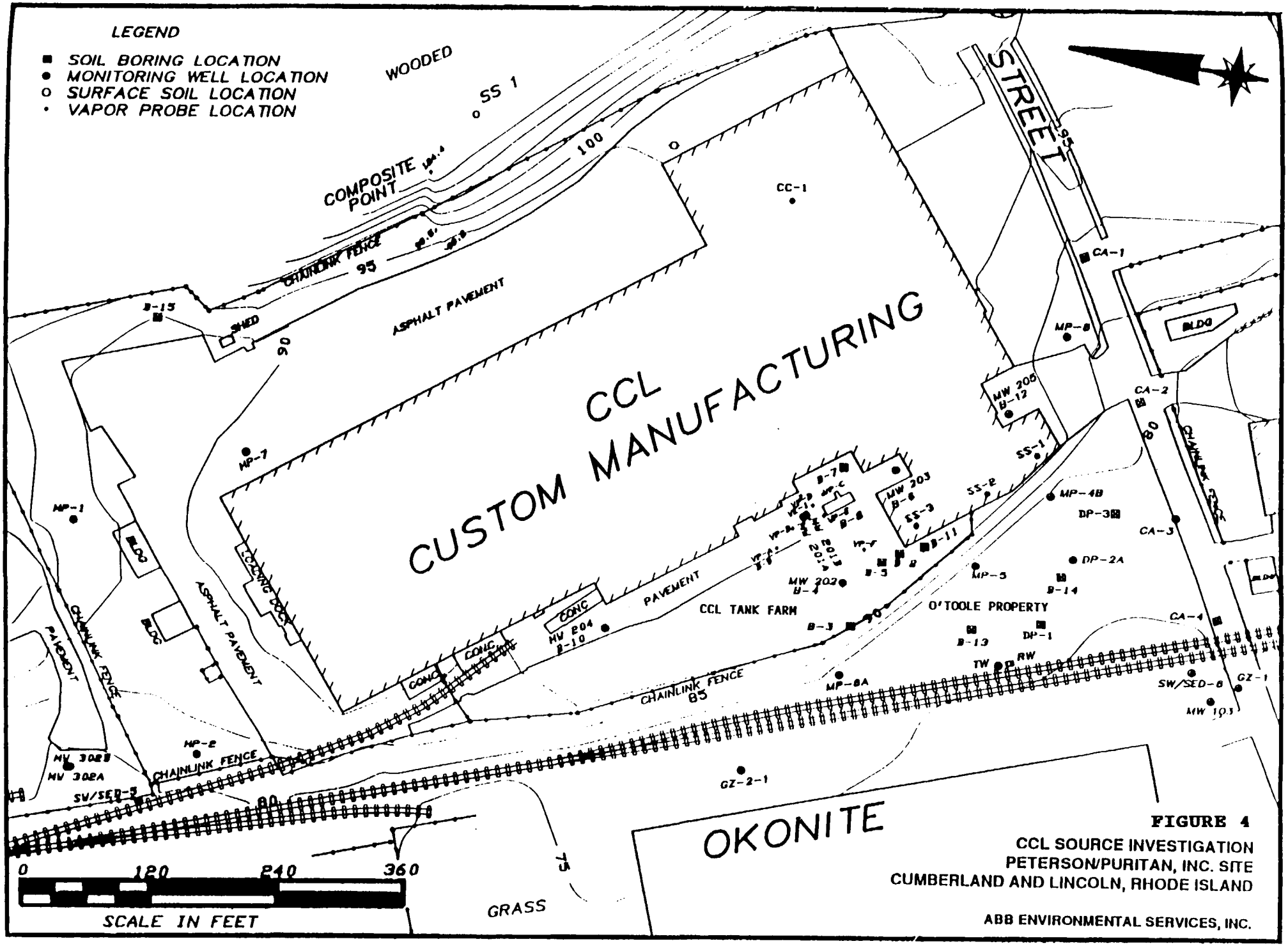
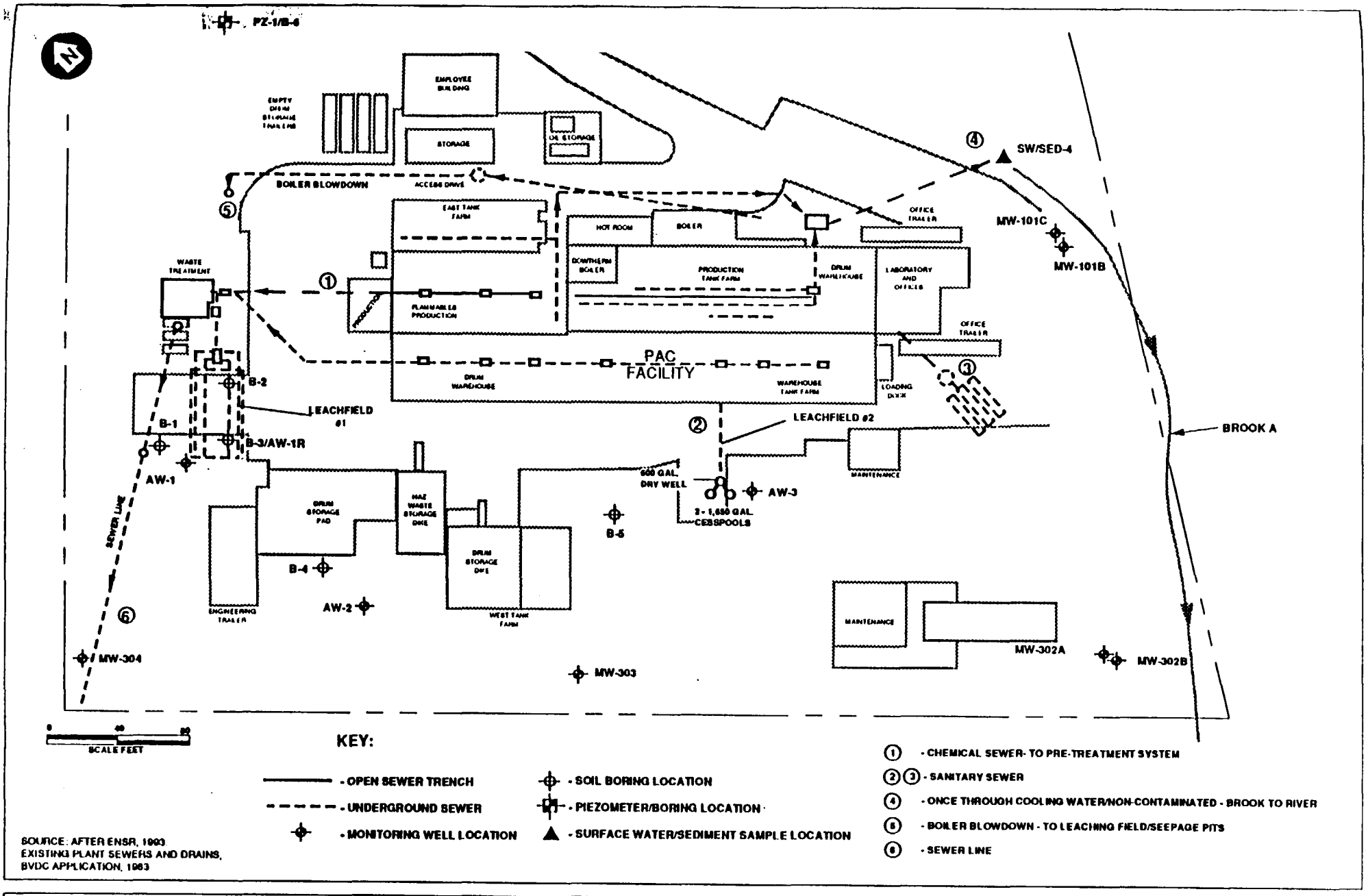


FIGURE 4
CCL SOURCE INVESTIGATION
PETERSON/PURITAN, INC. SITE
CUMBERLAND AND LINCOLN, RHODE ISLAND

ABB ENVIRONMENTAL SERVICES, INC.



SOURCE: AFTER ENSR, 1993
EXISTING PLANT SEWERS AND DRAINS,
BVDC APPLICATION, 1983

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FIGURE 5
HISTORIC AND CURRENT SEPTIC SYSTEMS - PAC FACILITY
PETERSON/PURITAN, INC. SITE - OU 1
CUMBERLAND AND LINCOLN, RHODE ISLAND

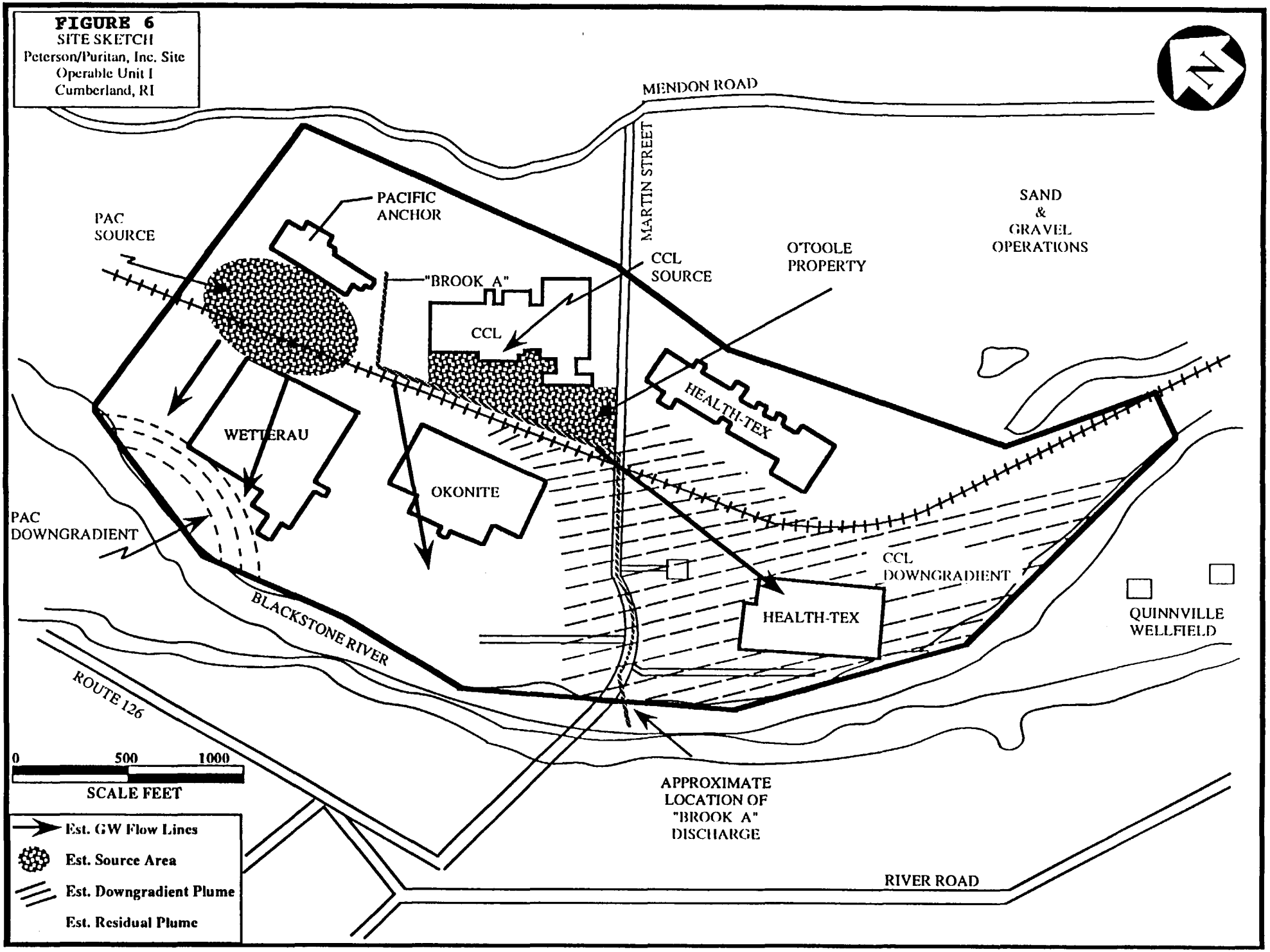
FIGURE 6
SITE SKETCH
Peterson/Puritan, Inc. Site
Operable Unit I
Cumberland, RI
N
MENDON ROAD
MARTIN STREET
PACIFIC ANCHOR
PAC SOURCE
"BROOK A"
CCL
CCL SOURCE
OTOOLE PROPERTY
SAND & GRAVEL OPERATIONS
HEALTH-TEX
WETTERAU
OKONITE
PAC DOWNGRADIENT
CCL DOWNGRADIENT
HEALTH-TEX
QUINNVILLE WELLFIELD
BLACKSTONE RIVER
ROUTE 126
0
500
1000
SCALE FEET
APPROXIMATE LOCATION OF "BROOK A" DISCHARGE
RIVER ROAD
Est. GW Flow Lines
Est. Source Area
Est. Downgradient Plume
Est. Residual Plume

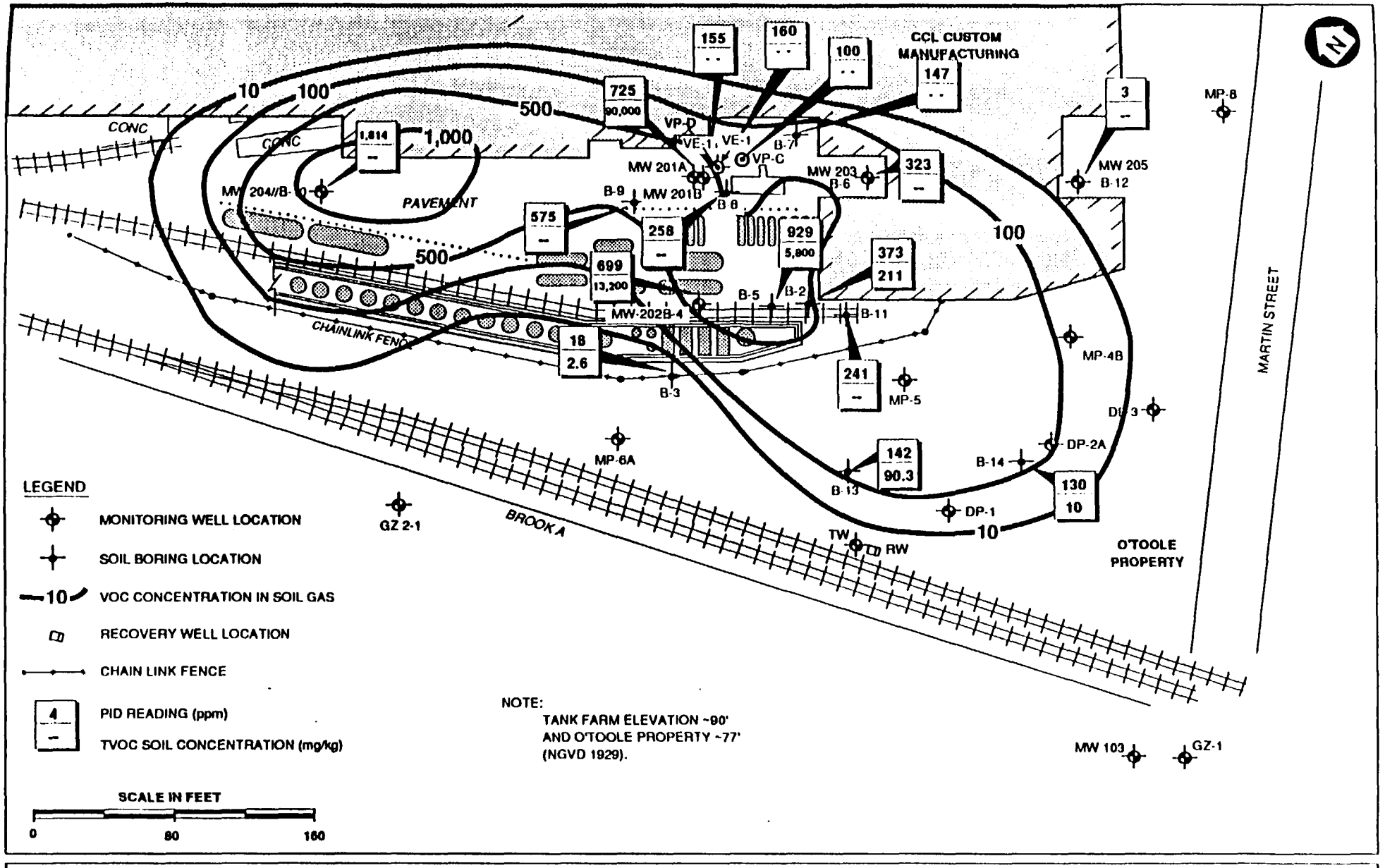

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FIGURE 7

TOTAL VOCs DETECTED (PPM)
ELEVATION 70'-80' (NGVD '29)
PETERSON/PURITAN, INC. SITE
CUMBERLAND AND LINCOLN, RHODE ISLAND

9212048D 2 5 A

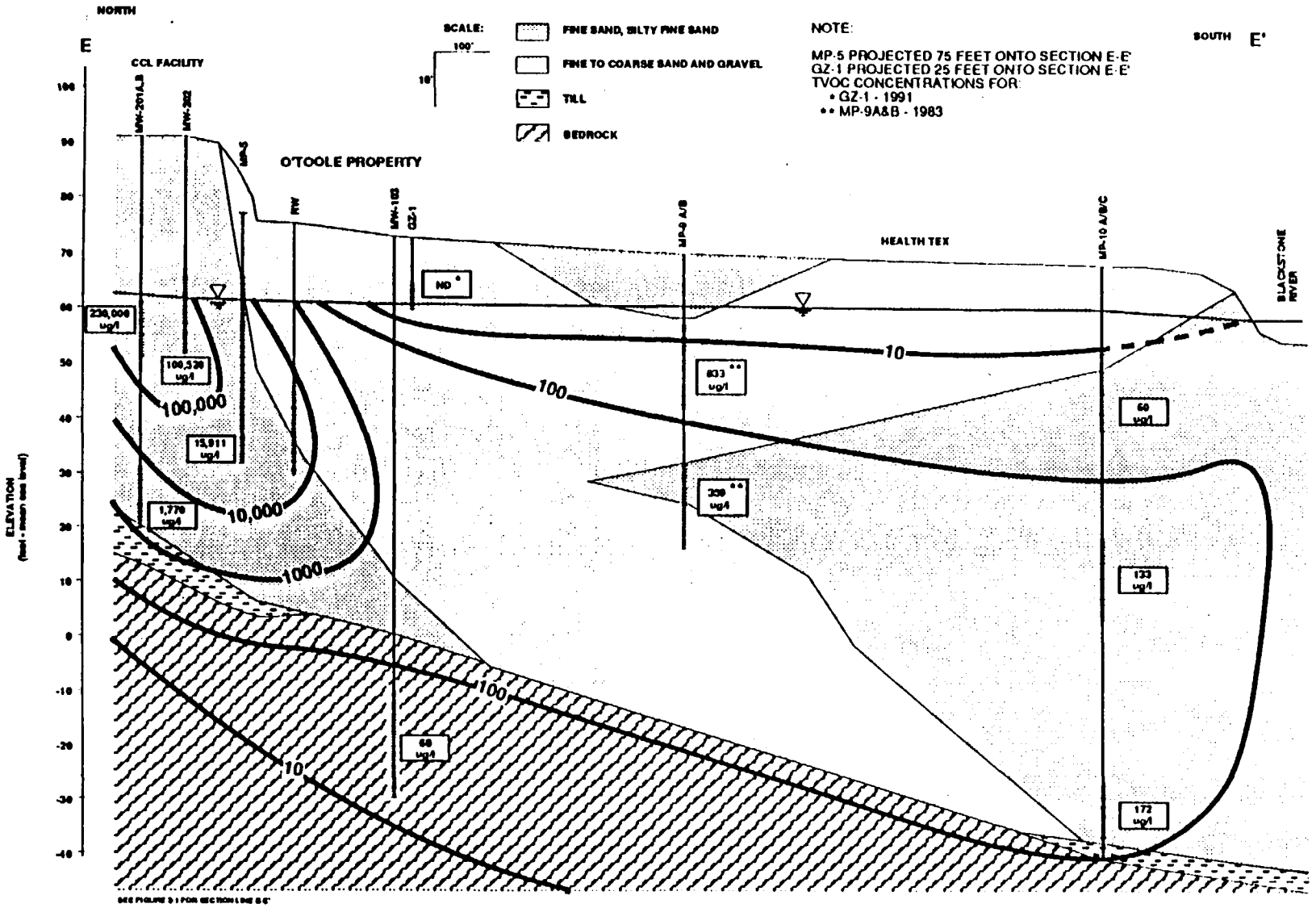

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FIGURE 8

VERTICAL DISTRIBUTION OF SELECT VOCS - JUNE 1992
PETERSON/PURITAN, INC. SITE - OU 1
CUMBERLAND AND LINCOLN, RHODE ISLAND

PETERSON/PURITAN, INC. SITE
OPERABLE UNIT 1
ROD SUMMARY

APPENDIX B

TABLES

TABLE B-1

DISTRIBUTION OF VOLATILE ORGANIC COMPOUNDS IN SOIL
CCL REMEDIATION AREA
PETERSON/PURITAN, INC. SITE
CUMBERLAND AND LINCOLN, RHODE ISLAND

SOIL SAMPLE:	B-1,S-3	B-1,S-5	B-1,S-7	B-2,S-3	B-2,S-4	B-2,S-7	B-3,S-3	B-3,S-5	B-3,S-7	B-4,S-2	B-4,S-3	B-4,S-4
SAMPLE DEPTH:	9'-11'	19'-21'	29'-31'	10'-12'	15'-17'	30'-32'	9'-11'	19'-21'	29'-31'	5'-7'	10'-12'	15'-17'
Methylene Chloride	1,000 J	280 J	180 J	0.67 J	0.29 J	--	--	--	--	--	--	15 JB
Acetone	1,200 J	330 J	--	--	--	--	--	--	--	--	--	--
1,1 Dichloroethene*	--	--	--	1.7	--	--	--	--	--	--	--	--
Chloroform	--	--	--	--	0.06 JB	--	0.13 JB	0.08 JB	--	0.09 JB	52 J	--
2-Butanone	--	--	--	--	--	0.33 J	--	--	--	--	--	--
1,1,1-Trichloroethane*	6,000	2,300	610	5.5	0.63	--	--	--	0.41 J	1.7	220 J	--
Trichloroethene*	--	--	--	--	0.21 J	--	--	--	--	--	--	--
Tetrachloroethene*	84,000 E	20,000	13,000	130 E	210	8.0	2.6	2.0	70	580	13,000 B	2,000 B
TOTAL VOCs	92,200	22,910	13,790	137.87	211.19	8.33	2.73	2.08	70.41	581.79	13,272	2,015
TOTAL SELECTED VOCs	90,000	22,300	13,610	137.2	210.84	8.0	2.6	2.0	70.41	581.7	13,220	2,000

SOURCE: ABB-ES (1990, Table 2) Preliminary Source Interim Report, Peterson/Puritan Facility.

NOTES:

Results in ug/g, dry weight. Approximately equal to parts per million (ppm).

J - Indicates an estimated value. Compound was detected, but at a concentration below the quantitation level.
B - The presence of this compound in the associated laboratory method blank indicates analyte found in the sample may be a result of laboratory contamination.
E - The concentration of tetrachloroethene exceeded the upper limit of the calibration curve. See complete analytical results for further details.
-- - Compound not detected
* - Selected VOC

Table1-1.wp
2/04/93

TABLE B-1 (cont.)

DISTRIBUTION OF VOLATILE ORGANIC COMPOUNDS IN SOIL
CCL REMEDIATION AREA
PETERSON/PURITAN, INC. SITE
CUMBERLAND AND LINCOLN, RHODE ISLAND

SOIL SAMPLE:	B-4,S-5	B-4,S-7	B-5,S-2	B-5,S-3	B-5,S-4	B-5,S-5	B-5,S-7
SAMPLE DEPTH:	20'-22'	30'-32'	5'-7'	10'-12'	15'-17'	20'-22'	30'-32'
Methylene Chloride	4 JB	88 JB	0.15 JB	100 JB	51 JB	12 JB	0.56 JB
Acetone	--	--	--	--	--	--	--
1,1 Dichloroethene*	--	--	--	--	--	--	--
Chloroform	--	--	--	--	--	--	--
2-Butanone	--	--	--	--	--	--	--
1,1,1-Trichloroethane*	--	330	1.0	--	--	--	--
Trichloroethene*	--	--	--	--	--	--	--
Tetrachloroethene*	140 B	7,500 B	530 B	5,800 B	2,000 B	710 B	7.6 B
TOTAL VOCs	144	7,918	531.15	5,900	2,051	722	8.16
TOTAL SELECTED VOCs	140	7,830	531	5,800	2,000	710	7.6

SOURCE: ABB-ES (1990, Table 2) *Preliminary Source Investigation Interim Report, Peterson/Puritan Facility.*

NOTES:

Results in ug/g, dry weight. Approximately equal to parts per million (ppm).

J - Indicates an estimated value. Compound was detected, but at a concentration below the quantitation level.
B - The presence of this compound in the associated laboratory method blank indicates analyte found in the sample may be a result of laboratory contamination.
E - The concentration of tetrachloroethene exceeded the upper limit of the calibration curve. See complete analytical results for further details.
-- - Compound not detected
* - Selected VOC

Table1-1.wp
2/04/93

TABLE B-2

DISTRIBUTION OF TOTAL SELECTED VOLATILE ORGANICS IN VADOSE ZONE SOILS – CCL FACILITY SEPTEMBER 1990 AND JUNE 1992 CCL REMEDIATION AREA PETERSON/PURITAN, INC. SITE CUMBERLAND AND LINCOLN, RHODE ISLAND

DEPTH INTERVAL (FT BGS)	SOIL BORING LOCATION										
	1990 – EPA METHOD 8240					1992 – EPA CLP-RAS					
	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11
0-1	---	---	---	---	---	0.900	0.225	11	222.2	43	0.016
1-3	---	---	---	---	---	---	---	---	---	---	---
2-4	---	---	---	---	---	---	---	---	---	---	---
3-5	---	---	---	---	---	---	---	---	---	---	---
4-6	---	---	---	---	---	618	---	---	7	---	24
5-7	---	---	---	581.7	531 B	---	---	---	---	---	---
6-8	---	---	---	---	---	---	---	---	---	---	---
7-9	---	---	---	---	---	---	---	---	---	---	---
8-10	---	---	---	---	---	---	---	100	---	<0.010	---
9-11	90,000 E	---	2.6	---	---	---	---	---	---	---	---
10-12	---	137.2 E	---	13,220 JB	5,800 B	---	---	---	---	---	---
15-17	---	210.84 J	---	2,000 B	2,000 B	---	---	---	---	---	---
19-21	22,300	---	2.0	---	---	---	---	---	---	---	---
20-22	---	---	---	140 B	710 B	---	---	---	---	---	---
29-31	13,610	---	70.41 J	---	---	---	---	---	---	---	---
30-32	---	8.0	---	7,830 B	7.6 B	---	---	---	---	---	---

NOTES:

CONCENTRATIONS GIVEN IN MG/KG DRY WEIGHT; APPROXIMATELY EQUAL TO PARTS PER MILLION (PPM).

--- SAMPLE NOT TAKEN, OR NOT FORWARDED TO THE LABORATORY FOR ANALYSIS.

TOTAL SELECTED VOCs INCLUDE:
- TETRACHLOROETHENE
- TRICHLOROETHENE
- 1,1,1-TRICHLOROETHANE
- 1,2-DICHLOROETHENE (TOTAL)
- 1,1-DICHLOROETHENE

E – CONCENTRATION EXCEEDED THE UPPER LIMIT OF THE CALIBRATION CURVE.

J – INDICATES AN ESTIMATED VALUE. COMPOUND WAS DETECTED, BUT AT A CONCENTRATION BELOW THE QUANTITATION LEVEL.

B – THIS COMPOUND WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK.

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07-Feb-93

TABLE B-3

DISTRIBUTION OF VOCs IN SOIL
O'TOOLE PROPERTY
PETERSON/PURITAN, INC. SITE

ABB-ES (JUNE 1992 - CLP PROTOCOL)

COMPOUND	CRQL (MG/KG)	B14-S01 (0-1)	CRQL (MG/KG)	B14-S03 (4-6)	B13-S01 (0-1)	B13-S02 (2-4)
TETRACHLOROETHENE	0.01	0.25 D	1.2	10	89	18
1,1,2,2-TETRACHLOROETHANE	0.01	---	1.2	---	2	---
1,1,1-TRICHLOROETHANE	0.01	---	1.2	---	1.3	---
2-BUTANONE	0.01	---	1.2	2	1.7	1.9
DILUTION FACTOR		5.0		1.0	1.0	1.0

GZA (MAY 1991-EPA METHOD 8240)

COMPOUND	MQL (MG/KG)	DP-1-S8 (14-16)	DP-2A-S2 (6-8)	DP-3-S2 (2-4)	DP-3-S5 (13-15)
TETRACHLOROETHENE	0.005	---	0.57	0.67	0.018
TRICHLOROETHENE	0.005	---	BMQL	---	---
1,1,1-TRICHLOROETHANE	0.005	---	0.013	0.04	---
DILUTION FACTOR		1.0	1.0	1.0	1.0

NOTES:

CRQL: CONTRACT REQUIRED QUANTITATION LIMIT
B14-S01: BORING LOCATION AND SPLIT-SPOON DESIGNATION
(0-1): DEPTH INTERVAL, FEET BELOW GROUND SURFACE
D: DILUTION REQUIRED
---: COMPOUND NOT DETECTED
MQL: METHOD QUANTIFICATION LIMIT

9/24/93
RODCOCs

TABLE B-4

PETERSON/PURITAN SITE
HUMAN HEALTH RISK ASSESSMENT
CONTAMINANTS OF CONCERN

GROUNDWATER/ BLACKSTONE RIVER	BORING SOILS	BROOK A SEDIMENTS
VOCs	VOCs	VOCs
Acetone	Acetone	Chloroform
Benzene	2-Butanone	Methylene Chloride
Chloroethane	Chloroform	
1,1-Dichloroethane	Ethylbenzene	SVOCs
1,2-Dichloroethane	Methylene Chloride	Bis(2-ethylhexyl)phthalate
1,1-Dichloroethene	Tetrachloroethene	PAHs
1,2-Dichloroethene	Toluene	Anthracene
Ethylbenzene	1,1,1-Trichloroethane	Benzo(a)anthracene
Methylene Chloride	Trichloroethene	Benzo(a)pyrene
Tetrachloroethene	Xylenes(total)	Benzo(g,h,i)perylene
Toluene		Benzo(k)fluoranthene
1,1,1-Trichloroethane	SVOCs	Chrysene
1,1,2-Trichloroethane	Bis(2-ethylhexyl)phthalate	Dibenzo(a,h)anthracene
Trichloroethene	PAHs	Fluoranthene
Trichlorofluoromethane	Anthracene	Indeno(1,2,3-cd)pyrene
Vinyl Chloride	Benzo(a)pyrene	Phenanthrene
Xylenes(total)	Benzo(b)fluoranthene	Pyrene
	Benzo(g,h,i)perylene	
SVOCs	Chrysene	Pesticides/PCBs
Bis(2-ethylhexyl)phthalate	Indeno(1,2,3-cd)pyrene	Chlordane
	Phenanthrene	DDT
Pesticides/PCBs		
Chlordane	Pesticides/PCBs	Inorganics
	Chlordane	Arsenic
Inorganics	DDT	Chromium
Arsenic		Copper
Cadmium	Inorganics	Lead
Chromium	Arsenic	Mercury
Copper	Chromium	Nickel
Lead	Lead	Vanadium
Nickel	Nickel	Zinc
Thallium	Vanadium	
Zinc		

Table B-5

PETERSON/PURITAN SITE
Summary of Groundwater Results
Concentration (ug/l)

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	Upgradient MW-301
VOLATILE ORGANICS					ND
1,1-DICHLOROETHANE	11/58	9.00 JJ	200.00 D	MP-11C	
1,1-DICHLOROETHENE	8/58	5.00 JJ	1500.00 DJJ	MW-201A	
1,1,1-TRICHLOROETHANE	19/58	6.00	120000.00 D	MW-201A	
1,1,2-TRICHLOROETHANE	1/58	10.00	10.00	RW	
1,1,2,2-TETRACHLOROETHANE	1/58	40.00	40.00	RW	
1,2-DICHLOROPROPANE	1/58	2.00 JJ	2.00 JJ	AW-1R	
1,2-DICHLOROETHANE	2/58	3.00 J	49.00	RW	
1,2-DICHLOROETHENE,TRANS	2/6	3.00	11.00	P-1	
1,2-DICHLOROETHENE(TOTAL)	30/52	4.00 JJ	8600.00	RW/GZ2-1	
2-BUTANONE	2/52	29.00	120.00	AW-1R	
4-METHYL-2-PENTANONE	1/52	140.00	150.00	AW-1R	
ACETONE	7/52	30.00	55000.00 D	AW-1R	
BENZENE	5/58	2.80 J	150.00	MW-306A	
BROMOMETHANE	1/58	3.00 JJ	3.00 JJ	MW-105A	
CHLOROBENZENE	4/58	1.00 JJ	6.00 JJ	MW-202	
CHLOROETHANE	5/58	18.00	1300.00	P-6	
CHLOROFORM	8/58	2.00 JJ	9.00 JJ	MW-302B	
CHLOROMETHANE	1/58	24.00	24.00	MW-202	
ETHYLBENZENE	11/58	2.00 JJ	890.00 EJ	AW-1R	
ISOPROPYL ALCOHOL	1/4	70.00	78.00	AW-1R	
METHYLENE CHLORIDE	12/58	2.00 JJ	67000.00 D	MW-201A	
STYRENE	1/52	13.00	13.00	AW-1R	
TETRACHLOROETHENE	26/58	5.80	110000.00 DJ	MW-201A	
TOLUENE	10/58	3.00 J	200.00	AW-1R	
TRICHLOROETHENE	32/58	2.00 JJ	5000.00	RW	
TRICHLOROFLUOROMETHANE	4/52	1.00 J	1300.00	RW	
VINYL CHLORIDE	5/58	9.00 J	830.00 EJ	GZ2-1	
XYLENES (TOTAL)	7/52	2.00 JJ	160.00	MW-202	
SEMIVOLATILE ORGANICS					NA
BIS(2-CHLOROETHYL) ETHER	1/18	6.30	6.30	MP-3	
BIS(2-ETHYLHEXYL) PHTHALATE	7/18	4.80	56.00	MP-10B	
BIS(2-CHLOROISOPROPYL)ETHER	1/18	7.70	7.70	MP-3	
DI-N-BUTYL PHTHALATE	4/18	1.00 JB	2.90	MP-3	
DIETHYL PHTHALATE	3/18	9.00	10.00	GZ2-2	
HEXACHLOROETHANE	1/18	3.10	3.10	MP-3	
NAPHTHALENE	1/18	10.00	10.00	AW-3	
PESTICIDES/PCBs					NA
ALPHA-BHC	1/18	0.06	0.06	442	
BETA-BHC	1/18	1.70 F	1.70 F	AW-1	
CHLORDANE	2/18	2.30	2.40	GZ2-1	
DELTA-BHC	1/18	0.22	0.22	MP-10C	
ENDRIN	1/18	0.06 F	0.06 F	GZ2-1	

PETERSON/PURITAN SITE
Summary of Groundwater Results
Concentration (ug/l)

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	Upgradient MW-301
INORGANICS (Total and Dissloved)					
ALUMINUM	43/57	53.60 []	34600.00	MW-201A	15000.00
ANTIMONY	2/63	1.40 []J	1.60 []J	MP-6A	1.10 U
ARSENIC	50/63	1.00 []J	1150.00	MP-3	38.70
BARIUM	57/57	2.60 []J	826.00 J	MW-201A	114.00 []
BERYLLIUM	4/63	1.20 []	3.10	MP-3	1.00 U
CADMIUM	6/63	6.10	20.00	MW-201A	5.00 U
CALCIUM	57/57	2660.00 []	121000.00	MP-11C	12900.00
CHROMIUM	40/63	5.10 []	107.00	MP-3	16.50
COBALT	18/57	9.20 []	50.90	MP-11C	17.20 []
COPPER	42/63	6.60 []	2550.00	MP-10B	47.60
CYANIDE	1/24	19.60	19.60	AW-1	NA
IRON	52/57	74.40 []	88200.00	AW-3	19100.00
LEAD	45/63	1.20 []	168.00	442	31.10
MAGNESIUM	57/57	476.00 []J	20500.00	AW-3	9020.00
MANGANESE	55/57	2.00 []	25700.00	MW-306C	1400.00
MERCURY	1/63	0.44	0.44	442	0.11 U
NICKEL	23/63	20.00	479.00	MP-3	22.00 U
POTASSIUM	57/57	744.00 []	21700.00	AW-1R	5800.00
SELENIUM	6/63	1.50 []J	3.60 []J	MP-4B	1.10 UJ
SODIUM	57/57	4290.00 []	498000.00	AW-1R	24600.00
THALLIUM	1/63	2.10 []J	2.10 []J	MP-10B	1.10 UJ
VANADIUM	17/57	6.00 []	58.10	MW-203	15.20 []
ZINC	45/63	9.80 []	1520.00	442	143.00

Data Qualifiers:
B - Analyte was found in the associated blank.
D - Concentration reported in analysis at a secondary dilution factor.
E - Concentration exceeded the calibration range of the GC/MS instrument for that specific analysis.
J - The associated numerical value is an estimated quantity.
JJ - The associated numerical value is an estimated quantity and the reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.
U - The compound was analyzed for, but was not detected. The associated value is the sample quantitation limit.
UJ - The compound was analyzed for, but was not detected. The associated value is an estimated quantity.
[] - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
[]J - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.

ND - Not Detected
NA - Not Analyzed

Table B-6

PETERSON/PURITAN SITE
Summary of Surface Water Results
Concentration (ug/l)

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	Average	Upgradient SW-1
BROOK A						
VOLATILE ORGANICS						
ACETONE	1/5	9.00 JJ	9.00 JJ	SW-8	5.80	10.00 U
BROMODICHLOROMETHANE	2/5	5.00 JJ	6.00 JJ	SW-4	4.67	10.00 U
CHLOROBENZENE	1/5	1.00 JJ	1.00 JJ	SW-7	3.92*	10.00 U
CHLOROFORM	5/5	2.00 JJ	16.00	SW-4	7.17	10.00 U
DIBROMOCHLOROMETHANE	2/5	1.00 JJ	2.00 JJ	SW-7	3.42*	10.00 U
SEMIVOLATILE ORGANICS						
NONE DETECTED						NA
PESTICIDES/PCBs						
NONE DETECTED						NA
INORGANICS (Total)						
ALUMINUM	4/5	43.80 []	102.00 []	SW-8	57.33	140.00 []
CALCIUM	5/5	13700.00	16100.00	SW-7	14810.00	9260.00
COPPER	1/5	22.00 []	22.00 []	SW-7	6.80	8.40 []
IRON	5/5	62.60 J	183.00 J	SW-5	106.11	417.00 J
MAGNESIUM	5/5	3000.00 []	3430.00 []	SW-7	3173.00	1470.00 []
MANGANESE	5/5	14.50 J	71.80 J	SW-5	35.79	106.00 J
POTASSIUM	5/5	2140.00 J	16300.00 J	SW-6	11518.00	1820.00 J
SODIUM	5/5	17000.00	18700.00	SW-6	18130.00	7010.00
ZINC	5/5	134.00	290.00	SW-7	201.30	60.50 U

					Upstream SW-2	Downstream SW-10
BLACKSTONE RIVER						
VOLATILE ORGANICS						
TRICHLOROFLUOROMETHANE	1/1	2.90	2.90	SW-6	ND	ND
SEMIVOLATILE ORGANICS						
NOT ANALYZED					BEHP 3.10	NA
PESTICIDES/PCBs						
NOT ANALYZED					NA	NA
INORGANICS						
NOT ANALYZED					Chromium 6.60	NA
					Zinc 34.00	NA

Data Qualifiers:
J - The associated numerical value is an estimated quantity.
JJ - The associated numerical value is an estimated quantity and the reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.
U - The compound was analyzed for, but was not detected. The associated value is the sample quantitation limit.
[] - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
* - Average concentration exceeds the maximum due to the Sample Quantitation Limit for nondetects being greater than the CRQL.
ND - Not Detected
NA - Not Analyzed

Table B-7

PETERSON/PURITAN SITE
Summary of Sediment Results

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	Average	Upstream SD-1
		Concentration (ug/kg)				
BROOK A						
VOLATILE ORGANICS						
CHLOROFORM	2/6	4.00 JJ	6.00 JJ	SD-4	10.25*	13.00 U
METHYLENE CHLORIDE	3/6	5.00 JJ	6.00 JJ	SD-4	10.25*	13.00 U
SEMIVOLATILE ORGANICS						
2-METHYLNAPHTHALENE	2/6	47.00 JJ	130.00 JJ	SD-3	180.33*	410.00 UJ
4-METHYLPHENOL	2/6	110.00 JJ	1700.00 JJ	SD-6	452.50	410.00 UJ
ACENAPHTHENE	1/6	70.00 JJ	70.00 JJ	SD-6	215.00*	410.00 UJ
ACENAPHTHYLENE	3/6	14.00 JJ	97.00 JJ	SD-3	137.17*	410.00 UJ
ANTHRACENE	4/6	25.00 JJ	210.00 JJ	SD-6	138.00	55.00 J
BENZO(A)ANTHRACENE	4/6	70.00 JJ	1600.00 JJ	SD-6	492.50	410.00 UJ
BENZO(A)PYRENE	4/6	83.00 JJ	1900.00	SD-6	649.67	420.00 J
BENZO(B)FLUORANTHENE	1/6	42.00 JJ	42.00 JJ	SD-4	345.58*	720.00 J
BENZO(G,H,I)PERYLENE	3/6	49.00 JJ	800.00	SD-3	407.33	320.00 JJ
BENZO(K)FLUORANTHENE	6/6	17.00 JJ	4500.00	SD-6	1340.42	410.00 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	3/6	470.00	2400.00	SD-6	723.75	460.00 J
BUTYLBENZYLPHTHALATE	3/6	130.00 JJ	340.00 JJ	SD-2	209.17	1100.00 J
CARBAZOLE	4/6	11.00 JJ	250.00 JJ	SD-6	133.50	57.00 JJ
CHRYSENE	4/6	130.00 JJ	2500.00	SD-6	689.17	360.00 JJ
DI-N-OCTYL PHTHALATE	4/6	10.00 JJ	78.00 JJ	SD-6	100.67*	410.00 UJ
DIBENZO(A,H)ANTHRACENE	4/6	17.00 JJ	470.00 JJ	SD-3	225.83	120.00 JJ
DIBENZOFURAN	2/6	50.00 JJ	90.00 JJ	SD-6	174.17*	410.00 UJ
DIETHYL PHTHALATE	2/6	37.00 JJ	100.00 JJ	SD-6	173.67*	410.00 UJ
FLUORANTHENE	5/6	14.00 JJ	2900.00	SD-6	754.08	700.00 J
FLUORENE	2/6	15.00 JJ	68.00 JJ	SD-6	172.17*	410.00 UJ
INDENO(1,2,3-CD)PYRENE	4/6	70.00 JJ	850.00	SD-3	310.83	300.00 JJ
NAPHTHALENE	2/6	83.00 JJ	110.00 JJ	SD-3	183.00*	410.00 UJ
PHENANTHRENE	4/6	99.00 JJ	1200.00 JJ	SD-6	407.33	310.00 JJ
PHENOL	1/6	31.00 JJ	31.00 JJ	SD-3	314.33*	410.00 UJ
PYRENE	5/6	18.00 JJ	2800.00	SD-6	736.08	480.00 J
PESTICIDES/PCBs						
4,4-DDE	1/6	34.00 J	34.00 J	SD-3	8.76	4.10 UJ
4,4-DDT	3/6	13.00 J	140.00 J	SD-6	31.89	4.10 UJ
4,4-DDD	2/6	13.00 J	74.00 J	SD-3	17.14	4.10 UJ
ALPHA-CHLORDANE	3/6	4.60 J	170.00 DJ	SD-6	31.31	2.10 UJ
AROCLOR-1260	2/6	150.00 J	370.00 J	SD-3	113.08	41.00 UJ
AROCLOR-1254	1/6	240.00 J	240.00 J	SD-3	70.92	41.00 UJ
DELTA-BHC	3/6	4.20 J	16.00 J	SD-6	5.04	2.10 UJ
DIELDRIN	1/6	46.00 J	46.00 J	SD-3	10.76	4.10 UJ
ENDOSULFAN I	1/6	32.00 J	32.00 J	SD-6	6.38	2.10 UJ
ENDOSULFAN II	1/6	39.00 J	39.00 J	SD-6	8.53	4.10 UJ
ENDRIN KETONE	1/6	8.10 J	8.10 J	SD-3	4.44	4.10 UJ
GAMMA-CHLORDANE	3/6	11.00 J	220.00 DJ	SD-6	41.21	2.10 UJ
HEPTACHLOR EPOXIDE	1/6	3.40 J	3.40 J	SD-3	2.18	2.10 UJ

PETERSON/PURITAN SITE
Summary of Sediment Results

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	Average	Upstream SD-1
		Concentration (mg/kg)				
BROOK A						
INORGANICS						
ALUMINUM	6/6	2360.00 J	17100.00 J	SD-6	8860.00	2530.00
ARSENIC	6/6	1.50 []	9.60	SD-6	4.99	6.70
BARIUM	6/6	12.90 []	141.00 []	SD-6	57.32	26.40 []
BERYLLIUM	1/6	1.50 []	1.50 []	SD-6	0.36	0.21 U
CALCIUM	6/6	415.00 []	6530.00	SD-6	2022.08	777.00 []
CHROMIUM	6/6	2.70 J	48.30 J	SD-3	21.88	9.30 J
COBALT	4/6	2.30 J	10.40 []	SD-6	3.97	1.90 U
COPPER	6/6	5.60 J	293.00 J	SD-6	114.06	14.90 J
IRON	6/6	4180.00	24400.00	SD-6	12453.33	7420.00 J
LEAD	6/6	5.60 J	561.00 J	SD-3	262.05	44.80
MAGNESIUM	6/6	1110.00 J	5820.00 J	SD-3	3000.83	1110.00 J
MANGANESE	6/6	72.30 J	912.00 J	SD-6	368.38	85.80 J
MERCURY	3/6	0.52 J	1.50 J	SD-3	0.48	0.10 J
NICKEL	3/6	10.40 []	59.50	SD-6	15.95	4.60 U
POTASSIUM	6/6	320.00 []	1990.00	SD-3	1051.17	581.00 []
SELENIUM	1/6	0.54 []	0.54 []	SD-3	0.25	0.23 U
SODIUM	4/6	44.30 J	253.00 []	SD-6	82.72	40.70 U
VANADIUM	6/6	5.40 []	72.10	SD-6	27.10	6.80 []
ZINC	6/6	71.70 J	2050.00 J	SD-6	480.70	66.20 J

BLACKSTONE RIVER					Upstream SD-2	Downstream SD-10
VOLATILE ORGANICS						
NOT DETECTED					ND	ND
		Concentration (ug/kg)				
SEMIVOLATILE ORGANICS						
CHRYSENE	1/1	252.00	252.00	SD-6	ND	ND
FLUORANTHENE	1/1	319.00	319.00	SD-6	ND	ND
PHENANTHRENE	1/1	201.00	201.00	SD-6	ND	ND
PYRENE	1/1	280.00	280.00	SD-6	ND	ND
PESTICIDES/PCBs						
AROCLOR 1260	1/1	4200.00	4200.00	SD-6	ND	ND
		Concentration (mg/kg)				
INORGANICS						
ARSENIC	1/1	5.80	5.80	SD-6	1.30	43.00
CHROMIUM	1/1	12.00	12.00	SD-6	11.00	7.30
COPPER	1/1	20.00	20.00	SD-6	13.00	ND
NICKEL	1/1	3.80	3.80	SD-6	4.80	4.50
ZINC	1/1	41.00	41.00	SD-6	26.00	24.00

Data Qualifiers:
D - Concentration reported in analysis at a secondary dilution factor.
J - The associated numerical value is an estimated quantity.
JJ - The associated numerical value is an estimated quantity and the reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.
U - The compound was analyzed for, but was not detected. The associated value is the sample quantitation limit.
[] - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
* - Average concentration exceeds the maximum due to the Sample Quantitation Limit for nondetects being greater than the CRQL.
ND - Not Detected

PETERSON/PURITAN SITE
Summary of Boring Soil Results
Concentration (ug/kg)

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	B301S01	B301S06
VOLATILE ORGANICS						
1,1-DICHLOROETHENE	1/52	1700.00	1700.00	B-2S-3	11.00 U	12.00 U
1,1,1-TRICHLOROETHANE	16/52	15.00	6000000.00	B-1S-3	11.00 U	12.00 U
1,1,2,2-TETRACHLOROETHANE	3/52	310.00 JJ	2000.00	B13S01	11.00 U	12.00 U
1,2-DICHLOROETHENE(TOTAL)	2/52	4.00 JJ	14.00 JJ	B06S01	11.00 U	12.00 U
2-BUTANONE	6/52	43.00 JJ	2000.00	B14S03	11.00 U	12.00 U
2-HEXANONE	2/52	22.00 JJ	1200.00 JJ	B13S02	11.00 U	12.00 U
4-METHYL-2-PENTANONE	2/52	29.00	44.00	B03S02	11.00 U	12.00 U
ACETONE	9/52	7.00 JJ	1200000.00 J	B-1S-3	11.00 U	12.00 U
BENZENE	1/52	8.00 JJ	8.00 JJ	B06S01	11.00 U	12.00 U
CARBON TETRACHLORIDE	1/52	180.00 JJ	180.00 JJ	B13S01	11.00 U	12.00 U
CHLOROBENZENE	2/52	3.00 JJ	11.00	B03S02	11.00 U	12.00 U
CHLOROFORM	4/52	8.00 JJ	52000.00 J	B-4S-3	11.00 U	12.00 U
ETHYLBENZENE	5/52	9.00 JJ	1500.00	B02S02	11.00 U	12.00 U
ISOPROPYL ALCOHOL	1/7	30.00	30.00	B01S04	11.00 U	12.00 U
METHYLENE CHLORIDE	9/52	5.00 JJ	1080000.00 J	B-1S-5	11.00 U	12.00 U
STYRENE	4/52	5.00 JJ	600.00 JJ	B02S02	11.00 U	12.00 U
TETRACHLOROETHENE	38/52	4.00 JJ	84000000.00 EJ	B-1S-3	6.00 JJ	4.00 JJ
TOLUENE	9/52	4.00 JJ	1600.00	B02S02	4.00 JJ	12.00 U
TRICHLOROETHENE	5/52	4.00 JJ	68000.00 D	B06S03	11.00 U	12.00 U
XYLENES (TOTAL)	8/52	3.00 JJ	5500.00	B02S02	3.00 JJ	12.00 U
SEMIVOLATILE ORGANICS						
2-METHYLPHENOL	1/31	230.00 JJ	230.00 JJ	B02S02	360.00 U	390.00 U
2-METHYLNAPHTHALENE	3/32	13.00 JJ	120.00 JJ	B03S02	70.00 JJ	390.00 U
4-METHYLPHENOL	2/31	110.00 JJ	480.00	B02S02	360.00 U	390.00 U
4-CHLOROANILINE	1/31	74.00 JJ	74.00 JJ	B03S02	360.00 U	390.00 U
ACENAPHTHENE	2/31	47.00 JJ	230.00 JJ	B301S01	230.00 JJ	390.00 U
ACENAPHTHYLENE	1/32	17.00 JJ	17.00 JJ	B13S01	360.00 U	390.00 U
ANTHRACENE	6/32	24.00 JJ	400.00 J	B03S02	180.00 JJ	390.00 U
BENZO(A)ANTHRACENE	12/32	10.00 JJ	720.00	B301S01	720.00	35.00 JJ
BENZO(A)PYRENE	12/32	9.00 JJ	1100.00	B02S01	610.00	33.00 JJ
BENZO(B)FLUORANTHENE	13/32	13.00 JJ	2200.00	B02S01	1000.00	74.00 JJ
BENZO(G,H,I)PERYLENE	11/32	13.00 JJ	1000.00	B02S01	350.00 JJ	30.00 JJ
BENZO(K)FLUORANTHENE	2/31	9.00 JJ	74.00 JJ	B02S02	360.00 U	390.00 U
BIS(2-ETHYLHEXYL) PHTHALATE	7/31	49.00 JJ	550.00	B06S01	140.00 JJ	190.00 JJ
BUTYLBENZYLPHTHALATE	1/31	200.00 JJ	200.00 JJ	B03S02	360.00 U	390.00 U
CARBAZOLE	4/32	16.00 JJ	240.00 JJ	B02S02	360.00 U	390.00 U
CHRYSENE	13/32	9.00 JJ	720.00	B02S01	690.00	47.00 JJ
DI-N-BUTYL PHTHALATE	7/31	31.00 JJ	93.00 JJ	B301S06	43.00 JJ	93.00 JJ
DI-N-OCTYL PHTHALATE	6/31	9.00 JJ	63.00 JJ	B301S01	63.00 JJ	30.00 JJ
DIBENZO(A,H)ANTHRACENE	3/32	70.00 JJ	310.00 JJ	B02S01	74.00 JJ	390.00 U
DIBENZOFURAN	1/31	130.00 JJ	130.00 JJ	B301S01	130.00 JJ	390.00 U
DIETHYL PHTHALATE	8/31	10.00 JJ	200.00 JJ	B11S03	360.00 U	390.00 U
FLUORANTHENE	14/32	12.00 JJ	1700.00	B301S01	1700.00	81.00 JJ
FLUORENE	3/31	61.00 JJ	180.00 JJ	B301S01	180.00 JJ	390.00 U
INDENO(1,2,3-CD)PYRENE	10/32	16.00 JJ	1100.00	B02S01	470.00	40.00 JJ
NAPHTHALENE	2/31	150.00 JJ	160.00 JJ	B301S01	160.00 JJ	390.00 U
PHENANTHRENE	13/32	10.00 JJ	690.00	B02S02	620.00	55.00 JJ
PHENOL	1/31	130.00 JJ	130.00 JJ	B02S02	360.00 U	390.00 U
PYRENE	15/32	11.00 JJ	1100.00	B301S01	1100.00	60.00 JJ

PETERSON/PURITAN SITE
Summary of Boring Soil Results
Concentration (ug/kg)

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	B301S01	B301S06
PESTICIDES/PCBs						
4,4-DDE	5/32	1.90 JJ	13.00 J	B301S06	4.80 J	13.00 J
4,4-DDD	3/32	3.30 JJ	7.20 J	B06S03	3.60 U	3.90 U
4,4-DDT	9/32	4.80 J	200.00 D	B04S01	8.80	18.00
ALPHA-CHLORDANE	7/32	2.20 J	71.00 JD	B301S06	25.00	71.00 JD
AROCLOR-1254	3/32	25.00 JP	93.00 J	B06S03	36.00 U	39.00 U
ENDOSULFAN I	6/32	3.00 J	72.00 D	B04S01	1.80 U	2.00 U
ENDOSULFAN II	5/32	3.50 JJ	53.00	B04S01	3.60 U	3.90 U
ENDRIN ALDEHYDE	3/32	12.00 J	23.00 J	B301S06	14.00 J	23.00 J
ENDRIN KETONE	1/32	3.60 J	3.60 J	B04S01	3.60 U	3.90 U
ENDRIN	4/32	4.20 J	66.00	B04S01	3.60 U	4.20 J
GAMMA-CHLORDANE	6/32	1.90 J	64.00 D	B11S01	19.00 J	54.00 JD
HEPTACHLOR EPOXIDE	2/32	2.90	8.90	B301S06	2.90	8.90
HEPTACHLOR	3/32	1.70 JJ	5.30 J	B301S06	1.70 JJ	5.30 J
INORGANICS						
ALUMINUM	32/32	1530000.00	14300000.00	B14S03	6210000.00	9240000.00
ANTIMONY	1/32	200.00 []J	200.00 []J	B11S01	230.00 UJ	230.00 UJ
ARSENIC	32/32	950.00 []J	8800.00	B13S01	3100.00	7400.00
BARIUM	32/32	7600.00 []J	70000.00 J	B11S01	30800.00 []J	27800.00 []J
BERYLLIUM	3/32	320.00 []	1300.00	B07S01	210.00 UJ	210.00 UJ
CALCIUM	32/32	362000.00 []J	6670000.00	B301S01	6670000.00	394000.00
CHROMIUM	32/32	2400.00	23500.00	B04S01	9500.00	12100.00
COBALT	21/32	1700.00 []	7600.00 []	B04S01	1900.00 U	3900.00 []
COPPER	32/32	2300.00 []	71500.00 J	B05S05	9800.00	4400.00 []
IRON	32/32	3070000.00	15500000.00	B14S03	7720000.00	11600000.00
LEAD	32/32	1600.00	262000.00	B11S01	48600.00	14100.00
MAGNESIUM	32/32	647000.00 []	3350000.00	B04S01	22700000.00	1500000.00
MANGANESE	32/32	36800.00 J	1090000.00 J	B14S03	168000.00	100000.00
NICKEL	23/32	4700.00 []	24000.00	B07S01	6500.00 []	7800.00 []
POTASSIUM	32/32	314000.00 []	1140000.00	B04S01	673000.00 []	398000.00 []
SELENIUM	2/32	530.00 []J	1200.00 []J	B14S03	230.00 U	230.00 U
SILVER	1/32	1200.00 []	1200.00 []	B01S01	1000.00 U	1000.00 U
SODIUM	26/32	18500.00 []	1500000.00	B01S04	35500.00 []	43000.00 []
VANADIUM	32/32	2800.00 []	236000.00	B07S01	12500.00	15000.00
ZINC	26/32	15100.00	70600.00	B06S01	68900.00	29400.00

Data Qualifiers:
D - Concentration reported in analysis at a secondary dilution factor.
E - Concentration exceeded the calibration range of the GS/MS instrument for the specific analysis.
J - The associated numerical value is an estimated quantity.
JJ - The associated numerical value is an estimated quantity and the reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.
P - There was a greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported.
U - The compound was analyzed for, but was not detected. The associated value is the sample quantitation limit.
UJ - The compound was analyzed for, but was not detected. The associated value is an estimated quantity.
[] - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
[]J - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.

PETERSON/PURITAN SITE
Summary of Surfical Soil (0 to 1 foot) Results

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	Average	Upsite B301S01	B15S01
		Concentration (ug/kg)					
VOLATILE ORGANICS							
1,2-DICHLOROETHENE(TOTAL)	2/14	4.00 JJ	14.00 JJ	B06S01	195.63*	11.00 U	11.00 U
1,1,1-TRICHLOROETHANE	4/14	15.00	2200.00	B09S01	354.23	11.00 U	11.00 U
1,1,2,2-TETRACHLOROETHANE	1/14	2000.00	2000.00	B13S01	292.63	11.00 U	11.00 U
2-BUTANONE	2/14	43.00 JJ	1700.00	B13S01	271.73	11.00 U	11.00 U
2-HEXANONE	1/14	22.00 JJ	22.00 JJ	B06S01	195.63*	11.00 U	11.00 U
ACETONE	2/14	7.00 JJ	180.00	B06S01	202.14*	11.00 U	11.00 U
BENZENE	1/14	8.00 JJ	8.00 JJ	B06S01	195.48*	11.00 U	11.00 U
CARBON TETRACHLORIDE	1/14	180.00 JJ	180.00 JJ	B13S01	162.63	11.00 U	11.00 U
CHLOROBENZENE	1/14	3.00 JJ	3.00 JJ	B06S01	195.30*	11.00 U	11.00 U
CHLOROFORM	1/14	8.00 JJ	8.00 JJ	B06S01	195.48*	11.00 U	11.00 U
ETHYLBENZENE	2/14	9.00 JJ	32.00	B02S01	197.41*	11.00 U	11.00 U
METHYLENE CHLORIDE	2/14	4400.00	5300.00	B10S01	792.63	11.00 U	5.00 J
STYRENE	1/14	5.00 JJ	5.00 JJ	B06S01	195.38*	11.00 U	11.00 U
TETRACHLOROETHENE	9/14	6.00 JJ	220000.00 D	B09S01	26005.88	6.00 JJ	11.00 U
TOLUENE	5/14	4.00 JJ	13.00	B02/06S01	226.55*	4.00 JJ	11.00 U
TRICHLOROETHENE	2/14	4.00 JJ	29.00 JJ	B06S01	195.66*	11.00 U	11.00 U
XYLENES (TOTAL)	3/14	3.00 JJ	26.00	B02/06S01	197.45*	3.00 JJ	11.00 U
SEMIVOLATILE ORGANICS							
2-METHYLNAPHTHALENE	1/14	13.00 JJ	13.00 JJ	B02S01	163.25*	70.00 JJ	360.00 UJ
ACENAPHTHENE	1/13	47.00 JJ	47.00 JJ	B02S01	164.96*	30.00 JJ	360.00 UJ
ACENAPHTHYLENE	1/14	17.00 JJ	17.00 JJ	B13S01	163.54*	360.00 U	360.00 UJ
ANTHRACENE	3/14	24.00 JJ	110.00 JJ	B02S01	149.46*	180.00 JJ	360.00 UJ
BENZO(A)ANTHRACENE	7/14	11.00 JJ	320.00	B02S01	151.82	720.00	10.00 JJ
BENZO(A)PYRENE	7/14	14.00 JJ	1100.00	B02S01	212.25	610.00	9.00 JJ
BENZO(B)FLUORANTHENE	8/14	33.00 JJ	2200.00	B02S01	326.00	1000.00	13.00 JJ
BENZO(G,H,I)PERYLENE	7/14	13.00 JJ	1000.00	B02S01	195.89	350.00 JJ	360.00 UJ
BIS(2-ETHYLHEXYL) PHTHALATE	3/13	49.00 JJ	550.00	B06S01	195.27	140.00 JJ	360.00 UJ
CARBAZOLE	2/14	16.00 JJ	210.00 JJ	B02S01	165.96	91.00 JJ	360.00 UJ
CHRYSENE	7/14	23.00 JJ	720.00	B02S01	199.82	690.00	9.00 JJ
DI-N-OCTYL PHTHALATE	1/13	18.00 JJ	18.00 JJ	B09S01	163.12*	63.00 JJ	10.00 JJ
DI-N-BUTYL PHTHALATE	2/13	31.00 JJ	57.00 JJ	B09S01	154.65*	43.00 JJ	360.00 UJ
DIBENZO(A,H)ANTHRACENE	2/14	70.00 JJ	310.00 JJ	B02S01	176.96	74.00 JJ	360.00 UJ
DIETHYL PHTHALATE	3/13	10.00 JJ	76.00 JJ	B06S01	146.69*	360.00 U	14.00 JJ
FLUORANTHENE	9/14	20.00 JJ	1400.00	B02S01	263.32	1700.00	12.00 JJ
FLUORENE	1/13	61.00 JJ	61.00 JJ	B02S01	166.04*	180.00 JJ	360.00 UJ
INDENO(1,2,3-CD)PYRENE	6/14	16.00 JJ	1100.00	B02S01	213.46	470.00	360.00 UJ
PHENANTHRENE	8/14	18.00 JJ	310.00 JJ	B02S01	142.46	620.00	10.00 JJ
PYRENE	8/14	20.00 JJ	570.00 JJ	B02S01	189.29	1100.00	11.00 JJ
PESTICIDES/PCBs							
4,4-DDE	1/14	6.50 J	6.50 J	B11S01	2.01	4.80 J	3.60 UJ
4,4-DDT	3/14	4.80 J	200.00 D	B04S01	9.34	8.80	3.60 UJ
ALPHA-CHLORDANE	3/14	2.20 J	54.00 JD	B11S01	4.87	25.00	1.80 UJ
AROCLOR-1254	2/14	25.00 JP	40.00 J	B06S01	18.07	36.00 U	36.00 UJ
ENDOSULFAN II	2/14	3.50 JJ	53.00	B04S01	3.63	3.60 U	3.60 UJ
ENDOSULFAN I	2/14	3.00 J	72.00 D	B04S01	3.35	1.80 U	1.80 UJ
ENDRIN	2/14	42.00	66.00	B04S01	6.84	3.60 U	3.60 UJ
ENDRIN KETONE	1/14	3.60 J	3.60 J	B04S01	1.74	3.60 U	3.60 UJ
GAMMA-CHLORDANE	3/14	1.90 J	64.00 D	B11S01	5.55	19.00 J	1.80 UJ
HEPTACHLOR	1/14	3.90 J	3.90 J	B11S01	1.07	1.70 JJ	1.80 UJ

PETERSON/PURITAN SITE
Summary of Surficial Soil (0 to 1 foot) Results

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	Average	Upsite B301S01	B15S01
		Concentration (mg/kg)					
INORGANICS							
ALUMINUM	14/14	1870.00	8010.00	B04S01	4321.43	6210.00	4870.00
ANTIMONY	1/14	0.20 []J	0.20 []J	B11S01	0.11	0.23 UJ	0.22 UJ
ARSENIC	14/14	1.30 []	8.80	B13S01	3.97	3.10	4.60
BARIUM	14/14	7.60 []J	70.00 J	B11S01	22.41	30.80 []J	17.80 []J
BERYLLIUM	1/14	1.30	1.30	B07S01	0.18	0.21 U	0.20 U
CALCIUM	14/14	484.00 []J	3000.00	B06S01	919.71	6670.00	1100.00 J
CHROMIUM	14/14	3.50	23.50	B04S01	8.27	9.50	8.30
COBALT	10/14	1.70 []	7.60 []	B04S01	2.69	1.90 U	2.10 []
COPPER	14/14	2.80 []	59.70	B06S01	13.19	9.80	13.00
IRON	14/14	3430.00	13600.00	B04S01	7763.57	7720.00	7060.00
LEAD	14/14	2.90	262.00	B11S01	32.48	48.60	17.40
MAGNESIUM	14/14	847.00 []	3350.00	B04S01	1960.14	2270.00	2250.00 J
MANGANESE	14/14	45.60 J	237.00 J	B04S01	131.65	168.00 J	150.00 J
NICKEL	10/14	5.10 []	24.00	B07S01	7.65	6.50 []	5.70 []
POTASSIUM	14/14	314.00 []	2280.00	B04S01	756.43	673.00 []	684.00 []
SELENIUM	1/14	0.53 []J	0.53 []J	B13S01	0.13	0.23 U	0.22 UJ
SILVER	1/14	1.20 []	1.20 []	B01S01	0.52	1.00 U	1.00 U
SODIUM	11/14	18.50 []	127.00 []	B12S01	55.10	35.50 []	57.40 []
VANADIUM	14/14	6.20 []	236.00	B07S01	28.03	12.50	10.20
ZINC	13/14	15.10	70.60	B06S01	27.62	68.90	29.20

Data Qualifiers:
D - Concentration reported in analysis at a secondary dilution factor.
J - The associated numerical value is an estimated quantity.
JJ - The associated numerical value is an estimated quantity and the reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.
P - There was a greater than 25% differecne for detected concentrations between the two GC columns. The lower of the two values is reported.
U - The compound was analyzed for, but was not detected. The associated value is the sample quantitation limit.
UJ - The compound was analyzed for, but was not detected. The associated value is an estimated quantity.
[] - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
[]J - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.
* - Average concentration exceeds the maximum due to the Sample Quantitation Limit for nondetects being greater than the CRQL.

Table B-10

PETERSON/PURITAN SITE
Summary of Background Surficial Soil Results

Compound Name	Freq	Range of Detected Values Minimum	Maximum	Location of Max.	Arith. Mean
		Concentration (ug/kg)			
VOLATILE ORGANICS					
NONE DETECTED					
SEMIVOLATILE ORGANICS					
BENZO(A)ANTHRACENE	1/6	9.00 JJ	9.00 JJ	SS-1	157.33*
BENZO(B)FLUORANTHENE	2/6	14.00 JJ	66.00 JJ	SS-6	139.08*
DIETHYL PHTHALATE	3/6	27.00 JJ	160.00 JJ	SS-6	138.58*
FLUORANTHENE	1/6	40.00 JJ	50.00 JJ	SS-6	165.83*
PHENANTHRENE	1/6	11.00 JJ	11.00 JJ	SS-1	157.67*
PYRENE	2/6	15.00 JJ	37.00 JJ	SS-6	134.83*
PESTICIDES/PCBs					
4,4-DDT	1/6	7.90 J	7.90 J	SS-1	2.88
ENDOSULFAN I	1/6	3.30 J	3.30 J	SS-1	1.35
		Concentration (mg/kg)			
INORGANICS					
ALUMINUM	6/6	6090.00	16100.00	SS-4	10984.44
ARSENIC	6/6	2.80	14.00	SS-2	7.93
BARIUM	6/6	9.10 []J	20.70 []J	SS-4	14.00
BERYLLIUM	2/6	0.23 []	0.30 []	SS-4	0.14
CALCIUM	6/6	107.00 []J	684.00 []	SS-6	272.17
CHROMIUM	6/6	4.00	12.60	SS-4	8.63
COBALT	1/6	2.90 []	3.30 []	SS-6	1.25
COPPER	6/6	2.50 []J	12.20	SS-6	4.63
IRON	6/6	6690.00	14400.00	SS-4	10511.67
LEAD	6/6	9.70	23.00	SS-4	16.90
MAGNESIUM	6/6	511.00 []	3130.00	SS-6	1276.33
MANGANESE	6/6	43.70	158.00	SS-6	65.93
NICKEL	4/6	4.30 []	6.60 []	SS-3	4.08
POTASSIUM	6/6	104.00 []	777.00 []	SS-6	274.67
SELENIUM	3/6	0.28 []	0.35 []	SS-2	0.19
SODIUM	5/6	16.40 []	47.30 []	SS-6	21.26
VANADIUM	6/6	10.40 []	20.80	SS-4	16.97
ZINC	6/6	14.10	32.70	SS-6	22.09

Data Qualifiers:
J - The associated numerical value is an estimated quantity.
JJ - The associated numerical value is an estimated quantity and the reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.
[] - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
[]J - The reported value is less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL) and the associated numerical value is an estimated quantity.
* - Average concentration exceeds the maximum concentration due to the Sample Quantitation Limit for nondetects being greater than the CRQL.

FUTURE GROUNDWATER INGESTION PATHWAY
CCL FACILITY SOURCE AREA
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Adult (l/kg/day)	RISK ESTIMATE Average Adult	RISK ESTIMATE Reasonable Max. Adult
Volatile Organic Compounds							
Acetone	0.31	5.6	--	D	1.2E-02	--	--
Benzene	0.005	0.005	2.9E-02	A	1.2E-02	1.7E-06	1.7E-06
Chloroethane	ND	ND	--	NA	1.2E-02	--	--
1,1- Dichloroethane	0.039	0.039	--	C	1.2E-02	--	--
1,2-Dichloroethane	0.049	0.049	9.1E-02	B2	1.2E-02	5.2E-05	5.2E-05
1,1-Dichloroethene	0.14	15	6.0E-01	C	1.2E-02	9.9E-04	1.1E-01
1,2-Dichloroethene	2.1	8.6	--	D	1.2E-02	--	--
Ethylbenzene	0.036	0.036	--	D	1.2E-02	--	--
Methylene Chloride	5.4	67	7.5E-03	B2	1.2E-02	4.8E-04	5.9E-03
Tetrachloroethene	20	110	5.2E-02	B2	1.2E-02	1.2E-02	6.7E-02
Toluene	0.06	0.06	--	D	1.2E-02	--	--
1,1,1-Trichloroethane	11	120	--	D	1.2E-02	--	--
1,1,2-Trichloroethane	0.01	0.01	5.7E-02	C	1.2E-02	6.7E-06	6.7E-06
Trichloroethene	0.67	5	1.1E-02	NA	1.2E-02	8.7E-05	6.5E-04
Trichlorofluoromethane	0.12	1.3	--	NA	1.2E-02	--	--
Vinyl Chloride	0.19	0.83	1.9E+00	A	1.2E-02	4.2E-03	1.9E-02
Xylenes	0.13	0.16	--	D	1.2E-02	--	--
Semi-Volatile Organic Compounds							
Bis(2-ethylhexyl)Phthalate	0.011	0.039	1.4E-02	B2	1.2E-02	1.8E-06	6.4E-06
Pesticides/PCBs							
Chlordane	0.001	0.0024	1.3E+00	B2	1.2E-02	1.5E-05	3.7E-05
Inorganics							
Arsenic	0.0085	0.036	1.75E+00	A	1.2E-02	1.7E-04 *	7.4E-04 *
Cadmium	0.0036	0.02	--	B1	1.2E-02	--	--
Chromium	0.015	0.089	--	D	1.2E-02	--	--
Copper	0.042	0.27	--	D	1.2E-02	--	--
Lead	0.0097	0.043	--	B2	1.2E-02	--	--
Nickel	0.02	0.051	--	A	1.2E-02	--	--
Thallium	ND	ND	--	D	1.2E-02	--	--
Zinc	0.12	0.56	--	D	1.2E-02	--	--
					SUM	1.8E-02	2.0E-01

Exposure Factors:
Adult - 2 liters of water per day for 350 days in a 365 day year for 30 years in a 70 year lifetime by a 70 kg adult = 0.012 liters per kg body weight per day

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

FUTURE GROUNDWATER INGESTION PATHWAY
CCL FACILITY SOURCE AREA
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Adult (l/kg/day)	HAZARD INDEX Average Adult	HAZARD INDEX Reasonable Max. Adult
Volatile Organic Compounds							
Acetone	0.31	5.6	1.0E-01	Liver/Kidney	2.7E-02	8.4E-02	1.5E+00
Benzene	0.005	0.005	--	--	2.7E-02	--	--
Chloroethane	ND	ND	--	--	2.7E-02	--	--
1,1- Dichloroethane	0.039	0.039	1.0E-01	None	2.7E-02	1.1E-02	1.1E-02
1,2-Dichloroethane	0.049	0.049	--	--	2.7E-02	--	--
1,1-Dichloroethene	0.14	15	9.0E-03	Liver	2.7E-02	4.2E-01	4.5E+01
1,2-Dichloroethene	2.1	8.6	9.0E-03	Liver	2.7E-02	6.3E+00	2.6E+01
Ethylbenzene	0.036	0.036	1.0E-01	Liver/Kidney	2.7E-02	9.7E-03	9.7E-03
Methylene Chloride	5.4	67	6.0E-02	Liver	2.7E-02	2.4E+00	3.0E+01
Tetrachloroethene	20	110	1.0E-02	Liver	2.7E-02	5.4E+01	3.0E+02
Toluene	0.06	0.06	2.0E-01	Liver/Kidney	2.7E-02	8.1E-03	8.1E-03
1,1,1-Trichloroethane	11	120	9.0E-02	Liver	2.7E-02	3.3E+00	3.6E+01
1,1,2-Trichloroethane	0.01	0.01	4.0E-03	Blood Chem.	2.7E-02	6.8E-02	6.8E-02
Trichloroethene	0.67	5	--	--	2.7E-02	--	--
Trichlorofluoromethane	0.12	1.3	3.0E-01	Survival	2.7E-02	1.1E-02	1.2E-01
Vinyl Chloride	0.19	0.83	--	--	2.7E-02	--	--
Xylenes	0.13	0.16	2.0E+00	Hyperactivity	2.7E-02	1.8E-03	2.2E-03
Semi-Volatile Organic Compounds							
Bis(2-ethylhexyl)Phthalate	0.011	0.039	2.0E-02	Liver	2.7E-02	1.5E-02	5.3E-02
Pesticides/PCBs							
Chlordane	0.001	0.0024	6.0E-05	Liver	2.7E-02	4.5E-01	1.1E+00
Inorganics							
Arsenic	0.0085	0.036	3.0E-04	Skin	2.7E-02	7.7E-01	3.2E+00
Cadmium	0.0036	0.02	5.0E-04	Kidney	2.7E-02	1.9E-01	1.1E+00
Chromium	0.015	0.089	1.0E+00	None	2.7E-02	4.1E-04	2.4E-03
Copper	0.042	0.27	3.7E-02	GI Irritation	2.7E-02	3.1E-02	2.0E-01
Lead	0.0097	0.043	--	--	2.7E-02	--	--
Nickel	0.02	0.051	2.0E-02	Organ Weight	2.7E-02	2.7E-02	6.9E-02
Thallium	ND	ND	8.0E-05	Liver/Blood	2.7E-02	--	--
Zinc	0.12	0.56	3.0E-01	Blood	2.7E-02	1.1E-02	5.0E-02
					SUM	68	441
					Liver	67	437
					Skin	0.8	3.2
					Kidney	0.2	1.1

Exposure Factors:
Adult - 2 liters of water per day for 350 days in a 365 day year for 30 years by a 70 kg adult = 0.027 liters per kg body weight per day

- Compounds and associated hazard quotients/indices exceeding 1.0.

FUTURE GROUNDWATER INGESTION PATHWAY
PAC FACILITY SOURCE AREA
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Adult (l/kg/day)	RISK ESTIMATE Average Adult	RISK ESTIMATE Reasonable Max. Adult
Volatile Organic Compounds							
Acetone	13	55	--	D	1.2E-02	--	--
Benzene	ND	ND	2.9E-02	A	1.2E-02	--	--
Chloroethane	ND	ND	--	NA	1.2E-02	--	--
1,1- Dichloroethane	ND	ND	--	C	1.2E-02	--	--
1,2-Dichloroethane	ND	ND	9.1E-02	B2	1.2E-02	--	--
1,1-Dichloroethene	ND	ND	6.0E-01	C	1.2E-02	--	--
1,2-Dichloroethene	ND	ND	--	D	1.2E-02	--	--
Ethylbenzene	0.41	0.89	--	D	1.2E-02	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	1.2E-02	--	--
Tetrachloroethene	0.032	0.062	5.2E-02	B2	1.2E-02	2.0E-05	3.8E-05
Toluene	0.054	0.2	--	D	1.2E-02	--	--
1,1,1-Trichloroethane	ND	ND	--	D	1.2E-02	--	--
1,1,2-Trichloroethane	ND	ND	5.7E-02	C	1.2E-02	--	--
Trichloroethene	ND	ND	1.1E-02	NA	1.2E-02	--	--
Trichlorofluoromethane	ND	ND	--	NA	1.2E-02	--	--
Vinyl Chloride	ND	ND	1.9E+00	A	1.2E-02	--	--
Xylenes	0.042	0.1	--	D	1.2E-02	--	--
Semi-Volatile Organic Compounds							
Bis(2-ethylhexyl)Phthalate	ND	ND	1.4E-02	B2	1.2E-02	--	--
Pesticides/PCBs							
Chlordane	ND	ND	1.3E+00	B2	1.2E-02	--	--
Inorganics							
Arsenic	0.3	0.46	1.75E+00	A	1.2E-02	6.2E-03 *	9.5E-03 *
Cadmium	ND	ND	--	B1	1.2E-02	--	--
Chromium	0.021	0.041	--	D	1.2E-02	--	--
Copper	0.049	0.075	--	D	1.2E-02	--	--
Lead	0.013	0.022	--	B2	1.2E-02	--	--
Nickel	0.12	0.15	--	A	1.2E-02	--	--
Thallium	ND	ND	--	D	1.2E-02	--	--
Zinc	0.066	0.098	--	D	1.2E-02	--	--
					SUM	6.2E-03	9.5E-03

Exposure Factors:
Adult - 2 liters of water per day for 350 days in a 365 day year for 30 years in a 70 year lifetime by a 70 kg adult = 0.012 liters per kg body weight per day

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

TABLE B-12 (cont'd.)

FUTURE GROUNDWATER INGESTION PATHWAY
PAC FACILITY SOURCE AREA
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration (mg/l) Average	Maximum	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Adult (l/kg/day)	HAZARD INDEX Average Adult	Reasonable Max. Adult
Volatile Organic Compounds							
Acetone	13	55	1.0E-01	Liver/Kidney	2.7E-02	3.5E+00	1.5E+01
Benzene	ND	ND	--	--	2.7E-02	--	--
Chloroethane	ND	ND	--	--	2.7E-02	--	--
1,1- Dichloroethane	ND	ND	1.0E-01	None	2.7E-02	--	--
1,2-Dichloroethane	ND	ND	--	--	2.7E-02	--	--
1,1-Dichloroethene	ND	ND	9.0E-03	Liver	2.7E-02	--	--
1,2-Dichloroethene	ND	ND	9.0E-03	Liver	2.7E-02	--	--
Ethylbenzene	0.41	0.89	1.0E-01	Liver/Kidney	2.7E-02	1.1E-01	2.4E-01
Methylene Chloride	ND	ND	6.0E-02	Liver	2.7E-02	--	--
Tetrachloroethene	0.032	0.062	1.0E-02	Liver	2.7E-02	8.6E-02	1.7E-01
Toluene	0.054	0.2	2.0E-01	Liver/Kidney	2.7E-02	7.3E-03	2.7E-02
1,1,1-Trichloroethane	ND	ND	9.0E-02	Liver	2.7E-02	--	--
1,1,2-Trichloroethane	ND	ND	4.0E-03	Blood Chem.	2.7E-02	--	--
Trichloroethene	ND	ND	--	--	2.7E-02	--	--
Trichlorofluoromethane	ND	ND	3.0E-01	Survival	2.7E-02	--	--
Vinyl Chloride	ND	ND	--	--	2.7E-02	--	--
Xylenes	0.042	0.1	2.0E+00	Hyperactivity	2.7E-02	5.7E-04	1.4E-03
Semi-Volatile Organic Compounds							
Bis(2-ethylhexyl)Phthalate	ND	ND	2.0E-02	Liver	2.7E-02	--	--
Pesticides/PCBs							
Chlordane	ND	ND	6.0E-05	Liver	2.7E-02	--	--
Inorganics							
Arsenic	0.3	0.46	3.0E-04	Skin	2.7E-02	2.7E+01	4.1E+01
Cadmium	ND	ND	5.0E-04	Kidney	2.7E-02	--	--
Chromium	0.021	0.041	1.0E+00	None	2.7E-02	5.7E-04	1.1E-03
Copper	0.049	0.075	3.7E-02	GI Irritation	2.7E-02	3.6E-02	5.5E-02
Lead	0.013	0.022	--	--	2.7E-02	--	--
Nickel	0.12	0.15	2.0E-02	Organ Weight	2.7E-02	1.6E-01	2.0E-01
Thallium	ND	ND	8.0E-05	Liver/Blood	2.7E-02	--	--
Zinc	0.066	0.098	3.0E-01	Blood	2.7E-02	5.9E-03	8.8E-03
					SUM	31	57
					Liver	3.7	15
					Skin	27	41
					Kidney	--	--

Exposure Factors:
Adult - 2 liters of water per day for 350 days in a 365 day year for 30 years by a 70 kg adult = 0.027 liters per kg body weight per day

- Compounds and associated hazard quotients/indices exceeding 1.0.

FUTURE GROUNDWATER INGESTION PATHWAY
CCL FACILITY DOWNGRADIENT AREA AND QUINNVILLE WELLFIELD
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Adult (l/kg/day)	RISK ESTIMATE Average Adult	RISK ESTIMATE Reasonable Max. Adult
Volatile Organic Compounds							
Acetone	0.011	0.03	--	D	1.2E-02	--	--
Benzene	0.0049	0.011	2.9E-02	A	1.2E-02	1.7E-06	3.7E-06
Chloroethane	0.15	1.3	--	NA	1.2E-02	--	--
1,1- Dichloroethane	0.044	0.2	--	C	1.2E-02	--	--
1,2-Dichloroethane	0.003	0.003	9.1E-02	B2	1.2E-02	3.2E-06	3.2E-06
1,1-Dichloroethene	ND	ND	6.0E-01	C	1.2E-02	--	--
1,2-Dichloroethene	0.038	0.11	--	D	1.2E-02	--	--
Ethylbenzene	0.003	0.003	--	D	1.2E-02	--	--
Methylene Chloride	0.0053	0.009	7.5E-03	B2	1.2E-02	4.7E-07	7.9E-07
Tetrachloroethene	0.037	0.26	5.2E-02	B2	1.2E-02	2.3E-05	1.6E-04
Toluene	0.003	0.003	--	D	1.2E-02	--	--
1,1,1-Trichloroethane	0.008	0.047	--	D	1.2E-02	--	--
1,1,2-Trichloroethane	ND	ND	5.7E-02	C	1.2E-02	--	--
Trichloroethene	0.011	0.055	1.1E-02	NA	1.2E-02	1.4E-06	7.1E-06
Trichlorofluoromethane	ND	ND	--	NA	1.2E-02	--	--
Vinyl Chloride	0.0047	0.01	1.9E+00	A	1.2E-02	1.0E-04	2.2E-04
Xylenes	ND	ND	--	D	1.2E-02	--	--
Semi-Volatile Organic Compounds							
Bis(2-ethylhexyl)Phthalate	0.021	0.056	1.4E-02	B2	1.2E-02	3.5E-06	9.2E-06
Pesticides/PCBs							
Chlordane	ND	ND	1.3E+00	B2	1.2E-02	--	--
Inorganics							
Arsenic	0.013	0.071	1.75E+00	A	1.2E-02	2.7E-04 *	1.5E-03 *
Cadmium	0.0039	0.0076	--	B1	1.2E-02	--	--
Chromium	0.0078	0.015	--	D	1.2E-02	--	--
Copper	0.33	2.6	--	D	1.2E-02	--	--
Lead	0.0032	0.0059	--	B2	1.2E-02	--	--
Nickel	0.019	0.057	--	A	1.2E-02	--	--
Thallium	0.0012	0.0021	--	D	1.2E-02	--	--
Zinc	0.038	0.13	--	D	1.2E-02	--	--
					SUM	4.0E-04	1.9E-03

Exposure Factors:
Adult - 2 liters of water per day for 350 days in a 365 day year for 30 years in a 70 year lifetime by a 70 kg adult = 0.012 liters per kg body weight per day

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

FUTURE GROUNDWATER INGESTION PATHWAY
CCL FACILITY DOWNGRADIENT AREA AND QUINNVILLE WELLFIELD
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Adult (l/kg/day)	HAZARD INDEX Average Adult	HAZARD INDEX Reasonable Max. Adult
Volatile Organic Compounds							
Acetone	0.011	0.03	1.0E-01	Liver/Kidney	2.7E-02	3.0E-03	8.1E-03
Benzene	0.0049	0.011	--	--	2.7E-02	--	--
Chloroethane	0.15	1.3	--	--	2.7E-02	--	--
1,1- Dichloroethane	0.044	0.2	1.0E-01	None	2.7E-02	1.2E-02	5.4E-02
1,2-Dichloroethane	0.003	0.003	--	--	2.7E-02	--	--
1,1-Dichloroethene	ND	ND	9.0E-03	Liver	2.7E-02	--	--
1,2-Dichloroethene	0.038	0.11	9.0E-03	Liver	2.7E-02	1.1E-01	3.3E-01
Ethylbenzene	0.003	0.003	1.0E-01	Liver/Kidney	2.7E-02	8.1E-04	8.1E-04
Methylene Chloride	0.0053	0.009	6.0E-02	Liver	2.7E-02	2.4E-03	4.1E-03
Tetrachloroethene	0.037	0.26	1.0E-02	Liver	2.7E-02	1.0E-01	7.0E-01
Toluene	0.003	0.003	2.0E-01	Liver/Kidney	2.7E-02	4.1E-04	4.1E-04
1,1,1-Trichloroethane	0.008	0.047	9.0E-02	Liver	2.7E-02	2.4E-03	1.4E-02
1,1,2-Trichloroethane	ND	ND	4.0E-03	Blood Chem.	2.7E-02	--	--
Trichloroethene	0.011	0.055	--	--	2.7E-02	--	--
Trichlorofluoromethane	ND	ND	3.0E-01	Survival	2.7E-02	--	--
Vinyl Chloride	0.0047	0.01	--	--	2.7E-02	--	--
Xylenes	ND	ND	2.0E+00	Hyperactivity	2.7E-02	--	--
Semi-Volatile Organic Compounds							
Bis(2-ethylhexyl)Phthalate	0.021	0.056	2.0E-02	Liver	2.7E-02	2.8E-02	7.6E-02
Pesticides/PCBs							
Chlordane	ND	ND	6.0E-05	Liver	2.7E-02	--	--
Inorganics							
Arsenic	0.013	0.071	3.0E-04	Skin	2.7E-02	1.2E+00	6.4E+00
Cadmium	0.0039	0.0076	5.0E-04	Kidney	2.7E-02	2.1E-01	4.1E-01
Chromium	0.0078	0.015	1.0E+00	None	2.7E-02	2.1E-04	4.1E-04
Copper	0.33	2.6	3.7E-02	GI Irritation	2.7E-02	2.4E-01	1.9E+00
Lead	0.0032	0.0059	--	--	2.7E-02	--	--
Nickel	0.019	0.057	2.0E-02	Organ Weight	2.7E-02	2.6E-02	7.7E-02
Thallium	0.0012	0.0021	8.0E-05	Liver/Blood	2.7E-02	4.1E-01	7.1E-01
Zinc	0.038	0.13	3.0E-01	Blood	2.7E-02	3.4E-03	1.2E-02
					SUM	2.3	11
					Liver	0.7	1.8
					Skin	1.2	6.4
					GI	0.24	1.9
					Kidney	0.21	0.41

Exposure Factors:
Adult - 2 liters of water per day for 350 days in a 365 day year for 30 years by a 70 kg adult = 0.027 liters per kg body weight per day

- Compounds and associated hazard quotients/indices exceeding 1.0.

FUTURE GROUNDWATER INGESTION PATHWAY
PAC FACILITY DOWNGRADIENT AREA
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Adult (l/kg/day)	RISK ESTIMATE Average Adult	RISK ESTIMATE Reasonable Max. Adult
Volatile Organic Compounds							
Acetone	ND	ND	--	D	1.2E-02	--	--
Benzene	0.029	0.15	2.9E-02	A	1.2E-02	9.9E-06	5.1E-05
Chloroethane	ND	ND	--	NA	1.2E-02	--	--
1,1- Dichloroethane	ND	ND	--	C	1.2E-02	--	--
1,2-Dichloroethane	ND	ND	9.1E-02	B2	1.2E-02	--	--
1,1-Dichloroethene	ND	ND	6.0E-01	C	1.2E-02	--	--
1,2-Dichloroethene	0.043	0.13	--	D	1.2E-02	--	--
Ethylbenzene	0.013	0.051	--	D	1.2E-02	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	1.2E-02	--	--
Tetrachloroethene	ND	ND	5.2E-02	B2	1.2E-02	--	--
Toluene	ND	ND	--	D	1.2E-02	--	--
1,1,1-Trichloroethane	0.012	0.023	--	D	1.2E-02	--	--
1,1,2-Trichloroethane	ND	ND	5.7E-02	C	1.2E-02	--	--
Trichloroethene	0.053	0.15	1.1E-02	NA	1.2E-02	6.6E-06	1.9E-05
Trichlorofluoromethane	ND	ND	--	NA	1.2E-02	--	--
Vinyl Chloride	ND	ND	1.9E+00	A	1.2E-02	--	--
Xylenes	0.006	0.011	--	D	1.2E-02	--	--
Semi-Volatile Organic Compounds							
Not Analyzed							
Pesticides/PCBs							
Not Analyzed							
Inorganics							
Arsenic	0.005	0.014	1.75E+00	A	1.2E-02	1.0E-04 *	2.9E-04 *
Cadmium	ND	ND	--	B1	1.2E-02	--	--
Chromium	0.014	0.025	--	D	1.2E-02	--	--
Copper	0.051	0.1	--	D	1.2E-02	--	--
Lead	0.01	0.022	--	B2	1.2E-02	--	--
Nickel	0.037	0.15	--	A	1.2E-02	--	--
Thallium	ND	ND	--	D	1.2E-02	--	--
Zinc	0.064	0.094	--	D	1.2E-02	--	--
					SUM	1.2E-04	3.6E-04

Exposure Factors:
Adult - 2 liters of water per day for 350 days in a 365 day year for 30 years in a 70 year lifetime by a 70 kg adult = 0.012 liters per kg body weight per day

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

FUTURE GROUNDWATER INGESTION PATHWAY
PAC FACILITY DOWNGRADIENT AREA
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Adult (l/kg/day)	HAZARD INDEX Average Adult	HAZARD INDEX Reasonable Max. Adult
Volatile Organic Compounds							
Acetone	ND	ND	1.0E-01	Liver/Kidney	2.7E-02	--	--
Benzene	0.029	0.15	--	--	2.7E-02	--	--
Chloroethane	ND	ND	--	--	2.7E-02	--	--
1,1- Dichloroethane	ND	ND	1.0E-01	None	2.7E-02	--	--
1,2-Dichloroethane	ND	ND	--	--	2.7E-02	--	--
1,1-Dichloroethene	ND	ND	9.0E-03	Liver	2.7E-02	--	--
1,2-Dichloroethene	0.043	0.13	9.0E-03	Liver	2.7E-02	1.3E-01	3.9E-01
Ethylbenzene	0.013	0.051	1.0E-01	Liver/Kidney	2.7E-02	3.5E-03	1.4E-02
Methylene Chloride	ND	ND	6.0E-02	Liver	2.7E-02	--	--
Tetrachloroethene	ND	ND	1.0E-02	Liver	2.7E-02	--	--
Toluene	ND	ND	2.0E-01	Liver/Kidney	2.7E-02	--	--
1,1,1-Trichloroethane	0.012	0.023	9.0E-02	Liver	2.7E-02	3.6E-03	6.9E-03
1,1,2-Trichloroethane	ND	ND	4.0E-03	Blood Chem.	2.7E-02	--	--
Trichloroethene	0.053	0.15	--	--	2.7E-02	--	--
Trichlorofluoromethane	ND	ND	3.0E-01	Survival	2.7E-02	--	--
Vinyl Chloride	ND	ND	--	--	2.7E-02	--	--
Xylenes	0.006	0.011	2.0E+00	Hyperactivity	2.7E-02	8.1E-05	1.5E-04
Semi-Volatile Organic Compounds							
Not Analyzed					2.7E-02		
Pesticides/PCBs							
Not Analyzed					2.7E-02		
Inorganics							
Arsenic	0.005	0.014	3.0E-04	Skin	2.7E-02	4.5E-01	1.3E+00
Cadmium	ND	ND	5.0E-04	Kidney	2.7E-02	--	--
Chromium	0.014	0.025	1.0E+00	None	2.7E-02	3.8E-04	6.8E-04
Copper	0.051	0.1	3.7E-02	GI Irritation	2.7E-02	3.7E-02	7.3E-02
Lead	0.01	0.022	--	--	2.7E-02	--	--
Nickel	0.037	0.15	2.0E-02	Organ Weight	2.7E-02	5.0E-02	2.0E-01
Thallium	ND	ND	8.0E-05	Liver/Blood	2.7E-02	--	--
Zinc	0.064	0.094	3.0E-01	Blood	2.7E-02	5.8E-03	8.5E-03
					SUM	0.68	2.0
					Liver	0.14	0.41
					Skin	0.5	1.3
					Organ Wt.	0.05	0.20
					Kidney	--	--

Exposure Factors:
Adult - 2 liters of water per day for 350 days in a 365 day year for 30 years by a 70 kg adult = 0.027 liters per kg body weight per day

- Compounds and associated hazard quotients/indices exceeding 1.0.

FUTURE SURFACE WATER INGESTION PATHWAY
BLACKSTONE RIVER
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Adult (l/kg/day)	Exposure Factor Child (l/kg/day)	RISK ESTIMATE Average Adult	Average Child	Average Total	Reasonable Maximum Adult	Reasonable Maximum Child	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	0.016	0.03	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
Benzene	0.013	0.15	2.9E-02	A	2.1E-06	5.5E-06	7.9E-10	2.1E-09	2.9E-09	9.1E-09	2.4E-08	
Chloroethane	0.1	1.3	--	NA	2.1E-06	5.5E-06	--	--	--	--	--	--
1,1- Dichloroethane	0.031	0.2	--	C	2.1E-06	5.5E-06	--	--	--	--	--	--
1,2-Dichloroethane	0.003	0.003	9.1E-02	B2	2.1E-06	5.5E-06	5.7E-10	1.5E-09	2.1E-09	5.7E-10	1.5E-09	2.1E-09
1,1-Dichloroethene	ND	ND	6.0E-01	C	2.1E-06	5.5E-06	--	--	--	--	--	--
1,2-Dichloroethene	0.044	0.13	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
Ethylbenzene	0.0069	0.051	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
Methylene Chloride	0.0052	0.009	7.5E-03	B2	2.1E-06	5.5E-06	8.2E-11	2.1E-10	2.9E-10	1.4E-10	3.7E-10	5.1E-10
Tetrachloroethene	0.027	0.26	5.2E-02	B2	2.1E-06	5.5E-06	2.9E-09	7.7E-09	1.1E-08	2.8E-08	7.4E-08	1.0E-07
Toluene	0.003	0.003	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.0091	0.047	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
1,1,2-Trichloroethane	ND	ND	5.7E-02	C	2.1E-06	5.5E-06	--	--	--	--	--	--
Trichloroethene	0.025	0.15	1.1E-02	NA	2.1E-06	5.5E-06	5.8E-10	1.5E-09	2.1E-09	3.5E-09	9.0E-09	1.2E-08
Trichlorofluoromethane	ND	ND	--	NA	2.1E-06	5.5E-06	--	--	--	--	--	--
Vinyl Chloride	0.0048	0.01	1.9E+00	A	2.1E-06	5.5E-06	1.9E-08	5.0E-08	6.9E-08	4.0E-08	1.0E-07	1.4E-07
Xylenes	0.0051	0.011	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Bis(2-ethylhexyl)Phthalate	0.021	0.057	1.4E-02	B2	2.1E-06	5.5E-06	6.2E-10	1.6E-09	2.2E-09	1.7E-09	4.4E-09	6.0E-09
Pesticides/PCBs												
Chlordane	ND	ND	1.3E+00	B2	2.1E-06	5.5E-06	--	--	--	--	--	--
Inorganics												
Arsenic	0.0098	0.071	1.75E+00	A	2.1E-06	5.5E-06	3.6E-08 *	9.4E-08 *	1.3E-07 *	2.6E-07 *	6.8E-07 *	9.4E-07 *
Cadmium	0.0033	0.0076	--	B1	2.1E-06	5.5E-06	--	--	--	--	--	--
Chromium	0.01	0.025	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
Copper	0.22	2.6	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
Lead	0.006	0.022	--	B2	2.1E-06	5.5E-06	--	--	--	--	--	--
Nickel	0.026	0.15	--	A	2.1E-06	5.5E-06	--	--	--	--	--	--
Thallium	0.00098	0.0022	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
Zinc	0.048	0.13	--	D	2.1E-06	5.5E-06	--	--	--	--	--	--
						SUM	6.1E-08	1.6E-07	2.2E-07	3.4E-07	9.0E-07	1.2E-06

Exposure Factors:
Adult - 0.05 liters of water per hour for 0.5 hours per day for 5 days in a 365 day year for 30 years in a 70 year lifetime by a 70 kg adult = 2.1 x 10-6 liters per kg body weight per day
Child - 0.05 liters of water per hour for 1 hour per day for 10 days in a 365 day year for 12 years in a 70 year lifetime by a 43 kg child = 5.5 x 10-6 liters per kg body weight per day

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

TABLE B-15 (cont'd.)

FUTURE SURFACE WATER INGESTION PATHWAY
BLACKSTONE RIVER
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Adult (l/kg/day)	Exposure Factor Child (l/kg/day)	HAZARD INDEX Average Adult	Average Child	Average Total	Reasonable Maximum Adult	Reasonable Maximum Child	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	0.016	0.03	1.0E-01	Liver/Kidney	4.9E-06	3.2E-05	7.8E-07	5.1E-06	5.9E-06	1.5E-06	9.6E-06	1.1E-05
Benzene	0.013	0.15	--	--	4.9E-06	3.2E-05	--	--	--	--	--	--
Chloroethane	0.1	1.3	--	--	4.9E-06	3.2E-05	--	--	--	--	--	--
1,1- Dichloroethane	0.031	0.2	1.0E-01	None	4.9E-06	3.2E-05	1.5E-06	9.9E-06	1.1E-05	9.8E-06	6.4E-05	7.4E-05
1,2-Dichloroethane	0.003	0.003	--	--	4.9E-06	3.2E-05	--	--	--	--	--	--
1,1-Dichloroethene	ND	ND	9.0E-03	Liver	4.9E-06	3.2E-05	--	--	--	--	--	--
1,2-Dichloroethene	0.044	0.13	9.0E-03	Liver	4.9E-06	3.2E-05	2.4E-05	1.6E-04	1.8E-04	7.1E-05	4.6E-04	5.3E-04
Ethylbenzene	0.0069	0.051	1.0E-01	Liver/Kidney	4.9E-06	3.2E-05	3.4E-07	2.2E-06	2.5E-06	2.5E-06	1.6E-05	1.9E-05
Methylene Chloride	0.0052	0.009	6.0E-02	Liver	4.9E-06	3.2E-05	4.2E-07	2.8E-06	3.2E-06	7.4E-07	4.8E-06	5.5E-06
Tetrachloroethene	0.027	0.26	1.0E-02	Liver	4.9E-06	3.2E-05	1.3E-05	8.6E-05	1.0E-04	1.3E-04	8.3E-04	9.6E-04
Toluene	0.003	0.003	2.0E-01	Liver/Kidney	4.9E-06	3.2E-05	7.4E-08	4.8E-07	5.5E-07	7.4E-08	4.8E-07	5.5E-07
1,1,1-Trichloroethane	0.0091	0.047	9.0E-02	Liver	4.9E-06	3.2E-05	5.0E-07	3.2E-06	3.7E-06	2.6E-06	1.7E-05	1.9E-05
1,1,2-Trichloroethane	ND	ND	4.0E-03	Blood Chem.	4.9E-06	3.2E-05	--	--	--	--	--	--
Trichloroethene	0.025	0.15	--	--	4.9E-06	3.2E-05	--	--	--	--	--	--
Trichlorofluoromethane	ND	ND	3.0E-01	Survival	4.9E-06	3.2E-05	--	--	--	--	--	--
Vinyl Chloride	0.0048	0.01	--	--	4.9E-06	3.2E-05	--	--	--	--	--	--
Xylenes	0.0051	0.011	2.0E+00	Hyperactivity	4.9E-06	3.2E-05	1.2E-08	8.2E-08	9.4E-08	2.7E-08	1.8E-07	2.0E-07
Semi-Volatile Organic Compounds												
Bis(2-ethylhexyl)Phthalate	0.021	0.057	2.0E-02	Liver	4.9E-06	3.2E-05	5.1E-06	3.4E-05	3.9E-05	1.4E-05	9.1E-05	1.1E-04
Pesticides/PCBs												
Chlordane	ND	ND	6.0E-05	Liver	4.9E-06	3.2E-05	--	--	--	--	--	--
Inorganics												
Arsenic	0.0098	0.071	3.0E-04	Skin	4.9E-06	3.2E-05	1.6E-04	1.0E-03	1.2E-03	1.2E-03	7.6E-03	8.7E-03
Cadmium	0.0033	0.0076	5.0E-04	Kidney	4.9E-06	3.2E-05	3.2E-05	2.1E-04	2.4E-04	7.4E-05	4.9E-04	5.6E-04
Chromium	0.01	0.025	1.0E+00	None	4.9E-06	3.2E-05	4.9E-08	3.2E-07	3.7E-07	1.2E-07	8.0E-07	9.2E-07
Copper	0.22	2.6	3.7E-02	GI Irritation	4.9E-06	3.2E-05	2.9E-05	1.9E-04	2.2E-04	3.4E-04	2.2E-03	2.6E-03
Lead	0.006	0.022	--	--	4.9E-06	3.2E-05	--	--	--	--	--	--
Nickel	0.026	0.15	2.0E-02	Organ Weight	4.9E-06	3.2E-05	6.4E-06	4.2E-05	4.8E-05	3.7E-05	2.4E-04	2.8E-04
Thallium	0.00098	0.0022	8.0E-05	Liver/Blood	4.9E-06	3.2E-05	6.0E-05	3.9E-04	4.5E-04	1.3E-04	8.8E-04	1.0E-03
Zinc	0.048	0.13	3.0E-01	Blood	4.9E-06	3.2E-05	7.8E-07	5.1E-06	5.9E-06	2.1E-06	1.4E-05	1.6E-05
						SUM	0.00033	0.0022	0.0025	0.0020	0.013	0.015

Exposure Factors:
Adult - 0.05 liters of water per hour for 0.5 hours per day for 5 days in a 365 day year for 30 years by a 70 kg adult = 4.9 x 10-6 liters per kg body weight per day
Child - 0.05 liters of water per hour for 1 hour per day for 10 days in a 365 day year for 12 years by a 43 kg child = 3.2 x 10-5 liters per kg body weight per day

FUTURE SURFACE WATER DERMAL CONTACT PATHWAY
BLACKSTONE RIVER
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Adult (l/kg/day)	Exposure Factor Child (l/kg/day)	RISK ESTIMATE Average Adult	Average Child	Average Total	Reasonable Maximum Adult	Reasonable Maximum Child	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	0.016	0.03	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
Benzene	0.013	0.15	2.9E-02	A	6.4E-07	1.2E-06	2.4E-10	4.5E-10	6.9E-10	2.8E-09	5.2E-09	8.0E-09
Chloroethane	0.1	1.3	--	NA	6.4E-07	1.2E-06	--	--	--	--	--	--
1,1- Dichloroethane	0.031	0.2	--	C	6.4E-07	1.2E-06	--	--	--	--	--	--
1,2-Dichloroethane	0.003	0.003	9.1E-02	B2	6.4E-07	1.2E-06	1.7E-10	3.3E-10	5.0E-10	1.7E-10	3.3E-10	5.0E-10
1,1-Dichloroethene	ND	ND	6.0E-01	C	6.4E-07	1.2E-06	--	--	--	--	--	--
1,2-Dichloroethene	0.044	0.13	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
Ethylbenzene	0.0069	0.051	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
Methylene Chloride	0.0052	0.009	7.5E-03	B2	6.4E-07	1.2E-06	2.5E-11	4.7E-11	7.2E-11	4.3E-11	8.1E-11	1.2E-10
Tetrachloroethene	0.027	0.26	5.2E-02	B2	6.4E-07	1.2E-06	9.0E-10	1.7E-09	2.6E-09	8.7E-09	1.6E-08	2.5E-08
Toluene	0.003	0.003	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.0091	0.047	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
1,1,2-Trichloroethane	ND	ND	5.7E-02	C	6.4E-07	1.2E-06	--	--	--	--	--	--
Trichloroethene	0.025	0.15	1.1E-02	NA	6.4E-07	1.2E-06	1.8E-10	3.3E-10	5.1E-10	1.1E-09	2.0E-09	3.0E-09
Trichlorofluoromethane	ND	ND	--	NA	6.4E-07	1.2E-06	--	--	--	--	--	--
Vinyl Chloride	0.0048	0.01	1.9E+00	A	6.4E-07	1.2E-06	5.8E-09	1.1E-08	1.7E-08	1.2E-08	2.3E-08	3.5E-08
Xylenes	0.0051	0.011	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Bis(2-ethylhexyl)Phthalate	0.021	0.057	1.4E-02	B2	6.4E-07	1.2E-06	1.9E-10	3.5E-10	5.4E-10	5.1E-10	9.6E-10	1.5E-09
Pesticides/PCBs												
Chlordane	ND	ND	1.3E+00	B2	6.4E-07	1.2E-06	--	--	--	--	--	--
Inorganics												
Arsenic	0.0098	0.071	1.75E+00	A	6.4E-07	1.2E-06	1.1E-08 *	2.1E-08 *	3.2E-08 *	8.0E-08 *	1.5E-07 *	2.3E-07 *
Cadmium	0.0033	0.0076	--	B1	6.4E-07	1.2E-06	--	--	--	--	--	--
Chromium	0.01	0.025	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
Copper	0.22	2.6	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
Lead	0.006	0.022	--	B2	6.4E-07	1.2E-06	--	--	--	--	--	--
Nickel	0.026	0.15	--	A	6.4E-07	1.2E-06	--	--	--	--	--	--
Thallium	0.00098	0.0022	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
Zinc	0.048	0.13	--	D	6.4E-07	1.2E-06	--	--	--	--	--	--
						SUM	1.9E-08	3.5E-08	5.3E-08	1.0E-07	2.0E-07	3.0E-07

Exposure Factors:
Adult - 18150 cm2 of skin area with a permeability of 8.4E-04 cm per hour for an exposure time of 0.5 hours per day for 5 days in a 365 day year for 30 years in a 70 year lifetime by a 70 kg adult
= 6.4E-07 liters per kg body weight per day
Child - 13000 cm2 of skin area with a permeability of 8.4E-04 cm per hour for an exposure time of 1 hour per day for 10 days in a 365 day year for 12 years in a 70 year lifetime by a 43 kg child
= 1.2E-06 liters per kg body weight per day

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

FUTURE SURFACE WATER DERMAL CONTACT PATHWAY
BLACKSTONE RIVER
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

Contaminants of Concern	Concentration Average (mg/l)	Concentration Maximum (mg/l)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Adult (l/kg/day)	Exposure Factor Child (l/kg/day)	HAZARD INDEX Average Adult	Average Child	Average Total	Reasonable Maximum Adult	Reasonable Maximum Child	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	0.016	0.03	1.0E-01	Liver/Kidney	1.5E-06	7.0E-06	2.4E-07	1.1E-06	1.4E-06	4.5E-07	2.1E-06	2.6E-06
Benzene	0.013	0.15	--	--	1.5E-06	7.0E-06	--	--	--	--	--	--
Chloroethane	0.1	1.3	--	--	1.5E-06	7.0E-06	--	--	--	--	--	--
1,1- Dichloroethane	0.031	0.2	1.0E-01	None	1.5E-06	7.0E-06	4.7E-07	2.2E-06	2.6E-06	3.0E-06	1.4E-05	1.7E-05
1,2-Dichloroethane	0.003	0.003	--	--	1.5E-06	7.0E-06	--	--	--	--	--	--
1,1-Dichloroethene	ND	ND	9.0E-03	Liver	1.5E-06	7.0E-06	--	--	--	--	--	--
1,2-Dichloroethene	0.044	0.13	9.0E-03	Liver	1.5E-06	7.0E-06	7.3E-06	3.4E-05	4.2E-05	2.2E-05	1.0E-04	1.2E-04
Ethylbenzene	0.0069	0.051	1.0E-01	Liver/Kidney	1.5E-06	7.0E-06	1.0E-07	4.8E-07	5.9E-07	7.7E-07	3.6E-06	4.3E-06
Methylene Chloride	0.0052	0.009	6.0E-02	Liver	1.5E-06	7.0E-06	1.3E-07	6.1E-07	7.4E-07	2.3E-07	1.1E-06	1.3E-06
Tetrachloroethene	0.027	0.26	1.0E-02	Liver	1.5E-06	7.0E-06	4.1E-06	1.9E-05	2.3E-05	3.9E-05	1.8E-04	2.2E-04
Toluene	0.003	0.003	2.0E-01	Liver/Kidney	1.5E-06	7.0E-06	2.3E-08	1.1E-07	1.3E-07	2.3E-08	1.1E-07	1.3E-07
1,1,1-Trichloroethane	0.0091	0.047	9.0E-02	Liver	1.5E-06	7.0E-06	1.5E-07	7.1E-07	8.6E-07	7.8E-07	3.7E-06	4.4E-06
1,1,2-Trichloroethane	ND	ND	4.0E-03	Blood Chem.	1.5E-06	7.0E-06	--	--	--	--	--	--
Trichloroethene	0.025	0.15	--	--	1.5E-06	7.0E-06	--	--	--	--	--	--
Trichlorofluoromethane	ND	ND	3.0E-01	Survival	1.5E-06	7.0E-06	--	--	--	--	--	--
Vinyl Chloride	0.0048	0.01	--	--	1.5E-06	7.0E-06	--	--	--	--	--	--
Xylenes	0.0051	0.011	2.0E+00	Hyperactivity	1.5E-06	7.0E-06	3.8E-09	1.8E-08	2.2E-08	8.3E-09	3.9E-08	4.7E-08
Semi-Volatile Organic Compounds												
Bis(2-ethylhexyl)Phthalate	0.021	0.057	2.0E-02	Liver	1.5E-06	7.0E-06	1.6E-06	7.4E-06	8.9E-06	4.3E-06	2.0E-05	2.4E-05
Pesticides/PCBs												
Chlordane	ND	ND	6.0E-05	Liver	1.5E-06	7.0E-06	--	--	--	--	--	--
Inorganics												
Arsenic	0.0098	0.071	3.0E-04	Skin	1.5E-06	7.0E-06	4.9E-05	2.3E-04	2.8E-04	3.6E-04	1.7E-03	2.0E-03
Cadmium	0.0033	0.0076	5.0E-04	Kidney	1.5E-06	7.0E-06	9.9E-06	4.6E-05	5.6E-05	2.3E-05	1.1E-04	1.3E-04
Chromium	0.01	0.025	1.0E+00	None	1.5E-06	7.0E-06	1.5E-08	7.0E-08	8.5E-08	3.8E-08	1.8E-07	2.1E-07
Copper	0.22	2.6	3.7E-02	GI Irritation	1.5E-06	7.0E-06	8.9E-06	4.2E-05	5.1E-05	1.1E-04	4.9E-04	6.0E-04
Lead	0.006	0.022	--	--	1.5E-06	7.0E-06	--	--	--	--	--	--
Nickel	0.026	0.15	2.0E-02	Organ Weight	1.5E-06	7.0E-06	2.0E-06	9.1E-06	1.1E-05	1.1E-05	5.3E-05	6.4E-05
Thallium	0.00098	0.0022	8.0E-05	Liver/Blood	1.5E-06	7.0E-06	1.8E-05	8.6E-05	1.0E-04	4.1E-05	1.9E-04	2.3E-04
Zinc	0.048	0.13	3.0E-01	Blood	1.5E-06	7.0E-06	2.4E-07	1.1E-06	1.4E-06	6.5E-07	3.0E-06	3.7E-06
						SUM	0.00010	0.00048	0.00058	0.00061	0.0028	0.0034

Exposure Factors:

Adult - 18150 cm2 of skin area with a permeability of 8.4E-04 cm per hour for an exposure time of 0.5 hours per day for 5 days in a 365 day year for 30 years by a 70 kg adult
= 1.5E-06 liters per kg body weight per day

Child - 13000 cm2 of skin area with a permeability of 8.4E-04 cm per hour for an exposure time of 1 hour per day for 10 days in a 365 day year for 12 years by a 43 kg child
= 7.0E-06 liters per kg body weight per day

SEDIMENT INGESTION AND DERMAL CONTACT PATHWAY
BROOK A - PAC FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO CHILD RESIDENTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Chloroform	0.006	0.006	6.1E-03	B2	2.2E-08	5.5E-08	8.1E-13	2.0E-12	2.8E-12	8.1E-13	2.0E-12	2.8E-12
Methylene Chloride	0.006	0.006	7.5E-03	B2	2.2E-08	5.5E-08	9.9E-13	2.5E-12	3.5E-12	9.9E-13	2.5E-12	3.5E-12
Semi-Volatile Organic Compounds												
Anthracene	0.12	0.12	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
Benzo(a)anthracene	0.37	0.62	7.3E+00	B2	2.2E-08	5.5E-09	5.9E-08	1.5E-08	7.4E-08	1.0E-07	2.5E-08	1.2E-07
Benzo(a)pyrene	0.58	1.3	7.3E+00	B2	2.2E-08	5.5E-09	9.3E-08	2.3E-08	1.2E-07	2.1E-07	5.2E-08	2.6E-07
Benzo(g,h,i)perylene	0.42	0.8	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
Benzo(k)fluoranthene	1.1	2.6	7.3E+00	B2	2.2E-08	5.5E-09	1.8E-07	4.4E-08	2.2E-07	4.2E-07	1.0E-07	5.2E-07
Bis(2-ethylhexyl)Phthalate	0.42	1.1	1.4E-02	B2	2.2E-08	5.5E-09	1.3E-10	3.2E-11	1.6E-10	3.4E-10	8.5E-11	4.2E-10
Chrysene	0.44	0.84	7.3E+00	B2	2.2E-08	5.5E-09	7.1E-08	1.8E-08	8.8E-08	1.3E-07	3.4E-08	1.7E-07
Dibenzo(a,h)anthracene	0.26	0.47	7.3E+00	B2	2.2E-08	5.5E-09	4.2E-08	1.0E-08	5.2E-08	7.5E-08	1.9E-08	9.4E-08
Fluoranthene	0.43	0.76	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene	0.44	0.85	7.3E+00	B2	2.2E-08	5.5E-09	7.1E-08	1.8E-08	8.8E-08	1.4E-07	3.4E-08	1.7E-07
Phenanthrene	0.32	0.51	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
Pyrene	0.43	0.81	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
(Total Carcinogenic PAHs)	3.4	6.7	7.3E+00	B2	2.2E-08	5.5E-09	5.5E-07	1.4E-07	6.8E-07	1.1E-06	2.7E-07	1.3E-06
Pesticides/PCBs												
Chlordane	0.014	0.023	1.3E+00	B2	6.6E-09	5.5E-09	1.2E-10	1.0E-10	2.2E-10	2.0E-10	1.6E-10	3.6E-10
DDT	0.016	0.032	3.4E-01	B2	6.6E-09	5.5E-09	3.6E-11	3.0E-11	6.6E-11	7.2E-11	6.0E-11	1.3E-10
Inorganics												
Arsenic	5.5	6.6	1.75E+00	A	2.2E-08	1.1E-09	2.1E-07 *	1.1E-08 *	2.2E-07 *	2.5E-07 *	1.3E-08 *	2.7E-07 *
Chromium	29	48	--	D	2.2E-08	--	--	--	--	--	--	--
Copper	53	93	--	D	2.2E-08	--	--	--	--	--	--	--
Lead	340	560	--	B2	2.2E-08	1.1E-09	--	--	--	--	--	--
Mercury	0.69	1.5	--	D	2.2E-08	1.1E-09	--	--	--	--	--	--
Nickel	10	19	--	A	2.2E-08	1.1E-09	--	--	--	--	--	--
Vanadium	26	40	--	D	2.2E-08	1.1E-09	--	--	--	--	--	--
Zinc	140	170	--	D	2.2E-08	1.1E-09	--	--	--	--	--	--
					SUM (Indiv. Carc. PAHs)		7.2E-07	1.4E-07	8.6E-07	1.3E-06	2.8E-07	1.6E-06
					SUM (Total Carc. PAHs)		7.6E-07	1.5E-07	9.1E-07	1.3E-06	2.8E-07	1.6E-06

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 10 days in a 365 day year for 12 years in a 70 year lifetime by a 43 kg child = 2.2 x 10-8 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 6.6 x 10-9 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 10 days in a 365 day year for 12 years in a 70 year lifetime by a 43 kg child = 5.5 x 10-8 for VOCs, 5.5 x 10-9 for SVOCs and Pesticides, and 1.1 x 10-9 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SEDIMENT INGESTION AND DERMAL CONTACT PATHWAY
BROOK A - PAC FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO CHILD RESIDENTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Chloroform	0.006	0.006	1.0E-02	Liver	1.3E-07	3.2E-07	7.8E-08	1.9E-07	2.7E-07	7.8E-08	1.9E-07	2.7E-07
Methylene Chloride	0.006	0.006	6.0E-02	Liver	1.3E-07	3.2E-07	1.3E-08	3.2E-08	4.5E-08	1.3E-08	3.2E-08	4.5E-08
Semi-Volatile Organic Compounds												
Anthracene	0.12	0.12	3.0E-01	None	1.3E-07	3.2E-08	5.2E-08	1.3E-08	6.5E-08	5.2E-08	1.3E-08	6.5E-08
Benzo(a)anthracene	0.37	0.62	2.0E-02	NA	1.3E-07	3.2E-08	2.4E-06	5.9E-07	3.0E-06	4.0E-06	9.9E-07	5.0E-06
Benzo(a)pyrene	0.58	1.3	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.42	0.8	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Benzo(k)fluoranthene	1.1	2.6	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Bis(2-ethylhexyl)Phthalate	0.42	1.1	--	Liver	1.3E-07	3.2E-08	--	--	--	--	--	--
Chrysene	0.44	0.84	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Dibenzo(a,h)anthracene	0.26	0.47	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Fluoranthene	0.43	0.76	4.0E-02	Kidney/Liver	1.3E-07	3.2E-08	1.4E-06	3.4E-07	1.7E-06	2.5E-06	6.1E-07	3.1E-06
Indeno(1,2,3-c,d)pyrene	0.44	0.85	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Phenanthrene	0.32	0.51	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Pyrene	0.43	0.81	3.0E-02	Kidney	1.3E-07	3.2E-08	1.9E-06	4.6E-07	2.3E-06	3.5E-06	8.6E-07	4.4E-06
Pesticides/PCBs												
Chlordane	0.014	0.023	6.0E-05	Liver	3.8E-08	3.2E-08	8.9E-06	7.5E-06	1.6E-05	1.5E-05	1.2E-05	2.7E-05
DDT	0.016	0.032	5.0E-04	Liver	3.8E-08	3.2E-08	1.2E-06	1.0E-06	2.2E-06	2.4E-06	2.0E-06	4.5E-06
Inorganics												
Arsenic	5.5	6.6	3.0E-04	Skin	1.3E-07	6.4E-09	2.4E-03	1.2E-04	2.5E-03	2.9E-03	1.4E-04	3.0E-03
Chromium	29	48	1.0E+00	None	1.3E-07	6.4E-09	3.8E-06	1.9E-07	4.0E-06	6.2E-06	3.1E-07	6.5E-06
Copper	53	93	3.7E-02	GI Irritation	1.3E-07	6.4E-09	1.9E-04	9.2E-06	2.0E-04	3.3E-04	1.6E-05	3.4E-04
Lead	340	560	--	CNS	1.3E-07	6.4E-09	--	--	--	--	--	--
Mercury	0.69	1.5	3.0E-04	CNS	1.3E-07	6.4E-09	3.0E-04	1.5E-05	3.1E-04	6.5E-04	3.2E-05	6.8E-04
Nickel	10	19	2.0E-02	Organ Weight	1.3E-07	6.4E-09	6.5E-05	3.2E-06	6.8E-05	1.2E-04	6.1E-06	1.3E-04
Vanadium	26	40	7.0E-03	None	1.3E-07	6.4E-09	4.8E-04	2.4E-05	5.1E-04	7.4E-04	3.7E-05	7.8E-04
Zinc	140	170	3.0E-01	Blood	1.3E-07	6.4E-09	6.1E-05	3.0E-06	6.4E-05	7.4E-05	3.6E-06	7.7E-05
						SUM	0.0035	0.00018	0.0037	0.0048	0.0003	0.0051

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 10 days in a 365 day year for 12 years by a 43 kg child = 1.3 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs and Inorganics and 3.8 x 10-8 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 10 days in a 365 day year for 12 years by a 43 kg child = 3.2 x 10-7 for VOCs, 3.2 x 10-8 for SVOCs and Pesticides, and 6.4 x 10-9 for Inorganics.

SEDIMENT INGESTION AND DERMAL CONTACT PATHWAY
BROOK A - RAILROAD AND OKONITE PROPERTY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO CHILD RESIDENTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Chloroform	ND	ND	6.1E-03	B2	2.2E-08	5.5E-08	--	--	--	--	--	--
Methylene Chloride	0.005	0.005	7.5E-03	B2	2.2E-08	5.5E-08	8.3E-13	2.1E-12	2.9E-12	8.3E-13	2.1E-12	2.9E-12
Semi-Volatile Organic Compounds												
Anthracene	0.2	0.21	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
Benzo(a)anthracene	0.89	1.6	7.3E+00	B2	2.2E-08	5.5E-09	1.4E-07	3.6E-08	1.8E-07	2.6E-07	6.4E-08	3.2E-07
Benzo(a)pyrene	1	1.9	7.3E+00	B2	2.2E-08	5.5E-09	1.6E-07	4.0E-08	2.0E-07	3.1E-07	7.6E-08	3.8E-07
Benzo(g,h,i)perylene	ND	ND	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
Benzo(k)fluoranthene	2.3	4.5	7.3E+00	B2	2.2E-08	5.5E-09	3.7E-07	9.2E-08	4.6E-07	7.2E-07	1.8E-07	9.0E-07
Bis(2-ethylhexyl)Phthalate	1.4	2.4	1.4E-02	B2	2.2E-08	5.5E-09	4.3E-10	1.1E-10	5.4E-10	7.4E-10	1.8E-10	9.2E-10
Chrysene	1.3	2.5	7.3E+00	B2	2.2E-08	5.5E-09	2.1E-07	5.2E-08	2.6E-07	4.0E-07	1.0E-07	5.0E-07
Dibenzo(a,h)anthracene	0.28	0.38	7.3E+00	B2	2.2E-08	5.5E-09	4.5E-08	1.1E-08	5.6E-08	6.1E-08	1.5E-08	7.6E-08
Fluoranthene	1.5	2.9	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene	0.24	0.29	7.3E+00	B2	2.2E-08	5.5E-09	3.9E-08	9.6E-09	4.8E-08	4.7E-08	1.2E-08	5.8E-08
Phenanthrene	0.69	1.2	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
Pyrene	1.5	2.8	--	D	2.2E-08	5.5E-09	--	--	--	--	--	--
(Total Carcinongenic PAHs)	6.5	12	7.3E+00	B2	2.2E-08	5.5E-09	1.0E-06	2.6E-07	1.3E-06	1.9E-06	4.8E-07	2.4E-06
Pesticides/PCBs												
Chlordane	0.2	0.39	1.3E+00	B2	6.6E-09	5.5E-09	1.7E-09	1.4E-09	3.1E-09	3.3E-09	2.8E-09	6.1E-09
DDT	0.071	0.14	3.4E-01	B2	6.6E-09	5.5E-09	1.6E-10	1.3E-10	2.9E-10	3.1E-10	2.6E-10	5.8E-10
Inorganics												
Arsenic	6.1	9.6	1.75E+00	A	2.2E-08	1.1E-09	2.3E-07 *	1.2E-08 *	2.5E-07 *	3.7E-07 *	1.8E-08 *	3.9E-07 *
Chromium	18	33	--	D	2.2E-08	--	--	--	--	--	--	--
Copper	150	290	--	D	2.2E-08	--	--	--	--	--	--	--
Lead	81	160	--	B2	2.2E-08	1.1E-09	--	--	--	--	--	--
Mercury	0.38	0.73	--	D	2.2E-08	1.1E-09	--	--	--	--	--	--
Nickel	31	60	--	A	2.2E-08	1.1E-09	--	--	--	--	--	--
Vanadium	39	72	--	D	2.2E-08	1.1E-09	--	--	--	--	--	--
Zinc	1100	2100	--	D	2.2E-08	1.1E-09	--	--	--	--	--	--
					SUM(Indiv. Carc. PAHs)		1.2E-06	2.5E-07	1.5E-06	2.2E-06	4.7E-07	2.6E-06
					SUM(Total Carc. PAHs)		1.3E-06	2.7E-07	1.6E-06	2.3E-06	5.0E-07	2.8E-06

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 10 days in a 365 day year for 12 years in a 70 year lifetime by a 43 kg child = 2.2 x 10-8 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 6.6 x 10-9 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 10 days in a 365 day year for 12 years in a 70 year lifetime by a 43 kg child = 5.5 x 10-8 for VOCs, 5.5 x 10-9 for SVOCs and Pesticides, and 1.1 x 10-9 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SEDIMENT INGESTION AND DERMAL CONTACT PATHWAY
BROOK A - RAILROAD AND OKONITE PROPERTY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO CHILD RESIDENTS

Contaminants of Concern	Concentration (mg/kg) Average	Concentration (mg/kg) Maximum	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor (kg/kg/day) Ingestion	Exposure Factor (kg/kg/day) Dermal	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Chloroform	ND	ND	1.0E-02	Liver	1.3E-07	3.2E-07	--	--	--	--	--	--
Methylene Chloride	0.005	0.005	6.0E-02	Liver	1.3E-07	3.2E-07	1.1E-08	2.7E-08	3.8E-08	1.1E-08	2.7E-08	3.8E-08
Semi-Volatile Organic Compounds												
Anthracene	0.2	0.21	3.0E-01	None	1.3E-07	3.2E-08	8.7E-08	2.1E-08	1.1E-07	9.1E-08	2.2E-08	1.1E-07
Benzo(a)anthracene	0.89	1.6	2.0E-02	NA	1.3E-07	3.2E-08	5.8E-06	1.4E-06	7.2E-06	1.0E-05	2.6E-06	1.3E-05
Benzo(a)pyrene	1	1.9	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Benzo(g,h,i)perylene	2.3	4.5	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Benzo(k)fluoranthene	ND	ND	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Bis(2-ethylhexyl)Phthalate	1.4	2.4	--	Liver	1.3E-07	3.2E-08	--	--	--	--	--	--
Chrysene	1.3	2.5	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Dibenzo(a,h)anthracene	0.28	0.38	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Fluoranthene	1.5	2.9	4.0E-02	Kidney/Liver	1.3E-07	3.2E-08	4.9E-06	1.2E-06	6.1E-06	9.4E-06	2.3E-06	1.2E-05
Indeno(1,2,3-c,d)pyrene	0.24	0.29	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Phenanthrene	0.69	1.2	--	NA	1.3E-07	3.2E-08	--	--	--	--	--	--
Pyrene	1.5	2.8	3.0E-02	Kidney	1.3E-07	3.2E-08	6.5E-06	1.6E-06	8.1E-06	1.2E-05	3.0E-06	1.5E-05
Pesticides/PCBs												
Chlordane	0.2	0.39	6.0E-05	Liver	3.8E-08	3.2E-08	1.3E-04	1.1E-04	2.3E-04	2.5E-04	2.1E-04	4.6E-04
DDT	0.071	0.14	5.0E-04	Liver	3.8E-08	3.2E-08	5.4E-06	4.5E-06	9.9E-06	1.1E-05	9.0E-06	2.0E-05
Inorganics												
Arsenic	6.1	9.6	3.0E-04	Skin	1.3E-07	6.4E-09	2.6E-03	1.3E-04	2.8E-03	4.2E-03	2.0E-04	4.4E-03
Chromium	18	33	1.0E+00	None	1.3E-07	6.4E-09	2.3E-06	1.2E-07	2.5E-06	4.3E-06	2.1E-07	4.5E-06
Copper	150	290	3.7E-02	GI Irritation	1.3E-07	6.4E-09	5.3E-04	2.6E-05	5.5E-04	1.0E-03	5.0E-05	1.1E-03
Lead	81	160	--	CNS	1.3E-07	6.4E-09	--	--	--	--	--	--
Mercury	0.38	0.73	3.0E-04	CNS	1.3E-07	6.4E-09	1.6E-04	8.1E-06	1.7E-04	3.2E-04	1.6E-05	3.3E-04
Nickel	31	60	2.0E-02	Organ Weight	1.3E-07	6.4E-09	2.0E-04	9.9E-06	2.1E-04	3.9E-04	1.9E-05	4.1E-04
Vanadium	39	72	7.0E-03	None	1.3E-07	6.4E-09	7.2E-04	3.6E-05	7.6E-04	1.3E-03	6.6E-05	1.4E-03
Zinc	1100	2100	3.0E-01	Blood	1.3E-07	6.4E-09	4.8E-04	2.3E-05	5.0E-04	9.1E-04	4.5E-05	9.5E-04
						SUM	0.0049	0.00035	0.0052	0.0084	0.0006	0.0091

Exposure Factors:

Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 10 days in a 365 day year for 12 years by a 43 kg child = 1.3 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs and Inorganics and 3.8 x 10-8 kg/kg/day for Pesticides.

Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 10 days in a 365 day year for 12 years by a 43 kg child = 3.2 x 10-7 for VOCs, 3.2 x 10-8 for SVOCs and Pesticides, and 6.4 x 10-9 for Inorganics.

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
CCL FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	0.18	0.18	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
2-Butanone	0.043	0.043	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Chloroform	0.008	0.008	6.1E-03	B2	4.7E-07	2.4E-06	2.3E-11	1.2E-10	1.4E-10	2.3E-11	1.2E-10	1.4E-10
Ethylbenzene	0.009	0.009	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Methylene Chloride	1.5	5.3	7.5E-03	B2	4.7E-07	2.4E-06	5.3E-09	2.7E-08	3.2E-08	1.9E-08	9.5E-08	1.1E-07
Tetrachloroethene	39	220	5.2E-02	B2	4.7E-07	2.4E-06	9.5E-07	4.9E-06	5.8E-06	5.4E-06	2.7E-05	3.3E-05
Toluene	0.013	0.013	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.52	2.2	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Trichloroethene	0.029	0.029	1.1E-02	NA	4.7E-07	2.4E-06	1.5E-10	7.7E-10	9.2E-10	1.5E-10	7.7E-10	9.2E-10
Xylenes	0.026	0.026	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.024	0.024	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.15	0.15	7.3E+00	B2	4.7E-07	2.4E-07	5.1E-07	2.6E-07	7.8E-07	5.1E-07	2.6E-07	7.8E-07
Benzo(b)fluoranthene	0.18	0.29	7.3E+00	B2	4.7E-07	2.4E-07	6.2E-07	3.2E-07	9.3E-07	9.9E-07	5.1E-07	1.5E-06
Benzo(g,h,i)perylene	0.11	0.11	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.21	0.55	1.4E-02	B2	4.7E-07	2.4E-07	1.4E-09	7.1E-10	2.1E-09	3.6E-09	1.8E-09	5.5E-09
Chrysene	0.18	0.25	7.3E+00	B2	4.7E-07	2.4E-07	6.2E-07	3.2E-07	9.3E-07	8.6E-07	4.4E-07	1.3E-06
Indeno(1,2,3-cd)pyrene	0.12	0.12	7.3E+00	B2	4.7E-07	2.4E-07	4.1E-07	2.1E-07	6.2E-07	4.1E-07	2.1E-07	6.2E-07
Phenanthrene	0.14	0.19	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	0.93	0.93	7.3E+00	B2	4.7E-07	2.4E-07	3.2E-06	1.6E-06	4.8E-06	3.2E-06	1.6E-06	4.8E-06
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.019	0.12	1.30E+00	B2	1.4E-07	2.4E-07	3.5E-09	5.9E-09	9.4E-09	2.2E-08	3.7E-08	5.9E-08
DDT	ND	ND	3.4E-01	B2	1.4E-07	2.4E-07	--	--	--	--	--	--
Inorganics												
Arsenic	3	5.4	1.8E+00	A	4.7E-07	4.8E-08	2.5E-06 *	2.5E-07 *	2.7E-06 *	4.4E-06 *	4.5E-07 *	4.9E-06 *
Chromium	7.5	17	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
Lead	42	260	--	B2	4.7E-07	4.8E-08	--	--	--	--	--	--
Nickel	9.5	24	--	A	4.7E-07	4.8E-08	--	--	--	--	--	--
Vanadium	44	240	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
					SUM (Indiv. Carc. PAHs)		5.6E-06	6.3E-06	1.2E-05	1.3E-05	2.9E-05	4.2E-05
					SUM (Total Carc. PAHs)		6.6E-06	6.8E-06	1.3E-05	1.3E-05	3.0E-05	4.3E-05

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 4.7 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 1.4 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 2.4 x 10-6 for VOCs, 2.4 x 10-7 for SVOCs and Pesticides, and 4.8 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
CCL FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	0.18	0.18	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
2-Butanone	0.043	0.043	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Chloroform	0.008	0.008	6.1E-03	B2	1.1E-06	2.7E-06	5.4E-11	1.3E-10	1.9E-10	5.4E-11	1.3E-10	1.9E-10
Ethylbenzene	0.009	0.009	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Methylene Chloride	1.5	5.3	7.5E-03	B2	1.1E-06	2.7E-06	1.2E-08	3.0E-08	4.3E-08	4.4E-08	1.1E-07	1.5E-07
Tetrachloroethene	39	220	5.2E-02	B2	1.1E-06	2.7E-06	2.2E-06	5.5E-06	7.7E-06	1.3E-05	3.1E-05	4.3E-05
Toluene	0.013	0.013	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.52	2.2	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Trichloroethene	0.029	0.029	1.1E-02	NA	1.1E-06	2.7E-06	3.5E-10	8.6E-10	1.2E-09	3.5E-10	8.6E-10	1.2E-09
Xylenes	0.026	0.026	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.024	0.024	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.15	0.15	7.3E+00	B2	1.1E-06	2.7E-07	1.2E-06	3.0E-07	1.5E-06	1.2E-06	3.0E-07	1.5E-06
Benzo(b)fluoranthene	0.18	0.29	7.3E+00	B2	1.1E-06	2.7E-07	1.4E-06	3.5E-07	1.8E-06	2.3E-06	5.7E-07	2.9E-06
Benzo(g,h,i)perylene	0.11	0.11	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.21	0.55	1.4E-02	B2	1.1E-06	2.7E-07	3.2E-09	7.9E-10	4.0E-09	8.5E-09	2.1E-09	1.1E-08
Chrysene	0.18	0.25	7.3E+00	B2	1.1E-06	2.7E-07	1.4E-06	3.5E-07	1.8E-06	2.0E-06	4.9E-07	2.5E-06
Indeno(1,2,3-cd)pyrene	0.12	0.12	7.3E+00	B2	1.1E-06	2.7E-07	9.6E-07	2.4E-07	1.2E-06	9.6E-07	2.4E-07	1.2E-06
Phenanthrene	0.14	0.19	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	0.93	0.93	7.3E+00	B2	1.1E-06	2.7E-07	7.5E-06	1.8E-06	9.3E-06	7.5E-06	1.8E-06	9.3E-06
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.019	0.12	1.30E+00	B2	3.3E-07	2.7E-07	8.2E-09	6.7E-09	1.5E-08	5.1E-08	4.2E-08	9.4E-08
DDT	ND	ND	3.4E-01	B2	3.3E-07	2.7E-07	--	--	--	--	--	--
Inorganics												
Arsenic	3	5.4	1.75E+00	A	1.1E-06	5.5E-08	5.8E-06 *	2.9E-07 *	6.1E-06 *	1.0E-05 *	5.2E-07 *	1.1E-05 *
Chromium	7.5	17	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
Lead	42	260	--	B2	1.1E-06	5.5E-08	--	--	--	--	--	--
Nickel	9.5	24	--	A	1.1E-06	5.5E-08	--	--	--	--	--	--
Vanadium	44	240	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
					SUM (Indiv. Carc. PAHs)		1.3E-05	7.0E-06	2.0E-05	3.0E-05	3.3E-05	6.3E-05
					SUM (Total Carc. PAHs)		1.5E-05	7.6E-06	2.3E-05	3.1E-05	3.3E-05	6.4E-05

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 1.1 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.3 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 2.7 x 10-6 for VOCs, 2.7 x 10-7 for SVOCs and Pesticides, and 5.5 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
CCL FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	0.18	0.18	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	2.5E-06	1.2E-05	1.5E-05	2.5E-06	1.2E-05	1.5E-05
2-Butanone	0.043	0.043	5.0E-02	None	1.4E-06	6.8E-06	1.2E-06	5.8E-06	7.1E-06	1.2E-06	5.8E-06	7.1E-06
Chloroform	0.008	0.008	1.0E-02	Liver	1.4E-06	6.8E-06	1.1E-06	5.4E-06	6.6E-06	1.1E-06	5.4E-06	6.6E-06
Ethylbenzene	0.009	0.009	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	1.3E-07	6.1E-07	7.4E-07	1.3E-07	6.1E-07	7.4E-07
Methylene Chloride	1.5	5.3	6.0E-02	Liver	1.4E-06	6.8E-06	3.5E-05	1.7E-04	2.1E-04	1.2E-04	6.0E-04	7.2E-04
Tetrachloroethene	39	220	1.0E-02	Liver	1.4E-06	6.8E-06	5.5E-03	2.7E-02	3.2E-02	3.1E-02	1.5E-01	1.8E-01
Toluene	0.013	0.013	2.0E-01	Liver/Kidney	1.4E-06	6.8E-06	9.1E-08	4.4E-07	5.3E-07	9.1E-08	4.4E-07	5.3E-07
1,1,1-Trichloroethane	0.52	2.2	9.0E-02	Liver	1.4E-06	6.8E-06	8.1E-06	3.9E-05	4.7E-05	3.4E-05	1.7E-04	2.0E-04
Trichloroethene	0.029	0.029	--	--	1.4E-06	6.8E-06	--	--	--	--	--	--
Xylenes	0.026	0.026	2.0E+00	Hyperactivity	1.4E-06	6.8E-06	1.8E-08	8.8E-08	1.1E-07	1.8E-08	8.8E-08	1.1E-07
Semi-Volatile Organic Compounds												
Anthracene	0.024	0.024	3.0E-01	None	1.4E-06	6.8E-07	1.1E-07	5.4E-08	1.7E-07	1.1E-07	5.4E-08	1.7E-07
Benzo(a)pyrene	0.15	0.15	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(b)fluoranthene	0.18	0.29	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.11	0.11	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.21	0.55	2.0E-02	Liver	1.4E-06	6.8E-07	1.5E-05	7.1E-06	2.2E-05	3.9E-05	1.9E-05	5.7E-05
Chrysene	0.18	0.25	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.12	0.12	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Phenanthrene	0.14	0.19	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.019	0.12	6.0E-05	Liver	4.2E-07	6.8E-07	1.3E-04	2.2E-04	3.5E-04	8.4E-04	1.4E-03	2.2E-03
DDT	ND	ND	5.0E-04	Liver	4.2E-07	6.8E-07	--	--	--	--	--	--
Inorganics												
Arsenic	3	5.4	3.0E-04	Skin	1.4E-06	1.4E-07	1.4E-02	1.4E-03	1.5E-02	2.5E-02	2.5E-03	2.8E-02
Chromium	7.5	17	1.0E+00	None	1.4E-06	1.4E-07	1.1E-05	1.1E-06	1.2E-05	2.4E-05	2.4E-06	2.6E-05
Lead	42	260	--	--	1.4E-06	1.4E-07	--	--	--	--	--	--
Nickel	9.5	24	2.0E-02	Organ Weight	1.4E-06	1.4E-07	6.7E-04	6.7E-05	7.3E-04	1.7E-03	1.7E-04	1.8E-03
Vanadium	44	240	7.0E-03	None	1.4E-06	1.4E-07	8.8E-03	8.8E-04	9.7E-03	4.8E-02	4.8E-03	5.3E-02
						SUM	0.03	0.03	0.06	0.11	0.16	0.27

Exposure Factors:

Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years by a 70 kg adult = 1.4 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 4.2 x 10-7 kg/kg/day for Pesticides.

Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years by a 70 kg adult = 6.8 x 10-6 for VOCs, 6.8 x 10-7 for SVOCs and Pesticides, and 1.4 x 10-7 for Inorganics.

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
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PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	0.18	0.18	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	2.3E-05	5.8E-05	8.1E-05	2.3E-05	5.8E-05	8.1E-05
2-Butanone	0.043	0.043	5.0E-02	None	1.3E-05	3.2E-05	1.1E-05	2.8E-05	3.9E-05	1.1E-05	2.8E-05	3.9E-05
Chloroform	0.008	0.008	1.0E-02	Liver	1.3E-05	3.2E-05	1.0E-05	2.6E-05	3.6E-05	1.0E-05	2.6E-05	3.6E-05
Ethylbenzene	0.009	0.009	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	1.2E-06	2.9E-06	4.1E-06	1.2E-06	2.9E-06	4.1E-06
Methylene Chloride	1.5	5.3	6.0E-02	Liver	1.3E-05	3.2E-05	3.3E-04	8.0E-04	1.1E-03	1.1E-03	2.8E-03	4.0E-03
Tetrachloroethene	39	220	1.0E-02	Liver	1.3E-05	3.2E-05	5.1E-02	1.2E-01	1.8E-01	2.9E-01	7.0E-01	9.9E-01
Toluene	0.013	0.013	2.0E-01	Liver/Kidney	1.3E-05	3.2E-05	8.5E-07	2.1E-06	2.9E-06	8.5E-07	2.1E-06	2.9E-06
1,1,1-Trichloroethane	0.52	2.2	9.0E-02	Liver	1.3E-05	3.2E-05	7.5E-05	1.8E-04	2.6E-04	3.2E-04	7.8E-04	1.1E-03
Trichloroethene	0.029	0.029	--	--	1.3E-05	3.2E-05	--	--	--	--	--	--
Xylenes	0.026	0.026	2.0E+00	Hyperactivity	1.3E-05	3.2E-05	1.7E-07	4.2E-07	5.9E-07	1.7E-07	4.2E-07	5.9E-07
Semi-Volatile Organic Compounds												
Anthracene	0.024	0.024	3.0E-01	None	1.3E-05	3.2E-06	1.0E-06	2.6E-07	1.3E-06	1.0E-06	2.6E-07	1.3E-06
Benzo(a)pyrene	0.15	0.15	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(b)fluoranthene	0.18	0.29	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.11	0.11	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.21	0.55	2.0E-02	Liver	1.3E-05	3.2E-06	1.4E-04	3.4E-05	1.7E-04	3.6E-04	8.8E-05	4.5E-04
Chrysene	0.18	0.25	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.12	0.12	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Phenanthrene	0.14	0.19	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.019	0.12	6.0E-05	Liver	3.8E-06	3.2E-06	1.2E-03	1.0E-03	2.2E-03	7.6E-03	6.4E-03	1.4E-02
DDT	ND	ND	5.0E-04	Liver	3.8E-06	3.2E-06	--	--	--	--	--	--
Inorganics												
Arsenic	3	5.4	3.0E-04	Skin	1.3E-05	6.4E-07	1.3E-01	6.4E-03	1.4E-01	2.3E-01	1.2E-02	2.5E-01
Chromium	7.5	17	1.0E+00	None	1.3E-05	6.4E-07	9.8E-05	4.8E-06	1.0E-04	2.2E-04	1.1E-05	2.3E-04
Lead	42	260	--	--	1.3E-05	6.4E-07	--	--	--	--	--	--
Nickel	9.5	24	2.0E-02	Organ Weight	1.3E-05	6.4E-07	6.2E-03	3.0E-04	6.5E-03	1.6E-02	7.7E-04	1.6E-02
Vanadium	44	240	7.0E-03	None	1.3E-05	6.4E-07	8.2E-02	4.0E-03	8.6E-02	4.5E-01	2.2E-02	4.7E-01
						SUM	0.27	0.14	0.41	0.99	0.75	1.74
						Liver						1.01
						None						0.47
						Skin						0.25

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years by a 15 kg child = 1.3 x 10-5 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.8 x 10-6 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years by a 15 kg child = 3.2 x 10-5 for VOCs, 3.2 x 10-6 for SVOCs and Pesticides, and 6.4 x 10-7 for Inorganics.

- Compounds and associated hazard quotients/indices exceeding 1.0.

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
2-Butanone	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Chloroform	ND	ND	6.1E-03	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Ethylbenzene	0.011	0.032	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Tetrachloroethene	ND	ND	5.2E-02	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Toluene	0.0069	0.013	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	4.7E-07	2.4E-06	--	--	--	--	--	--
Xylenes	0.0096	0.026	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.11	0.11	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.31	1.1	7.3E+00	B2	4.7E-07	2.4E-07	1.1E-06	5.4E-07	1.6E-06	3.8E-06	1.9E-06	5.7E-06
Benzo(b)fluoranthene	0.53	2.2	7.3E+00	B2	4.7E-07	2.4E-07	1.8E-06	9.3E-07	2.7E-06	7.5E-06	3.9E-06	1.1E-05
Benzo(g,h,i)perylene	0.29	1	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	1.4E-02	B2	4.7E-07	2.4E-07	--	--	--	--	--	--
Chrysene	0.24	0.72	7.3E+00	B2	4.7E-07	2.4E-07	8.2E-07	4.2E-07	1.2E-06	2.5E-06	1.3E-06	3.7E-06
Indeno(1,2,3-cd)pyrene	0.32	1.1	7.3E+00	B2	4.7E-07	2.4E-07	1.1E-06	5.6E-07	1.7E-06	3.8E-06	1.9E-06	5.7E-06
Phenanthrene	0.14	0.31	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	1.9	5.8	7.3E+00	B2	4.7E-07	2.4E-07	6.5E-06	3.3E-06	9.8E-06	2.0E-05	1.0E-05	3.0E-05
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0024	0.0058	1.30E+00	B2	1.4E-07	2.4E-07	4.4E-10	7.5E-10	1.2E-09	1.1E-09	1.8E-09	2.9E-09
DDT	0.042	0.2	3.4E-01	B2	1.4E-07	2.4E-07	2.0E-09	3.4E-09	5.4E-09	9.5E-09	1.6E-08	2.6E-08
Inorganics												
Arsenic	4.3	8	1.75E+00	A	4.7E-07	4.8E-08	3.5E-06 *	3.6E-07 *	3.9E-06 *	6.6E-06 *	6.7E-07 *	7.3E-06 *
Chromium	8	11	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
Lead	10	25	--	B2	4.7E-07	4.8E-08	--	--	--	--	--	--
Nickel	4.2	6.5	--	A	4.7E-07	4.8E-08	--	--	--	--	--	--
Vanadium	10	14	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
					SUM(Indiv. Carc. PAHs)		8.3E-06	2.8E-06	1.1E-05	2.4E-05	9.7E-06	3.4E-05
					SUM(Total Carc. PAHs)		1.0E-05	3.7E-06	1.4E-05	2.6E-05	1.1E-05	3.7E-05

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 4.7 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 1.4 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 2.4 x 10-6 for VOCs, 2.4 x 10-7 for SVOCs and Pesticides, and 4.8 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
2-Butanone	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Chloroform	ND	ND	6.1E-03	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Ethylbenzene	0.011	0.032	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Tetrachloroethene	ND	ND	5.2E-02	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Toluene	0.0069	0.013	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	1.1E-06	2.7E-06	--	--	--	--	--	--
Xylenes	0.0096	0.026	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.11	0.11	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.31	1.1	7.3E+00	B2	1.1E-06	2.7E-07	2.5E-06	6.1E-07	3.1E-06	8.8E-06	2.2E-06	1.1E-05
Benzo(b)fluoranthene	0.53	2.2	7.3E+00	B2	1.1E-06	2.7E-07	4.3E-06	1.0E-06	5.3E-06	1.8E-05	4.3E-06	2.2E-05
Benzo(g,h,i)perylene	0.29	1	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	1.4E-02	B2	1.1E-06	2.7E-07	--	--	--	--	--	--
Chrysene	0.24	0.72	7.3E+00	B2	1.1E-06	2.7E-07	1.9E-06	4.7E-07	2.4E-06	5.8E-06	1.4E-06	7.2E-06
Indeno(1,2,3-cd)pyrene	0.32	1.1	7.3E+00	B2	1.1E-06	2.7E-07	2.6E-06	6.3E-07	3.2E-06	8.8E-06	2.2E-06	1.1E-05
Phenanthrene	0.14	0.31	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	1.9	5.8	7.3E+00	B2	1.1E-06	2.7E-07	1.5E-05	3.7E-06	1.9E-05	4.7E-05	1.1E-05	5.8E-05
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0024	0.0058	1.30E+00	B2	3.3E-07	2.7E-07	1.0E-09	8.4E-10	1.9E-09	2.5E-09	2.0E-09	4.5E-09
DDT	0.042	0.2	3.4E-01	B2	3.3E-07	2.7E-07	4.7E-09	3.9E-09	8.6E-09	2.2E-08	1.8E-08	4.1E-08
Inorganics												
Arsenic	4.3	8	1.75E+00	A	1.1E-06	5.5E-08	8.3E-06 *	4.1E-07 *	8.7E-06 *	1.5E-05 *	7.7E-07 *	1.6E-05 *
Chromium	8	11	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
Lead	10	25	--	B2	1.1E-06	5.5E-08	--	--	--	--	--	--
Nickel	4.2	6.5	--	A	1.1E-06	5.5E-08	--	--	--	--	--	--
Vanadium	10	14	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
					SUM(Indiv. Carc. PAHs)		2.0E-05	3.2E-06	2.3E-05	5.7E-05	1.1E-05	6.7E-05
					SUM(Total Carc. PAHs)		2.4E-05	4.2E-06	2.8E-05	6.2E-05	1.2E-05	7.4E-05

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 1.1 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.3 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 2.7 x 10-6 for VOCs, 2.7 x 10-7 for SVOCs and Pesticides, and 5.5 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

TABLE B-20 (cont'd.)

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
2-Butanone	ND	ND	5.0E-02	None	1.4E-06	6.8E-06	--	--	--	--	--	--
Chloroform	ND	ND	1.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Ethylbenzene	0.011	0.032	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	1.5E-07	7.5E-07	9.0E-07	4.5E-07	2.2E-06	2.6E-06
Methylene Chloride	ND	ND	6.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Tetrachloroethene	ND	ND	1.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Toluene	0.0069	0.013	2.0E-01	Liver/Kidney	1.4E-06	6.8E-06	4.8E-08	2.3E-07	2.8E-07	9.1E-08	4.4E-07	5.3E-07
1,1,1-Trichloroethane	ND	ND	9.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	--	--	1.4E-06	6.8E-06	--	--	--	--	--	--
Xylenes	0.0096	0.026	2.0E+00	Hyperactivity	1.4E-06	6.8E-06	6.7E-09	3.3E-08	3.9E-08	1.8E-08	8.8E-08	1.1E-07
Semi-Volatile Organic Compounds												
Anthracene	0.11	0.11	3.0E-01	None	1.4E-06	6.8E-07	5.1E-07	2.5E-07	7.6E-07	5.1E-07	2.5E-07	7.6E-07
Benzo(a)pyrene	0.31	1.1	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(b)fluoranthene	0.53	2.2	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.29	1	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	2.0E-02	Liver	1.4E-06	6.8E-07	--	--	--	--	--	--
Chrysene	0.24	0.72	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.32	1.1	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Phenanthrene	0.14	0.31	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0024	0.0058	6.0E-05	Liver	4.2E-07	6.8E-07	1.7E-05	2.7E-05	4.4E-05	4.1E-05	6.6E-05	1.1E-04
DDT	0.042	0.2	5.0E-04	Liver	4.2E-07	6.8E-07	--	--	--	--	--	--
Inorganics												
Arsenic	4.3	8	3.0E-04	Skin	1.4E-06	1.4E-07	2.0E-02	2.0E-03	2.2E-02	3.7E-02	3.7E-03	4.1E-02
Chromium	8	11	1.0E+00	None	1.4E-06	1.4E-07	1.1E-05	1.1E-06	1.2E-05	1.5E-05	1.5E-06	1.7E-05
Lead	10	25	--	--	1.4E-06	1.4E-07	--	--	--	--	--	--
Nickel	4.2	6.5	2.0E-02	Organ Weight	1.4E-06	1.4E-07	2.9E-04	2.9E-05	3.2E-04	4.6E-04	4.6E-05	5.0E-04
Vanadium	10	14	7.0E-03	None	1.4E-06	1.4E-07	2.0E-03	2.0E-04	2.2E-03	2.8E-03	2.8E-04	3.1E-03
						SUM	0.022	0.002	0.025	0.041	0.004	0.045

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years by a 70 kg adult = 1.4 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 4.2 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years by a 70 kg adult = 6.8 x 10-6 for VOCs, 6.8 x 10-7 for SVOCs and Pesticides, and 1.4 x 10-7 for Inorganics.

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
2-Butanone	ND	ND	5.0E-02	None	1.3E-05	3.2E-05	--	--	--	--	--	--
Chloroform	ND	ND	1.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Ethylbenzene	0.011	0.032	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	1.4E-06	3.5E-06	5.0E-06	4.2E-06	1.0E-05	1.4E-05
Methylene Chloride	ND	ND	6.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Tetrachloroethene	ND	ND	1.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Toluene	0.0069	0.013	2.0E-01	Liver/Kidney	1.3E-05	3.2E-05	4.5E-07	1.1E-06	1.6E-06	8.5E-07	2.1E-06	2.9E-06
1,1,1-Trichloroethane	ND	ND	9.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Trichloroethene	ND	ND	--	--	1.3E-05	3.2E-05	--	--	--	--	--	--
Xylenes	0.0096	0.026	2.0E+00	Hyperactivity	1.3E-05	3.2E-05	6.2E-08	1.5E-07	2.2E-07	1.7E-07	4.2E-07	5.9E-07
Semi-Volatile Organic Compounds												
Anthracene	0.11	0.11	3.0E-01	None	1.3E-05	3.2E-06	4.8E-06	1.2E-06	5.9E-06	4.8E-06	1.2E-06	5.9E-06
Benzo(a)pyrene	0.31	1.1	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(b)fluoranthene	0.53	2.2	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.29	1	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	2.0E-02	Liver	1.3E-05	3.2E-06	--	--	--	--	--	--
Chrysene	0.24	0.72	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.32	1.1	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Phenanthrene	0.14	0.31	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0024	0.0058	6.0E-05	Liver	3.8E-06	3.2E-06	1.5E-04	1.3E-04	2.8E-04	3.7E-04	3.1E-04	6.8E-04
DDT	0.042	0.2	5.0E-04	Liver	3.8E-06	3.2E-06	--	--	--	--	--	--
Inorganics												
Arsenic	4.3	8	3.0E-04	Skin	1.3E-05	6.4E-07	1.9E-01	9.2E-03	2.0E-01	3.5E-01	1.7E-02	3.6E-01
Chromium	8	11	1.0E+00	None	1.3E-05	6.4E-07	1.0E-04	5.1E-06	1.1E-04	1.4E-04	7.0E-06	1.5E-04
Lead	10	25	--	--	1.3E-05	6.4E-07	--	--	--	--	--	--
Nickel	4.2	6.5	2.0E-02	Organ Weight	1.3E-05	6.4E-07	2.7E-03	1.3E-04	2.9E-03	4.2E-03	2.1E-04	4.4E-03
Vanadium	10	14	7.0E-03	None	1.3E-05	6.4E-07	1.9E-02	9.1E-04	1.9E-02	2.6E-02	1.3E-03	2.7E-02
						SUM	0.21	0.01	0.22	0.38	0.02	0.40

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years by a 15 kg child = 1.3 x 10-5 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.8 x 10-6 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years by a 15 kg child = 3.2 x 10-5 for VOCs, 3.2 x 10-6 for SVOCs and Pesticides, and 6.4 x 10-7 for Inorganics.

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
2-Butanone	0.86	1.7	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Chloroform	ND	ND	6.1E-03	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Ethylbenzene	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Tetrachloroethene	45	89	5.2E-02	B2	4.7E-07	2.4E-06	1.1E-06	5.6E-06	6.7E-06	2.2E-06	1.1E-05	1.3E-05
Toluene	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.66	1.3	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	4.7E-07	2.4E-06	--	--	--	--	--	--
Xylenes	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.031	0.031	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.13	0.2	7.3E+00	B2	4.7E-07	2.4E-07	4.5E-07	2.3E-07	6.7E-07	6.9E-07	3.5E-07	1.0E-06
Benzo(b)fluoranthene	0.31	0.47	7.3E+00	B2	4.7E-07	2.4E-07	1.1E-06	5.4E-07	1.6E-06	1.6E-06	8.2E-07	2.4E-06
Benzo(g,h,i)perylene	0.099	0.15	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	1.4E-02	B2	4.7E-07	2.4E-07	--	--	--	--	--	--
Chrysene	0.091	0.29	7.3E+00	B2	4.7E-07	2.4E-07	3.1E-07	1.6E-07	4.7E-07	9.9E-07	5.1E-07	1.5E-06
Indeno(1,2,3-cd)pyrene	0.12	0.18	7.3E+00	B2	4.7E-07	2.4E-07	4.1E-07	2.1E-07	6.2E-07	6.2E-07	3.2E-07	9.3E-07
Phenanthrene	0.13	0.21	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	1.2	1.4	7.3E+00	B2	1.1E-06	2.7E-07	9.6E-06	2.4E-06	1.2E-05	1.1E-05	2.8E-06	1.4E-05
Pesticides/PCBs												
Chlordane (alpha and gamma)	ND	ND	1.30E+00	B2	1.4E-07	2.4E-07	--	--	--	--	--	--
DDT	0.038	0.0058	3.4E-01	B2	1.4E-07	2.4E-07	1.8E-09	3.1E-09	4.9E-09	2.8E-10	4.7E-10	7.5E-10
Inorganics												
Arsenic	7.4	8.8	1.75E+00	A	4.7E-07	4.8E-08	6.1E-06 *	6.2E-07 *	6.7E-06 *	7.2E-06 *	7.4E-07 *	8.0E-06 *
Chromium	8.7	9	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
Lead	54	71	--	B2	4.7E-07	4.8E-08	--	--	--	--	--	--
Nickel	8.4	9.3	--	A	4.7E-07	4.8E-08	--	--	--	--	--	--
Vanadium	13	13	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
					SUM (Indiv. Carc. PAHs)		9.4E-06	7.4E-06	1.7E-05	1.3E-05	1.4E-05	2.7E-05
					SUM (Total Carc. PAHs)		1.7E-05	8.6E-06	2.5E-05	2.1E-05	1.5E-05	3.5E-05

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 4.7 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 1.4 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 2.4 x 10-6 for VOCs, 2.4 x 10-7 for SVOCs and Pesticides, and 4.8 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

TABLE B-21 (cont'd.)

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
2-Butanone	0.86	1.7	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Chloroform	ND	ND	6.1E-03	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Ethylbenzene	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Tetrachloroethene	45	89	5.2E-02	B2	1.1E-06	2.7E-06	2.6E-06	6.3E-06	8.9E-06	5.1E-06	1.2E-05	1.8E-05
Toluene	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.66	1.3	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	1.1E-06	2.7E-06	--	--	--	--	--	--
Xylenes	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.031	0.031	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.13	0.2	7.3E+00	B2	1.1E-06	2.7E-07	1.0E-06	2.6E-07	1.3E-06	1.6E-06	3.9E-07	2.0E-06
Benzo(b)fluoranthene	0.31	0.47	7.3E+00	B2	1.1E-06	2.7E-07	2.5E-06	6.1E-07	3.1E-06	3.8E-06	9.3E-07	4.7E-06
Benzo(g,h,i)perylene	0.099	0.15	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	1.4E-02	B2	1.1E-06	2.7E-07	--	--	--	--	--	--
Chrysene	0.091	0.29	7.3E+00	B2	1.1E-06	2.7E-07	7.3E-07	1.8E-07	9.1E-07	2.3E-06	5.7E-07	2.9E-06
Indeno(1,2,3-cd)pyrene	0.12	0.18	7.3E+00	B2	1.1E-06	2.7E-07	9.6E-07	2.4E-07	1.2E-06	1.4E-06	3.5E-07	1.8E-06
Phenanthrene	0.13	0.21	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	1.2	1.4	7.3E+00	B2	1.1E-06	2.7E-07	9.6E-06	2.4E-06	1.2E-05	1.1E-05	2.8E-06	1.4E-05
Pesticides/PCBs												
Chlordane (alpha and gamma)	ND	ND	1.30E+00	B2	3.3E-07	2.7E-07	--	--	--	--	--	--
DDT	0.038	0.0058	3.4E-01	B2	3.3E-07	2.7E-07	4.3E-09	3.5E-09	7.8E-09	6.5E-10	5.3E-10	1.2E-09
Inorganics												
Arsenic	7.4	8.8	1.75E+00	A	1.1E-06	5.5E-08	1.4E-05 *	7.1E-07 *	1.5E-05 *	1.7E-05 *	8.5E-07 *	1.8E-05 *
Chromium	8.7	9	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
Lead	54	71	--	B2	1.1E-06	5.5E-08	--	--	--	--	--	--
Nickel	8.4	9.3	--	A	1.1E-06	5.5E-08	--	--	--	--	--	--
Vanadium	13	13	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
					SUM (Indiv. Carc. PAHs)		2.2E-05	8.3E-06	3.0E-05	3.1E-05	1.6E-05	4.7E-05
					SUM (Total Carc. PAHs)		2.6E-05	9.4E-06	3.6E-05	3.3E-05	1.6E-05	4.9E-05

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 1.1 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.3 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 2.7 x 10-6 for VOCs, 2.7 x 10-7 for SVOCs and Pesticides, and 5.5 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
2-Butanone	0.86	1.7	5.0E-02	None	1.4E-06	6.8E-06	2.4E-05	1.2E-04	1.4E-04	4.8E-05	2.3E-04	2.8E-04
Chloroform	ND	ND	1.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Ethylbenzene	ND	ND	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	6.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Tetrachloroethene	45	89	1.0E-02	Liver	1.4E-06	6.8E-06	6.3E-03	3.1E-02	3.7E-02	1.2E-02	6.1E-02	7.3E-02
Toluene	ND	ND	2.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.66	1.3	9.0E-02	Liver	1.4E-06	6.8E-06	1.0E-05	5.0E-05	6.0E-05	2.0E-05	9.8E-05	1.2E-04
Trichloroethene	ND	ND	--	--	1.4E-06	6.8E-06	--	--	--	--	--	--
Xylenes	ND	ND	2.0E+00	Hyperactivity	1.4E-06	6.8E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.031	0.031	3.0E-01	None	1.4E-06	6.8E-07	1.4E-07	7.0E-08	2.1E-07	1.4E-07	7.0E-08	2.1E-07
Benzo(a)pyrene	0.13	0.2	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(b)fluoranthene	0.31	0.47	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.099	0.15	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	2.0E-02	Liver	1.4E-06	6.8E-07	--	--	--	--	--	--
Chrysene	0.091	0.29	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.12	0.18	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Phenanthrene	0.13	0.21	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	ND	ND	6.0E-05	Liver	4.2E-07	6.8E-07	--	--	--	--	--	--
DDT	0.038	0.0058	5.0E-04	Liver	4.2E-07	6.8E-07	3.2E-05	5.2E-05	8.4E-05	4.9E-06	7.9E-06	1.3E-05
Inorganics												
Arsenic	7.4	8.8	3.0E-04	Skin	1.4E-06	1.4E-07	3.5E-02	3.5E-03	3.8E-02	4.1E-02	4.1E-03	4.5E-02
Chromium	8.7	9	1.0E+00	None	1.4E-06	1.4E-07	1.2E-05	1.2E-06	1.3E-05	1.3E-05	1.3E-06	1.4E-05
Lead	54	71	--	--	1.4E-06	1.4E-07	--	--	--	--	--	--
Nickel	8.4	9.3	2.0E-02	Organ Weight	1.4E-06	1.4E-07	5.9E-04	5.9E-05	6.5E-04	6.5E-04	6.5E-05	7.2E-04
Vanadium	13	13	7.0E-03	None	1.4E-06	1.4E-07	2.6E-03	2.6E-04	2.9E-03	2.6E-03	2.6E-04	2.9E-03
						SUM	0.044	0.035	0.079	0.057	0.065	0.12

Exposure Factors:

Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years by a 70 kg adult = 1.4 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 4.2 x 10-7 kg/kg/day for Pesticides.

Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years by a 70 kg adult = 6.8 x 10-6 for VOCs, 6.8 x 10-7 for SVOCs and Pesticides, and 1.4 x 10-7 for Inorganics.

SURFICIAL SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
2-Butanone	0.86	1.7	5.0E-02	None	1.3E-05	3.2E-05	2.2E-04	5.5E-04	7.7E-04	4.4E-04	1.1E-03	1.5E-03
Chloroform	ND	ND	1.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Ethylbenzene	ND	ND	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
Methylene Chloride	ND	ND	6.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Tetrachloroethene	45	89	1.0E-02	Liver	1.3E-05	3.2E-05	5.9E-02	1.4E-01	2.0E-01	1.2E-01	2.8E-01	4.0E-01
Toluene	ND	ND	2.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
1,1,1-Trichloroethane	0.66	1.3	9.0E-02	Liver	1.3E-05	3.2E-05	9.5E-05	2.3E-04	3.3E-04	1.9E-04	4.6E-04	6.5E-04
Trichloroethene	ND	ND	--	--	1.3E-05	3.2E-05	--	--	--	--	--	--
Xylenes	ND	ND	2.0E+00	Hyperactivity	1.3E-05	3.2E-05	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.031	0.031	3.0E-01	None	1.3E-05	3.2E-06	1.3E-06	3.3E-07	1.7E-06	1.3E-06	3.3E-07	1.7E-06
Benzo(a)pyrene	0.13	0.2	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(b)fluoranthene	0.31	0.47	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.099	0.15	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	2.0E-02	Liver	1.3E-05	3.2E-06	--	--	--	--	--	--
Chrysene	0.091	0.29	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.12	0.18	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Phenanthrene	0.13	0.21	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	ND	ND	6.0E-05	Liver	3.8E-06	3.2E-06	--	--	--	--	--	--
DDT	0.038	0.0058	5.0E-04	Liver	3.8E-06	3.2E-06	2.9E-04	2.4E-04	5.3E-04	4.4E-05	3.7E-05	8.1E-05
Inorganics												
Arsenic	7.4	8.8	3.0E-04	Skin	1.3E-05	6.4E-07	3.2E-01	1.6E-02	3.4E-01	3.8E-01	1.9E-02	4.0E-01
Chromium	8.7	9	1.0E+00	None	1.3E-05	6.4E-07	1.1E-04	5.6E-06	1.2E-04	1.2E-04	5.8E-06	1.2E-04
Lead	54	71	--	--	1.3E-05	6.4E-07	--	--	--	--	--	--
Nickel	8.4	9.3	2.0E-02	Organ Weight	1.3E-05	6.4E-07	5.5E-03	2.7E-04	5.7E-03	6.0E-03	3.0E-04	6.3E-03
Vanadium	13	13	7.0E-03	None	1.3E-05	6.4E-07	2.4E-02	1.2E-03	2.5E-02	2.4E-02	1.2E-03	2.5E-02
						SUM	0.41	0.16	0.57	0.53	0.31	0.83

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years by a 15 kg child = 1.3 x 10-5 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.8 x 10-6 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years by a 15 kg child = 3.2 x 10-5 for VOCs, 3.2 x 10-6 for SVOCs and Pesticides, and 6.4 x 10-7 for Inorganics.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
CCL FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	110	1200	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
2-Butanone	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Chloroform	0.013	0.13	6.1E-03	B2	4.7E-07	2.4E-06	3.7E-11	1.9E-10	2.3E-10	3.7E-10	1.9E-09	2.3E-09
Ethylbenzene	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Methylene Chloride	92	1000	7.5E-03	B2	4.7E-07	2.4E-06	3.2E-07	1.7E-06	2.0E-06	3.5E-06	1.8E-05	2.2E-05
Tetrachloroethene	7700	84000	5.2E-02	B2	4.7E-07	2.4E-06	1.9E-04	9.6E-04	1.1E-03	2.1E-03	1.0E-02	1.3E-02
Toluene	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	550	6000	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Trichloroethene	68	68	1.1E-02	NA	4.7E-07	2.4E-06	3.5E-07	1.8E-06	2.1E-06	3.5E-07	1.8E-06	2.1E-06
Xylenes	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	ND	ND	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.035	0.035	7.3E+00	B2	4.7E-07	2.4E-07	1.2E-07	6.1E-08	1.8E-07	1.2E-07	6.1E-08	1.8E-07
Benzo(b)fluoranthene	0.062	0.062	7.3E+00	B2	4.7E-07	2.4E-07	2.1E-07	1.1E-07	3.2E-07	2.1E-07	1.1E-07	3.2E-07
Benzo(g,h,i)perylene	0.032	0.032	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.16	0.17	1.4E-02	B2	4.7E-07	2.4E-07	1.1E-09	5.4E-10	1.6E-09	1.1E-09	5.7E-10	1.7E-09
Chrysene	0.042	0.042	7.3E+00	B2	4.7E-07	2.4E-07	1.4E-07	7.4E-08	2.2E-07	1.4E-07	7.4E-08	2.2E-07
Indeno(1,2,3-cd)pyrene	0.036	0.036	7.3E+00	B2	4.7E-07	2.4E-07	1.2E-07	6.3E-08	1.9E-07	1.2E-07	6.3E-08	1.9E-07
Phenanthrene	0.028	0.028	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	0.18	0.18	7.3E+00	B2	4.7E-07	2.4E-07	6.2E-07	3.2E-07	9.3E-07	6.2E-07	3.2E-07	9.3E-07
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0039	0.018	1.30E+00	B2	1.4E-07	2.4E-07	7.1E-10	1.2E-09	1.9E-09	3.3E-09	5.6E-09	8.9E-09
DDT	ND	ND	3.4E-01	B2	1.4E-07	2.4E-07	--	--	--	--	--	--
Inorganics												
Arsenic	2.2	5.1	1.8E+00	A	4.7E-07	4.8E-08	1.8E-06 *	1.8E-07 *	2.0E-06 *	4.2E-06 *	4.3E-07 *	4.6E-06 *
Chromium	4.6	7.7	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
Lead	3.9	9.9	--	B2	4.7E-07	4.8E-08	--	--	--	--	--	--
Nickel	3.4	8.3	--	A	4.7E-07	4.8E-08	--	--	--	--	--	--
Vanadium	5.8	8.8	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
					SUM (Individual Carc. PAHs)		1.9E-04	9.6E-04	1.2E-03	2.1E-03	1.1E-02	1.3E-02
					SUM (Total Carc. PAHs)		1.9E-04	9.6E-04	1.2E-03	2.1E-03	1.1E-02	1.3E-02

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 4.7 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 1.4 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 2.4 x 10-6 for VOCs, 2.4 x 10-7 for SVOCs and Pesticides, and 4.8 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
CCL FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	110	1200	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
2-Butanone	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Chloroform	0.013	0.13	6.1E-03	B2	1.1E-06	2.7E-06	8.7E-11	2.1E-10	3.0E-10	8.7E-10	2.1E-09	3.0E-09
Ethylbenzene	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Methylene Chloride	92	1000	7.5E-03	B2	1.1E-06	2.7E-06	7.6E-07	1.9E-06	2.6E-06	8.3E-06	2.0E-05	2.9E-05
Tetrachloroethene	7700	84000	5.2E-02	B2	1.1E-06	2.7E-06	4.4E-04	1.1E-03	1.5E-03	4.8E-03	1.2E-02	1.7E-02
Toluene	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	550	6000	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Trichloroethene	68	68	1.1E-02	NA	1.1E-06	2.7E-06	8.2E-07	2.0E-06	2.8E-06	8.2E-07	2.0E-06	2.8E-06
Xylenes	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	ND	ND	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.035	0.035	7.3E+00	B2	1.1E-06	2.7E-07	2.8E-07	6.9E-08	3.5E-07	2.8E-07	6.9E-08	3.5E-07
Benzo(b)fluoranthene	0.062	0.062	7.3E+00	B2	1.1E-06	2.7E-07	5.0E-07	1.2E-07	6.2E-07	5.0E-07	1.2E-07	6.2E-07
Benzo(g,h,i)perylene	0.032	0.032	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.16	0.17	1.4E-02	B2	1.1E-06	2.7E-07	2.5E-09	6.0E-10	3.1E-09	2.6E-09	6.4E-10	3.3E-09
Chrysene	0.042	0.042	7.3E+00	B2	1.1E-06	2.7E-07	3.4E-07	8.3E-08	4.2E-07	3.4E-07	8.3E-08	4.2E-07
Indeno(1,2,3-cd)pyrene	0.036	0.036	7.3E+00	B2	1.1E-06	2.7E-07	2.9E-07	7.1E-08	3.6E-07	2.9E-07	7.1E-08	3.6E-07
Phenanthrene	0.028	0.028	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	0.18	0.18	7.3E+00	B2	1.1E-06	2.7E-07	1.4E-06	3.5E-07	1.8E-06	1.4E-06	3.5E-07	1.8E-06
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0039	0.018	1.30E+00	B2	3.3E-07	2.7E-07	1.7E-09	1.4E-09	3.0E-09	7.7E-09	6.3E-09	1.4E-08
DDT	ND	ND	3.4E-01	B2	3.3E-07	2.7E-07	--	--	--	--	--	--
Inorganics												
Arsenic	2.2	5.1	1.75E+00	A	1.1E-06	5.5E-08	4.2E-06 *	2.1E-07 *	4.4E-06 *	9.8E-06 *	4.9E-07 *	1.0E-05 *
Chromium	4.6	7.7	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
Lead	3.9	9.9	--	B2	1.1E-06	5.5E-08	--	--	--	--	--	--
Nickel	3.4	8.3	--	A	1.1E-06	5.5E-08	--	--	--	--	--	--
Vanadium	5.8	8.8	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
					SUM (Individual Carc. PAHs)		4.5E-04	1.1E-03	1.5E-03	4.8E-03	1.2E-02	1.7E-02
					SUM (Total Carc. PAHs)		4.5E-04	1.1E-03	1.5E-03	4.8E-03	1.2E-02	1.7E-02

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 1.1 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.3 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 2.7 x 10-6 for VOCs, 2.7 x 10-7 for SVOCs and Pesticides, and 5.5 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
CCL FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	110	1200	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	1.5E-03	7.5E-03	9.0E-03	1.7E-02	8.2E-02	9.8E-02
2-Butanone	ND	ND	5.0E-02	None	1.4E-06	6.8E-06	--	--	--	--	--	--
Chloroform	0.013	0.13	1.0E-02	Liver	1.4E-06	6.8E-06	1.8E-06	8.8E-06	1.1E-05	1.8E-05	8.8E-05	1.1E-04
Ethylbenzene	ND	ND	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
Methylene Chloride	92	1000	6.0E-02	Liver	1.4E-06	6.8E-06	2.1E-03	1.0E-02	1.3E-02	2.3E-02	1.1E-01	1.4E-01
Tetrachloroethene	7700	84000	1.0E-02	Liver	1.4E-06	6.8E-06	1.1E+00	5.2E+00	6.3E+00	1.2E+01	5.7E+01	6.9E+01
Toluene	ND	ND	2.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	550	6000	9.0E-02	Liver	1.4E-06	6.8E-06	8.6E-03	4.2E-02	5.0E-02	9.3E-02	4.5E-01	5.5E-01
Trichloroethene	68	68	--	--	1.4E-06	6.8E-06	--	--	--	--	--	--
Xylenes	ND	ND	2.0E+00	Hyperactivity	1.4E-06	6.8E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	ND	ND	3.0E-01	None	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.035	0.035	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(b)fluoranthene	0.062	0.062	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.032	0.032	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.16	0.17	2.0E-02	Liver	1.4E-06	6.8E-07	1.1E-05	5.4E-06	1.7E-05	1.2E-05	5.8E-06	1.8E-05
Chrysene	0.042	0.042	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.036	0.036	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Phenanthrene	0.028	0.028	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0039	0.018	6.0E-05	Liver	4.2E-07	6.8E-07	2.7E-05	4.4E-05	7.2E-05	1.3E-04	2.0E-04	3.3E-04
DDT	ND	ND	5.0E-04	Liver	4.2E-07	6.8E-07	--	--	--	--	--	--
Inorganics												
Arsenic	2.2	5.1	3.0E-04	Skin	1.4E-06	1.4E-07	1.0E-02	1.0E-03	1.1E-02	2.4E-02	2.4E-03	2.6E-02
Chromium	4.6	7.7	1.0E+00	None	1.4E-06	1.4E-07	6.4E-06	6.4E-07	7.1E-06	1.1E-05	1.1E-06	1.2E-05
Lead	3.9	9.9	--	--	1.4E-06	1.4E-07	--	--	--	--	--	--
Nickel	3.4	8.3	2.0E-02	Organ Weight	1.4E-06	1.4E-07	2.4E-04	2.4E-05	2.6E-04	5.8E-04	5.8E-05	6.4E-04
Vanadium	5.8	8.8	7.0E-03	None	1.4E-06	1.4E-07	1.2E-03	1.2E-04	1.3E-03	1.8E-03	1.8E-04	1.9E-03
						SUM	1.1	5.3	6.4	12	58	70
						Liver	1.1	5.3	6.4	12	58	70

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years by a 70 kg adult = 1.4 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 4.2 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years by a 70 kg adult = 6.8 x 10-6 for VOCs, 6.8 x 10-7 for SVOCs and Pesticides, and 1.4 x 10-7 for Inorganics.

- Compounds and associated hazard quotients/indices exceeding 1.0.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
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NONCARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	110	1200	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	1.4E-02	3.5E-02	5.0E-02	1.6E-01	3.8E-01	5.4E-01
2-Butanone	ND	ND	5.0E-02	None	1.3E-05	3.2E-05	--	--	--	--	--	--
Chloroform	0.013	0.13	1.0E-02	Liver	1.3E-05	3.2E-05	1.7E-05	4.2E-05	5.9E-05	1.7E-04	4.2E-04	5.9E-04
Ethylbenzene	ND	ND	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
Methylene Chloride	92	1000	6.0E-02	Liver	1.3E-05	3.2E-05	2.0E-02	4.9E-02	6.9E-02	2.2E-01	5.3E-01	7.5E-01
Tetrachloroethene	7700	84000	1.0E-02	Liver	1.3E-05	3.2E-05	1.0E+01	2.5E+01	3.5E+01	1.1E+02	2.7E+02	3.8E+02
Toluene	ND	ND	2.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
1,1,1-Trichloroethane	550	6000	9.0E-02	Liver	1.3E-05	3.2E-05	7.9E-02	2.0E-01	2.8E-01	8.7E-01	2.1E+00	3.0E+00
Trichloroethene	68	68	--	--	1.3E-05	3.2E-05	--	--	--	--	--	--
Xylenes	ND	ND	2.0E+00	Hyperactivity	1.3E-05	3.2E-05	--	--	--	--	--	--
Anthracene	ND	ND	3.0E-01	None	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(a)pyrene	0.035	0.035	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(b)fluoranthene	0.062	0.062	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.032	0.032	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.16	0.17	2.0E-02	Liver	1.3E-05	3.2E-06	1.0E-04	2.6E-05	1.3E-04	1.1E-04	2.7E-05	1.4E-04
Chrysene	0.042	0.042	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.036	0.036	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Phenanthrene	0.028	0.028	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0039	0.018	6.0E-05	Liver	3.8E-06	3.2E-06	2.5E-04	2.1E-04	4.6E-04	1.1E-03	9.6E-04	2.1E-03
DDT	ND	ND	5.0E-04	Liver	3.8E-06	3.2E-06	--	--	--	--	--	--
Inorganics												
Arsenic	2.2	5.1	3.0E-04	Skin	1.3E-05	6.4E-07	9.5E-02	4.7E-03	1.0E-01	2.2E-01	1.1E-02	2.3E-01
Chromium	4.6	7.7	1.0E+00	None	1.3E-05	6.4E-07	6.0E-05	2.9E-06	6.3E-05	1.0E-04	4.9E-06	1.1E-04
Lead	3.9	9.9	--	--	1.3E-05	6.4E-07	--	--	--	--	--	--
Nickel	3.4	8.3	2.0E-02	Organ Weight	1.3E-05	6.4E-07	2.2E-03	1.1E-04	2.3E-03	5.4E-03	2.7E-04	5.7E-03
Vanadium	5.8	8.8	7.0E-03	None	1.3E-05	6.4E-07	1.1E-02	5.3E-04	1.1E-02	1.6E-02	8.0E-04	1.7E-02
						SUM	10	25	35	111	272	383
						Liver	10	25	35	110	272	382

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years by a 15 kg child = 1.3 x 10-5 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.8 x 10-6 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years by a 15 kg child = 3.2 x 10-5 for VOCs, 3.2 x 10-6 for SVOCs and Pesticides, and 6.4 x 10-7 for Inorganics.

- Compounds and associated hazard quotients/indices exceeding 1.0.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	1.4	4.4	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
2-Butanone	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Chloroform	ND	ND	6.1E-03	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Ethylbenzene	0.34	1.5	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Tetrachloroethene	ND	ND	5.2E-02	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Toluene	0.75	1.6	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	4.7E-07	2.4E-06	--	--	--	--	--	--
Xylenes	1.3	5.5	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.4	0.4	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.16	0.16	7.3E+00	B2	4.7E-07	2.4E-07	5.5E-07	2.8E-07	8.3E-07	5.5E-07	2.8E-07	8.3E-07
Benzo(b)fluoranthene	0.23	0.23	7.3E+00	B2	4.7E-07	2.4E-07	7.9E-07	4.0E-07	1.2E-06	7.9E-07	4.0E-07	1.2E-06
Benzo(g,h,i)perylene	0.13	0.13	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	1.4E-02	B2		2.4E-07	--	--	--	--	--	--
Chrysene	0.29	0.29	7.3E+00	B2	4.7E-07	2.4E-07	9.9E-07	5.1E-07	1.5E-06	9.9E-07	5.1E-07	1.5E-06
Indeno(1,2,3-cd)pyrene	0.13	0.13	7.3E+00	B2	4.7E-07	2.4E-07	4.5E-07	2.3E-07	6.7E-07	4.5E-07	2.3E-07	6.7E-07
Phenanthrene	0.69	0.69	--	D	4.7E-07	2.4E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	1.1	1.1	7.3E+00	B2	4.7E-07	2.4E-07	3.8E-06	1.9E-06	5.7E-06	3.8E-06	1.9E-06	5.7E-06
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0013	0.003	1.30E+00	B2	1.4E-07	2.4E-07	2.4E-10	4.1E-10	6.4E-10	5.5E-10	9.4E-10	1.5E-09
DDT	0.016	0.039	3.4E-01	B2	1.4E-07	2.4E-07	7.6E-10	1.3E-09	2.1E-09	1.9E-09	3.2E-09	5.0E-09
Inorganics												
Arsenic	3.2	6	1.75E+00	A	4.7E-07	4.8E-08	2.6E-06 *	2.7E-07 *	2.9E-06 *	4.9E-06 *	5.0E-07 *	5.4E-06 *
Chromium	10	16	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
Lead	9.6	8.2	--	B2	4.7E-07	4.8E-08	--	--	--	--	--	--
Nickel	5.9	7.3	--	A	4.7E-07	4.8E-08	--	--	--	--	--	--
Vanadium	5.9	13	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
					SUM (Individual Carc. PAHs)		5.4E-06	1.7E-06	7.1E-06	7.7E-06	1.9E-06	9.6E-06
					SUM (Total Carc. PAHs)		6.4E-06	2.2E-06	8.6E-06	8.7E-06	2.4E-06	1.1E-05

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 4.7 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 1.4 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 2.4 x 10-6 for VOCs, 2.4 x 10-7 for SVOCs and Pesticides, and 4.8 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	1.4	4.4	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
2-Butanone	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Chloroform	ND	ND	6.1E-03	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Ethylbenzene	0.34	1.5	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Tetrachloroethene	ND	ND	5.2E-02	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Toluene	0.75	1.6	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	1.1E-06	2.7E-06	--	--	--	--	--	--
Xylenes	1.3	5.5	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.4	0.4	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.16	0.16	7.3E+00	B2	1.1E-06	2.7E-07	1.3E-06	3.2E-07	1.6E-06	1.3E-06	3.2E-07	1.6E-06
Benzo(b)fluoranthene	0.23	0.23	7.3E+00	B2	1.1E-06	2.7E-07	1.8E-06	4.5E-07	2.3E-06	1.8E-06	4.5E-07	2.3E-06
Benzo(g,h,i)perylene	0.13	0.13	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	1.4E-02	B2	1.1E-06	2.7E-07	--	--	--	--	--	--
Chrysene	0.29	0.29	7.3E+00	B2	1.1E-06	2.7E-07	2.3E-06	5.7E-07	2.9E-06	2.3E-06	5.7E-07	2.9E-06
Indeno(1,2,3-cd)pyrene	0.13	0.13	7.3E+00	B2	1.1E-06	2.7E-07	1.0E-06	2.6E-07	1.3E-06	1.0E-06	2.6E-07	1.3E-06
Phenanthrene	0.69	0.69	--	D	1.1E-06	2.7E-07	--	--	--	--	--	--
(Total Carcinogenic PAHs)	1.1	1.1	7.3E+00	B2	1.1E-06	2.7E-07	8.8E-06	2.2E-06	1.1E-05	8.8E-06	2.2E-06	1.1E-05
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0013	0.003	1.30E+00	B2	3.3E-07	2.7E-07	5.6E-10	4.6E-10	1.0E-09	1.3E-09	1.1E-09	2.3E-09
DDT	0.016	0.039	3.4E-01	B2	3.3E-07	2.7E-07	1.8E-09	1.5E-09	3.3E-09	4.4E-09	3.6E-09	8.0E-09
Inorganics												
Arsenic	3.2	6	1.75E+00	A	1.1E-06	5.5E-08	6.2E-06 *	3.1E-07 *	6.5E-06 *	1.2E-05 *	5.8E-07 *	1.2E-05 *
Chromium	10	16	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
Lead	9.6	8.2	--	B2	1.1E-06	5.5E-08	--	--	--	--	--	--
Nickel	5.9	7.3	--	A	1.1E-06	5.5E-08	--	--	--	--	--	--
Vanadium	5.9	13	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
					SUM (Individual Carc. PAHs)		1.3E-05	1.9E-06	1.5E-05	1.8E-05	2.2E-06	2.0E-05
					SUM (Total Carc. PAHs)		1.5E-05	2.5E-06	1.7E-05	2.0E-05	2.8E-06	2.3E-05

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 1.1 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.3 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 2.7 x 10-6 for VOCs, 2.7 x 10-7 for SVOCs and Pesticides, and 5.5 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	1.4	4.4	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	2.0E-05	9.5E-05	1.1E-04	6.2E-05	3.0E-04	3.6E-04
2-Butanone	ND	ND	5.0E-02	None	1.4E-06	6.8E-06	--	--	--	--	--	--
Chloroform	ND	ND	1.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Ethylbenzene	0.34	1.5	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	4.8E-06	2.3E-05	2.8E-05	2.1E-05	1.0E-04	1.2E-04
Methylene Chloride	ND	ND	6.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Tetrachloroethene	ND	ND	1.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Toluene	0.75	1.6	2.0E-01	Liver/Kidney	1.4E-06	6.8E-06	5.3E-06	2.6E-05	3.1E-05	1.1E-05	5.4E-05	6.6E-05
1,1,1-Trichloroethane	ND	ND	9.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	--	--	1.4E-06	6.8E-06	--	--	--	--	--	--
Xylenes	1.3	5.5	2.0E+00	Hyperactivity	1.4E-06	6.8E-06	9.1E-07	4.4E-06	5.3E-06	3.9E-06	1.9E-05	2.3E-05
Semi-Volatile Organic Compounds												
Anthracene	0.4	0.4	3.0E-01	None	1.4E-06	6.8E-07	1.9E-06	9.1E-07	2.8E-06	1.9E-06	9.1E-07	2.8E-06
Benzo(a)pyrene	0.16	0.16	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(b)fluoranthene	0.23	0.23	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.13	0.13	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	2.0E-02	Liver	1.4E-06	6.8E-07	--	--	--	--	--	--
Chrysene	0.29	0.29	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.13	0.13	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Phenanthrene	0.69	0.69	--	--	1.4E-06	6.8E-07	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0013	0.003	6.0E-05	Liver	4.2E-07	6.8E-07	9.1E-06	1.5E-05	2.4E-05	2.1E-05	3.4E-05	5.5E-05
DDT	0.016	0.039	5.0E-04	Liver	4.2E-07	6.8E-07	1.3E-05	2.2E-05	3.5E-05	3.3E-05	5.3E-05	8.6E-05
Inorganics												
Arsenic	3.2	6	3.0E-04	Skin	1.4E-06	1.4E-07	1.5E-02	1.5E-03	1.6E-02	2.8E-02	2.8E-03	3.1E-02
Chromium	10	16	1.0E+00	None	1.4E-06	1.4E-07	1.4E-05	1.4E-06	1.5E-05	2.2E-05	2.2E-06	2.5E-05
Lead	9.6	8.2	--	--	1.4E-06	1.4E-07	--	--	--	--	--	--
Nickel	5.9	7.3	2.0E-02	Organ Weight	1.4E-06	1.4E-07	4.1E-04	4.1E-05	4.5E-04	5.1E-04	5.1E-05	5.6E-04
Vanadium	5.9	13	7.0E-03	None	1.4E-06	1.4E-07	1.2E-03	1.2E-04	1.3E-03	2.6E-03	2.6E-04	2.9E-03
						SUM	0.017	0.002	0.018	0.031	0.004	0.035

Exposure Factors:

Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 24 years by a 70 kg adult = 1.4 x 10-6 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 4.2 x 10-7 kg/kg/day for Pesticides.

Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 24 years by a 70 kg adult = 6.8 x 10-6 for VOCs, 6.8 x 10-7 for SVOCs and Pesticides, and 1.4 x 10-7 for Inorganics.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	1.4	4.4	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	1.8E-04	4.5E-04	6.3E-04	5.7E-04	1.4E-03	2.0E-03
2-Butanone	ND	ND	5.0E-02	None	1.3E-05	3.2E-05	--	--	--	--	--	--
Chloroform	ND	ND	1.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Ethylbenzene	0.34	1.5	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	4.4E-05	1.1E-04	1.5E-04	2.0E-04	4.8E-04	6.8E-04
Methylene Chloride	ND	ND	6.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Tetrachloroethene	ND	ND	1.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Toluene	0.75	1.6	2.0E-01	Liver/Kidney	1.3E-05	3.2E-05	4.9E-05	1.2E-04	1.7E-04	1.0E-04	2.6E-04	3.6E-04
1,1,1-Trichloroethane	ND	ND	9.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Trichloroethene	ND	ND	--	--	1.3E-05	3.2E-05	--	--	--	--	--	--
Xylenes	1.3	5.5	2.0E+00	Hyperactivity	1.3E-05	3.2E-05	8.5E-06	2.1E-05	2.9E-05	3.6E-05	8.8E-05	1.2E-04
Semi-Volatile Organic Compounds												
Anthracene	0.4	0.4	3.0E-01	None	1.3E-05	3.2E-06	1.7E-05	4.3E-06	2.2E-05	1.7E-05	4.3E-06	2.2E-05
Benzo(a)pyrene	0.16	0.16	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(b)fluoranthene	0.23	0.23	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.13	0.13	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	2.0E-02	Liver	1.3E-05	3.2E-06	--	--	--	--	--	--
Chrysene	0.29	0.29	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.13	0.13	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Phenanthrene	0.69	0.69	--	--	1.3E-05	3.2E-06	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0013	0.003	6.0E-05	Liver	3.8E-06	3.2E-06	8.2E-05	6.9E-05	1.5E-04	1.9E-04	1.6E-04	3.5E-04
DDT	0.016	0.039	5.0E-04	Liver	3.8E-06	3.2E-06	1.2E-04	1.0E-04	2.2E-04	3.0E-04	2.5E-04	5.5E-04
Inorganics												
Arsenic	3.2	6	3.0E-04	Skin	1.3E-05	6.4E-07	1.4E-01	6.8E-03	1.5E-01	2.6E-01	1.3E-02	2.7E-01
Chromium	10	16	1.0E+00	None	1.3E-05	6.4E-07	1.3E-04	6.4E-06	1.4E-04	2.1E-04	1.0E-05	2.2E-04
Lead	9.6	8.2	--	--	1.3E-05	6.4E-07	--	--	--	--	--	--
Nickel	5.9	7.3	2.0E-02	Organ Weight	1.3E-05	6.4E-07	3.8E-03	1.9E-04	4.0E-03	4.7E-03	2.3E-04	5.0E-03
Vanadium	5.9	13	7.0E-03	None	1.3E-05	6.4E-07	1.1E-02	5.4E-04	1.1E-02	2.4E-02	1.2E-03	2.5E-02
						SUM	0.15	0.01	0.16	0.29	0.02	0.31

Exposure Factors:

Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 350 days in a 365 day year for 6 years by a 15 kg child = 1.3 x 10-5 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 3.8 x 10-6 kg/kg/day for Pesticides.

Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 350 days in a 365 day year for 6 years by a 15 kg child = 3.2 x 10-5 for VOCs, 3.2 x 10-6 for SVOCs and Pesticides, and 6.4 x 10-7 for Inorganics.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
2-Butanone	2	2	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Chloroform	0.045	0.045	6.1E-03	B2	4.7E-07	2.4E-06	1.3E-10	6.6E-10	7.9E-10	1.3E-10	6.6E-10	7.9E-10
Ethylbenzene	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	4.7E-07	2.4E-06	--	--	--	--	--	--
Tetrachloroethene	14	18	5.2E-02	B2	4.7E-07	2.4E-06	3.4E-07	1.7E-06	2.1E-06	4.4E-07	2.2E-06	2.7E-06
Toluene	ND	ND	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.24	0.24	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	4.7E-07	2.4E-06	--	--	--	--	--	--
Xylenes	0.049	0.049	--	D	4.7E-07	2.4E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
COCs Not Detected												
Pesticides/PCBs												
COCs Not Detected												
Inorganics												
Arsenic	7.8	8.6	1.75E+00	A	4.7E-07	4.8E-08	6.4E-06 *	6.6E-07 *	7.1E-06 *	7.1E-06 *	7.2E-07 *	7.8E-06 *
Chromium	13	15	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
Lead	9.1	12	--	B2	4.7E-07	4.8E-08	--	--	--	--	--	--
Nickel	10	11	--	A	4.7E-07	4.8E-08	--	--	--	--	--	--
Vanadium	16	20	--	D	4.7E-07	4.8E-08	--	--	--	--	--	--
						SUM	6.8E-06	2.4E-06	9.2E-06	7.5E-06	3.0E-06	1.0E-05

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs Inorganics for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 4.7 x 10-7 kg of soil per kg body weight per day for VOCs and Inorganics.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs and 1% for Inorganics for 350 days in a 365 day year for 24 years in a 70 year lifetime by a 70 kg adult = 2.4 x 10-6 for VOCs and 4.8 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
2-Butanone	2	2	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Chloroform	0.045	0.045	6.1E-03	B2	1.1E-06	2.7E-06	3.0E-10	7.4E-10	1.0E-09	3.0E-10	7.4E-10	1.0E-09
Ethylbenzene	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	1.1E-06	2.7E-06	--	--	--	--	--	--
Tetrachloroethene	14	18	5.2E-02	B2	1.1E-06	2.7E-06	8.0E-07	2.0E-06	2.8E-06	1.0E-06	2.5E-06	3.6E-06
Toluene	ND	ND	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.24	0.24	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	1.1E-06	2.7E-06	--	--	--	--	--	--
Xylenes	0.049	0.049	--	D	1.1E-06	2.7E-06	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
COCs Not Detected												
Pesticides/PCBs												
COCs Not Detected												
Inorganics												
Arsenic	7.8	8.6	1.75E+00	A	1.1E-06	5.5E-08	1.5E-05 *	7.5E-07 *	1.6E-05 *	1.7E-05 *	8.3E-07 *	1.7E-05 *
Chromium	13	15	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
Lead	9.1	12	--	B2	1.1E-06	5.5E-08	--	--	--	--	--	--
Nickel	10	11	--	A	1.1E-06	5.5E-08	--	--	--	--	--	--
Vanadium	16	20	--	D	1.1E-06	5.5E-08	--	--	--	--	--	--
						SUM	1.6E-05	2.7E-06	1.9E-05	1.8E-05	3.4E-06	2.1E-05

Exposure Factors:
Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs and Inorganics for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 1.1 x 10-6 kg of soil per kg body weight per day for VOCs and Inorganics.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs and 1% for Inorganics for 350 days in a 365 day year for 6 years in a 70 year lifetime by a 15 kg child = 2.7 x 10-6 for VOCs and 5.5 x 10-8 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

ADULTS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
2-Butanone	2	2	5.0E-02	None	1.4E-06	6.8E-06	5.6E-05	2.7E-04	3.3E-04	5.6E-05	2.7E-04	3.3E-04
Chloroform	0.045	0.045	1.0E-02	Liver	1.4E-06	6.8E-06	6.3E-06	3.1E-05	3.7E-05	6.3E-06	3.1E-05	3.7E-05
Ethylbenzene	ND	ND	1.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	6.0E-02	Liver	1.4E-06	6.8E-06	--	--	--	--	--	--
Tetrachloroethene	14	18	1.0E-02	Liver	1.4E-06	6.8E-06	2.0E-03	9.5E-03	1.1E-02	2.5E-03	1.2E-02	1.5E-02
Toluene	ND	ND	2.0E-01	Liver/Kidney	1.4E-06	6.8E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.24	0.24	9.0E-02	Liver	1.4E-06	6.8E-06	3.7E-06	1.8E-05	2.2E-05	3.7E-06	1.8E-05	2.2E-05
Trichloroethene	ND	ND	--	--	1.4E-06	6.8E-06	--	--	--	--	--	--
Xylenes	0.049	0.049	2.0E+00	Hyperactivity	1.4E-06	6.8E-06	3.4E-08	1.7E-07	2.0E-07	3.4E-08	1.7E-07	2.0E-07
Semi-Volatile Organic Compounds												
COCs Not Detected												
Pesticides/PCBs												
COCs Not Detected												
Inorganics												
Arsenic	7.8	8.6	3.0E-04	Skin	1.4E-06	1.4E-07	3.6E-02	3.6E-03	4.0E-02	4.0E-02	4.0E-03	4.4E-02
Chromium	13	15	1.0E+00	None	1.4E-06	1.4E-07	1.8E-05	1.8E-06	2.0E-05	2.1E-05	2.1E-06	2.3E-05
Lead	9.1	12	--	--	1.4E-06	1.4E-07	--	--	--	--	--	--
Nickel	10	11	2.0E-02	Organ Weight	1.4E-06	1.4E-07	7.0E-04	7.0E-05	7.7E-04	7.7E-04	7.7E-05	8.5E-04
Vanadium	16	20	7.0E-03	None	1.4E-06	1.4E-07	3.2E-03	3.2E-04	3.5E-03	4.0E-03	4.0E-04	4.4E-03
						SUM	0.042	0.014	0.056	0.048	0.017	0.065

Exposure Factors:
Ingestion - 100 mg of soil ingested per day with 100% absorption for VOCs and Inorganics for 350 days in a 365 day year for 24 years by a 70 kg adult = 1.4 x 10-6 kg of soil per kg body weight per day for VOCs and Inorganics.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs and 1% for Inorganics for 350 days in a 365 day year for 24 years by a 70 kg adult = 6.8 x 10-6 for VOCs and 1.4 x 10-7 for Inorganics.

- Compounds and associated hazard quotients/indices exceeding 1.0.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO RESIDENTS

CHILDREN

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
2-Butanone	2	2	5.0E-02	None	1.3E-05	3.2E-05	5.2E-04	1.3E-03	1.8E-03	5.2E-04	1.3E-03	1.8E-03
Chloroform	0.045	0.045	1.0E-02	Liver	1.3E-05	3.2E-05	5.9E-05	1.4E-04	2.0E-04	5.9E-05	1.4E-04	2.0E-04
Ethylbenzene	ND	ND	1.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
Methylene Chloride	ND	ND	6.0E-02	Liver	1.3E-05	3.2E-05	--	--	--	--	--	--
Tetrachloroethene	14	18	1.0E-02	Liver	1.3E-05	3.2E-05	1.8E-02	4.5E-02	6.3E-02	2.3E-02	5.8E-02	8.1E-02
Toluene	ND	ND	2.0E-01	Liver/Kidney	1.3E-05	3.2E-05	--	--	--	--	--	--
1,1,1-Trichloroethane	0.24	0.24	9.0E-02	Liver	1.3E-05	3.2E-05	3.5E-05	8.5E-05	1.2E-04	3.5E-05	8.5E-05	1.2E-04
Trichloroethene	ND	ND	--	--	1.3E-05	3.2E-05	--	--	--	--	--	--
Xylenes	0.049	0.049	2.0E+00	Hyperactivity	1.3E-05	3.2E-05	3.2E-07	7.8E-07	1.1E-06	3.2E-07	7.8E-07	1.1E-06
Semi-Volatile Organic Compounds												
COCs Not Detected												
Pesticides/PCBs												
COCs Not Detected												
Inorganics												
Arsenic	7.8	8.6	3.0E-04	Skin	1.3E-05	6.4E-07	3.4E-01	1.7E-02	3.5E-01	3.7E-01	1.8E-02	3.9E-01
Chromium	13	15	1.0E+00	None	1.3E-05	6.4E-07	1.7E-04	8.3E-06	1.8E-04	2.0E-04	9.6E-06	2.0E-04
Lead	9.1	12	--	--	1.3E-05	6.4E-07	--	--	--	--	--	--
Nickel	10	11	2.0E-02	Organ Weight	1.3E-05	6.4E-07	6.5E-03	3.2E-04	6.8E-03	7.2E-03	3.5E-04	7.5E-03
Vanadium	16	20	7.0E-03	None	1.3E-05	6.4E-07	3.0E-02	1.5E-03	3.1E-02	3.7E-02	1.8E-03	3.9E-02
						SUM	0.39	0.06	0.46	0.44	0.08	0.52

Exposure Factors:

Ingestion - 200 mg of soil ingested per day with 100% absorption for VOCs and Inorganics for 350 days in a 365 day year for 6 years by a 15 kg child = 1.3 x 10-5 kg of soil per kg body weight per day for VOCs and Inorganics.

Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs and 1% for Inorganics for 350 days in a 365 day year for 6 years by a 15 kg child = 3.2 x 10-5 for VOCs and 6.4 x 10-7 for Inorganics.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
CCL FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO WORKERS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	110	1200	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
2-Butanone	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Chloroform	0.013	0.13	6.1E-03	B2	7.0E-09	7.0E-08	5.6E-13	5.6E-12	6.1E-12	5.6E-12	5.6E-11	6.1E-11
Ethylbenzene	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Methylene Chloride	92	1000	7.5E-03	B2	7.0E-09	7.0E-08	4.8E-09	4.8E-08	5.3E-08	5.3E-08	5.3E-07	5.8E-07
Tetrachloroethene	7700	84000	5.2E-02	B2	7.0E-09	7.0E-08	2.8E-06	2.8E-05	3.1E-05	3.1E-05	3.1E-04	3.4E-04
Toluene	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
1,1,1-Trichloroethane	550	6000	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Trichloroethene	68	68	1.1E-02	NA	7.0E-09	7.0E-08	5.2E-09	5.2E-08	5.8E-08	5.2E-09	5.2E-08	5.8E-08
Xylenes	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	ND	ND	--	D	7.0E-09	7.0E-09	--	--	--	--	--	--
Benzo(a)pyrene	0.035	0.035	7.3E+00	B2	7.0E-09	7.0E-09	1.8E-09	1.8E-09	3.6E-09	1.8E-09	1.8E-09	3.6E-09
Benzo(b)fluoranthene	0.062	0.062	7.3E+00	B2	7.0E-09	7.0E-09	3.2E-09	3.2E-09	6.3E-09	3.2E-09	3.2E-09	6.3E-09
Benzo(g,h,i)perylene	0.032	0.032	--	D	7.0E-09	7.0E-09	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.16	0.17	1.4E-02	B2	7.0E-09	7.0E-09	1.6E-11	1.6E-11	3.1E-11	1.7E-11	1.7E-11	3.3E-11
Chrysene	0.042	0.042	7.3E+00	B2	7.0E-09	7.0E-09	2.1E-09	2.1E-09	4.3E-09	2.1E-09	2.1E-09	4.3E-09
Indeno(1,2,3-cd)pyrene	0.036	0.036	7.3E+00	B2	7.0E-09	7.0E-09	1.8E-09	1.8E-09	3.7E-09	1.8E-09	1.8E-09	3.7E-09
Phenanthrene	0.028	0.028	--	D	7.0E-09	7.0E-09	--	--	--	--	--	--
(Total Carcinogenic PAHs)	0.18	0.18	7.3E+00	B2	7.0E-09	7.0E-09	9.2E-09	9.2E-09	1.8E-08	9.2E-09	9.2E-09	1.8E-08
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0039	0.018	1.30E+00	B2	2.1E-09	7.0E-09	1.1E-11	3.5E-11	4.6E-11	4.9E-11	1.6E-10	2.1E-10
DDT	ND	ND	3.4E-01	B2	2.1E-09	7.0E-09	--	--	--	--	--	--
Inorganics												
Arsenic	2.2	5.1	1.75E+00	A	7.0E-09	1.4E-09	2.7E-08 *	5.4E-09 *	3.2E-08 *	6.2E-08 *	1.2E-08 *	7.5E-08 *
Chromium	4.6	7.7	--	D	7.0E-09	1.4E-09	--	--	--	--	--	--
Lead	3.9	9.9	--	B2	7.0E-09	1.4E-09	--	--	--	--	--	--
Nickel	3.4	8.3	--	A	7.0E-09	1.4E-09	--	--	--	--	--	--
Vanadium	5.8	8.8	--	D	7.0E-09	1.4E-09	--	--	--	--	--	--
					SUM (Individual Carc. PAHs)		2.8E-06	2.8E-05	3.1E-05	3.1E-05	3.1E-04	3.4E-04
					SUM (Total Carc. PAHs)		2.8E-06	2.8E-05	3.1E-05	3.1E-05	3.1E-04	3.4E-04

Exposure Factors:
Ingestion - 50 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 250 days in a 365 day year for 1 year in a 70 year lifetime by a 70 kg adult worker = 7.0 x 10-9 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 2.1 x 10-9 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 250 days in a 365 day year for 1 year in a 70 year lifetime by a 70 kg adult worker = 7.0 x 10-8 for VOCs, 7.0 x 10-9 for SVOCs and Pesticides, and 1.4 x 10-9 for Inorganics.

- Compounds and associated risk estimates exceeding 1x10-6.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
CCL FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO WORKERS

Contaminants of Concern	Concentration (mg/kg)		Subchronic Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor (kg/kg/day)		HAZARD INDEX					
	Average	Maximum			Ingestion	Dermal	Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	110	1200	1.0E+00	Liver/Kidney	4.9E-07	4.9E-06	5.4E-05	5.4E-04	5.9E-04	5.9E-04	5.9E-03	6.5E-03
2-Butanone	ND	ND	5.0E-01	None	4.9E-07	4.9E-06	--	--	--	--	--	--
Chloroform	0.013	0.13	1.0E-02	Liver	4.9E-07	4.9E-06	6.4E-07	6.4E-06	7.0E-06	6.4E-06	6.4E-05	7.0E-05
Ethylbenzene	ND	ND	1.0E+00	Liver/Kidney	4.9E-07	4.9E-06	--	--	--	--	--	--
Methylene Chloride	92	1000	6.0E-02	Liver	4.9E-07	4.9E-06	7.5E-04	7.5E-03	8.3E-03	8.2E-03	8.2E-02	9.0E-02
Tetrachloroethene	7700	84000	1.0E-01	Liver	4.9E-07	4.9E-06	3.8E-02	3.8E-01	4.2E-01	4.1E-01	4.1E+00	4.5E+00
Toluene	ND	ND	2.0E+00	Liver/Kidney	4.9E-07	4.9E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	550	6000	9.0E-01	Liver	4.9E-07	4.9E-06	3.0E-04	3.0E-03	3.3E-03	3.3E-03	3.3E-02	3.6E-02
Trichloroethene	68	68	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Xylenes	ND	ND	4.0E+00	Hyperactivity	4.9E-07	4.9E-06	--	--	--	--	--	--
Anthracene	ND	ND	3.0E+00	None	4.9E-07	4.9E-07	--	--	--	--	--	--
Benzo(a)pyrene	0.035	0.035	--	--	4.9E-07	4.9E-07	--	--	--	--	--	--
Benzo(b)fluoranthene	0.062	0.062	--	--	4.9E-07	4.9E-07	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.032	0.032	--	--	4.9E-07	4.9E-07	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.16	0.17	2.0E-02	Liver	4.9E-07	4.9E-07	3.9E-06	3.9E-06	7.8E-06	4.2E-06	4.2E-06	8.3E-06
Chrysene	0.042	0.042	--	--	4.9E-07	4.9E-07	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.036	0.036	--	--	4.9E-07	4.9E-07	--	--	--	--	--	--
Phenanthrene	0.028	0.028	--	--	4.9E-07	4.9E-07	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0039	0.018	6.0E-05	Liver	1.5E-07	4.9E-07	9.8E-06	3.2E-05	4.2E-05	4.5E-05	1.5E-04	1.9E-04
DDT	ND	ND	5.0E-04	Liver	1.5E-07	4.9E-07	--	--	--	--	--	--
Inorganics												
Arsenic	2.2	5.1	3.0E-04	Skin	4.9E-07	9.8E-08	3.6E-03	7.2E-04	4.3E-03	8.3E-03	1.7E-03	1.0E-02
Chromium	4.6	7.7	1.0E+00	None	4.9E-07	9.8E-08	2.3E-06	4.5E-07	2.7E-06	3.8E-06	7.5E-07	4.5E-06
Lead	3.9	9.9	--	--	4.9E-07	9.8E-08	--	--	--	--	--	--
Nickel	3.4	8.3	2.0E-02	Organ Weight	4.9E-07	9.8E-08	8.3E-05	1.7E-05	1.0E-04	2.0E-04	4.1E-05	2.4E-04
Vanadium	5.8	8.8	7.0E-03	None	4.9E-07	9.8E-08	4.1E-04	8.1E-05	4.9E-04	6.2E-04	1.2E-04	7.4E-04
						SUM	0.043	0.39	0.43	0.43	4.2	4.7
						Liver					4.2	4.7

Exposure Factors:
Ingestion - 50 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 250 days in a 365 day year for 1 year by a 70 kg adult worker = 4.9 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 1.5 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 250 days in a 365 day year for 1 year by a 70 kg adult worker = 4.9 x 10-6 for VOCs, 4.9 x 10-7 for SVOCs and Pesticides, and 9.8 x 10-8 for Inorganics.

- Compounds and associated hazard quotients/indices exceeding 1.0.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO WORKERS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	1.4	4.4	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
2-Butanone	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Chloroform	ND	ND	6.1E-03	B2	7.0E-09	7.0E-08	--	--	--	--	--	--
Ethylbenzene	0.34	1.5	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	7.0E-09	7.0E-08	--	--	--	--	--	--
Tetrachloroethene	ND	ND	5.2E-02	B2	7.0E-09	7.0E-08	--	--	--	--	--	--
Toluene	0.75	1.6	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
1,1,1-Trichloroethane	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	7.0E-09	7.0E-08	--	--	--	--	--	--
Xylenes	1.3	5.5	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
Anthracene	0.4	0.4	--	D	7.0E-09	7.0E-09	--	--	--	--	--	--
Benzo(a)pyrene	0.16	0.16	7.3E+00	B2	7.0E-09	7.0E-09	8.2E-09	8.2E-09	1.6E-08	8.2E-09	8.2E-09	1.6E-08
Benzo(b)fluoranthene	0.23	0.23	7.3E+00	B2	7.0E-09	7.0E-09	1.2E-08	1.2E-08	2.4E-08	1.2E-08	1.2E-08	2.4E-08
Benzo(g,h,i)perylene	0.13	0.13	--	D	7.0E-09	7.0E-09	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	1.4E-02	B2	7.0E-09	7.0E-09	--	--	--	--	--	--
Chrysene	0.29	0.29	7.3E+00	B2	7.0E-09	7.0E-09	1.5E-08	1.5E-08	3.0E-08	1.5E-08	1.5E-08	3.0E-08
Indeno(1,2,3-cd)pyrene	0.13	0.13	7.3E+00	B2	7.0E-09	7.0E-09	6.6E-09	6.6E-09	1.3E-08	6.6E-09	6.6E-09	1.3E-08
Phenanthrene	0.69	0.69	--	D	7.0E-09	7.0E-09	--	--	--	--	--	--
(Total Carcinogenic PAHs)	1.1	1.1	7.3E+00	B2	7.0E-09	7.0E-09	5.6E-08	5.6E-08	1.1E-07	5.6E-08	5.6E-08	1.1E-07
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0013	0.003	1.30E+00	B2	2.1E-09	7.0E-09	3.5E-12	1.2E-11	1.5E-11	8.2E-12	2.7E-11	3.5E-11
DDT	0.016	0.039	3.4E-01	B2	2.1E-09	7.0E-09	1.1E-11	3.8E-11	5.0E-11	2.8E-11	9.3E-11	1.2E-10
Inorganics												
Arsenic	3.2	6	1.75E+00	A	7.0E-09	1.4E-09	3.9E-08 *	7.8E-09 *	4.7E-08 *	7.4E-08 *	1.5E-08 *	8.8E-08 *
Chromium	10	16	--	D	7.0E-09	1.4E-09	--	--	--	--	--	--
Lead	9.6	8.2	--	B2	7.0E-09	1.4E-09	--	--	--	--	--	--
Nickel	5.9	7.3	--	A	7.0E-09	1.4E-09	--	--	--	--	--	--
Vanadium	5.9	13	--	D	7.0E-09	1.4E-09	--	--	--	--	--	--
					SUM(Indiv. Carc. PAHs)		8.1E-08	4.9E-08	1.3E-07	1.1E-07	5.6E-08	1.7E-07
					SUM(Total Carc. PAHs)		9.5E-08	6.4E-08	1.6E-07	1.3E-07	7.1E-08	2.0E-07

Exposure Factors:

Ingestion - 50 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 250 days in a 365 day year for 1 year in a 70 year lifetime by a 70 kg adult worker = 7.0 x 10-9 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 2.1 x 10-9 kg/kg/day for Pesticides.

Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 250 days in a 365 day year for 1 year in a 70 year lifetime by a 70 kg adult worker = 7.0 x 10-8 for VOCs, 7.0 x 10-9 for SVOCs and Pesticides, and 1.4 x 10-9 for Inorganics.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
PAC FACILITY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO WORKERS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Subchronic Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	1.4	4.4	1.0E+00	Liver/Kidney	4.9E-07	4.9E-06	6.9E-07	6.9E-06	7.5E-06	2.2E-06	2.2E-05	2.4E-05
2-Butanone	ND	ND	5.0E-01	None	4.9E-07	4.9E-06	--	--	--	--	--	--
Chloroform	ND	ND	1.0E-02	Liver	4.9E-07	4.9E-06	--	--	--	--	--	--
Ethylbenzene	0.34	1.5	1.0E+00	Liver/Kidney	4.9E-07	4.9E-06	1.7E-07	1.7E-06	1.8E-06	7.4E-07	7.4E-06	8.1E-06
Methylene Chloride	ND	ND	6.0E-02	Liver	4.9E-07	4.9E-06	--	--	--	--	--	--
Tetrachloroethene	ND	ND	1.0E-01	Liver	4.9E-07	4.9E-06	--	--	--	--	--	--
Toluene	0.75	1.6	2.0E+00	Liver/Kidney	4.9E-07	4.9E-06	1.8E-07	1.8E-06	2.0E-06	3.9E-07	3.9E-06	4.3E-06
1,1,1-Trichloroethane	ND	ND	9.0E-01	Liver	4.9E-07	4.9E-06	--	--	--	--	--	--
Trichloroethene	ND	ND	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Xylenes	1.3	5.5	4.0E+00	Hyperactivity	4.9E-07	4.9E-06	1.6E-07	1.6E-06	1.8E-06	6.7E-07	6.7E-06	7.4E-06
Semi-Volatile Organic Compounds												
Anthracene	0.4	0.4	3.0E+00	None	4.9E-07	4.9E-06	6.5E-08	6.5E-07	7.2E-07	6.5E-08	6.5E-07	7.2E-07
Benzo(a)pyrene	0.16	0.16	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Benzo(b)fluoranthene	0.23	0.23	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.13	0.13	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	ND	ND	2.0E-02	Liver	4.9E-07	4.9E-06	--	--	--	--	--	--
Chrysene	0.29	0.29	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.13	0.13	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Phenanthrene	0.69	0.69	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Pesticides/PCBs												
Chlordane (alpha and gamma)	0.0013	0.003	6.0E-05	Liver	1.5E-07	4.9E-07	3.3E-06	1.1E-05	1.4E-05	7.5E-06	2.5E-05	3.2E-05
DDT	0.016	0.039	5.0E-04	Liver	1.5E-07	4.9E-07	4.8E-06	1.6E-05	2.0E-05	1.2E-05	3.8E-05	5.0E-05
Inorganics												
Arsenic	3.2	6	3.0E-04	Skin	4.9E-07	9.8E-08	5.2E-03	1.0E-03	6.3E-03	9.8E-03	2.0E-03	1.2E-02
Chromium	10	16	1.0E+00	None	4.9E-07	9.8E-08	4.9E-06	9.8E-07	5.9E-06	7.8E-06	1.6E-06	9.4E-06
Lead	9.6	8.2	--	--	4.9E-07	9.8E-08	--	--	--	--	--	--
Nickel	5.9	7.3	2.0E-02	Organ Weight	4.9E-07	9.8E-08	1.4E-04	2.9E-05	1.7E-04	1.8E-04	3.6E-05	2.1E-04
Vanadium	5.9	13	7.0E-03	None	4.9E-07	9.8E-08	4.1E-04	8.3E-05	5.0E-04	9.1E-04	1.8E-04	1.1E-03
						SUM	0.0058	0.0012	0.0070	0.011	0.0023	0.013

Exposure Factors:
Ingestion - 50 mg of soil ingested per day with 100% absorption for VOCs, SVOCs and Inorganics and 30% absorption for Pesticides for 250 days in a 365 day year for 1 year by a 70 kg adult worker = 4.9 x 10-7 kg of soil per kg body weight per day for VOCs, SVOCs, and Inorganics and 1.5 x 10-7 kg/kg/day for Pesticides.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs, 5% for SVOCs and Pesticides and 1% for Inorganics for 250 days in a 365 day year for 1 year by a 70 kg adult worker = 4.9 x 10-6 for VOCs, 4.9 x 10-7 for SVOCs and Pesticides, and 9.8 x 10-8 for Inorganics.

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
CARCINOGENIC RISKS TO WORKERS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Cancer Slope Factor (mg/kg/day)-1	Weight of Evidence	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	RISK ESTIMATE Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
2-Butanone	2	2	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Chloroform	0.045	0.045	6.1E-03	B2	7.0E-09	7.0E-08	1.9E-12	1.9E-11	2.1E-11	1.9E-12	1.9E-11	2.1E-11
Ethylbenzene	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Methylene Chloride	ND	ND	7.5E-03	B2	7.0E-09	7.0E-08	--	--	--	--	--	--
Tetrachloroethene	14	18	5.2E-02	B2	7.0E-09	7.0E-08	5.1E-09	5.1E-08	5.6E-08	6.6E-09	6.6E-08	7.2E-08
Toluene	ND	ND	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
1,1,1-Trichloroethane	0.24	0.24	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Trichloroethene	ND	ND	1.1E-02	NA	7.0E-09	7.0E-08	--	--	--	--	--	--
Xylenes	0.049	0.049	--	D	7.0E-09	7.0E-08	--	--	--	--	--	--
Semi-Volatile Organic Compounds												
COCs Not Detected												
Pesticides/PCBs												
COCs Not Detected												
Inorganics												
Arsenic	7.8	8.6	1.75E+00	A	7.0E-09	1.4E-09	9.6E-08 *	1.9E-08 *	1.1E-07 *	1.1E-07 *	2.1E-08 *	1.3E-07 *
Chromium	13	15	--	D	7.0E-09	1.4E-09	--	--	--	--	--	--
Lead	9.1	12	--	B2	7.0E-09	1.4E-09	--	--	--	--	--	--
Nickel	10	11	--	A	7.0E-09	1.4E-09	--	--	--	--	--	--
Vanadium	16	20	--	D	7.0E-09	1.4E-09	--	--	--	--	--	--
						SUM	1.0E-07	7.0E-08	1.7E-07	1.1E-07	8.7E-08	2.0E-07

Exposure Factors:
Ingestion - 50 mg of soil ingested per day with 100% absorption for VOCs and Inorganics for 250 days in a 365 day year for 1 year in a 70 year lifetime by a 70 kg adult worker = 7.0 x 10-9 kg of soil per kg body weight per day for VOCs and Inorganics.
Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs and 1% for Inorganics for 250 days in a 365 day year for 1 year in a 70 year lifetime by a 70 kg adult worker = 7.0 x 10-8 for VOCs and 1.4 x 10-9 for Inorganics.

* The uncertainties associated with ingested inorganic arsenic are as such that risk estimates could be modified downwards, in reaching risk management decisions, as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (EPA, 1993).

SUBSURFACE SOIL INGESTION AND DERMAL CONTACT PATHWAY
O'TOOLE PROPERTY
PETERSON/PURITAN SITE
NONCARCINOGENIC RISKS TO WORKERS

Contaminants of Concern	Concentration Average (mg/kg)	Concentration Maximum (mg/kg)	Subchronic Reference Dose (mg/kg/day)	Toxicity Endpoint	Exposure Factor Ingestion (kg/kg/day)	Exposure Factor Dermal (kg/kg/day)	HAZARD INDEX Average Ingestion	Average Dermal	Average Total	Reasonable Maximum Ingestion	Reasonable Maximum Dermal	Reasonable Maximum Total
Volatile Organic Compounds												
Acetone	ND	ND	1.0E+00	Liver/Kidney	4.9E-07	4.9E-06	--	--	--	--	--	--
2-Butanone	2	2	5.0E-01	None	4.9E-07	4.9E-06	2.0E-06	2.0E-05	2.2E-05	2.0E-06	2.0E-05	2.2E-05
Chloroform	0.045	0.045	1.0E-02	Liver	4.9E-07	4.9E-06	2.2E-06	2.2E-05	2.4E-05	2.2E-06	2.2E-05	2.4E-05
Ethylbenzene	ND	ND	1.0E+00	Liver/Kidney	4.9E-07	4.9E-06	--	--	--	--	--	--
Methylene Chloride	ND	ND	6.0E-02	Liver	4.9E-07	4.9E-06	--	--	--	--	--	--
Tetrachloroethene	14	18	1.0E-01	Liver	4.9E-07	4.9E-06	6.9E-05	6.9E-04	7.5E-04	8.8E-05	8.8E-04	9.7E-04
Toluene	ND	ND	2.0E+00	Liver/Kidney	4.9E-07	4.9E-06	--	--	--	--	--	--
1,1,1-Trichloroethane	0.24	0.24	9.0E-01	Liver	4.9E-07	4.9E-06	1.3E-07	1.3E-06	1.4E-06	1.3E-07	1.3E-06	1.4E-06
Trichloroethene	ND	ND	--	--	4.9E-07	4.9E-06	--	--	--	--	--	--
Xylenes	0.049	0.049	4.0E+00	Hyperactivity	4.9E-07	4.9E-06	6.0E-09	6.0E-08	6.6E-08	6.0E-09	6.0E-08	6.6E-08
Semi-Volatile Organic Compounds												
COCs Not Detected												
Pesticides/PCBs												
COCs Not Detected												
Inorganics												
Arsenic	7.8	8.6	3.0E-04	Skin	4.9E-07	9.8E-08	1.3E-02	2.5E-03	1.5E-02	1.4E-02	2.8E-03	1.7E-02
Chromium	13	15	1.0E+00	None	4.9E-07	9.8E-08	6.4E-06	1.3E-06	7.6E-06	7.4E-06	1.5E-06	8.8E-06
Lead	9.1	12	--	--	4.9E-07	9.8E-08	--	--	--	--	--	--
Nickel	10	11	2.0E-02	Organ Weight	4.9E-07	9.8E-08	2.5E-04	4.9E-05	2.9E-04	2.7E-04	5.4E-05	3.2E-04
Vanadium	16	20	7.0E-03	None	4.9E-07	9.8E-08	1.1E-03	2.2E-04	1.3E-03	1.4E-03	2.8E-04	1.7E-03
						SUM	0.014	0.004	0.018	0.016	0.004	0.020

Exposure Factors:

Ingestion - 50 mg of soil ingested per day with 100% absorption for VOCs and Inorganics for 250 days in a 365 day year for 1 year in a 70 year lifetime by a 70 kg adult worker = 4.9 x 10-7 kg of soil per kg body weight per day for VOCs and Inorganics.

Dermal - 2000 cm2 of skin area exposed with an soil adherence factor of 0.5 mg/cm2 and an absorption factor of 50% for VOCs and 1% for Inorganics for 250 days in a 365 day year for 1 year in a 70 year lifetime by a 70 kg adult worker = 4.9 x 10-6 for VOCs and 9.8 x 10-8 for Inorganics.

9/24/93
RODCOCs

TABLE B-28

PETERSON/PURITAN SITE
ECOLOGICAL ASSESSMENT
CONTAMINANTS OF CONCERN

GROUNDWATER TO BLACKSTONE RIVER	BROOK A	SURFICIAL SOILS
SURFACE WATER	SURFACE WATER	VOCs*
VOCs*	Inorganics	Methylene Chloride
Benzene	Copper	Tetrachloroethene
1,1-Dichloroethane	Zinc	1,1,1-Trichloroethane
1,2-Dichloroethene		
Methylene Chloride	SEDIMENTS	SVOCs
Tetrachloroethene	SVOCs	Bis(2-ethylhexyl)phthalate
1,1,1-Trichloroethane	Bis(2-ethylhexyl)phthalate	PAHs
	4-methylphenol	Acenaphthylene
SVOCs	PAHs	Benzo(b)fluoranthene
Bis(2-ethylhexyl)phthalate	Anthracene	Dibenzo(a,h)anthracene
	Benzo(a)anthracene	Fluorene
Inorganics	Benzo(a)pyrene	
Arsenic	Benzo(g,h,i)perylene	Pesticides/PCBs
Cadmium	Chrysene	DDT
Copper	Dibenzo(a,h)anthracene	Chlordane (alpha- & gamma-)
Lead	Fluoranthene	Heptachlor
Nickel	Indeno(1,2,3-c,d)pyrene	PCBs (Aroclor 1254)
Zinc	2-methylnaphthalene	
	Phenanthrene	Inorganics
SEDIMENTS	Pyrene	Copper
PCBs (Aroclor 1260)		Lead
	Pesticides/PCBs	Nickel
	DDD, DDE, DDT	
	Chlordane (alpha- & beta-)	
	delta-BHC	
	Dieldrin	
	Heptachlor Epoxide	
	PCBs (Aroclor 1254 &1260)	
	Inorganics	
	Copper	
	Lead	
	Mercury	
	Nickel	
	Zinc	

* These VOCs will be evaluated in the ecological assessment, because they are the primary contaminants for the PSA, although these compounds exhibit low toxicity to aquatic and terrestrial organisms and are not highly persistent or bioconcentrated.

PETERSON/PURITAN SITE
COMPARISON OF SURFACE WATER CONCENTRATIONS TO
PROTECTIVE GUIDELINES FOR SURFACE WATER

CONCENTRATION (ug/l)

COCs	MAXIMUM CONCENTRATION	AWQC CMC (ACUTE)	HAZARD QUOTIENT	LOEL ACUTE	HAZARD QUOTIENT	RIDEM ACUTE	HAZARD QUOTIENT
BROOK A							
Copper	22	18	1.2				
Zinc	290	120	2.4				
GROUNDWATER DISCHARGING INTO BLACKSTONE RIVER							
Volatile Organic Compounds							
Benzene	150			5300	0.028	265	0.57
1,1-Dichloroethane	200			118000	0.0017		
1,2-Dichloroethene	130			11600	0.011		
Methylene Chloride	9			11000	0.0008	9650	0.00093
Tetrachloroethene	260			9320	0.028	240	1.1
1,1,1-Trichloroethane	47			18000	0.0026		
Semi-Volatile Organic Compounds							
Bis(2-ethylhexyl)phthalate	56			940	0.060	555	0.10
Inorganics							
Arsenic	71	360	0.20			52	1.4
Cadmium	7.6	3.9	1.9				
Copper	2550	18	142				
Lead	22.2	82	0.27				
Nickel	479	1400	0.34				
Zinc	133	120	1.1				

PETERSON/PURITAN SITE
COMPARISON OF SURFACE WATER CONCENTRATIONS TO
PROTECTIVE GUIDELINES FOR SURFACE WATER

CONCENTRATION (ug/l)

COCs	AVERAGE CONCENTRATION	AWQC CCC (CHRONIC)	HAZARD QUOTIENT	LOEL CHRONIC	HAZARD QUOTIENT	RIDEM CHRONIC	HAZARD QUOTIENT
BROOK A							
Copper	6.8	12	0.57				
Zinc	200	110	1.8				
GROUNDWATER DISCHARGING INTO BLACKSTONE RIVER							
Volatile Organic Compounds							
Benzene	13					5.9	2.2
1,1-Dichloroethane	31			20000	0.002	131	0.24
1,2-Dichloroethene	40					36	1.1
Methylene Chloride	5.2					5.3	0.98
Tetrachloroethene	27			2400	0.011	14	1.9
1,1,1-Trichloroethane	9.1			9400	0.001	20	0.46
Semi-Volatile Organic Compounds							
Bis(2-ethylhexyl)phthalate	21			3	7	12	1.8
Inorganics							
Arsenic	9.8	190	0.052			12	0.82
Cadmium	3.3	1.1	3.0				
Copper	220	12	18				
Lead	6	3.2	1.9				
Nickel	26	160	0.16				
Zinc	48	110	0.44				

Notes:
1. AWQC - Federal Ambient Water Quality Criteria for freshwater aquatic life obtained from US EPA, 1986.
Quality Criteria for Water 1986, and subsequent update issued in the Federal Register, Dec. 22, 1992.
2. CMC - Criterion Maximum Concentration; CCC - Criterion Continuous Concentration.
3. Hardness dependent criteria for cadmium, copper, lead and zinc. Concentrations derived at a hardness of 100 mg/l as CaCO3.
4. LOEL - Lowest Observed Effect Level.
5. RIDEM guidelines for freshwater aquatic life.

Hazard Quotient exceeds 1.0.

PETERSON/PURITAN SITE
COMPARISON OF SEDIMENT CONCENTRATIONS TO
PROTECTIVE GUIDELINES FOR SEDIMENTS

COCs	MAXIMUM CONCENTRATION	INTERIM SEDIMENT CRITERIA Total Organic Carbon (TOC) 0.10%	1%	10%	HAZARD QUOTIENT Total Organic Carbon (TOC) 0.10%	1%	10%	LONG & MORGAN ER-L	ER-M	HAZARD QUOTIENT ER-L	ER-M
BROOK A	(ug/kg)		(ug/kg)						(ug/kg)		
Semivolatile Organics											
2-Methylnaphthalene	130							65	670	2.00	0.19
4-Methylphenol	1700										
Anthracene	210							85	960	2.47	0.22
Benzo(a)anthracene	1600	1320	13200	132000	1.2	0.12	0.012	230	1600	6.96	1.00
Benzo(a)pyrene	1900	1060	10600	106000	1.8	0.18	0.018	400	2500	4.75	0.76
Benzo(g,h,i)perylene	800										
Bis(2-ethylhexyl)phthalate	2400										
Chrysene	2500							400	2800	6.25	0.89
Dibenzo(a,h)anthracene	470							60	260	7.83	1.81
Fluoranthene	2900	1880	18800	188000	1.5	0.15	0.015	600	3600	4.83	0.81
Indeno(1,2,3-c,d)pyrene	850										
Phenanthrene	1200	139	1390	13900	8.6	0.86	0.086	225	1380	5.33	0.87
Pyrene	2800	1310	13100	131000	2.1	0.21	0.021	350	2200	8.00	1.27
Total PAHs	18625							4000	35000	4.66	0.53
Pesticides/PCBs											
4,4-DDE	34							2	15	17.00	2.27
4,4'-DDT	140	0.828	8.28	82.8	169.1	16.91	1.691	1	7	140.00	20.00
4,4'-DDD	74							2	20	37.00	3.70
Alpha-Chlordane	170							0.5	6	340.00	28.33
Aroclor-1254	370	19.6	196	1960	18.9	1.89	0.189	50	400	7.40	0.93
Aroclor -1260	240	19.6	196	1960	12.2	1.22	0.122	50	400	4.80	0.60
Delta-BHC	16	0.157	15.7	157	101.9	1.02	0.102				
Dieldrin	46	19.9	199	1990	2.3	0.23	0.023	0.02	8	2300.00	5.75
Gamma-Chlordane	220							0.5	6	440.00	36.67
Heptachlor Epoxide	3.4	0.11	1.1	11	30.9	3.09	0.309				
	(mg/kg)								(mg/kg)		
Inorganics											
Copper	293							70	390	4.19	0.75
Lead	561							35	100	16.03	5.61
Mercury	1.5							0.15	1.3	10.00	1.15
Nickel	59.5							30	50	1.98	1.19
Zinc	2050							120	270	17.08	7.59
BLACKSTONE RIVER	(ug/kg)		(ug/kg)						(ug/kg)		
Pesticides/PCBs											
Aroclor -1260	4200	19.6	196	1960	214.3	21.43	2.143	50	400	84.00	10.50

PETERSON/PURITAN SITE
COMPARISON OF SEDIMENT CONCENTRATIONS TO
PROTECTIVE GUIDELINES FOR SEDIMENTS

COCs	AVERAGE CONCENTRATION	INTERIM SEDIMENT CRITERIA Total Organic Carbon (TOC) 0.10%	1%	10%	HAZARD QUOTIENT Total Organic Carbon (TOC) 0.10%	1%	10%	LONG & MORGAN ER-L	ER-M	HAZARD QUOTIENT ER-L	ER-M
BROOK A	(ug/kg)		(ug/kg)						(ug/kg)		
Semivolatile Organics											
2-Methylnaphthalene	--							65	670	--	--
4-Methylphenol	450										
Anthracene	140							85	960	1.65	0.15
Benzo(a)anthracene	490	1320	13200	13200	0.4	0.04	0.037	230	1600	2.13	0.31
Benzo(a)pyrene	650	1060	10600	106000	0.6	0.06	0.006	400	2500	1.63	0.26
Benzo(g,h,i)perylene	410										
Bis(2-ethylhexyl)phthalate	720										
Chrysene	690							400	2800	1.73	0.25
Dibenzo(a,h)anthracene	230							60	260	3.83	0.88
Fluoranthene	750	1880	18800	188000	0.4	0.04	0.004	600	3600	1.25	0.21
Indeno(1,2,3-c,d)pyrene	310										
Phenanthrene	410	139	1390	13900	2.9	0.29	0.029	225	1380	1.82	0.30
Pyrene	740	1310	13100	131000	0.6	0.06	0.006	350	2200	2.11	0.34
Pesticides/PCBs											
4,4-DDE	8.8							2	15	4.40	0.59
4,4'-DDT	32	0.828	8.28	82.8	38.6	3.86	0.386	1	7	32.00	4.57
4,4'-DDD	17							2	20	8.50	0.85
Alpha-Chlordane	31							0.5	6	62.00	5.17
Aroclor-1254	110	19.6	196	1960	5.6	0.56	0.056	50	400	2.20	0.28
Aroclor -1260	71	19.6	196	1960	3.6	0.36	0.036	50	400	1.42	0.18
Delta-BHC	5	0.157	15.7	157	31.8	0.32	0.032				
Dieldrin	11	19.9	199	1990	0.6	0.06	0.006	0.02	8	550.00	1.38
Gamma-Chlordane	41							0.5	6	82.00	6.83
Heptachlor Epoxide	2.2	0.11	1.1	11	20.0	2.00	0.200				
	(mg/kg)								(mg/kg)		
Inorganics											
Copper	110							70	390	1.57	0.28
Lead	260							35	100	7.43	2.60
Mercury	0.48							0.15	1.3	3.20	0.37
Nickel	16							30	50	0.53	0.32
Zinc	480							120	270	4.00	1.78

Notes:

1. Interim Sediment Criteria obtained from U.S. EPA, 1988. Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants. Office of Water Regulations and Standards.
2. Effects Range-Low (ER-L) and Effects Range-Median (ER-M) obtained from Long, E.R. and L.G. Morgan. 1990. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program.

Hazard Quotient exceeds 1.0.

PETERSON/PURITAN SITE
INDICATOR SPECIES

INDICATOR SPECIES	HABITAT	TYPE OF FEEDER	DIET
Mammals			
Meadow vole *(Microtus pennsylvanicus)*	Terrestrial - Fields, pastures, stream borders and swamps	Herbivore - Ground Grazer	Grasses, roots, stems and grains.
Northern short-tailed shrew *(Blarina brevicauda)*	Terrestrial - Forests, stream banks, grasses and sedges	Insectivore/Omnivore - Ground Gleaner	Primarily insects. Also plants, worms, snails and small vertebrates.
Red fox *(Vulpes vulpes)*	Terrestrial - Forest edges and open areas	Omnivore - Ground Forager	Rodents, birds, turtles, frogs and snakes.
Reptiles/Amphibians			
Eastern painted turtle *(Chrysemys picta)*	Aquatic - Ponds, marshes, stream back water and lake edges	Omnivore- Bottom Forager	Aquatic insects, tadpoles, and small fish.
Eastern American toad *(Bufo americanus)*	Semi-aquatic/terrestrial - Gardens, woods, fields, shallow waters for breeding	Insectivore - Ground Ambusher	Terrestrial arthropods, including insects, spiders and sowbugs. Also slugs and earthworms.
Fish			
Pumpkinseed (Sunfish) *(Lepomis gibbosus)*	Aquatic - Ponds, lakes, and streams with weedy bottoms	Omnivore	Algae, zooplankton, and macroinvertebrates.
Largemouth bass *(Micropterus salmoides)*	Aquatic - Shallow and weedy lakes and river backwaters	Omnivore	Small fish and insects.

PETERSON/PURITAN SITE
INDICATOR SPECIES

INDICATOR SPECIES	HABITAT	TYPE OF FEEDER	DIET
Birds			
Mallard duck *(Anas platyrhynchos)*	Aquatic - ponds, lakes, rivers and wooded swamps	Grainvore/Omnivore - Water Forager	Primarily, seeds of sedges, grasses, leaves and stems of marsh plants.
Red-tailed hawk *(Buteo jamicensis)*	Terrestrial - woodlands interspersed with meadows. Migratory.	Carnivore - Ground Pouncer	Small mammals, primarily rodents. Also amphibians, reptiles and insects.
Great blue heron *(Ardea herodias)*	Semi-aquatic - Shallow shores of ponds, lakes, streams and rivers. Trees for nesting. Migratory.	Carnivore - Water Pouncer	Aquatic/terrestrial fishes, reptiles, amphibians, and occasionally small birds and mammals.
Plants			
Broomsedge *(andropogon virginicus)*	Freshwater marshes, wet soils and sandy grounds		

TABLE B-32
Comparison of Alternatives

ALTERNATIVE COMPONENTS	#1 NO ACTION	#2 LIMITED ACTION	#3 SOURCE CONTROL	#4 ENHANCED SOURCE CONTROL (ESC)	#5 ** ESC W/ CCL MGT OF MIGRATION	#6 ESC W/ CCL/PAC MGT OF MIGRATION
MONITORING	X	X	X	X	X	X
FOCUSSED INVESTIGATION		X	X	X	X	X
INSTITUTIONAL CONTROLS		X	X	X	X	X
EXCAVATION			X	X	X	X
CAPPING			X	X	X	X
SOIL VENTING			X	X	X	X
SOURCE GROUND WATER EXTRACTION			X	X	X	X
GROUND WATER TREATMENT & DISCHARGE			X	X	X	X
IN-SITU OXIDATION				X	X	X
CCL DOWNGRADIENT - GROUND WATER EXTRACTION & DISCHARGE					X	X
PAC DOWNGRADIENT - GROUND WATER EXTRACTION & DISCHARGE						X
ESTIMATED COST	$1 mil	$1.3 mil	$6.3 mil	$6.5 mil	$7.3 mil	$7.4 mil
** EPA'S PREFERRED ALTERNATIVE					MGT = MANAGEMENT	

Note: Estimated cost assumes a 7% discount rate.

TABLE B-33
SYNOPSIS OF CHEMICAL-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

FEDERAL STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Resource Conservation and Recovery Act (RCRA), Identification and Listing of Hazardous Waste; [40 CFR Part 261]	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 CFR Parts 262-265.	Applicable	These requirements define RCRA-regulated wastes, thereby delineating acceptable management approaches for listed and characteristically hazardous wastes which should be incorporated into the characterization and remediation elements of remedial response projects. Chemicals in the soil and groundwater at OU-1 have been identified as hazardous wastes regulated under RCRA. Therefore, the selected remedy shall comply with applicable parts of the RCRA hazardous waste regulations, as discussed below.
Safe Drinking Water Act (SDWA), Maximum Contaminant Level Goals (MCLGs); [40 CFR Part 141]	MCLGs are non-enforceable health goals under the SDWA. MCLGs establish drinking water quality goals at levels of no known or anticipated adverse health effects with an adequate margin of safety. Non-zero MCLGs are used in setting cleanup goals.	Relevant and Appropriate	Non-zero MCLGs will be met downgradient of CCL in six years, and within six years downgradient of PAC; twelve years at the CCL source area, and one year at the PAC source.
Safe Drinking Water Act (SDWA), National Primary Drinking Water Standards, Maximum Contaminant Levels (MCLs); [40 CFR Part 141]	Establishes enforceable standards for specific contaminants which have been determined to adversely effect human health. These standards, MCLs, are protective of human health for individual chemicals and are used in setting cleanup levels.	Relevant and Appropriate	MCLs will be met downgradient of CCL in six years, and within six years downgradient of PAC; twelve years at the CCL source area, and one year at the PAC source area.

continued

TABLE B-33
SYNOPSIS OF CHEMICAL-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

FEDERAL STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
USEPA Health Assessment Documents, Acceptable Intake, Chronic (AIC) and Subchronic (AIS)	AIC and AIS values provide values for RfDs and HEAs for non-carcinogenic compounds.	To be Considered	This guidance shall be used to assess chronic and subchronic risks for noncarcinogenic compounds.
USEPA Human Health Assessment Cancer Slope Factors (CSFs)	Cancer Slope Factors are developed by the USEPA from Health Effect Assessment (HEA), or evaluation by the Human Health Assessment Group (HHAG).	To be Considered	These values present the most up-to-date cancer risk potency information. HHAGs shall be used to compute the individual cancer risk resulting from exposure to contaminants.
USEPA Office of Drinking Water, Health Advisories	Health advisories are estimates of risk due to consumption of contaminated drinking water.	To be Considered	These advisories solely consider noncarcinogenic effects due to the ingestion of contaminants in drinking water. These advisories should be considered for contaminants in surface and groundwater which is or could potentially be used as a potable water source.
USEPA Reference Doses (RfDs)	RfDs are dose levels developed by the USEPA for use in the characterization of risks due to non-carcinogens in various media.	To be Considered	RfDs are considered the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure. RfDs are typically employed to characterize risks of soil and groundwater contaminant exposure (for the dermal contact and ingestion pathways).

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

STATE STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Rhode Island Hazardous Waste Rules and Regulations - Section 9	Sets forth the operational requirements for treatment, storage, and disposal facilities.	Applicable	Any remedial action involving treatment, storage, or disposal of waste shall comply with substantive requirements of this section.

NOTE: Date following State Citation is either the date promulgated or the date of the most recent amendment.

AIC = Acceptable intake, chronic
AIS = Acceptable intake, subchronic
ARAR = Applicable or Relevant and Appropriate Requirement
AWQC = Ambient Water Quality Criteria
CAA = Clean Air Act
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CSF = Cancer Slope Factor
CWA = Clean Water Act
FS = Feasibility Study
HEA = Health Effect Assessment
HHAG = Human Health Assessment Group
LDRs = Land Disposal Restrictions
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
mg/kg = milligrams per kilogram
NCP = National Contingency Plan
NEPA = National Environmental Policy Act
NESHAPs = National Emission Standards for Hazardous Air Pollutants
NPDES = National Pollutant Discharge Elimination System
OSHA = Occupational Health and Safety Act
OSWER = Office of Solid Waste and Emergency Response
POTW = publicly owned treatment works
RCRA = Resource Conservation and Recovery Act
RfD = Reference Dose
RIDEM = Rhode Island Department of Environmental Management
RIPDES = Rhode Island Pollutant Discharge Elimination System
SDWA = Safe Drinking Water Act
SPCC = Spill Prevention, Control, and Countermeasure
SWMU = Solid Waste Management Unit
TCLP = Toxicity Characteristic Leaching Procedure
TSDFs = Treatment, Storage, and Disposal Facilities
USC = United States Code
USEPA = United States Environmental Protection Agency
VOC = volatile organic compound

continued

AIC = Acceptable intake, chronic
AIS = Acceptable intake, subchronic
ARAR = Applicable or Relevant and Appropriate Requirement
AWQC = Ambient Water Quality Criteria
CAA = Clean Air Act
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CSF = Cancer Slope Factor
CWA = Clean Water Act
FS = Feasibility Study
HEA = Health Effect Assessment
HHAG = Human Health Assessment Group
LDRs = Land Disposal Restrictions
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
mg/kg = milligrams per kilogram
NCP = National Contingency Plan
NEPA = National Environmental Policy Act
NESHAPs = National Emission Standards for Hazardous Air Pollutants
NPDES = National Pollutant Discharge Elimination System
OSHA = Occupational Health and Safety Act
OSWER = Office of Solid Waste and Emergency Response
POTW = publicly owned treatment works
RCRA = Resource Conservation and Recovery Act
RfD = Reference Dose
RIDEM = Rhode Island Department of Environmental Management
RIPDES = Rhode Island Pollutant Discharge Elimination System
SDWA = Safe Drinking Water Act
SPCC = Spill Prevention, Control, and Countermeasure
SWMU = Solid Waste Management Unit
TCLP = Toxicity Characteristic Leaching Procedure
TSDFs = Treatment, Storage, and Disposal Facilities
USC = United States Code
USEPA = United States Environmental Protection Agency
VOC = volatile organic compound

continued

TABLE B-33
SYNOPSIS OF LOCATION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

STATE STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Rhode Island Rules and Regulations Governing the Enforcement of the Freshwater Wetlands Act - August, 1990	Establishes strict guidelines for altering, in any way, a designated or suspected wetlands area.	Applicable	The selected remedy will not include any adverse impacts to wetlands.

NOTE: Date following State Citation is either the date promulgated or the date of the most recent amendment.

AIC = Acceptable intake, chronic
AIS = Acceptable intake, subchronic
ARAR = Applicable or Relevant and Appropriate Requirement
AWQC = Ambient Water Quality Criteria
CAA = Clean Air Act
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CSF = Cancer Slope Factor
CWA = Clean Water Act
FS = Feasibility Study
HEA = Health Effect Assessment
HHAG = Human Health Assessment Group
LDRs = Land Disposal Restrictions
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
mg/kg = milligrams per kilogram
NCP = National Contingency Plan
NEPA = National Environmental Policy Act
NESHAPs = National Emission Standards for Hazardous Air Pollutants
NPDES = National Pollutant Discharge Elimination System
OSHA = Occupational Health and Safety Act
OSWER = Office of Solid Waste and Emergency Response
POTW = publicly owned treatment works
RCRA = Resource Conservation and Recovery Act
RfD = Reference Dose
RIDEM = Rhode Island Department of Environmental Management
RIPDES = Rhode Island Pollutant Discharge Elimination System
SDWA = Safe Drinking Water Act
SPCC = Spill Prevention, Control, and Countermeasure
SWMU = Solid Waste Management Unit
TCLP = Toxicity Characteristic Leaching Procedure
TSDFs = Treatment, Storage, and Disposal Facilities
USC = United States Code
USEPA = United States Environmental Protection Agency
VOC = volatile organic compound

continued

TABLE B-33
SYNOPSIS OF CHEMICAL-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

STATE STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	ARAR TYPE	CONSIDERATION IN THE SELECTED REMEDY
Rhode Island Rules and Regulations Pertaining to Public Drinking Water - July, 1991	Adopts standards compatible with the standards set forth in the federal Safe Drinking Water Act. The MCLs specified in this rule are based on the federal MCLs.	Relevant and Appropriate	Forms the basis for drinking water quality standards. These values are relevant and appropriate in those cases where more stringent than federal MCLs or non-zero MCLGs. These drinking water standards will be met in groundwater within OU-1 within twelve years.
Rhode Island Rules and Regulations for Groundwater Quality - July, 1993	Establishes groundwater quality standards for GAA classification and goals for GAA non-attainment areas. Provides requirements for the development of residual zones where pollutant concentrations are allowed to be greater than the groundwater quality standards. This regulation further describes requirements for installation and abandonment of monitoring wells.	Relevant and Appropriate	The groundwater quality standards established in this rule are relevant and appropriate when the established values are more stringent than federal MCLs and non-zero MCLGs. The monitoring well installation requirements are relevant and appropriate for the installation of monitoring wells.

NOTE: Date following State Citation is either the date promulgated or the date of the most recent amendment.

TABLE B-33
SYNOPSIS OF LOCATION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

FEDERAL STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Protection of Wetlands Executive Order No. 11990; [40 CFR Part 6]	Requires Federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practical alternative exists.	Applicable	Alternatives that involve the alteration of a wetland may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the wetland. EPA has determined that the selected remedy will not cause any adverse impacts on wetlands.
Floodplain Management Executive Order No. 11988; [40 CFR Part 6]	Requires Federal agencies to evaluate the potential effects of adverse impacts to floodplains associated with direct and indirect development of a floodplain.	Applicable	The installation of wells in the CCL downgradient area will be the only component of the remedial action conducted in a floodplain. EPA has determined that such actions will not adversely affect the floodplain and that no practicable alternative exists.

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

FEDERAL STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Clean Air Act (CAA), National Emission Standards for Hazardous Air Pollutants (NESHAP); [40 CFR Part 61]	Establishes emission levels for certain hazardous air pollutants for specific source categories.	Relevant and Appropriate	Remedial actions at CCL shall attain NESHAP emission limits for any vinyl chloride emissions from the air stripping treatment process. Emissions shall be monitored for vinyl chloride.
RCRA Air Emissions Standards [40 CFR Part 264, Subparts AA, BB, and CC]	Subpart AA contains air pollutant emission standards applying to solvent extraction and air stripping facilities treating RCRA wastes with total organics concentrations of 10 parts per million by weight or greater. Subpart BB sets emission standards for equipment leaks at facilities where equipment contacts wastes with organic concentrations of at least 10 percent by weight. Proposed Subpart CC requires specific organic emissions controls on tanks and containers having VOC concentrations equal to or greater than 500 parts per million by weight.	Subparts AA and BB - Applicable, Subpart CC - To be considered	Treatment facility components shall be designed to meet the criteria set forth in these subparts.
CWA, National Pretreatment Standards; [40 CFR Part 403]	Sets pretreatment standards through the National Categorical Standards or the General Pretreatment Regulations, for the introduction of pollutants from non-domestic sources into POTWs, in order to control pollutants which pass through, cause interference, or are otherwise incompatible with treatment processes at a POTW.	Applicable	The selected remedy includes POTW discharge, and shall attain these pretreatment standards prior to discharge to the POTW.

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

FEDERAL STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
RCRA, Standards Applicable to Generators of Hazardous Waste; [40 CFR Part 262]	Establishes standards for generators of hazardous wastes that address waste accumulation, preparation for shipment, and completion of the uniform hazardous waste manifest. These requirements are integrated with DOT regulations.	Applicable	Residuals such as filters or recovered solvents from the diffused aeration or carbon adsorption/regeneration systems will be tested prior to off-site disposal. RCRA listed or characteristic wastes shall be shipped in properly marked and labeled containers. The transporter shall display proper placards. All hazardous waste shipments shall be accompanied by manifests.
RCRA, General Facility Standards; [40 CFR Subpart B, 264.10-264.18]	Sets the general facility requirements including general waste analysis, security measures, inspections, and training requirements. Section 264.18 establishes that a facility located in a 100 year floodplain must be designed, constructed, and maintained to prevent washout of any hazardous wastes by a 100-year flood.	Applicable	The selected remedy includes excavation, storage, or treatment of contaminated soil and/or groundwater, and shall comply with these requirements.
RCRA, Preparedness and Prevention; [40 CFR Part 264, Subpart C]	Outlines requirements for safety equipment and spill control for hazardous waste facilities. Facilities must be designed, maintained, constructed, and operated to minimize the possibility of an unplanned release that could threaten human health or the environment.	Applicable	Safety and communication equipment and other requirements of this subpart shall be incorporated into all aspects of the remedial process and local authorities shall be familiarized with site operations.

continued

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

FEDERAL STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
RCRA, Contingency Plan and Emergency Procedures; [40 CFR Part 264, Subpart D]	Outlines requirements for emergency procedures to be used following explosions, fires, etc.	Applicable	The selected remedy shall attain these requirements to ensure for adequate prevention and response capability.
RCRA, Releases from Solid Waste Management Units; [40 CFR Part 264, Subpart F]	Establishes the requirements for solid waste management units (SWMUs) at RCRA regulated treatment, storage, and disposal facilities. The scope of the regulation encompasses groundwater protection standards; concentration limits; points of compliance; compliance period; requirements for groundwater monitoring, detection monitoring, and compliance monitoring; and the corrective action program.	Applicable	Subpart F rules are applicable for establishing cleanup criteria for the selected remedy.
RCRA, Closure and Post-Closure; [40 CFR Part 264, Subpart G]	Details general requirements for closure and post-closure of hazardous waste facilities, including installation of a groundwater monitoring program.	Applicable	The selected remedy shall include closure and shall comply with Subpart G requirements.
RCRA, Use and Management of Containers;[40 CFR Part 264, Subpart I]	Sets standards for the storage of containers of hazardous waste.	Applicable	The selected remedy includes containerized storage of hazardous waste and shall comply with Subpart I.
RCRA, Tanks; [40 CFR Part 264, Subpart J]	Establishes procedures for corrective action in the event of a discharge from a tank, and includes procedures for tank closure.	Applicable	The selected remedy includes on-site treatment involving surface tanks. Such tanks shall be managed in accordance with these requirements.

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

STATE STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 7 - July, 1990	Prohibits emission of contaminants which may be injurious to human, plant or animal life, or cause damage to property or which unreasonably interferes with the enjoyment of life and property.	Applicable	This rule will be met for technologies in the selected remedy which have the potential of emitting contaminants (including excavation, soil venting, biological and physical/chemical treatments and thermal technologies).
Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 9 - March, 1993	Establishes guidelines for the construction, installation, modification or operation of potential air emissions units. Establishes permissible emission rates for some contaminants.	Applicable	To be met for components of the selected remedy which involve construction, installation, modification, or operation of air emission units.
Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 13 - October, 1982	Sets emissions standards for a class of fossil fuel fired steam or hot water units. Establishes a prohibition against the use of rotary cup burners.	Applicable	If carbon adsorption is chosen, then steam will be needed to regenerate the carbon beds. Hot water may be required in other remedial technologies. This rule shall be met for components of the selected remedy which require the use of a fossil fuel fired unit.
Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 15 - January, 1993	Details organic solvents of concern. Establishes emissions standards for two sizes of units: less than 50 tons per year VOC and greater than 50 tons per year VOC.	Applicable	This rule shall be met for components of the selected remedy which use equipment which could emit organic solvent, including air stripping and soil venting.

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

STATE STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Rhode Island Pretreatment Regulations - June, 1984	Adopts a state and local pretreatment system for wastewater based on the federal regulations.	Applicable	Covers pollutants in wastewaters which can have detrimental effects on POTW processes or which may contaminate sewage sludge. Since the selected remedy includes discharge to a POTW, the discharge must meet all discharge limitations imposed by the POTW.
Rhode Island Underground Injection Control Regulations - June, 1984	Defines requirements for construction and operation of injection wells. Establishes prohibitions for groundwater reinjection.	Applicable	In-situ treatment utilizes subsurface injection as a component of the remedy. Injection wells used to introduce amended water as part of the in-situ oxidation process shall be constructed and operated in compliance with these regulations.
Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 1 - Amended 1977	No air contaminant emissions will be allowed for periods more than 3 minutes in any one hour which is greater or equal to 20% opacity.	Applicable	Regulation will be met for air releases resulting from remedial activities.

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

STATE STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 17 - February, 1977	Prohibits the release of objectionable odors across property lines.	Applicable	The selected remedy shall not emit objectionable odors outside of the area of OU 1.
Rhode Island Air Pollution Control Regulations, Air Pollution Control Regulation No. 22 - October, 1992	Establishes acceptable ambient air quality levels for listed toxic air contaminants.	Applicable	The ambient air quality levels for listed toxic air contaminants shall be met by technologies which emit air contaminants.
Rhode Island Rules and Regulations for Solid Waste Management Facilities - June, 1992	Details requirements for investigation plans, radius plans, site plans, operating plans, and closure plans. Any solid waste generated by excavation or remedial activities will be disposed of at a licensed solid waste facility. Also prohibits emission or creation of objectionable odor beyond the property boundaries.	Applicable	Solid waste generated by the selected remedy shall be disposed of at a licensed solid waste facility.
Rhode Island Hazardous Waste Rules and Regulations - Section 8	Outlines requirements for general waste analysis, security measures, inspections, and training requirements.	Relevant and Appropriate	Any remedial action will be constructed, fenced, posted, and operated in accordance with this requirements. All workers will be properly trained.

continued

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

FEDERAL STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
RCRA, Miscellaneous Units [40 CFR Part 264, Subpart X, 264.600-264.999]	These standards are applicable to miscellaneous units not previously defined under existing RCRA regulations. Subpart X outlines performance requirements that miscellaneous units be designed, constructed, operated, and maintained to prevent releases to the subsurface, groundwater, and wetlands that may have adverse effects on human health and the environment.	Applicable	The selected remedy shall ensure that the design of treatment processes, not specifically regulated under other subparts of RCRA, prevents the release of hazardous constituents and prevents future impacts on the environment.
RCRA, Interim Status TSDF Standards; Chemical, Physical, and Biological Treatment [40 CFR 265, Subpart Q, 265.400-265.406]	The requirements established in this rule apply to owners and operators of facilities which treat hazardous waste by chemical, physical, or biological methods in other than tanks, surface impoundment, and land treatment facilities. General operating, waste analysis and trial test, inspection, and closure requirements are established. Special requirements for ignitable or reactive wastes and incompatible wastes are also established.	Applicable	These requirements shall be met for on-site chemical, biological, or physical treatment technologies.
RCRA, Land Disposal Restrictions; [40 CFR Part 268]	LDRs place restrictions on land disposal of RCRA hazardous wastes. Such wastes must meet LDR treatment standards or qualify for a treatability variance.	Applicable	Remedial alternatives include excavation and off-site disposal of RCRA contaminated soils. Disposal of such wastes shall comply with LDR restrictions by meeting treatment standards prior to any off-site disposal or by use of a treatability variance as provided in 40 CFR 268.44.

TABLE B-33
SYNOPSIS OF ACTION-SPECIFIC ARARS AND GUIDANCE MATERIALS

PETERSON/PURITAN, INC. SITE-FIRST OPERABLE UNIT
CUMBERLAND AND LINCOLN, RHODE ISLAND

FEDERAL STANDARDS AND REQUIREMENTS	REQUIREMENTS SYNOPSIS	STATUS	CONSIDERATION IN THE SELECTED REMEDY
Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites; [OSWER Directive #9355 0-28]	Controls on air strippers at sites located in attainment areas will be based on state ARARs, risk management guidelines, and other requirements of CERCLA Section 121. In ozone non-attainment areas, however, controls are more likely, based on the contribution of VOCs to the formation of ozone.	To be considered	Controls on air strippers will be employed as necessary to attain ARARs, criteria, and guidance.
USEPA Region I Memo from Louis Gitto to Merrill Hohman- July 12, 1989	Superfund air strippers in ozone non-attainment areas will generally merit controls on VOC emissions.	To be considered	Any remedial action which includes air stripping will include off-gas controls to reduce VOC emissions.

TABLE B-34

ALTERNATIVE 5: COST ESTIMATE

PETERSON/PURITAN, INC. SITE
CUMBERLAND AND LINCOLN, RHODE ISLAND

ITEM	COST	PRESENT WORTH			
DISCOUNT RATE		3%	5%	7%	10%
CAPITAL COSTS					
CCL Remediation Area:					
Excavation, Disposal, Backfill	$262,000				
Capping	$92,000				
Soil Venting, Off-gas Treatment	$388,000				
Source Area Groundwater Extraction	$120,000				
Source Area Groundwater Treatment and Discharge	$365,000				
Downgradient Groundwater Extraction and Discharge	$225,000				
Institutional Controls (including Quinnville)	$20,000				
Subtotal CCL Remediation Area	$1,472,000	$1,472,000	$1,472,000	$1,472,000	$1,472,000
PAC Remediation Area:					
Focused Investigation	$79,000				
Excavation and Disposal and Leachfield Reconstruction	$294,000				
In-Situ Oxidation	$36,000				
Institutional Controls	$20,000				
Subtotal PAC Remediation Area	$429,000	$429,000	$429,000	$429,000	$429,000
Total Capital Cost	$1,901,000	$1,901,000	$1,901,000	$1,901,000	$1,901,000

(Continued)

TABLE B-34 (cont.)

ALTERNATIVE 5: COST ESTIMATE

PETERSON/PURITAN, INC. SITE
CUMBERLAND AND LINCOLN, RHODE ISLAND

ITEM	COST	PRESENT WORTH			
DISCOUNT RATE		3%	5%	7%	10%
ANNUAL OPERATION AND MAINTENANCE COSTS					
CCL Remediation Area:					
Soil Venting, Off-gas Treatment[1]	$295,000	$564,000	$548,000	$533,000	$512,000
Groundwater Treatment and Discharge[2]	$414,000	$4,121,000	$3,669,000	$3,288,000	$2,821,000
Downgradient Groundwater Extraction and Discharge[3]	$103,000	$558,000	$523,000	$491,000	$449,000
Environmental Monitoring[4]	$46,000	$684,000	$573,000	$487,000	$392,000
Subtotal CCL Remediation Area	$858,000	$5,927,000	$5,313,000	$4,799,000	$4,174,000
PAC Remediation Area:					
In-situ Oxidation[5]	$236,000	$229,000	$225,000	$221,000	$215,000
Environmental Monitoring[6]	$47,000	$401,000	$363,000	$330,000	$289,000
Subtotal PAC Remediation Area	$283,000	$630,000	$588,000	$551,000	$504,000
Total Operation and Maintenance Cost	$1,141,000	$6,557,000	$5,901,000	$5,350,000	$4,678,000
TOTAL PRESENT WORTH COST		**$8,458,000**	**$7,802,000**	**$7,251,000**	**$6,579,000**

Note:
[1]Present worth based on a duration of 2 years.
[2]Present worth based on a duration of 12 years.
[3]Present worth based on a duration of 6 years.
[4]Present worth based on a duration of 20 years.
[5]Present worth based on a duration of one year.
[6]Present worth based on a duration of 10 years.

Note: In accordance with OSWER Directive No. 9355.3-20, June 25, 1993, EPA is directed to use a 7% discount rate in cost analyses.

PETERSON/PURITAN, INC. SITE
OPERABLE UNIT 1
ROD SUMMARY

APPENDIX C

RESPONSIVENESS SUMMARY

United States
Environmental Protection Agency
Region I

S U P E R F U N D

Responsiveness Summary
Peterson/Puritan, Inc. Site - OU 1

September 30, 1993

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INTRODUCTION

The U.S. Environmental Protection Agency (EPA) held a 30-day comment period from July 6 to August 5, 1993 to provide an opportunity for interested parties to comment on the Proposed Plan, the Remedial Investigation/Feasibility Study (RI/FS) and other documentation included in the Administrative Record developed to address a portion of the contamination at the Peterson/Puritan, Inc. Superfund Site (the Site) in Cumberland, Rhode Island. The proposed plan specifically addresses contamination from a source area at the Site referred to as Operable Unit 1 (OU 1). Subsequent operable units for this Site will be addressed through future investigations and response actions as necessary. The FS examined and evaluated various options, called remedial alternatives, to address source control and management of migration of contaminants at OU 1. EPA identified its preferred alternative for OU 1 in the Proposed Plan issued on July 6, 1993. All supporting documentation for the decision regarding OU 1 is placed in the Administrative Record for review. The Administrative Record is a collection of all the documents considered by EPA in choosing the remedy for OU 1. It was made available at the EPA Records Center, at 90 Canal Street, in Boston, MA, and at the Cumberland and Lincoln public libraries. The Cumberland public library is located on Diamond Hill Road in Cumberland, Rhode Island. The Lincoln public library is located on Old River Road, in Lincoln, Rhode Island. An index to the Administrative Record for OU 1 is provided as Appendix E to the Record of Decision.

The Purpose of this Responsiveness Summary is to document EPA responses to the questions and comments raised during the public comment period on the RI/FS, Proposed Plan, and other documents in the Administrative Record. EPA reviewed and considered the comments prior to selecting the remedy for OU 1 which is documented in the Record of Decision.

This Responsiveness Summary is organized into the following sections:

I. **Overview of Remedial Alternatives Considered in the Feasibility Study Including the Selected Remedy** - This section briefly outlines the remedial alternatives evaluated in the Feasibility Study (FS) and the Proposed Plan, including EPA's selected remedy.

II. **Background on Community Involvement** - This section provides a brief history of community involvement and EPA initiatives in apprising the community of Site activities.

III. **Summary of Comments Received During the Public Comment Period and EPA Responses** - This section summarizes and provides EPA responses to the oral and written comments received from the public during the public comment period. In Part A, the comments received from citizens and interested parties are presented. Part B contains comments received from the Town of Cumberland. Part C summarizes comments received from the State of Rhode Island. Part D summarizes comments received from potentially responsible parties (PRPs).

****

I. Overview of Remedial Alternatives Considered in the Feasibility Study Including the Selected Remedy

- Alternative 1: No-Action
  There would be no remedial action of any of the contaminated media; however long-term monitoring of existing ground water monitoring wells located within the CCL and PAC remediation areas and the Quinnville wellfield would be conducted.

- Alternative 2: Limited Action
  This alternative would include the long-term environmental monitoring of ground water, establish institutional controls to prevent its future use, as well as to prevent direct contact or exposure to contaminated soils, and provide a focussed investigation of volatile organic compounds (VOC) contaminants detected in the PAC downgradient area.

- Alternative 3: Source Control
  This alternative involves source control actions to limit the migration of contaminants. Source control at the CCL remediation area would include excavating contaminated soils in the manholes and catch basin, capping source soils, venting vadose zone soils, and extracting and treating source area ground water via an air stripping process with discharge to the POTW (Narragansett Bay Commission) interceptor (i.e. sewer) located on-site. Source control at the PAC remediation area would consist of excavating leachfields #1 and #2. This alternative would include the long-term environmental monitoring of ground water and institutional controls to prevent the future use of ground water, as well as prevent direct contact or exposure to contaminated soils, and provide a focussed investigation of VOC contaminants detected in the PAC downgradient area.

- Alternative 4: Enhanced Source Control
  The enhanced source control alternative would include all the remedial actions described in Alternative 3 for the CCL remediation area; however, at the PAC remediation area, this alternative would combine the source control remedial actions described in Alternative 3 with in-situ oxidation (i.e. treatment) of ground water. In-situ oxidation would be used to reduce the mobility of arsenic in ground water migrating from the PAC leachfields. Institutional controls, environmental monitoring, and a focussed investigation would be conducted as described in Alternative 3.

EPA's Selected Remedy is Alternative 5.

- Alternative 5: Enhanced Source Control and CCL Area Management of Migration
  Remediation for the CCL remediation area includes excavation (manholes and catch basins), capping, soil venting of source area soils, source area ground water extraction, treatment and discharge to POTW via the sewer, downgradient area ground water extraction with direct POTW discharge to the sewer, natural attenuation of the Quinnville wellfield, institutional controls, and environmental monitoring. PAC area remediation actions include: excavation, disposal and reconstruction of the leachfields, in situ oxidation treatment of the PAC downgradient ground water, institutional controls, focussed investigation of the PAC downgradient area, and environmental monitoring.

- Alternative 6: Enhanced Source Control and CCL/PAC Area Management of Migration
  This alternative would combine the remedial actions of Alternative 5, the Preferred Alternative, with additional extraction and direct discharge of PAC downgradient ground water pending the results of the focussed investigation. Cleanup time frames for the PAC downgradient area would be reduced to 3 years, as opposed to 6 years under natural attenuation.

The approximate cleanup timeframes for the selected remedy are as follows: 12 years in the CCL source area, 6 years for the CCL downgradient area, 6 years to naturally attenuate contaminants at PAC downgradient area, and 1 year for source control measures at the PAC source. The Quinnville wellfield, currently estimated to be within acceptable contaminant levels, under nonpumping conditions, is expected to continue to attenuate throughout the duration of the cleanup.

II. Background on Community Involvement

Throughout the Site's history, community concern and involvement has been minimal. EPA has kept the community and other interested parties apprised of Site activities through informational meetings, fact sheets, press releases and public meetings.

In January, 1987, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. On January 15, 1987, EPA held an informational meeting at the Ashton elementary school in Cumberland, Rhode Island to describe the plans for the Remedial Investigation and Feasibility Study. Information regarding this meeting is included in the Administrative Record.

A fact sheet was issued in June, 1993 which discussed the findings of the Remedial Investigation, Risk Assessment, Ecological Assessment and opportunities for public involvement.

EPA issued a public notice and brief analysis of the Proposed Plan in the Pawtucket times and Woonsocket Call on July 1, 1993 and made the plan available to the public at the Lincoln and Cumberland town libraries. On July 6, 1993, EPA made the administrative record available for public review at EPA's offices in Boston and at the above referenced local information repositories.

On July 15, 1993, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan. Also during this meeting, the Agency answered questions from the public.

From July 6, 1993 to August 5, 1993, the Agency held a 30 day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public.

On July 29, 1993, the Agency held a public hearing to discuss the Proposed Plan and to accept oral comments. A transcript of this hearing with the comments received, and EPA responses to the comments, are included in this responsiveness summary. The Rhode Island Department of Environmental Management, Mr. John Morra, a consultant for the Town of Cumberland, and Mr. Robert Cox of the Blackstone Valley Tourism Council requested time to present comment at the hearing. Mr. Cox later declined to present comment in lieu of a written response from the Tourism Council which was later received by EPA. EPA's responses to the comments received at this hearing are incorporated below.

III. Summary of Comments Received During the Public Comment Period and EPA Responses

A. Citizen and Interested Party Comments

Comment A-1: A former employee of CCL Custom Manufacturing, Inc., who worked as a quality control assurance inspector and lab tester, expressed concern over health issues at the CCL facility. This person commented that she experienced very serious and complicated, unexplainable health problems from the very beginning of her employment and is now declared totally disabled. This person states that employees were ordered to spray each and every can out on the end of the line where every one was working, directly into the enclosed, unventilated, environment. Employees were given no protection against the toxic chemicals and gases.

EPA Response: Regulation of industrial work practices is not within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). However, EPA forwarded this comment to the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR provides support and consultation to EPA regarding health issues relating to hazardous waste sites. While ATSDR does not have a

legislative mandate to evaluate worker health issues, two agencies can be of help to workers concerned about the health and safety of the workplace environment.

These agencies are the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH). OSHA is a regulatory agency that will go to a facility and evaluate the work conditions. The Rhode Island OSHA office number is (401) 528-4669. The commentor may also contact the Rhode Island Department of Health's Division of Occupational Health and Safety, (401) 277-2438, for more information on OSHA or the state's own work place evaluation program.

NIOSH is a research agency with headquarters in Cincinnati, Ohio. This agency conducts investigations of work complaints when requested by three or more employees. NIOSH can be contacted at (513) 684-4287.

The above information has been forwarded to counsel for this commentor.

Comment A-2: Save the Bay, an environmental citizen's group agreed that of the six alternatives suggested, Alternative 5 will restore the soils and ground water at the CCL and PAC sites. With regard to the question of PAC downgradient ground water removal, this group would prefer the ground water be extracted and treated, as stated in Alternative 6. However, Save the Bay is willing to accept Alternative 5 because the EPA believes the risk of the area is within an acceptable risk range. Should investigations of the PAC downgradient area lead the EPA to suspect further contamination, Save the Bay strongly urges EPA to initiate extraction and treatment of ground water.

EPA Response: A focussed investigation of the PAC downgradient area is presented as part of the selected remedy. This investigation will provide further information about the source, extent and migration of contaminants in this area. Based on the results of this investigation, further response actions may be required. The type and scope of a response action, if any, can not be determined at this time but will be carefully considered once the results of the investigation are analyzed.

Comment A-3: Save the Bay commented that at this time the Blackstone River is classified as a Class C waterway; however, the River may be upgraded to Class B later this year when RIDEM releases its Triennial Review. Because of this potential upgrade, EPA is urged to take all measures to prevent further contamination of the Blackstone River during cleanup.

EPA Response: Pursuant to the Clean Water Act, the State of Rhode Island is in the process of revising the State's Water Quality Regulations for Water Pollution Control. Currently, it is the purpose of these regulations to restore, preserve and enhance the quality of the waters of the State and to protect the waters from pollutants so that waters shall, where attainable, be fishable and swimmable, be available for all beneficial uses, and thus assure protection of the public health, welfare and the environment. Specifically, Appendix A of the regulation currently classifies the Blackstone River from the Massachusetts/Rhode Island state line to the Main St. dam in Pawtucket as class C (boating, other secondary contact recreational activities, fish/wildlife habitat, industrial processes and cooling).

The revised regulation is expected by the end of 1993. It is anticipated that the river may be upgraded; however, it is not clear at this time to what extent the river will be upgraded and which sections of the river, if any, may be subject to the new classification.

Although the river is a receptor of OU 1 contamination, remediation of the Blackstone River itself is not a remedial action objective under this Superfund action. Historically, the river has been subjected to contamination from various non-site related sources, as evidenced by its current Class C designation. Such contamination is beyond the scope of any OU 1 remedial action. However, low levels of OU 1 contaminants currently discharge into the river. The evaluation of alternatives in the FS considered technologies for OU 1 which will mitigate, to the extent practicable, this discharge by extracting CCL downgradient ground water contaminated with VOCs. Accordingly, the selected remedy will reduce the discharge of OU 1 contaminants to the river.

Comment A-4: Save the Bay also expressed the need for a timeline that will expedite cleanup because of the levels of risk and presence of contamination in a densely populated area.

EPA Response: EPA is committed to a timely cleanup of OU 1. The Agency is in the process of evaluating its options for commencing cleanup, and expects to select a strategy that will expedite the implementation of the remedial action. Such a strategy may include performance of the remedial action by potentially responsible parties ("PRPs"). As described in the proposed plan, design and construction of the remedy is projected to take approximately three years.

Comment A-5: The Blackstone Valley Tourism Council recommended Alternative #6, Enhanced Source Control and CCL/PAC Area Management of Migration.

EPA Response: EPA evaluated the alternatives against nine evaluation criteria as presented in the proposed plan and as further discussed in the Record of Decision (ROD). The difference between Alternative 5 and 6 is that Alternative 6 calls for active treatment of the PAC downgradient area. However, the risk presented at the PAC downgradient area is within EPA's acceptable risk range, considering the Agency's risk management factor for arsenic.

While Alternative 6 provides for faster cleanup in the PAC downgradient area, it does not restore that portion of OU 1 to EPA's acceptable risk range any faster than Alternative 5 (the selected remedy). Also, the additional measures required at the PAC downgradient area under Alternative 6 do not provide for quicker attainment of EPA's remedial response objectives at OU 1. Therefore, Alternative 5 and Alternative 6 are considered by EPA to be equally protective.

Alternative 5 and Alternative 6 both attain all Federal and State ARARs. Alternative 6 provides that ground water at the PAC downgradient area would be restored to MCLs in three years, as opposed to six years under Alternative 5; however, as stated above, the risk at the PAC downgradient area is currently within EPA's acceptable risk range, considering the Agency's risk management factor for arsenic. Monitoring and institutional controls in the PAC downgradient area during remediation, as required under Alternative 5, will provide added assurance to the public that no significant risks will go unaddressed under Alternative 5. Therefore, the required timeframe for Alternative 5 to attain ARARs at the PAC downgradient area is acceptable to EPA.

Alternative 6 in the FS is more costly than the selected remedy. Alternative 6 is not cost effective. Any enhanced protectiveness provided by Alternative 6 is not proportional to its additional costs, since Alternative 6 would require immediate active restoration in the PAC downgradient area, where risks are currently within EPA's acceptable risk range, considering the Agency's risk management factor for arsenic. The Agency believes it that it is more cost effective to conduct a focussed investigation, with monitoring and institutional controls, in the PAC downgradient area prior to deciding whether additional response actions may be required. This approach is incorporated into the selected remedy. Thus, the Agency believes that, in review of Alternative 6 and the selected remedy, the selected remedy is more cost effective since it provides for

protectiveness throughout OU 1 and does not require the further expenditure of an estimated $183,000 on active restoration in the PAC downgradient area.

B. Town of Cumberland Comments

The Town of Cumberland (The Town) submitted written comments in a letter dated August 4, 1993, signed by Edgar R. Alger III., Mayor of Cumberland. Mr. John Morra, a consultant to the Town, also commented on behalf of the Town at the public hearing. The Town's comments are summarized below.

Comment B-1: According to the Town's waterworks consultant, information in the Town's possession indicates that the wellfield at Martin Street was active and productive in the 1970s. Use of the field was discontinued in 1985 because of contamination from the Site. The Town stated that this information is contrary to information provided in the RI/FS.

EPA Response: On June 27, 1993, a meeting was held at the Town Hall to clarify and discuss EPA's understanding of the town's impacted wells. Present were David J. Newton, RPM, USEPA, Leo Hellested, RIDEM, Mayor Alger, the town's waterworks consultant and the water department superintendent. Mayor Alger understood that the proposed plan for OU 1 did not address the Lenox St. well. He remarked at that time that certain town records indicate that the Martin St. well remained in service as a standby well and that some pumping records existed through 1975.

EPA's understanding of the Martin Street well situation is that the well was not in service at the time of Site Discovery and NPL Listing. EPA's records (GZA, 1982) indicate that until 1967, the Lenox St and Martin St wells supplied a major portion of Cumberland's water needs, but were eventually replaced by wells in other parts of the town. EPA's RI/FS work plan (CDM, 1987) states that the Martin St. well was taken out of service in 1967 due to the presence of iron. Throughout the time of the RI/FS, EPA had no supporting information which indicated that the Martin St. well was in service through 1985. However, it has been determined through the RI/FS process that ground water at the Martin St. location has been impacted by contamination originating from the CCL source area (formerly Peterson/Puritan, Inc.). As such, the selected remedy provides for restoration of the ground water throughout the CCL remediation area, which includes the ground water in the vicinity of the Martin St. well.

Comment B-2: The Town contends that CPC should take steps to restore the Martin Street wellfield area to acceptable drinking water quality levels as defined by the Rhode Island Department of Health and the EPA. Restoration should include reconstruction of the wellhead and replacement of the necessary equipment.

EPA Response: In accordance with the NCP, the selected remedy does not include measures whose primary purpose is to replace the equipment needed to provide drinking water to the municipal water system. Any efforts by the Town to require CPC to fund restoration of the Martin Street wellfield can only proceed in an action separate from this remedy and remedy implementation. However, EPA's selected remedy calls for restoration of the underlying aquifer supplying the Martin St. well. The selected remedy will restore this ground water to its beneficial use as soon as practicable.

Comment B-3: The Town contends that CPC should be responsible for all costs incurred by the Town in meeting the permitting process of the Rhode Island Department of Health and Environmental Management (RIDEM) and EPA. Furthermore, the Town believes that CPC International should be responsible for the Town's cost of hiring an independent consultant to advise them of their rights and obligations in meeting all local, state, and federal requirements and regulations.

EPA Response: The claims raised by the Town in this comment are beyond the scope of this Responsiveness Summary. Any such claims that the Town has, or may have, against CPC should be further pursued in discussions solely between CPC and the Town. EPA has no position regarding such claims.

Comment B-4: The Town requests that EPA conduct further studies to identify the source of contamination in the Lenox Street wells. The Town also requests that EPA identify the responsible parties for the Lenox Street contamination and require remediation of the Lenox Street wells.

EPA Response: As deemed necessary by EPA, future investigations will be conducted to determine the source of contamination which impacted the Lenox St. well as part of Operable Unit #2. It is anticipated that a future RI/FS will identify and evaluate alternatives which will consider source control and management of migration of contaminants impacting the Blackstone aquifer in the vicinity of the Lenox St. well. As part of any response action taken under CERCLA, EPA will also attempt to identify the parties responsible for releases of hazardous substances at the Site.

Comment B-5: The Town requested that the Rhode Island Department of Health (RIDOH) Water Quality Section and RIDEM Division of Groundwater be involved in the review process and be given the opportunity to provide comment.

EPA Response: EPA consistently sends site-related technical documents for review and comment to RIDEM. In its discretion, RIDEM may forward the material to any other state agency or division, such as RIDOH or RIDEM Division of Groundwater, for technical support on certain issues. RIDEM is the appropriate support agency in the development of the RI/FS and Proposed Plan, and was given the opportunity to comment on the Plan.

C. State Comments

Leo Hellested, Engineer, Division of Site Remediation, Rhode Island Department of Environmental Management (RIDEM) provided oral and written comments at the public hearing on behalf of the Department. RIDEM later submitted more detailed comments through a letter dated August 5, 1993. RIDEM comments are summarized below.

Comment C-1: RIDEM views the ROD as a significant milestone in moving towards a comprehensive, whole site remedy for the entire Peterson/Puritan Site. RIDEM also shares the desires of the citizens of this area for a cleaner Blackstone River, and encourages the EPA to implement the proposed remediation activities as soon as possible. RIDEM encourages EPA to move forward to a much needed investigation of the remaining operable units.

EPA Response: EPA shares the views of both RIDEM and the community that the entire Site should be investigated and remediated as necessary. EPA believes that the operable unit approach provides for the most efficient site-wide remediation. Preliminary response actions, including a site assessment and removal action at the landfill, have already been taken. EPA anticipates that other operable units, including the J.M. Mills landfill, will be investigated and remediated in the future as necessary.

Comment C-2: RIDEM recommended that frequent data collection and monitoring be included in the remedy to determine the effectiveness of the in-situ oxidation system, because the system proposed at the PAC remediation area is a relatively new and untested method of treating arsenic in soil. RIDEM suggests that a triggering mechanism that could allow for an alternative remedy

if the in-situ oxidation system does not perform to expectations be included in the ROD.

EPA Response: EPA acknowledges RIDEM's recommendation for frequent data collection and monitoring of the in-situ oxidation system. However, EPA does not believe that a "trigger" mechanism to require another technology at the PAC source area is required for the following reasons: 1) since the technology is innovative it will require piloting during its design and implementation. A function of the pilot will be data collection and monitoring of the system. Based on the results of the pilot, further modification may be required to ensure the technology's effectiveness; 2) the in-situ oxidation system is coupled with the excavation of two leachfields. The excavation is expected to significantly reduce contamination in the PAC source area. Thus, the in-situ oxidation is not relied on solely as the remedy for the PAC remediation area; 3) the Feasibility Study and the ENSR report (July, 1993) independently submitted to EPA for review on behalf of Lonza, Inc., provide technical information showing that this technology, in combination with the leachfield excavation, is the preferred method for decreasing arsenic concentrations in ground water at the PAC remediation area and is fully implementable, in accordance with the remedy selection criteria in the NCP.

Comment C-3: RIDEM noted that preventing the future use of ground water through institutional controls alone, without active remediation and/or evidence of natural attenuation, would violate the State ARAR for ground water quality. The temporary use of institutional controls to control the use of ground water is acceptable, however as part of a more comprehensive, permanent solution. The institutional controls implemented for the PAC downgradient area should prohibit the extraction of ground water, except as part of a remedial action. Institutional controls should be eliminated once cleanup standards have been met.

Sole reliance on Institutional Controls in a remediation area would require such area to be considered a residual zone. Residual zones have to meet all the requirements of Section 13.04 of the Rhode Island Rules and Regulations for Groundwater Quality for consistency and compliance with these regulations.

EPA Response: EPA and RIDEM have clarified that this comment pertains to the use of institutional controls as the sole means of remediation throughout OU 1. The selected remedy, while employing institutional controls, also employs a number of active measures to reduce contaminants. Therefore, EPA and RIDEM agree that the selected remedy attains all state ARARs. EPA further agrees with RIDEM that the institutional controls to be

implemented at the PAC downgradient area will prohibit the extraction of ground water, unless such extraction is within the scope of any authorized response action. Such institutional controls will, in fact, be implemented throughout OU 1, and shall also prohibit the hydrologic alteration of ground water.

Comment C-4: RIDEM expressed concern that unidentified sources of contamination may exist on or near the PAC downgradient area. Overly broad language regarding natural attenuation at the entire PAC downgradient area may jeopardize future (potential) enforcement actions by RIDEM. RIDEM further urged EPA not to pre-judge the results of the focussed investigation. Based on its results, active response measures may be appropriate, by either the State or EPA.

EPA Response: A focussed investigation of the PAC downgradient area is presented as part of the selected remedy. This investigation will provide further information about the source, extent and migration of contaminants in this area. Based on the results of this investigation, further response actions may be required. EPA will assess the results of the investigation, at such time that these results are received, to determine if any response action is required under CERCLA to protect human health and the environment. EPA agrees with the State that the need for further response actions should not be pre-judged.

Comment C-5: RIDEM would prefer a triggering mechanism be incorporated into the ROD that would initiate active remediation of the PAC downgradient area if a new, significant source of contamination is identified as a result of the focussed investigation. RIDEM also believes that a trigger should require active restoration if contaminant levels currently observed in the PAC downgradient area do not decrease through natural attenuation. RIDEM also states that the ROD should specify the elements of the focussed investigation.

EPA Response: EPA does not believe that such a trigger should be explicitly described in the ROD. EPA believes it is preferable to assess the facts at the time that the results of the investigation are known. Based on the review of all available data at that time, EPA will assess the need for active restoration at the PAC downgradient area.

EPA does not believe that a trigger is required if contaminant levels do not decrease through natural attenuation. The risk at the PAC downgradient area is within EPA's acceptable risk range at this time, considering the Agency's risk management factor for arsenic. If contaminant levels remain constant, and within EPA's

acceptable risk range, over time, active restoration under CERCLA will not be required. However, if EPA receives any new information which calls into question the protectiveness of the remedial action at the PAC downgradient area, EPA will review the information and assess the need for active restoration at the PAC downgradient area.

The goals of the investigation are stated in the ROD: namely, sampling and analysis of ground water and an investigation of potential contaminant sources impacting the area. The investigation will include new well installations. Further details regarding the scope of the investigation will be determined in the Remedial Design process. At that time, the Agency will determine the appropriate sampling, testing and investigation techniques in the process of developing the investigation workplan.

Comment C-6: RIDEM commented that there are certain limitations to the ground water model used in the Feasibility Study Report. According to RIDEM, the model appears to rely on a variation of Darcy's Law in calculating mass flux. Although Darcy's Law provides a relatively accurate description of the flow of ground water in most hydrogeological environments, there are certain limitations to this two-dimensional model. A number of the assumptions used by ABB-ES in these calculations seem optimistic, and therefore render unrealistic cleanup times.

EPA Response: Although RIDEM did not specify the limitations they believe are present in the use of these models, EPA recognizes that all models have limitations. However, EPA believes the use of the two-dimensional model, which is based upon Darcy's Law, is appropriate at OU 1, because flow is through saturated glacial outwash, a granular material. Use of more complex models is not expected to appreciably increase the accuracy of the predicted results presented in this study. Further, EPA believes the assumptions used in the modelling effort do not appear to be inherently optimistic given the level of data presented for OU 1. In reviewing the cleanup timeframes presented in the Feasibility Study, EPA independently modelled certain portions of OU 1 rendering cleanup timeframes which were consistent with the ones presented in the Feasibility Study.

Comment C-7: RIDEM identified that the State of Rhode Island goal for restoration of contaminated ground water in a GAA classified aquifer is attainment of Federal Maximum Contaminant Levels (MCLs) as established by the Safe Drinking Water Act (SDWA) and adopted in the Rhode Island Rules and Regulations for Ground Water Quality. RIDEM states that these rules and

regulations are promulgated, and the standards set forth under these regulations have been applied consistently at numerous contaminated sites throughout the State.

EPA Response: The Rhode Island ground water classification (GAA-NA) and MCLs adopted in Rhode Island Rules and Regulations for Ground Water Quality were incorporated into the Human Health Baseline Risk Assessment. The future use of ground water underlying the PAC and CCL downgradient areas were evaluated as a potential drinking water source. In addition, ground water exposure point concentrations were compared to Rhode Island ground water standards (Table 5-2 of Baseline Risk Assessment).

D. Potentially Responsible Party Comments

1. Air Products and Chemicals, Inc

Air Products and Chemicals Inc., ("Air Products") on behalf of its subsidiary, Pacific Anchor Chemicals Corporation, which is a potentially responsible party at OU 1, provided written comments on July 7, 1993 regarding the June 1993 RI Fact Sheet and again on August 4, 1993, regarding the July 1993 Proposed Plan for the first operable unit at the Peterson/Puritan Inc. Site. These comments were provided by David E. Bates, P.E., Manager, Safety, Health and Environment for Air Products and Chemicals, Inc. The comments are summarized below.

Comment D-1: (in reference to the RI Fact Sheet) Air Products states the correct name of its subsidiary is Pacific Anchor Chemicals Corporation and would prefer it to be listed as "PACC" (for Pacific Anchor Chemicals Corporation) when discussing the present operation or ownership of the facility.

The company understands that its facility is referred to as the PAC Facility in existing Superfund-related documents issued by EPA and that these documents have already been issued for public review. A suggested means of providing distinction from past and present operations while retaining the term PAC Facility would be to refer to the present operation/ownership as PACC. In the section on Site History several references were made to "PAC" that should have been "PAC facility." The company is concerned that EPA's inconsistency will cause many to interpret events in the site history to reflect activities of the present owner which would not be correct.

EPA Response: To clarify, EPA uses the acronym "PAC" to describe the Pacific Anchor Chemical Company facility which includes the present and former operations at the Cumberland location. The

Record of Decision (ROD) further describes this facility as a source area, identifying it as the Pacific Anchor Chemical Corporation (PAC) facility, formerly the Lonza and Universal Chemical Company facility. While the ownership of the facility has changed hands over time, EPA regards the PAC facility as a source of contamination regardless of the past or present facility operation or activity. Superfund documentation, including that which is incorporated into the Administrative Record, refers to the facility and source area as "PAC". EPA believes that a change to the acronym at this time may lead to confusion in the record.

Comment D-2: (in reference to the RI Fact Sheet) Air Products believes the statement "PAC also discharged wastewaters to three leachfields," in the Site History section, gives the impression that the leachfields were in use during the same period as the direct discharges by Universal Chemical. For clarity, Air Products suggests that EPA should make the following distinctions: 1) the three leachfields were used for different periods of time; 2) the two main leachfields were installed around 1973 and were shut down in 1985; 3) the third field was in use in 1972 and may have been installed as early as 1962; 4) this third leachfield is still in use today as a sole sanitary system; 5) although the exact use of this third leachfield during its 20+ years is unknown, EPA investigations under this Superfund program have not identified this leachfield as a source of concern.

EPA Response: The ROD identifies the location of each of the PAC leachfields and clarifies the removal of two leachfields; leachfield #1 and leachfield #2. The third leachfield, which is described as a sole sanitary system still in use today, is not considered for active remediation and will remain intact. As a further point of clarification, the third leachfield within the PAC source area will be a part of the source area ground water monitoring component, in that source area monitoring wells will monitor PAC source area ground water immediately downgradient of this active leachfield.

Comment D-3: (in reference to the RI Fact Sheet) Air Products states the third sentence in the second paragraph of Site History is incorrect. Routine EPA inspection in 1981 did <u>not</u> detect levels of arsenic and solvents in the facility waste systems. The arsenic was found by Lonza during sampling initiated immediately following the inspection conducted October 13 to 30, 1981.

EPA Response: EPA acknowledges this clarification and notes that the RI Fact Sheet did not provide this level of detail. EPA

believes the ROD factually summarizes the historical detection of arsenic and other contaminants in the facility wastestream during 1981 through 1984. The important factor in the presentation of this material is that arsenic, among other contaminants of concern, was detected in facility wastewater historically and therefore it is quite probable that a portion of the arsenic detected in ground water during the RI existed historically in facility wastewater disposed of on-site.

Comment D-4: (in reference to the RI Fact Sheet) Air Products questions the need to draw attention to the permitted, clean discharge referenced in the fifth sentence in the second paragraph of Site History, "....PAC continues to discharge noncontact cooling waters to Brook A...." The discharge of noncontact cooling waters to Brook A has occurred for 20+ years and has not been identified by EPA as a source of concern.

EPA Response: It is the function of the RI to identify and assess the physical characteristics of OU 1, including surface features and hydrology. Brook A is significant because of its presence within the source area, its discharge to the Blackstone River, its historic acceptance of industrial wastewater discharges from the PAC and CCL facilities, and because its flow is currently maintained primarily by PAC's discharge of non-contact cooling water as permitted under RIPDES. Based on the findings of the RI, concentrations of a number of contaminants of concern detected in Brook A sediments exceeded the benchmark criteria for ecological receptors. However, EPA has concluded, based on RI data, that Brook A does not provide likely or valuable habitat for ecological receptors based on its location and ephemeral nature. The RIPDES permit is the appropriate mechanism for monitoring the water quality of Brook A.

Comment D-5: (in reference to the RI Fact Sheet) Air Products contends that the last sentence in the first paragraph on Ground Water which says "....extends west from the PAC property's septic system and leachfield...." may lead the public to confuse the old leachfields with the existing sanitary septic system at the facility. The term "septic system" is unnecessary and should not be used.

EPA Response: As stated above in comment D-2, EPA believes the information has been further clarified in appropriate sections of the ROD.

Comment D-6: (in reference to the RI Fact Sheet) Air Products contends that the last sentence, first paragraph in Ground Water

"...leachfield to the Blackstone River," implies that the "plume" being discussed has reached the Blackstone River. EPA investigations do not identify that the plume has reached the Blackstone River, only that it extends toward the river.

EPA Response: In view of the ENSR report submitted to EPA on August 2, 1993, and data contained in the RI report, EPA believes that a plume of contaminated ground water in the PAC remediation area, containing VOCs and detectable levels of arsenic, reaches the river. As presented in the ROD, historic wastewater and ground water sampling at PAC does indicate the release of compounds including PCE, which degrades to TCE and 1,2-DCE. These compounds have been detected in PAC downgradient wells, albeit at higher concentrations than were detected at the PAC source area during the RI. With the exception of benzene, aromatic hydrocarbons that have been found in the PAC downgradient area have consistently been detected at the PAC source area. Furthermore, acetone, a PAC source contaminant detected at the PAC leachfield, was recently detected in the PAC downgradient area at the MW 305 well location in June, 1993. Taken as a whole, this data indicates that historic waste disposal practices at the PAC source area have contributed to the contamination presently detected in the PAC downgradient area, although the PAC source area is now diminished as a source of VOCs for the PAC downgradient area. Given that the PAC downgradient wells MW 305 and 306 are located less than 100 feet from the river, and considering the ground water flow direction, it is quite likely that the plume of contamination has reached the river.

Comment D-7: (in reference to the RI Fact Sheet) Air Products believes the first sentence in the third paragraph on Ground water which reads "....in the southeastern portion of the property," is incorrect and should read "southwestern." The ground water contamination is highest in the western portion of the property.

EPA Response: EPA acknowledges that the ground water contamination is highest in the western portion of the PAC property.

Comment D-8: (in reference to the RI Fact Sheet) Air Products is concerned that some statements in the fact sheet raise public concern unjustifiably and unnecessarily. Two examples cited are the following: 1. "Other organics compounds include: ethylbenzene, PCE, toluene, and xylenes. Additional inorganics that were detected include chromium, copper, lead, nickel, and zinc." (Page four, Ground water, third paragraph, third and

fourth sentences). 2. "Brook A mainly indicated the presence of VOCs (primarily chloroform), polycyclic aromatic hydrocarbons (PAHs), poly-chlorinated biphenyls (PCBs), pesticides, and inorganics." (Page four, Surface Water and Sediments, second sentence).

Air Products contends that the mentioned compounds were not identified by EPA in the RI, RA, or FS as causes for concern and are not slated for remedial actions. The compounds were found infrequently and/or were found at trace or expected background levels. Pesticides and PCBs were not found in Brook A surface water at all. PAC contends there were no identified risks requiring remedial action at Brook A. The fact sheet should identify issues that warrant concern.

EPA Response: The above listed chemicals, with the exception of PCBs, were Contaminants of Concern in the Risk Assessment although they were not major contributors to the risk with respect to the PAC remediation area. The RI Fact Sheet inaccurately attributes PCBs to the PAC property. However, EPA has made this correction in the "Results of the Remedial Investigation" section of the Proposed Plan. Also, the ROD presents a more detailed discussion of the findings as found in the RI report.

Comment D-9: (in reference to the RI Fact Sheet) Air Products states that, on page four of the RI Fact Sheet, the first sentence in the section on Surface Water which ends- "...and zinc) relating to contamination from the site," gives the erroneous impression that EPA determined that the elevated inorganic levels in the Blackstone River were caused by contamination found at the CCL and PAC facilities.

EPA Response: Zinc was detected within the confines of OU 1 and was listed as a Contaminant of Concern in the Ecological Assessment (EA). It was later determined through the EA that the discharge of inorganics into the Blackstone River is not likely to significantly impact aquatic organisms.

Comment D-10: (in reference to the RI Fact Sheet) Air Products states that in the second sentence of the soil section ("that soils on each of the properties contain VOCs, PAHs, pesticides, PCBs and inorganics"), the use of the word <u>each</u> is improper because no PCBs have been detected on the PAC facility and PAHs were attributed to the asphalt paving used on the site. No exposure risks requiring remedial action for PAHs, pesticides, or PCBs in the soils at the PAC facility were identified. The statement in the fact sheet raises public concerns unjustifiably

and unnecessarily.

EPA Response: As stated in response D-8 above, PCBs were not detected at the PAC property. The other chemicals were considered contaminants of concern and were included in the risk assessment.

Comment D-11: (in reference to the Proposed Plan) Air Products supports EPA's decision not to select Alternative 6 as the preferred alternative because Alternative 6 is not cost effective under CERCLA, and the remediation of the PAC downgradient area as proposed in Alternative 6 is premature at this time.

EPA Response: EPA agrees with this comment, as discussed in comment A-5, in Part 1.

Comment D-12: (in reference to the Proposed Plan) Air Products observed that EPA noted in the RI report on pages 6-17 and 18, that the contamination on the PAC downgradient area is not related to the contamination from the PAC facility.

EPA Response: EPA acknowledges the discussion presented on pages 6-17 and 18 of the RI report. However, the FS report at page 1-30 states the following: "The current distribution of chlorinated solvents and aromatic hydrocarbons do not strongly indicate that activities at the PAC facility contributed significantly to contaminants detected in MW-305 and -306. Historic wastewater and ground water sampling at PAC, however, does indicate the release of these compounds (including PCE, which degrades to TCE and 1,2-DCE). Historic ground water flow patterns, especially when the PAC leachfields were active, are not well documented. For these reasons, the PAC facility cannot be ruled out as the source of some contaminants detected in MW-305 and 306." EPA also recognizes that benzene, detected only in well MW 306A, has not been detected at the PAC facility.

The ENSR report submitted to EPA on August 2, 1993, identified that acetone, a PAC source contaminant detected at the PAC leachfield #1, was detected in the PAC downgradient area at the MW-305 well location in June, 1993. Arsenic, while only slightly elevated above detection limits, was detected in MW-306. MW-308, located between leachfields #1 and #2 and MW-306, reported a concentration of total arsenic at 151 ug/l, which is above the MCL of 50 ug/l.

Taken as a whole, this data indicates that historic waste disposal practices at the PAC source area have contributed to the contamination presently detected in the PAC downgradient area,

although the PAC source area may be diminishing as a source of VOCs and arsenic for the PAC downgradient area.

EPA has addressed the concern of a potential additional source contributing to the PAC downgradient area with a focussed investigation as described in the ROD. EPA believes a focussed investigation of the PAC downgradient area is necessary to further identify and characterize the source or sources impacting the ground water in this area.

Comment D-13: (in reference to the Proposed Plan) Air Products supports the requirement for pilot testing of in-situ oxidation. Air Products adds that flexibility needs to be incorporated into the ROD to provide for progression and development of a series of studies needed to develop the site-specific requirements of this new technology for application on the PAC facility.

EPA Response: As described in the Proposed Plan, in-situ oxidation is an innovative technology. EPA believes that frequent data collection and monitoring of the in-situ oxidation system is necessary. EPA will require piloting during its design and implementation to ensure the effectiveness of the system. Further details regarding the piloting of this technology will be determined in the Remedial Design process. At that time, EPA will consider appropriate methods for designing the system, evaluating system response, monitoring and other requirements to be addressed in appropriate design workplans.

Comment D-14: (in reference to the Proposed Plan) Air Products requests that the leachfield areas be studied to identify the exact location of the leachfields and the required excavation before any excavation occurs so that adequate operational planning can be performed. Air Products asserts that the exact location/extent of leachfields #1 and #2 are is not fully documented, and it is concerned with safety issues and business impacts. Air Products also believes that the leachfield excavation will address a major portion (if not all) of the risk associated with contamination identified at the PAC facility and supports an expedited implementation of this remedial activity. Further, Air Products believes that if the excavation of the two leachfields occurs quickly, valuable data can be obtained on the effectiveness of this removal which can be used to strengthen and finalize the design for the in-situ oxidation treatment.

EPA Response: EPA acknowledges Air Products' concerns regarding the extent and location of the excavation, as well as the timeliness of this component of the remedial action. A precise analysis of the location and extent of the leachfields will be

conducted as part of pre-design activities. EPA understands that Air Products is concerned about potential impacts that may occur during remedy implementation. To the extent that the remedy remains protective and otherwise consistent with the NCP, EPA will seek to minimize adverse business impacts to the PAC facility.

The selected remedy, which includes the excavation of the leachfields, is primarily based on restoration of ground water to public drinking water standards. Therefore, the excavation component in itself is not considered by EPA to fully satisfy this cleanup goal in that elevated levels of arsenic in ground water are not addressed. In-situ oxidation is selected as part of the remedy to meet ground water cleanup standards for arsenic.

Comment D-15: (in reference to the Proposed Plan) Air Products is concerned about institutional controls and their impact on operations at its facility. Air Products requests that the ROD reflect the need for flexible and defined institutional controls, the details of which would be cooperatively developed with EPA. Air Products is concerned that controls that include prohibitions on non-CERCLA related excavation of source area soils, if not clearly defined, could have severe impacts its use of the facility. Air Products contends that areas of its property not related to the leachfield contamination should be exempted from control; excavations less than 20 cubic yards should be excluded from EPA/State oversight (to eliminate the need for review of minor excavations); and that Air Products be able to submit a plan regarding excavation of soils.

EPA Response: EPA believes that institutional controls are a necessary component of remedial actions at OU 1. While EPA appreciates PAC's concerns, EPA must ensure that the institutional controls provide adequate protectiveness at the PAC facility. Air Products suggests certain limitations on the controls that EPA places on the property, such as limiting the area of institutional controls, or having such controls apply only to excavations over a certain volume. Such limitations are unacceptable to the Agency. As described in the ROD, the controls will prohibit future use or hydrologic alteration of ground water throughout the PAC property. Certain soil excavations must be prohibited as part of this restriction. Specifically, EPA believes that restrictions must be placed on the entire PAC property since the aquifer is present under all parts of the property. EPA further believes that a presumption against any surficial work (unrelated to any authorized response action) at the PAC facility is appropriate. Any exceptions would be made only after a proposal is submitted to and approved by EPA. This approach would, of course, also apply to the CCL

property, and all of OU 1, as appropriate.

Comment D-16: (in reference to the Proposed Plan) Air Products noted that the Proposed Plan does not provide exact details on the selected remedy, and so Air Products reserves comments on many issues that are not yet defined by EPA. Air Products requests that the ROD be appropriately referenced to reflect the opportunity to comment on issues that are not completely defined in the current description of the selected remedy, such as the monitoring plans and investigation of the PAC downgradient area.

EPA Response: The ROD is a final decision document which summarizes EPA's selected remedy. EPA sought comment on its preferred alternative in the Proposed Plan which was distributed to the public. Details, such as the development of design specifications and monitoring plans, are to be developed during the remedial design process. To the extent that EPA, in its enforcement discretion, believes that negotiations with the PRPs will expedite the remedial action, Air Products will be given the opportunity to further discuss the details of the remedy in such negotiations.

2. Lonza, Incorporated

On August 5, 1993, comments were submitted, with supporting documentation, by David J. Freeman, of Holtzmann, Wise & Shepard, on behalf of Lonza, Incorporated. These comments are summarized below and the supporting documentation is included in the Administrative Record. In addition, ENSR Consulting and Engineering (ENSR) provided comments on the FS and Proposed Plan and the Risk Assessment to Mr. Freeman on August 2, 1993. These additional comments are also summarized below.

Comment D-17: Lonza believes that EPA should consider new ground water/aquifer data in the report prepared by its consultant ENSR Consulting and Engineering (ENSR), in selecting a remedy for OU 1. This report was requested by Lonza because of its interpretation of data gaps in review of the June 1993 RI/FS report prepared by ABB-ES, on behalf of CPC with respect to arsenic contamination. Lonza believes the data in the ENSR report is persuasive with respect to the PAC component of Alternative 3, i.e. that in-situ oxidation is not necessary at the PAC facility. Lonza contends that selection of a remedy without fully considering this data would be arbitrary and capricious and an abuse of agency discretion.

EPA Response: EPA has considered the ENSR report in selecting the remedy. The report is incorporated into the Administrative Record by reference as are other supporting documents.

EPA believes that the results presented in the July, 1993 ENSR report concerning arsenic supports the Agency's selection of the selected remedy. The selected remedy combines excavation and removal of the PAC facility leachfields with in-situ oxidation of PAC source area groundwater to reduce arsenic contamination. The selected remedy also relies on natural attenuation of VOCs and arsenic in the PAC downgradient area. Based on the FS, EPA believes this combination of remedial technologies will reduce arsenic concentration in ground water at the PAC source area to the MCL of 50 ug/l in approximately 1 year. Natural attenuation of the VOCs and arsenic detected in the PAC downgradient area will reduce the levels to MCLs within an estimated 6 years.

The ENSR report, while sampling ground water within the PAC remediation area for VOCs, as well as arsenic, did not consider the attenuation of VOCs in PAC downgradient ground water in reporting its estimated cleanup timeframes, i.e. its cleanup timeframes for the entire PAC remediation area are depicted only for arsenic. ENSR, using other modelling concepts than those employed in the FS, and considering the combination of excavation with in-situ oxidation, predicts a cleanup of arsenic to the MCL in approximately 2 years throughout the PAC remediation area. This estimated timeframe (for arsenic) is within a reasonable comparison to EPA's estimates of 1 year for PAC source area and 6 years for PAC downgradient area as stated in the ROD, considering that the selected remedy considers natural attenuation of VOCs in the PAC downgradient area as well as arsenic, while the ENSR modelling does not.

While Lonza believes the data in the ENSR report is persuasive with respect to the PAC component of Alternative 3, Alternative 3 is insufficient with respect to the contamination at the PAC remediation area. Alternative 3 addresses only the source of VOC contamination at the PAC source area while relying solely on natural attenuation processes in the vicinity of the source to reduce arsenic concentrations in ground water throughout the PAC remediation area. Arsenic concentrations in the PAC source area pose a significant risk to human health in ground water. In-situ oxidation will reduce arsenic concentrations to protective levels sooner than natural attenuation, and is considered more reliable and effective as an active measure. Since in-situ oxidation provides greater protectiveness, and reduces toxicity and mobility of arsenic through treatment, it compared favorably in the comparative analysis of alternatives.

Comment D-18: Lonza believes that EPA should treat the Wetterau Property as a contaminant source rather than refer to contamination at the Wetterau Property as downgradient from PAC. Lonza states that although data indicate that certain areas of the Wetterau property where contaminants of concern were found at wells MW-305 and -306 are downgradient from PAC, the contaminants found in those wells are not consistent with upgradient conditions.

EPA Response: EPA disagrees. As more fully described in response to comment # D-12, available evidence indicates that historic waste disposal practices at the PAC source area have contributed to the contamination presently detected in the PAC downgradient area. EPA believes a focussed investigation is necessary to further identify and characterize the source or sources impacting the ground water in this area.

Comment D-19: Lonza believes it is more likely that the VOCs found in wells MW-305 and -306 originated at the Wetterau facility itself. The § 104(e) response filed by the predecessor owner, Roger Williams Foods, documented solvent use at the facility. Solvent use was noted in a 1988 study produced by Mott & Associates. The AET Report in February, 1988 references an onsite leachfield and the use of a degreaser containing TCA. Additional potential sources of contamination include a vehicle maintenance facility onsite, a sewer main, and sewer connections.

EPA Response: All Roger Williams Foods, Inc./Wetterau, Inc. 104(e) responses which have been considered by EPA in the selection of the remedy are included in the Administrative Record. EPA disagrees with Lonza's assertion that it is likely that all contamination observed in wells MW-305 and 306 originates from the Wetterau facility (see response D-12). EPA has addressed the concern of a potential additional source contributing to the PAC downgradient area with a focussed investigation as described in the ROD.

Comment D-20: Based on available evidence, Lonza believes that EPA should notify the former and current owner/operators of the Wetterau property of their liability for contamination at the Wetterau property. Failure to do so will result in delays in remedy implementation and lead to inequitable results.

EPA Response: Lonza's comment is beyond the scope of this Responsiveness Summary. The public comment period on the Proposed Plan was provided to allow interested persons to comment on the proposed remedial action for OU 1, as presented in the Proposed Plan. Liability issues may be further discussed during

future negotiations for implementation of the OU 1 remedy. EPA notes that decisions as to which parties it notifies of liability for OU 1 are within the Agency's enforcement discretion.

Comment D-21: Lonza states that in-situ oxidation of the ground water should be retained as a contingent remedy, should the proposed PAC source control measures (i.e. excavation of the leachfields) fail to meet the required cleanup standards. A contingent remedy strategy consistent with CERCLA and EPA guidance has been adopted at several Superfund sites.

EPA Response: EPA is aware of the appropriate use of contingency remedies in certain situations. However, due to the circumstances at OU 1, it is appropriate to incorporate in-situ oxidation into the selected remedy, as described in response D-17.

Comment D-22: Lonza urges EPA to recategorize the future land use of the Site as "commercial/industrial" instead of "residential" and recalculate exposure scenarios for this use before selecting a remedy for OU 1 based upon the following directives found in EPA guidance documents. OSWER Directive 9285.6-03, Risk Assessment Guidance for Superfund, Vol. 1: Human Health Evaluation Manual, Supplemental Guidance, "Standard Default Exposure Factors," Interim Final (March 25, 1991) states "[s]cenarios for [residential] land use should be evaluated whenever there are homes on or near the site, or when residential development is reasonably expected in the future." The same OSWER Directive also requires that "[i]n determining potential for future residential use, the RPM should consider: historical land use; suitability for residential development; local zoning; and land use trends." Furthermore, OSWER Directive 9285.7-01B, Human Health Evaluation Manual, Part B: "Development of Risk-based Preliminary Remediation Goals" (December 1991) states that "[S]ites that are surrounded by operating industrial facilities can be assumed to remain industrial areas unless there is an indication that this is not appropriate."

According to Lonza, each of the factors referenced in the OSWER Directives weighs in favor of classification of OU 1 as "commercial/industrial." OU 1 use for the majority of this century has been industrial. The area is completely unsuitable for residential development both by virtue of its history of industrial use and its location. Lonza further cites the Cumberland Comprehensive Plan and the Cumberland Economic Development Strategy to support its future land use development arguments.

EPA Response: EPA disagrees with recategorizing OU 1 land use as industrial. Furthermore, Lonza fails to recognize that it is inappropriate to consider an industrial scenario when it is clear that the aquifer beneath OU 1 is classified as a potential drinking water source.

EPA's assumption that this ground water may be used in the future as a drinking water source is valid and reasonable. In review of the hydrology, there can be no dispute that the Blackstone Valley aquifer is viable in terms of water production in the vicinity of the Site. The overall saturated thickness (averaging approximately 70-100 feet) of sand and gravel encountered in boreholes completed within the Site, a transmissivity of approximately 30,000 to 100,000 gallons/day/foot and an average hydraulic conductivity on the order of 1000 gallons/day/foot^2 validates the aquifer as a viable resource. Moreover, the aquifer underlying OU 1 had in fact served as a drinking water source prior to the closure of the Quinnville wellfield and Lenox St. well in 1979 due to Site-related contamination.

While the aquifer is currently not used for drinking water purposes in area of OU 1, its potential future use as a municipal water source is realistic. Cumberland maintains municipal wells north of the Site in Manville and municipal wells are also located south of the Site in Lonsdale, each field tapping the Blackstone Valley aquifer. Other water sources, such as the Scituate reservoir, and the Sneech Pond reservoir and the Abbott Run Valley aquifer, which are currently supplying the towns of Lincoln and Cumberland, respectively, cannot be relied on indefinitely, and demand in Lincoln and Cumberland will have to be met by other, more localized sources. (See the comments submitted by the Town of Cumberland, identified in part B of this Responsiveness Summary. Such comments indicate the Town's concern for the loss of its water supply and position that it be restored for future use.) The Rhode Island Department of Environmental Management considers the aquifer a potential drinking water source, as evidenced by its GAA-NA classification. Thus, the risk assessment must analyze the aquifer as a potential future drinking water source, (i.e. residential use exposure). For purposes of the ground water component of the risk assessment, it is irrelevant whether the affected receptor is located within OU 1 or is outside its boundaries and receiving water through municipal distribution from the aquifer underlying OU 1. Thus, whether or not residences are actually built within OU 1, the underlying aquifer is a viable drinking water source that must be restored to its beneficial use.

Comment D-23: Lonza contends that the same evidence of industrial land use (identified in the previous comment)

demonstrates why Rhode Island drinking water standards should not be considered ARARs. The National Contingency Plan (NCP), while generally favoring restoration of ground water to drinking water standards, acknowledges a number of factors that would dictate a different objective. Among those are the "possible uses (of the ground water), exposure, and likelihood of exposure and similar considerations." 55 Fed. Reg. 8753-8754 (March 9, 1990). Records show that the Martin Street wellfield was closed because of heavy iron and manganese content. Thus, according to Lonza, at least portions of the aquifer have been proven undesirable as a drinking water source, regardless of contamination at OU 1. Furthermore, the aquifer is not currently used as a water supply, no human receptors of contaminated ground water are present at OU 1, and it is unlikely that the aquifer will be used as a potable water supply at any time in the foreseeable future.

EPA Response: With respect to industrial land use issues and the viability of the aquifer, this comment is answered by reference to response D-22, above. While the presence of iron and manganese may be a concern in portions of the aquifer, municipalities typically take measures to address these naturally occurring elements. However, it is the presence of carcinogenic risks, due to VOC and arsenic contamination, that necessitates remediation of the aquifer.

Comment D-24: Lonza's technical consultant, ENSR, states that EPA has not considered the full range of remedial alternatives for OU 1. Since there are two distinct remediation areas, according to ENSR, EPA should have separately evaluated alternatives for each. Instead, EPA has artificially grouped PAC and CCL alternatives together, which excludes combinations of alternatives that should have been considered. ENSR provides a matrix showing that EPA only considered five of a possible twelve alternative combinations.

EPA Response: ENSR, through it's client, Lonza, Inc., has been aware of EPA's decision to remediate the Site in a series of operable units for more than one year. EPA met with Lonza on several occasions to discuss the scope, role, timing, etc. of OU 1 within the context of Site-wide remediation. As EPA explained to Lonza, EPA believes that the contaminated areas associated with each source are located in such proximity that remedial efforts at one area may impact contamination at the other area, unless both areas are addressed in concert. Thus, if the remedial efforts at each portion of OU 1 do not proceed together, one remediation area may be restored to protective levels while contamination at the other is exacerbated. Furthermore, the geographic proximity, and similarity in types of contamination and remedial technologies to be employed at each area, provide for certain efficiencies in performance of the remediation at

both areas at the same time.

Comment D-25: ENSR contends that the FS provides cleanup timeframes that were based on less sophisticated modelling efforts and less detailed site-specific information than that which ENSR more recently developed and independently reported to EPA in its July, 1993 report. ENSR believes its estimated timeframes are more reliable and should be used by EPA in evaluating PAC remedial alternative elements.

EPA Response: EPA has considered this report in selecting the final remedy. The ENSR report, using modelling concepts different than those employed in the FS, (See response D-17), obtained similar but different results in the reporting of estimated cleanup timeframes. EPA's analysis of these differing results is provided in response D-17. However, even assuming the veracity of ENSR's modelling timeframes, the selected remedy would still be the preferred option for OU 1 remediation, since it would continue to meet the statutory criteria and be consistent with the NCP, as discussed in Response D-17.

Comment D-26: While the selected remedy includes enhanced source control at the PAC facility, i.e. in-situ oxidation of ground water, ENSR argues that Alternative 3, source control, is sufficient with respect to the PAC facility. To support its argument, ENSR says that restoration "as soon as practicable" is not necessary at the PAC facility, based on current zoning, water supply development being impossible in the near-term, and flaws in EPA's risk assessment.

EPA Response: EPA disagrees with ENSR's assertions. As described in Section XI of the ROD, §121(b) of CERCLA contains a statutory preference for treatment which permanently and significantly reduces the toxicity, mobility or volume of hazardous substances as a principal element. The selected remedy, which includes in-situ oxidation, satisfies this preference. The limited source control action favored by ENSR does not. ENSR's approach would leave arsenic to naturally attenuate, which is predicted to occur in four years, assuming the leachfields are removed. However, the modelling on which the arsenic cleanup timeframe is based is not a guarantee that arsenic levels will reduce. No natural attenuation of arsenic has thus far been proven, and there is uncertainty as to the degree to which arsenic will resorb to soil after VOCs are reduced. The selected remedy, rather than merely hoping that arsenic will attenuate throughout the PAC remediation area, employs active measures to ensure that it reduces to protective levels. The aquifer underlying the PAC facility is a potential

drinking water source, and has been used in the past. In-situ oxidation is also expected to further diminish arsenic contaminant levels in the PAC downgradient area, due to the overall increased oxidation of the aquifer in the PAC source area. Therefore, considering the added certainty of arsenic cleanup afforded by in-situ oxidation, the value of the underlying aquifer, and EPA's policy of rapid restoration of ground water to its beneficial uses, enhanced source control is warranted at the PAC facility. Such enhanced source control will ensure that the PAC source area is restored to MCLs within a reasonable time period, considering the particular circumstances of OU 1.

With respect to ENSR's criticisms of EPA's risk assessment, such concerns, to the extent that they concern water supply development and zoning issues, are discussed in responses D-22, D-49 and D-53. EPA's long-term exposure scenarios (30 years), criticized by ENSR, are appropriately conservative, considering Agency risk assessment policy. EPA employs a conservative baseline, which does not include factors relating to potential future contaminant levels. To be appropriately conservative, the risk assessment must consider currently known data, not projected future data. The level of certainty regarding such future data is insufficient for the baseline risk assessment.

Comment D-27: ENSR disagrees with the reasoning contained in the FS regarding Alternative 3 with respect to overall protection of human health and the environment. It notes that acetone concentrations are steadily decreasing, and will disappear in four years. ENSR also states that acetone is localized on the PAC property, and rather than spreading, is probably contracting. According to ENSR, the action taken in Alternative 3 removes the source of contamination which in turn is expected to decrease the contaminant concentrations in ground water over time through natural attenuation.

EPA Response: ENSR fails to acknowledge that arsenic is consistently above health-based levels in ground water in the vicinity of the PAC source area, and is driving the risk in the PAC remediation area. EPA believes that the arsenic is both naturally occurring and anthropogenic (i.e. from man-made sources) at the PAC remediation area. EPA is concerned that an unacceptable risk will remain over time due to concentrations of arsenic in ground water. Excavation of the leachfields does not guarantee a reduction in risk in ground water within an acceptable timeframe. Applying in-situ oxidation as a treatment to further reduce arsenic concentrations in area ground water will quicken the restoration process and provide a greater degree of protection throughout the PAC remediation area.

With respect to acetone, EPA has considered data which shows a decrease in acetone concentration at the PAC source area. However, the ENSR report detected acetone (reported below health-based levels) in downgradient wells in June, 1993 which suggests a spreading of PAC contamination. It is thus erroneous to consider such contamination as localized to the PAC source area.

Comment D-28 ENSR commented that the reasoning applied to Source Control with respect to Compliance with ARARs as presented in the FS is flawed. As modelled by ENSR, the concentrations throughout the PAC remediation area will approximate target cleanup levels in four years, not six years as presented in the FS. The use of additional aggressive measures to accelerate cleanup is unjustified, since such measures will provide no actual reduction in risk of exposure.

EPA Response: As stated in Response D-27, above, arsenic is driving the risk in ground water within the PAC source area. Combining in-situ oxidation with excavation at the PAC source addresses both source control and management of migration of contaminants and assures a cleanup of PAC contamination, as soon as practicable, with technologies that are cost effective. For the reasons described in Response D-17, above, EPA believes that in-situ oxidation is not only justified, but is required in accordance with the NCP.

Comment D-29: ENSR believes that if EPA is uncertain as to whether Alternative 3 can reach cleanup objectives in a reasonable time frame, then in-situ oxidation should be employed as a contingency, only to be used if Alternative 3 proves ineffective after a sufficient period of monitoring. ENSR further justifies this approach by stating that pilot studies for in-situ oxidation cannot begin until limited source control actions are completed.

EPA Response: Lonza's comments also suggest that in-situ oxidation be employed as a contingency measure. See response D-21, above. With respect to the coordination between removal of the leachfields and in-situ oxidation, EPA believes that the type of coordination described by ENSR is not accurate. Pilot studies at OU 1 can be undertaken independently of source control measures. The timing and scope of the pilot study will be determined during remedial design.

Comment D-30: ENSR considers it inappropriate to specify the process option to be used to accomplish in-situ oxidation. ENSR states that the process option described in the FS is only one of

several process options which may be available. The FS did not evaluate these various process options and may not present the best approach. Other configurations may be more effective.

EPA Response: Both PAC and Lonza were involved in the development of this process option as described in the FS. PAC and Lonza representatives met with EPA and communicated with the FS consultant. These discussions addressed the possibility of in-situ oxidation as a technology and also considered the various process options. The ROD requires a certain level of specificity in evaluating alternatives and selecting a remedy. EPA believes that the in-situ oxidation process option described in the FS is a suitable option for the PAC facility, in accordance with the remedy selection process described in the NCP. Furthermore, EPA will require that in-situ oxidation be pilot tested to ensure its suitability to site conditions.

Comment D-31: ENSR believes that the PAC downgradient area, in the vicinity of wells MW-305 and -306, is a separate source of contamination. As such, the owners/operators of this downgradient area (Wetterau property) should be responsible for investigating contamination that may originate on their property.

EPA Response: As described in comment response D-12, data presented in the RI indicates that historic waste disposal practices at the PAC source area have contributed to the contamination presently detected in the PAC downgradient area, although the PAC source area may be diminishing as a source of VOCs and arsenic for the PAC downgradient area.

EPA has addressed the concern of a potential additional source contributing to the PAC downgradient area in the focussed investigation described in the ROD. EPA believes a focussed investigation of the PAC downgradient area is necessary to further identify and characterize the source or sources impacting the ground water in this area.

Comment D-32: ENSR advocates that leachfield #2 be studied before a final decision is made as to its removal.

EPA Response: EPA agrees that there is no direct evidence that leachfield #2 is contaminated. However, the indirect evidence is compelling. Concentrations of VOCs, including ethylbenzene and xylene, have been detected in well AW-3. Arsenic has been detected at 290 ug/l in the ground water at well AW-3. Lead has also been detected above health-based levels at well AW-3. Well AW-3 is in close proximity to leachfield #2. Historic analytical summaries of PAC facility wastewater dating back to 1981 indicate

the historic presence of VOCs in PAC facility leachfields. Exact discharges to leachfield #2 are not definitively known, and the leachfield is currently inactive. Ground water parameters in the vicinity of leachfield #2, measured for the ENSR report, indicate degraded ground water in the vicinity of leachfield #2. Considering all of this information, EPA determined that the removal of leachfield #2 is necessary to ensure the protectiveness and long term effectiveness of the remedy at the PAC facility.

Comment D-33: ENSR presented a comparison of two data sets collected from monitoring wells in proximity to the PAC facility. ENSR's review of the data pointed to certain general observations: 1) the dissipation of PCE at the PAC facility, 2) anaerobic biodegradation of contamination in well clusters MW-305 and -306, 3) appearance of PCE in well MW-307 in June, 1993, and 4) a consideration for a different source of VOCs in well clusters MW-305 and -306. Based on these observations, ENSR concluded the following: 1) a different suite of compounds is detected at wells MW-305 and -306, than that which is detected at the PAC facility; 2) contaminants found in wells MW-305 and -306 are not hydrologically downgradient from any similar compounds from the PAC source area; and 3) the concentrations detected at these wells are higher than any detected at PAC.

EPA Response: EPA believes that the conclusions offered by ENSR are not supported by the data to which they refer. As discussed in response D-12 above, EPA believes the data indicates that historic waste disposal practices at the PAC source area have contributed to the contamination presently detected in the PAC downgradient area, although the PAC source area may be diminishing as a source of contaminants for the PAC downgradient area.

The following points also cast doubt on ENSR's assertions: 1) EPA considers the PAC facility as being hydrologically upgradient from the contamination found in the PAC downgradient wells; 2) it is likely that the current hydrology associated with the PAC source and its relationship to the PAC downgradient area does not represent the hydrology of historic times when the leachfields were actively discharging; 3) little information is known about the PAC discharges, past PAC facility wasteline connections and PAC facility housekeeping practices with respect to the use of the leachfields; 4) certain VOCs detected in PAC downgradient wells, with the exception of benzene, can be linked to historic wastewater practices at the PAC facility; 5) arsenic has been detected in downgradient wells, and 6) most recently, ENSR itself has reported acetone detected in downgradient wells.

Comment D-34: ENSR states that EPA is inappropriately characterizing the exposure point concentrations (EPCs) of chemicals of concern (COC) in ground water at the PAC property.

EPA Response: The "exposure point concentration" calculation for ground water assumes that any part of the aquifer can be used for drinking water purposes in the future. This assumption is consistent with risk assessments at other Region I Superfund sites and is consistent with the Rhode Island Department of Environmental Management's classification of this aquifer.

Comment D-35: ENSR states that EPA uses the maximum detected concentration to characterize risk to the reasonably maximally exposed (RME) individual. This approach is inconsistent with more recent EPA Headquarters guidance. According to ENSR, the use of the upper 95% confidence interval concentration on the arithmetic mean is more meaningful and more representative of a reasonable maximum exposure.

EPA Response: EPA does not agree that the 95% upper confidence limit on the arithmetic average (the 95% UCL) across an entire ground water plume is representative of exposure. This is not inconsistent with other EPA Regions. Region I's experience is that calculation of the 95% UCL on a well or group of wells in the center of the plume results in a concentration that exceeds the maximum concentration. Thus, EPA considers the use of the maximum concentration a reasonable default value.

The use of the 95% UCL for the soils risk assessment may have made some difference in the final risk numbers. However, EPA considers this difference to be slight, and such difference does not affect the OU 1 remedy selection.

Comment D-36: While pleased that EPA has qualitatively acknowledged the uncertainty associated with the cancer slope factor for arsenic, ENSR states that EPA does not take this modifying factor into account in the FS.

EPA Response: The "modifying factor" of ten is a risk management factor, and thus, was taken into account in the remedy selection process. EPA notes, however, that when this factor was incorporated into the remedy selection process, arsenic risk at the PAC source area remained outside of EPA's acceptable risk range. In accordance with the NCP, this result requires active measures to restore the PAC source area to protective levels.

Comment D-37: ENSR states that EPA has maintained the

unreasonable assumption that all carcinogenic polyaromatic hydrocarbons (PAHs) are equal in potency to benzo(a)pyrene (BaP), which is considered by EPA to one of the most potent of the group of PAH compounds. However, ENSR states that EPA's Environmental Criteria and Assessment Office (ECAO) will be releasing a new document on recommended toxic equivalency factors for PAH compounds.

EPA Response: EPA is aware of the development of the document to which ENSR refers. EPA followed the existing ECAO guidance with respect to PAHs (i.e., assume all carcinogenic PAHs are equal in potency to BaP in conducting the risk assessment) for OU 1. EPA anticipates that this policy may change in the future and any new policy would be reflected in future risk assessments. However, the use of Toxic Equivalence Factors for PAHs would not affect the basis of the remedy for OU 1.

Comment D-38: ENSR states that EPA uses unrealistic soil exposure frequencies for the hypothetical future on-site resident of 350 days/year and for on-site construction worker of 250 days/year.

EPA Response: The soil exposure frequencies are consistent with EPA's standard default parameters. (Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors", OSWER Directive 9285.6-03, March 25, 1991.)

Comment D-39: ENSR states that EPA calculated risk for carcinogenic PAH in two ways: 1) for each individual carcinogenic PAH; and 2) for the sum of all carcinogenic PAH compounds. It is unclear to ENSR why this dual approach was used and how the total carcinogenic PAH concentrations for sediments, surface soil, and subsurface soil were derived.

EPA Response: Two different approaches were used in the derivation of EPCs for carcinogenic PAHs for sediments, surface soils and subsurface soils for the purpose of comparison. In the first approach, the maximum detected individual carcinogenic PAH for any sample for a given media was selected as the EPC. This maximum concentration for any one analyte was detected in different samples. In the second approach, the individual carcinogenic PAHs in each sample were first totalled, and then the maximum total carcinogenic PAHs, for any sample, were selected as the EPC. Therefore, the total concentration from the first approach would not equal the second because the individual concentrations are derived from different samples under a different approach. The estimated risk associated with carcinogenic PAHs does not drive the remedy.

Comment D-40: ENSR states that EPA has included a hypothetical exposure scenario for future on-site resident's exposure to subsurface soil. The assumptions used are unreasonable and this exposure scenario should be removed from the risk assessment.

EPA Response: EPA acknowledges that the subsurface soil exposure scenario is conservative but maintains that exposure to subsurface soils in the future is a real possibility. Again, this scenario is not the basis for selecting the remedy at the PAC remediation area.

3. CPC International, Inc.

On August 5, 1993, John F. Bomster and Dennis H. Esposito, attorneys for Adler, Pollock & Sheehan, submitted written comments, and supporting documentation, pertaining to the Proposed Plan on behalf of CPC International, Inc (CPC). CPC conducted and financed the RI/FS under an Administrative Order by Consent. CPC's comments are limited to those portions of the Proposed Plan relating to the CCL Custom Manufacturing facility (CCL remediation area). The comments and associated supporting documentation are included in the Administrative Record. A summary of the comments is provided below.

Comment D-41: CPC asserts that it is not a liable party under CERCLA. CPC describes that its sole relationship to the Site is as former owner of Peterson/Puritan, Inc. CPC states that Peterson/Puritan was a separately managed facility. Furthermore, when CPC sold its interest in Peterson/Puritan to Hi-Port Industries, it assumed the obligation to perform the RI/FS for the Site, which obligation is embodied in an Administrative Order on Consent signed by EPA and Peterson/Puritan. CPC maintains that its performance of RI/FS tasks, including recent revisions to the AOC between itself and EPA, do not constitute any liability finding against CPC.

EPA Response: CPC's comment is beyond the scope of this Responsiveness Summary. The public comment period on the Proposed Plan was provided to allow interested persons to comment on the proposed remedial action for OU 1, as presented in the Proposed Plan. Liability issues may be further discussed during future negotiations for implementation of the OU 1 remedy.

Comment D-42: CPC asserts that the Providence and Worcester Railroad Company ("P & W") is a liable party under CERCLA. CPC

bases this assertion on a spill of perchloroethylene in 1974 at the Peterson/Puritan facility, with which P & W was purportedly involved.

EPA Response: Like comment D-41, this comment is beyond the scope of this Responsiveness Summary, which is limited to comments on the proposed remedial action at OU 1.

Comment D-43: CPC contends that there is no identified risk, or threat of risk, of injury to human health or the environment associated with present land use in the area, and that EPA's assumption of future residential use for OU 1 is not a realistic prospect for the foreseeable future.

EPA Response: The risk identified for contaminated ground water throughout the CCL remediation area is future residential use. The remedy selected at OU 1 is based on future residential use of ground water. As more fully explained in response D-22 above, EPA believes that future residential use of the ground water at OU 1 is realistic based on historical use and the Rhode Island Department of Environmental Management's classification of this aquifer.

Comment D-44: CPC recommends a remedial strategy that includes: excavation (manholes and catch basins), capping, source area ground water extraction, treatment and discharge to POTW as needed in conjunction with soil venting of source area soils, natural attenuation of the Quinnville wellfields, institutional controls, and environmental monitoring.

CPC believes that this remedial strategy will be protective of human health and the environment, is consistent with the NCP, is cost effective, and is all that is warranted under CERCLA to remediate contamination associated with OU 1.

EPA Response: CPC's recommended remedy for the CCL remediation area, as described above, was considered as Alternative 3 in the FS. CPC's remedial strategy does not contain active measures to restore downgradient ground water contamination which exceeds health-based levels throughout the CCL downgradient area. Active restoration of the CCL downgradient area is necessary to be protective of human health and the environment.

According to CPC's recommended remedy, institutional controls would be solely relied upon as a protective measure throughout the geographic extent of the CCL downgradient area. Institutional controls, relied upon as a sole measure of response, are questionable in their ability to provide adequate

protectiveness and are considered to be less protective than EPA's selected remedy which calls for active treatment of the CCL downgradient area. See response D-63. The active response measures selected by EPA for the downgradient area greatly reduce the amount of time for which institutional controls must be relied upon throughout the CCL downgradient area.

Comment D-45: CPC believes EPA's preferred alternative that includes remediation of the ground water by use of pump-and-treat technology is not mandated by Section 121 of CERCLA because the statute does not mandate remediation when there is no present or future risk to human health or the environment. In addition, presently available ground water technology does not support the expectation that EPA's projected pump-and-treat approach would be effective in attaining cleanup levels in the source ground water, given the nature and characteristics of the contamination.

EPA Response: The findings of the Human Health Baseline Risk Assessment indicate that there are potential future risks to human health associated with contamination in ground water throughout the CCL remediation area. Therefore, under CERCLA, as amended, and the NCP, EPA has authority to implement a remedial action which is protective of human health and the environment. As described in § 121, there is a statutory preference for remedial actions which employ treatment which permanently and significantly reduces the volume, toxicity or mobility of contaminants as a principal element.

EPA disagrees with CPC that available ground water pump and treat technology would be ineffective at OU 1. Pump and treat technology is commonly and successfully used at hazardous waste sites in remediating ground water contamination. Furthermore, CPC's own documentation, as presented in the FS, indicates that a majority of the source of contamination is held in the tank farm soils. This information was considered in evaluating the predicted success of the selected remedy. By combining soil and ground water technologies, source contamination will be reduced to cleanup levels at the CCL source area within an estimated 12 years.

Each of these treatment technologies in the selected remedy was evaluated in Section 4 of the FS. A single recovery well, which operated at the CCL facility for a number of years, provided data indicating that a newly designed system will be effective in mitigating the migration of ground water from the source to downgradient areas. Such system will also effectively act to lower the ground water table to aid dewatering of the tank farm. This will in turn enhance the SVE system.

Information presented on the findings of the SVE pilot indicates that this technology will significantly reduce VOC contamination held in the soils above the ground water table.

Comment D-46: CPC believes that the remedial requirements of CERCLA will be satisfied by a 2-year program of source-area remediation designed to remove soil contamination and to prevent further downgradient contamination. By cleansing the source-area soils to the extent practicable, the natural attenuation of the Site ground water would be substantially accelerated and the attenuation period for the downgradient plume would not be significantly prolonged in light of present and projected land use and EPA's imposition of institutional controls for the area.

EPA Response: EPA disagrees. As more fully explained in responses D-43, D-44, D-45, D-75, D-76, D-78, and D-80, the approach advocated by CPC is not protective of human health and the environment, while the selected remedy meets the threshold criteria and provides the best balance among the other remedy selection factors set forth in the NCP.

Comment D-47: CPC contends that Site risks based on the Lenox Street well are irrelevant to OU 1 and should not be referenced in the ROD. CPC states that EPA's Proposed Plan is in error when it states on page 5 "Preliminary studies in 1982 indicated that the Peterson/Puritan Inc. facility was a major source of contamination found in the Quinnville wells and that similar contamination, found in the Lenox Street Well .... suggested a potential link to the identified source."

CPC further states that The Malcolm Pirnie Report (June 1983 pp. 1-8) established that the Lenox Street well contamination did not originate with the Site plume. Moreover, CPC cites the EPA's Remedial Project Manager, David J. Newton, as stating at the public information meeting held on July 15, 1993, that EPA did not believe the Lenox Street well contamination originated from the Site. Remedial activity at the Site--designated as Operable Unit 1 ("OU 1") by EPA--will not have any material effect on contamination detected in the Lenox Street well.

EPA Response: EPA disagrees with CPC's comments. EPA considers the Lenox St. well to be a part of the Peterson/Puritan, Inc. Superfund Site. The Peterson/Puritan, Inc. Site Listing Document identifies the Quinnville and Lenox St. wells as receptors to Site contamination. The Site is further described in the Proposed Plan as the extent of contamination that has impacted wellfields in the towns of Lincoln and Cumberland and encompasses approximately two miles of the Blackstone Valley, including the

industrial park in the vicinity of Martin St., the J.M. Mills landfill and the wellfields. Contamination similar to that found in the Quinnville wells was found in the Lenox St. well in 1979 by RIDOH. It was this detection of contamination that rendered the wells inactive and that prompted investigation of the source or sources impacting the wells. Early investigations concluded that the Peterson/Puritan, Inc. facility was a major source of Site contamination.

The Malcolm Pirnie report, in 1983, concurred with EPA and its consultants that the available data at the time was insufficient to ascribe the contamination at the Lenox St. well to any specific source. Early investigations (GZA, 1982, Malcolm Pirnie, 1983) differed as to whether the Lenox St. well was impacted by contamination emanating from OU 1 during periods of reduced pumping rates at the Quinnville wellfield.

Current data under non-pumping conditions does not strongly suggest a direct connection between the Lenox St. well and the CCL downgradient plume. However, the current hydrology does not mirror the conditions of the aquifer when the wellfields were fully active. Therefore, definitive information identifying the source of contamination impacting the Lenox St. well has not been established and will be further investigated as appropriate in the context of a second operable unit. Mr. Newton's remarks at the public meeting were misinterpreted. While information is speculative as to the impact of the Lenox St. well from the CCL downgradient plume (i.e. OU 1), the Lenox St. well is indeed part of the Site.

Comment D-48: CPC contends that EPA recognizes in the Proposed Plan that ground water conditions at OU 1 do not pose any present risk to human health or the environment. CPC also contends that EPA's calculation of future risks is dependent on a risk scenario that is inconsistent with the industrial history of OU 1, naturally occurring constituents of the soil and ground water, and present and future uses of the OU 1 area. Therefore, EPA's remedial plan fails to address the problems of the Site properly.

EPA Response: As addressed in responses D-43 and D-45, EPA's assumptions regarding future use of ground water are consistent with the historic use of ground water at OU 1. EPA's remedial plan is designed to address this use (i.e. a drinking water source). Naturally occurring elements were considered in the development of the risk assessment, and are properly addressed in the selected remedy.

Comment D-49: CPC states that EPA has identified no present

risks arising from ground water contamination at OU 1. The Proposed Plan states "The Risk Assessment determined that there are no current health risks associated with human exposure to ground water for the following reasons: all residents obtain drinking water from municipal water supplies, which prevent them from being exposed to ground water contamination from the site, and the drinking water wells historically impacted by the site are not presently used."

CPC states that the impacted Town of Lincoln wells upon which ground water risks are based were closed in 1979 and the wells have been replaced by alternative municipal sources (RI, June 1993). Closure of the Martin Street well was attributed to high levels of naturally occurring iron and manganese and occurred prior to discovery of any contaminants and prior to the 1974 rail car spill. There are no private wells in the area impacted by OU 1. CPC questions the residential risk assumptions. Based upon the flood plain designation for this area, and the Town of Cumberland Comprehensive Plan, the industrial use of OU 1 will remain unchanged.

EPA Response: As discussed in responses D-43, D-44, and D-45, the Risk Assessment identified a future residential risk in the use of ground water. The State of Rhode Island views the aquifer underlying the Site as a potential drinking water source. The floodplain designation and the Town of Cumberland Comprehensive Plan only designate land uses within OU 1; these documents in no way affect the designation of the ground water within OU 1 as a potential drinking water source or the conclusions of EPA's risk assessment. Barring effective institutional controls, water can be pumped from the aquifer underlying OU 1 and be distributed for use. CPC should further note the comments submitted by the Town of Cumberland, identified in part B of this Responsiveness Summary. Such comments indicate the Town's concern for the loss of its water supply and position that it be restored for future use.

Comment D-50: CPC contends that if source soil is remediated the downgradient portion of the contaminant plume, if left alone, will remediate itself without treatment through natural attenuation to the extent possible and consistent with the presence of DNAPLs in the ground water. The downgradient ground water also will, in due course, naturally achieve contaminant levels approximating drinking water standards. Even if ingestion of significant amounts of the ground water were possible, the exposure risk levels would not be meaningful.

EPA Response: The approach advocated for in this comment is inappropriate for OU 1, for reasons set forth in responses D-43,

D-44 and D-45. EPA again emphasizes that the remedial plan at OU 1 calls for reducing soil contaminant levels such that ground water is protected. The future use of ground water is assumed to be residential drinking water. This exposure scenario assumption is not inconsistent with historic use, EPA's risk assessment, or the RIDEM ground water classification.

Comment D-51: CPC states that the assumption of future residential use and residential exposure use of OU1 is inappropriate for the following reasons: EPA guidance documents require the historic use of OU 1 to be taken into consideration; the municipality's intentions demonstrate clearly established industrial plans for future industrial use of OU 1; the current zoning status and future use are set forth in the Town of Cumberland's Comprehensive Plan. In addition, CPC quotes the testimony of Robert M. Sussman, EPA Deputy Administrator. Sussman recently told a congressional subcommittee that in the immediate future, the EPA's efforts in the risk assessment area will focus on, among other things, consideration of the future uses of sites to be remediated. Sussman testified that the EPA has been criticized for making future land use assumptions without sufficient input from local communities and for being overly conservative in its remedy selection. Sussman stated the EPA is likely to take the position that the current land use of a site should be assumed to be the future land use. Other future uses may be considered if there is persuasive information to show the current land use is likely to change.

EPA Response: One of the primary objectives of EPA's Superfund Program is the restoration of contaminated ground waters consistent with their current or reasonably expected future use. The NCP states that "EPA expects to return useable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site." (40 CFR 300.430 (a)(1)(F)). Ground water is a valuable resource which should be protected and restored where necessary and practicable. It is EPA's policy to consider the potential beneficial uses of the ground water and to protect against current and future exposures. Even though the ground water is currently not being used as a drinking water source, it may be used in the future as indicated by its history and the State's ground water classification. (See responses D-22, D-43, D-44, D-45, and D-49).

EPA policy requires the use of appropriately conservative assumptions regarding future land use of a site. EPA's risk assessment was performed in accordance with this policy. Mr. Sussman's comments point out the sensitive nature of future land use assumptions in the CERCLA context. EPA believes that its

current policy, as reflected in the risk assessment for OU 1, enables the Agency to select remedies that are protective of human health and the environment. Potential future modifications to EPA risk assessment policy, as CPC describes, do not apply to the risk assessment performed for OU 1. Any such modifications would only apply to risk assessments performed after the effective date of any EPA guidance or policy containing these modifications.

Comment D-52: CPC contends that a review of EPA guidance does not support EPA's choice of future residential land use. CPC cites OSWER Directive 90-355.0-30 (April 1991) p.5, "[t]he potential land use associated with the highest level of exposure and risk that can reasonably be expected to occur ....".

CPC also quotes a letter from its former counsel to EPA, Region 1 pp. 1-2 (Nov. 19, 1992), which states the following:

> While recognizing that risk assessment generally qualifies future land use as residential, the guidance quotes the National Contingency Plan [preamble] ("NCP") stating, "the assumption of future residential land use may not be justifiable if the probability that the site will support residential use in the future is small. Sites that are surrounded by operating industrial facilities can be assumed to remain as industrial areas ...." U.S. EPA, role of Baseline Risk Assessment in Superfund Remedy Selection Decisions (emphasis added in letter).

In addition, CPC quotes the U.S. EPA, Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual (Part A) Interim Final EPA/540/1-89/022, Office of Emergency Remedial Response, p. 6-7 (Dec. 1989), which states that in determining the proper future use scenario, "established land use trends in the general area and the area immediately surrounding the site" should be evaluated using Census Bureau of state or local reports, or general historical accounts.

EPA Response: It is a matter of Region I policy to evaluate future residential land use at Sites where residences are located nearby. EPA again points out that the basis of the remedy at OU 1 is future residential use of ground water. It is inappropriate to employ an industrial use scenario in the risk assessment for OU 1 ground water when the aquifer beneath OU 1 is classified as a potential drinking water source. The assumption that this ground water may be used in the future as a drinking water source is valid and reasonable, as discussed in comment response D-22.

Comment D-53: CPC contends that the history of the Site as an industrial area is well established in the RI and the Feasibility Study (FS) (June 1993) and that the probability of residential use in the future is small, therefore the residential risk exposures used for the baseline risk assessment are inappropriate. CPC cites the Town of Cumberland Comprehensive Plan as evidence to support this claim.

The Comprehensive Plan describes the Site as follows:

"Martin Street Industrial Area: Immediately north of the New River site and on the Blackstone River is the Martin Street Industrial Area. This site is bounded on the west by the Blackstone, bounded to the north by Ashton Park Industrial Area, and to the east by mixed use development and Mendon Road and the south by Martin Street. The site is approximately 48 acres in size. It is predominantly developed but is included in the site inventory because of the existence of the Roger Williams Food Complex which is currently vacant. Much of the Roger Williams site and vacant parcels adjoining the Blackstone River are likely to inhibit any future large scale development and reactivation of the Roger Williams property is more important to the community than new construction within the site."

EPA Response: EPA acknowledges the information contained in the Cumberland Comprehensive Plan. Only approximately 65 percent of OU 1 is located within the Blackstone River floodplain. The remainder of OU 1 could be redeveloped. Other areas, adjacent to OU 1, and outside of the floodplain, could also be redeveloped. While OU 1 is zoned for industrial use, municipal wells have been sited both in OU 1 and adjacent to it. While inactive due to Site-related contamination, these wells are located in highly transmissive ground water production areas, and the aquifer is viable. See responses D-22 and D-49. Comments submitted by the Town of Cumberland, identified in part B of this Responsiveness Summary, indicate the Town's concern for the loss of its water supply and position that it be restored for future use. The Town's Comprehensive Plan cannot be relied upon to ensure that current land use patterns will remain unchanged in the foreseeable future. In fact, pursuant to the Rhode Island Comprehensive Planning and Land Use Act, the Town's plan must be updated every five years. Such updates, which may account for growth within a town, could result in future changes to land use within OU 1. EPA's risk assessment must be conservative in order to ensure protection of human health and the environment.

Comment D-54: CPC cites the Cumberland Comprehensive Plan as projecting twenty more years of industrial use at OU 1. Accordingly, CPC states that its alternative remedial scheme will

address OU 1 contamination well within the time frame in which industrial use is projected to continue in a manner that is protective of human health based on industrial use. CPC states that in view of the continuing attenuation, downgradient contamination levels already approach MCL standards, EPA's inclusion of health risks associated with naturally occurring arsenic notwithstanding.

EPA Response: As described in response D-53, above, the Town's Comprehensive Plan does not guarantee that land use patterns will remain unchanged in the foreseeable future. Also, as described in response D-43, the aquifer underlying OU 1 is a valuable resource whose potential use is not necessarily linked to actual residential development within OU 1. CPC's assessment of contaminant levels at OU 1 is also flawed. As described in the RI, tetrachlorethene, trichloroethene, and vinyl chloride were detected in the CCL downgradient area during the conduct of the RI, at concentrations of 260 ug/l, 55 ug/l, and 10 ug/l, respectively. These concentrations are well above the MCLs for these compounds.

Comment D-55: CPC believes that the history of pollution in the Blackstone River is also relevant to the future prospects for any residential scenario encompassing use of ground water for drinking purposes. According to CPC, river water would comprise 80 percent of drinking water under normal pumping conditions at the Quinnville wellfield, thus yielding drinking water that may well exceed MCLs. Moreover, the presence of naturally occurring iron, manganese, and arsenic in the area could also present significant concerns as to MCLs and potability of the water.

EPA Response: EPA acknowledges the history and past use of the Blackstone river, including its current designation as a Class C waterway. However, the Quinnville wellfield was a drinking water source until 1979, when it was closed due to OU 1 contamination. Prior to its closure, the wellfield provided water that did not pose any health threats. Thus, the assumed contribution of river water was not considered to pose an unacceptably adverse impact on wellfield water quality prior to wellfield closure. River water quality has improved since closure of the wellfield, as alluded to in the comments by Save The Bay. See comment A-3. Therefore, the assumed contribution of river water is expected to pose less adverse impacts on the wellfield should it resume production in the future.

Cumberland maintains active wells north of the Site, (Manville wells 1 and 2) within the Blackstone Aquifer, where the river is classified as C. For any municipal well located in this aquifer, in proximity to the river, it can be expected that a contribution

of the total water supplied from the well originates from the river. However, river water quality has not led to the permanent closure of these wells. Similarly, the Quinnville wells remained in service until VOC contamination from OU 1 caused the closure of these wells.

While the presence of iron and manganese may be a concern in portions of the aquifer, municipalities typically take measures to address these naturally occurring elements. However, it is the presence of carcinogenic risks, due to VOC and arsenic contamination, that necessitates remediation of the aquifer.

Comment D-56: CPC cites evidence that much of OU 1 is located in a flood plain, making it unsuitable for residential development. The limits imposed by its designation within the flood plain make residential financing and development virtually impossible. Federal Emergency Management Agency, Flood Insurance Rate Map, Town of Cumberland, Rhode Island, Providence County, Parcel 6 of 7, Community-Panel No. 440016 0006B (Feb. 16, 1990) and Panel 7 of 7, Community Panel No. 440016 0007C (June 16, 1992). This is clear and convincing evidence that future use of the Site will be limited to industrial use for the foreseeable future. CPC suggests EPA designate the use of the site as industrial when evaluating site risk and in developing the remedial plan.

EPA Response: EPA disagrees with this comment, for reasons fully set forth in responses D-22, D-49 and D-53.

Comment D-57: CPC suggests EPA's Preferred Plan should take into account two factors in addressing an appropriate remedy. The first factor for consideration is that there are no current health risks associated with human exposure to ground water; the second factor is the most probable future industrial use of the site.

EPA Response: EPA disagrees, as fully set forth in responses D-22, D-43, D-44 and D-45.

Comment D-58: CPC states that the Risk Assessment scenario assumes reopening of the Quinnville wellfield for residential water use in that this wellfield is a potential receptor for risk assessment purposes. CPC recognizes that the NCP requires evaluation of "actual and potential exposure pathways through environmental media." However, this potential exposure pathway is based on ground water from the wellfield for use as drinking water and household uses such as showering. CPC contends none of these uses are appropriate for ground water in the vicinity of OU

1 at least for the foreseeable future.

EPA Response: The Quinnville wellfield was properly considered to be a receptor of OU 1 contamination in the risk assessment. As described in response 47, the NPL Listing Document considered the wellfield as a receptor. Furthermore, the potential future use of the wellfield as a drinking water source is a realistic possibility. See response D-22.

Comment D-59: CPC recommends that if EPA insists on maintaining its position on use of the Quinnville wellfield as a receptor, it retain the multiplication of 0.20 factor as used in the draft Risk Assessment. In the draft Risk Assessments, the exposure point concentrations at the Quinnville wellfield were calculated by multiplying downgradient monitoring well concentrations by a factor of 0.20 under pumping conditions. This factor represented the contribution of ground water from the downgradient plume to the wellfield under pumping conditions and acknowledged that the primary recharge for the wellfield is the polluted Blackstone River. Support for use of the multiplication is found in the RI which cites the Johnson and Dickerman (1974a) study to show that 80 percent of wellfield yield is derived from the Blackstone River after 10 days of pumping.

Use of this multiplication factor brought calculated contaminant levels at the wellfield within MCLs. The Final Risk Assessment eliminates the multiplication factor and makes the Quinnville wellfield exposure point concentrations as the same as the downgradient area. CPC believes use of the 0.20 multiplication factor is more predictive of and site-specific for EPA's assumed potential risk at the Quinnville wellfield receptor area.

EPA Response: Under pumping conditions, the CCL contaminant plume impacts the Quinnville wellfield. Even considering dilution of river water to the Quinnville wellfield, RI sampling data indicates contaminants which exceed health-based standards under pumping conditions. Assuming no active measures are taken in the CCL downgradient area to control the migration of ground water contamination, EPA believes that the risks posed by reactivating the Quinnville wellfield would still exceed EPA's acceptable risk range, and exposure point concentrations of three compounds (tetrachloroethylene, trichloroethylene and vinyl chloride) would exceed MCLS. This belief is based on the history of contamination detected at the wellfield during pumping, and the degradation and concentration of the plume measured in the CCL downgradient area. Furthermore, according to EPA policy, the dilution factor is not an appropriate consideration in the risk assessment process. Although the Quinnville wellfield was considered a receptor of the CCL plume, it is by no means the

exclusive potential receptor. Another existing well, such as Martin St., or a potential future well could be impacted by the CCL plume, while receiving much less dilution from the river.

Comment D-60: CPC contends that control of all present and potential risks associated with ground water at the Quinnville wellfield can be accomplished without any active treatment. At present there is no risk, and institutional controls will prevent future risk. CPC challenges the inference that institutional controls for the Quinnville wellfield are imposed for the purposes of addressing present contamination or associated risk at the wellfield from OU 1. The RA states there is no present risk from ground water and testing throughout the development of the RI/FS has not revealed contaminant levels in excess of drinking water standards in any part of the wellfield.

The underlying premise of future ground water risk is the speculation that the Quinnville wellfield might be reactivated, and that, in the event of heavy pumping, ground water contamination may be transported under the river, contaminating the wellfield. However, there is no present intent or need to use the wellfield and institutional controls can be used to prevent future use.

EPA Response: EPA disagrees with this comment for reasons set forth in response D-22 discussing the viability of the aquifer; response D-58 discussing the appropriateness of the Quinnville wellfield as a receptor; and responses D-44 and D-63 discussing institutional controls. Furthermore, the risk observed at OU 1 is not exclusively based on the Quinnville wellfield as a receptor. Any municipal development of OU 1 ground water for consumption would result in the risks noted in the risk assessment. Also, any municipal development, at Quinnville or elsewhere in OU 1, would exacerbate ground water contamination by drawing contamination to the wellhead.

Comment D-61: CPC contends that numerous factors, unrelated to OU 1, adversely affect water quality in the Quinnville wellfield under pumping conditions and make the possibility of future ground water use at the Site both unlikely and impractical. These factors include that recharge from streams (presumably the Blackstone River and the Blackstone Canal) is the primary source of water to the most heavily pumped wells in the area of the Blackstone River, and that routine testing of the Quinnville wellfield by RI Department of Health detected dieldrin contamination considered to be from facilities located upstream and unrelated to the Site.

EPA Response: EPA acknowledges that wells located along the river will derive a portion of their water indirectly from the river. As discussed in response D-55, the river water quality was not, in itself, the source which caused the closure of municipal supply wells in the vicinity of the Site.

Dieldrin, a pesticide compound used historically in the textile industry and detected in Brook A sediments, was one of several pesticides identified as a contaminant of concern for ecological receptors. However, the Ecological Assessment concluded that Brook A does not provide likely or valuable habitat for ecological receptors. The RI included testing for dieldrin throughout OU 1 in ground water. Such testing did not detect it at concentrations that required further scrutiny as a contaminant of concern for the OU 1 Human Health Risk Assessment.

Comment D-62: CPC believes that the assumption that remediation of the CCL plume will improve water quality at the Quinnville wellfield is inappropriate because other multiple sources of ground water recharge identified in the GZA report contribute to contamination found at the Quinnville wellfield, and they will not be affected by the cleanup of the CCL plume.

When the wellfield is under pumping conditions, GZA identified ground water sources not only from the west, but also "from the Blackstone River or from ground water flow on the east side of the river... Areas of possible recharge under pumping conditions therefore include the north end of the J. M. Mills landfill and the entire industrial park in Cumberland." Thus according to CPC, institutional controls to prevent use of ground water are not mandated solely by the status of the CCL plume, but by the poor water quality of the other sources of recharge. Remediation of the downgradient CCL plume will impact the wellfield only under heavy pumping conditions.

EPA Response: CPC's own consultants (Malcolm Pirnie, VERSAR, and ABB) agreed with the findings reached by EPA that the (former) Peterson/Puritan, Inc. facility was a primary source of contamination impacting area ground water, including the Quinnville wellfield.

Malcolm Pirnie concluded that the Peterson/Puritan facility is the principal (though not sole) source of volatile organic contamination in the Site study area. Malcolm Pirnie further concluded that under pumping conditions, VOCs released from the Peterson/Puritan, Inc. facility can reach the Quinnville wellfield, and that volatile organic compounds comprise the major type of contamination to ground water in the Site study area. VERSAR and ABB did not dispute this conclusion.

EPA is aware of ground water modelling which suggests a contaminant link to the wellfield from J. M. Mills landfill. EPA has identified this part of the Site as Operable Unit 2 for future response actions as necessary. Thus, institutional controls are required for the Quinnville wellfield until such time that the contaminant sources impacting the wellfield are fully identified and addressed.

The purpose of the CCL downgradient active response measure is to control the extent and spread of the CCL contaminant plume in order to restore the aquifer to its beneficial use, as soon as practicable, throughout OU 1.

Comment D-63: CPC states that the CCL downgradient plume should be addressed solely through institutional controls. While acknowledging the statutory preference for remedies employing treatment, CPC believes that the characteristics of the CCL downgradient plume are such that active restoration is not required. CPC cites the NCP in support of its proposition. Adding that institutional controls will be completely reliable at the CCL downgradient plume, CPC states that institutional controls will achieve MCLs in a reasonable time period.

EPA Response: The CCL downgradient plume, stretching almost one half mile to the Blackstone River, represents a major contaminant source in the Blackstone Valley aquifer. The aquifer is an important ground water resource. The portion of the aquifer now contaminated by the CCL downgradient plume was a drinking water source prior to the contamination now emanating from the CCL facility. As such, rapid restoration of the aquifer is appropriate. Such restoration can be readily achieved through the known technologies to be employed in the CCL downgradient area.

By contrast, CPC's recommended remedy allows institutional controls to be the sole measure taken in the CCL downgradient area. Institutional controls are questionable in their reliability, since they depend on the cooperation of adjacent landowners and enforcement by governmental agencies and private parties. Such factors make institutional controls considerably less protective than active measures. For these reasons, institutional controls should not be used as the primary remedy when more active remediation measures, which provide greater reliability in the long term, are practicable.

As stated in response D-67, the pump and treat technology to be employed at the CCL downgradient area is proven to be effective. This technology is far more reliable than institutional controls because it minimizes the amount of untreated waste at OU 1, as

opposed to CPC's recommended remedy.

Comment D-64: CPC believes that the potential human health risk identified by EPA as arising from contaminated source soils is addressed in the remedial plan CPC has recommended. The remaining potential risks arise from naturally occurring arsenic and possible ingestion of ground water. CPC states EPA has determined that ground water poses no present risk because there is no opportunity for human contact. Future risk will be eliminated through institutional controls.

EPA Response: EPA disagrees with this comment, for the reasons set forth in responses D-43, D-44, D-45, and D-63.

Comment D-65: CPC reminds EPA that CERCLA does not require remediation of naturally occurring substances either in their unaltered form or as altered solely through naturally occurring processes or phenomena. Evidence indicates that naturally occurring arsenic is present at the CCL portion of the Site at levels that exceed both MCLs and the total excess cancer risk of greater than $1x10^{-4}$ to $1x10^{-6}$. CPC contends that EPA has introduced a risk management factor to reduce assumed risks as they pertain to arsenic that CPC believes is unnecessary.

EPA Response: Available evidence indicates that arsenic contamination in the CCL downgradient area may not be anthropogenic. However, environmental monitoring throughout the remedial action will assess the extent of arsenic in the CCL downgradient area, and the risk that it presents. The response actions to be employed at the CCL downgradient area are required to remediate VOC contamination. After the completion of such remedial actions, any residual risk posed by arsenic, and other contaminants, will be evaluated in an EPA risk assessment. The issue of EPA's use of a risk management factor for arsenic is discussed in response D-66, below.

Comment D-66: CPC believes that the presence of naturally occurring arsenic at OU 1 will remain even after the extensive VOC remediation designed to reduce the level of risk at OU 1 to $1x10^{-4}$ to $x10^{-6}$ range has been conducted. CPC states arsenic will remain in quantities that will produce a risk level on the order of 10^{-3}. This naturally occurring arsenic makes it factually impossible for EPA to remediate the ground water for residential use to acceptable risk limits set by EPA.

EPA Response: EPA has identified a risk management factor for arsenic which EPA finds is protective of human health. The note

at the bottom of Table I in the ROD explains the rationale for the risk management factor. The result is that arsenic at this Site is managed as if it were one order of magnitude lower than the calculated risk. Consequently, the carcinogenic risk for arsenic at 50 ug/l (cleanup level) is managed as 10^{-4}, which is within EPA's risk range. Arsenic has only been detected above the MCL at a single location in the CCL downgradient area. Based on available data, EPA does not believe that arsenic in the CCL downgradient area will adversely impact the selected remedy's ability to restore ground water at OU 1 to protective levels. In accordance with the ROD, a future risk assessment will quantify the residual risks posed by all contaminants of concern, including arsenic, at the CCL downgradient area.

Comment D-67: CPC contends that the EPA Proposed Plan does not take into account the characteristics of PCE, which is a main contaminant at OU 1. EPA has set interim cleanup levels, based on MCLs, MCLGs, or Rhode Island Drinking Water Standards, that studies indicate present technology cannot achieve. PCE is a chlorinated solvent identified among the compounds classified as dense non-aqueous phase liquids. These compounds, commonly referred to as DNAPLs, are characterized by their persistence and failure to respond to conventional pump and treat technology. The result of EPA's own recent study reveals the ineffectiveness of pump and treat technology in addressing DNAPLs. The emerging consensus based on the results of these studies is that current technology is incapable of restoring a contaminated aquifer to drinking water standards when DNAPLs are presence. CPC cites U.S. EPA, Evaluation of Ground-Water Extraction Remedies: PHASE II, Vol., 1 Summary Report, Publication 9355.4-05, Office of Emergency and Remedial Response (Feb. 1992).

EPA Response: The term Dense Non-aqueous Phase Liquids (DNAPLs) has sometimes been used to refer to dissolved- or aqueous-phase contaminants. However, to clarify, the term DNAPL should be reserved exclusively for non-aqueous (immiscible) phase liquids. Tetrachloroethene (PCE) is a chlorinated solvent which has a density greater than 1 (relative to water) which will cause the compound to sink in an aquifer if a sufficient quantity has been released. Soil properties, such as soil heterogeneity, intrinsic permeability, mineralogy, pore size, pore geometry, and macropores all influence the compound's mobility in the subsurface.

PCE is a major component of the CCL remediation area plume. As presented in the RI/FS, approximately 6200 gallons of PCE was released from a railcar at the CCL facility in 1974. It is this spill, and other historical releases of VOCs to the facility sewer system which comprise the CCL source.

While indirect evidence points to the possibility of DNAPL at the CCL source, no actual DNAPL has been reported in any Site investigation to date. Current information indicates a very high concentration of VOC compounds contained in the soil beneath and in the vicinity of the CCL tankfarm. High concentrations of VOCs in ground water in the tankfarm area indicate that the VOC contamination has reached the ground water table and is continuing to disperse. Ground water samples taken from throughout the CCL remediation area have indicated a marked decrease in plume concentration in the aquifer away from the source. If present, DNAPL could serve as a long term source of contamination to the CCL source area. This could impact the ability of the remedial action to achieve cleanup levels at all points throughout the CCL source area in a reasonable time period.

EPA guidance documents, while informing the public of the degree of difficulty in achieving cleanup levels where DNAPL is present, point to current treatment technology, such as soil vapor extraction and ground water pumping and treatment, as the most effective means to date to both recover DNAPL from the subsurface and to prevent plume migration. The selected remedy employs these technologies at the CCL remediation area. The EPA report, referred to by CPC, indicates that certain sites failed to achieve identified cleanup goals within the predicted timeframe due to a serious underestimation of the mass of contaminant released at those sites. At the CCL facility, the major component of the total mass of contaminant released was from the railcar spill. Therefore, there is a much better understanding of the total mass of contaminant which has been released at OU 1.

EPA has taken into account the contaminant properties, sampling data, and remedial technologies in selecting the appropriate remedy for the CCL remediation area. While the possible presence of DNAPL at the CCL source remains a concern, the existence of DNAPL has not been proven. However, CPC's consultant, in development of the FS and as presented in Appendix E of the FS, took into account the potential for DNAPL at the source in estimating the cleanup timeframes and in identifying appropriate remedial technologies for the CCL remediation area. Given this data, it was estimated that under the no action alternative, the CCL remediation area would meet cleanup standards in 30+ years. However, applying source control measures as identified in the proposed plan, the source will be depleted in an estimated 12 years. With the source depleted, restoration of the aquifer is considered to be achievable.

The source control measures, as identified in the Proposed Plan and in the ROD, are considered to be effective in mitigating the migration of contaminants to the downgradient area. The location

and extent of the source, along with a shallow depth to bedrock and limited infiltration, all favor mitigating contaminant migration. In doing so, the source control measures are, in effect, providing containment of the source. Therefore, there would be no appreciable difference between containment and full remediation of the source at OU 1.

EPA has considered the potential for DNAPL in Section X of the ROD. The ROD provides that certain modifications can be made to the remedial systems during the period of operation. The ROD further states "[i]f, following a reasonable period of system operation, EPA determines that the selected remedy cannot meet cleanup levels, EPA may consider contingency measures as a modification to the selected remedy." By employing this approach, the ROD ensures that the selected remedy will maximize the efficiency of the CCL source control measures, while also recognizing that other measures may be necessary in the future, based on future site information.

Comment D-68: CPC cites the Congressional testimony of EPA's Deputy Administrator, Robert Sussman, on the issue of the Agency's efforts to address DNAPLs in ground water. Sussman described this issue as "one of the most difficult problems facing the Superfund program" and acknowledged that the traditional "pump-and-treat" methods have proven ineffective in dealing with DNAPLs. CPC also notes that EPA has identified the need for guidance on the DNAPL issue in its Superfund Administration Improvements, Executive Summary (June 23, 1992).

EPA Response: Mr. Sussman's comments regarding DNAPLs reflect current Agency concern regarding the presence of DNAPL at sites. The Agency is currently exploring ways to increase its effectiveness in remediating sites where DNAPL is present. At OU 1, DNAPLS have not been identified. EPA believes that the selected remedy may be able to restore ground water to cleanup levels. However, the selected remedy takes into account that possibility that EPA may reevaluate and, as appropriate, modify the cleanup approach, as discussed in response D-67, above.

Comment D-69: After further describing scientific aspects of DNAPL, CPC cites EPA's Superfund Administrative Improvements report, June 23, 1993. This report describes how the Agency will develop technical impracticability ARAR waiver language for use in consent decrees when the ROD is silent on the issue.

EPA Response: The details of any future consent decree regarding OU 1 are beyond the scope of this Responsiveness Summary. However, EPA points out that the ROD specifically addresses the

potential that certain portions of the aquifer may not be restored to their beneficial uses by the remedial components of the selected remedy. In such a case, EPA may consider certain modifications to the system and contingency measures, including waiver of ARARs. The full text of potential modifications to the selected remedy is found in section X of the ROD.

Comment D-70: CPC believes that, in light if site circumstances, pump and treat technology is unreasonable and not cost-effective. CPC recommends an approach more in tune with the needs of OU 1, and the capabilities of existing technology.

EPA Response: EPA disagrees with CPC's characterization of the needs of OU 1, as more thoroughly described in Responses D-22, D-43, D-44 and D-45. Contrary to CPC's assertion, the selected remedy, including its pump and treat component, is both reasonable and cost effective. In the analysis of remedial options for a site, EPA may only consider cost effectiveness as among remedies that are protective and attain ARARs. As described in Response D-63, above, remedies that do not incorporate an active component at the CCL downgradient area are not sufficiently protective. While passive measures may indeed be cheaper than pump and treat, they would provide only a minimal reduction of risk, and allow such risk to continue for an unacceptably long time frame. Thus, the cost of passive measures is irrelevant.

The selected remedy, by contrast, provides a cost effective approach to all of OU 1, in that the relationship of overall effectiveness of the remedy is proportional to its costs. The remedy is not a "hope for the best" approach, as CPC contends. Rather, the selected technologies are expected to remove significant amounts of contaminants from the soil and ground water. EPA believes that the selected remedy may be able to restore ground water to cleanup levels. Recognizing that there are no guarantees, however, EPA has allowed for the possibility that it may have to reevaluate the performance of the remedy, as described in response D-67, above. Based on the comparative analysis of alternatives performed in the FS, EPA believes that it is proper to employ technologies that provide for the optimization of cleanup at OU 1, rather than allowing the OU 1 contamination to persist in an nonprotective state.

Comment D-71: CPC states that, in accordance with the NCP, EPA must evaluate the performance of any selected remedy. CPC asserts that available technology will be of limited effectiveness due to the presence of DNAPL.

EPA Response: EPA has evaluated all necessary criteria in its remedy selection process. This selected remedy was chosen only after a detailed analysis of alternative remedies according to the nine criteria described in the NCP. These criteria included an analysis of long term effectiveness, short term effectiveness, and implementability of the alternatives. In addition, upon further analysis and in response to comments received during the public comment period, EPA has adjusted the selected remedy to include certain modifications to enhance system performance. Further, the ROD includes contingency measures if EPA determines that the aquifer cannot be restored to cleanup levels.

Comment D-72: CPC contends that the Proposed Plan omitted a "cost benefit review", as required by the NCP. CPC further contends that the remedy, as described in the Proposed Plan, will operate well beyond the twelve years projected in the Proposed Plan, due to the presence of DNAPL. Citing § 121(a) of CERCLA, CPC says that EPA must consider operation and maintenance costs for the entire period of remedy operation. Considering that the system may not achieve cleanup levels within any foreseeable timeframe, remedial costs will increase dramatically and the remedy will not be cost effective. Instead, and more realistic, achievable cleanup goals must be established, which can be realized in a cost effective manner.

EPA Response: The NCP does not require a cost-benefit analysis as CPC has described. Rather, the NCP provides that any remedial action selected shall be cost effective. Cost effectiveness is defined by assessing the remedy according to the following three of the nine criteria: long term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, and short term effectiveness. The overall effectiveness of the remedy that is established through this analysis is then compared to cost to ensure that the remedy is cost effective. A remedy is considered cost effective if its costs are proportional to its overall effectiveness. The preamble to the NCP (55 Fed. Reg. p. 8726) makes clear that cost can only be analyzed with respect to a remedy that meets the threshold criteria of overall protection of human health and the environment and compliance with ARARs.

As described in the FS, only alternatives 5 (the selected remedy) and 6 comply with ARARs and are fully protective of human health and the environment. To varying degrees, the other alternatives rely solely on institutional controls to provide protection in areas of OU 1 where risks are currently outside EPA's acceptable risk range. The selected remedy provides for known technologies to remediate OU 1. These technologies present the greatest likelihood of meeting ARARs in OU 1 ground water within a

reasonable time period.

While actual operation times cannot be known until the system is actually recovering contaminants, the selected remedy provides the most significant and most timely reduction of contaminants in all areas of OU 1 that currently exceed EPA's risk range. Accordingly, the selected remedy is considered overall extremely effective, according to the criteria described above. If, after a reasonable period of system operation, cleanup levels cannot be met, EPA may consider contingency measures. Such contingency measures ensure that the remedy will remain cost effective over its operational life, while meeting the threshold criteria of overall protection of human health and the environment and compliance with ARARs, or invoking a waiver of ARARs, as appropriate.

Comment D-73: CPC believes that EPA's preferred alternative will not accomplish its remedial objective, the attainment of MCLs. Rather, it will simply shorten the time until a condition above MCLs is reached. Considering that there are no risks at OU 1 and that EPA's remedy is not cost effective, the CPC recommended remedy should be adopted. This approach provides for longer natural attenuation, but the same level of protection as the EPA remedy.

EPA Response: EPA disagrees with CPC's assertions. EPA believes that the selected remedy may be able to restore ground water to cleanup levels. The selected remedy also contains contingency measures that EPA may consider in the event that MCLs cannot be attained. These technologies and contingencies of the selected remedy are protective and will attain or waive ARARs as appropriate. By contrast, the CPC remedy would not be protective for the reasons described in response D-63, above, and would of necessity require ARARs waivers. EPA disagrees with CPC's characterization of risks at OU 1, as described in Response D-43, D-44, and D-45, above. In fact, it is the very risks that CPC disavows that make the CPC recommended remedy not protective. EPA's description of cost effectiveness is described in Response 72, above.

Comment D-74: CPC advocated that its recommended remedy is consistent with the NCP. While not described in any detail, the CPC recommended remedy proposes active remediation in the CCL source area to address source soil contamination, reduce the level of contaminants in ground water, and prevent migration of contaminants beyond the source area. These actions would be limited by technology. Institutional controls alone would be used for the downgradient portion of the CCL plume and the

Quinnville wellfield.

EPA Response: EPA does not agree that such a remedy would be consistent with the NCP. The CPC recommended remedy would permit the entire CCL plume, extending nearly one half mile, to naturally attenuate, while the sole means of providing protectiveness would be through institutional controls. Such measures, by themselves, are not sufficiently protective at OU 1, as described in responses D-44 and D-63. Furthermore, the selected remedy provides that EPA may consider certain other measures if ARARs cannot be met after a reasonable period of system operation. These contingency measures ensure that the remedy would remain protective even if the technologies of the selected remedy were unable to attain ARARs.

Comment D-75: CPC further argues for its recommended remedy, stating that the NCP's "cost benefit" considerations favor natural attenuation of the CCL plume, since there are no present or future risks associated with the plume. CPC quotes the NCP at § 300.430(e)(7)(iii) in support of this argument.

EPA Response: The section of the NCP relied on by CPC describes the method by which cost is factored into the initial screening of alternatives. As described in more detail in the FS, the initial screening process sorts from a broad range of remedial options to narrow the field of alternatives that will be scrutinized in the detailed analysis of alternatives. The process was properly performed in the FS, and more costly process options were eliminated from further consideration when more economical, yet equally effective and implementable alternatives existed. Based on this process, six alternatives were developed for further FS analysis. CPC is misguided in citing this NCP section to support its recommended remedy as against EPA's selected remedy. Such arguments should be based on the nine criteria which form the detailed analysis of alternatives.

However, even assuming that CPC's comment is properly directed, the NCP language it cites does not further its argument. Section 300.430(e)(7)(iii) provides that one factor that can lead to elimination of an alternative is if its costs are grossly excessive compared to the alternatives's overall effectiveness. The section also provides that when one alternative provides similar effectiveness and implementability as another alternative by employing a similar method of treatment or engineering control, but at greater cost, such alternative may be eliminated from further consideration. Both these factors support EPA's selected remedy and disqualify CPC's recommended remedy.

EPA's selected remedy provides the most effective and timely

approach to removing contaminants from OU 1. While its costs may indeed be higher than CPC's recommended remedy, this is because the CPC recommended remedy does not provide the same degree of protectiveness. Higher costs do not by definition mean excessive costs, as CPC suggests. Rather, such higher costs are justified, (i.e. the remedy is cost effective) when they are proportional to that remedy's overall effectiveness.

CPC's recommended remedy fails to provide similar effectiveness and implementability, as described in § 300.430(e)(7)(iii). Rather than employing similar methods of treatment or engineering controls at the CCL downgradient plume, the CPC recommended remedy provides dramatically less treatment, in that no contaminated ground water is extracted from the CCL downgradient plume. In place of this active remediation, the CPC recommended remedy calls for extended institutional controls in this area. While institutional controls are part of EPA's selected remedy, EPA is concerned about the effectiveness of such controls, especially when solely relied upon to provide protectiveness. CPC's recommended remedy would exacerbate this situation by prolonging the time by which institutional controls are the sole means of providing protection in the CCL downgradient area.

Comment D-76: CPC asserts that since in the Proposed Plan EPA states that there are no current health risks associated with ground water, less costly remediation can satisfy the NCP requirement that any remedial action be protective of human health and the environment, while eliminating any possible risks associated with ground water.

EPA Response: EPA disagrees with CPC's analysis. The first of the nine criteria that EPA must consider in its remedy selection process is overall protection of human health and the environment. To assess this criteria, EPA looks at several other criteria, particularly long term effectiveness and permanence, short term effectiveness, and compliance with ARARs. CPC's recommended remedy is deficient with respect to each of these criteria.

CPC's recommended remedy would allow continued exceedances of chemical-specific ARARs in the CCL downgradient area until such time as natural attenuation restores ground water throughout the CCL plume. The CPC recommended remedy also would only address risks in the CCL plume through institutional controls, which are questionable in their reliability, as described in responses D-44 and D-63, above. Since the CPC recommended remedy does not aggressively seek to achieve cleanup levels through active measures, as does the selected remedy, such institutional controls could be the sole means of managing risks at OU 1 for an

extended period of time. This result also makes the long term effectiveness of the CPC recommended remedy difficult to assess, since the CPC recommended remedy may allow a much longer period of time before cleanup levels are achieved.

Comment D-77: CPC states that the analysis of overall protection of human health and the environment includes an assessment of how public health and environmental risks are properly eliminated, reduced, or controlled through treatment, engineering controls or institutional controls. CPC maintains that source remediation, combined with institutional controls, will adequately manage OU 1 risks, and is therefore consistent with the NCP.

EPA Response: As described in response D-76, EPA does not believe that source remediation, combined with institutional controls, will adequately manage OU 1 risks. Such a remedial plan is inconsistent with the NCP, since risks which are outside EPA's acceptable risk range would not be properly eliminated, reduced or controlled, as required by the Site-specific circumstances at OU 1.

Comment D-78: CPC states that there is an exceedingly low probability that ARARs will be met in OU 1 ground water. CPC believes that EPA's periodic reviews and evaluations of the remedy are insufficient methods for evaluating cleanup goals. Rather, goals that are attainable with currently available technology should be established at the outset in the ROD.

EPA Response: EPA believes that the selected remedy may meet all ARARs that have been identified for OU 1, including MCLs. See response D-67. Furthermore, as described in section X of the ROD, the selected remedy describes certain contingency measures that EPA may consider if, after a reasonable period of system operation, EPA determines that the selected remedy cannot meet cleanup levels. EPA believes that this approach provides for maximum protectiveness of human health and the environment through an aggressive cleanup of heavily contaminated soils and ground water at OU 1. Only after a reasonable period of system operation will sufficient data regarding system performance and contaminant removal be available to assess with more certainty the likelihood of achieving cleanup levels. By contrast, the CPC proposal concedes that cleanup levels would not be attained before even beginning the cleanup.

Comment D-79: CPC states that MCLs should not be ARARs at OU 1. According to CPC, since DNAPL is present, ground water cannot be restored to MCLs by currently available technology.

EPA Response: Again, EPA disagrees with CPC's assertion regarding the likelihood of attaining MCLs at OU 1. See responses D-67 and D-72, above. MCLs are ARARs at OU 1, because EPA's goal in this remedial action is to restore the ground water at OU 1 to drinking water quality. Furthermore, the contingency measures that EPA may consider, after a reasonable period of system operation, include the possibility that an ARAR may be waived. EPA notes that such a waiver would be incorporated into a future decision document, as necessary.

Comment D-80: CPC states that its recommended remedy will provide the same degree of long term effectiveness and permanence as the selected remedy.

EPA Response: The criteria of long term effectiveness and permanence contains an analysis of residual risks that remain after completion of the remedial action. All remedial alternatives evaluated in the FS may provide that MCLs, and all other ARARs, will be met at the conclusion of the remedial action. The difference is the time required to attain ARARs and the confidence that ARARs will in fact be achieved. Alternatives relying on institutional controls to restore a portion of OU 1 are less reliable, as described in responses D-44 and D-63. Such alternatives require that institutional controls must be maintained for longer periods of time than the selected remedy, since fewer active measures will be implemented and contamination will require much longer periods of time to naturally attenuate. Therefore, long term effectiveness and permanence of these remedies does not compare favorably to that of the selected remedy, since the time at which ARARs would be met, and the degree of certainty regarding institutional controls, are unclear. The selected remedy, however, provides for the shortest restoration to ARARs of all alternatives evaluated. Residual risks at the completion of the remedial action will be readily quantifiable due to the contaminant removal and monitoring that has occurred.

Moreover, the CPC recommended remedy does not even provide that ARARs will eventually be met. It simply states that a degree of active restoration will occur in the CCL source area, and then provides for natural attenuation with institutional controls. Such long term attenuation, with sole reliance on institutional controls, is unacceptable. The point at which ARARs are attained under the CPC recommended remedy is unclear. The degree to which the limited active restoration of the CCL source area would affect the eventual attenuation of the aquifer to MCLs is not understood. The CPC recommended remedy also does not describe any contingencies that may be employed after the limited active restoration. All these factors combine to question the long term

effectiveness and permanence of the CPC's recommended remedy.

Comment D-81: CPC states that EPA's proposed plan is not cost effective as required by CERCLA and the NCP, since it does not include a cost benefit analysis. CPC believes that its plan is the cost effective alternative, considering risks at OU 1.

EPA Response: As described in response D-70, above, EPA believes that the selected remedy is cost-effective, according to the analysis of costs required by the NCP. Response D-72 describes that a cost benefit analysis is not required by the NCP. Rather, alternatives that provide overall effectiveness are analyzed to determine which are cost effective. The CPC recommended remedy would not provide overall effectiveness, as described in Response D-75, above, and therefore would not be analyzed for cost effectiveness.

ATTACHMENT A

PUBLIC HEARING TRANSCRIPT

STATE OF RHODE ISLAND

HEARING, taken before DEANNA L. ANDERSON, Notary Public and Court Reporter, at the ASHTON ELEMENTARY SCHOOL, Scott Road, Ashton, Rhode Island, on July 29, 1993.

DEANNA L. ANDERSON

CERTIFIED SHORTHAND REPORTER

MR. BOYNTON: Good evening, my name is Dick Boynton and I'm with EPA's Boston regional office superfund program. And I'm the supervisor who's responsible for EPA response actions at superfund sites in Rhode Island.

I'll be the hearing officer for tonight's hearing of the Peterson/Puritan Superfund Site Proposed Plan.

Also here tonight are Dave Newton who's the project manager for the site, he's on my left; Leo Kay who signed you in at the back of the room, he's our community relations coordinator; and in the front row, Warren Angel who is the Rhode Island DEM Supervisor and Leo Hellested who is the Rhode Island DEM Project Manager.

The purpose of tonight's hearing is to formally accept oral

comments on the Peterson/Puritan Operable Unit 1 Proposed Plan FS and Remedial Investigation.

Since this is a hearing, we won't be answering questions today or responding to comments tonight. We will respond to them after the close of the comment period in a document called a Responsiveness Summary which will be included with our decision document called a Record of Decision that we will prepare after the close of the comment period which closes August 5.

We were here at this location several weeks ago where we presented information on the proposed plan and answered questions about the site and the public comment period began on July 6. And as I said, it will end on August 5.

Let me now describe the format for the hearing. First, Dave Newton will give a brief overview of the propsed plan for the cleanup of the site. Following Dave's presentation, we'll accept oral comments for the record.

Those of you wishing to make oral comments should have indicated your desire to do so by filling out a card with Leo at the back of the room. And I have three cards that have been filled out. Also at the back of the room are copies of the proposed plan.

If you wish to make an oral comment and haven't filled out a card, please see Leo and fill out a card and he'll give me the card.

I'll call on those people in the order in which they filled out the cards. They should come to the front of the room and state their

name and address and/or their affiliation.

The reason for doing this is as you can see we're recording the proceedings verbatim and we want to make sure everything is accurate for the record.

If you have oral comments that are going to last more than fifteen minutes, please just address the major points and present us with a written extent of your comments and those will go into the record in their entirety verbatim and become part of the hearing record.

I may ask those people making comments a question to just clarify their statement so that when we consider their statement, we get everything and we understand it and it's accurate.

If you wish to make or submit written comments, you can give

those to us tonight or you can mail them to our Boston office address which is in the proposed plan postmarked no later than August 5 which is the close of the comment period.

All the oral comments that we receive tonight and the written comments that we receive during the comment period will be responded to or addressed in our Responsiveness Summary and become a part of the administrative record of the site.

And as I said, the responsive summary will be included with our decision document, the Record of Decision, that we prepare at the conclusion of the comment period.

Now, before we begin, are there any questions about the proceedings or how to make comments and so on?

If there are no questions,

I'll ask Dave to just briefly go over the proposed plan and then we'll get into the oral comments.

MR. NEWTON: Good evening, my name is Dave Newton and I'm the Remedial Project Manager for the site. Our site is the Peterson/Puritan Superfund Site in Cumberland/Lincoln, Rhode Island.

As you can see by this map here just to give you a brief overview of where the site is located in case you didn't join us a couple of weeks ago, the site is some two miles in length and it's located in the Blackstone River Valley with Cumberland and Lincoln, Rhode Island flanking both sides of the river.

You'll see that there's an outline here in purple. This outline represents what we will be discussing tonight. This is the

first operable unit of the Peterson/Puritan Superfund Site.

I'd like to throw up another overlay here to give you a little larger view. Because of the expansive site area and the number of identified areas of contamination, in 1990, EPA administratively divided the site into smaller, more manageable units as we call them operable units. And as I said before, this is the first operable unit.

Operable Unit 1 consists of two principle source areas, the CCL, Custom Manufacturing Facility, that's the current name, formerly the Peterson/Puritan, Inc. facility for which this site has its namesake. And also the Pacific Anchor Chemicals Corporation. We've listed both of these as CCL and PAC respectively as acronyms.

Our preferred alternative -- what I'd like to do is get into the preferred alternative a bit here.

In review of the RI and the feasibility study, EPA has written a proposed plan for the community to review and provide comment to in order to come to a decision on this portion of the site cleanup.

And EPA's selection of the preferred cleanup alternative as described in the proposed plan was a result of a comprehensive evaluation and screening process.

The FS for this OU was conducted to identify and analyze the alternatives which are considered and, you know, as well as the process and criteria EPA used to narrow the list to six potential alternatives of which we selected one as our preferred alternative.

Our preferred alternative is described in the feasibility study as number five and it is referred to as Enhanced Source Control with CCL area management of migration.

For source control measures, we have elected to excavate the manholes and the catchbasins of the CCL property, lay down some capping, soil vent the source area of soils, also extract source area ground water with treatment and discharge to the POTW, that's the Publicly Owned Treatment Works.

We have a downgradient component of ground water which will be extracted with direct discharge to the POTW, natural attenuation of the Quinnville wellfield, institutional controls and environmental monitoring throughout the duration of the cleanup.

For the PAC remediation area, we've elected excavation and disposal and reconstruction of leachfields out on the facility. We have elected in-situ oxidation treatment of the PAC source area which is on the facility.

And we are considering natural attenuation of the PAC downgradient ground water with institutional controls throughout the remediation area and a focused investigation of the PAC downgradient area and environmental monitoring.

There are approximate cleanup time frames for which this alternative follows and I'd like to just list that for you.

We considered as part of this alternative, cleanup time frames and those are twelve years for the CCL source area in this region, six years for the CCL downgradient area

considering actively pumping the ground water in this area, six years to naturally attenuate a downgradient plume that has been identified in the PAC remediation area and approximately one year to clean up the PAC source area.

The estimated time for design and construction of this alternative is approximately three years. And the estimated total cost is approximately 7.3 million dollars.

The public is also invited to comment not only on our preferred alternative but also on the other alternatives that were carried forward in our feasibility study.

Alternative one is a no action alternative and it includes environmental monitoring throughout the duration of the site attenuation.

The estimated time for restoration for alternative one is thirty plus years for the entire operable unit. The estimated total cost is approximately a million dollars. Again, that's for the environmental monitoring.

Alternative two adds institutional controls and a focused investigation to alternative one.

The time of restoration is still approximately thirty plus years for the entire OU and an estimated total cost of 1.3 million.

Alternative three is a source control measure. This alternative involves source control actions to limit the migration of contaminants from the sources.

At the CCL remediation area, again, as I've gone over with the

preferred alternative, it will include excavation, capping, soil venting of soft soils and treatment, source area ground water extraction, ground water treatment and discharge, institutional controls throughout the CCL remediation area and environmental monitoring.

For the PAC remediation area it would be excavation and disposal of leachfield soils, institutional controls throughout the PAC remediation area and a focused investigation.

The estimated time frame for restoration of the site is cut to four years at the PAC source area, six years to the PAC downgradient area, twelve years at the CCL source area and twelve years at the CCL downgradient area.

Alternative four is an

enhanced source control alternative and that includes all the remedial actions I've just described for the CCL remediation area and it includes for the PAC remediation area source control measure with in-situ treatment of ground water.

The estimated time for restoration for this site -- excuse me, for this alternative then is one year at the PAC source, six years at PAC downgradient, twelve years at the CCL source and twelve years at the CCL downgradient with an estimated cost of 6.5 million dollars.

Alternative six -- we've already discussed the preferred alternative. Alternative six is enhanced source control at both the CCL impact area management of migration.

This alternative would combine

the remedial actions of alternative five. It will also include PAC downgradient, ground water extraction and discharge.

The estimated period of operation is one year at the PAC source, three years at the PAC downgradient, twelve years for the CCL source and six years for the CCL downgradient at a cost of approximately 7.4 million dollars. I don't know if you can see the costs. That's how it plays out.

Based on the current information and analysis of the RI and FS reports, EPA believes that the preferred alternative for OU 1 is consistent with the requirements of the superfund law and its amendments specifically Section 121 of Circla (phonetic) and the NCP.

EPA believes the preferred alternative provides for the

fastest practical restoration of all portions of OU 1 that are outside of EPA's acceptable risk range. And it also is the most cost-effective approach to meeting EPA's remedial objectives for this operable unit. That concludes my summary.

MR. BOYNTON: Thanks, Dave. Now, we'll get into the oral comments.

First is Mr. Leo Hellested from the Rhode Island Department of Environmental Management.

MR. HELLESTED: Good evening, my name is Leo Hellested. I'm an engineer with the State of Rhode Island, Department of Environmental Management, a division of Site Remediation. I'm also the State Project Manager for Peterson/Puritan Superfund Site.

Based upon the information

available at this time, the Rhode Island Department of Environmental Management (RIDEM) expects to concur with the remedy as proposed by the U.S. Environmental Protection Agency for Operable Unit 1 of the Peterson/Puritan Superfund Site.

The State has been actively involved in all stages of the review process for the Peterson/Puritan Superfund Site, including the investigation of this operable unit.

This involvement has included thorough reviews of the Remedial Investigation Report, the Feasibility Study Report, as well as other technical documents generated including the Proposed Plan.

The State's role in the review process is to insure that all State

Applicable Or Relevant and Appropriate Requirements are met.

As a result of our review of the Proposed Plan, the State will be providing a written comment letter to the EPA that includes, in detail, all remaining concerns the State has regarding the preferred alternative.

This evening I would like to outline some of those concerns, as well as our points of agreement with the EPA.

At the CCL remediation area, the State supports the proposed methods of source control, and management of migration.

These measures include: Excavation of contaminated soil around manholes and catchbasins, capping source area soils, installing and operating a soil vapor extraction system at the

source, source area ground water extraction, treatment, and discharge to the POTW, downgradient area ground water extraction with direct POTW discharge, natural attenuation of the Quinnville wellfield, institutional controls, and environmental monitoring for the duration of the remedial action.

At the Pacific Anchor Chemical Corporation or PAC remediation area, the state also supports the proposed methods of source control and management of migration.

These measures for this area include: Excavation and disposal of the existing leachfields, reconstruction of the leachfields for installation of an in-situ oxidation treatment system, natural attenuation of the PAC downgradient ground water, institutional

controls, a focused investigation of the PAC downgradient area, and environmental monitoring for the duration of the remedial action.

However, regarding the preferred alternative selected by the EPA, the State does have the following concerns: One, the in-situ oxidation system proposed at the PAC remediation area is a relatively new and untested method of treating arsenic in soil.

Although the State strongly supports the use of new technologies, a comprehensive site remedy must include frequent data collection and monitoring to determine its effectiveness, along with a triggering mechanism that could allow for an alternative remedy if the in-situ oxidation system does not perform to expectations.

Two, based upon information available at this time the State supports natural attenuation with a focused investigation, monitoring, and institutional controls for the PAC downgradient area.

However, the state would like to see a mechanism incorporated into the Record of Decision (ROD) that would initiate active remediation of the PAC downgradient area if a new, significant source of contamination is identified as a result of the focused investigation. The Record of Decision should also specify the proposed elements of the focused investigation.

Although the State expects to concur with the USEPA on the proposed remedy of Operable Unit 1 of this Site, we believe that the concerns stated above should be

addressed in the Proposed Plan prior to finalization.

Finally, the State views this Record of Decision as a significant milestone and moving towards a comprehensive, whole site remedy for the entire Peterson/Puritan Site.

The State shares the desires of the citizens of this area for a cleaner Blackstone River, and therefore, encourages the EPA to implement the proposed remediation activities as soon as possible and move forward to the much needed investigation of the remaining operable units.

That concludes our comment this evening. As I previously stated, the State will be providing EPA with a detailed comment letter on the Proposed Plan. Copies of that letter will be incorporated

into the Administrative Record. Thank you.

MR. BOYNTON: Thank you, Leo. Next Mr. John Morra for the Town of Cumberland would like to make a comment.

MR. MORRA: Yes, my name is John Morra and I'm here representing the Town of Cumberland. I represent the firm of Water Works Engineering and Associates.

The Town of Cumberland is going to make a written comment concerning the remediation of this Operable Unit 1 to the USEPA but I had a couple thoughts and comments that I wanted to get on the record this evening in advance of that statement or that written comment -- written statement rather.

One is and I'm not sure this

may already be true that the Department of Environmental Management Ground Water Section be involved in this process or comment period if you will between now and August 6.

And that further that the Rhode Island Department of Health Water Quality Section be involved or asked to comment on this if they so choose and that the public comment period be amended to include their comment if they do not have time.

One of the reasons for this is the fact that the Town of Cumberland in addition to perhaps not wanting a Superfund Site within its political boundaries has lost two municipal wells in this area to drinking water supplies.

One of them was active and was within Operable Unit 1. That was

the Martin Street well with perhaps a million and a half gallons a day.

The other which I'm not sure whether EPA's program has adequately addressed is the Lenox Street well which is outside the operable unit and will not be directly impacted or at least I don't feel it will be within the twelve year time frame or any natural attenuation process.

And therefore, this is kind of a dangling part of this overall cleanup that I'm not sure is going to be addressed fully with this particular site remediation.

And that actually concludes my statement. But I would like to say that I would like to have the Department of Health Water Quality Section involved as well as Ground Water and allow them to comment also. Thank you.

MR. BOYNTON: Thank you, Mr. Morra. Next Mr. Robert Cox, Blackstone Valley Town Counsel.

MR. COX: I'm the designated sitter here. We're waiting for Bob Newington the president and counsel who had a statement. He's journeying up from Warren, Rhode Island.

MR. BOYNTON: Will he have a written statement, do you think?

MR. COX: He'll have a written statement, yes.

MR. BOYNTON: Okay. Does anybody else have any comments they wish to make for the record?

I'll accept, of course, the Town of Blackstone's comments, written comments.

MR. COX: We will have comments.

MR. BOYNTON: Yeah, okay. Fine. If we don't have any further

oral comments, I'm going to close the hearing and then we can open it for general questions if anybody has any general questions.

So with that, this hearing is closed. And remember that written comments have to be postmarked no later than August 5.

And if you do have some questions on how to make comments, you can get in touch with either Leo or David or myself during the comment period.

So does anybody have any general comments about the remedy that they'd like to bring up at this time? Nothing? Everybody's completed satisfied with the remedy? That's good.

Well, thank you very much for participating and coming to the hearing and we look forward to your comments by August 5. Thank you.

Good night.

(Hearing concluded)

COMMONWEALTH OF MASSACHUSETTS

Norfolk, ss.

I, DEANNA L. ANDERSON, Certified Shorthand Reporter, do hereby certify that the foregoing testimony is true and accurate, to the best of my knowledge and ability.

WITNESS MY HAND, this 12th day of August, 1993.

Deanna L. Anderson

PETERSON/PURITAN, INC. SITE
OPERABLE UNIT 1
ROD SUMMARY

APPENDIX D

DECLARATION OF STATE CONCURRENCE

State of Rhode Island and Providence Plantations
Department of Environmental Management
Office of the Director
9 Hayes Street
Providence, RI 02908

September 28, 1993

Mr. Paul Keough
Acting Regional Administrator
Environmental Protection Agency, Region 1
John F. Kennedy Federal Building
Boston, MA 02203-2211

Re: Record of Decision for the Peterson/Puritan, Inc. Site - Operable Unit #1
Cumberland, Rhode Island

Dear Mr. Keough:

This is to advise you that the State of Rhode Island concurs with the selected remedy detailed in the September 1993 Record of Decision for the Remedial Action of the Peterson/Puritan, Inc. Superfund Site - Operable Unit #1. This concurrence is based upon all aspects of the abovementioned Record of Decision being adequately addressed and implemented during design, construction and operation of the remedy.

The Department wishes to specifically emphasize the following aspects of the Record of Decision:

- This Record of Decision is for the first operable unit of the Peterson/Puritan, Inc. Superfund Site. The remaining areas of concern on site, not addressed by this Record of Decision, are to be addressed by future operable units.

- The remedy as proposed and implemented must ensure compliance with all applicable or relevant and appropriate State and Federal statutes, regulations and policies.

- The remedy must identify institutional controls that are appropriate for each specific area of the operable unit, are applicable throughout the remedial action, and which are protective of human health. Also, in the event that the remedial risk goals cannot be achieved, long-term controls (applicable after the remedy is terminated) must be instituted to prevent an unacceptable risk to human health and the environment.

- The State understands that the selected remedy provides for natural attenuation, institutional controls, a focussed investigation, and environmental monitoring of the PAC downgradient area. The State also understands that its rights to take independent actions at the PAC downgradient area, based on state law, are not prejudiced or preempted by this Record of Decision to the extent that such actions will not delay or be inconsistent with the selected remedy.

Finally, I urge EPA to make every effort to assure that this remedy is implemented in an expeditious fashion, and the remaining operable units are addressed in a timely and efficient manner.

Thank you for providing us with an opportunity to review and concur with this important Record of Decision.

Sincerely,

Louise Durfee, Director
Department of Environmental Management

cc: James Fester, Associate Director, DEM
Merrill Hohman, Director, EPA Region I Waste Management Division
Richard Boynton, Chief, RI Superfund Section
Terrence Gray, Chief, DEM Division of Site Remediation
Claude Cote, Esq. DEM Office of Legal Services
Warren Angell, Supervising Engineer, DEM Division of Site Remediation
David Newton, EPA Remedial Project Manager

PPROD.LET/LH

PETERSON/PURITAN, INC. SITE
OPERABLE UNIT 1
ROD SUMMARY

APPENDIX E

ADMINISTRATIVE RECORD INDEX

Peterson/Puritan, Inc.
(Operable Unit I)

NPL Site Administrative Record

Index

Compiled: July 6, 1993
ROD Signed: September 30, 1993

Prepared for

Region I
Waste Management Division
U.S. Environmental Protection Agency

With Assistance from

AMERICAN MANAGEMENT SYSTEMS, INC.
One Bowdoin Square, 7th Floor • Boston, Massachusetts 02114 • (617) 557-2000

Introduction

This document is the Index to the Administrative Record for the Record of Decision for the Peterson/Puritan, Inc. National Priorities List (NPL) site, Operable Unit 1. Section I of the Index cites site-specific documents, and Section II cites guidance documents used by EPA staff in selecting a response action at the site.

Although not expressly listed in this Index, all documents contained in the January 31, 1992 Peterson/Puritan, Inc. (J.M. Mills Landfill) Removal Action Administrative Record are incorporated by reference herein, and are expressly made a part of this Administrative Record.

The Administrative Record is available for public review by appointment at the EPA Region I Records Center in Boston, Massachusetts (telephone: 617-573-5729), the Cumberland Public Library, 1464 Diamond Hill Road, Cumberland, Rhode Island 02864 and the Lincoln Public Library, Old River Road, Lincoln, Rhode Island 02865. Questions concerning this Administrative Record should be addressed to the EPA Region I Remedial Project Manager.

The Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Section I

Site-Specific Documents

ADMINISTRATIVE RECORD INDEX

for the

Peterson/Puritan, Inc. NPL Site
(Operable Unit I)

ROD Signed: September 30, 1993

1.0 Pre-Remedial

1.2 Preliminary Assessment

1. Memorandum from Robert A. O'Meara, EPA Region I to Gerald Levy, EPA Region I (January 15, 1980). Concerning the preliminary assessment and site inspection of the Cumberland Landfill/J.M. Mills, Inc.
2. "Preliminary Assessment for Lenox Street Well," NUS Corporation (August 28, 1986).
3. "Draft Site Information and Assessment," EPA Region I (January 7, 1988).
4. "Preliminary Assessment of Lonza, Inc./Trimont Chemicals," NUS Corporation (March 29, 1988).
5. "Preliminary Assessment of Synthron, Inc.," NUS Corporation (March 30, 1988).

1.3 Site Inspection

1. "Site Inspection Report," EPA Region I (June 20, 1980).
2. "Tentative Disposition," EPA Region I (June 20, 1980).

Attachments associated with entry number 3 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

3. Letter from John E. Ayres and Charles A. Lindberg, Goldberg-Zoino & Associates, Inc. to Robert A. O'Meara, EPA Region I (November 13, 1980). Concerning site reconnaissance and results of soil and water samples.
4. "Lincoln/Cumberland Wellfield Contamination Study," Goldberg-Zoino & Associates, Inc. (March 1982).

1.5 Correspondence Related to CERCLIS

Attachments associated with entry number 1 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. Letter from John V. Hagopian, State of Rhode Island Department of Health to Maurice P. Trudeau, Town of Lincoln (November 5, 1979). Concerning chemical contaminants found in drinking water supply.
2. Meeting Notes, Town of Cumberland (June 17, 1980). Concerning resolution that EPA be requested to sink test wells to determine source of contamination.
3. Telephone Notes Between Robert A. O'Meara, EPA Region I and Charles T. Kufs Jr., JRB Associates (June 24, 1980). Concerning field work activities.
4. Letter from Agnes T. Teal, Town of Cumberland to EPA Region I (July 3, 1980). Concerning request for test wells.
5. Letter from Charles T. Kufs Jr., JRB Associates to John E. Ayres, Goldberg-Zoino & Associates, Inc. (July 7, 1980). Concerning information request.

1.5 Correspondence Related to CERCLIS (cont'd.)

6. Letter from William A. Brungs, EPA Region I to Agnes T. Teal, Town of Cumberland (July 8, 1980). Concerning request for test wells.
7. Letter from William A. Brungs, EPA Region I to Kathy Fitzgerald, EPA Region I (July 8, 1980). Concerning request for test wells.
8. Meeting Notes, Goldberg-Zoino & Associates, Inc., Ecology and Environment, Inc., and EPA Region I (August 19, 1980). Concerning the August 13, 1980 meeting to discuss the hydrogeologic investigation.
9. Letter from Andrew E. Lauterback, EPA Region I to Ray Joubert, Blackstone Valley Sewer District Commission (August 26, 1980). Concerning request for a copy of the "Blackstone Valley Sewer District Sewer Plan Phase I, Section E."
10. Letter from Robert A. O'Meara, EPA Region I to Agnes T. Teal, Town of Cumberland (August 27, 1980). Concerning installation of test wells.

Pumping records associated with entry number 11 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts

11. Memorandum from Glenn Smart, Ecology and Environment, Inc. to Robert A. O'Meara, EPA Region I (December 30, 1980) with attached chronology. Concerning field work activities.
12. Memorandum from Robert A. O'Meara, EPA Region I to Distribution (July 14, 1981). Concerning progress on a groundwater flow model.
13. Meeting Notes, Town of Cumberland (April 21, 1982). Concerning resolution that EPA be requested to determine source of contamination of two wells.
14. Letter from Agnes T. Teal, Town of Cumberland to EPA Region I (May 3, 1982). Concerning April 21, 1982 resolution.
15. Letter from John R. Moebes, EPA Region I to Agnes T. Teal, Town of Cumberland (June 1, 1982). Concerning the investigation of contamination in the Blackstone Valley aquifer.
16. Letter from Maurice P. Trudeau, Town of Lincoln to Andrew E. Lauterback, EPA Region I (June 18, 1982). Concerning a request for a copy of the results of the contamination study.
17. Letter from Andrew E. Lauterback, EPA Region I to Maurice P. Trudeau, Town of Lincoln (June 29, 1982). Concerning transmittal of the results of the contamination study.
18. Memorandum from Deborah J. Pernice, EPA Region I to File (June 7, 1989). Concerning inclusion of Lonza/Universal Chemical Co. as part of the site.
19. Memorandum from Sharon M. Hayes, EPA Region I to File (July 10, 1990). Concerning inclusion of Lenox Street well as part of the site.
20. Memorandum from Sharon M. Hayes, EPA Region I to File (July 16, 1990). Concerning inclusion of the J.M. Mills landfill as part of the site.
21. Memorandum from Sharon M. Hayes, EPA Region I to File (August 28, 1990). Concerning exclusion of Synthron Inc. as part of the site.
22. Letter from Edward P. Manning, Manning, West & Santaniello (Attorney for James Walsh) to Sharon M. Hayes, EPA Region I (November 14, 1990). Concerning current status of the Synthron property.
23. Letter from Sharon M. Hayes, EPA Region I to Edward P. Manning, Manning, West & Santaniello (Attorney for James Walsh) (November 19, 1990). Concerning EPA's timetable for evaluation of the Synthron property.
24. Letter from John Quattrocchi III, Town of Lincoln to Robert A. O'Meara, EPA Region I. Concerning request for results of water samples.

1.6 Hazard Ranking System (HRS)

1. Documentation Records for Hazard Ranking System, EPA Region I (October 5, 1982).

1.7 Correspondence Related to Proposal of a Site to the NPL

1. "The National Priorities List," Federal Register, Vol.47, No. 251 (December 30, 1982).
2. Letter from Randy M. Mott, Zuckert, Scoutt, Rasenberger & Delaney (Attorney for Peterson/Puritan) to William Hedeman, EPA Headquarters (February 7, 1983). Concerning EPA's hydrology investigation.
3. Letter from Thomas E. Wright, Rhode Island Department of Environmental Management to Russel H. Wyer, EPA Headquarters (March 3, 1983). Concerning evaluation of sites based on the Mitre Model.
4. Comment #106, Peterson/Puritan Site (May 1983).
5. "National Priorities List Site," EPA Region I (August 1983).
6. List of Commenters, Peterson/Puritan Site (September 1983).

1.13 FIT Related Correspondence

1. Memorandum from Robert A. O'Meara, EPA Region I to Distribution List (January 30, 1981) with attached analysis results. Concerning status report on sites in Rhode Island and Connecticut.

1.18 FIT Technical Direction Documents (TDDs) and Associated Records

1. "Volatile Organics Analysis - Final Report," Goldberg-Zoino & Associates, Inc. (October 1980).
2. "Fracture Pattern Analysis of the Blackstone Series Bedrock in Lincoln, Rhode Island," Ecology and Environment, Inc. (January 2, 1981).
3. "Volatile Organics Analysis," Goldberg-Zoino & Associates, Inc. (April 8, 1981).
4. Memorandum from Richard G. Dinitto, NUS Corporation to Steven P. Fradkoff, EPA Region I (July 11, 1983). Concerning characterization of downgradient plume.
5. Memorandum from Richard G. Dinitto, NUS Corporation to H. Stan Rydell, EPA Region I (August 22, 1983). Concerning the attached "Monitoring and Testing Program for Determining Downgradient Extent of Contamination."
6. Memorandum from Stephen Smith, NUS Corporation to Steven P. Fradkoff, EPA Region I (November 16, 1983). Concerning the migration study.
7. Memorandum from Stephen Smith and Barbara Buckley, NUS Corporation to William Walsh-Rogalski, EPA Region I (December 22, 1983). Concerning "Attachment F: Contaminant Migration Scope of Work."
8. Letter from Donald Smith, EPA Region I to Alicia Good, Rhode Island Department of Environmental Management (October 1, 1986) with the attached Memorandum from Herbert Colby, NUS Corporation to Donald Smith, EPA Region I (September 15, 1986). Concerning transmittal of the "Preliminary Assessment for Lenox St. Well."

2.0 Removal Response

2.1 Correspondence - Removal Assessments

Attachments associated with entry number 1 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. Memorandum from Donald F. Berger, EPA Region I to David J. Newton, EPA Region I (March 9, 1990). Concerning removal assessments and procedures.
2. Memorandum from David J. Newton, EPA Region I to Dorothy Girten, EPA Region I (March 15, 1993). Concerning removal assessment request.

3.0 Remedial Investigation (RI)

3.1 Correspondence

Camp Dresser & McKee Inc.

1. Memorandum from Theresa E. Murphy, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (July 22, 1986). Concerning tasks proposed for each phase of the cleanup.
2. Memorandum from Theresa E. Murphy, Camp Dresser & McKee Inc. to David J. Newton EPA Region I (November 21, 1986). Concerning activities planned for the site.
3. Memorandum from Theresa E. Murphy, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (April 20, 1987). Concerning well installation program at the site.
4. Memorandum from Theresa E. Murphy, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (April 21, 1987). Concerning samples obtained from the MW-109 bedrock well.
5. Memorandum from Theresa E. Murphy, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (April 28, 1987) with attached "Geophone Interval-Spread Length Relationship" chart and map of the proposed sampling plan. Concerning review of the Versar, Inc. Work Plan for the Seismic Refraction Survey at the site.
6. Letter from Theresa E. Murphy, Camp Dresser & McKee Inc. to Richard Beach, Versar, Inc. (September 17, 1987). Concerning analysis on split-spoon soil samples.

Attachments associated with entry number 7 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

7. Trip Report on a Visit to Perterson/Puritan, Inc, Site, EPA Region I, Camp Dresser & McKee Inc., Rhode Island Department Environmental Management, and Versar, Inc. (November 13, 1987). Concerning soil source investigation.
8. Letter from Michael R. Kulbersh, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (April 4, 1989). Concerning list of personnel who are presently available to work on the site.
9. Letter from Michael R. Kulbersh, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (April 12, 1989). Concerning attached list of deliverables which have been submitted to EPA.
10. "Final Report - Submission of Deliverables Required Under the Administrative Order," Camp Dresser & McKee Inc. (August 29, 1989).

3.1 Correspondence (cont'd.)

Camp Dresser & McKee Inc.

11. Letter from Michael R. Kulbersh, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (September 13, 1989). Concerning documents prepared for submission to CPC International, Inc. at EPA's request.
12. Letter from Michael R. Kulbersh, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (December 5, 1989). Concerning list of reports submitted to EPA since September 13, 1989.
13. Letter from Patrick Blumeris, Camp Dresser & McKee Inc. to Neil Fiorio, Town of Cumberland (September 20, 1990). Concern test well locations.
14. Memorandum from Michael R. Kulbersh, Camp Dresser & McKee Inc. to David J. Newton, EPA Region I (November 12, 1990). Concerning well assignments for risk assessment purposes.

C-E Environmental, Inc. (ABB Environmental Services)

15. Letter from Paul J. Exner and Richard A. McGrath, C-E Environmental, Inc. to David J. Newton, EPA Region I (August 28, 1989). Concerning transmittal of groundwater sampling results.
16. Letter from Paul J. Exner, ABB Environmental Services to David J. Newton, EPA Region I (April 20, 1990). Concerning risk assessment strategy meeting.

ENSR

Reference documents associated with entry number 17 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

17. Letter from Scott J. Perry and William A. Duvel Jr., ENSR to Paul J. Exner, ABB Environmental Services (January 19, 1993). Concerning a request for information with attached:
    A. List of references
    B. Table 1 - Summary of System No. 1 Wastewater Characterization
    C. Table 2 - Summary of October 1981 Wastewater Analysis by EPA
    D. Figure 1 - Sewer & Wastewater System Layout (January 1993).

Environmental Protection Agency

18. Letter from Andrew E. Lauterback, EPA Region I to Peter M. Roncetti, CPC North America (June 29, 1982). Concerning transmittal of the report on Lincoln/Cumberland wellfield contamination with attached:
    A. Letter from Peter M. Roncetti, CPC North America to Andrew E. Lauterback, EPA Region I (June 16, 1982).
    B. Letter from Peter M. Roncetti, CPC North America to Steven P. Fradkoff, EPA Region I (September 9, 1982) with attached "Occurrence of VOCs in Drinking Water" (May 1982).
19. Letter from Steven P. Fradkoff, EPA Region I to Peter M. Roncetti, CPC North America (October 1, 1982). Concerning transmittal of "Fracture Pattern Analysis of the Blackstone Series Bedrock in Lincoln, Rhode Island," Ecology and Environment, Inc. (January 2, 1981) and "Occurance of VOCs in Drinking Water."

3.1 Correspondence (cont'd.)

Environmental Protection Agency

20. Letter from William Walsh-Rogalski, EPA Region I to Randy M. Mott, Heron, Burchette, Rickert & Rothwell (Attorney for Peterson/Puritan, Inc.) (November 29, 1985). Concerning the importance of negotiating the remedial design/remedial action phases of the cleanup.
21. Letter from David J. Newton, EPA Region I to Susan Zon Oettingen, U.S. Department of the Interior Fish and Wildlife Service (December 19, 1985). Concerning submission of the Draft Remedial Investigation/ Feasibility Study Work Plan to her for comment.
22. Letter from Merrill S. Hohman, EPA Region I to Daniel W. Varin, State of Rhode Island Department of Administration Statewide Planning Program (January 16, 1986). Concerning notification that the state has 60 days to comment on the proposed Superfund cleanup activities at the site.
23. Letter from William Walsh-Rogalski, EPA Region I to Michael L. Italiano, Heron, Burchett, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.). (February 18, 1986). Concerning development of a draft remedial investigation/feasibility study scope of work.
24. Trip Report on a Visit to Peterson/Puritan, Inc. Site, David J. Newton, EPA Region I and Dick Willey, EPA Region I (April 11, 1986). Concerning preliminary inspection of the site and its surroundings.
25. Memorandum from David J. Newton, EPA Region I to Alicia M. Good, Rhode Island Department of Environmental Management (June 23, 1986). Concerning RIDEM review of the Draft Remedial/Investigation/ Feasibility Study Work Plan.
26. Memorandum from Richard C. Boynton, EPA Region I to Dennis Huebner, EPA Region I (July 21, 1986). Concerning issues discussed at the July 10, 1986 meeting with Rhode Island Department of Environmental Management.
27. Letter from David J. Newton, EPA Region I to David McIntyre, EPA Region I (September 29, 1986). Concerning attached maps depicting recently-discovered drums in the site area.
28. Letter from David J. Newton, EPA Region I to Warren S. Angell II, Rhode Island Department of Environmental Management (December 1, 1986). Concerning transmittal of the September 1986 "Final Work Plan - Remedial Investigation/Feasibility Study," Camp Dresser & McKee.
29. Letter from David J. Newton, EPA Region I to Tracy Getz, Heron, Burchett, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) (January 9, 1987) with attached Letter from Kenneth DeCosta, Lee Pare Associates, Inc. to William Cadzow Jr., Aerial Data Reduction Associates, Inc. (February 10, 1987). Concerning transmittal of the September 1986 "Final Work Plan - Remedial Investigation/ Feasibility Study - Volume I: Technical Scope of Work," Camp Dresser and McKee Inc.
30. Memorandum from David J. Newton, EPA Region I to Susan Von Oettingen, U.S. Department of the Interior Fish and Wildlife Service (February 23, 1987). Concerning transmittal of the September 1986 "Final Work Plan - Remedial Investigation/ Feasibility Study - Volume I: Technical Scope of Work," Camp Dresser and McKee Inc. and the Blackstone River Master Plan.
31. Trip Report on a Visit to Peterson/Puritan, Inc. Site, John Zannos, EPA Region I, Dick Friend, Camp Dresser & McKee Inc., and Al Whitcker, Guild Drilling Services (April 17, 1987). Concerning future drilling methods.

3.1 Correspondence (cont'd.)

Environmental Protection Agency

32. Memorandum from John Zannos, EPA Region I to David J. Newton, EPA Region I (June 18, 1987). Concerning the June 8, 1987 Draft Seismic Refraction Study.
33. Letter from David J. Newton, EPA Region I to Wesley L. Bradford, Versar, Inc. (June 19, 1987). Concerning comments on the Revised Seismic Scope of Work and Proposal.
34. Memorandum from David J. Newton, EPA Region I to File (June 21, 1987). Concerning potential additional sources of contamination.
35. Letter from David J. Newton, EPA Region I to Wesley L. Bradford, Versar, Inc. (July 6, 1987). Concerning transmittal of updated well-location map.
36. Letter from David J. Newton, EPA Region I to William Harris, Versar, Inc. (July 16, 1987). Concerning attached revision of the "Draft Project Operations Plan," Versar, Inc.
37. Letter from David J. Newton, EPA Region I to Wesley L. Bradford, Versar, Inc. (August 5, 1987). Concerning clarification of statements made in Versar's summary of the July 13, 1987 "Seismic Refraction Survey," Weston Geophysical Corporation for Versar, Inc..
38. Letter from David J. Newton, EPA Region I to Wesley L. Bradford, Versar, Inc. (September 30, 1987). Concerning adjustments to the "Health & Safety Plan," Versar, Inc.
39. Letter from David J. Newton, EPA Region I to Terence J. Greenlief, Lee Pare Associates, Inc. (October 21, 1987). Concerning Lee Pare Associates, Inc.'s responsibilities during survey operations.
40. Telephone Notes between John Zannos, EPA Region I and Wesley L. Bradford, Versar, Inc. (January 19, 1988). Concerning site status and identification of priority work products.
41. Telephone Notes between Diana Lettro and John Zannos, EPA Region I and Wesley L. Bradford, Versar, Inc. (May 9, 1988). Concerning well assessment and sampling plan.
42. Telephone Notes between Diana Lettro, EPA Region I and Warren S. Angell II, Rhode Island Department of Environmental Management (July 11, 1988). Concerning changes to the soil gas sampling plan.
43. Telephone Notes between Diana Lettro, EPA Region I and Warren S. Angell II, Rhode Island department of Environmental Management (July 12, 1988). Concerning changes to the soil gas sampling plan.
44. Telephone Notes between Diana Lettro, EPA Region I and Warren S. Angell II, Rhode Island department of Environmental Management (July 12, 1988). Concerning soil gas sampling plan.
45. Telephone Notes between Diana Lettro, EPA Region I, John Zannos, EPA Region I and Rose Tuscano, EPA Region I (July 13, 1988). Concerning actions to be taken if purged water is found to be contaminated.
46. Telephone Notes between Diana Lettro, EPA Region I and Warren S. Angell II, Rhode Island Department of Environmental Management (July 13, 1988). Concerning actions to be taken if purged water is found to be contaminated.
47. Telephone Notes between Diana Lettro, EPA Region I and Wesley L. Bradford, Versar, Inc. (July 1988). Concerning groundwater sampling plans.
48. Letter from Diana Lettro, EPA Region I to Wesley L. Bradford, Versar, Inc. (September 14, 1988). Concerning plans forgroundwater sampling.
49. Letter from Richard C. Boynton, EPA Region I to J. Craig Flanders, Trimont Chemicals (February 21, 1989). Concerning transmittal of technical data.

3.1 Correspondence (cont'd.)

Environmental Protection Agency

50. Letter from David J. Newton, EPA Region I to Edward W. Kleppinger, EWK Consultants (April 18, 1989). Concerning 10 sampling wells.
51. Memorandum from David J. Newton, EPA Region I to Norm Beddows, EPA Region I (May 11, 1989). Concerning request to review the "Revised Health and Safety Plan," C-E Environmental, Inc. for Peterson/Puritan, Inc.
52. Memorandum from David J. Newton, EPA Region I to Carol Wood, EPA Region I (May 15, 1989). Concerning review of the "Revised Quality Assurance Project Plan," C-E Environmental, Inc. for Peterson/Puritan, Inc.
53. Memorandum from David J. Newton, EPA Region I to Paul J. Exner, C-E Environmental, Inc. (May 31, 1989). Concerning attached note from Norm Beddows, EPA Region I approving the "Revised Health and Safety Plan," C-E Environmental, Inc. for Peterson/Puritan, Inc.
54. Letter from David J. Newton, EPA Region I to Edward W. Kleppinger, EWK Consultants (July 10, 1989). Concerning transmittal of technical information.
55. Memorandum from David J. Newton, EPA Region I to Richard C. Boynton, EPA Region I (July 18, 1989). Concerning resolution of site issues.
56. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (August 15, 1989). Concerning issues raised during the August 3, 1989 meeting regarding the ongoing investigation.
57. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (October 4, 1989) with attached list. Concerning transmittal of various documents requested by CPC International, Inc..
58. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (October 16, 1989). Concerning attached September 25, 1989 "Final Report - Review of C-E Environmental's Subtask 2D-B Primary Source Area Sampling Draft Report."
59. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (February 9, 1990). Concerning attached:
    A. Review Team Coordination List
    B. Letter from Michael R. Kulbersh, CDM Federal Programs Corporation to David J. Newton, EPA Region I (February 8, 1990).
60. Memorandum from David J. Newton, EPA Region I to Addressees (February 20, 1990). Concerning the review process for the remedial investigation and the attached "Review Team Coordination List."
61. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (May 1, 1990). Concerning remedial investigation data.
62. Memorandum from David J. Newton, EPA Region I to File (May 16, 1990). Concerning May 11, 1990 site visit.
63. Trip Report on a Visit to Peterson/Puritan, Inc. Site, Al Klinger, EPA Region I (June 15, 1990). Concerning the installation of water-level recording devices.
64. Memorandum from Nadine Raniere, EPA Region I to David J. Newton, EPA Region I (July 11, 1990) with attached letter from John Walker, CDM Federal Programs Corporation to Jack Jojokian, EPA Headquarters (July 10, 1990). Concerning transmittal of the "Review of Draft Remedial Investigation Report Volumes I and II," (February 1990).
65. Letter from David J. Newton, EPA Region I to Neil Fiorio, Town of Cumberland (March 14, 1991). Concerning transmittal of analytical data.
66. Memorandum from David J. Newton, EPA Region I to File (April 1, 1993). Concerning remedial action objectives.

3.1 Correspondence (cont'd.)

Environmental Protection Agency

67. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. and David J. Freeman, Holtzman, Wise & Shepard (Attorney for Lonza, Inc.) (April 13, 1993). Concerning trasmittal of the April 9, 1993 "Final Draft Report - Ecological Assessment," Camp Dresser & McKee Inc.
68. Letter from Brian Rohan, EPA Region I to Dennis Esposito, Adler, Pollock & Sheehan (Attorney for CPC International, Inc.) (April 22, 1993). Concerning risk assessment issues.
69. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (May 28, 1993). Concerning transmittal of the May 21, 1993 "Ecological Assessment - Final Report," CDM Federal Programs Corporation.
70. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (June 14, 1993). Concerning transmittal of the June 1993 "Baseline Risk Assessment - Final Report," CDM Federal Programs Corporation.

EWK Consultants

Attachments associated with entry numbers 71 and 72 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

71. Letter from Edward W. Kleppinger, EWK Consultants to David J. Newton, EPA Region I (June 22, 1989). Concerning use of the Quinnville wellfield.
72. Letter from Edward W. Kleppinger, EWK Consultants to David J. Newton, EPA Region I (July 3, 1989). Concerning the attached "Environmental News," EPA Headquarters (June 22, 1989).

Goldberg, Zoino & Associates, Inc.

73. Letter from Charles A. Lindberg and Laura Feldman for John E. Ayers, Goldberg, Zoino & Associates, Inc. to Marilyn Wade, EPA Region I (December 11, 1984). Concerning the summarization of GZA's responses to Peterson/Puritan's comments on the May 23, 1984 "Preliminary Work Plan - Remedial Investigation/Feasibility Study," NUS Corporation.

Lee Pare Associates, Inc.

74. Letter from Kenneth DeCosta, Lee Pare Associates, Inc. to William Cadzow Jr., Aerial Data Reduction Associates, Inc. (February 10, 1987). Concerning release of the ground surveys established for the Blackstone River Bikeway ADR Project and to provide additional mapping for Camp Dresser & McKee Inc.
75. Letter from Kenneth DeCosta, Lee Pare Associates, Inc. to Edward W. Kleppinger, EWK Consultants (March 23, 1987). Concerning delivery dates for the installation of computer equipment to be used in mapping the site.
76. Letter from Kenneth DeCosta, Lee Pare Associates, Inc. to Edward W. Kleppinger, EWK Consultants (April 14, 1987). Concerning notification that Lee Pare Associates, Inc. is on schedule with the site mapping efforts.
77. Letter from Robert P. Campbell for Kenneth DeCosta, Lee Pare Associates, Inc. to Edward W. Kleppinger, EWK Consultants (April 27, 1987). Concerning transmittal of one set of blue lines of the site map.

3.1 Correspondence (cont'd.)

Lee Pare Associates, Inc.

78. Letter from Kenneth DeCosta, Lee Pare Associates, Inc. to Edward W. Kleppinger, EWK Consultants (May 1, 1987). Concerning an update of the mapping project.

Malcolm Pirnie, Inc.

79. Letter from Vincent W. Uhl Jr., Malcolm Pirnie, Inc. to Joel Blumstein, EPA Region I (June 8, 1983). Concerning transmittal of the June 1983 "Investigation of Volatile Organic Chemical Groundwater Contamination" report, Malcolm Pirnie, Inc. for Peterson/Puritan, Inc.

Peterson/Puritan, Inc. (CPC International, Inc.)

80. Letter from Michael L. Italiano, Heron, Burchett, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (February 6, 1986). Concerning request for the Remedial Investigation/ Feasibility Study Scope of Work.
81. Letter from Michael L. Italiano, Heron, Burchett, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (February 18, 1986). Concerning second request for copy of the Remedial Investigation/Feasibility Study Scope of Work.
82. Letter from David F. Rogers, CPC International, Inc. to David J. Newton, EPA Region I (August 24, 1989). Concerning attached "Brook A" map of the site.
83. Letter from David F. Rogers, CPC International to David J. Newton, EPA Region I (November 16, 1989). Concerning status of the draft remedial investigation report.
84. Letter from David F. Rogers, CPC International, Inc. to David J. Newton, EPA Region I (December 11, 1989). Concerning delay in delivery of the draft remedial investigation report.
85. Letter from David F. Rogers, CPC International, Inc. to David J. Newton, EPA Region I (February 16, 1990). Concerning transmittal of the February 1990 "Draft Remedial Investigation Report - Volumes I-III," C-E Environmental, Inc. for CPC International, Inc.
86. Letter from David F. Rogers, CPC International, Inc. to David J. Newton, EPA Region I (May 17, 1990). Concerning remedial investigation data.
87. Lettter from Dennis H. Esposito, Adler Pollack & Sheehan (Attorney for CPC International, Inc.) to Claude Cote and Warren S. Angell II, Rhode Island Department of Environmental Management (March 4, 1993). Concerning confirmation of the March 24, 1993 meeting.

Rhode Island Department of Administative Statewide Planning Program

88. Letter from Daniel W. Varin, State of Rhode Island Department of Administration Statewide Planning Program to David J. Newton, EPA Region I (February 17, 1986). Concerning support of the proposed Remedial Investigation/Feasibility Study for the site.

3.1 Correspondence (cont'd.)

Rhode Island Department of Environmental Management (RIDEM)

89. Letter from Alicia M. Good, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (July 29, 1986). Concerning comments on the Draft Remedial Investigation/Feasibility Study Work Plan.
90. Letter from Thomas D. Getz, Rhode Island Department of Environmental Management to Edward W. Kleppinger, EWK Consultants (May 6, 1987). Concerning the Division of Air and Hazardous Materials' requirements that may effect the selection of remedial alternatives presented in the Feasibility Study.
91. Letter from Warren S. Angell II, Rhode Island Department of Environmental Management to Saverio Mancieri, State of Rhode Island Department of Environmental Management (August 10, 1989). Concerning transmittal of field investigation report on the Martin Street well.
92. Letter from Linda B. Wofford, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (November 29, 1989). Concerning review of the July 31, 1989 "Annotated Outline for Remedial Investigation," E.C. Jordan for C-E Environmental, Inc.
93. Letter from Linda B. Wofford, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (October 4, 1990). Concerning a statement regarding classification of groundwater at the site.

U.S. Department of Commerce National Oceanic and Atmospheric Administration

94. Memorandum from Sharon K. Christopherson, Department of Commerce National Oceanic and Atmospheric Administration to David J. Newton, EPA Region I (July 9, 1986). Concerning possible environmental significance of the presence of dieldrin in groundwater samples.

Versar, Inc.

95. Letter from William E. Harris, Versar, Inc. to Peter Calise, State of Rhode Island Water Resource Board (April 14, 1987). Concerning request for information on what responsibilities the Board has in regard to the site.
96. Letter from William E. Harris, Versar, Inc. to Kathy Johnson, Rhode Island Department of Environmental Management (April 14, 1987). Concerning request for information on what responsibilities the Division of Water Resources has in regard to the site.
97. Letter from William E. Harris, Versar, Inc. to Eugene Morin, State of Rhode Island Department of Health (April 14, 1987). Concerning request for information on what responsibilities the Division of Water Supply has in regard to the site.
98. Letter from William E. Harris, Versar, Inc. to Susan Morrison, State of Rhode Island Department of Administration Statewide Planning Program (April 14, 1987). Concerning request for information on what responsibilities the Department has in regard to the site.
99. Letter from William E. Harris, Versar, Inc. to David J. Newton, EPA Region I (April 24, 1987). Concerning problems associated with traverse line C-C1 which will cross both residential and business properties.

3.1 Correspondence (cont'd.)

Versar, Inc.

100. Letter from William E. Harris, Versar, Inc. to David J. Newton, EPA Region I (April 29, 1987). Concerning seismic line access and the request for well installation records.
101. Letter from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (May 11, 1987). Concerning transmittal of the "Seismic Refraction Survey," Weston Geophysical Corporation.
102. Letter from Janet T. Hart, Versar, Inc. to Sharon Christopherson, U.S. Department of Commerce National Oceanic and Atmospheric Administration (May 15, 1987). Concerning NOAA regulations as they apply to the site.
103. Memorandum from Mark Potts, Versar, Inc. to Edward N. Levine, Weston Geophysical Corporation (May 27, 1987). Concerning transmittal of maps for land access during seismic work.
104. Letter from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (June 8, 1987). Concerning transmittal of the "Seismic Refraction Survey," Weston Geophysical Corporation.
105. Letter Report from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (July 8, 1987). Concerning information on the "Seismic Refraction Survey," Weston Geophysical Corporation.
106. Letter from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (September 11, 1987). Concerning proposed schedule for the performance of all tasks at the site.
107. Letter from Wesley L. Bradford and Richard B. Beach, Versar, Inc. to David J. Newton, EPA Region I (September 28, 1987). Concerning use of Alpha Analytical Laboratory for analytical services.
108. Letter from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (September 29, 1987). Concerning approval of sampling activities.
109. Letter from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (October 1, 1987). Concerning schedule for walkover of the site.
110. Letter from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (October 22, 1987). Concerning transmittal of revised sections of the September 18, 1987 "Draft Project Operations Plan - Revision 1," Versar, Inc. for Peterson/Puritan, Inc.

The printouts associated with entry number 111 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

111. Letter from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (December 17, 1987). Concerning transmittal of well construction data.
112. Letter from Wesley L. Bradford, Versar, Inc. to Diana Lettro, EPA Region I (February 18, 1988). Concerning request for EPA split sample results.

The printouts associated with entry number 113 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

113. Letter from Wesley L. Bradford, Versar, Inc. to Diana Lettro, EPA Region I (March 1, 1988). Concerning well construction data.
114. Letter from Wesley L. Bradford, Versar, Inc. to Diana Lettro, EPA Region I (March 23, 1988). Concerning results of surface water and sediment sampling.

3.1 Correspondence (cont'd.)

Versar, Inc.

The printouts associated with entry number 115 may be reviewed, by appointment only, at EPA Region I Records Center in Boston, Massachusetts.

115. Letter from Wesley L. Bradford, Versar, Inc. to Diana Lettro, EPA Region I (April 25, 1988). Concerning well sample results.
116. Letter from Wesley L. Bradford, Versar, Inc. to Diana Lettro, EPA Region I (June 1, 1988). Concerning selection of wells for sampling and soil gas investigations.
117. Letter from Mark R. McElroy for Patrick Dobak, Versar, Inc. to Diana Lettro, EPA Region I (June 28, 1988). Concerning return of keys used by Versar personnel.
118. Letter from Wesley L. Bradford, Versar, Inc. to Scott McLean, Alpha Analytical Laboratory (July 15, 1988). Concerning analysis of groundwater samples.
119. Letter from Wesley L. Bradford, Versar, Inc. to Diana Lettro, EPA Region I (July 18, 1988). Concerning methods to be used in groundwater sampling.

3.2 Sampling and Analysis Data

The Sampling and Analysis Data for the Remedial Investigation (RI) may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

3.3 Scopes of Work

1. "Draft Field Investigation Scope of Work Peterson/Puritan Facility," ABB Environmental Services for CPC International, Inc. (November 1990).
2. "Draft Field Investigation Scope of Work Lonza Property," ABB Environmental Services for CPC International, Inc. (November 1990).
3. "Phase II Scope of Work for Primary Source Area," CDM Federal Programs Corporation (March 4, 1992).

Comments

4. Comments Dated January 3, 1991 on the November 1990 "Draft Field Investigation Scope of Work Peterson/Puritan Facility," ABB Environmental Services for CPC International, Inc.
5. Comments Dated January 14, 1991 on the November 1990 "Draft Field Investigation Scope of Work Lonza Property," ABB Environmental Services for CPC International, Inc.
6. Comments Dated April 21, 1992 from Scott J. Perry and William A. Duvel Jr., ENSR Consulting on the March 4, 1992 "Phase II Scope of Work for Primary Source Area," CDM Federal Programs Corporation.

3.4 Interim Deliverables

Reports

The records cited in entry numbers 1 through 3 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. "Project Operations Plan," Camp Dresser & McKee Inc. (October 1986).
2. "Draft Wetlands and Floodplain Assessment," Versar, Inc. for Peterson/Puritan, Inc. (May 1987).
3. "Draft - Task Three Development of Preliminary Remedial Technologies," Versar, Inc. (July 1, 1987).

The seismic profile associated with entry number 4 is oversized and may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

4. Letter Report from Mark Blackey, Weston Geophysical for Versar, Inc. (July 13, 1987). Concerning the seismic refraction investigation.

The records cited in entry numbers 5 and 6 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

5. Memorandum from David Brooks, EPA Region I to Theresa Murphy, Camp Dresser & McKee Inc. (August 19, 1987 - Revised October 14, 1987). Concerning evaluation of existing wells at the site.
6. "Draft Project Operations Plan - Revision 1," Versar, Inc. for Peterson/Puritan, Inc. (September 18, 1987).
7. "Monitoring Well and Peizometer Installation - Final Report," Camp Dresser & McKee Inc. (September 1987).
8. Letter from Wesley L. Bradford, Versar, Inc. to David J. Newton, EPA Region I (October 19, 1987). Concerning results of study area walkover.
9. "Draft - Subtask 2B - Surface Water and Sediment Sampling and Analysis, Round 1," Versar, Inc. for Peterson/Puritan, Inc. (March 23, 1988).

The records cited in entry numbers 10 through 12 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

10. Letter Report from Wesley L. Bradford, Versar, Inc. to Diana Lettro, EPA Region I (April 1, 1988). Concerning well sampling at the site.
11. "Draft - Subtask 2F - Plant Visit - October 20, 1987," Versar, Inc. (April 4, 1988).
12. Letter Report from Michael R. Kulbersh, CDM Federal Programs Corporation (April 26, 1988). Concerning oversight activities.
13. "Technical Memorandum - Peterson/Puritan Plant Visit," CDM Federal Programs Corporation (May 26, 1988).

The records cited in entry numbers 14 through 24 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

14. "Health and Safety Plan," CDM Federal Programs Corporation (May 31, 1988).
15. "Quality Assurance (Brossman Type) Project Plan for RI/FS Field Oversight (Groundwater Sampling Phase)," CDM Federal Programs Corporation (June 1, 1988).

3.4 Interim Deliverables (cont'd.)

Reports

16. "Quality Assurance (Brossman Type) Project Plan for RI/FS Field Oversight (Groundwater Sampling Phase) Revision I," CDM Federal Programs Corporation (August 4, 1988).
17. Letter Report: "Trip Report Peterson Puritan," CDM Federal Programs Corporation (August 17, 1988). Concerning groundwater sampling.
18. "Draft Report - Quality Assurance (Brossman Type) Project Plan for RI/FS Field Oversight (Surface Water and Sediment Sampling Phase)," CDM Federal Programs Corporation (August 18, 1988).
19. Trip Report on a Visit to Peterson/Puritan Site, CDM Federal Programs Corporation (August 22-26, 1988). Concerning oversight activities.
20. Trip Report on a Visit to Peterson/Puritan Site, CDM Federal Programs Corporation (October 10 through October 21, 1988). Concerning soil gas sampling.
21. "Quality Assurance (Brossman Type) Project Plan," CDM Federal Programs Corporation (October 25, 1988).
22. Letter Report from Wesley L. Bradford, Versar, Inc. to Diana Lettro, EPA Region I (October 25, 1988). Concerning results of soil samples.
23. "Quality Assurance Project Plan," Versar, Inc. for CPC International, Inc.(January 25, 1989).
24. "Draft Report - Review of Versar's Round 2 Surface Water and Sediment Sampling Report," CDM Federal Programs Corporation (March 3, 1989).
25. "Draft - Subtask 2G - Soil Sources Sampling and Analysis," Versar, Inc. for Peterson/Puritan, Inc. (April 7, 1989).

The records cited in entry numbers 26 through 28 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

26. "Revised Project Operations Plan," C-E Environmental for CPC International, Inc. (May 5, 1989).
27. "Draft Quality Assurance Project Plan," C-E Environmental for CPC International, Inc. (May 5, 1989).
28. "Quality Assurance Project Plan," C-E Environmental for CPC International, Inc. (June 13, 1989).
29. "Draft Report - Submission of Deliverables Required Under the Administrative Order," CDM Federal Programs Corporation (July 28, 1989).
30. "Draft Report - Summary of Primary Source Area Groundwater Results," CDM Federal Programs Corporation (August 1, 1989).
31. "Final Report - Meeting Minutes from the August 2, 1989 Meeting," CDM Federal Programs Corporation (August 29, 1989).
32. "Final Report - Round 1 Groundwater Data for Selected Monitoring Wells," CDM Federal Programs Corporation (August 29, 1989).
33. "Final Report - Summary of Primary Source Area Groundwater Results," CDM Federal Programs Corporation (August 29, 1989).

The records cited in entry numbers 34 and 37 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

34. "Draft Subtask 2D-B Primary Source Area Sampling June 26-29, 1989," C-E Environmental for CPC International, Inc. (August 1989).

3.4 Interim Deliverables (cont'd.)

Reports

35. "Draft Quality Assurance Project Plan," CDM Federal Programs Corporation (September 13, 1989).
36. "Draft Subtask 2D-B Primary Source Area Sampling August 21-24, 1989," C-E Environmental for CPC International, Inc. (October 1989).
37. "Final Report - Review of CEE's Subtask 2D August 1989 Groundwater Report," CDM Federal Programs Corporation (November 8, 1989).
38. "Final Report - Review of CEE's and FPC's Analytical Data for Monitoring Well AW-2," CDM Federal Programs Corporation (December 21, 1989).

The maps and analytical data associated with entry numbers 39 and 40 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

39. "Revised Draft Subtask 2D-B Primary Source Area Sampling," C-E Environmental for CPC International, Inc. (December 1989).
40. "Final Report - Review of CEE's Subtask 2D August 1989 Groundwater Sampling Report," CDM Federal Programs Corporation (February 27, 1990).
41. Trip Report on a Visit to Peterson/Puritan, Inc.Site, EPA Region I, Camp Dresser & McKee Inc. and Rhode Island Department of Environmental Management (May 11, 1990). Concerning well installation at site.

The records cited in entry numbers 42 and 43 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

42. Letter Report from Paul J. Exner, ABB Environmental Services to David J. Newton, EPA Region I (November 20, 1990). Concerning chronology of the project operations plans' revisions.
43. "Draft Preliminary Source Investigation Report," ABB Environmental Services for CPC International, Inc.
44. "Risk Assessment Discussion Paper," ABB Environmental Services for CPC International, Inc. (May 1991).

The records cited in entry numbers 45 through 53 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

45. "REMTECH 6.1 User's Guide to the Sampling Database," CDM Federal Programs Corporation (February 12, 1992).
46. "Draft Project Operations Plan - Phase II Remedial Investigation," ABB Environmental Services for CPC International, Inc. (April 1992).
47. "Final Project Operations Plan Phase II Remedial Investigation Primary Source Area (OU 1)," ABB Environmental Services for CPC International, Inc. (May 1992).
48. "Health and Safety Plan Amendment #2," CDM Federal Programs Corporation (May 1, 1992).
49. "Quality Assurance Project Plan," CDM Federal Programs Corporation (May 12, 1992).
50. "Status Report from May 13-19, 1992," CDM Federal Programs Corporation (June 5, 1992).
51. "Daily Status Reports," CDM Federal Programs Corporation (June 25, 1992).

3.4 Interim Deliverables (cont'd.)

Reports

52. "Daily Status Reports," CDM Federal Programs Corporation (July 9, 1992).
53. "Trip Report for Brook A Dye Test," "Daily Status Reports," CDM Federal Programs Corporation (September 3, 1992).

Comments

54. Comments Dated June 30, 1987 from Mark J. Kern, EPA Region I on the May 1987 "Draft Wetlands and Floodplain Assessment," Versar, Inc. for
55. Comments Dated July 2, 1987 from Gordon E. Beckett, U.S. Department of the Interior Fish and Wildlife Service on the May 1987 "Draft Wetlands and Floodplain Assessment," Versar, Inc. for Peterson/Puritan, Inc.
56. Comments Dated July 10, 1987 from Sharon K. Christopherson, U.S. Department of Commerce National Oceanic and Atmospheric Administration on the May 1987 "Draft Wetlands and Floodplain Assessment," Versar, Inc. for Peterson/Puritan, Inc.
57. Comments Dated July 10, 1987 from Warren S. Angell II and Alicia M. Good, Rhode Island Department of Environmental Management on the May 1987 "Draft Wetlands and Floodplain Assessment," Versar, Inc. for Peterson/Puritan, Inc.
58. Comments Dated October 1, 1987 from Theresa Murphy, Camp Dresser & McKee Inc. on the September 18, 1987 "Draft Project Operations Plan - Revision 1," (sections 4.1 and 6.3) Versar, Inc. for Peterson/Puritan, Inc.
59. Comments Dated October 1, 1987 from Theresa Murphy, Camp Dress & McKee Inc. on the September 18, 1987 "Draft Project Operations Plan - Revision 1," (sections 4.4 and 6.7) Versar, Inc. for Peterson/Puritan, Inc.
60. Comments Dated June 23, 1988 on the June 1, 1988 "Quality Assurance (Brossman Type) Project Plan for RI/FS Field Oversight (Groundwater Sampling Phase)," CDM Federal Programs Corporation.
61. Comments Dated May 9,1989 from Michael R. Kulbersh, CDM Federal Programs Corporation on the April 7, 1989 "Draft - Subtask 2G - Soil Sources Sampling and Analysis," Versar, Inc. for Peterson/Puritan, Inc.
62. Comments Dated May 16,1989 from Michael R. Kulbersh, CDM Federal Programs Corporation on the May 5, 1989 "Revised Project Operations Plans," C-E Environmental for CPC International, Inc.
63. Comments Dated May 24, 1989 from James S. Sullivan and Joseph D. Mastone, Roy F. Weston, Inc. on the May 5, 1989 "Draft Quality Assurance Project Plan," C-E Environmental for CPC International, Inc.
64. Comments Dated June 22, 1989 from Michael R. Kulbersh, CDM Federal Programs Corporation on the May 5, 1989 "Revised Project Operations Plans," C-E Environmental for CPC International, Inc.
65. Comments Dated September 25, 1989 from Michael R. Kulbersh on the August 1989 "Draft Subtask 2D-B Primary Source Area Sampling June 26-29, 1989," C-E Environmental for CPC International, Inc.
66. Comments Dated November 14, 1989 from David J. Newton, EPA Region I on the October 1989 "Draft Subtask 2D-B Primary Source Area Sampling August 21-24, 1989," C-E Environmental for CPC International, Inc.

3.4 Interim Deliverables (cont'd.)

Comments

67. Comments Dated May 5, 1992 from Warren S. Angell II, Rhode Island Department of Environmental Management on the April 1992 "Draft Project Operations Plan - Phase II Remedial Investigation," ABB Environmental Services for CPC International, Inc.

Attachments associated with entry number 68 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts

68. Comments Dated May 11, 1992 from David J. Newton, EPA Region I on the April 1992 "Draft Project Operations Plan - Phase II Remedial Investigation," ABB Environmental Services for CPC International, Inc.
69. Comments Dated May 15, 1992 from Scott J. Perry and William A. Duvel Jr., ENSR Consulting on the April 1992 "Draft Project Operations Plan - Phase II Remedial Investigation," ABB Environmental Services for CPC International, Inc.
70. Comments Dated August 6, 1992 from Michael R. Kulbersh, CDM Federal Programs Corporation on the May 1992 "Final Project Operations Plan Phase II Remedial Investigation Primary Source Area (OU 1)," ABB Environmental Services for CPC International, Inc.
71. Comments Dated August 19, 1992 from David J. Newton, EPA Region I on the May 1992 "Final Project Operations Plan Phase II Remedial Investigation Primary Source Area (OU 1)," ABB Environmental Services for CPC International, Inc.

Responses to Comments

72. Response Dated June 13, 1989 from Paul J. Exner, C-E Environmental, Inc. to the May 24, 1989 Comment from James S. Sullivan and Joseph D. Mastone, Roy F. Weston, Inc.

3.5 Applicable or Relevant and Appropriate Requirements (ARARs)

Attachments associated with entry number 1 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts

1. Letter from William E. Harris, Versar, Inc. to David J. Newton, EPA Region I (May 22, 1987). Concerning ARARs for the site.
2. Memorandum from Susan Henderson, Camp Dresser & McKee, Inc. to Theresa Murphy, Camp Dresser & McKee Inc. (July 28, 1987). Concerning review of ARARs for the site.

Attachment associated with entry number 3 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts

3. Letter from Linda B. Wofford, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (December 29, 1989). Concerning groundwater classification.

3.6 Remedial Investigation (RI) Reports

Reports

1. "Annotated Outline Proposed for Remedial Investigation Report," E.C. Jordan Co. for C-E Environmental, Inc. (July 31, 1989).

Some of the maps associated with entry number 2 are oversized and may be reviewed, by appointment only, at the EPA Region I Records Center un Boston, Massachusetts.

2. "Draft Remedial Investigation Report - Volume I," C-E Environmental, Inc. for CPC International, Inc. (February 1990).
3. "Draft Remedial Investigation Appendices - Volume II," C-E Environmental, Inc. for CPC International, Inc. (February 1990).
4. "Draft Remedial Investigation Appendix - Volume III," C-E Environmental, Inc. for CPC International, Inc. (June 1990).

The records cited in entry numbers 5 through 9 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

5. "Laboratory Analysis and Chain of Custody Information - Part I," Versar, Inc. and ABB Environmental Services for CPC International, Inc. (June 1990).
6. "Laboratory Analysis and Chain of Custody Information - Part II," Versar, Inc. and ABB Environmental Services for CPC International, Inc. (June 1990).
7. "Final Draft Remedial Investigation - Primary Source Area (OU1) - Volume I," ABB Environmental Services for CPC International, Inc. (March 1993).
8. "Final Draft Remedial Investigation Appendices - Primary Source Area (OU1) - Volume II," ABB Environmental Services for CPC International, Inc. (March 1993).
9. "Final Draft Remedial Investigation - Primary Source Area (OU1) - Oversized Figures," ABB Environmental Services for CPC International, Inc. (March 1993).
10. "Revised Final Remedial Investigation - Primary Source Area (OU1) - Volume I," ABB Environmental Services for CPC International, Inc. (June 1993).
11. "Revised Final Remedial Investigation - Primary Source Area (OU1) - Volume II," ABB Environmental Services for CPC International, Inc. (June 1993).
12. "Revised Final Remedial Investigation - Primary Source Area (OU1) - Oversized Figures," ABB Environmental Services for CPC International, Inc. (June 1993).

Comments

13. Comments Dated March 22, 1990 from Michael R. Kulbersh, Camp Dresser & McKee Inc. on the February 1990 "Draft Remedial Investigation Report - Volumes I and II," C-E Environmental, Inc. for CPC International, Inc.
14. Comment Dated June 1, 1990 from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) on the February 1990 "Draft Remedial Investigation Report - Volumes I and II," C-E Environmental, Inc. for CPC International, Inc.
15. Comments Dated June 8, 1990 from Linda B. Wofford, Rhode Island Department of Environmental Management on the February 1990 "Draft Remedial Investigation Report - Volumes I and II," C-E Environmental, Inc. for CPC International, Inc.

3.6 Remedial Investigation (RI) Reports (cont'd.)

Comments

The map associated with entry number 16 is oversized and may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

16. Comments Dated July 10, 1990 from Michael R. Kulbersh, Camp Dresser & McKee Inc. on the February 1990 "Draft Remedial Investigation Report - Volumes I and II," C-E Environmental, Inc. for CPC International, Inc.
17. Comments Dated July 30, 1990 from David J. Newton, EPA Region I on the February 1990 "Draft Remedial Investigation Report - Volumes I and II," C-E Environmental, Inc. for CPC International, Inc.
18. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (September 6, 1990). Concerning transmittal of attached Comments Dated September 4, 1990 from Michael R. Kulbersh, Camp Dresser & McKee Inc. on the February 1990 "Draft Remedial Investigation Appendix - Volume III," C-E Environmental, Inc. for CPC International, Inc.
19. Comments Dated October 2, 1990 from Sofia Bobiak, Rhode Island Department of Environmental Management on the February 1990 "Draft Remedial Investigation Report - Volumes I and II," C-E Environmental, Inc. for CPC International, Inc.
20. Comments Dated October 11, 1990 from David J. Newton, EPA Region I on the February 1990 "Draft Remedial Investigation Report - Volumes I and II," C-E Environmental, Inc. for CPC International, Inc.

Responses to Comments

21. Response Dated November 1990 from ABB Environmental Services for CPC International, Inc. to the July 30, 1990 Comments from David J. Newton, EPA Region I.
22. Response Dated February 1, 1991 from Michael R. Kulbersh, Camp Dresser & McKee Inc. to the November 1990 Response from ABB Environmental Services for CPC International, Inc.

3.7 Work Plans and Progress Reports

Progress Reports associated with the Remedial Investigation phase may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

Work Plans

CDM Federal Programs Corporation

1. "Final Work Plan - Remedial Investigation/Feasibility Study - Volume I: Technical Scope of Work," Camp Dresser & McKee Inc. (September 1986).
2. "Final Work Plan - Remedial Investigation/Feasibility Study - Volume I: Attachments," Camp Dresser & McKee Inc. (September 1986).

3.7 Work Plans and Progress Reports (cont'd.)

The records cited in entry number 3 and 4 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

NUS Corporation

3. "Preliminary Work Plan - Remedial Investigation/Feasibility Study," NUS Corporation (May 23, 1984).

Versar, Inc.

4. "Work Plan - Peterson/Puritan Plant Visit and Soil Gas Sampling and Analysis," Versar, Inc. (April 10, 1987).

Weston Geophysical Corporation

5. Letter from Mark Blackey, Weston Geophysical Corporation to Wesley L. Bradford, Versar, Inc. (June 3, 1987). Concerning revised proposal for geophysical investigations with attached Letter from Edward N. Levine, Weston Geophysical Corporation to Wesley L. Bradford, Versar, Inc. (May 8, 1987) with attached maps and "Seismic Refraction Survey."

3.9 Health Assessments

1. "Preliminary Health Assessment," U.S. Public Health Service Agency for Toxic Substances and Disease Registry (ATSDR) (April 10, 1989).
2. "Lead Initiative Summary Report," U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR) (September 24, 1992).

Comments

3. Comments Dated May 1, 1989 from Michael R. Kulbersh, CDM Federal Programs Corporation on the April 10, 1989 "Preliminary Health Assessment," U.S. Public Health Service Agency for Toxic Substances and Disease Registry (ATSDR).
4. Comments Dated October 26, 1992 from Thomas D. Getz, Rhode Island Department of Environmental Management on the March 21, 1992 "Lead Initiative Summary Report," U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR).

3.10 Endangerment Assessments

1. "Endangerment Assessment for the Peterson/Puritan, Inc. Site," NUS Corporation (March 21, 1984).

The records cited in entry numbers 2, 3 and 4 is may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

2. "Draft Baseline Risk Assessment," CDM Federal Programs Corporation (November 10, 1992).
3. "Draft Baseline Risk Assessment," CDM Federal Programs Corporation (March 15, 1993).

3.10 Endangerment Assessments (cont'd.)

4. "Final Draft Report - Ecological Assessment," CDM Federal Programs Corporation (April 9, 1993).
5. "Final Report - Ecological Assessment," CDM Federal Programs Corporation (May 21, 1993).
6. "Baseline Risk Assessment - Final Report," CDM Federal Programs Corporation (June 2, 1993).

Comments

7. Comments Dated April 16, 1993 from William A. Duvel Jr. and Betsy Ruffle, ENSR Consulting for Lonza, Inc. on the March 15, 1993 "Draft Baseline Risk Assessment," CDM Federal Programs Corporation.
8. Comments Dated April 30, 1993 from William A. Duvel Jr. and Betsy Ruffle, ENSR Consulting for Lonza, Inc. on the March 15, 1993 "Draft Baseline Risk Assessment," CDM Federal Programs Corporation.
9. Cross-Reference: Comments Dated August 2, 1993 from William A. Duvel Jr. and Betsy Ruffle, ENSR Consulting for Lonza, Inc. on the June 2, 1993 "Baseline Risk Assessment - Final Report," CDM Federal Programs Corporation [Filed and cited as entry number 5 in 5.3 Responsiveness Summaries].

4.0 Feasibility Study (FS)

4.1 Correspondence

1. Letter from Paul J. Exner, ABB Environmental Services to David J. Newton, EPA Region I (August 17, 1992). Concerning transmittal of the August 1992 "Draft Operable Unit 1 Feasibility Study Work Plan," ABB Environmental Services for CPC International, Inc.
2. Letter from Paul J. Exner, ABB Environmental Services to David F. Rogers, CPC International, Inc. (November 16, 1992). Concerning technical issues.
3. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (November 17, 1992). Concerning the feasibility study.
4. Letter from David F. Rogers, CPC International, Inc. to David Keehn Air Products and Chemicals (December 9, 1992). Concerning the feasibility study for the Pacific Anchor Chemical Corporation site.
5. Letter from Brian Rohan, EPA Region I to Dennis H. Esposito, Adler Pollock & Sheehan (April 13, 1993). Concerning feasibility study issues.
6. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (May 19, 1993). Concerning proposal for expedited field program with attached May 17, 1993 Letter from Stephen V. Byrne and William A. Duval Jr., ENSR Consulting.
7. Letter from Brian Rohan, EPA Region I to Warren S. Angell II, Rhode Island Department of Environmental Management (May 20, 1993). Concerning publicly-owned treatment works (POTW) compliance issues.
8. Letter from Brian Rohan, EPA Region I to Warren S. Angell II, Rhode Island Department of Environmental Management (May 20, 1993). Concerning Rhode Island Historic Commission issues.
9. Letter from David A. Ferenz and Michael R. Kulbersh, CDM Federal Programs Corporation to David J. Newton, EPA Region I (May 25, 1993). Concerning the in-situ oxidation process.

4.1 Correspondence (cont'd.)

10. Letter from Brian Rohan, EPA Region I to David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) (May 26, 1993). Concerning the proposed arsenic investigation.
11. Letter from Brian Rohan, EPA Region I to Dennis H. Esposito, Adler Pollock & Sheehan (June 7, 1993). Concerning feasibility study timetable.
12. Letter from Leo Hellested, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (June 8, 1993). Concerning sampling plan for well water.
13. Letter from Paul J. Exner, ABB Environmental Services to David J. Newton, EPA Region I (June 10, 1993). Concerning transmittal of the June 1993 "Revised Draft Feasibility Study Report - Primary Source Area (OU1) - Volumes IA,IB & II," ABB Environmental Services for CPC International, Inc.
14. Letter from David A. Ferenz and Michael R. Kulbersh, CDM Federal Programs Corporation to David J. Newton, EPA Region I (June 11, 1993). Concerning proposed investigation of PAC's acquifer.

Charts associated with entry number 15 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

15. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (June 18, 1993). Concerning approach to modeling arsenic mobility with attached June 17, 1993 Letter from Mark Gerath and Steve Byrne, ENSR Consulting to David J. Freeman, Holtzmann, Wise & Shepard.
16. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (July 15, 1993). Concerning transmittal of draft report on the arsenic investigation.
17. Letter from Mark Gerath and William A. Duvel Jr., ENSR Consulting to David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) (July 16, 1993). Concerning a summary of results from the arsenic investigation.
18. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (August 2, 1993). Concerning transmittal of the July 1993 [Final Report] "Considerations of Arsenic at the PAC Facility," ENSR Consulting for Lonza, Inc.

4.4 Interim Deliverables

The records cited in entry numbers 1 and 2 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. "Draft Feasibility Study CCL Remediation Area Primary Source Area (OU1) Screening of Remedial Alternatives," ABB Environmental Services for CPC International, Inc. (March 1993).
2. "Draft Feasibility Study PAC Remediation Area Primary Source Area (OU1) Screening of Remedial Alternatives," ABB Environmental Services for CPC International, Inc. (March 1993).
3. Letter from Paul J. Exner, ABB Environmental Services for CPC International, Inc. to Brian Rohan, EPA Region I (June 21, 1993). Concerning attached edits and ARARs tables which will appear in the June 1993 [Final] "Feasibility Study Report - Primary Source Area (OU1) - Volumes I & II," ABB Environmental Services for CPC International, Inc.
4. Cross-Reference: [Final Report] "Considerations of Arsenic at the PAC Facility," ENSR Consulting for Lonza, Inc. (July 1993) [Filed and cited as entry number 4 in 11.12 PRP-Related Documents].

Comments

5. Comments Dated April 16, 1993 from David J. Newton, EPA Region I on the March 1993 "Draft Feasibility Study CCL Remediation Area Primary Source Area (OU1) Screening of Remedial Alternatives," and the "Draft Feasibility Study PAC Remediation Area Primary Source Area (OU1) Screening of Remedial Alternatives," ABB Environmental Services for CPC International, Inc.

4.5 Applicable or Relevant and Appropriate Requirements (ARARs)

1. Memorandum from Sofia M. Bobiak, Rhode Island Department of Environmental Management to Linda B. Wofford, Rhode Island Department of Environmental Management (October 2, 1990). Concerning groundwater classification at the site.
2. Letter from Linda B. Wofford, Rhode Island Department of Environmental Management to Karen Stone, Camp Dresser & McKee Inc. (December 6, 1990). Concerning list of Rhode Island ARARs.
3. Cross-Reference: Comments Dated May 11, 1992 from David J. Newton, EPA Region I on the April 1992 "Draft Project Operations Plan - Phase II Remedial Investigation - Primary Source Area (OU1)," ABB Environmental Services for CPC International, Inc. [Filed and cited as entry number 68 in 3.4 Interim Deliverables].
4. Letter from Leo Hellested, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (March 4, 1993). Concerning state ARARs.
5. Letter from Leo Hellested, Rhode Island Department of Environmental Management to Nancy Brittain, Blackstone River Valley National Heritage Commission (June 4, 1993). Concerning a determination of adverse effects on the Blackstone River.
6. Letter from Leo Hellested, Rhode Island Department of Environmental Management to Richard Greenwood, Rhode Island Historic Preservation Commission (June 4, 1993). Concerning a determination of adverse effects on the Blackstone River.

4.6 Feasibility Study (FS) Reports

Reports

The records cited in entry numbers 1 through 5 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. "Draft Feasibility Study Report - Primary Source Area (OU1) - Volume I," ABB Environmental Services for CPC International, Inc. (May 1993).
2. "Draft Feasibility Study Report - Primary Source Area (OU1) - Volume II," ABB Environmental Services for CPC International, Inc. (May 1993).
3. "Revised Draft Feasibility Study Report - Primary Source Area (OU1) - Volume IA," ABB Environmental Services for CPC International, Inc. (June 1993).
4. "Revised Draft Feasibility Study Report - Primary Source Area (OU1) - Volume IB," ABB Environmental Services for CPC International, Inc. (June 1993).
5. "Revised Draft Feasibility Study Report - Primary Source Area (OU1) - Volume II," ABB Environmental Services for CPC International, Inc. (June 1993).
6. "[Final] Feasibility Study Report - Primary Source Area (OU1) - Volume I," ABB Environmental Services for CPC International, Inc. (June 1993).
7. "[Final] Feasibility Study Report - Primary Source Area (OU1) - Volume II - Appendices," ABB Environmental Services for CPC International, Inc. (June 1993).
8. Letter from Paul J. Exner, ABB Environmental Services to David J. Newton, EPA Region I (August 25, 1993). Concerning corrections to the June 1993 "[Final] Feasibility Study Report - Primary Source Area (OU1) - Volumes I & II," ABB Environmental Services for CPC International, Inc.

Comments

9. Comments Dated May 10, 1993 from William A. Duvel Jr. and Stephen V. Byrne, ENSR Consulting for Lonza, Inc. on the May 5, 1993 "Draft Feasibility Study," ABB Environmental Services.
10. Comments Dated May 20, 1993 from William A. Duvel Jr. and Stephen V. Byrne, ENSR Consulting for Lonza, Inc. on the May 5, 1993 "Draft Feasibility Study," ABB Environmental Services.
11. Comments Dated May 24, 1993 from Brian Rohan, EPA Region I on the May 5, 1993 "Draft Feasibility Study," ABB Environmental Services.
12. Comments Dated May 24, 1993 from Leo Hellested, Rhode Island Department of Environmental Management on the May 5, 1993 "Draft Feasibility Study," ABB Environmental Services.
13. Comments Dated May 24, 1993 from Leo Hellested, Rhode Island Department of Environmental Management on the (POTW compliance) May 5, 1993 "Draft Feasibility Study," ABB Environmental Services.
14. Comments Dated June 22, 1993 from Brian Rohan, EPA Region I on the June 1993 "Revised Draft Feasibility Study Report - Primary Source Area (OU1) - Volumes IA,IB & II," ABB Environmental Services for CPC International, Inc.
15. Comments Dated June 22, 1993 from Leo Hellested, Rhode Island Department of Environmental Management on the June 1993 "Revised Draft Feasibility Study Report - Primary Source Area (OU1) - Volumes IA,IB & II," ABB Environmental Services for CPC International, Inc.

4.7 Work Plans and Progress Reports

1. "Draft Feasibility Study Work Plan - Operable Unit 1," ABB Environmental Services for CPC International, Inc. (August 1992).
2. "Final Feasibility Study Work Plan - Primary Source Area (OU1)," ABB Environmental Services for CPC International, Inc. (March 1993).

Comments

3. Comments Dated December 17, 1992 from David J. Newton, EPA Region I on the "Draft Feasibility Study Work Plan - Operable Unit 1," ABB Environmental Services for CPC International, Inc. (August 1992).

4.9 Proposed Plans for Selected Remedial Action

1. "EPA Proposes Cleanup Plan for the Peterson/Puritan, Inc. Superfund Site," EPA Region I (June 1993).

Comments

Comments on the Remedial Investigation, Feasibility Study and Proposed Plan received by EPA Region I during the formal comment period are filed and cited in 5.3 Responsiveness Summaries.

5.0 Record of Decision (ROD)

5.1 Correspondence

1. Letter from Warren S. Angell II, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (July 22, 1993). Concerning owner of the O'Toole property.
2. Memorandum from David A. Ferenz, CDM Federal Programs Corporation to David J. Newton, EPA Region I (August 3, 1993). Concerning impact of ENSR's report "Considerations of Arsenic at the PAC Facility" on EPA's preferred alternative.

5.1 Correspondence (cont'd.)

Attachments cited in entry number 3 are cross-referenced and, unless otherwise noted, may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

3. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to David J. Newton, EPA Region I (August 5, 1993). Concerning the attached being a part of the Administrative Record:
   A. Cross-Reference: Comments Dated August 2, 1993 from William A. Duvel Jr. and Betsy Ruffle, ENSR Consulting for Lonza, Inc. on the June 2, 1993 "Baseline Risk Assessment - Final Report," CDM Federal Programs Corporation [Filed and cited as entry number 5 in 5.3 Responsiveness Summaries].
   B. Cross-Reference: Comments Dated August 2, 1993 from William A. Duvel Jr. and Steven Byrne, ENSR Consulting on the June 1993 "[Final] Feasibility Study Report - Primary Source Area (OU1) - Volumes I & II," ABB Environmental Services for CPC International, Inc. and the June 1993 Proposed Plan [Filed and cited as entry number 4 in 5.3 Responsiveness Summaries].
   C. Cross-Reference: Letter from Scott J. Perry and William A. Duvel Jr., ENSR Consulting to Paul J. Exner, ABB Environmental Services (January 19, 1993) [Filed and cited as entry number 17 in 3.1 Correspondence].
   D. Cross-Reference: "Summary Data Tables June 1992 Sampling Event Pacific Anchor Property," ENSR Consulting for Lonza, Inc. (November 1992) [Filed and cited as entry number 3 in 11.12 PRP-Related Documents].
   E. Cross-Reference: Comments Dated May 15, 1992 from Scott J. Perry and William A. Duvel Jr., ENSR Consulting on the April 1992 "Draft Project Operations Plan - Phase II Remedial Investigation," ABB Environmental Services for CPC International, Inc. (Filed and cited as entry number 69 in 3.4 Interim Deliverables].
   F. Cross-Reference: Comments Dated April 21, 1992 from Scott J. Perry and William A. Duvel Jr., ENSR Consulting on the March 4, 1992 "Phase II Scope of Work for Primary Source Area," CDM Federal Programs Corporation [Filed and cited as entry number 6 in 3.3 Scopes of Work].
   G. Cross-Reference: [Final Report] "Considerations of Arsenic at the PAC Facility," ENSR Consulting for Lonza, Inc. (July 1993) [Filed and cited as entry number 4 in 11.12 PRP-Related Documents].
   H. Cross-Reference: Comments Dated May 20, 1993 from William A. Duvel Jr. and Stephen V. Byrne, ENSR Consulting for Lonza, Inc. on the May 5, 1993 "Draft Feasibility Study," ABB Environmental Services [Filed and cited as entry number 10 in 4.6 Feasibility Study (FS) Reports].
   I. Cross-Reference: Comments Dated May 10, 1993 from William A. Duvel Jr. and Stephen V. Byrne, ENSR Consulting for Lonza, Inc. on the May 5, 1993 "Draft Feasibility Study," ABB Environmental Services [Filed and cited as entry number 9 in 4.6 Feasibility Study (FS) Reports].
   J. Cross-Reference: Comments Dated April 16, 1993 from William A. Duvel Jr. and Betsy Ruffle, ENSR for Lonza, Inc. on the March 15, 1993 "Draft Baseline Risk Assessment," CDM Federal Programs Corporation [Filed and cited as entry number 7 in 3.10 Endangerment Assessments].

5.1 Correspondence (cont'd.)

K. Cross-Reference: Comments Dated April 30, 1993 from William A. Duvel Jr. and Betsy Ruffle, ENSR Consulting for Lonza, Inc. on the March 15, 1993 "Draft Baseline Risk Assessment," CDM Federal Programs Corporation [Filed and cited as entry number 8 in 3.10 Endangerment Assessments].

L. Cross-Reference: "Technical Analysis of Lonza's Responsibility for Contamination at the Peterson/Puritan, Inc. Superfund Site," ENSR Consulting for Lonza, Inc. (January 1990) [Filed and cited as entry number 2 in 11.12 PRP-Related Documents].

4. Memorandum from Louise House, Agency for Toxic Substances and Disease Registry (ATSDR) U.S. Department of Health & Human Services to David J. Newton, EPA Region I (August 9, 1993). Concerning the fact that ATSDR does not have a legislative mandate to evaluate work health issues [see entry number 5.3.3].
5. Letter from Brian Rohan, EPA Region I to John Harnett, Levitt, Schefrin, Gallogly & Harnett (August 12, 1993). Concerning transmittal of information relating to chemicals associated with the site.
6. Memorandum from David J. Newton, EPA Region I to File (August 13, 1993). Concerning the June 27, 1993 meeting with Edgar R. Alger, Mayor of Cumberland.
7. Letter from Richard C. Boynton, EPA Region I to Terrance Gray, Rhode Island Department of Environmental Management (August 19, 1993). Concerning review of the Record of Decision.
8. Letter from David J. Newton, EPA Region I to Leo Hellested, Rhode Island Department of Environmental Management (September 9, 1993). Concerning a request for comment on the final draft of the Record of Decision.

5.3 Responsiveness Summaries

1. Cross-Reference: Responsiveness Summary, EPA Region I (September 30, 1993) [Filed and included as an Appendix to entry number 1 in 5.4 Record of Decision (ROD)].

The following citations indicate written comments received by EPA Region I during the formal comment period:

2. Letter from David E. Bates, Pacific Anchor Chemicals Corporation to David J. Newton and Kristen Fadden, EPA Region I (July 7, 1993). Concerning corrections to the June 1993 Fact Sheet.
3. Letter from Linda A. Palagi Brule' to David J. Newton, EPA Region I (July 1993). Concerning health hazards at the site.
4. Comments Dated August 2, 1993 from William A. Duvel Jr. and Steven Byrne, ENSR Consulting on the June 1993 "[Final] Feasibility Study Report - Primary Source Area (OU1) - Volumes I & II," ABB Environmental Services for CPC International, Inc. and the June 1993 Proposed Plan.
5. Comments Dated August 2, 1993 from William A. Duvel Jr. and Steven Byrne, ENSR Consulting on the June 2, 1993 "Baseline Risk Assessment - Final Report," CDM Federal Programs Corporation.
6. Comments Dated August 3, 1993 from Paul Carroll, Save The Bay on the June 1993 Proposed Plan.
7. Letter from Edgar R. Alger III, Mayor of Cumberland to David J. Newton, EPA Region I (August 4, 1993). Concerning the Martin Street area of the site.

5.3 Responsiveness Summaries (cont'd.)

8. Comments Dated August 4, 1993 from David E. Bates, Pacific Anchor Chemicals Corporation on the June 1993 Proposed Plan.
9. Comments Dated August 5, 1993 from Leo Hellested, Rhode Island Department of Environmental Management on the June 1993 Proposed Plan.
10. Comments Dated August 5, 1993 from David J. Freeman, Holtzman, Wise & Shepard (Attorney for Lonza, Inc.) on the June 1993 Proposed Plan.

Appendices associated with entry number 11 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

11. Comments Dated August 5, 1993 from John F. Bomster and Dennis H. Esposito, Alder Pollock & Sheehan (Attorneys for CPC International, Inc.) with 15 appendices on the June 1993 Proposed Plan.
12. Comments Dated August 8, 1993 from Robert D. Billington, Blackstone Valley Tourism Council on the June 1993 Proposed Plan.

5.4 Record of Decision (ROD)

1. "Record of Decision for Peterson/Puritan, Inc. (Operable Unit I)," EPA Region I (September 30, 1993).

9.0 State Coordination

9.1 Correspondence

1. Memorandum from David J. Newton, EPA Region I to Warren S. Angell II, Rhode Island Department of Environmental Management (March 26, 1987). Concerning transmittal of aerial photographs of the site from 1939 to the present.
2. Memorandum from David J. Newton, EPA Region I to Warren S. Angell II, Rhode Island Department of Environmental Management (April 3, 1987). Concerning transmittal of enforcement work plan to be used by Versar, Inc. and Peterson/Puritan, Inc.

10.0 Enforcement

10.1 Correspondence

1. Letter from Randy M. Mott, Zuckert, Scoutt & Rasenberger (Attorney for Peterson/Puritan, Inc.) to Joel Blumstein, EPA Region I (November 30, 1982). Concerning legal representation.

10.3 Local and State Enforcement Records

The record cited in entry number 1 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. Settlement Agreement, *Town of Lincoln and Board of Water Commissioners v. Peterson/Puritan, Inc.*, Superior Court, State of Rhode Island, C.A.No.82-4302 (June 6, 1984).
2. Letter from Thomas D. Getz, Rhode Island Department of Environmental Management to Thomas Laborio, Okonite Company (August 13, 1987). Concerning the attached Notice of Violation and Order.

10.3 Local and State Enforcement Records (cont'd.)

3. Letter from Saverio Mancieri, Rhode Island Department of Environmental Management to Harvey Salvas, Town of Cumberland (April 5, 1989). Concerning Town's application for underground storage tanks with attached Registration Certificate #2972.
4. "Application for Underground Storage Facilities," Rhode Island Department of Environmental Management with attached"Notification for Underground Storage Tanks," EPA Region I (April 1989).
5. Letter from Helen S. Jones-Quiterio, CCL Custom Manufacturing to Thomas A. Epstein, Rhode Island Department of Environmental Management (September 4, 1991). Concerning extension request on tank storage.
6. Letter from Thomas A. Epstein, Rhode Island Department of Environmental Management to Helen S. Jones-Quiterio, CCL Custom Manufacturing (September 12, 1991). Concerning denial of extension request.

Attachment B cited in entry number 7 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

7. Letter from Richard Ferreira, CCL Custom Manufacturing to Susan A. Ferreira, Narragansett Bay Commission (May 7, 1992). Concerning shutdown of groundwater discharge operation with attached.
   A. Letter from Susan A. Ferreira, Narragansett Bay Commission to Donald M. Nolan, CCL Custom Manufacturing (April 3, 1992).
   B. Wastewater Discharge Permit, Narragansett Bay Commission (April 1, 1992).
8. Letter from Barbara Cesaro, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (July 30, 1992). Concerning the attached RIDEM discharge permits:
   A. Modification Authorization to Discharge Under the Rhode Island Pollutant Discharge Elimination System - Okonite Company (January 12, 1987)
   B. Modification Authorization to Discharge Under the Rhode Island Pollutant Discharge Elimination System - Trimont Chemicals (January 12, 1987).

Attachment B cited in entry number 9 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

9. Letter from Leo Hellested, Rhode Island Department of Environmental Management to David J. Newton, EPA Region I (December 29, 1992). Concerning benzene contamination at the site with attached:
   A. Certificate of Registration for Underground Storage Facilities, Rhode Island Department of Environmental Management - Roger Williams Foods (April 28, 1992).
   B. Application for Underground Storage Facilities, Rhode Island Department of Environmental Management - Roger Williams Foods (May 1, 1985).

10.6 PRP-Specific Negotiations

1. Letter from Randy M. Mott, Breed, Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (October 29, 1984). Concerning water sampling results.
2. Letter from Randy M. Mott, Breed, Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (October 31, 1984). Concerning attached list of consent decree requirements.
3. Letter from Randy M. Mott, Mott, Williams & Lee (Attorney for Peterson/ Puritan, Inc.) to Mary Borg, EPA Region I (August 13, 1990). Concerning oversite costs.
4. Letter from Brian Rohan, EPA Region I to Randy M. Mott, Mott, Williams & Lee (Attorney for CPC International, Inc.) (January 29, 1991). Concerning oversite invoice #OT047.

Attachments associated with entry number 5 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

5. Memorandum from Joan Maddalozzo, EPA Region I to Mike Manlogon, EPA Region I (March 21, 1991). Concerning penalties due for performance delay with attached Letter from Merrill S. Hohman, EPA Region I to Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) (March 19, 1991).
6. Letter from Brian Rohan, EPA Region I to Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) (December 19, 1991) with attached:
   A. Draft Memorandum of Understanding Relating to the First Amendment
   B. Draft First Amendment to Administrative Order on Consent, *In the Matter of Peterson/Puritan, Inc. NPL Site*, Docket No. 1-87-1064.
7. Letter from Brian Rohan, EPA Region I to Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) (December 31, 1991). Concerning revisions to the attached:
   A. Memorandum of Understanding Relating to the First Amendment.
   B. First Amendment to Administrative Order on Consent, *In the Matter of Peterson/Puritan, Inc. NPL Site*, Docket No. 1-87-1064
8. Letter from Brian Rohan, EPA Region I to Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) (January 7, 1992). Concerning revisions to attached Memorandum of Understanding Relating to the First Amendment.
9. Letter from Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (January 22, 1992). Concerning transmittal of signed Memorandum of Understanding Relating to the First Amendment.and First Amendment to Administrative Order on Consent.
10. Letter from Brian Rohan, EPA Region I to Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) (December 29, 1992). Concerning interim remediation at the site.

10.7 EPA Administrative Orders

The record cited in entry number 1 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1.. Consent Order, *In the Matter of Peterson/Puritan, Inc. NPL Site,* Docket No. 1-87-1064 (May 29, 1987).
2. Letter from Brian Rohan, EPA Region I to Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) (January 28, 1992). Concerning the attached revised Memorandum of Understanding.

10.7 EPA Administrative Orders (cont'd.)

3. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (February 11, 1992). Concerning transmittal of the revised Memorandum of Understanding.
4. First Amendment to Administrative Order on Consent, *In the Matter of Peterson/ Puritan, Inc. NPL Site*, Docket No. 1-87-1064 (March 10, 1992) with attached Memorandum of Understanding Relating to the First Amendment, EPA Region I (March 10, 1992).

11.0 Potentially Responsible Party (PRP)

11.6 Site Level - Evidence - Government Agency Documents

Maps and graphs associated with entry number 1 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. Letter from Peter M. Roncetti, Peterson/Puritan, Inc. to Peter P. Granieri Jr., Blackstone Valley District Commission (April 8, 1983). Concerning request to discharge groundwater into existing system.
2. Letter from David L. Mayer, Edwards & Angell (Attorney for Peterson/Puritan, Inc.) to Peter M. Roncetti, Peterson/Puritan, Inc. (November 1, 1983). Concerning transmittal of indemnification agreement.
3. Letter from Peter M. Roncetti, Peterson/Puritan, Inc. to David L. Mayer, Edwards & Angell (Attorney for Peterson/Puritan, Inc.) (November 2, 1983). Concerning transmittal of indemnification agreement.

Attachments B and C associated with entry number 4 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

4. Letter from David L. Mayer, Edwards & Angell (Attorney for Peterson/Puritan, Inc.) to Peter P. Granieri Jr., Blackstone Valley Sewer District Commission (November 3, 1983). Concerning executed indemnification agreement with attached:
   A. Agreement (November 2, 1983).
   B. Letter from Peter M. Roncetti, Peterson/Puritan, Inc. to Peter P. Granieri Jr., Blackstone Valley Sewer District Commission (September 19, 1983).
   C. "Proposed Sampling and Protocol," Peterson/Puritan, Inc.

Attachments associated with entry number 5 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

5. Letter from Alfredo V. Brancucci, Peterson/Puritan, Inc. to Steven Fradkoff, EPA Region I (May 21, 1984). Concerning groundwater discharge permit.

11.8 Site-Specific Contractor Deliverables

The records cited in entry numbers 1, 2, and 3 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. "Preliminary Report of Investigation of Potentially Responsible Parties Within Study Area - Volume 1 of 3," Mott & Associates for Peterson/Puritan, Inc. (February 1989).
2. "Preliminary Report of Investigation of Potentially Responsible Parties Within Study Area - Volume 2 of 3," Mott & Associates for Peterson/Puritan, Inc. (February 1989).
3. "Preliminary Report of Investigation of Potentially Responsible Parties Within Study Area - Volume 3 of 3," Mott & Associates for Peterson/Puritan, Inc. (February 1989).

11.9 PRP-Specific Correspondence

CCL Custom Manufacturing

The attachment associated with entry number 1 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. Letter from David J. Newton, EPA Region I to Richard Ferreira, CCL Custom Manufacturing (June 4, 1992). Concerning CCL's installation of a water well.
2. Letter from Richard Ferreira, CCL Custom Manufacturing to David J. Newton, EPA Region I (June 17, 1992). Concerning CCL's installation of a water well.
3. Letter from Merrill S. Hohman, EPA Region I to President, CCL Custom Manufacturing (June 24, 1992). Concerning notice of potential liability.
4. Letter from Donald LaBarre, A&W Artesian Well Company to Richard Ferreira, CCL Custom Manufacturing (June 26, 1992). Concerning well installation.
5. Letter from Richard Ferreira, CCL Custom Manufacturing to David J. Newton, EPA Region I (July 13, 1992). Concerning receipt of the June 24, 1992 notice of potential liability letter.

The attachment associated with entry number 6 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

6. Letter from Richard Ferreira, CCL Custom Manufacturing to David J. Newton, EPA Region I (September 24, 1992). Concerning transmittal of the September 1992 "Work Plan for the Sampling of Groundwater from the Back-up Water Supply Well," Environmental Science Services for CCL Custom Manufacturing.
7. Letter from David J. Newton, EPA Region I to Richard Ferreira, CCL Custom Manufacturing (October 5, 1992). Concerning EPA's approval of CCL's well testing procedures.

Logging chart associated with entry number 8 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

8. Letter from Richard Ferreira, CCL Custom Manufacturing to David J. Newton, EPA Region I (December 14, 1992). Concerning results of borehole logging in the attached Letter Dated December 4, 1992 from Donna Holden Pallister, Environmental Science Services to Richard Ferreira, CCL Custom Manufacturing.

11.9 PRP-Specific Correspondence (cont'd.)

9. Letter from David J. Newton, EPA Region I to Richard Ferreira, CCL Custom Manufacturing (January 20, 1993). Concerning review of borehole logging results.
10. Letter from Richard Ferreira, CCL Custom Manufacturing to David J. Newton, EPA Region I (February 17, 1993). Concerning borehole closure and abandonment in the attached Letter Dated February 10, 1993 from Michael J. Baer and Donna Holden Pallister, Environmental Science Services to Richard Ferreira, CCL Custom Manufacturing.
11. Letter from David J. Newton, EPA Region I to Richard Ferreira, CCL Custom Manufacturing (February 25, 1993). Concerning EPA's approval of CCL's borehole closure and abandonment procedure.

Attachment D associated with entry number 12 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

12. Letter from Richard Ferreira, CCL Custom Manufacturing to David J. Newton, EPA Region I (June 8, 1993). Concerning the attached:
    A. Letter from Richard Ferreira, CCL Custom Manufacturing to Susan A. Ferreira, Narragansett Bay Commission (April 12, 1993).
    B. Letter from Susan A. Ferreira, Narragansett Bay Commission to Richard Ferreira, CCL Custom Manufacturing (April 21, 1993).
    C. Letter from Richard Ferreira, CCL Custom Manufacturing to Susan A. Ferreira, Narragansett Bay Commission (April 22, 1993).
    D. "Borehole Closure Activities Summary," Environmental Science Services for CCL Custom Manufacturing (June 1993).
13. Letter from David J. Newton, EPA Region I to Richard Ferreira, CCL Custom Manufacturing (July 23, 1993). Concerning transmittal of a copy of June 8, 1993 letter from Mr. Ferreira and acceptance of Attachment D above.

Health-tex Inc.

14. Letter from Merrill S. Hohman, EPA Region I to Eric Margolin, Health-tex Inc. (December 14, 1987). Concerning request for information.

Hi-Port Industries

15. Letter from Merrill S. Hohman, EPA Region I to President, Hi-Port Industries (June 24, 1992). Concerning notice of potential liability.

Industrial Foundation of Rhode Island

16. Letter from Merrill S. Hohman, EPA Region I to President, Industrial Foundation of Rhode Island (June 24, 1992). Concerning notice of potential liability.

Attachments associated with entry number 17 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

17. Letter from Timothy T. More, Edwards & Angell (Attorney for Industrial Foundation of Rhode Island) to Brian Rohan, EPA Region I (September 1, 1992). Concerning response to June 24, 1992 letter.

11.9 PRP-Specific Correspondence (cont'd.)

Lonza, Inc.

18. Letter from Merrill S. Hohman, EPA Region I to Michael J. Reale, Lonza, Inc. (November 30, 1987). Concerning request for information.
19. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to David J. Newton, EPA Region I (December 11, 1989). Concerning document delivery schedule.
20. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to David J. Newton, EPA Region I (January 22, 1990). Concerning transmittal of "Technical Analysis of Lonza's Responsibility for Contamination," ENSR Consulting (January 1990).
21. Letter from David J. Newton, EPA Region I to David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) (March 6, 1990). Concerning denial of request for sample results information.
22. Telephone Notes Between David J. Newton, EPA Region I and David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) (April 18, 1990). Concerning Mr. Freeman's intention to comment on the February 1990 "Draft Remedial Investigation Report," C-E Environmental, Inc. for CPC International, Inc.
23. Letter from David J. Freeman and David C. Keehn, Holtzmann, Wise & Shepard (Attorneys for Lonza, Inc.) to David J. Newton, EPA Region I (April 24, 1992) with attached agenda. Concerning request for a meeting.
24. Letter from Merrill S. Hohman, EPA Region I to President, Lonza, Inc. (June 24, 1992). Concerning notice of potential liability.
25. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (June 29, 1992). Concerning revision of meeting agenda.
26. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to David J. Newton, EPA Region I (July 9, 1992). Concerning response to June 24, 1992 letter.
27. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to David J. Newton, EPA Region I (August 5, 1992). Concerning confirmation of August 13, 1992 meeting date.
28. Letter from Brian Rohan to David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) (August 6, 1992). Concerning postponement of the August 13, 1992 meeting.
29. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (September 25, 1992). Concerning the need to set a revised meeting date.
30. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (October 30, 1992). Concerning confirmation of November 9, 1992 meeting date.
31. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (December 17, 1992). Concerning the attached Letter from William A. Duvel Jr., ENSR Consulting to David F. Rogers, CPC International, Inc. (December 16, 1992).
32. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Brian Rohan, EPA Region I (February 11, 1993). Concerning request for EPA documents.
33. Letter from David J. Newton, EPA Region I to David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) (March 31, 1993). Concerning transmittal of EPA documents.

11.9 PRP-Specific Correspondence (cont'd.)

Lonza, Inc.

34. Letter from Brian Rohan to David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) (April 21, 1993). Concerning completion schedule for feasibility study.

Okonite Company

35. Letter from Merrill S. Hohman, EPA Region I to Thomas LaBorio, Okonite Company (December 14, 1987). Concerning request for information.

Pacific Anchor Chemical Company

36. Letter from David E. Bates, Pacific Anchor Chemical Company to David J. Newton, EPA Region I (October 30, 1990). Concerning construction activities at the site with attached scope of work.
37. Letter from David E. Bates, Pacific Anchor Chemical Company to David J. Newton, EPA Region I (December 21, 1990). Concerning transmittal of results of soil samplings.
38. Letter from David C. Keehn, Pacific Anchor Chemical Company to David J. Newton and Richard C. Boynton, EPA Region I (January 18, 1991). Concerning construction schedule at the site.
39. Letter from Merrill S. Hohman, EPA Region I to President, Pacific Anchor Chemical Company (June 24, 1992). Concerning notice of potential liability.

Peterson/Puritan, Inc. (CPC International, Inc.)

40. Letter from Gerald M. Levy, EPA Region I to Alfredo V. Brancucci, Peterson/ Puritan, Inc. (April 5, 1982). Concerning request for a meeting.
41. Letter from John C. Henningson, Malcolm Pirnie, Inc. to Dale M. Cook, Peterson/Puritan (June 18, 1982). Concerning consulting services to assess groundwater at the site.
42. Letter from Hanes A. Heller, CPC North America to Andrew Lauterback, EPA Region I (July 12, 1982). Concerning transmittal of proposal for groundwater study.
43. Letter from Andrew Lauterback, EPA Region I to Hanes A. Heller, CPC North America (July 29, 1982). Concerning assignment of new attorney to the site.
44. Letter from Merrill S. Hohman, EPA Region I to Hanes A. Heller, CPC North America (September 9, 1982). Concerning the proposed groundwater study.
45. Letter from Hanes A. Heller, CPC North America to Merrill S. Hohman, EPA Region I (September 16, 1982). Concerning rescheduling of field activities.
46. Letter from Randy M. Mott, Zuckert, Scoutt, Rasenberger & Delaney (Attorney for Peterson/Puritan, Inc.) to Joel Blumstein, EPA Region I (December 20, 1982). Concerning groundwater investigation at the site.
47. Letter from Randy M. Mott, Zuckert, Scoutt, Rasenberger & Delaney (Attorney for Peterson/Puritan, Inc.) to William Hedeman, EPA Headquarters (February 7, 1983). Concerning request to certify costs of contamination studies at the site.
48. Letter from Lee M. Thomas, EPA Headquarters to Randy M. Mott, Zuckert, Scoutt, Rasenberger & Delaney (Attorney for Peterson/Puritan, Inc.) (March 21, 1983). Concerning denial of request to certify costs of contamination studies at the site.

11.9 PRP-Specific Correspondence (cont'd.)

Peterson/Puritan, Inc. (CPC International, Inc.)

49. Letter from Randy M. Mott, Zuckert, Scoutt, Rasenberger & Delaney (Attorney for Peterson/Puritan, Inc.) to Joel Blumstein, EPA Region I (April 28, 1983). Concerning delay in preparation of report.
50. Letter from Randy M. Mott, Zuckert, Scoutt, Rasenberger & Delaney (Attorney for Peterson/Puritan, Inc.) to Joel Blumstein, EPA Region I (May 27, 1983). Concerning transmittal of portions of the draft of the June 1983 "Investigation of Volatile Organic Chemical Groundwater Contamination" report, Malcolm Pirnie, Inc. for Peterson/Puritan, Inc.
51. Letter from Peter M. Roncetti, Peterson/Puritan, Inc. to Peter P. Granieri Jr., Blackstone Valley District Commission (August 19, 1983). Concerning transmittal of the "Proposed Sampling Program and Protocol."
52. Letter from Peter M. Roncetti, Peterson/Puritan, Inc. to Peter P. Granieri Jr., Blackstone Valley District Commission (October 12, 1983). Concerning transmittal of the results of the first phase of the interceptor well groundwater discharge monitoring program.
53. Letter from William Walsh-Rogalski, EPA Region I to Randy M. Mott, Breed Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) (September 26, 1984). Concerning development of a remedial investigation/feasibility study work plan.
54. Letter from William Walsh-Rogalski, EPA Region I to Randy M. Mott, Breed Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) (October 15, 1984). Concerning sediment sampling of the Blackstone River.

Attachments associated with entry number 55 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

55. Letter from Randy M. Mott, Breed, Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (October 16, 1984). Concerning conducting a remedial investigation.
56. Letter from Randy M. Mott, Breed, Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (October 23, 1984). Concerning request for additional studies at the site.
57. Letter from William Walsh-Rogalski, EPA Region I to Randy M. Mott, Breed Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) (November 2, 1984). Concerning investigative studies at the site.

Attachments associated with entry number 58 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

58. Letter from Randy M. Mott, Breed, Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (February 7, 1985). Concerning proposed consent decree.
59. Letter from William Walsh-Rogalski, EPA Region I to Randy M. Mott, Breed Abbott & Morgan (Attorney for Peterson/Puritan, Inc.) (February 26, 1985). Concerning proposed consent decree.

11.9 PRP-Specific Correspondence (cont'd.)

Peterson/Puritan, Inc. (CPC International, Inc.)

Analytical data associated with entry number 60 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

60. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (October 23, 1985). Concerning sampling results.
61. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (December 17, 1985). Concerning a settlement agreement.
62. Letter from William Walsh-Rogalski, EPA Region I to Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attoryney for Peterson/Puritan, Inc.) (April 16, 1986). Concerning remedial action at the site.
63. Letter from Tracy M. Getz, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (February 13, 1987). Concerning agenda for the February 23, 1987 meeting.
64. Letter from Joseph O. Hearne, Versar, Inc. to Michael L. Italiano, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) (March 17, 1987). Concerning transmittal of bid documents.
65. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) to Woodward Realty Company (July 13, 1987). Concerning property access.
66. Letter from Tracy M. Getz, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (July 13, 1987). Concerning efforts to obtain property access.
67. Letter from Tracy M. Getz, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson/Puritan, Inc.) to Joseph J. Roszkowski, Zimmerman, Roszkowski & Brenner (Attorney for J.M. Mills) (July 13, 1987). Concerning attached Hazardous Substance List.
68. Letter from Scott Slaughter, Mott & Associates (Attorney for CPC International, Inc.) to Fran R. Robins-Liben, Tillinghast, Collins & Graham (Attorney for J.M. Mills) (January 29, 1988). Concerning access to landfill site.
69. Letter from Robert T. Lee, Mott & Associates (Attorney for CPC International, Inc.) to Diana Lettro, EPA Region I (September 15, 1988). Concerning request to evaluate certain EPA documents.
70. Letter from Robert T. Lee, Mott & Associates (Attorney for CPC International, Inc.) to Diana Lettro, EPA Region I (September 27, 1988). Concerning confirmation of the October 12, 1988 meeting.
71. Letter from Robert T. Lee, Mott & Associates (Attorney for CPC International, Inc.) to Diana Lettro, EPA Region I (October 19, 1988). Concerning request for EPA documents.
72. Letter from Robert T. Lee, Mott & Associates (Attorney for CPC International, Inc.) to William Walsh-Rogalski, EPA Region I (October 19, 1988). Concerning request for EPA documents.
73. Letter from Randy M. Mott, Mott & Associates (Attorney for CPC International, Inc.) to William Walsh-Rogalski, EPA Region I (February 6, 1989). Concerning transmittal of a preliminary investigation report of site contamination.
74. Letter from Scott Slaughter, Mott & Associates (Attorney for CPC International, Inc.) to William Walsh-Rogalski, EPA Region I (February 17, 1989). Concerning request for a meeting.

11.9 PRP-Specific Correspondence (cont'd.)

Peterson/Puritan, Inc. (CPC International, Inc.)

75. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (August 15, 1989). Concerning issues regarding the ongoing remedial investigation.
76. Letter from Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) to Mary Borg, EPA Region I (September 27, 1989). Concerning scope of responsibilities for site investigation.
77. Letter from Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) to Mary Borg, EPA Region I (July 19, 1990). Concerning request for a meeting with Region I site team.
78. Letter from Robert T. Lee, Mott, Williams & Lee (Attorney for CPC International, Inc.) to Mary Borg, EPA Region I (July 27, 1990). Concerning continued request for a meeting with the Region I site team.
79. Letter from Robert T. Lee, Mott, Pearce, Williams & Lee (Attorney for CPC International, Inc.) to David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) (November 27, 1990). Concerning proposed activities.
80. Letter from David J. Freeman, Holtzmann, Wise & Shepard (Attorney for Lonza, Inc.) to Robert T. Lee, Mott, Pearce, Williams & Lee (Attorney for CPC International, Inc.) (February 12, 1991). Concerning access to the site.
81. Letter from Paul G. Keough, EPA Region I to John W. Scott, CPC International, Inc. (April 29, 1991). Concerning future activities at the site.
82. Letter from John W. Scott, CPC International, Inc. to Paul G. Keough, EPA Region I (May 9, 1991). Concerning operable units for the site.
83. Letter from Robert T. Lee, Mott, Pearce, Williams & Lee (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (June 17, 1991). Concerning invoice sent by EPA for oversight costs.
84. Letter from David F. Rogers, CPC International, Inc. to David J. Newton, EPA Region I (May 8, 1992). Concerning the attached wastewater discharge permit.
85. Letter from David F. Rogers, CPC International, Inc. to Scott Perry, ENSR Consulting (May 27, 1992). Concerning ENSR's recommendations on collecting soil samples.
86. Letter from Merrill S. Hohman, EPA Region I to President, CPC International, Inc. (June 24, 1992). Concerning notice of potential liability.
87. Letter from Merrill S. Hohman, EPA Region I to President, Peterson/Puritan, Inc. (June 24, 1992). Concerning notice of potential liability.
88. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Merrill S. Hohman, EPA Region I (July 9, 1992). Concerning extension of time for response to the June 24, 1992 letter.
89. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (July 23, 1992). Concerning confirmation of the August 12, 1992 meeting.
90. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (August 10, 1992). Concerning confirmation of rescheduled meeting to September 21, 1992.
91. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (August 24, 1992). Concerning another rescheduling of the September meeting.
92. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (September 17, 1992). Concerning proposed agenda for the September 22, 1992 meeting.

11.9 PRP-Specific Correspondence (cont'd.)

Peterson/Puritan, Inc. (CPC International, Inc.)

93. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (September 22, 1992). Concerning confirmation of rescheduled meeting to October 29, 1992.
94. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (November 17, 1992). Concerning completion of the remedial investigation and the attached November 16, 1992 Letter from Paul J. Exner, ABB Environmental Services to David F. Rogers, CPC International, Inc.

Attachments associated with entry number 95 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

95. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (November 19, 1992). Concerning the use of a residential-use exposure scenario for groundwater for risk assessment purposes.
96. Letter from David J. Newton, EPA Region I to David F. Rogers, CPC International, Inc. (November 19, 1992). Concerning transmittal of data tables from the June 1992 sampling.
97. Letter from Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (November 30, 1992). Concerning interim remedial actions at the site.
98. Letter from Brian Rohan, EPA Region I to Robert T. Lee, Troy, Gould & Mott (Attorney for CPC International, Inc.) (December 29, 1992). Concerning interim remediation at the site.
99. Letter from Warren S. Angell II, Rhode Island Department of Environmental Management to Dennis H. Esposito, Adler Pollack & Sheehan (Attorney for CPC International, Inc.) (March 3, 1993). Concerning request for a meeting.
100. Letter from Dennis H. Esposito, Adler Pollack & Sheehan (Attorney for CPC International, Inc.) to Warren S. Angell II and Claude Cote, Rhode Island Department of Environmental Management (March 4, 1993). Concerning confirmation of the March 24, 1993 meeting.
101. Letter Dennis H. Esposito, Adler Pollack & Sheehan (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (March 5, 1993). Concerning unresolved site issues.
102. Letter from David F. Rogers, CPC International, Inc. to David J. Newton, EPA Region I (March 14, 1993). Concerning transmittal of several interim deliverables.
103. Letter from Dennis H. Esposito, Adler Pollack & Sheehan (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (April 22, 1993). Concerning outstanding feasibility study issues.
104. Letter from Brian Rohan, EPA Region I to Dennis H. Esposito, Adler Pollack & Sheehan (Attorney for CPC International, Inc.) (June 17, 1993). Concerning CPC's deficiencies with feasibility study submittal.
105. Letter from Dennis H. Esposito, Adler Pollack & Sheehan (Attorney for CPC International, Inc.) to Brian Rohan, EPA Region I (June 23, 1993). Concerning feasibility study issues raised during the June 18, 1993 meeting.
106. Letter from William Walsh-Rogalski, EPA Region I to Randy Mott, Mott & Associates (Attorney for Peterson/Puritan, Inc.). Concerning potential meeting regarding the PRPs.

11.9 PRP-Specific Correspondence (cont'd.)

Roger Williams Foods, Inc. (Wetterau, Inc.)

107. Letter from Merrill S. Hohman, EPA Region I to Scott Lawrence, Roger Williams Foods, Inc. (December 23, 1987). Concerning request for information.
108. Letter from Merrill S. Hohman, EPA Region I to Scott B. Laurans, Roger Williams Foods, Inc. (October 16, 1989). Concerning request for additional information.
109. Letter from Gregory L. Benik, Hinckley, Allen Snyder & Comen (Attorney for Roger Williams Foods, Inc.) to Mary Borg, EPA Region I (October 27, 1989). Concerning response date to EPA's request for information.
110. Letter from Merrill S. Hohman, EPA Region I to Chief Executive Officer, Roger Williams Foods, Inc. (March 25, 1993). Concerning contamination at the site.
111. Letter from Merrill S. Hohman, EPA Region I to Chief Executive Officer, Wetterau, Inc. (March 25, 1993). Concerning contamination at the site.
112. Letter from Matthew M. McCarthy, Wetterau, Inc. to Brian Rohan, EPA Region I (April 20, 1993). Concerning request for names of other PRPs.
113. Letter from Merrill S. Hohman, EPA Region I to Matthew M. McCarthy, Wetterau, Inc. (June 4, 1993). Concerning request for information.
114. Letter from Brian Rohan, EPA Region I to Gregory L. Benik, McGovern, Noel & Benik (Attorney for Wetterau, Inc.) (June 24, 1993). Concerning deadline for responding to information request.
115. Letter from Brian Rohan, EPA Region I to Gregory L. Benik, McGovern, Noel & Benik (Attorney for Wetterau, Inc.) (July 20, 1993). Concerning deadline for responding to information request.

Trimont Chemicals

116. Letter from Merrill S. Hohman, EPA Region I to Glenn Tashjian, Trimont Chemicals (November 30, 1987). Concerning request for information.

11.11 PRP-Specific Evidence

Health-tex Inc.

1. Letter from Anastasia McLaughlin, Health-tex Inc. to Richard C. Boynton, EPA Region I (January 26, 1988). Concerning attached information response.

Lonza, Inc.

2. Memorandum from A.G. McFarland, Lonza, Inc. to W.W. Huisking Jr., Lonza, Inc. (August 11, 1987). Concerning sampling of facility wells.
3. Letter from Michael J. Reale, Lonza, Inc. to David J. Newton, EPA Region I (December 18, 1987). Concerning submittal of various technical records.

Appendices associated with entry number 4 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

4. Letter from Michael J. Reale, Lonza, Inc. to Richard C. Boynton, EPA Region I (January 25, 1988). Concerning attached information response.

11.11 PRP-Specific Evidence

Okonite Company

Exhibits associated with entry number 5 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

5. "Response of the Okonite Company to Request for Information dated December 14, 1987" with Exhibit 4 (February 3, 1988).

Attachments associated with entry numbers 6 and 7 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

6. Letter from Antonetta A. DelSanto, Peterson/Puritan, Inc. to Lawrence M. Goldman, EPA Region I (August 28, 1981). Concerning information response.

Peterson/Puritan, Inc.

7. "Facility Improvements and Pollution Prevention Measures," Peterson/Puritan, Inc. (July 1983).
8. Letter from Peter M. Roncetti, Peterson/Puritan, Inc. to Steven Fradkoff, EPA Region I (July 19, 1983). Concerning attached report on the upgradient interceptor well system.

Attachments associated with entry number 9 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

9. Letter from Peter M. Roncetti, Peterson/Puritan, Inc. to Peter P. Granieri, Blackstone Valley District Commission (September 19, 1983). Concerning the attached "Groundwater Interception Well Pumping Test Proposed Sampling Program and Protocol."
10. "Test Boring 6-Hour Pump Test," Peterson/Puritan, Inc. (October 5, 1983).

Analytical results associated with entry number 11 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

11. Letter from Peter M. Roncetti, Peterson/Puritan, Inc. to Peter P. Granieri, Blackstone Valley District Commission (December 14, 1983). Concerning results of the groundwater discharge monitoring program.
12. "Facility Improvements and Pollution Prevention Measures - Inspection and Maintenance ," Peterson/Puritan, Inc. (February 1984).

Roger Williams Foods, Inc. (Wetterau, Inc.)

Attachments associated with entry numbers 13 and 14 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

13. Letter from Gregory L. Benik, Hinckley, Allen, Synder & Comen (Attorney for Roger Williams Foods, Inc.) to Richard C. Boynton, EPA Region I (February 2, 1988). Concerning information response.
14. Letter from Gregory L. Benik, Hinckley, Allen, Synder & Comen (Attorney for Roger Williams Foods, Inc.) to David J. Newton, EPA Region I (November 17, 1989). Concerning additional information response.

11.11 PRP-Specific Evidence (cont'd.)

Roger Williams Foods, Inc. (Wetterau, Inc.)

15. Letter from Gregory L. Benik, McGovern, Noel & Benok (Attorney for Wetterau, Inc.) to David J. Newton, EPA Region I (July 6, 1993). Concerning information response.

Attachments and maps associated with entry number 16 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

16. Letter from Matthew M. McCarthy, Wetterau, Inc. to Brian Rohan, EPA Region I (July 30, 1993). Concerning supplemental response to information request.

Trimont Chemicals

17. Letter from John W. Babcock, Trimont Chemicals to Richard C. Boynton, EPA Region I (January 5, 1988). Concerning attached information response.

11.12 PRP-Related Documents

Lonza, Inc.

The records cited in entry numbers 1 through 4 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. "Ground Water Quality Evaluation," AWARE Inc. for Lonza, Inc. (June 1987).
2. "Technical Analysis of Lonza's Responsibility for Contamination at the Peterson/Puritan, Inc. Superfund Site," ENSR Consulting for Lonza, Inc. (January 1990).
3. "Summary Data Tables June 1992 Sampling Event Pacific Anchor Property," ENSR Consulting for Lonza, Inc. (November 1992).
4. [Final Report] "Considerations of Arsenic at the PAC Facility," ENSR Consulting for Lonza, Inc. (July 1993).

Comments

5. Comments Dated August 29, 1989 by Michael R. Kulbersh, Camp Dresser & McKee Inc. on the June 1987 "Ground Water Quality Evaluation," AWARE Inc. for Lonza, Inc.

Pacific Anchor Chemical Corporation

The records cited in entry numbers 6 and 7 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

6. "Report for APCI Chemical Mfg.," (soil gas survey results) United Engineers & Constructors for Pacific Anchor Chemcial Corporation (November 26, 1990).

Pacific Anchor Chemical Corporation

7. "Documentation of Field Activities," ERM-New England, Inc. for Pacific Anchor Chemical Corporation (December 20, 1990).

11.12 PRP-Related Documents (cont'd.)

Peterson/Puritan, Inc.

8. Letter from Hanes A. Heller, CPC North America to Andrew Lauterback, EPA Region I (July 12, 1982). Concerning transmittal of Malcolm Pirnie, Inc. groundwater study proposal.

The records cited in entry numbers 9 and 10 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

9. "Volume 1 - Investigation of Volatile Organic Chemical Groundwater Contamination," Malcolm Pirnie, Inc. for Peterson/Puritan, Inc. (June 1983).
10. "Volume 2 - Investigation of Volatile Organic Chemical Groundwater Contamination," Malcolm Pirnie, Inc. for Peterson/Puritan, Inc. (June 1983).
11. Letter from Vincent W. Uhl Jr., Malcolm Pirnie, Inc. to Steven Fradkoff, EPA Region I (September 2, 1983). Concerning attached errata sheet for the June 1983 "Volumes 1 and 2 - Investigation of Volatile Organic Chemical Groundwater Contamination," Malcolm Pirnie, Inc. for Peterson/Puritan, Inc.

The records cited in entry numbers 12 and 13 may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

12. "Recovery Well Program," Malcolm Pirnie, Inc. for Peterson/Puritan, Inc. (January 1984).
13. "Remedial Investigation/Feasibility Study," Versar, Inc. for Peterson/Puritan, Inc. (October 30, 1984).
14. "Progress Review Presentation," CPC International, Inc. (May 23, 1989).

Comments

15. Comments Dated July 26, 1983 from H. Stan Rydell, EPA Region I on the June 1983 "Volumes 1 & 2 - Investigation of Volatile Organic Chemical Groundwater Contamination," Malcolm Pirnie, Inc. for Peterson/Puritan, Inc.

Roger Williams Foods, Inc.

16. Letter Report from Suzanne C. Courtemanche and Thomas J. Dolce, Applied Environmental Technologies Corporation to Scott Laurans, Roger Williams Food, Inc. (February 22, 1988). Concerning an environmental site assessment.
17. Letter Report from Suzanne C. Courtemanche and Thomas J. Dolce, Applied Environmental Technologies Corporation to Scott Laurans, Roger Williams Food, Inc. (March 29, 1988). Concerning an environmental site assessment.

13.0 Community Relations

13.1 Correspondence

1. Letter from John R. Moebes, EPA Region I to Agnes T. Teal, Town of Cumberland (June 1, 1982). Concerning contamination of Martin Street and Lenox Street wells.
2. Letter from Frances M. Audette, Town of Cumberland to John R. Moebes, EPA Region I (June 30, 1982). Concerning EPA's attendance at the August 18, 1982 Town Council meeting.
3. Letter from Frances M. Audette, Town of Cumberland to John R. Moebes, EPA Region I (July 1, 1982). Concerning EPA's attendance at the July 21, 1982 Town Council meeting.
4. Motion by Nancy B. Quinn, Town of Cumberland requesting that EPA Region I by advised of all meetings (August 4, 1982).
5. Letter from John R. Moebes, EPA Region I to Frances M. Audette, Town of Cumberland (October 12, 1982). Concerning providing status reports to the Town Council with attached September 9, 1982 Letter from Merrill S. Hohman to Hanes Heller, CPC North America.
6. Letter from John R. Moebes, EPA Region I to Frances M. Audette, Town of Cumberland (January 3, 1983). Concerning report on well contamination.

13.2 Community Relations Plans

1. "Final Community Relations Plan," EPA Region I (January 1988).

13.3 News Clippings/Press Releases

News Clippings

1. "Town Wells Closed In Lincoln," Evening Bulletin - Providence, RI (October 31, 1979).
2. "Synthron Situation Leaves A Bad Smell," The Providence Sunday Journal - Providence, RI (July 6, 1980).
3. "Aerosol Company Told By EPA To Clean Up Water," Blackstone Valley Journal - Providence, RI (June 2, 1982).
4. "If Talk Is Pollution, Council Wants In," The Evening Times - Pawtucket, RI (July 23, 1982).
5. "Lincoln Water Commissioners File Suit Saying Manufacturer Contaminated Wells," The Providence Journal - Providence, RI (November 17, 1982).
6. "State Says 3 R.I. Dumps On Hazard List Because Of Nearness To Water Supplies," The Providence Journal - Providence, RI (December 22, 1982).
7. "Water's Drinkable, Says Town," The Evening Times - Pawtucket, RI (December 23, 1982).
8. "Accord On Well Cleanup Expected By Mid-March," Evening Bulletin - Providence, RI (February 9, 1983).
9. "Peterson/Puritan Hires D.C.-Based Attorney," The Call - Woonsocket, RI (February 18, 1983).
10. "Trudeau: Delay Drilling Of New Water Wells Until Peak Needs Determined," The Providence Journal - Providence, RI (March 11, 1983).
11. "Pollution Link Acknowledged By Area Firm," The Call - Woonsocket, RI (March 22, 1983).
12. "EPA: Wait And See On Puritan Plan," The Evening Times - Pawtucket, RI (March 23, 1983).

13.3 News Clippings/Press Releases (cont'd.)

13. "Peterson/Puritan Vows Cleanup," Evening Bulletin - Providence, RI (March 23, 1983).
14. "Town Mum On Firm's Offer," The Call - Woonsocket, RI (March 23, 1983).
15. "Environment: A R.I. Firm Scores High," The Providence Journal - Providence, RI (March 28, 1983).
16. "EPA, Peterson Puritan Discuss Aquifer Cleanup," The Call - Woonsocket, RI (July 29, 1983).
17. "EPA Lawyer Says Plan To Clean Aquifer Moving Along," The Providence Journal - Providence, RI (July 29, 1983).
18. "Peterson/Puritan Starts Cleanup Of Polluted Aquifer," The Call - Woonsocket, RI (February 10, 1984).
19. "Peterson/Puritan Starts Cleanup Of Aquifer Blamed For Fouling Wells," The Providence Journal - Providence, RI (February 10, 1984).
20. "Water Emergency In Lincoln," The Evening Times - Pawtucket, RI (April 18, 1984).
21. "$780,000 Settlement Accepted By Lincoln In Pollution Lawsuit," The Call - Woonsocket, RI (May 10, 1984).
22. "Puritan Will Pay $780,000 To Settle Polluted-Well Suit," The Providence Journal - Providence, RI (May 10, 1984).
23. "EPA Presses Peterson On Study Of Pollution," Evening Bulletin - Providence, RI (September 28, 1984).
24. "EPA Tells Peterson/Puritan To Hold Water Pollution Study," The Call - Woonsocket, RI (October 12, 1984).
25. "EPA To Conduct Pollution Study At Peterson/Puritan," Evening Times - Providence, RI (March 14, 1985).
26. "State Acquires 22 Acres Of Land For Blackstone R. Park Project," The Providence Journal - Providence, RI (January 1986).
27. "J.M. Mills Transfer Station Ordered Town Down," Evening Times - Providence, RI (September 23, 1986).
28. "EPA To Show Plans To Study Peterson Puritan Site," Evening Times - Pawtucket, RI (January 6, 1987).
29. "Public Hearing Set On Plans For Study Of Toxic Waste Site," The Call - Woonsocket, RI (January 6, 1987).
30. "Cumberland Meetings This Week," The Call - Woonsocket, RI (January 11, 1987).
31. "EPA To Air Plan For Local Superfund Site," The Providence Journal - Providence, RI (January 14, 1987).
32. "EPA To Air Plan For Local Superfund Site," The Evening Bulletin - Providence, RI (January 14, 1987).
33. "EPA In Town Tonight To Explain Cleanup," The Pawtucket Times - Pawtucket, RI (January 15, 1987).
34. "EPA Peterson/Puritan Contamination Study Set," The Call - Woonsocket, RI (January 16, 1987).
35. "Peterson/Puritan Study To Get Underway In Feb.," The Evening Times - Pawtucket, RI (January 16, 1987).
36. "25 People Question EPA On Its Plan To Clean Up Peterson/Puritan Site," The Providence Journal-Bulletin - Providence, RI (January 16, 1987).
37. "Fumes Ignite Plant," The Providence Journal-Bulletin - Providence, RI (January 22, 1987).
38. "Peterson/Puritan To Pay For Hazardous Waste Study," The Providence Journal-Bulletin - Providence, RI (June 3, 1987).

13.3 News Clippings/Press Releases (cont'd.)

39. "Superfund Sites In Limbo," The Providence Sunday Journal - Providence, RI (October 22, 1989).
40. "Plastics Plant Emits Cloud of Toxic Vapor Into Cumberland Sky," The Providence Sunday Journal - Providence, RI (October 21, 1990).
41. "Impurity Suspect in Toxic Cloud at Berkeley Plant," The Providence Journal-Bulletin - Providence, RI (October 22, 1990).
42. Cumberland Chemical Plant is Little Known to Neighbors," The Providence Journal-Bulletin - Providence, RI (October 22, 1990).
43. "Illegal Dumping Worries Officials," The Evening Times - Pawtucket, RI (April 4, 1991).
44. "EPA to Restrict Access to Mendon Rd. Landfill," The Evening Times - Pawtucket, RI (November 13, 1991).
45. "EPA Agrees to Restrict Access to Landfill," The Providence Journal-Bulletin - Woonsocket, RI (November 13, 1991).
46. "EPA to Fence Off, Restrict Access to Cumberland Demp," The Call - Providence, RI (November 13, 1991).
47. "EPA to Clean Superfund Site," The Evening Times - Pawtucket, RI (June 30, 1993).
48. "The United States Environmental Protection Agency Announces Proposed Remedial Alternatives for Operable Unit 1 of the Peterson/Puritan, Inc. Superfund Site," The Call - Woonsocket, RI (July 1, 1993).
49. "Public's Opinion Sought on EPA Cleanup Plan," The Call - Woonsocket, RI (July 1, 1993).
50. "EPA Cleanup Plan to be Aired," The Evening Times - Pawtucket, RI (July 15, 1993).
51. "Neighbors to Hear Plan for Waste Site Cleanup," The Providence Journal-Bulletin - Providence, RI (July 15, 1993).
52. "EPA Outlines $7.3M Plan for Berkeley Site Cleanup," The Evening Times - Pawtucket, RI (July 16, 1993).
53. "EPA Selects $7.5 million Plan to Cleanup Superfund Site," The Call - Woonsocket, RI (July 16, 1993).
54. "EPA Unveils Cleanup Proposal," The Providence Journal-Bulletin - Providence, RI (July 16, 1993).
55. "DEM Plans To Purchase 31 Acres in Lincoln For Blackstone River Park," The Providence Journal-Bulletin - Providence, RI.
56. "Lincoln Accepts $780,000 Settlement In Pollution Suit."
57. "Two Parcels Totaling 55 Acres eyed For Blackstone River Park."

Press Releases

58. "Town of Lincoln - Drinking Water Supply Monitoring," State of Rhode Island Department of Health (October 31, 1979).
59. "To Public Officials and Concerned Citizens of Cumberland and Lincoln, RI," EPA Region I (1985).
60. "Environmental News - Public Meeting to Explain Plans for the Peterson/Puritan Superfund Site Announced," EPA Region I (January 2, 1987).
61. "Peterson/Puritan, Inc. Superfund Site," Peterson/Puritan, Inc. (January 15, 1987). Concerning an additional study to be conducted at the site.
62. "Environmental News," (June 1, 1987). Concerning the announcement of a consent agreement.
63. "EPA Meeting to Discuss Proposed Cleanup Plan for Peterson/Puritan, Inc. Superfund Site," EPA Region I (June 29, 1993).

13.4 Public Meetings

1. Letter from William R. Swanson, Camp Dresser & McKee Inc. to Dennis P. Gagne and Patty D'Andrea, EPA Region I (May 21, 1987). Concerning the attached January 15, 1987 "Revised Draft Public Meeting Summary."
2. Summary of Public Meeting, EPA Region I (July 29, 1993).
3. "Public Hearing - 29 July 1993 - State Response," Rhode Island Department of Environmental Management (August 3, 1993).
4. "Final Informational Public Meeting Summary," CDM Federal Programs Corporation (August 25, 1993).

13.5 Fact Sheets

1. "Superfund Program Fact Sheet - Peterson/Puritan Site," EPA Region I (January 1987).
2. "Superfund Program Fact Sheet - EPA Announces the Results of Remedial Investigation and Risk Assessment Studies," EPA Region I (June 1993).

16.0 Natural Resource Trustee

16.1 Correspondence

1. Letter from Kenneth Finkelstein, National Oceanic and Atmospheric Administration to Richard C. Boynton, EPA Region I (March 1, 1989). Concerning sampling results from runoff near the site.

16.4 Trustee Notification Form and Selection Guide

1. Letter from Gordon E. Beckett, U.S. Department of the Interior Fish and Wildlife Service to David J. Newton, EPA Region I (July 21, 1987) with the attached Letter from Ira Leighton for Merrill S. Hohman, EPA Region I to William Patterson, Department of the Interior. Concerning attached "Trustee Notification Attachment" and "Guide to Trustee Selection."
2. Letter from Kenneth Finkelstein, National Oceanic and Atmospheric Administration to David J. Newton, EPA Region I (September 21, 1987) with attached Letter from Ira Leighton for Merrill S. Hohman, EPA Region I to Sharon Christopherson, National Oceanic and Atmospheric Administration. Concerning receipt of June 8, 1987 "Trustee Notification Form."

16.5 Technical Issue Papers

1. Findings of Fact, U.S. Department of Commerce National Oceanic and Atmospheric Administation (May 7, 1990).

17.0 Site Management Records

17.1 Correspondence

1. Letter from Joseph J. Roszkowski, Zimmerman, Roszkowski & Brenner (Attorney for Mr. and Mrs. Joseph Marszalkowski, propertyowners near site) to David J. Newton, EPA Region I (June 16, 1987). Concerning request for sampling results performed on the Marszalkowski property.
2. Letter from Joseph J. Roszkowski, Zimmerman, Roszkowski & Brenner (Attorney for J.M. Mills) to Randy Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson Puritan, Inc.) (June 19, 1987). Concerning J.M. Mills' refusal to consent to further geophysical testing without evidence supporting the necessity of testing.
3. Memorandum from David Webster, EPA Region I to Waste Management Division Staff, EPA Region I (April 7, 1993). Concerning soil vapor extraction information exchange session.

17.2 Access Records

1. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson Puritan, Inc.) to Cedar Hill Realty (June 15, 1987). Concerning request for permission to perform sampling on Cedar Hill Realty property.
2. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson Puritan, Inc.) to New Metal Industries, Inc. (June 15, 1987). Concerning request for permission to perform sampling on New Metal Industries' property.

17.2 Access Records

3. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson Puritan, Inc.) to Okonite Company (June 16, 1987). Concerning request for permission to perform sampling on Okonite Company property.
4. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson Puritan, Inc.) to Roger Williams Food, Inc. (June 16, 1987). Concerning request for permission to perform sampling on Roger Williams Food property.
5. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson Puritan, Inc.) to Joseph J. Roszkowski, Zimmerman, Roszowski & Brenner (Attorney for J.M. Mills, Inc.) (June 16, 1987). Concerning request for permission to perform testing and sampling on J.M. Mills' property.
6. Letter from Randy M. Mott, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson Puritan, Inc.) to Robert Gaudette (June 16, 1987). Concerning request for permission to perform sampling on Mr. Gaudette's property.
7. Letter from Tracy M. Getz, Heron, Burchette, Ruckert & Rothwell (Attorney for Peterson Puritan, Inc.) to William Walsh-Rogalski, EPA Region I (June 29, 1987) with attached address list. Concerning efforts to obtain access from property owners in the site area.

17.4 Site Photographs/Maps

The records cited in entry numbers 1 and 2 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. "Site Analysis - Study Area - Volume 1," EPA Region I (March 1987).
2. "Site Analysis - Study Area - Volume 2," EPA Region I (March 1987).

17.7 Reference Documents

Reference documents may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

17.8 State and Local Technical Records

The records cited in entry numbers 1 through 4 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

1. "Study of Contaminated Wells," Goldberg-Zoino & Associates for Town of Lincoln (May 1982).
2. "Blackstone River Park Master Plan," Rhode Island Department of Environmental Management (June 1986).
3. "Replacement of the Berkeley Bridge and the Martin Street Canal Bridge," Gordon R. Archibald, Inc. for Rhode Island Department of Transportation (February 1988).
4. "Environmental Site Investigation - Plat 34 Lots 99 and 277," [aka: Miller's Auto Body (formerly Synthron, Inc.)] Lincoln Environmental (July 24, 1989).

Attachments associated with entry number 5 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

5. Letter from Thomas E. Billups, GZA GeoEnvironmental, Inc. to David J. Newton, EPA Region I (May 30, 1991). Concerning a study to relocate the Berkeley Bridge.
6. Letter from David J. Newton, EPA Region I to Thomas E. Billups, GZA GeoEnvironmental, Inc. (June 25, 1991). Concerning relocation of the Berkeley Bridgewith attached list of released information.

The record cited in entry number 7 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

7. "Environmental Study Berkeley Bridge No. 769," GZA GeoEnvironmental, Inc. for Gordon R. Archibald, Inc. (July 1991).
8. Letter from David J. Newton, EPA Region I to David A. Ferguson, Rhode Island Department of Transportation (March 24, 1992). Concerning the Route 122 reconstruction project.

17.8 State and Local Technical Records (cont'd.)

Attachments associated with entry number 9 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

9. Letter from Edmund T. Parker Jr., Rhode Island Department of Transportation to David J. Newton, EPA Region I (June 30, 1993). Concerning transmittal of Comments Dated October 22, 1991 from David J. Newton, EPA Region I on the July 1991 "Environmental Study Berkeley Bridge No. 769," GZA GeoEnvironmental, Inc. for Gordon R. Archibald, Inc. and the June 28, 1993 "Design & Construction Report for the Replacement of the Berkeley Bridge and Martin Street Canal Bridge," Gordon R. Archibald, Inc. for Rhode Island Department of Transportation.
10. Letter from David J. Newton, EPA Region I to Edmund T. Parker Jr., Rhode Island Department of Transportation (July 28, 1993). Concerning site impact of RIDOT's contemplated bridge work.

The records cited in entry numbers 11 and 12 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

11. "Environmental Monitoring & Oversight of Field Activities for the Berkeley Bridge/Martin Street Canal Bridge," Environmental Resource Associates, Inc. for Rhode Island Department of Transportation (August 25, 1993).
12. "Environmental Sampling and Analyses Report for the Proposed Reconstruction of Route 122," Briggs Associates for R.A. Cataldo Engineering.

Comments

13. Comments Dated October 22, 1991 from David J. Newton, EPA Region I on the July 1991 "Environmental Study Berkeley Bridge No. 769," GZA GeoEnvironmental, Inc. for Gordon R. Archibald, Inc.
14. Comments Dated November 4, 1991 from Linda B. Wofford, Rhode Island Department of Environmental Management on the July 1991 "Environmental Study Berkeley Bridge No. 769," GZA GeoEnvironmental, Inc. for Gordon R. Archibald, Inc.

Section II

Guidance Documents

GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at the EPA Region I Records Center in Boston, Massachusetts.

General EPA Guidance Documents

1. "Protection of Wetlands (Executive Order 11990), Appendix D," Federal Register (Vol. 42), 1977.

2. U.S. Environmental Protection Agency. Guidance Manual for Minimizing Pollution from Waste Disposal Sites (EPA/600/2-78/142), August 1978.

3. "Polychlorinated Biphenyls; Criteria Modification; Hearings," Federal Register (Vol. 44, No. 106), May 31, 1979.

4. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Biodegradation and Treatability of Specific Pollutants (EPA/600/9-79/034), October 1979.

5. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Carbon Adsorption Isotherms for Toxic Organics (EPA/600/8-80/023), April 1, 1980.

6. U.S. Environmental Protection Agency. Office of Water and Waste Management. Evaluating Cover Systems for Solid and Hazardous Waste, 1980.

7. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Costs of Remedial Response Actions at Uncontrolled Hazardous Waste Sites, April 15, 1981.

8. U.S. Environmental Protection Agency. Office of Water and Waste Management. Engineering Handbook for Hazardous Waste Incineration (SW-889, OSWER Directive 9488.00-5), September 1981.

9. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Evaluating Cover Systems for Solid and Hazardous Waste (Revised Edition) (SW-867, OSWER Directive 9476.00-1), September 1982.

10. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Lining of Waste Impoundment and Disposal Facilities (SW-870, OSWER Directive 9480.00-4), March 1983.

11. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Joint Corps/EPA Guidance (OSWER Directive 9295.2-02), June 24, 1983.

12. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance Manual for Hazardous Waste Incinerator Permits (EPA SW-966), July 1983.

13. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Handbook for Evaluating Remedial Action Technology Plans (EPA/600/2-83/076), August 1983.

14. "Final and Proposed Amendments to the National Oil and Hazardous Substances Pollution Contingency Plan," Code of Federal Regulations (Title 40, Part 300), September 8, 1983.

15. "National Oil and Hazardous Substances Pollution Contingency Plan," Code of Federal Regulations (Title 40, Part 300), 1985.

16. "National Oil and Hazardous Substances Pollution Contingency Plan - Final Rule," Federal Register (Vol. 55, No. 46), March 8, 1990.

17. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/HW-6), September 1983.

18. U.S. Environmental Protection Agency. Office of Research and Development and Office of Emergency and Remedial Response. Case Studies 1-23: Remedial Response at Hazardous Waste Sites (EPA 540/2-84/002b), March 1984.

19. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory. Soil Sampling Quality Assurance User's Guide (EPA/600/4-84/043), May 1984.

20. "Polychlorinated Biphenyls (PCBs); Final Rules and Notice of Request for Additional Comments on Certain Individual and Class Petitions for Exemption," Federal Register (Vol. 49, No. 133), July 10, 1984.

21. U.S. Environmental Protection Agency. Office of Ground-Water Protection. Ground-Water Protection Strategy (EPA/440/6-84/002), August 1984.

22. U.S. Environmental Protection Agency. Environmental Criteria and Assessment Office. Health Effects Assessment Documents (58 Chemical Profiles) (EPA/540/1-86/001-058), September 1, 1984.

23. U.S. Environmental Protection Agency. Office of Research and Development and Office of Emergency and Remedial Response. Review of In-Place Treatment Techniques for Contaminated Surface Soils - Volume 1: Technical Evaluation (EPA/540/2-84/003a), September 1984.

24. "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule," Federal Register (Vol. 49, No. 209), October 26, 1984.

25. U.S. Environmental Protection Agency. Hazardous Response Support Division. Standard Operating Safety Guides, November 1984.

26. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Field Standard Operating Procedures Manual #4: Site Entry (OSWER Directive 9285.2-01), January 1, 1985.

27. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Field Standard Operating Procedures Manual #8: Air Surveillance (OSWER Directive 9285.2-03), January 1, 1985.

28. U.S. Environmental Protection Agency. Office of Health and Environmental Assessment. Development of Statistical Distribution or Ranges Standard Factors Used in Exposure Assessments (EPA OHEA-E-16), March 1985.

29. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Field Standard Operating Procedures Manual #6: Work Zones (OSWER Directive 9285.2-04), April 1, 1985.

30. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Field Standard Operating Procedures Manual #9: Site Safety Plan (OSWER Directive 9285.2-05), April 1, 1985.

31. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance Document for Cleanup of Surface Tank and Drum Sites (OSWER Directive 9380.0-3), May 28, 1985.

32. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Project Summary: Settlement and Cover Subsidence of Hazardous Waste Landfills (EPA/600/S2-85/035), May 1985.

33. U.S. Environmental Protection Agency. Environmental Research Laboratory. EPA Guide for Minimizing the Adverse Environmental Effects of Cleanup of Uncontrolled Hazardous-Waste Sites (EPA/600/8-85/008), June 1985.

34. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Remedial Investigations under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/002), June 1985.

35. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/003), June 1985.

36. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory. Sediment Sampling Quality Assurance User's Guide (EPA/600/4-85/048), July 1985.

37. Memorandum from William N. Hedeman, Director, U.S. Environmental Protection Agency Office of Emergency and Remedial Response to Toxic and Waste Management Division Directors, Regions I-X (OSWER Directive 9280.0-02), August 1, 1985 (discussing policy on flood plains and wetland assessments for CERCLA Actions).

38. U.S. Environmental Protection Agency. Office of Waste Programs Enforcement. Toxicology Handbook (OSWER Directive 9850.2), August 1, 1985.

39. Memorandum from Gene Lucero, U.S. Environmental Protection Agency Office of Waste Programs Enforcement to Addressees ("Director, Waste Management Division, Regions I, IV, V, VII, and VIII; Director, Emergency and Remedial Response Division, Region II; Director, Hazardous Waste Management Division, Region III; Director, Air and Waste Management Division, Region VI; Director, Toxics and Waste Management Division, Region IX; Director, Hazardous and Waste Division, Region X"), August 28, 1985 (discussing community relations activities at Superfund Enforcement sites).

40. U.S. Environmental Protection Agency. Office of Waste Programs Enforcement. Endangerment Assessment Handbook, August 1985.

41. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory and Office of Emergency and Remedial Response. Covers for Uncontrolled Hazardous Waste Sites (EPA 540/2-85/002), September 1985.

42. U.S. Environmental Protection Agency. Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites (OSWER Directive 9850.3), September 27, 1985.

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