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Superfund Record of Decision:

Sealand Limited, DE

50272-101

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 2-acre Sealand Limited site, a former coal tar treatment and recycling facility, is located in Mt. Pleasant, New Castle County, Delaware. Land use in the area is primarily industrial and commercial. Current site features include a concrete slab, a one-story building, an abandoned rail spur, a gravel road, and miscellaneous debris. Ground water underlying the site is used as a source of drinking water. From 1971 until 1976, Adams Laboratory used the site for animal fat rendering activities. The property was subsequently sold to Conrail, which cleaned up the property to meet State standards in 1979. From 1982 to 1983, Conrail leased the property to Sealand. Sealand allegedly conducted treatment, processing, and recycling of coal to tar and off- specification creosote wastes onsite until abandoning the site in 1983. A 1983 State investigation discovered 21 steel tanks or hoppers; a 10,000-gallon wooden storage tank and 300 55-gallon steel drums, which were leaking liquids onsite; a boiler house; and various mixing chambers and pressure vessels on the abandoned site. Additional studies by EPA and the State identified organics including PAHs, creosols, and solvents in the onsite soil, drums, and tanks. Subsequently in 1983, EPA conducted an emergency removal action

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Sealand Limited, DE
First Remedial Action - Final
Contaminated Medium: None
Key Contaminants: None

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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EPA/ROD/R03-91/121
Sealand Limited, DE
First Remedial Action - Final

Abstract (Continued)

at the site and removed offsite 240,000 gallons of organic wastes from within the wooden and steel tanks, and 320 drums. Additionally, EPA disposed of 122 cubic yards of solid waste, including 30 cubic yards of wooden tank debris and approximately 50 to 92 cubic yards of sludge and contaminated material offsite. The owner voluntarily removed 239 drums of off-specification product. In addition, the storage tanks were cleaned and moved, and the tank and drum storage area was capped with clay. This Record of Decision (ROD) addresses onsite soil as the first and final operable unit (OU1). All hazardous materials contained in abandoned onsite tanks and drums were disposed of offsite during the EPA removal action, and any remaining soil contaminants pose low risks for humans at the site. Based on this rationale, there are no primary contaminants of concern affecting this site.

The selected remedial action for this site is no action. There are no costs associated with this no action remedy.

PERFORMANCE STANDARDS OR GOALS: Not applicable.

United States Environmental Protection Agency - Region III
Superfund Program

Record of Decision

Sealand Limited Site
Mt. Pleasant, Delaware

September 1991

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RECORD OF DECISION
SEALAND LIMITED SITE

DECLARATION

SITE NAME AND LOCATION

Sealand Limited Site
Mt. Pleasant, Delaware

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Sealand Limited Site, in Mt. Pleasant, Delaware, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this Site.

The Delaware Department of Natural Resources and Environmental Control has not yet concurred with the selected remedy. The information supporting this remedial action decision is contained in the Administrative Record for this Site.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for the Sealand Limited Site is No Action. Under this alternative, no further action will be taken at the site. Although not required by EPA policy or guidance, a review of the condition of the Site will be conducted in five years to verify that no unacceptable hazards are posed by conditions which then exist at the Site.

DECLARATION STATEMENT

Emergency removal activities that were taken at the Site were sufficient to mitigate threats posed by the Site to human health and the environment. Therefore, no further action is necessary to ensure protection of human health and the environment.

for W Muszewski — 9-30-91

Edwin B. Erickson
Regional Administrator
Region III

Date

DECISION SUMMARY

1. Site Name, Location, and Description

The Sealand Limited, Inc. Site (Site) is located in Mt. Pleasant, New Castle County, Delaware, several hundred feet east of the intersection of Routes 896 and 71/301 (Figure 1). The Chesapeake and Delaware Canal is approximately 2 miles north of the Site. The Site property is approximately 2 acres in size and is currently owned by the Consolidated Railroad Corporation (Conrail). The Site is rectangular in shape and is bordered on the west by an active Conrail track and on the north and east by a 15-acre parcel of land owned by Tilcon Minerals, Inc. On the south, the Site is bordered by Routes 71/301. Private residences and light industrial and commercial establishments are also located to the south and west of the Site.

The Site is presently inactive and unoccupied following an U.S. Environmental Protection Agency (EPA) Emergency Removal Action conducted in late 1983 and early 1984. Current Site features include a concrete slab, a one-story building, an abandoned rail spur, a gravel road, and miscellaneous debris. A one to three foot thick clay cap which was placed over the process area following the removal action is intact and well vegetated. Shallow ground water flows in a north- northeasterly direction, toward Joy Run, a stream located 1000 feet north of the Site. Ground water is used as a source for domestic water supplies. The nearest residences are less than 500 feet from the site.

2. Site History and Enforcement Activities

According to EPA records, industrial activity at the Site began in 1971 when Adams Laboratory operated an animal fat rendering plant on the property. Sometime prior to 1976, Adams Laboratory ceased operations at the facility. In 1976, Conrail acquired the property. A contractor hired by Conrail cleaned up the Site to the Delaware Department of Natural Resources and Environmental Control's (DNREC's) satisfaction in 1979.

In August 1982, Conrail leased the Site to Sealand Ltd. for the stated purpose of waste oil recycling. The Site was operated by Sealand Ltd. from August 1982 until August 1983. During that period, the operations consisted of the treatment and/or processing of coal tars and other similar materials referred to as No. 4 and No. 6 oil, oil/gas tar, off-spec creosote, ink oil waste, and oil cuff (an oil and water mixture). The operators allegedly accepted the various materials, separated the water, and transferred the liquid materials by tank truck to Burke-Parsons-Bowlby Corporation.

Sealand Ltd. abandoned the Site in August 1983. At that time, the Site contained 21 steel tanks or hoppers, one 10,000-gallon wooden storage tank, approximately 300 55-gallon steel drums, a boiler house, and various mixing chambers and pressure vessels. An investigation of the Site conducted by the DNREC concluded that the

wooden storage tank and numerous 55-gallon drums were leaking their contents onto the ground surface. The observed leaking liquids were described by DNREC representatives as black, viscous, tar-like substances. Laboratory analysis of samples collected in October 1983 by the DNREC and EPA from tanks, drums, and soils reported the presence of polynuclear aromatic organic compounds, creosols, solvents, and other organic compounds.

In December 1983, EPA initiated an Emergency Removal Action under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The action consisted of the removal of 240,000 gallons of coal tar which had been contained in the wooden and steel tanks, 320 drums, and approximately 122 cubic yards of solid waste. The solid waste consisted of 30 cubic yards of the wooden tank debris and anywhere from 50 to 92 cubic yards of sludge and contaminated material. Farboil Company voluntarily removed 239 drums of off-spec product (EPA OSC report mentions two quantities, 238 and 239) from the site in December 1983. In addition, storage tanks were cleaned and moved, and the tank and drum storage area was capped with clay. The extent of the capped area is shown in Figure 2.

None of the potentially contaminated soil located within the storage tank area was removed from the Site. Soil from the excavation of an L-shaped trench along the southern and western boundaries of the storage tank area was also left onsite within the subsequently capped former tank area. According to EPA records, the trench was constructed along the railroad side of the Site to aid in minimizing any horizontal movement of contaminants. The trench was filled with clay, and it and soil within the storage tank area were then covered with 1 foot of clay and 6 inches of topsoil. Six groundwater monitoring wells were also installed during the Emergency Removal Action. Available information indicates that there were two wells existing onsite prior to the emergency action. The removal action was concluded in June 1984.

The following is a chronology of EPA and DNREC regulatory actions with regard to the Sealand Ltd. operations:

- August 1983: DNREC site visit following abandonment of Sealand Ltd. operations

- September 1983: DNREC request to EPA to perform CERCLA preliminary assessment

- September 1983: EPA performs visual site inspection

- October 1983: EPA site assessment

- November 1983 to June 1984: EPA Emergency Removal Action

- August 20, 1985: Civil Compliant filed by the United States, U.S. v. Consolidated Rail Corporation, et al., Civil No. 85-502 MMS, pursuant to Sections 104 and 107 of CERCLA.

- September 2, 1986: Amended Civil Complaint filed by the United States in U.S. v. Consolidated Rail Corporation, et al., Civil No 85-502 MMS, pursuant to Sections 104 and 107 of CERCLA.

- June 28, 1988: Sealand Limited Site proposed for National Priorities List (NPL)

- December 30, 1988: EPA and Sealand Respondents - National Industrial Services, Inc; Coopers Creek Chemical Corp.; Casie Ecology Oil Salvage Co., Inc.; The Times Journal Company; Farboil Company; Philadelphia Gas Works; Consolidated Rail Corporation; Public Service Electric and Gas Company; Chem Clear, Inc.; Koppers Co., Inc.; Globe Newspaper Company; The Washington Post Company; Penn Fuel Gas, Inc.; USX - sign Administrative Order on Consent for RI/FS (Docket No. 111-89-08-DC).

- January 30, 1990: EPA and Sealand Respondents enter into a Partial Consent Decree for Response Costs (Civil No. 85-502 MMS).

- August 30, 1990 Sealand Limited formally added to NPL

3. Highlights of Community Participation

The RI/FS Report and the Proposed Plan for the Sealand, Limited Site were released to the public for comment on July 26, 1991. In accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, these two documents were made available to the public in the Administrative Record maintained at the EPA Docket Room in Region III, at the Middletown Public Library, and at Townsend's, Inc. in Mt. Pleasant, Delaware. The notice of availability of these two documents was published in the Wilmington News Journal on July 26, 1991. A public comment period on the documents was held from July 26, 1991 to August 24, 1991. In addition, a public meeting was held on August 6, 1991. At this meeting, representatives from EPA and the DNREC answered questions about conditions at the site and the remedial alternative under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD.

4. Scope and Role of the Response Action Within Site Strategy

EPA first identified the need to take action at the Site following the abandonment of the recycling operation. EPA then conducted the emergency removal described in the Site History section of the Decision Summary. Following the completion of the removal action, the site was listed on the National Priorities List, and an Remedial Investigation (RI) was undertaken by a group of PRPs. Upon reviewing the RI report and the Site risk assessment,

EPA has determined that the Site does not pose a threat to human health and the environment, and that no further action is required.

5. Summary ~~of~~ Site Characteristics

The Site is located within the Coastal Plain Physiographic Province which is characterized as a series of unconsolidated or partially consolidated sands, gravels, silts, and clays. These sediments form a wedge which dips and thickens to the southeast. According to Sundstrom and Pickett (1971), the thickness of the coastal plain sediments is approximately 700 feet in the vicinity of the Site. The geologic formations in the vicinity of the Site are, from youngest to oldest: Columbia, Mt. Laurel, Marshalltown, Englishtown, and Merchantville Formations. The Pliestocene Columbia Formation occurs as a thin cover over the majority of the area in the vicinity of the Site.

The vadose zone at the Site is comprised of sediments of the Columbia Formation. The Columbia Formation consists primarily of unconsolidated brown, fine to coarse (0.1 to 1.0 mm), subround, moderately to poorly sorted sand. Minor components include silt and fine gravel. In some areas, the vadose zone sediments consist of fill containing trace amounts of coal and/or cinders which may be attributable to the adjacent rail lines. These minor constituents caused the sediments to appear grey to dark grey. The vadose zone was generally 4 to 5 feet thick onsite.

The aquifer beneath the Site consists of the Columbia, Mt. Laurel, Marshalltown, and additional underlying formations. These formations are generally hydraulically interconnected and are usually referred to as the water table aquifer. No laterally continuous confining layers are in evidence within the depth encountered by onsite wells. This indicates that there are no confining layers separating the water table aquifer from deeper water bearing zones. However, the Marshalltown Formation, encountered at approximately 93 feet below grade, contains significant amounts of fine grained materials (silt and clay) which would impede groundwater flow and is thus considered an aquitard in this setting. Sundstrom and Pickett (1971) do not consider the Marshalltown Formation to be an aquifer and it is not generally mapped as such. For the purpose of the Remedial Investigation (RI), the water table aquifer was considered to extend from the surface of the water table to a depth of 93 feet below grade.

Groundwater movement at the Site has a downward component of flow indicating that the Site is in a groundwater recharge area. Flow is considered to move toward Joy Run northeast of the Site and regionally to the C & D Canal approximately 2 miles north of the Site. The nearest downgradient residential well is located on the opposite side of Joy Run; the nearest commercial well is located approximately 200 feet east of the site.

As part of the RI, onsite soil samples were collected in March and June 1990 to delineate the horizontal and vertical extent of

soil contamination. Soil samples were collected from eight locations within the former drum and storage tank area, four other onsite areas and one additional soil sample location adjacent to the east side of the concrete pad. In one boring, no sample was collected because no sample interval of unsaturated soil was present between the clay cap and the top of the water table.

A total of 24 soil samples were submitted for laboratory analyses, including three field duplicate samples. Table 1 represents a statistical summary and frequency of detection for the RI soils analytical data. The distribution of compounds detected onsite is presented in Figure 3. All analytical data and accompanying documentation is contained in the RI report.

Twenty-three soil samples were analyzed for volatile organic compounds (VOCs). VOCs were found in onsite soil samples in concentrations ranging from non-detect to 220 ug/kg (parts per billion). Methylene Chloride was found in all 23 soil samples (5-220 ug/kg); however, this compound was found to be a laboratory contaminant in all but one of the samples analyzed for VOC. Acetone was found in 20 of 23 soil samples (5-220 ug/kg); however, all but one of these contain data validation qualifiers. Benzene was found in 1 of 23 samples (4 ug/kg). 2-Hexanone was found in 1 of 23 samples (110 ug/kg). Many of the values reported for individual VOCs were estimated values below the detection limit established for the compound in question. These estimated values were considered detected in this discussion of results.

Semivolatile organic compounds were found in onsite soil samples at concentrations ranging from non-detect to 23,000 ug/kg. Of the 24 Target Compound List (TCL) list semivolatile organic compounds, all 24 were found in at least one sample and 22 were found in at least three samples. The compounds found most frequently and at the highest concentrations include naphthalene (8 of 24 samples, with the highest concentration of 20,000 ug/kg), 2-Methylnapthalene (8 of 24 samples, up to 14,000 ug/kg), phenanthrene (11 of 24 samples, up to 22,000 ug/kg), fluoranthene (9 of 24 samples, up to 23,000 ug/kg), pyrene (10 of 24 samples, up to 22,000 ug/kg), and other isomers of fluoranthene and pyrenes ranging up to 20,000 ug/kg. The highest concentrations of semivolatile organic compounds were seen in the borings that had been completed below the clay cap. Total semivolatile organic compound concentrations of up to 169,840 ug/kg were detected between the clay cap and the water table.

Of the 19 metals analyzed, only antimony was absent from any of the samples. Cyanide was detected in two samples at 0.59 and 1.6 mg/kg. Figure 3 shows the distribution of several metals in onsite soil samples. Arsenic is present at concentrations ranging from non-detect to 9.0 mg/kg. Chromium was present in all samples at concentrations ranging from 9.6 to 58.4 mg/kg. The horizontal distribution of chromium appears to be random. The concentrations of chromium appear slightly lower in the deeper samples than in the shallow samples. Lead was present in onsite soil samples in

concentrations ranging from 6.1 to 100 mg/kg. Lead was present in all samples. In a majority of samples the concentration of lead was lower in the deeper samples than in the shallow samples. No horizontal distribution pattern is evident. Mercury was present in 15 of 18 samples in concentrations ranging from non-detect to 3.9 mg/kg.

Table 2 presents a statistical summary and frequency of detection for groundwater analytical data. The distribution of selected compounds detected is presented in Figure 4. All analytical data and accompanying documentation is contained in the RI report.

Two samples showed the presence of VOCs above the level at which they could be quantified by laboratory equipment. Methylene chloride was detected in a sample from an offsite well at 11.0 ug/l and acetone in a sample from an onsite well at 10.0 ug/l. Acetone was present in the Trip Blank for April 26 at a concentration of 210 ug/l. Methylene chloride was present in the Trip Blank for April 27 at 1.0 ug/l. No other well water samples showed the presence of VOCs. Therefore, it seems likely that the presence of methylene chloride and acetone in ground water is indicative of laboratory contamination rather than of their presence in onsite or offsite wells.

Few semivolatile organic compounds were detected in groundwater samples. Bis(2-ethylhexyl) phthalate was detected at an estimated concentration of 2.0 ug/l in one offsite well sample. Naphthalene was detected at estimated concentrations of 4.0 ug/l in two onsite well samples. No other well samples showed the presence of semivolatile organic compounds.

Twenty metals plus cyanide were analyzed in filtered and unfiltered groundwater samples from offsite and onsite wells. The presence of beryllium, cobalt, copper, silver, and zinc in some of the filtered and unfiltered samples was questioned during data validation because the level at which they were detected was below the detection limit used during analysis. Of the 20 metals tested, only antimony, barium, beryllium, chromium and mercury were not present above their respective detection limits in any sample. Cyanide was detected in filtered samples at 25.7 ug/l and 19.5 ug/l. Cyanide was also detected a number of unfiltered samples. Figure 4 shows the distribution of several metals and cyanide in both onsite and offsite monitoring wells. Iron is present at concentrations ranging from non-detect to 45,000 ug/l. Manganese was present in all samples at concentration ranging from 17.8 to 6,360 ug/l. The distribution of nickel appears to be limited to onsite wells only. The concentrations of nickel ranged from non-detect to 789 ug/l.

A review of the compounds detected during the soil and groundwater investigations indicates that the chemicals of potential concern are the semivolatile organic compounds, including polynuclear aromatic hydrocarbons (PAHs), and two metals, nickel and

mercury in soil. The remaining compounds in soil and all the compounds in groundwater were detected at low frequencies and concentrations, at isolated locations, or at concentrations within the range of background. PAHs tend to bind to soil material and generally do not contaminate the groundwater.

The most likely potential receptors under current site conditions are children exposed to shallow soils while trespassing on the Site; under a potential future use scenario, potential receptors are workers that may be exposed to soil during construction activities. The exposure pathways include ingestion of soil and dermal absorption of contaminants. The presence of the clay cap currently restricts access to Site contaminants by trespassers. However, construction workers would be exposed to the relatively higher levels of contamination present in the subsurface soil.

The nearest surface water, Joy Run, is located 1,000 to 1,500 feet north of the Site. Soil within the former tank area is capped so there is no source of surface contamination to the stream. There is no visible evidence of intrusive activities or disturbance to the cap. There are currently other sources of surface runoff contamination from a former asphalt manufacturing facility, including several tar spills and an abandoned tank trailer, which are between the Site and Joy Run. A dump area (which consists mainly of discarded highway materials) located on the banks of Joy Run is another potential source of contaminated subsurface water. These areas were not evaluated during the RI as they are not a part of the Site.

6. Summary of Site Risks

The risk assessment for the Sealand Site was conducted in accordance with EPA protocols. The risk assessment first evaluated the chemicals found in the soil and groundwater at the Site and determined which Site-related chemicals are a potential concern to human health and the environment. Next, it considered whether humans or the environment are currently exposed to these chemicals or will be at some time in the future. In the final step, the concentrations of the chemicals at the point of exposure were used to estimate the potential for an adverse effect on human health or the environment.

The chemicals of potential concern for the risk assessment included all semivolatile organic compounds and two inorganics, nickel and mercury, in the soil. The selection of semivolatile organics is supported by the analytical data collected during previous investigations and the history of Site operations. The metals are included based on their frequency of detection at concentrations above background. In soil, the eight volatile organic compounds detected have low frequency of detection and distribution. The inorganic parameters, with the exception of nickel and mercury, are within the range of background, or appear to be isolated occurrences unrelated to activities which took place at

the Site. No chemicals of potential concern were identified in groundwater samples. The volatile and semivolatile detections were low in frequency and concentration and the inorganic parameters are within Site-related background concentrations.

The potential receptors, both current and future, were evaluated. For current exposure, the most likely potential receptors are children exposed to shallow surface soils while trespassing on the Site on an infrequent basis. For the future use of the Site, the potential receptors are workers that may be exposed to soil from all depths during construction activities. Observations during the remedial investigation and evidence of Site use support an exposure pathway of trespassers, particularly children.

There are low density private residential areas located to the east of the Site. Private residences and light industrial and commercial establishments are located to the south and west of the Site. Bordering the Site to the north, a 15-acre parcel of land owned by Tilcon Mineral Inc. contains miscellaneous equipment and debris. There is no evidence of consistent use of the Site such as dirt bike trails to suggest that children from the nearby residences play at the site on a regular basis. There is evidence, however, that pre-teenage children are potentially exposed while walking along the active railroad bed. Although there is no evidence that these children actively play on the Site, the risk assessment was based on a worst case assumption that there is regular use of the Site by area children.

A future use scenario was developed considering exposure by workers during construction of a manufacturing facility. The Site is zoned for manufacturing uses only. The zoning cannot be changed to residential because a 60-foot frontage is required for residential use and the Sealand property has only 57 feet of frontage. Property to the east of the Site is also zoned for manufacturing use. The active railroad bordering one side of the Site significantly reduces the likelihood that the Site will be developed for residential use.

Exposure pathways include all the various ways in which humans may come in contact with the chemicals of potential concern, either currently or at some time in the future. Identification of exposure pathways is developed from a fate and transport evaluation followed by an analysis of the likelihood that human or environmental receptors will contact the chemicals and the way in which any potential contact may occur. The fate and transport evaluation considers the properties of the chemicals of potential concern, the media in which the chemicals are found, and the likelihood that the chemicals will persist and/or migrate to other media.

The focus of the fate and transport study was polynuclear aromatic hydrocarbons (PAHs) in soil because these chemicals comprise 17 of the 26 chemicals of potential concern. PAHs, which are mixtures of organic chemicals made up of benzene rings, are

by-products of the incomplete combustion of organic material. Although combustion of petroleum products represents a major source of PAHs in the environment, combustion of any organic material including wood, coal, charcoal and even garbage can result in ash and smoke containing PAHs.

The chemical properties of individual PAH compounds, in particular their solubility in water, depend on the number of benzene rings. Chemicals with few benzene rings (such as naphthalene with two rings) tend to be the most water soluble, mobile in the groundwater and also susceptible to degradation by bacteria. They are also less toxic than the higher weight PAHs. PAHs with higher numbers of benzene rings (such as benzo(a)pyrene with five rings) tend to remain strongly bound to soil particles, especially particles high in organic content, and are highly water-insoluble. These higher weight PAHs are also more persistent and are degraded slowly by bacteria.

Because chemicals of potential concern were not detected in Site ground water, the soil represents the only exposure pathway for these chemicals. The media of concern is soil and the chemicals of potential concern are all the semivolatile organic chemicals detected and nickel and mercury. The exposure pathways identified are (1) ingestion of soil and (2) dermal absorption of contaminants. In risk assessment, it is seldom possible to measure a specific dosage for each identified exposure pathway. As a result, it is necessary to estimate the dose based upon a series of assumptions such as how much soil the average person ingests. These assumptions were developed from the most current Superfund Risk Assessment Guidance documents. The assumptions used in calculating the exposure for each pathway are presented in Table 3.

In order to estimate the excess lifetime cancer risk associated with exposure to potentially carcinogenic chemicals, cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Review and Verification Endeavor (CRAVE) Workgroup. CPFs are expressed in units of $(mg/kg\text{-}day)^{-1}$ and are multiplied by the estimated intake of a potential carcinogen (expressed in mg/kg-day). This calculation provides an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal experiments to which animal-to-human extrapolation and uncertainty factors have been applied.

The carcinogenicity of some PAHs has been known to the scientific community since the late 1800's and a large database has been developed regarding the mechanism of action of those PAHs which are or appear to be carcinogens. In this regard, the EPA has performed a study which is based on a biological model of cancer and calculates a best estimate of the CPF for the most well known

carcinogenic PAH, benzo(a)pyrene[1]. In addition, this study developed CPFs for other carcinogenic PAHs, and based these values on a comparison of their toxicities to the toxicity of benzo(a)pyrene. This approach is in accordance with EPA's policy of utilizing best science to develop risk estimates. Region III has adopted this practice to support the risk assessment for this Site.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6} or 1E-6). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

The cancer risk associated with each contaminant of concern in each exposure pathway for both current and future use scenarios are shown in Tables 4 and 5. For the sum of the current exposure scenarios, the cancer risk associated with trespassing on the Site is 3×10^{-7}. Under the future use scenario, the cancer risk is 1×10^{-7}. These risk levels are below the 1×10^{-4} to 1×10^{-6} risk range that EPA believes to represent acceptable risk. Therefore, the Site does not pose an unacceptable cancer risk to exposed individuals.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, that are not likely to result in an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

The numerical value used to evaluate noncarcinogenic risk is the Hazard Index (HI). The HI is the ratio of the exposure dose to the RfD and is calculated by dividing dose (chronic daily intake or CDI) by the RfD. The HI is not strictly an estimate of the risk, but a number which compares CDI to a level considered to have limited potential for lifetime health effects. Hence, HI values greater than 1 indicate that exposure exceeded the acceptable daily

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[1] Comparative potency approach for estimating the cancer risk associated with exposure to mixtures of polycyclic aromatic hydrocarbons (1988), Interim Final Report, Contract No. 68-02-4403, ICF-Clement Assoc., Fairfax, VA.

level while HI values less than 1 show that exposure is lower.

Similar to cancer risks, the HI values for each chemical are added together to assess the overall potential for noncarcinogenic effects. This approach was developed by EPA based on the assumption that simultaneous exposures to numerous chemical compounds can result in an adverse health effect. Tables 6 and 7 present the HI associated with each chemical and pathway for the current and future use scenarios. The maximum HI values for all chemicals for ingestion and dermal contact added together, 0.007 for current use and 0.006 for future use, are more than 2 orders of magnitude below the trigger HI value of 1. Therefore, potential noncarcinogenic health effects for all pathways under current and future use conditions are expected to be negligible.

Areas that represent some uncertainty in the risk assessment include carcinogenic and non-carcinogenic effects of chemicals in mixtures and the presence of any unknown chemicals. There is very little information on the toxicological effects of mixtures. In some cases, the presence of several chemicals together may result in an enhancement of the overall toxicity (synergistic) effects. Other chemicals mixed together may result in fewer toxic effects (antagonism). Lastly, the chemical analyses were for specific parameters. The chemicals evaluated are those that have been identified as the most important chemicals in air, soil, and water. The possibility exists that other chemicals are present that were not detected. However, the chemicals which were found onsite are reflective of the activities which took place during Site operations; it does not appear likely that other sources of contamination exist at this time.

The environmental risk assessment conducted for the Site concluded that there are no complete exposure pathways. The contaminated soils are capped and there are no chemicals of potential concern in the groundwater. The nearest environmental receptor of concern, Joy Run, is potentially impacted by multiple sources of contamination (not related to Site activities) including tar spills, numerous piles of asphalt and highway debris between the Site and the creek, and road bed materials dumped along the creek banks.

7. Description of the No-Action Alternative

Under the Superfund Program, studies are conducted at NPL sites to characterize the nature and extent of contamination and to determine the most feasible cleanup approaches. During the course of the removal action that took place at this site, EPA disposed of hazardous materials contained in tanks and drums abandoned onsite. Leakage or spillage which took place prior to the removal action during Sealand's short tenancy at the Site accounts for any contaminants currently onsite. The levels of contaminants present beneath the site cap do not pose an unacceptable risk to human health or the environment.

Long-term management controls relative to maintenance of the clay cap are not considered necessary since even under a worst case scenario of cap erosion or loss of integrity and subsequent human exposure, a significant health threat would not result. Remaining soil contaminant levels are within EPA's acceptable health risk range, even considering a lifetime of residential exposure. However, EPA will conduct a five-year review to verify that the selected remedy remains protective of human health and the environment.

EPA's selection of the No Action alternative under CERCLA is not to be construed as a recommendation or indication that the State of Delaware should not seek to undertake additional cleanup of the Site pursuant to its authorities under State law. EPA considers action to be warranted at a site when the calculated cancer risk exceeds one in ten thousand. At the Sealand Site, an individual would have less than one in one million chances of developing cancer as a result of exposure to site contamination. Therefore, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), no action is warranted. However, the State may have requirements that differ from EPA's, under which it may chose to take further action.

8. Documentation of No Significant Change

The Proposed Plan for the Sealand Site was released for public comment on July 26, 1991. The public comment period closed on August 24, 1991. EPA reviewed all written comments submitted during the public comment period. A summary of the comments received during the public comment period is included in the Responsiveness Summary section of this Record of Decision. Based on these comments, it was determined that no significant change to EPA's proposed remedy, as originally identified in the Proposed Plan, was necessary.

RESPONSIVENESS SUMMARY

1. Overview

On August 6, 1991, EPA held a public meeting to present the findings of the remedial investigation and to solicit comments on the Proposed Plan issued on July 26, 1991. Residents did express some concern over the potential for future ground water contamination, in particular, contamination that would potentially reach their private wells in the time prior to the five year review. EPA explained that the contaminants of concern are relatively insoluble in water, and that no ground water contamination has been confirmed in onsite wells. This suggests that domestic water supplies are not threatened by the site.

The state has maintained that the Site does pose a potential threat to local ground water supplies, and has reserved its right to take some action at the Site under its Hazardous Substances Control Act. The potentially responsible parties questioned the State's position relative to ground water issues. The full text of the State's response is given in Section 3 of this Responsiveness Summary.

2. Background on Community Involvement

During community interviews and public meeting held throughout EPA's remedial response activities, the local populace indicated a relatively low level of interest in the Site. Those most interested were residents who lived close to the Site, or in a new development located approximately 1/2 mile from the Site. Most residents were primarily concerned about the quality of local ground water, although some were also concerned about their property values. Workers at Townsend's, Inc., a granary located approximately 200 feet from the Site, were interested in following EPA's activities at the Site, as they have been since the time Sealand Limited began its operation. Townsend's employees frequently complained to local health officials about odors released during Site operations.

The Sealand Site property is bounded by an active railroad spur, a highway, and a parcel of property owned by Tilcon, Inc., which is littered with road paving materials and a tar spill. Local businesses, which include the granary, a small shopping plaza, and Summit Airfield, are apparently unaffected by the Site. Once the Site has been delisted, its affect on local property values should be negligible. No short- or long-term health risks have been identified respective to exposure to the Site.

3. Summary of Public Comments and Lead Agency Response

Oral Comments Received During the Public Meeting

Comment: The primary concern expressed during the public meeting involved the potential for future ground water contamination at the site. At least one resident stated that because EPA would not be re-sampling ground water wells for five years, residents could potentially be consuming contaminated ground water for a number of years before this was recognized.

EPA Response: The primary contaminants of concern at the Site, polynuclear aromatic hydrocarbons (PAHs), are relatively insoluble in water and tend to adhere to soil particles. During the RI, the only PAH detected in ground water was naphthalene, which was detected in two onsite wells at the estimated concentration of 4 parts per billion, two orders of magnitude below levels of regulatory concern. Even using the most sensitive analytical method available at the current time, none of the potentially carcinogenic PAHs were detected in ground water onsite.

The clay cap present at the Site reduces the infiltration of precipitation through the contaminated soil. In addition, if contaminants were to enter the ground water, the concentration of these contaminants would be reduced as contaminants moved offsite and became diluted. As the nearest downgradient resident is located over 1/4 mile from the site, it does not appear that residential wells are threatened at this time, or will be in the future. If data collected at the time of the five year review suggest differently, EPA will take appropriate action at that time.

Written Comments Received During the Public Comment Period

Comment: EPA received a letter from BCM Engineers, the PRP's consultant, concerning a statement in the Proposed Plan reflective of the State's position relative to the potential for future ground water contamination at the Site. Specifically, BCM questions the State's position that the potential for future ground water contamination exists when the known behavior of PNAs and the historical Site sampling data indicate the contrary.

EPA Response: EPA requested that DNREC provide a response to this comment. A September 9, 1991 letter from the State Project Manager to the RPM states as follows:

> "The State concurs that laboratory evidence reveals no contamination of groundwater has occurred up to now. However, due to the shallow water table aquifer and its contact with contaminated soils, it is likely the contaminants presently retained in the soils will eventually leach into the groundwater. ([T]he soil boring logs from S-04, S-05, S-06, S-07, S-08, S-10 and S-11 indicate the presence of the water table aquifer in the contaminated soils.) The presence of the clay cap will aid

in preventing infiltration of water into the contaminated batch thus minimizing the risks of the contaminants being introduced in this manner.

"We maintain that long term contact of the groundwater with the contaminated soils will likely result in contamination of the groundwater. Consequently it is imperative the remediation of the contaminated soils be conducted in a timely manner. Furthermore, it is our opinion that removal of the pollution source occur now before it migrates into the groundwater of the surrounding area is a better alternative than to study the site later and recommend a clean up after the problem has become larger in magnitude and scope."

EPA does not agree with DNREC's assessment of the Site. Based upon the information available at this time, EPA believes the Site does not pose a threat to human health or the environment, nor does it pose a threat to ground water resources in the vicinity of the site. EPA does not, however, question the State's authority to take action at this Site in accordance with State law to address what it believes is a threat.

Attachment

The Community Relations activities conducted at the Sealand Limited Site to date have included the following:

- January 23, 1990: Public meeting held following approval of the RI/FS work plan to inform the public of investigatory activities planned for the Site. Fact sheet issued.

- January 1991: EPA conducted community interviews to update community relations plan.

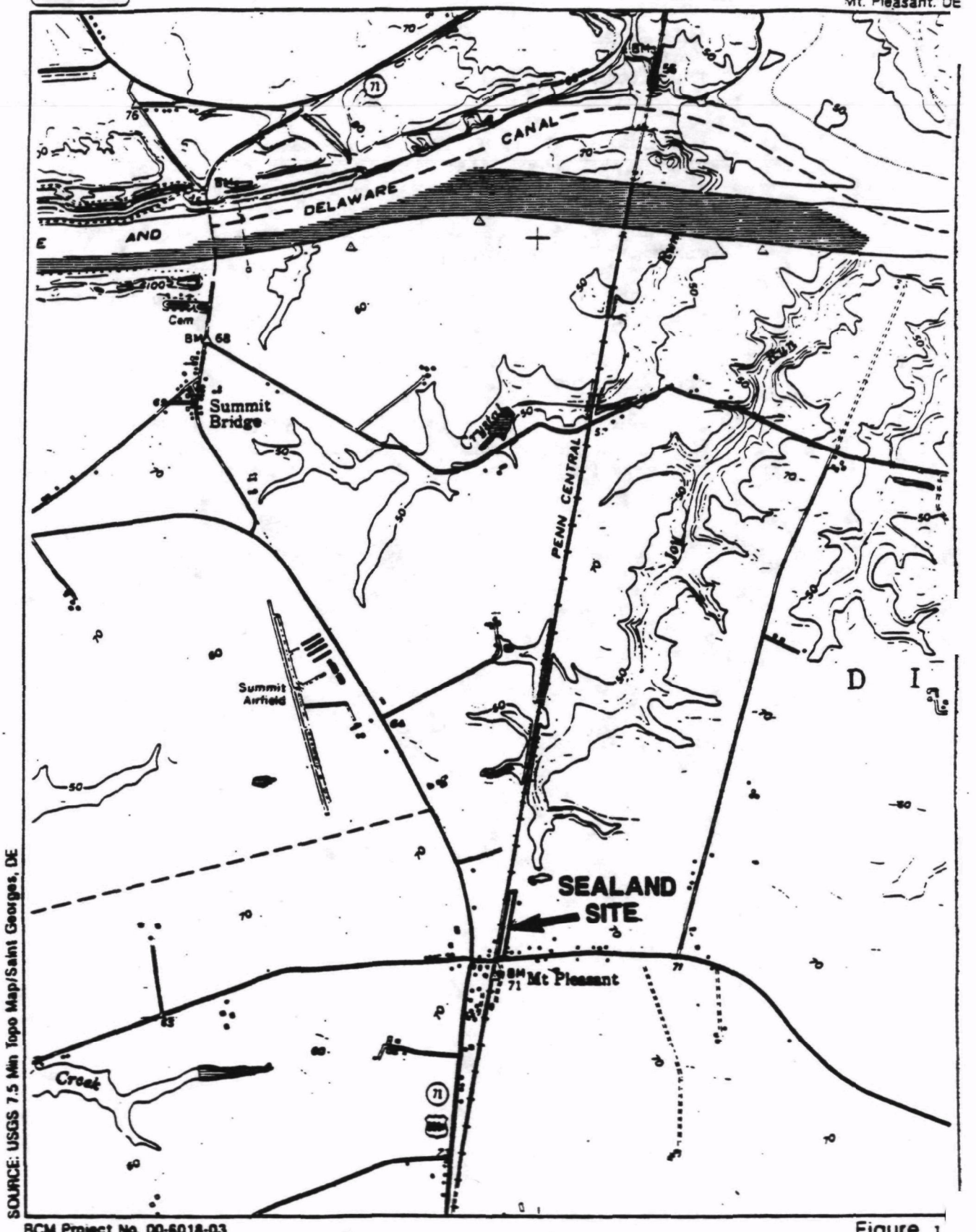
- March, 1991: Fact sheet issued providing an update on site activities.

- July 26, 1991: EPA issued Proposed Plan describing EPA's preferred remedy.

- August 6, 1991: EPA and DNREC hold public meeting to present the findings of the RI and to solicit public comment on the preferred alternative identified in the Proposed Plan.

BCM

SEALAND LTD. SITE
Mt. Pleasant, DE



SOURCE: USGS 7.5 Min Topo Map/Saint Georges, DE

BCM Project No. 00-6018-03

0 2000 ft

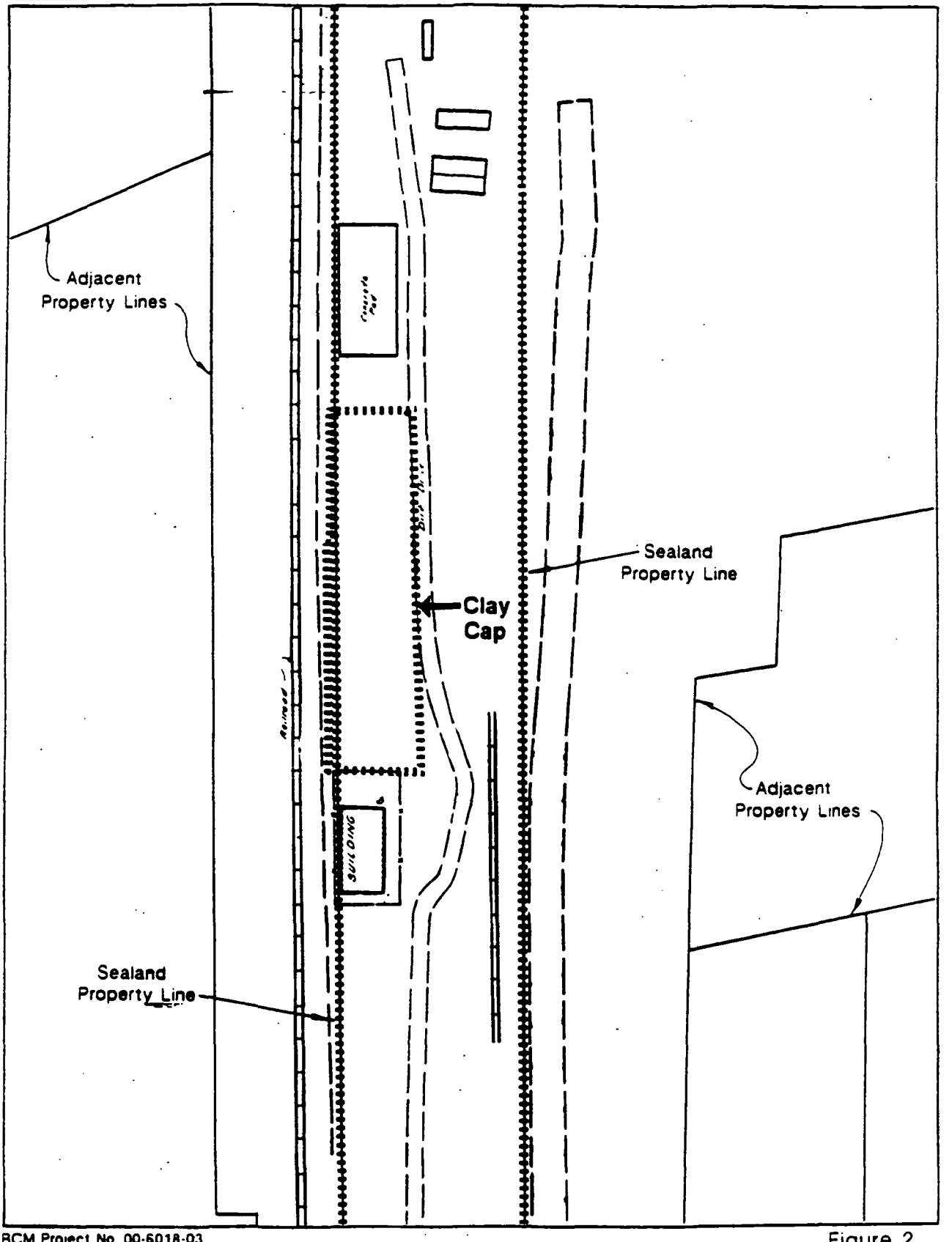
North

Figure 1
Site Location Map
Sealand Site

POOR QUALITY
ORIGINAL

BCM

SEALAND LTD. SITE
Mt. Pleasant, DE



BCM Project No. 00-6018-03

0 80 Ft

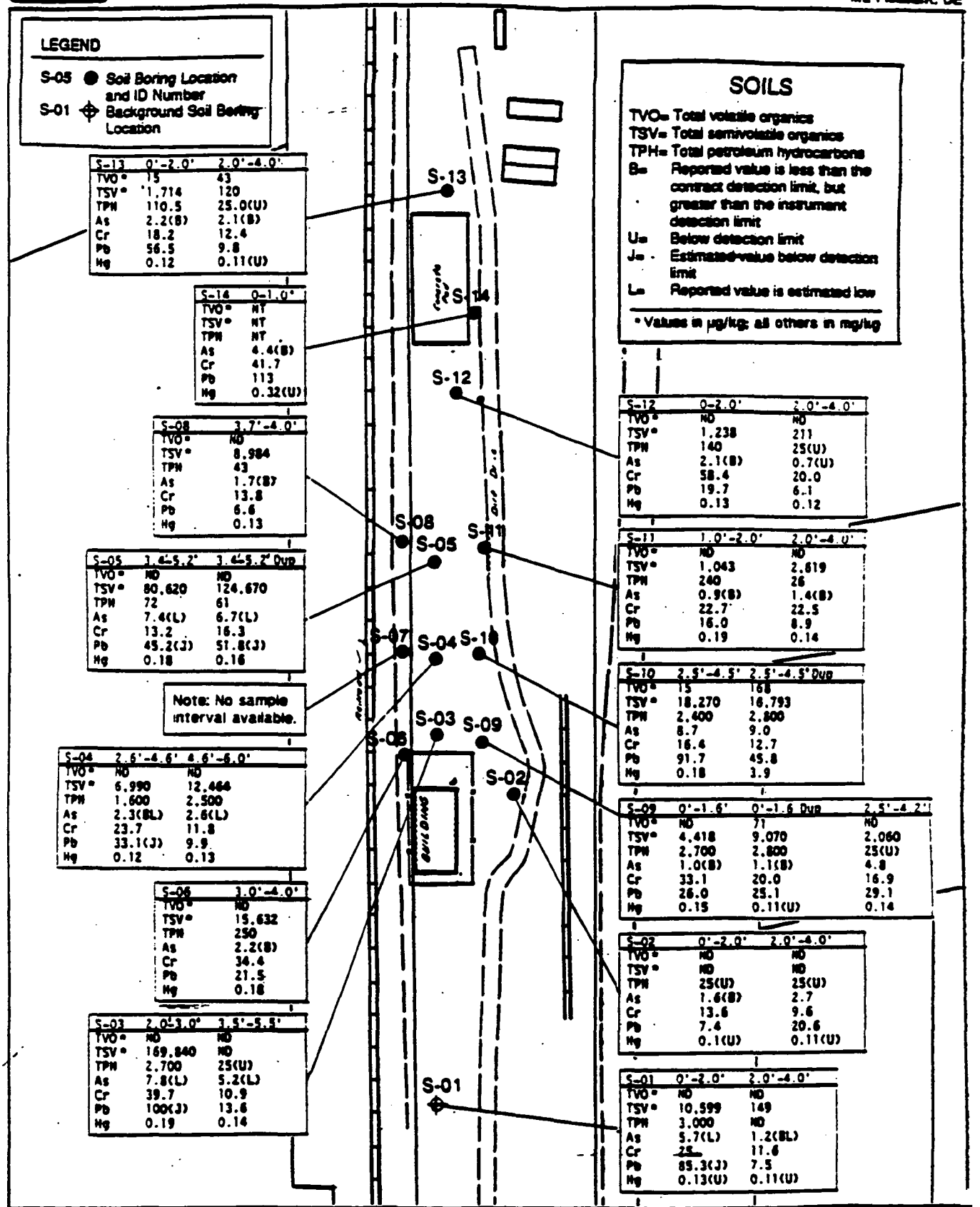
NORTH

Figure 2

Approximate Location of Clay-Capped Area Sealand Site

BCM

SEALAND LTD. SITE
Mt. Pleasant, DE

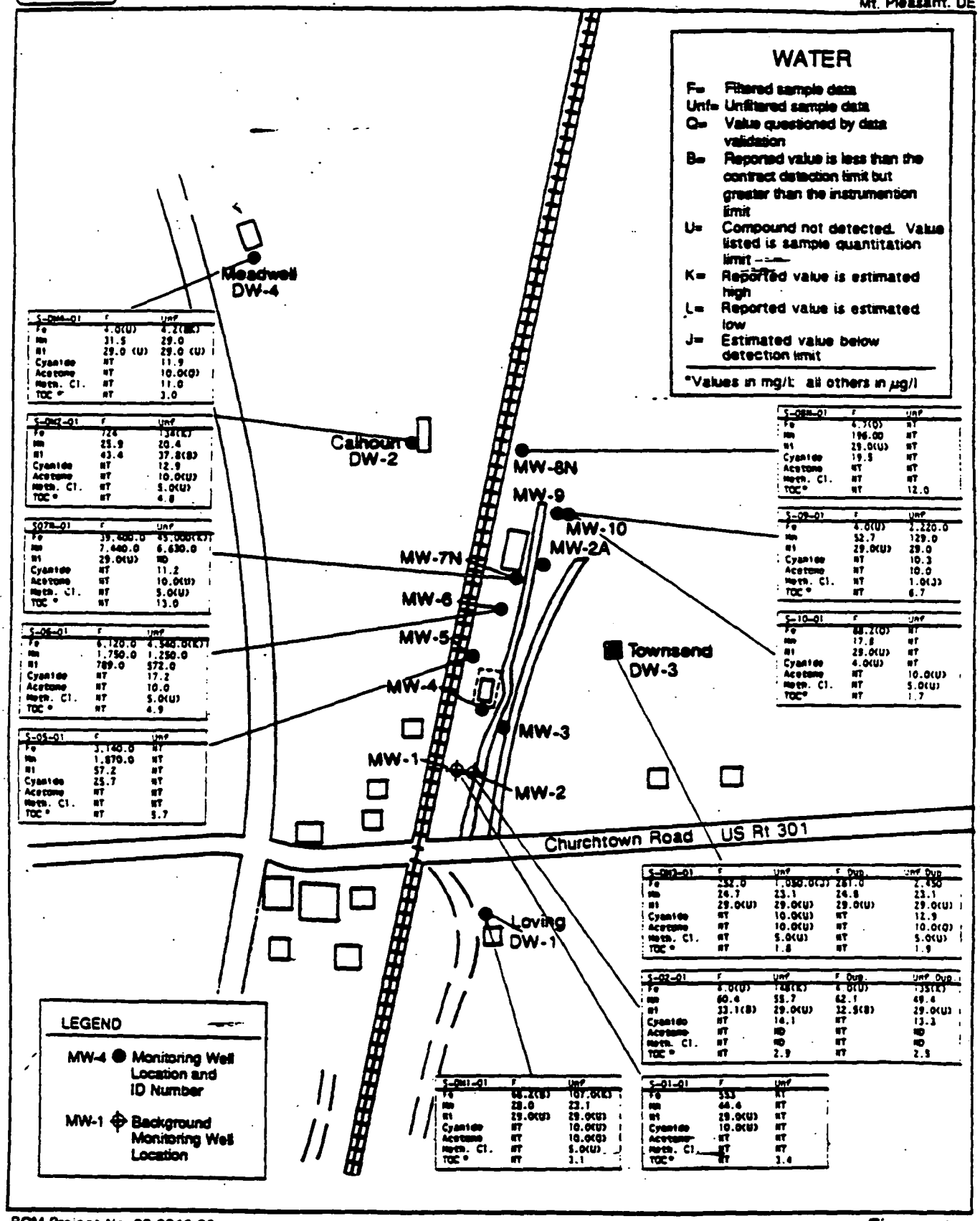


BCM Project No. 00-6018-03

Figure 3
Soil Quality Characteristics Map
Sealand Site

BCM

SEALAND LTD. SITE
Mt. Pleasant, DE



BCM Project No. 00-6018-03

0 300 Ft.

NORTH

Figure 4

Groundwater Quality Characteristics
Sealand Site

POOR QUALITY
ORIGINAL

TABLE 1

FREQUENCY OF DETECTION FOR SOIL SAMPLES AND COMPARISON TO BACKGROUND CONCENTRATIONS

SEALAND LIMITED SITE
MT. PLEASANT, DELAWARE

Data Summary	SITE SPECIFIC				
	Frequency of Detection *	Range	Arithmetic Average **	Background 0-2 ft	Background 2-4 ft
Volatile Organics, ug/kg					
Acetone	7/18	4 - 71	18.5	4	9
Benzene	1/18	<1 - 4	1.5	<1	<6
2-Hexanone	1/18	<2 - 110	4.9	<2	<12
Toluene	1/18	<5 - 34	3.5	<2	<6
Ethylbenzene	1/18	<5 - 92	5.8	<1	<6
Total Xylenes	2/18	<5 - 190	13.3	<7	<6
Carbon Disulfide	1/18	<5 - 2 #	1.5	<1	<6
Chloroform	1/18	<5 - 1 #	2.6	<3	<6
Semi-Volatile Organics, ug/kg					
Phenol	1/19	<350 - 40 #	322	<430	<380
4-Methylphenol	3/19	<350 - 610	184	<430	<380
2,4-Dimethylphenol	3/19	<350 - 670	312	<430	<380
Benzoic Acid	9/19	<350 - 1500	296	46	<1900
Naphthalene	11/19	<350 - 20000	1484	170	<380
2-Methylnaphthalene	14/19	<350 - 14000	1770	290	<380
Acenaphthylene	6/19	<350 - 7800	696	130	<380
Acenaphthene	7/19	<350 - 1900	343	44	<380
Dibenzofuran	8/19	<350 - 1300	301	110	<380
Fluorene	8/19	<350 - 7400	764	<430	<380
Phenanthrene	14/19	<350 - 22000	2038	620	46
Anthracene	9/19	<350 - 5700	586	160	<380
Fluoranthene	14/19	<350 - 23000	1937	1300	46
Pyrene	15/19	<350 - 22000	2329	1200	57
Benzo(a)anthracene	15/19	<350 - 12000	1119	900	<380
Chrysene	15/19	<350 - 11000	1157	1100	<380
bis(2-Ethylhexyl)phthalate	6/19	<350 - 530	161	<430	<380
Benzo(b)fluoranthene	15/19	<350 - 20000	2112	3000	<380
Benzo(k)fluoranthene	15/19	<350 - 20000	2154	3000	<380
Benzo(a)pyrene	13/19	<350 - 13000	1427	830	<380
Ideno(1,2,3,-cd)pyrene	12/19	<350 - 5600	526	300	<380
Dibenzo(a,h)anthracene	5/19	<350 - 2900	364	130	<380
Benzo(g,h,i)perylene	12/19	<350 - 5800	622	310	<380
Dimethyl phthalate	1/19	<350 - 66 #	288	<430	<380

* Number of detected values over the total number of samples taken.

** In calculating averages, one-half the detection limit was used for non-detects to represent a conservative estimate of the risk. Duplicate samples were averaged prior to use.

\# Detected concentration was estimated below the quantitation limit

Data questioned by data validation was considered to be below detection.

EPA split samples were not included as part of this summary.

Compiled by: BCM Engineers Inc. (BCM Project No. 00-6018-03).

TABLE 1

FREQUENCY OF DETECTION FOR SOIL SAMPLES AND
COMPARISON TO BACKGROUND SAMPLES

SEALAND LIMITED SITE
MT. PLEASANT, DELAWARE

Data Summary	SITE SPECIFIC					REGIONAL				
	Frequency of Detection *	Range	Arithmetic Average **	Background		Northern Delaware [a]	Delaware [b]		Southern NJ MD - Delaware [a]	Eastern U.S Geometric Mean
				0-2 ft	2-4 ft		Mean	SD		
Metals, mg/kg										
Aluminum	19/19	4,990 - 15,600	10,441	10,200	10,700	30,000	--	--	700-30,000	--
Antimony	4/19	<4.3 - 7.9	3.3	<4.3	<4.3	<1	--	--	<1	--
Arsenic	18/19	<0.2 - 8.9	3.1	5.7	1.2	<0.1-2.6	--	--	19-41 [e]	--
Barium	19/19	19.6 - 217	85	120	44.3	500	--	--	10-300	300
Beryllium	14/19	<0.21 - 3.3	0.4	0.73	0.57	<1	--	--	<1	--
Calcium	19/19	175 - 26,500	6,268	3,240	175	130-2,300	--	--	130-5,200	--
Chromium	19/19	9.6 - 58.4	21	25	11.6	50	--	--	1-30	36
Cobalt	19/19	4.1 - 21	9.3	6.8	6.8	3-5	--	--	<3	7
Copper	19/19	2.3 - 54	25	39.8	6.0	<1-10	5	2.2	<1-20	14
Iron	19/19	8,820 - 28,800	16,272	23,800	12,000	<7,000	--	--	100-10,000	15,000
Lead	19/19	6.1 - 100	29	66.3	7.5	20	10	2	<10-20	14
Magnesium	19/19	365 - 14,050	4,101	3,660	733	0-1,500	--	--	50-3,000	--
Manganese	19/19	61.4 - 573	195	198	199	150	--	--	<2-300	285
Mercury	15/18 #	<0.11 - 3.9	0.2	<0.11	<0.11	0.051	--	--	<0.01-0.013	--
Nickel	17/19	<6.1 - 365	47	22.8	<5.8	7-10	6.6	4.4	<5-10	13
Potassium	12/19	<288 - 4,400	1,165	2,310	657	16,000	--	--	2,200-11,000	--
Sodium	6/19	<315 - 781	256	366	407	3,000-5,000	--	--	<500-5,000	--
Vanadium	19/19	16.5 - 48	28	43.7	20.8	30-60	--	--	<7-50	46
Zinc	19/19	17 - 329	75	78.9	23.1	62 [c]	25	9	<5-196 [c]	36
Cyanide	2/19	<0.28 - 0.59	0.3	<0.66	<0.56	--	--	--	--	--
Pesticides, ug/kg										
beta-BHC	3/18	<8.4 - 37	8.2	<9.3	<9.3	--	--	--	--	--

* Number of detected values over the total number of samples taken

** In calculating averages, one-half the detection limit was used for non-detects to represent a conservative estimate of the risk. Duplicate samples were averaged prior to use.

SD Standard deviation

-- Data not available

Quality control indicates that the mercury data for sample S14(0-1)-S is unusable.

EPA split samples were not included as part of this summary.

a Shacklette & Boerngen, 1984. Element Concentrations in Soils and other Surficial Materials of the Conterminous United States.

b Logan, T.G. and Ryan, J.A., 1987. Land Application of Sludge. Lewis Publishers, Chelsea, MI.

c Pennsylvania State University, 1985. Criteria and Recommendations for Land Application of Sludges in the Northeast. Bulletin 851, March 1985.

d USEPA, 1986. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water - Part 1. EPA/600/6-85/002a. September 1985 Revised.

e USEPA, 1984. Health Assessment Document for Inorganic Arsenic. EPA-600/8-83-021F. March 1984.

Compiled by: BCM Engineers Inc. (BCM Project No. 00-6018-03)

TABLE 2

FREQUENCY OF DETECTION FOR GROUNDWATER SAMPLES AND COMPARISON TO BACKGROUND CONCENTRATIONS

SEALAND LIMITED SITE
MT. PLEASANT, DELAWARE

Data Summary	SITE SPECIFIC				
	Frequency of Detection* [ ]	Range	Arithmetic Average **	Background	
				MW1	MW2***
Metals, Filtered, ug/l					
Aluminum	3/10 [2]	<16 - 217	39.5	<16	103
Antimony	1/10 [1]	<21 - 24	11.2	<21	17.3
Barium	10/10 [3]	50 - 149	84.1	142	69.9
Beryllium	1/10 [1]	<1.0 - 2	0.6	<1.0	<1.0
Calcium	10/10 [0]	13,600 - 67,000	39,760	47,500	35,200
Chromium	1/10 [1]	<5 - 6.6	2.8	<5	4.6
Cobalt	2/10 [2]	<3 - 56.8	7.6	<3	14.1
Copper	2/10 [2]	<4 - 70.4	9.4	<4	<4
Iron	6/10 [3]	<4 - 39,400	4,957	553	<4
Magnesium	10/10 [2]	3,230 - 21,000	10,299	3,450	8,495
Manganese	10/10 [4]	17.8 - 7,440	1,149	44	61
Nickel	3/10 [1]	<29 - 789	98.1	<29	32.8
Potassium	10/10 [3]	2,180 - 10,000	5,029	3,720	2,875
Sodium	10/10 [1]	4,460 - 47,800	20,003	4,840	28,700
Vanadium	2/10 [2]	<2 - 29.3	1.0	<2	<2
Zinc	5/10 [1]	<1 - 1440	166.3	9	49
Cyanide	2/4 [-]	<10 - 25.7	13.8	<10	NT
Metals, Unfiltered, ug/l					
Aluminum	6/6	23.5 - 2190	618.8	NT	216
Barium	6/6	35.6 - 90.2	58.6	NT	52.4
Beryllium	2/6	<1.0 - 2.1	0.9	NT	<1
Calcium	6/6	10700 - 56800	33033.3	NT	27650
Chromium	2/6	<5.0 - 7.3	3.8	NT	6.9
Cobalt	1/6	<3.0 - 51.9	9.9	NT	12.7
Copper	2/6	<4.0 - 52.4	11.2	NT	7.2
Iron	6/6	4.2 - 45000	8942.6	NT	142
Lead	4/6	<4.0 - 5.9	3.0	NT	<2
Magnesium	6/6	2470 - 18000	10315.8	NT	6500
Manganese	6/6	23.1 - 6630	1352.3	NT	52.6
Nickel	1/6	<0.2 - 572	107.4	NT	0.38
Potassium	5/6	<1260 - 10600	84	NT	1290
Sodium	6/6	6420 - 39800	22425.8	NT	21880
Vanadium	3/6	<2.0 - 55.2	12.3	NT	<2
Zinc	5/6	27.6 - 1350	239.0	NT	51.6
Cyanide	6/6	10.3 - 17.2	12.2	NT	13.4

TABLE 2

FREQUENCY OF DETECTION FOR GROUNDWATER SAMPLES AND
COMPARISON TO BACKGROUND CONCENTRATIONS

SEALAND LIMITED SITE
MT. PLEASANT, DELAWARE

Data Summary	SITE SPECIFIC				
	Frequency of Detection* [ ]	Range	Arithmetic Average **	Background	
				MW1	MW2***
Volatile Organic Compounds, ug/l					
Benzene	1/7	<5 - 2 ϕ	2.4	<5	<5
Methylene Chloride	2/7	<5 - 11	3.5	<5	<5
Total Xylenes	1/7	<5 - 3 ϕ	2.2	<5	<5
Semivolitale Organics, ug/l					
bis(2-Ethylhexyl) Phthalate	1/10	<10 - 2 ϕ	4.7	<10	<10
Napthalene	2/10	<10 - 4 ϕ	4.8	<10	<10

NT Not tested
* Number of detected values over the total number of samples taken.
** In calculating averages, one-half the detection limit was used for non-detects to represent a conservative estimate of the risk. Duplicate samples were averaged prior to use.
*** Value represents an average of duplicate samples.
[ ] The number of detects which are twice the background
ϕ Detected value was estimated below the quantitation limit.
Data questioned by data validation was considered to be below detection.

Compiled by : BCM Engineers Inc. (BCM Project No. 00-6018-03)

TABLE 3

ASSUMPTIONS USED IN CALCULATING EXPOSURE

SEALAND LIMITED SITE
MT. PLEASANT, DELAWARE

		Reference
INGESTION OF SOIL		
Current Use		
Ingestion Rate (mg/day)	100	EPA, 1989c
Body Weight (kg) - Child	32	EPA, 1989b
Exposure Frequency (days/year)	100	Site Specific
Exposure Duration (years)	4	Site Specific
Future Use		
Ingestion Rate (mg/day)	100	EPA, 1989c
Body Weight (kg) - Adult	70	EPA, 1989c
Exposure Frequency (days/year)	120	Site Specific
Exposure Duration (years)	1	Site Specific
DERMAL ABSORPTION FROM SOIL		
Current Use		
Skin surface area (sq. cm)- Child	4,970	EPA, 1989b
Skin adherence factor (mg/sq. cm)	2.77	EPA, 1986g
Absorption factor (percent)	1.8	EPA, 1988
Exposure frequency (events/year)	100	Site Specific
Exposure duration (years)	4	Site Specific
Body weight (kg) - Child	32	EPA, 1989c
Future Use		
Skin surface area (sq. cm) - Adult	3,120	EPA, 1989b
Skin adherence factor (mg/sq. cm)	2.77	EPA, 1986g
Absorption factor (percent)	0.9	EPA, 1988
Exposure frequency (events/year)	120	Site Specific
Exposure duration (years)	1	Site Specific
Body weight (kg) - Adult	70	EPA, 1989c

Compiled by: BCM Engineers Inc. (BCM Project No. 00-6018-03)

TABLE 4

CANCER RISK ESTIMATES - CURRENT USE

SEALAND LIMITED SITE
MT. PLEASANT, DELAWARE

Chemical	CDI (mg/kg-day)	Slope Factor	Weight of Evidence	Chemical Specific Risk	Total Exposure Pathway
Exposure Pathway: Ingestion of Soil					
Benzo(a)anthracene	4.9E-11	3.22	B2	2E-10	
Chrysene	2.4E-10	3.22	B2	8E-10	
bis(2-Ethylhexyl)phthalate	8.1E-09	0.014	B2	1E-10	
Benzo(b)fluoranthene	2.6E-09	3.22	B2	9E-09	
Benzo(a)pyrene	7.8E-09	3.22	B2	3E-08	
Ideno(1,2,3-cd)pyrene	8.8E-10	3.22	B2	3E-09	
Dibenzo(a,h)anthracene	9.0E-09	3.22	B2	3E-08	
Nitrosodiphenylamine *	8.1E-09	0.0049	B2	4E-11	
					7E-08
Exposure Pathway: Dermal Absorption of Contaminants					
Benzo(a)anthracene	1.2E-10	3.22	B2	4E-10	
Chrysene	6.1E-10	3.22	B2	2E-09	
bis(2-Ethylhexyl)phthalate	2.0E-08	0.014	B2	3E-10	
Benzo(b)fluoranthene	6.5E-09	3.22	B2	2E-08	
Benzo(a)pyrene	1.9E-08	3.22	B2	6E-08	
Ideno(1,2,3-cd)pyrene	2.2E-09	3.22	B2	7E-09	
Dibenzo(a,h)anthracene	2.2E-08	3.22	B2	7E-08	
Nitrosodiphenylamine*	2.0E-08	0.0049	B2	1E-10	
					2E-07
				TOTAL EXPOSURE	3E-07

* Detected once in EPA split samples

Compiled by: BCM Engineers Inc. (BCM Project No. 00-6018-03)

TABLE 5

CANCER RISK ESTIMATES - FUTURE USE

SEALAND LIMITED SITE
MT. PLEASANT, DELAWARE

Chemical	CDI (mg/kg-day) RME	Slope Factor	Weight of Evidence	Chemical Specific Risk	Total Exposure Pathway
Exposure Pathway: Ingestion of Soil					
Benzo(a)anthracene	4.0E-11	3.22	B2	1E-10	
Chrysene	2.5E-10	3.22	B2	8E-10	
bis(2-Ethylhexyl)phthalate	1.2E-09	0.014	B2	2E-11	
Benzo(b)fluoranthene	2.0E-09	3.22	B2	6E-09	
Benzo(a)pyrene	1.3E-08	3.22	B2	4E-08	
Ideno(1,2,3-cd)pyrene	1.1E-09	3.22	B2	4E-09	
Dibenzo(a,h)anthracene	3.6E-09	3.22	B2	1E-08	
Nitrosodiphenylamine *	2.5E-09	0.0049	B2	1E-11	
					7E-08
Exposure Pathway: Dermal Absorption of Contaminants					
Benzo(a)anthracene	3.9E-11	3.22	B2	1E-10	
Chrysene	2.4E-10	3.22	B2	8E-10	
bis(2-Ethylhexyl)phthalate	1.2E-09	0.014	B2	2E-11	
Benzo(b)fluoranthene	1.9E-09	3.22	B2	6E-09	
Benzo(a)pyrene	1.3E-08	3.22	B2	4E-08	
Ideno(1,2,3-cd)pyrene	1.1E-09	3.22	B2	4E-09	
Dibenzo(a,h)anthracene	3.5E-09	3.22	B2	1E-08	
Nitrosodiphenylamine *	2.4E-09	0.0049	B2	1E-11	
					6E-08
				TOTAL EXPOSURE	1E-07

* Detected once in EPA split samples

RME - Reasonable Maximum Exposure is defined as the upper bound 95 percent confidence interval of the most probable concentration

Compiled by: BCM Engineers Inc. (BCM Project No. 00-6018-03)

TABLE 6

CHRONIC HAZARD INDEX ESTIMATES - CURRENT USE

SEALAND LIMITED SITE
MT. PLEASANT, DELAWARE

Chemical	CDI (mg/kg/day)	RfD (mg/kg-day)	Hazard Index	Pathway Hazard Index
Exposure Pathway: Ingestion of Soil				
Benzoic Acid	1.5E-06	4	0.0000004	
Mercury	1.1E-07	0.0003	0.0004	
Nickel	2.9E-06	0.02	0.001	
Naphthalene	4.7E-08	0.004	0.00001	
Acenaphthene	1.4E-07	0.06	0.000002	
Anthracene	1.4E-07	0.3	0.0000005	
Fluoranthene	1.8E-07	0.04	0.000004	
Pyrene	1.4E-07	0.03	0.000005	
Phenol	2.8E-07	0.6	0.0000005	
4-Methyl phenol	1.4E-07	0.05	0.000003	
Fluorene	1.4E-07	0.04	0.000004	
bis(2-Ethylhexyl)phthalate	1.4E-07	0.02	0.000007	
Di-n-butyl phthalate *	1.4E-07	0.1	0.000001	
				0.002
Exposure Pathway: Dermal Absorption of Contaminants				
Benzoic Acid	3.6E-06	4	0.000001	
Mercury	2.6E-07	0.0003	0.0009	
Nickel	7.1E-06	0.02	0.004	
Naphthalene	1.2E-07	0.004	0.00003	
Acenaphthene	3.5E-07	0.06	0.000006	
Anthracene	3.5E-07	0.3	0.000001	
Fluoranthene	4.5E-07	0.04	0.00001	
Pyrene	3.4E-07	0.03	0.00001	
Phenol	7.0E-07	0.6	0.000001	
4-Methyl phenol	3.5E-07	0.05	0.000007	
Fluorene	3.5E-07	0.04	0.000009	
bis(2-Ethylhexyl)phthalate	3.5E-07	0.02	0.00002	
Di-n-butyl phthalate *	3.5E-07	0.1	0.000004	
				0.005
			TOTAL EXPOSURE	0.007

* Detected once in EPA split samples

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