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## 1.0 INTRODUCTION

### 1.1 Site Background Information

The Drake Chemical Site is located in Lock Haven, Clinton County, Pennsylvania, as shown on Figure 1-1. The eight-acre site, shown on Figure 1-2, is inactive and contains six major buildings, including former offices, production facilities, and a wastewater treatment building. Inside and surrounding the process buildings are approximately 60 process tanks and reactors. Outside these buildings are approximately 10 large tanks that were used for bulk storage of acids, bases, and fuel oils. Also located on site are two lined wastewater treatment lagoons, an unlined lagoon (leachate lagoon) from which a leachate stream originates, a second small unlined lagoon (canal lagoon), and an unlined sludge lagoon. Chemical sludge covers or underlays much of the open area on site and was detected as deep as 20 feet below the ground surface. Drums and bulk waste may also be buried at the site. Construction debris is strewn about the site.

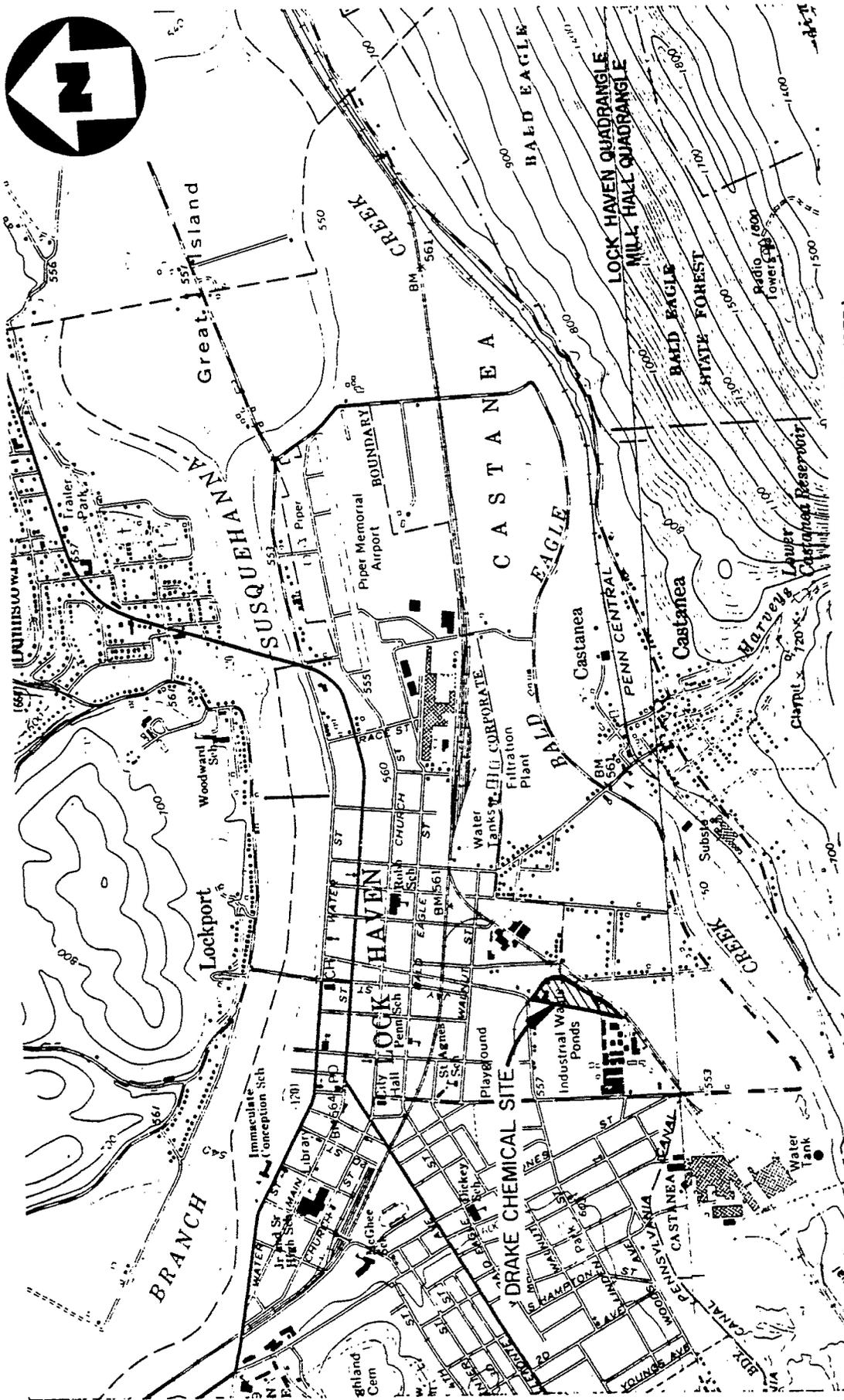
The Drake Chemical Site is bounded on the west by the American Color and Chemical Company. An apartment complex, a shopping center, and Castanea Township Park are located within 1/4 mile of the site. Bald Eagle Creek is located less than 1/2 mile south of the site, and the West Branch of the Susquehanna River is located approximately 3/4 mile north of the site. A leachate stream originates at the leachate lagoon and flows through Castanea Township Park to Bald Eagle Creek.

Drake Chemical, Inc., purchased the site in 1962. Site use before 1962 is not completely known, but it is reported that the site was used for the production of chemicals. Aerial photographs show that tanks, buildings, and a lagoon were located on the site between 1951 and 1959. By 1963, there was further development of the site as a lagoon area. Nearly the entire site appeared as standing water, apparently an unlined lagoon. Also, a new building was present along with some scattered debris, as indicated on aerial photographs taken in 1963.

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BASE MAP IS A PORTION OF THE U.S.G.S. LOCK HAVEN, PA. QUADRANGLE (7.5 MINUTE SERIES, PHOTO REVISED 1973), AND THE MILL HALL, PA. QUADRANGLE (7.5 MINUTE SERIES, 1965). CONTOUR INTERVAL 20', EXCEPT AS NOTED.

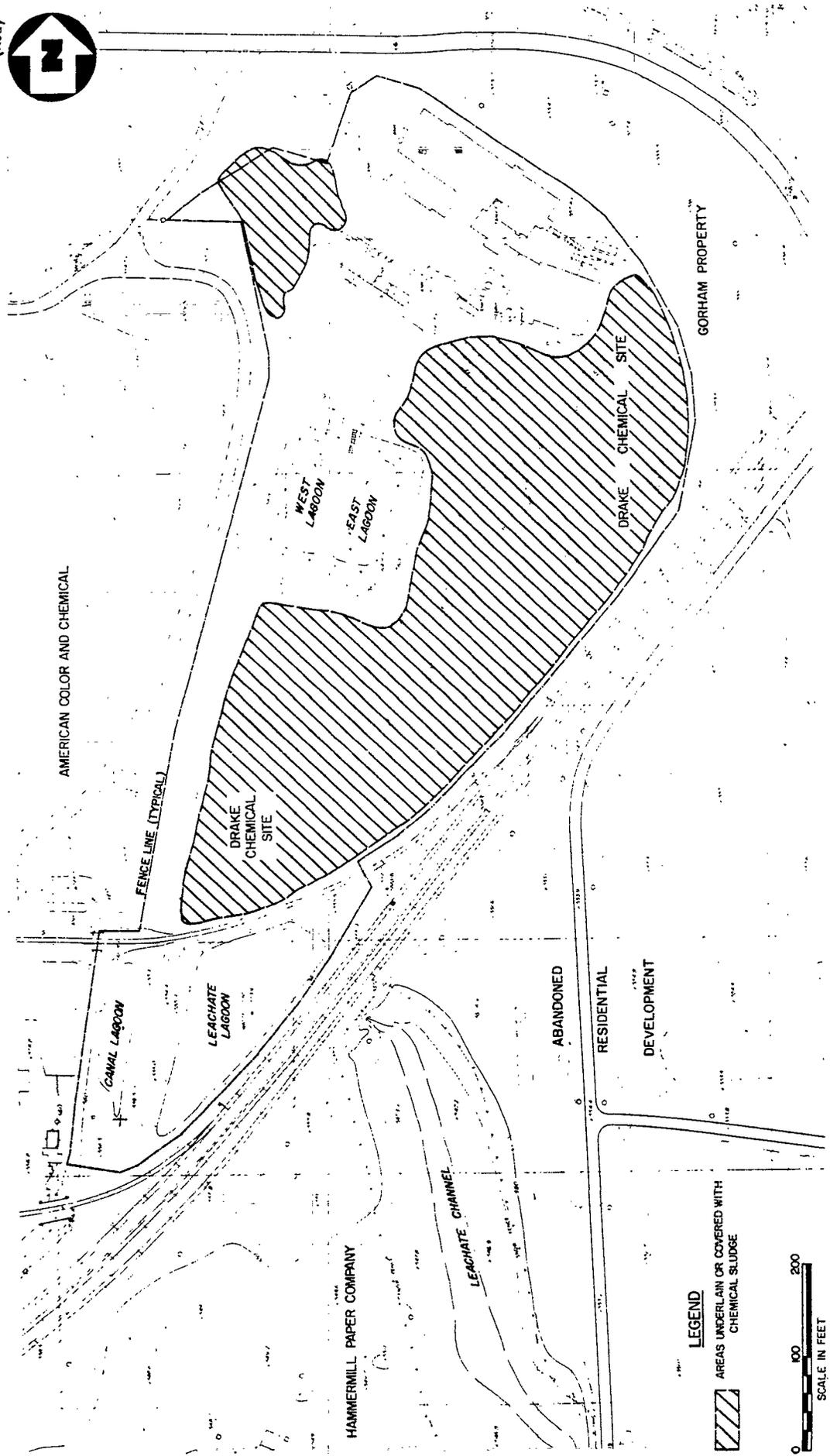
**LOCATION MAP**  
**DRAKE CHEMICAL, INC. SITE, LOCK HAVEN, PA**

SCALE: 1"=2000

FIGURE 1-1



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**LEGEND**  
 AREAS UNDERLAIN OR COVERED WITH CHEMICAL SLUDGE



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FIGURE 1-2



GENERAL ARRANGEMENT  
 DRAKE CHEMICAL, INC. SITE, LOCK HAVEN, PA

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The majority of the areas of standing water present on site in 1963 have since been filled with debris and used for waste disposal operations.

The early production history at Drake Chemical, Inc., is unclear, but the facility had been involved for many years in the manufacture of batches of specialty, intermediate chemicals for producers of dyes, pharmaceuticals, cosmetics, herbicides, and pesticides. The organic compound 2,3,6-trichlorophenylacetic acid (Fenac\*), a herbicide, was manufactured at the plant and is a major site contaminant. The chemical products were produced using the processes of chlorination, cyanation, sulfonation, and amination. Most processes at Drake Chemical, Inc., were not highly automated and required hand charging of chemicals into reactor vessels. Many waste streams produced during the various manufacturing processes were either treated or placed directly in drums and stored on site. Much of the former lagoon area on site was filled with treated and untreated process wastes and sludges, along with demolition debris and other miscellaneous fill materials.

Drake Chemical, Inc., was cited several times between 1973 and 1982 for violations of environmental and health and safety regulations. After Drake Chemical, Inc., failed to respond to a request for voluntary cleanup, the United States Environmental Protection Agency (EPA), began emergency cleanup activities at the site on February 28, 1982. During the emergency cleanup, surface drums and sludges and liquids from process and storage tanks were removed from the site. A fence was also erected around the site. The cleanup was completed on April 21, 1982. The Environmental Response Team (ERT) of EPA performed an Extent of Contamination (EOC) Study in March 1982, which focused on the area around the leachate stream. The results of this study were presented in the Phase I Remedial Investigation (RI) report.

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\* Fenac is registered under a British patent to Union Carbide Agricultural Products Company, Inc.

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In August 1982, the EPA requested remedial action studies of the Drake Chemical Site. These studies included the preparation of a Work Plan for a Remedial Investigation and Feasibility Study (RI/FS) by the Remedial Planning Office (REMPO) of NUS Corporation (May 1983), a Toxicological Impact Assessment by the Region III Field Investigation Team (FIT) of NUS Corporation (September 1983), a Phase I RI Report on the leachate stream by the REMPO of NUS Corporation (July 1984), a Phase I Feasibility Study of Alternatives Report on the leachate stream by the REMPO of NUS Corporation (August 1984), and a Draft Phase II RI Report on the remainder of the site by the REMPO of NUS Corporation (January 1985).

## 1.2 Hydrogeology

The hydrogeology of the site consists of saturated alluvial deposits overlying fractured bedrock. The bedrock and overlying deposits are hydraulically connected, forming the unconfined aquifer in the area. In the southern part of the site, a perched water table was found. This condition is caused by a greater depth of silt in this area than is commonly found across the site. This silt has a low hydraulic conductivity. The existence of the perched zone was determined by the evaluation of water levels in monitoring wells screened in both the perched zone and in the unconfined aquifer.

The depth to groundwater is approximately 10 to 15 feet, except in the area of the perched water table, where it is approximately 5 feet. The groundwater elevation varies seasonally with the amount of precipitation and the elevation of Bald Eagle Creek, which is prone to flooding. Groundwater flow direction, regionally and across the site, is east to southeast, eventually discharging into Bald Eagle Creek or the West Branch of the Susquehanna River.

## 1.3 Nature and Extent of Problems

Most sludges and liquids from process and storage tanks have been removed, as have surface drums, but several potential sources of contamination still remain on

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site. Chemical sludge covers or underlies much of the open area on site and was detected as deep as 20 feet below the ground surface. The onsite lagoons remain, as well as buildings, debris, and tanks, many of which contain residue of former tank contents.

Fenac appears to be the major site contaminant, although a wide variety of contaminants were detected at widely varying concentrations. Fenac was detected in groundwater, soil, lagoon liquid and sediment, the leachate stream, and building and debris samples.

A wide range of organic and inorganic chemicals was detected in both onsite and offsite groundwater. In some cases, groundwater from wells located on property adjacent to and northeast of the site had higher concentrations of many contaminants than groundwater from onsite monitoring wells. Groundwater from offsite areas east of the site, on the other side of Route 220, does not appear to be affected by contaminant migration. A few organic chemicals were detected in offsite wells near the site that were not detected in onsite wells.

Water and sediment in the two lined wastewater treatment lagoons are contaminated with metals, Fenac, and other organic compounds. The water is also acidic.

In soil samples, Fenac was found to be a good indicator of contamination. Where Fenac concentrations are elevated, other chemical concentrations are elevated. The opposite also appears to be true (where Fenac concentrations are low, so are other chemical concentrations). Onsite surface and subsurface soils appear to be highly contaminated, especially in the sludge disposal areas. Offsite surface soils appear to be contaminated in those areas which receive surface water runoff from the site. The Fenac detected in offsite, subsurface soils appears to be connected with Fenac-contaminated groundwater. Fenac contamination in these subsurface soils exists only in those samples that were taken from below the groundwater table.

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Beta-naphthylamine, a known human carcinogen, was detected in sludge on site at depths of 5 and 12 feet in one boring.

A wide range of organic compounds were detected in the building samples and debris samples at concentrations that varied from part-per-billion to percent levels. Fenac was detected in all but four of the building samples and debris samples that were analyzed for Fenac. Beta-naphthylamine was detected in one building in samples from process equipment such as ovens, tanks, and a filter press.

Air sampling results indicated no significant hazards from volatile organic contaminant vapors at the site boundary.

#### 1.4 Public Health and Environmental Concerns

Groundwater was found to be contaminated. It is not a source of potable water and poses only a low, direct contact exposure risk in those areas near the site where it may discharge to surface water. Groundwater from monitoring wells in offsite areas away from the site does not appear to be contaminated.

Present impacts of the lined lagoons on site are negligible, except from direct contact. Potential impacts could arise in the event of flood, lagoon overflow, or liner failure.

Of greater importance was the widespread soil and building contamination. Compounds detected represent significant potential for continued degradation of groundwater and possible offsite surface migration of contaminants. The greatest risks to human health are associated with direct contact with the contaminants, many of which are highly toxic or carcinogenic.

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### 1.5 Objectives of Remedial Action

The objective of remedial action at the Drake Chemical Site is to reduce or eliminate exposure pathways by which contaminants may reach potential receptors. The exposure pathways of most concern are as follows:

- Direct contact with contaminated areas on site
- Potential migration of contamination via surface water, sediment transport, and air
- Potential migration of contamination via groundwater, in terms of restrictions on future usage, and discharge of contaminants into local streams.

General response actions and associated remedial technologies will be developed to meet the stated objectives.

An initial screening of technologies is required in order to reject infeasible or inappropriate technologies from consideration. Remaining technologies will be selected for possible combination into remedial action alternatives. The remedial action alternatives will then undergo a detailed evaluation to determine their effectiveness and cost.

To guide final selection, future site use will be assumed to be restricted to non-farming, non-industrial, and non-residential purposes unless all contaminated materials are removed from the site. No structures of any kind will be considered as part of ultimate use.

## 2.0 SCREENING OF REMEDIAL ACTION TECHNOLOGIES

A two-phase process has been used to develop appropriate Remedial Action Alternatives for the Drake Chemical Site. In the first phase, an initial screening of feasible technologies was performed to eliminate infeasible, inappropriate, or environmentally unacceptable remedial technologies. The remedial technologies that were identified as feasible or applicable to the site were then combined into Remedial Action Alternatives. During the second phase, a detailed analysis was performed on the Remedial Action Alternatives to identify related cost and non-cost criteria. The purpose of this chapter is to present the initial screening methodology, the feasible remedial technologies, and the objectives of Remedial Action Alternatives development.

Feasible remedial technologies for the Drake Chemical Site have been identified by screening general response actions for application to site problems and by evaluating site-specific information obtained during the Remedial Investigation (RI). Each general response action consists of one or more associated technologies that are also considered for site applicability. The Drake Chemical Site general response actions and associated technologies are presented in Table 2-1.

The technologies were then studied and reviewed in depth using the following criteria:

- Technical
- Environmental/Public Health
- Institutional
- Cost

Feasible remedial technologies that remain after this screening process are then combined into Remedial Action Alternatives that can be applied to the remediation of the Drake Chemical Site.

TABLE 2-1  
PRELIMINARY SCREENING OF TECHNOLOGIES  
DRAKE CHEMICAL SITE  
PAGE TWO

| General Response Actions and Associated Remedial Technologies   | Applicable  | Excluded   | Comments   |
|---|---|--|--|
| 5. Diversion<br>a. Grading and Revegetation<br>b. Dikes and Levees<br>c. Diversion Ditches, Trenches<br>d. Benches, Chutes                                | <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>                       | <ul style="list-style-type: none"> <li>•</li> </ul>            | <ul style="list-style-type: none"> <li>a. Applicable with capping, landfilling, and for general site improvement.</li> <li>b. Applicable for runoff diversion and flood protection.</li> <li>c. Applicable for control of surface runoff.</li> <li>d. Not applicable because of site characteristics.</li> </ul>   |
| 6. Complete Removal<br>a. Soils and Sludges, Drums, Sediments, Liquid Wastes<br>b. Tanks, Buildings, Debris, Sewers, and Water Lines                      | <ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>                                  | <ul style="list-style-type: none"> <li>•</li> </ul>            | <ul style="list-style-type: none"> <li>a. These materials can be completely removed from the site.</li> <li>b. These materials can be completely removed from the site.</li> </ul>   |
| 7. Partial Removal<br>(Same as General Response Action 6)   | <ul style="list-style-type: none"> <li>•</li> </ul>   | <ul style="list-style-type: none"> <li>•</li> </ul>            | Applicable only if site characteristics preclude complete removal.   |
| 8. Onsite and Offsite Treatment<br>a. Incineration<br>b. Solidification<br>c. Land Treatment<br>d. Biological Treatment<br>e. Physical/Chemical Treatment | <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul> | <ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul> | <ul style="list-style-type: none"> <li>a. Applicable for onsite and offsite incineration.</li> <li>b. Not applicable because of site and waste characteristics.</li> <li>c. Not applicable because of site and waste characteristics.</li> <li>d. Onsite treatment applicable for aqueous wastes.</li> <li>e. Onsite treatment applicable for aqueous wastes.</li> </ul> |

TABLE 2-1  
PRELIMINARY SCREENING OF TECHNOLOGIES  
DRAKE CHEMICAL SITE  
PAGE THREE

| <u>General Response Actions and Associated Remedial Technologies</u> | <u>Applicable</u> | <u>Excluded</u> | <u>Comments</u>                             |
|--|-------------------|-----------------|---|
| 9. Storage   | •                 |                 | Temporary storage during construction only. |
| 10. Offsite Disposal   | •                 |                 | Applicable to this site.                    |
| 11. Onsite Disposal  | •                 |                 | Applicable to this site.                    |
| 12. Alternative Drinking Water Supply                                |                   | •               | Not applicable to this site.                |
| 13. Relocation   |                   | •               | Not applicable to this site.                |

The results and methodology of the technology screening process are discussed in the following narratives.

## 2.1 No Action

The purpose of reviewing the no-action alternative is to estimate the effect of not performing additional remedial actions at the site.

### 2.1.1 Monitoring and Analysis

Under the no-action alternative, additional remedial activities would not be performed. However, a long-term monitoring program could be established to provide information to help identify and detect possible adverse public health or environmental effects.

The no-action alternative, with monitoring and analysis, does not address the remediation of the buildings, sludges and contaminated soils, and groundwater, nor does it address the potential threat to the environment or public health via the associated contamination pathways.

The potential for future groundwater contamination resulting from onsite wastes would still remain. The potential for contamination migration via surface water runoff from the site would continue, and the potential for direct contact with onsite wastes would not be addressed. There is also the possibility of offsite migration via airborne particulates. The risk assessment presented in the Phase II RI Report should be consulted for a detailed presentation of the risks associated with the no-action alternative.

Monitoring of surface water and groundwater is proposed only as a means of monitoring and identifying future problems, not as a sole remediation action. Based on comparison of the results of monitoring and pre-established criteria, remedial actions can be taken if required.

The monitoring and analysis technologies are retained for further evaluation, but are limited in fulfilling the environmental, public health, and institutional criteria.

## 2.2 Containment

### 2.2.1 Capping

Capping technologies are used to minimize infiltration, to reduce offsite transport of exposed waste materials, and to minimize the potential for direct contact with contaminants. Capping can involve the installation of an impermeable barrier or compacted soil zone over the wastes and can include an overlying layer of topsoil and vegetation cover to protect the cap. Excavation and/or regrading of some of the material in preparation for capping is often required.

Possible capping materials include the following:

- Synthetic membranes
- Clay
- Polyurethane foam
- Resins
- Sprayed bituminous membrane
- Soil
- Soil additives and cements

Synthetic membranes and clay have been used extensively as capping materials with positive, reliable results. Disadvantages may exist with respect to material availability, costs, and extended exposure/deterioration, but these capping materials will be retained for further evaluation because of their positive effects and wide usage.

Cap materials such as polyurethane foam and resins are engineering concepts that have not had widely practiced, site-specific applications. Their ability to meet the

needs of this site is questionable; therefore, they are not considered to be feasible at this site.

Sprayed bituminous membranes, such as asphalt, are susceptible to cracking and subsidence actions and thereby reduce the effectiveness of the cap, due to increased potential for infiltration. Special handling and application procedures are required, which can increase the cost for this type of cap. Sprayed bituminous membranes are eliminated from further consideration based on their potential inability to minimize infiltration.

Compacted soil caps are similar to clay caps, except that a soil cap may be more permeable than a clay cap. A soil cap is an effective means of covering exposed wastes, reducing infiltration rates, and reducing offsite transport of hazardous substances. The soil cap material option is retained for further evaluation because of its ability to reduce infiltration, contaminant migration, and receptor contact.

Soil additives are not applicable at this site because the existing cover is generally either contaminated soil or exposed sludge material. Soil additives are effective in cases where clean soils are abundant but too permeable for use as capping materials. Caps made with soil additives are also susceptible to cracking and deterioration. The cost of soil additives is usually greater than the cost of more effective capping materials such as clays, soils, or synthetics.

The following types of caps, or combinations thereof, are retained for further consideration based on technical criteria:

- Synthetic membranes
- Clay
- Compacted soil

Capping isolates wastes from contact with the atmosphere and the public. Capping will protect public health by reducing the potential for direct contact with contaminated materials. It will also reduce or eliminate the potential for offsite

migration of contaminated materials via surface water runoff and subsequent transport.

According to the requirements of the Resource Conservation and Recovery Act (RCRA), caps must be designed and constructed to provide long-term minimization of migration of liquids through the closed site, function with minimum maintenance, promote drainage and minimize erosion of the cover, accommodate settling and subsidence to maintain the cover's integrity, and have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils (40 CFR 264.310). EPA has published various Technical Resource Documents identifying the types of capping procedures and materials that will meet the requirements. These will be considered in the design of Remedial Action Alternatives that use the capping remedial technology.

#### 2.2.2 Groundwater Barrier Walls

Impermeable barriers can be used to divert groundwater flow around a waste disposal area or to contain contaminated groundwater emanating from a waste site. Groundwater controls considered for installation at the Drake Chemical Site included (1) impermeable barriers upgradient of the site, (2) impermeable barriers downgradient of the site, and (3) impermeable barriers completely surrounding the site. Various methods and materials considered for use in constructing impermeable groundwater barriers include the following:

- Slurry walls
  - Soil/bentonite
  - Cement/bentonite
- Sheet piling
- Gel injection
- Grout curtain
- Vibrating beam

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The subsurface conditions at the Drake Chemical Site, however, are not well suited for the installation of groundwater barrier walls. Groundwater barriers are designed to intersect with an impervious layer (clay or bedrock) in order to stop or impede groundwater flows. The lithology of the Drake Chemical Site consists of layers of clayey to sandy silt, which increase in grain size and permeability with depth. The remaining lithology consists of a sand and gravel underlain by sandstone fragments and a fractured shale. The shale is partially replaced by alluvial materials in the direction of Bald Eagle Creek. None of the lithologies encountered are considered to be impervious layers. Groundwater barrier walls are thus not applicable to the site and are eliminated from further evaluation.

### 2.2.3 Gas Barriers

Barriers against the migration of gases and vapors are employed in a number of ways at waste disposal sites, usually in conjunction with other remedial measures. An effective barrier against gas flow must consist of a material with low gas permeability. Materials found to prevent gas migration include compacted clay, concrete slurry walls, gunite, and synthetic liners.

Based on the results of the RI at the Drake Chemical Site, gas or vapor generation is not a problem at the site. Therefore, gas barrier technologies are eliminated from further consideration.

## 2.3 Pumping

### 2.3.1 Groundwater Pumping

Groundwater pumping technology can be used to lower a water table, contain and collect a contaminant plume, extract groundwater contaminants, and, when coupled with treatment systems designed for specific groundwater contamination problems, used for groundwater reinjection or offsite discharge.

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Groundwater pumping is commonly used to lower the water table in a particular area. The combined cones of depression from multiple extraction wells can be designed to lower the elevation of the groundwater. Specific applications include the following:

- Lowering the water table so that it is not in direct contact with below-ground wastes.
- Lowering an unconfined aquifer so that contaminated groundwater does not discharge to a receiving stream that is hydraulically connected.

The first application listed, lowering the water table so it does not contact buried wastes, is the design most applicable to the Drake Chemical Site.

Groundwater, at times, discharges to the leachate stream and to Bald Eagle Creek. The proposed alternative for the leachate stream (Phase I Feasibility Study) will reduce the potential for groundwater discharge to the leachate stream. Bald Eagle Creek does not appear to be adversely affected by the discharge of groundwater. Thus, the second application listed above is not applicable to this site.

Groundwater pumping can be used to contain a contaminant plume. Specific applications include

- Use of extraction and injection wells that will allow groundwater within the plume to be pumped, treated, and pumped back into the aquifer.
- Low rates of pumping to contain a plume with no subsequent recharge to the aquifer.
- Pumping and treatment of the plume followed by recharge using recharge basins.

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All three of the above applications may be applicable to the Drake Chemical Site. Subsurface conditions and aquifer characteristics will determine the amount of groundwater that can be extracted.

Groundwater treatment systems can be used in conjunction with pumping to lower a water table or to contain a contaminated plume. The use of reinjection after treatment can also be considered to help dilute contamination in parts of the aquifer not being pumped.

Lowering of the water table by groundwater pumping, with or without subsequent treatment, can prevent further groundwater contamination by eliminating contact with buried wastes and further contaminant migration via the groundwater by containing a contaminated plume.

Permits may be required to discharge extracted water to surface waters or to a publicly owned treatment works (POTW).

### 2.3.2 Liquid Removal

Liquid removal refers to dewatering surface impoundments, lagoons, and/or tanks by using pumps or vacuum trucks. At the Drake Chemical Site, this technology can be used to remove liquids from the lined lagoons and the leachate lagoon area. This will remove the threat of contaminant migration from seepage from unlined lagoons or from overtopping, should the lagoons overflow or if the site is flooded.

Removed liquid can be treated on site, hauled off site for treatment or disposal, or discharged to the local sewer system with pretreatment depending on the contaminant levels and chemical characteristics.

### 2.3.3 Dredging

Remedial technologies for contaminated sediments generally involve removal and subsequent disposal of the sediments. Sediment removal methods include well-

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established excavation and dredging techniques. Mechanical dredging is discussed later in this section under "Complete Removal." This subsection refers to low-turbidity hydraulic dredging.

Low-turbidity dredging operations are required for contaminated sediments in deep bodies of water or in water with any appreciable flow. Low-turbidity dredging is any hydraulic dredging operation that uses special equipment or techniques to minimize the re-suspension of bottom materials and subsequent turbidity that may occur during the operation. Low-turbidity hydraulic dredging systems include small specialty dredge vessels, suction dredging systems, and conventional cutter-head dredges that are modified using special equipment or techniques for turbidity control.

This technology would be applicable for the onsite lagoons at the site if the sediment alone was contaminated. However, the water in these lagoons is also contaminated and would have to be removed along with the sediment. More effective technologies and construction schemes, such as removing any ponded water and then removing the sediments by mechanical means, are available at lower cost. This technology is not applicable to this site and is eliminated.

## 2.4 Collection

### 2.4.1 Sedimentation Basins

Sedimentation basins are used to control suspended solids entrained in surface flows. A sedimentation basin is constructed by placing an earthen dam across a waterway or natural depression, or by excavation, or by a combination of both. The purpose of installing a sedimentation basin is to impede surface runoff carrying solids, thus allowing sufficient time for the particulate matter to settle. Sedimentation basins are usually the final step in the control of diverted surface runoff, prior to discharge to a receiving stream. They are an essential part of any good surface flow control system and should be included in the design of remedial actions at this site.

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This technology for storm water management is retained for further consideration at the Drake Chemical Site. Collected sediments must be removed periodically to ensure efficient operation. A discharge to surface water may require a National Pollutant Discharge Elimination System (NPDES) Permit.

#### 2.4.2 French Drains

French drains, with removal of collected water, can serve many of the same purposes as groundwater pumping. If installed around the perimeter of a waste burial area, groundwater can be collected and removed to lower the water table or to extract groundwater for subsequent treatment.

French drains are constructed by excavating a trench, lining the trench with filter fabric, and backfilling with gravel. Groundwater that is intercepted then flows along the trench to a sump or appropriate collection point. Perforated plastic pipe can be installed at the bottom of the trench to provide a more effective conduit for groundwater removal.

Groundwater collection using French drains can prevent further contamination by eliminating contact between the groundwater and buried wastes. This method can also prevent further contaminant migration via the groundwater route by controlling a contaminated plume.

The site's topography and groundwater elevations place extreme limitations on the use of this technology. A groundwater collection drain will also require a pumping system to extract the collected groundwater. There are no technical or cost advantages to using a groundwater collection system with French drains and pumping. A pumping system for groundwater control and collection is more cost effective and applicable to the Drake Chemical Site. The French drain option of the groundwater control and collection technologies is eliminated.

### 2.4.3 Gas Vents

Pipe vents or trench vents can be used to control or attenuate lateral gas or vapor migration. They can be used to control methane and/or volatile organics. Pipe vents consist of vertical or lateral perforated pipe. They are usually surrounded by a layer of coarse gravel to prevent clogging by solids or water. They may discharge directly to the atmosphere, be flared, or be connected to a gas collection system. Trench vents are constructed by excavating a deep, narrow trench that is backfilled with gravel, forming a path of least resistance through which gases migrate upward to the atmosphere or to a collection system.

Gas vents are not applicable at the Drake Chemical Site. There is no methane generation, and volatile organic vapors are not expected to be a problem at the site. This technology is screened from further consideration.

### 2.4.4 Gas Collection Systems

Gas collection systems are used whenever forced ventilation of gas vents is designated or required. Since gas vents are not applicable at the Drake Chemical Site, there is no need for a gas collection system.

This technology is screened from further consideration.

## 2.5 Diversion

### 2.5.1 Grading and Revegetation

This technology involves regrading the site to reduce surface water infiltration and to control erosion. Grading is often performed as a part of surface-sealing activities because of its inherent aesthetic and soil transport control aspects. Revegetation involves preparing the soil surface, seeding, fertilizing, and mulching to establish a good growth of vegetation. This action should decrease the amount

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TABLE 2-1

PRELIMINARY SCREENING OF TECHNOLOGIES  
DRAKE CHEMICAL SITE

| <u>General Response Actions and Associated Remedial Technologies</u> | <u>Applicable</u> | <u>Excluded</u> | <u>Comments</u>  |
|--|-------------------|-----------------|--|
| 1. No Action<br>a. Monitoring  | •                 |                 | a. Monitoring will identify further contaminant migration.   |
| 2. Containment<br>a. Capping   | •                 |                 | a. Capping will reduce infiltration and prohibit direct contact.                                   |
| b. Groundwater Barrier Walls   |                   | •               | b. Not applicable because of site geology.   |
| c. Gas Barriers  |                   | •               | c. Not applicable because gas generation is not expected   |
| 3. Pumping   |                   |                 |  |
| a. Groundwater Pumping   | •                 |                 | a. This can remove contaminated groundwater and can reduce groundwater contact with buried wastes. |
| b. Liquid Removal  | •                 |                 | b. Lagoons on site will require dewatering.  |
| c. Dredging  |                   | •               | c. Lagoon sediment excavation is addressed under another technology.                               |
| 4. Collection  |                   |                 |  |
| a. Sedimentation Basins  | •                 |                 | a. Stormwater management will require the use of sedimentation basins.                             |
| b. French Drains   |                   | •               | b. Not applicable because of site characteristics.   |
| c. Gas Vents   |                   | •               | c. Not applicable to site conditions.  |
| d. Gas Collection System   |                   | •               | d. Not applicable to site conditions.  |

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of erosion caused by wind, precipitation, and surface water runoff and will minimize offsite transport of contaminants.

Grading and revegetation involve the use of standard construction procedures; however, substantial quantities of soil may be required to modify the present ground contour. Periodic regrading and future site maintenance may be necessary.

Grading and revegetation are widely accepted engineering practices and are applicable to the Drake Chemical Site, so they are retained for further evaluation in conjunction with capping, landfilling, and general site improvement.

### 2.5.2 Dikes and Levees

Dikes, or berms, are well-compacted earthen ridges or ledges constructed immediately upslope from or along the perimeter of disposal sites. These structures are generally designed to provide protection of critical areas by intercepting storm runoff and diverting the flow to natural or man-made drainage paths or to sedimentation basins. Dikes and berms may be used to prevent excessive erosion of newly constructed slopes until more permanent drainage structures are installed or until the slope is stabilized with vegetation. They will also provide temporary isolation of uncapped and unvegetated areas from surface water runoff and erosion and subsequent transport of contaminants.

Levees are earthen embankments that function as flood protection structures in areas subject to flooding. Levees create a barrier to protect structures located behind the barrier. Flood containment levees may be constructed as perimeter embankments surrounding disposal sites located in a flood plain or may be installed at the base of landfills along slope faces that are subject to periodic inundation. Levees serve to protect land disposal sites from flood waters, which may erode cover materials and transport contaminants off site or which may add water to waste materials, increasing leachate production.

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Levees are generally constructed of compacted, impervious fill. Special drainage structures are often required to drain the area behind the embankment. Levees are normally constructed for long-term flood protection, but they require periodic inspection and maintenance to assure proper functioning.

Dikes, berms, and levees are applicable at the Drake Chemical Site and are retained for use as remedial technologies in developing Remedial Action Alternatives.

### 2.5.3 Stream Diversion Ditches and Trenches

These structures are excavated drainageways used above and below disturbed areas to intercept and divert runoff and run-on. Their function is the same as dikes and berms; only their method of construction is different.

These technologies are applicable at the Drake Chemical Site for the same reasons as dikes and berms, and are retained for further evaluation.

### 2.5.4 Benches and Chutes

Benches, or terraces, are relatively flat areas constructed along the contour of very long or very steep slopes to slow down runoff and divert it into ditches or diversions for offsite transport at non-erosive velocities. They may be used to break up steeply-graded slopes of covered disposal sites into less erodible segments. Chutes (and downpipes) are structures used to carry concentrated flows of surface runoff from one level to another level without erosive damage.

These technologies are screened from further evaluation at the Drake Chemical Site. The site, in its present state, has no steep slopes. Any remedial action alternatives, such as an onsite landfill, will be designed to avoid steep slopes or very long slopes.

## 2.6 Complete Removal

### 2.6.1 Soils and Sludges, Buried Drums, Sediments, and Liquid Wastes

Excavation will be used to remove soils and sludges, any buried drums encountered, and sediments from the leachate lagoon area (after the liquid is removed).

Excavation involves the physical removal of the wastes using common practices. Typical equipment includes draglines, loaders, dozers, pans, trucks, and backhoes. Excavated material can be loaded onto trucks and hauled to an approved facility or disposed on site. Excavation is a commonly used and well-established technique that involves standard engineering practices.

Excavation removes the wastes from the site or to a better engineered environment (onsite landfill) and precludes further contaminant migration. There is a potential risk of exposure to vapors or particulates during onsite removal or excavation activities. Transporting of wastes resulting from excavation must meet Department of Transportation (DOT) and State/Federal shipping and manifesting regulations.

Excavation is retained for further evaluation for the complete removal of soil and sludge, sediments, and possibly buried drums at the Drake Chemical Site.

Liquid wastes will be removed as outlined in Section 2.3.2, Liquid Removal.

### 2.6.2 Tanks, Buildings, Debris, Sewers, and Water Lines

Tanks and process equipment inside the buildings can be loaded onto trucks, disposed on site or off site, or decontaminated and then salvaged. Decontamination water or fluids could be hauled away for treatment/disposal or treated on site in a treatment plant.

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The onsite buildings could be dismantled in a controlled manner. Dismantling activities must be performed in a manner that prevents the release of contaminants to the air or surface waters. Porous building materials cannot be decontaminated and must be handled accordingly. Non-porous building materials can be decontaminated and then disposed or salvaged. Decontamination water or fluids can be hauled away for treatment/disposal or treated on site and discharged.

Water and sewer lines may have to be removed and/or relocated depending on the remedial action chosen for the sludges and soil. Water and sewer lines that served Drake Chemical, Inc., could be removed and not relocated nor reinstalled.

These removal actions remove contaminated materials off site or to a better-engineered environment (onsite landfill or beneath a cap) and should mitigate further contaminant migration. There is a potential risk of exposure to vapors or particulates during onsite removal or excavation activities.

Transportation of wastes off site must meet DOT and State/Federal shipping and manifesting regulations. Discharge of treated decontamination liquid or fluid to groundwater, surface water, or to the local sewer system may require an NPDES permit.

Complete removal of buildings and contaminated structures is retained for further consideration at the Drake Chemical Site.

## 2.7 Partial Removal

Partial removal technologies are the same as complete removal, except that some contaminated materials may not be able to be completely removed because of physical constraints at the site.

## 2.8 Onsite and Offsite Treatment

### 2.8.1 Incineration

Incineration is a process that uses thermal oxidation to convert organic substances to a less bulky decontaminated material. Generally, only organic and combined inorganic-organic wastes are considered for incineration. This process can reduce the waste volume and destroy toxic compounds by a number of methods currently available. The total destruction of organic contaminants can be obtained by the use of incinerators that operate at temperatures in excess of 1,000°C. At present, there are only a few commercial facilities permitted under RCRA interim status. The incinerator types considered for use on wastes found on site include

- Rotary kiln
- Fluidized bed
- Multiple hearth
- Cement kiln

The process used by all of the commercial solid waste destruction facilities is the rotary kiln. This unit has proven to be very flexible and can withstand the rigorous conditions experienced during heterogeneous waste type destruction. The rotary kiln incinerator is relatively simple and rugged while exhibiting a good performance and maintenance record.

Onsite incineration is retained for further consideration for use at the Drake Chemical Site. The costs for constructing an incinerator on site might be less than for shipping the material to an offsite facility. A mobile incineration unit is also applicable, although the prospects for leasing a mobile incineration unit are uncertain due to the questionable availability of such a unit and possible problems with capacity.

Offsite incineration is retained for further evaluation. Incineration will effectively reduce the organic contaminants present in the waste, as long as the incinerator is

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operated within its permitted limits. Residue that is generated must be disposed at a permitted facility; however, this would be the responsibility of the operators of the offsite incinerator. Air releases from the commercial facility responsible for incineration should have a minimal impact on public health and the environment because of the required use of air pollution control equipment. The offsite incinerator must be permitted under RCRA. There are short-term effects on the environment and public health because of the risks associated with the transport of wastes from the site and through the community.

### 2.8.2 Solidification

Solidification methods can be placed in two main groups, based on how the contaminants are held in the solid. Some methods physically surround the waste particles with the solidifying agent. Other methods chemically fix the wastes in a reaction with the solidifier.

Many processes rely on the reactions of materials such as Portland cement, lime, and common silicates for the encapsulation, solidification, and/or cementation of a waste material. These processes involve the mixing of such materials with the waste. Some of the processes rely mainly on the ability of the chemical system to insulate each particle of pollutant from adjacent leaching fluid. Other processes rely on the formation of a relatively impermeable mass to exclude leaching fluids from passing through the solidified waste.

The most effective inorganic treatment systems involve the use of Portland cement, lime-based mortars, lime-pozzolan cements such as fly ash, and some mixed inorganic-organic materials.

Many wastes contain significant concentrations of organic chemical and hydrocarbon constituents. The organic fixing capacity of the various processes should be carefully reviewed and compared in regard to potential leachates of such pollutants from the solidified waste. Very little has been reported on the effect and use of solidification agents on organic-contaminated wastes. It is important to

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evaluate the chemistry of the contaminants involved and to conduct leachate surveys prior to final selection of solidification agents or methods. The governing sorption mechanisms for organic contaminants are not as well characterized as for inorganics.

It appears that technology is available to address the ultimate-disposal requirements for toxic metal and trace metal wastes. The technology for wastes containing organics is not as readily available. Current solidification materials for organics control are either inadequate or are not designed specifically for the disposal of organics.

Some chemical admix techniques depend on a reaction between the additives and the water contained in the waste to produce a cementing or pozzolanic reaction. Stabilization processes must usually be adapted to a particular waste, generally by trial and error, because of the many complex chemical reactions that cannot be predicted in advance.

There is a need to conduct laboratory applicability tests on new types of waste. Leaching and physical properties are dependent on the amount of additives used. The choice of solidification technique for a particular waste should be based on the waste volume, mobility, and toxicity of the contaminants; the compatibility of the waste with the additives or process used; and characteristics of the disposal site.

Bench-scale testing of the solidified waste must take place prior to applying the solidification agent to the waste before final disposal. Some form of field demonstration should be performed to test the long-term durability and the acceptability of the treatment approach.

Solidification is screened from further consideration at the Drake Chemical Site. Aside from the unproven performance of solidification systems on organics, there are other considerations. This technology offers no advantage over an onsite landfill; in fact, it would increase the waste volume, possibly to the point where it would be physically impossible to place all of the wastes on site because of the

relatively small size of the site. An above-ground landfill would be required so that waste materials would not be in direct contact with the groundwater.

Solidification may not be reliable since the waste on site is nonhomogeneous and varies in chemical composition. It would be difficult to optimize solidification agent admix ratios to consistently obtain a solidified, non-leaching material. There would also be implementation difficulties. The wastes would have to be excavated, staged, solidified, allowed to cure, and then landfilled properly. In-situ stabilization is not suitable since some waste is located below the water table. Also, it would be very difficult to tell if the solidification was effective in reducing the leachability of the waste.

### 2.8.3 Land Treatment

Land treatment involves the uniform application of selected wastes to a specific area for natural biodegradation and includes mixing the waste with the upper soil layers. This is usually done after the wastes have been converted to environmentally acceptable materials by means of biological, physical, or chemical treatment. This technique has been used for the disposal of municipal sludges and petroleum industry wastes. For those wastes that are resistant to biodegradation, there is the potential for contaminant migration by surface water runoff and infiltration. Uptake of unaltered materials by vegetation can introduce potentially hazardous compounds into the food chain.

Land treatment is not applicable at the Drake Chemical Site. The technology is not used for contaminated soils and the sludges found on site. The land on site is not suitable or of sufficient area for such an operation.

### 2.8.4 Biological Treatment

Most organic compounds are biodegradable, although the degree of biodegradation varies widely with properly acclimated microbial populations, adequate detention times, and fluctuations in wastewater concentration and flow rate. Biological

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treatment involves placing the wastewater in contact with a mixture of microorganisms so that the organic compounds in the wastewater are decomposed. In some cases, the microorganisms are present in the wastewater; in others, they must be added. Since soluble inorganics (heavy metals) may inhibit microbial activity, preliminary treatment should be used to lower the levels of these substances prior to biological processes.

### Activated Sludge

The activated sludge process is capable of converting most organic wastes to more stable inorganic forms or to cellular biomass. Much of the soluble organic material is converted to carbon dioxide and water in an aeration tank by a diverse group of microorganisms. The biomass, after removing the organic material from the wastewater, must be separated from the liquid stream in a clarifier or sedimentation tank. After sedimentation, excess biomass is returned to the aeration tank. Thus, a relatively constant mass of microorganisms is maintained in the system. System performance depends upon the recycle of sufficient biomass to maintain an optimum food-to-microorganism (contaminant to biomass) ratio that is unique to the waste treated and the settling characteristics of the biomass. This process has been proven effective for the treatment of industrial and municipal wastewaters. Special considerations, such as waste strength and the toxicity of waste constituents to the biomass, must be considered in the use of this technology.

### Trickling Filter

A trickling filter is an attached biological growth system that requires the presence of some type of medium to support the biological mass. The process consists of uniformly distributing the wastewater over a bed of stone or synthetic support media. As the wastewater flows over the biological growth attached to the surface of the media, contaminants are consumed by the microorganisms. As the microorganisms grow, their thickness on the media will increase to a point where they will break away from the media and will be washed out of the filter. The

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waste stream containing these solids flows to a sedimentation tank where the solids are removed from the liquid. Trickling filters decompose organics in the same manner as in the activated sludge process; however, the percentage removal of organics is not as complete because of a shorter residence time.

#### Rotating Biological Contactors (RBCs)

RBCs consist of a series of closely spaced disks. They are partially submerged in the wastewater and are slowly rotated through it. The biological growth attaches to the surfaces of the disks. As the disks rotate, a film of wastewater adheres to the disks, and the microorganisms consume the organic material in the wastewater as food. When the biological growth gets too thick to adhere to the disks, it breaks off into the wastewater and is removed in a sedimentation tank.

#### Anaerobic, Aerobic, and Facultative Lagoons

Lagoons, or waste stabilization ponds, are large, shallow basins that rely on long retention times and natural aeration to biologically decompose the wastewater. The aerated (aerobic) lagoon is a variation in which the wastewater is aerated with diffused air or mechanical aerators. The aerobic lagoon differs from activated sludge in that there is no recycle of biomass.

#### Summary

The activated sludge process is retained for further consideration for treatment of groundwater from the Drake Chemical Site because of sufficient organic materials for the microorganisms to use as food.

The trickling filter is screened from further consideration. Trickling filters are sensitive to climate and temperature changes. Reliability is lower when wastewater temperatures fall below 55°F. There is a strong possibility of odors and, if there is a process "upset," there could be a long recovery time for the biological growth.

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The aerobic and facultative lagoons are screened from further consideration because of relatively poor treatment efficiencies; the anaerobic lagoon is screened out due to potential odor problems. RBCs are screened from further consideration due to maintenance problems, such as shaft breakage and failure, for this type of operation.

## 2.8.5 Chemical and Physical Treatment

### Equalization

The primary objective of equalization is to dampen flow and concentration fluctuations. Both biological and physical/chemical treatment processes operate more effectively if wastewater composition and flow rate are fairly constant. Equalization basins and tanks can dramatically increase the stability of treatment processes that are sensitive to fluctuating contaminant concentrations. Such treatment processes include activated carbon adsorption, biological treatment, precipitation, and ion exchange. The only disadvantage is that an equalization basin, when used to dampen fluctuations in the flow rate, may require a considerable amount of land area to accommodate peak flows.

Equalization will be retained for further evaluation at the Drake Chemical Site to blend groundwater from the various groundwater recovery wells prior to subsequent treatment steps.

### Precipitation, Flocculation, and Sedimentation

Precipitation, flocculation, and sedimentation are well-developed processes that have been used to treat various municipal and industrial wastewaters containing suspended solids and/or soluble heavy metals. Precipitation removes a substance from solution and transforms it into a solid particle. Flocculation promotes particle growth and agglomeration of the solids so that they can be more easily removed from the liquid. Sedimentation removes the suspended solids from the liquid.

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Many metals can be successfully removed from the wastewater using these processes. There is no upper limit on the concentrations that can be treated by these processes. The theoretical lower limit for removal of soluble substances is generally governed by the solubility product of the particular ion, although this method of predicting removal efficiency is not very reliable. Laboratory tests are needed to determine the degree of precipitation, the required chemical dosage, the settling rate, and sludge production rates.

These processes are retained for further evaluation for removal of heavy metals from water at the Drake Chemical Site.

#### Chemical Oxidation

The chemical oxidation process involves the chemical rather than the biological oxidation of dissolved organics in wastewater. Oxidation-reduction reactions are those in which the oxidation state of at least one reactant is raised while that of another is lowered. There are many oxidation agents; however, only a few are convenient to use. The ones most commonly used in waste treatment are air, chlorine gas, chlorine dioxide, sodium and calcium hypochlorites, potassium permanganate, and hydrogen peroxide. Present uses include oxidation of cyanide, phenols, other organics, sulfur compounds, and some pesticides.

Chemical oxidation is screened from further consideration at the Drake Chemical Site. Most of the compounds for which it is used are not present at levels that will require treatment. Another disadvantage is that it may introduce other compounds such as organic intermediates into the water which may require further treatment.

#### Chemical Reduction

Chemical reduction is used to reduce metals to less toxic oxidation states. Reduction-oxidation reactions are those in which the oxidation state of at least one reactant is raised while that of another is lowered. Present applications include the reduction of hexavalent chromium to trivalent chromium and mercury removal

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for subsequent recycle. Reduction processes cannot, however, effectively achieve mercury levels below 100 µg/l.

Chemical reduction is screened from further consideration unless it is determined that the chromium is in the hexavalent (+6) valence state.

#### Chemical Dechlorination

Chemical dechlorination refers to a group of emerging technologies that can be used to strip chlorine atoms from highly chlorinated, toxic compounds, such as PCBs, in order to produce a nontoxic residue. Chemical dechlorination processes were developed primarily for the destruction of PCBs in electric transformer fluids. In theory, the processes may be applicable to other highly chlorinated compounds, such as pesticides. Several companies have developed processes, but none are commercialized except for use with PCB transformer oil.

This technology is screened from further consideration since it is not yet developed on a commercial scale for non-PCB chlorinated compounds and since PCBs are not a problem at the Drake Chemical Site.

#### Ultraviolet/Ozonation

Ozonation is a process where ozone is used for oxidizing organics. Combined ultraviolet/ozone systems can extend the utility of ozonation dramatically. Ozone is sufficiently strong to break many organic compounds. Complete oxidation of a compound to carbon dioxide, water, etc., is not improbable if the dosage is high enough. Ozone must be generated on site. It is presently used to treat cyanides, dyestuffs, and phenols. The feasibility of ultraviolet/ozonation as a treatment for a particular waste can be demonstrated conclusively only by lab and/or pilot tests on the waste.

This process is screened from further consideration at the Drake Chemical Site. Most of the compounds for which it is currently used are not present at levels that

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will require treatment. Also, in some cases, oxidation is not complete because of the formation of oxidized intermediates that resist further ozonation.

#### Carbon Adsorption

The process of carbon adsorption involves contacting a waste stream with activated carbon, which selectively adsorbs hazardous materials by physical and/or chemical forces. When the carbon reaches its ultimate capacity for adsorption, it is removed from the containment vessel for disposal, destruction, or regeneration.

The suitability of carbon adsorption for the treatment of wastewater depends upon the contaminant characteristics, the extent of pretreatment, and the required effluent quality. Contaminant characteristics, such as molecular weight, structure, and solubility, are important considerations. Activated carbon has been proven effective for the removal of a variety of chlorinated hydrocarbons, organic phosphorus, PCBs, phenols, aromatic hydrocarbons, and some heavy metals. It is also effective for taste and odor control and color removal.

Carbon adsorption is retained for further evaluation at the Drake Chemical Site.

#### Absorption by Oil-Absorbing Media (Klensorb)

Absorption by oil-absorbing media, such as Klensorb, is similar to carbon adsorption, but it is used for different substances. The equipment used is similar to granular activated carbon columns. Klensorb is used to remove oils and other low-solubility (less than 1,000 mg/l) organics. It can be used as a companion treatment with carbon adsorption. Klensorb can replace carbon adsorption for polishing water any time the organic compounds to be removed have solubilities in water of 1,000 mg/l or less.

This technology is screened from further evaluation at the Drake Chemical Site. Contaminants in the groundwater can be more effectively removed by other

technologies, as performance data on Klensorb is limited. Also, oil is not present in the groundwater beneath the site.

### Ion Exchange

Ion exchange resins are insoluble solids containing fixed cations and anions capable of reversible exchange with mobile ions of the opposite charge in solutions with which they are brought into contact. The direction and extent of the reaction are governed by the relative insolubilities of the salts that can be formed and the associated equilibrium constants. The ion exchange resins will eventually be exhausted and must be regenerated. The regenerant waste will contain the ions removed at much higher concentrations than in the influent and must be further treated and/or disposed.

Ion exchange is considered applicable for the removal of the following:

- All soluble metallic elements
- Anions such as halides, cyanides, sulfates, and nitrate
- Carboxylic and sulfonic acids and some phenols at alkaline pH.

Limitations of ion exchange are as follows:

- The upper influent concentration limit for exchangeable ions for efficient operations is 2,500 mg/l (as calcium carbonate).
- Effectiveness can be decreased by the presence of certain waste constituents.
- Influent suspended solids must be very low as not to foul the resins.
- Some organics, especially aromatics, can be irreversibly adsorbed by the resins, resulting in decreased capacity.

Ion exchange is retained for further evaluation for the treatment of groundwater as a polishing step at the Drake Chemical Site, but only after pretreatment. The technology can be used to reduce heavy metals to very low concentrations and for the removal of dissolved solids, chlorides, and sulfates (if required).

#### Reverse Osmosis

Reverse osmosis uses a semi-permeable barrier, which will pass only certain components of a solution, and a driving force to separate those components at a useful rate. The membrane is permeable to the solvent (water) but impermeable to most dissolved substances, both organic and inorganic. The driving force is an applied pressure gradient. Reverse osmosis produces a concentrate for reuse or disposal and a dilute stream of purified water.

Reverse osmosis may be used to concentrate dilute solutions of many inorganic and organic solutes. Pretreatment may be required to optimize pH, remove strong oxidants, and filter out suspended solids. The dissolved solids in the influent may be as high as that of sea water (34,000 mg/l) and will produce water with dissolved solids as low as 5 mg/l. Reverse osmosis reduces excess dissolved solids, reduces or removes many organics, reduces or removes heavy metals, produces almost turbidity-free water, and removes or reduces microorganisms.

Reverse osmosis is retained for further evaluation as a polishing step for the treatment of groundwater from the Drake Chemical Site, but only after pretreatment. The technology can be used to reduce metals to very low levels and for the removal of other dissolved solids.

#### Liquid-Liquid Extraction

Liquid-liquid solvent extraction is the separation of the constituents of a liquid solution by contact with another immiscible liquid. If the substances comprising the original solution distribute themselves differently between the two phases, a certain degree of separation will result. This may be enhanced by multiple

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contacts. Liquid-liquid extraction may be a viable treatment process for selected, concentrated, and segregated waste streams primarily where material recovery is possible and desirable. Present uses include the recovery of phenol from aqueous wastes and the recovery of halogenated hydrocarbon solvents from organic solutions containing other water-soluble components.

Liquid-liquid extraction is screened from further evaluation for groundwater treatment at the Drake Chemical Site. The technology is applicable where only a few organics are present in the waste stream; this is not the case at this site. Also, the technology is most viable where material recovery is possible and desirable. Again, this is not the case at the Drake Chemical Site. The immiscible liquid used for extraction would contain the same components as the water being treated and would require further treatment.

#### Oil-Water Separation

Floating oils can be treated by gravity separation and skimming. Emulsified oil-water mixtures can be treated by gravity separation followed by chemical coagulation with air flotation or high-rate filtration. These processes usually have influent concentrations of 20 to 48,000 mg/l oil and reduce them to 10-15 mg/l. The processes are generally used to treat wastes from steel mills or petroleum refineries.

This process is screened from further consideration for groundwater treatment at the Drake Chemical Site since oil was not detected at the site.

#### Steam Distillation

Steam distillation is a proven process for removing water-immiscible volatile compounds from process or waste streams. It can be applied to any stream that can be contacted with steam or water without reaction or decomposition. Numerous industrial wastes are treated by contract disposal companies using steam distillation to recover valuable components or to reduce waste volumes. Aside

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from the environmental impact of generating steam for the process, the environmental impacts are those associated with disposal of the treated waste after the volatile component has been removed and wastewater from condensed steam. The wastewater will contain trace amounts of the volatile organics and may have to be treated prior to discharge. The process is generally used to treat concentrated waste streams.

This process is screened from further consideration at the Drake Chemical Site. It is used for waste streams far more concentrated than the groundwater at the site. The amount of volatiles in the condensed steam could exceed applicable criteria and thus require further treatment.

#### Air Stripping

Air stripping consists of entraining the gases or volatile materials dissolved in water by means of a current of air passing in the opposite direction through the liquid to be treated. Plate towers and packed towers filled with a contact mass (plastic rings, etc.) are generally used. This technology is used for deodorization, removal of ammonia and sulfur compounds, phenols, and a variety of volatile organics such as trichloroethylene, tetrachloroethylene, etc.

Problems associated with air stripping are reduced efficiency during cold weather and possible ice formation. Also of concern is the possibility of exceeding ambient air standards for certain stripped constituents.

Air stripping is retained for further consideration at the Drake Chemical Site. It can effectively reduce the concentrations of some volatile organics present in the groundwater.

#### Steam Stripping

Steam stripping is similar to air stripping, except that steam, rather than air, is used to strip organics and other compounds from the waste stream. The compounds

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removed will be transferred to the steam. When the steam is condensed, the volatile organics will remain and must be further treated. The specific application will depend on its efficiency compared with other wastewater treatment process.

This process is screened from further evaluation at the Drake Chemical Site. Its present applications for waste treatment are for waste streams that are more concentrated than the groundwater beneath the site.

### Filtration

Filtration is used to separate suspended matter from water or wastewater by passing it through a filter bed composed of granular material (sand, gravel, anthracite coal), with or without chemical addition. Solids removal depends on the filter media, the filtration rate, and the chemical characteristics of the influent wastewater.

During the filtration cycle, suspended solids and/or colloidal material accumulate within the spaces of the filter media. As the holding capacity of the filter media bed is approached, indicated either by a "breakthrough" of turbidity or suspended solids, or by an excessive pressure rise, the filtration cycle is reversed, and the unit is placed in the backwash mode. Clean water is pumped through the filter at a relatively high rate in the reverse direction from the filtering mode in such a manner as to physically agitate the media to dislodge the accumulated solids. The effluent from the backwash operation is recycled or discharged to an additional treatment device for solids removal. At some point, the solids (sludge) must be disposed of.

Filtration is retained for further evaluation at the Drake Chemical Site to remove residual metal hydroxides from the precipitation and sedimentation effluent.

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## 2.9 Storage

Storage refers to temporary storage of contaminated materials prior to disposal, treatment, landfilling, etc. Storage at the Drake Chemical Site is limited to temporary, above-ground storage during activities that must be completed in stages, such as onsite landfilling. Contaminated material must be stored while an onsite landfill is being completed, for example, or material may be stored while the site surface is being prepared for capping, or during building dismantling.

Contaminated material would be stored in a temporary waste pile. If there was a liner under the pile, contaminant migration to soils and groundwater could be mitigated. A cover on the pile, or keeping the pile wet, could minimize offsite transport of contaminants by the wind and by surface runoff.

There is a potential risk of exposure to vapors or particulates during onsite removal or excavation activities.

It is not known what type of permits, if any, would be required for temporary storage. A RCRA permit may be required if material is stored for more than 90 days.

Storage is retained for further evaluation as a temporary measure during the construction of various remedial action alternatives.

## 2.10 Offsite Disposal

Landfill disposal of waste materials can be on site in a newly constructed landfill (see Section 2.11) or off site in an existing landfill. Offsite disposal involves excavation of contaminated soils and sludges and dismantling of buildings and transport of materials to the nearest approved hazardous waste disposal facility. All aspects of offsite disposal are based on standard engineering practice, provided an approved hazardous waste landfill is used as the disposal site. Offsite disposal is retained for further consideration for the Drake Chemical Site.

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Offsite landfill disposal will virtually eliminate any long-term effects of the wastes and contaminants presently at the site. Short-term effects would be more severe upon the environment and upon public health because of the risks associated with the transport of the waste from the site and through the community.

Commercial disposal facilities must meet stringent analytical, RCRA, and State permitting and compliance standards. Transport of the materials off site also must comply with DOT and State/Federal shipping and manifesting requirements.

### 2.11 Onsite Disposal

Onsite disposal necessitates the construction of a secure hazardous waste landfill. Elements of such a site must meet the applicable RCRA and Pennsylvania Department of Environmental Resources (PADER) requirements and regulations. Thus, the landfill design would include a lined impoundment, a leachate and runoff collection system, and a final cover to reduce precipitation infiltration. Flood protection would also be required since the site is located in the 100-year flood plain of Bald Eagle Creek and the West Branch of the Susquehanna River.

In order to meet the requirements of the National Contingency Plan (NCP) and EPA technical guidance, if offsite disposal is evaluated as a remedial alternative, then onsite disposal must also be evaluated. Therefore, onsite disposal is retained for further evaluation at the Drake Chemical Site.

Construction must proceed in stages so that (1) surface materials can be removed and stored, (2) buried materials can be excavated and stored, (3) flood protection levees can be built, and (4) an onsite landfill can be constructed within the flood protection. This is potentially very complicated and could result in wastes and contaminated materials exposed to the environment for long periods of time before they are finally disposed in an environmentally acceptable manner.

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Onsite landfill disposal will virtually eliminate any long-term effects of the wastes on site compared to their present state. Construction of such a landfill may be difficult and lengthy, however.

Construction of an onsite landfill for disposal has numerous design requirements under RCRA and State regulations. RCRA design and permitting standards are contained in 40 CFR, Parts 264 and 267. Various guidance documents regarding siting, design, construction, and permitting of such facilities are available.

#### **2.12 Alternative Drinking Water Supply**

Alternative water supply technologies include bottled water, aboveground tanks, deeper or upgradient wells, connection to a municipal water system, relocation of water intake structures, and individual treatment devices. None of these are applicable at the Drake Chemical Site since there are no drinking water wells in the groundwater contaminated by previous site activities.

#### **2.13 Relocation**

Permanent relocation of residents, businesses, and community facilities may be provided where it is determined that human health is in danger and that, alone or in combination with other measures, relocation would be cost-effective and environmentally preferable to other remedial response. Temporary relocation may also be taken in appropriate circumstances.

This alternative is not applicable at the Drake Chemical Site, since human health is not endangered by the site. Any other remedial actions could be performed in such a manner as to minimize contaminant migration and to protect the public health.

#### **2.14 Remedial Action Objectives**

This section reviews the objectives used to develop the candidate alternatives. The technologies remaining after the initial screening (see Table 2-1) will now be

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combined to develop the alternatives that will meet the site-specific remedial action objectives and the criteria for evaluation of alternatives. Remedial Action Alternatives are discussed in Section 3.0 of this report. The combined technologies were screened with respect to the general remedial objectives as outlined below:

- Maintain public health and safety
- Maintain acceptable risk levels associated with surface water and groundwater contamination.
- Decrease the risk of the migration of contaminants by wind or surface water transport.
- Reduce the risk of direct contact with contaminated materials on site.
- Check that the remedial actions are technically feasible, socially acceptable, and cost-effective.

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APPENDIX A  
FLOODPLAIN MANAGEMENT ASSESSMENT

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APPENDIX A

FLOODPLAIN MANAGEMENT ASSESSMENT  
DRAKE CHEMICAL SITE  
LOCK HAVEN, CLINTON COUNTY, PENNSYLVANIA

A.1 Purpose

The purpose of this floodplain management assessment is to evaluate the remedial action alternatives impact on the floodplain relevant to Executive Order Number 11988 and applicable Federal, State, and local requirements.

A.2 Introduction

The Drake Chemical Site is located in north central Pennsylvania in the City of Lock Haven, Clinton County. Lock Haven is located at the confluence of two surface waters, the West Branch of the Susquehanna River and Bald Eagle Creek. The two surface waters have a combined watershed of 4,117 square miles of drainage at Lock Haven.

Continuous records of river stages and discharges on the West Branch Susquehanna River have been maintained since 1928 when the U.S. Geological Survey (USGS) installed a recording gage at Williamsport, Pennsylvania, downstream of the site. Locally, the National Weather Service has maintained a staff gage on the Jay Street Bridge in Lock Haven since 1940. In 1974, the USGS installed a continuous recording gage (Number 5458) on the downstream side of the Jay Street Bridge. On Bald Eagle Creek, records have been maintained since 1910 at the Beech Creek Station, 12 miles upstream. The maximum discharge recorded at the Jay Street Bridge, U.S. Weather Bureau gage is 238,000 cfs in 1936. In the same year, the Beech Creek Station also recorded its maximum discharge, 25,600 cfs.

The U.S. Army Corps of Engineers (USACOE) has reported that there are two conditions that cause flooding in the Lock Haven area: the peak discharge on the

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West Branch Susquehanna River and peak flows on Bald Eagle Creek. The maximum stage of flooding occurs when the West Branch Susquehanna River is at maximum flood stage. Peak flood stages along Bald Eagle Creek occur during times of flooding on the West Branch Susquehanna River because of river backwater and coincidental flows on the creek. A major reason for the less severe flood problem on the Bald Eagle Creek is the Foster Joseph Sayers flood control reservoir, which controls 330 square miles of the 770-square mile drainage area of Bald Eagle Creek.

The Lock Haven area also has four upstream flood control reservoirs affecting the flows of the Bald Eagle Creek and the West Branch of the Susquehanna River. The reservoirs are:

- Bald Eagle Creek

Foster Joseph Sayers Dam (USACOE, March 1971)

- West Branch Susquehanna River

George B. Stevens Dam (PADER, January 1956)

Alvin R. Bush Dam (USACOE, February 1962)

Corwensville Dam (USACOE, November 1965)

The Drake Chemical Site is located between the two surface waters, about 1,200 feet north of Bald Eagle Creek and 3,500 feet south of the West Branch of the Susquehanna River. The City of Lock Haven has experienced 19 floods in excess of Mean Sea Level (MSL) elevation 556.9 in the last 130 years. The average elevation of the Drake Chemical Site, prior to the 1972 Agnes Flood, is estimated to be about 556 feet above MSL. The southern and western portions of the site were used for landfilling of flood debris; therefore, the higher elevations are not representative of the site's natural elevation. The Drake Chemical Site was also partially or completely flooded during those 19 recorded events. The USACOE has identified a 100-year floodplain for the Lock Haven area, and the site is located

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well within the 100-year floodplain. The 1972 Agnes flood is very similar to the estimated 100-year flood in that it reached a flood elevation of 566.5 feet above MSL. The 100-year flood elevation is 565.5 feet above MSL.

The Drake Chemical Site has a local drainage flow that causes runoff to areas both north and south of the site. Stormwater runoff from the site has caused migration of site-related contaminants, in particular, the leachate lagoon area and leachate stream in the south and the Gorham property to the northeast. A railroad embankment prevents easterly migration and the adjacent American Color and Chemical (ACC) Site prevents identification of westerly stormwater runoff contaminant migration.

Extensive stormwater studies and floodplain assessments have already been performed by the USACOE for a Lock Haven flood protection project. The USACOE has recommended that a series of flood control devices be constructed to protect Lock Haven.

The hydrologic data prepared by the USACOE was used extensively in developing and evaluating the Drake Chemical Site remedial action alternatives.

### A.3 Proposed Remedial Action Alternatives and Evaluation

The remedial action alternatives developed for the Drake Chemical Site can be categorized by the following:

- No Action
- Limited Action
- Flood Protection Dike Construction
- Site Removal.

In accordance with Executive Order Number 11988, Floodplain Management, the remedial actions will be evaluated under the above categories for potential effects of actions within the floodplain and potential harm to the floodplain. Comments

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will be made on the ability of a remedial action to reduce risk of flood loss, minimize flood impacts on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

#### **No Action**

The No-Action Alternative is inconsistent with the goals and criteria established by the National Contingency Plan (NCP), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) plus numerous other Federal, State, and local regulations. No action serves no purpose towards reducing impacts on human health and safety. Flooding could cause migration of contaminants from the soils, sludges, groundwaters, and structures. No action does not serve to restore or preserve the values of a floodplain; rather, it diminishes and/or eliminates any value associated with a natural floodplain because of the nature and extent of contamination found at the site.

#### **Limited Action**

These remedial actions call for capping the site, extracting and treating the groundwater, and demolition of the existing buildings and storage tanks. Limited action removes the source of contamination and/or seals it below ground to prevent dermal contact. These actions do nothing to restore the floodplain to its original condition or develop an area that can utilize the natural beneficial values of a floodplain. The site will be restricted from usage as commercial, recreational, residential, or agricultural area.

Flooding of the site could possibly damage any groundwater pumping and treatment system if the flood protection is not included. A small amount of contaminants could be released from those systems during flooding. Capping measures will be designed to minimize the potential of contaminant washout. Limited-action remedial alternatives reduce the risk of flood loss and the risk of adverse impacts on public health and safety during a flooding event.

### **Flood Protection Dike Construction**

Two remedial action alternatives were developed that utilized a flood dike to prevent site flooding. This assumes that flood protection measures proposed by the USACOE for Lock Haven are not implemented. The dike is a large earthen structure constructed around the site. Such a structure would change the area's flooding characteristics; but, based on the USACOE evaluation of a much larger dike (levee) system, it would not adversely effect flood stage elevations, flood velocities, or maximum discharge rates.

A flood protection dike would not adversely affect the flood area, nor would it help return the flood plain to a natural state. The dike would be another structure on an industrialized floodplain area. The use of groundwater pumping and treatment with this action might include pump stations and treatment plants outside the dike. These additional structures would have no significant effect on the floodplain.

The flood protection dike would reduce potential impacts on human health and safety by protecting the contaminant source from flooding and subsequent mobilization. There would be a reduction in flood loss risks associated with a flood protection dike.

### **Site Removal**

The remedial actions that call for excavation of contaminants and demolition of structures with offsite disposal can return this area of the floodplain to a state approaching natural conditions. The positive effects of such a move on the floodplain are limited because of the commercialization and industrialization of the remaining floodplain area.

Site removal has positive effects on reducing human health and safety risks and reduces the risk of flood loss. These actions will not harm the floodplain and will help remediate the environmental damage done by the existing site.

#### A.4 Flood Hazard Assessment

There are two flood hazard risks at the Drake Chemical Site:

- Events with flood stages above elevation 556 MSL
- Failure of one or more of the four upstream dams.

The remedial actions related to the site all occur in an area that has been flooded or partially flooded 19 times between 1847 and 1980. The 100-year storm elevation is 565.5 MSL and would cover the entire site with 6 to 10 feet of water. Floodwaters could wash away contaminants from the site in its existing condition and after construction of the remedial actions without flood protection. Flooding during interim construction on all remedial action could cause contaminant migration via surface waters and groundwaters.

The dams mentioned in this assessment are monitored and controlled by the USACOE and the Pennsylvania Department of Environmental Resources (PADER). No immediate hazardous conditions are reported for the dams, but failure of the structures could create flooding conditions of varying proportions dependent upon coincidental stream discharge rates and pool elevations.

In conclusion, the Drake Chemical Site is influenced by flooding of either the West Branch Susquehanna River and/or the Bald Eagle Creek. There is a substantial risk to the environment and public health because of flooding at the site. The selection and final design of site remediation measures will be influenced by the flooding characteristics of the site.

#### A.5 References

United States Army Corps of Engineers, Baltimore District, July 1980.  
Lock Haven, Pennsylvania, Phase I General Design Memorandum.

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Hedeman, W. N., October 24, 1984. Draft Policy on Floodplains and Wetland Assessments for CERCLA Actions. United States Environmental Protection Agency, Washington, D.C.

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AR301231

APPENDIX B  
COST DATA

AR301232

ALTERNATIVE A1

B-1

AR301233

DRAKE CHEMICAL RAA 1A  
DISPOSAL AT CECOS LANDFILL BUFFALO  
DRARAA1

| ITEM                              | QUANTITY    | DIRECT UNIT PRICE |        |           | DIRECT COST |        |           | ITEM DIRECT COST | COMMENTS            |
|-----------------------------------|-------------|-------------------|--------|-----------|-------------|--------|-----------|------------------|---------------------|
|                                   |             | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR  | EQUIPMENT |                  |                     |
| EXCAVATION                        |             |                   |        |           |             |        |           |                  |                     |
| SLUDGES                           | 69000 CY    | \$1.50            | \$1.48 | \$3.59    | 103500      | 82800  | 247710    | 349830           |                     |
| RECLAMATION                       |             |                   |        |           |             |        |           |                  |                     |
| BACKFILL                          | 69000 CY    | \$5.50            | \$1.20 | \$2.83    | 103500      | 82800  | 195270    | 381570           |                     |
| TOPSOIL                           | 5200 CY     | \$24.60           | \$1.20 | \$2.83    | 28600       | 6240   | 14716     | 49556            |                     |
| REVEGETATION                      | 280 MSF     | \$3.50            | \$5.60 | \$4.45    | 6888        | 1568   | 1246      | 9702             |                     |
| SHEETPILE WALL                    | 2800 SF     | \$3.50            | \$1.89 | \$2.19    | 9800        | 5292   | 6132      | 21224            |                     |
| HAULING                           |             |                   |        |           |             |        |           |                  |                     |
| SLUDGES                           | 3450 TRL    |                   |        | \$600.00  |             |        |           | 2070000          | 20 CY/TRL & 250 mi. |
| LEACHATE LAGOON MATERIAL          | 125 TRL     |                   |        | \$600.00  |             |        |           | 75000            | @ \$4 / mi.         |
| DISPOSAL                          |             |                   |        |           |             |        |           |                  |                     |
| SLUDGES                           | 103500 TONS |                   |        | \$110.00  | 11385000    |        |           | 11385000         | 1.5 TONS/CY &       |
| LEACHATE LAGOON MATERIAL          | 3375 TRL    |                   |        | \$110.00  | 371250      |        |           | 371250           | \$110 / TON         |
| Total                             |             |                   |        |           | 148788      | 198020 | 465074    | 13901250         |                     |
| Subcontractor @ 10% of Sub        |             |                   |        |           |             |        |           | 1390125          |                     |
| Burden @ 13% of Labor Cost        |             |                   |        |           |             | 25743  |           | 25743            |                     |
| Labor @ 15% of Labor Cost         |             |                   |        |           |             | 29703  |           | 29703            |                     |
| Material @ 5% of Material Cost    |             |                   |        |           | 7439        |        |           | 7439             |                     |
| Total Direct Costs (TDC)          |             |                   |        |           | 156227      | 253466 | 465074    | 15291375         |                     |
| Indirects 75% of Labor TDC        |             |                   |        |           |             | 190099 |           | 190099           |                     |
| Profit @ 10% of TDC               |             |                   |        |           |             |        |           | 1616614          |                     |
| Total                             |             |                   |        |           | 156227      | 443565 | 465074    | 15291375         |                     |
| Working Level: C=0.70             |             |                   |        |           |             |        |           | 17972855         |                     |
| Health & Safety Monitoring at .08 |             |                   |        |           |             |        |           | 636047           |                     |
|                                   |             |                   |        |           |             |        |           | 744356           |                     |
| Total Field Cost (TFC)            |             |                   |        |           |             |        |           | 19353259         |                     |
| Contingency @ 20% of TFC          |             |                   |        |           |             |        |           | 3870652          |                     |
| Engineering @ 5% of TFC           |             |                   |        |           |             |        |           | 967663           |                     |
| CAPITAL COST THIS PAGE            |             |                   |        |           |             |        |           | 24191573         |                     |

SENSITIVITY FACTORS

1A

| SENSITIVITY FACTOR   | JUSTIFICATION FOR CONSIDERATION | RANGE  | JUSTIFICATION FOR RANGE   |
|--|---------------------------------|--|---|
| <u>Excavation</u><br>Sludges   | Major construction item         | -50<br>+50   | Actual field conditions may warrant changes in final design stage |
| <u>Reclamation</u><br>Backfill<br>Topsoil<br>Revegetation<br><br>Sheet Pile Wall | Major construction item         | -50<br>+50<br>-10<br>+20<br>-10<br>+20<br>-10<br>+20 | Actual field conditions may warrant changes in final design stage |
| <u>Hauling</u><br>Sludges<br>Leachate Lagoon Sed.                                | Major construction item         | -50<br>+50<br>-10<br>+20                             | Actual field conditions may warrant changes in final design stage |
| <u>Disposal</u><br>Sludges<br>Leachate Lagoon Sed.                               | Major construction item         | -50<br>+50<br>-10<br>+20                             | Actual field conditions may warrant changes in final design stage |

DRAKE CHEMICAL LEACHATE LAGOON REMEDIATION  
EXCAVATION, EBS CONTROLS AND DISPOSAL AT DUPONT IN NJ  
DRAPREP

RAA 2

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |        |           | DIRECT COST |       |           | ITEM DIRECT COST | COMMENTS          |
|----------------------------------|----------|-------------------|--------|-----------|-------------|-------|-----------|------------------|-------------------|
|                                  |          | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |                  |                   |
| LEACHATE LAGOON                  |          |                   |        |           |             |       |           |                  |                   |
| EXCAVATE LAGOON SEDIMENTS        | 2500     |                   | \$2.16 | \$3.04    |             | 5400  | 7600      | 13000            |                   |
| EXCAVATE FOR EBS CONTROLS        | 2100     |                   | \$1.67 | \$2.58    |             | 3507  | 5418      | 8925             |                   |
| BACKFILL AREA                    | 4300     | \$1.50            | \$1.20 | \$2.83    | 6450        | 5160  | 12169     | 23779            |                   |
| REVEGETATION                     | 34       | \$24.60           | \$5.60 | \$4.45    | 836         | 190   | 151       | 1178.1           |                   |
| TOPSOIL                          | 630      | \$5.50            | \$1.20 | \$2.83    | 3465        | 756   | 1783      | 6003.9           |                   |
| SILT FENCES (TEMPORARY)          | 7000     | \$2.25            | \$0.16 |           | 15750       | 1120  | 6300      | 16870            |                   |
| VACUUM OFF AQUEOUS WASTES        | 280      |                   | \$3.00 | \$22.50   |             | 840   |           | 7140             | 4,000 gal/TRL &   |
| HAULING                          | 70       |                   |        |           |             |       |           | 56000            | 250 ml. @ \$4/ml. |
| DISPOSAL                         | 280      |                   |        | \$800.00  |             |       |           | 56000            | 1,000 gal/MGL @   |
|                                  |          |                   |        | \$200.00  |             |       |           | 56000            | \$0.20 / gal      |
| Total                            |          |                   |        |           | 26501       | 16973 | 33421     | 112000           | 188896            |
| Subcontractor @ 10% of Sub.      |          |                   |        |           |             |       |           | 11200            |                   |
| Burden @ 13% of Labor Cost       |          |                   |        |           |             | 2207  |           | 2207             |                   |
| Labor @ 15% of Labor Cost        |          |                   |        |           |             | 2546  |           | 2546             |                   |
| Material @ 5% of Material Cost   |          |                   |        |           | 1325        |       |           | 1325             |                   |
| Total Direct Costs (IDC)         |          |                   |        |           | 27826       | 21726 | 33421     | 123200           | 206174            |
| Indirects 75% of Labor IDC       |          |                   |        |           |             | 16294 |           | 16294            |                   |
| Profit @ 10% of IDC              |          |                   |        |           |             |       |           | 20617            |                   |
| Total                            |          |                   |        |           | 27826       | 38020 | 33421     | 123200           | 243085            |
| Working level: C=.7              |          |                   |        |           |             |       |           | 50009            |                   |
| Health & Safety Monitoring at .1 |          |                   |        |           |             |       |           | 29309            |                   |
| Total Field Cost (IFC)           |          |                   |        |           |             |       |           | 322404           |                   |
| Contingency @ 20% of IFC         |          |                   |        |           |             |       |           | 64481            |                   |
| Engineering @ 5% of IFC          |          |                   |        |           |             |       |           | 16120            |                   |
| CAPITAL COST THIS PAGE           |          |                   |        |           |             |       |           | 403005           |                   |

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BRAKE (HEMICAL DECON AND HAUL ROADS  
HYDRATION

| ITEM                              | QUANTITY | DIRECT UNIT PRICE |        |           | DIRECT COST |       |           | ITEM<br>DIRECT<br>COST  | COMMENTS |
|-----------------------------------|----------|-------------------|--------|-----------|-------------|-------|-----------|---|----------|
|                                   |          | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |   |          |
| ACCESS ROAD                       |          |                   |        |           |             |       |           |   |          |
| GRAVEL ROADCURSE                  | 2000 CY  | \$10.00           | \$1.20 | \$2.83    | 20000       | 2400  | 5660      | 28060   |          |
| GLOTTXITIE MAI                    | 18700 SF | \$1.15            | \$0.16 | \$0.00    | 21505       | 2992  |           | 24497   |          |
| EXCAVATION & GRADING              | 2000 CY  | \$0.00            | \$1.20 | \$2.83    |             | 2400  | 5660      | 8060  |          |
| DECON                             |          |                   |        |           |             |       |           |   |          |
| DECON STATION                     | 1 UNIT   |                   |        |           | \$20000.00  |       |           | 20000   |          |
| HYDRO BLASTING EQ                 | 1 UNIT   |                   |        |           | \$68840.00  |       |           | 68840   |          |
| DECON FLUID HAULING               | 180 TRL  |                   |        |           | \$800.00    |       |           | 144000  |          |
|                                   |          |                   |        |           | \$200.00    |       |           |   |          |
| DISPOSAL                          | 720 MGI  |                   |        |           |             |       |           | 144000  |          |
|                                   |          |                   |        |           |             |       |           | 4,000 gal/TRL<br>250 mi. @ \$4/mi.<br>1,000 gal/NGL @<br>\$0.20 / gal |          |
| Total                             |          |                   |        |           | 41505       | 7792  | 11320     | 376840  | 437457   |
| Subcontractor @ 10% of Sub        |          |                   |        |           |             |       |           | 37684   |          |
| Burden @ 13% of Labor Cost        |          |                   |        |           |             | 1013  |           | 1013  |          |
| Labor @ 15% of Labor Cost         |          |                   |        |           |             | 1169  |           | 1169  |          |
| Material @ 5% of Material Cost    |          |                   |        |           | 2075        |       |           | 2075  |          |
| Total Direct Costs (TDC)          |          |                   |        |           | 43580       | 9974  | 11320     | 414524  | 479398   |
| Indirects 75% of Labor TDC        |          |                   |        |           |             | 7480  |           | 7480  |          |
| Profit @ 10% of TDC               |          |                   |        |           |             |       |           | 47940   |          |
| Total                             |          |                   |        |           | 43580       | 17454 | 11320     | 414524  | 534818   |
| Working level: D=.15              |          |                   |        |           |             |       |           | 4316  |          |
| Health & Safety Monitoring at .08 |          |                   |        |           |             |       |           | 43131   |          |
| Total Field Cost (TFC)            |          |                   |        |           |             |       |           | 582265  |          |
| Contingency @ 20% of TFC          |          |                   |        |           |             |       |           | 116453  |          |
| Engineering @ 5% of TFC           |          |                   |        |           |             |       |           | 29113   |          |
| CAPITAL COST THIS PAGE            |          |                   |        |           |             |       |           | 727831  |          |

SENSITIVITY FACTORS  
SITE PREP

| SENSITIVITY FACTOR               | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE  |
|----------------------------------|---------------------------------|------------|--|
| Access Roads                     | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| E & S Controls                   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Decontamination Station          | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Leachate Lagoon Area Remediation | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 1A

| COST COMPONENT                       | ESTIMATE (\$) | BASIS OF ESTIMATE              | FREQUENCY | YEAR   |
|--------------------------------------|---------------|--------------------------------|-----------|--------|
| *****                                |               |                                |           |        |
| O & M COSTS                          | *             | *                              | *         | *      |
| 1. Operating Labor                   | *             | * 2 men @ \$30 / hr.           | *         | *      |
| a. Sampling                          | * \$1920.00   | * 32 hrs. 2 x yr.              | *         | * 1-30 |
| b. Inspection                        | * \$1920.00   | *                              | *         | *      |
| c.                                   | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| 2. Maintenance, Matl's and labor     | *             | *                              | *         | *      |
| a. Labor                             | * \$3000.00   | * @ 2% of Material Direct Cost | *         | * 1-30 |
| b. Material                          | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| 3. Auxiliary Materials and Labor     | *             | *                              | *         | *      |
| a.                                   | *             | *                              | *         | *      |
| b.                                   | *             | *                              | *         | *      |
| c.                                   | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| 4. Purchased Services                | *             | * Laboratory Analysis          | *         | *      |
| a. Equipment                         | * \$20000.00  | * 10 samples @ \$1000 / sample | *         | * 1-30 |
| b.                                   | *             | * 2 x yr.                      | *         | *      |
| c.                                   | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| 5. Disposal                          | *             | *                              | *         | *      |
| a.                                   | *             | *                              | *         | *      |
| b.                                   | *             | *                              | *         | *      |
| c.                                   | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| 6. Administration                    | *             | * Report Preparation           | *         | *      |
| a.                                   | * \$960.00    | * 1 man @ \$60/hr              | *         | * 1-30 |
| b.                                   | *             | * 8 hrs. 2 x yr.               | *         | *      |
| c.                                   | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| 7. Insurances, Taxes Licenses        | *             | *                              | *         | *      |
| a.                                   | *             | *                              | *         | *      |
| b.                                   | *             | *                              | *         | *      |
| c.                                   | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| 8. Maintenance and Contingency Costs | * \$1390.00   | * @ 5% of O&M Costs            | *         | * 1-30 |
| a.                                   | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| 9. Other                             | *             | *                              | *         | *      |
| *****                                |               |                                |           |        |
| ANNUALIZED CAPITAL COST              | * \$29190.00  | *                              | *         | * 1-30 |
| *****                                |               |                                |           |        |

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SITE: DRAKE CHEMICAL  
ALTERNATIVE NO.: 1A  
25598

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 25323                           |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 29.2  |       |       |       |       |       |       |       |       |       |      |
| 3. ANNUAL COSTS             | 25323                           | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  | 29.2 |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| PRESENT WORTH =             | 25323                           | 27    | 24    | 22    | 20    | 18    | 16    | 15    | 14    | 12    | 11    | 10   |

|                          |       |      |       |       |       |       |      |       |       |       |       |       |
|--------------------------|-------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| O & M COSTS              | 12    | 13   | 14    | 15    | 16    | 17    | 18   | 19    | 20    | 21    | 22    | 23    |
| ANNUAL DISCOUNT RATE=10% | 29.2  | 29.2 | 29.2  | 29.2  | 29.2  | 29.2  | 29.2 | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  |
| PRESENT WORTH =          | 0.319 | 0.29 | 0.263 | 0.239 | 0.218 | 0.198 | 0.18 | 0.164 | 0.149 | 0.135 | 0.123 | 0.112 |

PRESENT WORTH =

|       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|
| 24    | 25    | 26    | 27    | 28    | 29    | 30    |
| 29.2  | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  | 29.2  |
| 0.101 | 0.092 | 0.084 | 0.076 | 0.069 | 0.063 | 0.057 |

PRESENT WORTH =

|                     |       |   |   |   |   |   |
|---------------------|-------|---|---|---|---|---|
| 3                   | 3     | 2 | 2 | 2 | 2 | 2 |
| TOTAL PRESENT WORTH | 25598 |   |   |   |   |   |

ORIGINAL  
(Red)

ALTERNATIVE A2

B-9

AR301241

ORIGINAL (Red)

DRAKE CHEMICAL RAA 2A  
DISPOSAL AT ROLLINS INCINERATOR, BRIDGEPORT, NJ  
DRARAAZ

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |         |           | DIRECT COST |        |           | ITEM DIRECT COST | COMMENTS              |
|----------------------------------|----------|-------------------|---------|-----------|-------------|--------|-----------|------------------|-----------------------|
|                                  |          | MATERIALS         | LABOR   | EQUIPMENT | MATERIALS   | LABOR  | EQUIPMENT |                  |                       |
| EXCAVATION                       |          |                   |         |           |             |        |           |                  |                       |
| SLUDGES                          | 69000    | CY                | \$1.48  | \$3.59    | 102120      | 247710 | 349830    |                  |                       |
| RECLAMATION                      |          |                   |         |           |             |        |           |                  |                       |
| BACKFILL                         | 69000    | CY                | \$1.50  | \$2.83    | 82800       | 195270 | 381570    |                  |                       |
| TOPSOIL                          | 5200     | CY                | \$5.50  | \$2.83    | 6240        | 14716  | 49556     |                  |                       |
| REVEGETATION                     | 280      | MSF               | \$24.60 | \$4.45    |             | 1246   | 1246      |                  |                       |
| SHEETPILE CUTOFF WALL            | 2800     | SF                | \$3.50  | \$2.19    | 5292        | 6132   | 21224     |                  |                       |
| HAULING                          |          |                   |         |           |             |        |           |                  |                       |
| SLUDGES                          | 4300     | TRL               |         | \$600.00  |             |        | 2580000   |                  | 5 DR/CY, 80 DR/TRL    |
| LEACHATE LAGOON                  | 160      | TRL               |         | \$600.00  |             |        | 96000     |                  | 150 mi./TRL @ \$4/mi. |
| DISPOSAL                         |          |                   |         |           |             |        |           |                  |                       |
| SLUDGE                           | 345000   | DR                |         | \$72.00   |             |        | 24840000  |                  | \$72 / Drum           |
| LEACHATE LAGOON                  | 12500    | DR                |         | \$72.00   |             |        | 900000    |                  |                       |
| Total                            |          |                   |         |           | 141900      | 196452 | 465074    | 28416000         | 29219426              |
| Subcontractor @ 10% of Sub.      |          |                   |         |           |             |        | 2841600   |                  |                       |
| Burden @ 13% of Labor Cost       |          |                   |         |           |             | 25539  |           | 25539            |                       |
| Labor @ 15% of Labor Cost        |          |                   |         |           |             | 29468  |           | 29468            |                       |
| Material @ 5% of Material Cost   |          |                   |         |           | 7095        |        |           | 7095             |                       |
| Total Direct Costs (TDC)         |          |                   |         |           | 148995      | 251459 | 465074    | 31257600         | 32123128              |
| Indirects 75% of Labor TDC       |          |                   |         |           |             | 188594 |           | 188594           |                       |
| Profit @ 10% of TDC              |          |                   |         |           |             |        |           | 3212313          |                       |
| Total                            |          |                   |         |           | 148995      | 440052 | 465074    | 31257600         | 35524034              |
| Working Level: C=0.70            |          |                   |         |           |             |        |           | 633589           |                       |
| Health & Safety Monitoring @ .04 |          |                   |         |           |             |        |           | 1446305          |                       |
| Total Field Cost (TFC)           |          |                   |         |           |             |        |           | 37603928         |                       |
| Contingency @ 20% of TFC         |          |                   |         |           |             |        |           | 7520786          |                       |
| Engineering @ 5% of TFC          |          |                   |         |           |             |        |           | 1880196          |                       |
| CAPITAL COST THIS PAGE           |          |                   |         |           |             |        |           | 47004910         |                       |

SENSITIVITY FACTORS

2A

| SENSITIVITY FACTOR             | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|--------------------------------|---------------------------------|------------|---|
| <u>Excavation</u><br>Sludges   | Major construction item         | -50<br>+50 | Actual field conditions may warrant changes in final design stage |
| <u>Reclamation</u><br>Backfill | Major construction item         | -50<br>+50 | Actual field conditions may warrant changes in final design stage |
| Topsoil                        |                                 | -10<br>+20 |   |
| Revegetation                   |                                 | -10<br>+20 |   |
| Sheet pile                     |                                 | -10<br>+20 |   |
| <u>Hauling</u><br>Sludges      | Major construction item         | -50<br>+50 | Actual field conditions may warrant changes in final design stage |
| Leachate Lagoon                |                                 | -10<br>+20 |   |
| <u>Disposal</u><br>Sludges     | Major construction item         | -50<br>+50 | Actual field conditions may warrant changes in final design stage |
| Leachate Lagoon                |                                 | -10<br>+10 |   |

DRAKE CHEMICAL LEACHATE LAGOON REMEDIATION  
EXCAVATION, E&S CONTROLS AND DISPOSAL AT DUPONT IN NJ  
DRAPREP

RAA ?

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |        |           |          | DIRECT COST |       |           | ITEM DIRECT COST | COMMENTS                          |
|----------------------------------|----------|-------------------|--------|-----------|----------|-------------|-------|-----------|------------------|-----------------------------------|
|                                  |          | MATERIALS         | LABOR  | EQUIPMENT | SUB.     | MATERIALS   | LABOR | EQUIPMENT |                  |                                   |
| LEACHATE LAGOON                  |          |                   |        |           |          |             |       |           |                  |                                   |
| EXCAVATE LAGOON SEDIMENTS        | 2500     |                   | \$2.16 | \$3.04    |          | 5400        | 7600  |           | 13000            |                                   |
| EXCAVATE FOR E&S CONTROLS        | 2100     |                   | \$1.67 | \$2.58    |          | 3507        | 5418  |           | 8925             |                                   |
| BACKFILL AREA                    | 4300     | \$1.50            | \$1.20 | \$2.83    |          | 6450        | 12169 |           | 23779            |                                   |
| REVEGETATION                     | 34       | \$24.60           | \$5.60 | \$4.45    |          | 190         | 151   |           | 1178.1           |                                   |
| TOPSOIL                          | 630      | \$5.50            | \$1.20 | \$2.83    |          | 3465        | 1783  |           | 6003.9           |                                   |
| SILT FENCES (TEMPORARY)          | 7000     | \$2.25            | \$0.16 |           |          | 1120        | 6300  |           | 16870            |                                   |
| VACUUM OFF AQUEOUS WASTES        | 280      |                   | \$3.00 | \$22.50   | \$800.00 | 840         |       | 56000     | 56000            | 4,000 gal/TRL & 250 ml. @ \$4/ml. |
| HAULING                          | 70       |                   |        |           |          |             |       | 56000     | 56000            | 1,000 gal/MCL @ \$0.20 / gal      |
| DISPOSAL                         | 280      |                   |        |           | \$200.00 |             |       |           |                  |                                   |
| <b>Total</b>                     |          |                   |        |           |          | 26501       | 33421 | 112000    | 188896           |                                   |
| Subcontractor @ 10% of Sub.      |          |                   |        |           |          |             |       | 11200     | 11200            |                                   |
| Burden @ 13% of Labor Cost       |          |                   |        |           |          | 2207        |       |           | 2207             |                                   |
| Labor @ 15% of Labor Cost        |          |                   |        |           |          | 2546        |       |           | 2546             |                                   |
| Material @ 5% of Material Cost   |          |                   |        |           |          | 1325        |       |           | 1325             |                                   |
| <b>Total Direct Costs (TDC)</b>  |          |                   |        |           |          | 27826       | 33421 | 123200    | 206174           |                                   |
| Indirects 75% of Labor TDC       |          |                   |        |           |          | 16294       |       |           | 16294            |                                   |
| Profit @ 10% of TDC              |          |                   |        |           |          |             |       |           | 20617            |                                   |
| <b>Total</b>                     |          |                   |        |           |          | 27826       | 38020 | 123200    | 243085           |                                   |
| Working Level: C=-7              |          |                   |        |           |          |             |       |           | 50009            |                                   |
| Health & Safety Monitoring at .1 |          |                   |        |           |          |             |       |           | 29309            |                                   |
| <b>Total Field Cost (TFC)</b>    |          |                   |        |           |          |             |       |           | 322404           |                                   |
| Contingency @ 20% of TFC         |          |                   |        |           |          |             |       |           | 64481            |                                   |
| Engineering @ 5% of TFC          |          |                   |        |           |          |             |       |           | 16120            |                                   |
| <b>CAPITAL COST THIS PAGE</b>    |          |                   |        |           |          |             |       |           | 403005           |                                   |

ORIGINAL (Red)

DRAKE CHEMICAL INCORP AND HAUL ROADS  
BRANDTICH

| ITEM                              | QUANTITY | DIRECT UNIT PRICE |        |           |            | DIRECT COST |       |             | ITEM<br>DIREC<br>COST | COMMENTS   |
|-----------------------------------|----------|-------------------|--------|-----------|------------|-------------|-------|-------------|-----------------------|--|
|                                   |          | MATERIALS         | LABOR  | EQUIPMENT | SUB.       | MATERIALS   | LABOR | EQUIPMENT   |                       |  |
| ACCESS ROAD                       |          |                   |        |           |            |             |       |             |                       |  |
| GRAVEL ROADCOURSE                 | 2000 CY  | \$10.00           | \$1.20 | \$2.83    |            | 20000       | 5660  |             | 28060                 |  |
| GEOTEXTILE MAT                    | 10700 SF | \$1.15            | \$0.16 | \$0.00    |            | 21505       | 2992  |             | 24497                 |  |
| EXCAVATION & GRADING              | 2000 CY  | \$0.00            | \$1.20 | \$2.83    |            |             | 5660  |             | 8060                  |  |
| INCOR                             |          |                   |        |           |            |             |       |             |                       |  |
| INCOR STATION                     | 1 UNIT   |                   |        |           | \$20000.00 |             |       | \$20000.00  | 20000                 |  |
| HYDRO BLASTING EQ                 | 1 UNIT   |                   |        |           | \$68840.00 |             |       | \$68840.00  | 68840                 |  |
| INCOR FLUID HOURLING              | 100 TPH  |                   |        |           | \$8000.00  |             |       | \$144000.00 | 144000                | 4,000 gal/TRI<br>250 ml. @ \$4/ml.<br>1,000 gal/INCL @<br>\$0.20 / gal |
| DISPOSAL                          | 720 MCH  |                   |        |           | \$200.00   |             |       | \$144000.00 | 144000                |  |
| <hr/>                             |          |                   |        |           |            |             |       |             |                       |  |
| Total                             |          |                   |        |           |            | 41505       | 7792  | 11320       | 376840                | 437457   |
| Subcontractor @ 10% of Sub        |          |                   |        |           |            |             |       |             |                       |  |
| Burden @ 13% of Labor Cost        |          |                   |        |           |            |             |       |             |                       |  |
| Labor @ 15% of Labor Cost         |          |                   |        |           |            |             |       |             |                       |  |
| Material @ 5% of Material Cost    |          |                   |        |           |            |             |       |             |                       |  |
| <hr/>                             |          |                   |        |           |            |             |       |             |                       |  |
| Total Direct Costs (TDC)          |          |                   |        |           |            | 43580       | 9974  | 11320       | 414524                | 479398   |
| Indirects 75% of Labor TDC        |          |                   |        |           |            |             | 7480  |             |                       | 7480   |
| Profit @ 10% of TDC               |          |                   |        |           |            |             |       |             |                       | 47940  |
| <hr/>                             |          |                   |        |           |            |             |       |             |                       |  |
| Total                             |          |                   |        |           |            | 43580       | 17454 | 11320       | 414524                | 534818   |
| Monitoring level: 0.15            |          |                   |        |           |            |             |       |             |                       | 4316   |
| Health & Safety Monitoring at .08 |          |                   |        |           |            |             |       |             |                       | 43131  |
| <hr/>                             |          |                   |        |           |            |             |       |             |                       |  |
| Total Field Cost (TFC)            |          |                   |        |           |            |             |       |             |                       | 582265   |
| Contingency @ 20% of TFC          |          |                   |        |           |            |             |       |             |                       | 116453   |
| Engineering @ 5% of TFC           |          |                   |        |           |            |             |       |             |                       | 29113  |
| <hr/>                             |          |                   |        |           |            |             |       |             |                       |  |
| CAPITAL COST THIS PAGE            |          |                   |        |           |            |             |       |             |                       | 727831   |

ORIGINAL  
(Rec.)

SENSITIVITY FACTORS

SITE PREP

| SENSITIVITY FACTOR               | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE  |
|----------------------------------|---------------------------------|------------|--|
| Access Roads                     | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| E & S Controls                   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Decontamination Station          | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Leachate Lagoon Area Remediation | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 2A

| COST COMPONENT                          | * ESTIMATE (\$) | * BASIS OF ESTIMATE               | * FREQUENCY | * YEAR |
|---|-----------------|-----------------------------------|-------------|--------|
| *****                                   |                 |                                   |             |        |
| O & M COSTS                             | *               | *                                 | *           | *      |
| 1. Operating Labor                      | *               | * 2 men @ \$30 / hr.              | *           | *      |
| a. Sampling                             | * \$1920.00     | * 32 hrs. 2 x yr.                 | *           | * 1-30 |
| b. Inspection                           | * \$1920.00     | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 2. Maintenance, Mat'l's<br>and labor    | *               | *                                 | *           | *      |
| a. Labor                                | * \$2800.00     | * @ 2% of Material<br>Direct Cost | *           | * 1-30 |
| b. Material                             | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 3. Auxiliary Materials<br>and Labor     | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 4. Purchased Services                   | *               | * Laboratory Analysis             | *           | *      |
| a. Equipment                            | * \$20000.00    | * 10 samples @                    | *           | * 1-30 |
| b.                                      | *               | * \$1000 / sample                 | *           | *      |
| c.                                      | *               | * 2 X YR.                         | *           | *      |
| *****                                   |                 |                                   |             |        |
| 5. Disposal                             | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 6. Administration                       | *               | * Report Preparation              | *           | *      |
|   | * \$960.00      | * 1 man @ \$60/hr                 | *           | * 1-30 |
|   | *               | * 8 hrs. 2 x yr.                  | *           | *      |
| *****                                   |                 |                                   |             |        |
| 7. Insurances, Taxes<br>Licenses        | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 8. Maintenance and<br>Contingency Costs | * \$1380.00     | * @ 5% of O&M Costs               | *           | * 1-30 |
| *****                                   |                 |                                   |             |        |
| 9. Other                                | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| ANNUALIZED CAPITAL<br>COST              | * \$28980.00    | *                                 | *           | * 1-30 |
| *****                                   |                 |                                   |             |        |

70011020  
(REV)

SITE: DRAKE CHEMICAL  
ALTERNATIVE NO.: 2A  
48411

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 48136                           |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 29    |       |       |       |       |       |       |       |       |       |      |
| 3. ANNUAL COSTS             | 48136                           | 29    | 29    | 29    | 29    | 29    | 29    | 29    | 29    | 29    | 29    | 29   |
| 4. ANNUAL DISCOUNT RATE=10% | I                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| PRESENT WORTH =             | 48136                           | 27    | 24    | 22    | 20    | 18    | 16    | 15    | 14    | 12    | 11    | 10   |

|                 |      |       |       |       |       |      |       |       |       |       |       |
|-----------------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| 12              | 13   | 14    | 15    | 16    | 17    | 18   | 19    | 20    | 21    | 22    | 23    |
| 29              | 29   | 29    | 29    | 29    | 29    | 29   | 29    | 29    | 29    | 29    | 29    |
| 0.319           | 0.29 | 0.263 | 0.239 | 0.218 | 0.198 | 0.18 | 0.164 | 0.149 | 0.135 | 0.123 | 0.112 |
| PRESENT WORTH = | 9    | 8     | 7     | 6     | 6     | 5    | 5     | 4     | 4     | 4     | 3     |

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 48136                           |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 29    |       |       |       |       |       |       |       |       |       |      |
| 3. ANNUAL COSTS             | 48136                           | 29    | 29    | 29    | 29    | 29    | 29    | 29    | 29    | 29    | 29    | 29   |
| 4. ANNUAL DISCOUNT RATE=10% | I                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| PRESENT WORTH =             | 48136                           | 27    | 24    | 22    | 20    | 18    | 16    | 15    | 14    | 12    | 11    | 10   |

GI  
tec

ALTERNATIVE A3

ORIGINAL (red)

DRAKE CHEMICAL RAA3A  
 SYNTHETIC CAP  
 DRARAA3

| ITEM                             | QUANTITY  | DIRECT UNIT PRICE |        |           | DIRECT COST |        |              | ITEM DIRECT COST | COMMENTS |
|----------------------------------|-----------|-------------------|--------|-----------|-------------|--------|--------------|------------------|----------|
|                                  |           | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR  | EQUIPMENT    |                  |          |
| CAP                              |           |                   |        |           |             |        |              |                  |          |
| TOPSOIL-6 IN.                    | 4600 CY   | \$5.50            | \$1.20 | \$2.83    | 25300       | 5520   | 13018        | 43838            |          |
| FILTER FABRIC                    | 2800 SY   | \$1.15            | \$0.16 |           | 3220        | 448    |              | 3668             |          |
| SW SAND (12 in.)                 | 9600 CY   | \$10.40           | \$1.54 | \$0.59    | 99840       | 14784  | 5664         | 120288           |          |
| 50 MIL MEMBRANE                  | 250000 SF |                   |        | \$0.80    |             |        | \$2000000.00 | 200000           |          |
| PERF. PVC PIPE-4 in.             | 1600 LF   | \$0.65            | \$1.32 |           | 1040        | 2112   |              | 3152             |          |
| REVEGETATION                     | 375 MSF   | \$24.60           | \$5.60 | \$4.45    | 9225        | 2100   | 1669         | 12994            |          |
| GRADE BACKFILL                   | 47000 CY  | \$1.50            | \$1.20 | \$2.83    | 70500       | 56400  | 133010       | 259910           |          |
| FLOOD DIKE CONSTRUCTION          |           |                   |        |           |             |        |              |                  |          |
| FILL                             | 20700 CY  | \$1.50            | \$2.40 | \$5.66    | 31050       | 49680  | 117162       | 197892           |          |
| EXCAVATION OF KEY                | 27000 CY  |                   | \$1.26 | \$1.35    | 34020       | 36450  |              | 70470            |          |
| BACKFILL                         | 27000 CY  | \$1.50            | \$2.40 | \$5.66    | 40500       | 64800  | 152820       | 258120           |          |
| Total                            |           |                   |        |           | 280675      | 229864 | 459793       | 1170332          |          |
| Subcontractor @ 10% of Sub       |           |                   |        |           |             |        | 20000        | 20000            |          |
| Burden @ 13% of Labor Cost       |           |                   |        |           |             | 29882  |              | 29882            |          |
| Labor @ 15% of Labor Cost        |           |                   |        |           |             | 34480  |              | 34480            |          |
| Material @ 5% of Material Cost   |           |                   |        |           | 14034       |        |              | 14034            |          |
| Total Direct Costs (TDC)         |           |                   |        |           | 294709      | 294226 | 459793       | 220000           | 1268727  |
| Indirects 75% of Labor TDC       |           |                   |        |           |             | 220669 |              | 220669           |          |
| Profit @ 10% of TDC              |           |                   |        |           |             |        |              | 126873           |          |
| Total                            |           |                   |        |           | 294709      | 514895 | 459793       | 220000           | 1616270  |
| Working Level: C=0.70            |           |                   |        |           |             |        |              | 682282           |          |
| Health & Safety Monitoring @ .08 |           |                   |        |           |             |        |              | 183884           |          |
| Total Field Cost (TFC)           |           |                   |        |           |             |        |              | 2482435          |          |
| Contingency @ 20% of TFC         |           |                   |        |           |             |        |              | 496487           |          |
| Engineering @ 5% of TFC          |           |                   |        |           |             |        |              | 124122           |          |
| CAPITAL COST THIS PAGE           |           |                   |        |           |             |        |              | 3103044          |          |

SENSITIVITY FACTORS

ORIGINAL  
(Rec)

3A

| SENSITIVITY FACTOR      | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|-------------------------|---------------------------------|------------|---|
| Cap Construction        | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Flood Dike Construction | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

ORIGINAL (Red)

BRAKE CHEMICAL LEACHATE LAGOON REMEDIATION  
 EXCAVATION, EBS CONTROLS AND DISPOSAL AT DUPONT IN NJ  
 DRAPREP

RAA 2

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |        |           | DIRECT COST |       |           | ITEM DIRECT COST | COMMENTS          |
|----------------------------------|----------|-------------------|--------|-----------|-------------|-------|-----------|------------------|-------------------|
|                                  |          | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |                  |                   |
| LEACHATE LAGOON                  |          |                   |        |           |             |       |           |                  |                   |
| EXCAVATE LAGOON SEDIMENTS        | 2500     |                   | \$2.16 | \$3.04    |             | 5400  | 7600      | 13000            |                   |
| EXCAVATE FOR E&S CONTROLS        | 2100     |                   | \$1.67 | \$2.58    |             | 3507  | 5418      | 8925             |                   |
| BACKFILL AREA                    | 4300     | \$1.50            | \$1.20 | \$2.83    | 6450        | 5160  | 12169     | 23779            |                   |
| REVEGETATION                     | 34       | MSF               | \$5.60 | \$4.45    | 836         | 190   | 151       | 1178.1           |                   |
| TOPSOIL                          | 630      | CY                | \$1.20 | \$2.83    | 3465        | 756   | 1783      | 6003.9           |                   |
| SILT FENCES (TEMPORARY)          | 7000     | LF                | \$0.16 |           | 15750       | 1120  |           | 16870            |                   |
| VACUUM OFF AQUEOUS WASTES        | 280      | GAL               | \$3.00 | \$22.50   |             | 840   | 6300      | 7140             | 4,000 gal/TRL &   |
| HAULING                          | 70       | TRL               |        | \$800.00  |             |       |           | 56000            | 250 ml. @ \$9/ml. |
| DISPOSAL                         | 280      | MGL               |        | \$200.00  |             |       |           | 56000            | 1,000 gal/MGL @   |
|                                  |          |                   |        |           |             |       |           |                  | \$0.20 / gal      |
| Total                            |          |                   |        |           | 26501       | 16973 | 33421     | 112000           | 188896            |
| Subcontractor @ 10% of Sub.      |          |                   |        |           |             |       |           | 11200            |                   |
| Burden @ 13% of Labor Cost       |          |                   |        |           |             | 2207  |           |                  | 2207              |
| Labor @ 15% of Labor Cost        |          |                   |        |           |             | 2546  |           |                  | 2546              |
| Material @ 5% of Material Cost   |          |                   |        |           | 1325        |       |           |                  | 1325              |
| Total Direct Costs (TDC)         |          |                   |        |           | 27826       | 21726 | 33421     | 123200           | 206174            |
| Indirects 75% of Labor TDC       |          |                   |        |           |             | 16294 |           |                  | 16294             |
| Profit @ 10% of TDC              |          |                   |        |           |             |       |           |                  | 20617             |
| Total                            |          |                   |        |           | 27826       | 38020 | 33421     | 123200           | 243085            |
| Working Level: C=.7              |          |                   |        |           |             |       |           |                  | 50009             |
| Health & Safety Monitoring at .1 |          |                   |        |           |             |       |           |                  | 29309             |
| Total Field Cost (TFC)           |          |                   |        |           |             |       |           |                  | 322404            |
| Contingency @ 20% of TFC         |          |                   |        |           |             |       |           |                  | 64481             |
| Engineering @ 5% of TFC          |          |                   |        |           |             |       |           |                  | 16120             |
| CAPITAL COST THIS PAGE           |          |                   |        |           |             |       |           |                  | 403005            |

ORIGINAL  
(Red)

BRAKE CRITICAL DECOR AND HAUL ROADS  
DRAHECON

| ITEM   | QUANTITY | DIRECT UNIT PRICE |        |           | DIRECT COST |       |           | ITEM COST  | COMMENTS |
|--|----------|-------------------|--------|-----------|-------------|-------|-----------|--|----------|
|  |          | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |  |          |
| ACCESS ROAD  |          |                   |        |           |             |       |           |  |          |
| GRAVEL ROADBASE  | 2000 CY  | \$10.00           | \$1.20 | \$2.83    | 20000       | 2400  | 5660      | 28060  |          |
| GLOTTITE MAT   | 18700 SF | \$1.15            | \$0.16 | \$0.00    | 21505       | 2992  |           | 24497  |          |
| EXCAVATION & GRADING   | 2000 CY  | \$0.00            | \$1.20 | \$2.83    |             | 2400  | 5660      | 8060   |          |
| DECOR  |          |                   |        |           |             |       |           |  |          |
| DECOR STATION  | 1 UNIT   |                   |        |           | \$20000.00  |       |           | 20000  |          |
| HYDRO BLASTING EQ  | 1 UNIT   |                   |        |           | \$68840.00  |       |           | 68840  |          |
| DECOR FLUID HAULING  | 180 TRL  |                   |        |           | \$800.00    |       |           | 144000   |          |
| DISPOSAL   | 720 MGL  |                   |        |           | \$200.00    |       |           | 144000   |          |
|  |          |                   |        |           |             |       |           | 4,000 gal/TRL<br>250 ml. @ \$4/ml.<br>1,000 gal/MGL @<br>\$.20 / gal |          |
| Total  |          |                   |        |           | 41505       | 7792  | 11320     | 437457   |          |
| Subcontractor @ 10% of Sub Burden @ 13% of Labor Cost Labor @ 15% of Labor Cost Material @ 5% of Material Cost |          |                   |        |           |             |       |           | 37684  |          |
| Total Direct Costs (TDC)   |          |                   |        |           |             |       |           | 1013   |          |
| Indirects 75% of Labor TDC Profit @ 10% of TDC   |          |                   |        |           |             |       |           | 1169   |          |
|  |          |                   |        |           | 2075        |       |           | 2075   |          |
| Total  |          |                   |        |           | 43580       | 9974  | 11320     | 479398   |          |
| Working level: D-15 Health & Safety Monitoring at .08  |          |                   |        |           |             | 7480  |           | 7480   |          |
| Total Field Cost (TFC)   |          |                   |        |           | 43580       | 17454 | 11320     | 534818   |          |
| Contingency @ 20% of TFC Engineering @ 5% of TFC   |          |                   |        |           |             |       |           | 4316   |          |
| CAPITAL COST THIS PAGE   |          |                   |        |           |             |       |           | 43131  |          |
|  |          |                   |        |           |             |       |           | 582265   |          |
|  |          |                   |        |           |             |       |           | 116453   |          |
|  |          |                   |        |           |             |       |           | 29113  |          |
|  |          |                   |        |           |             |       |           | 727831   |          |

SENSITIVITY FACTORS  
SITE PREP

| SENSITIVITY FACTOR               | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE  |
|----------------------------------|---------------------------------|------------|--|
| Access Roads                     | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| E & S Controls                   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Decontamination Station          | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Leachate Lagoon Area Remediation | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 3A

| COST COMPONENT                          | * ESTIMATE (\$) | * BASIS OF ESTIMATE               | * FREQUENCY | * YEAR |
|---|-----------------|-----------------------------------|-------------|--------|
| *****                                   |                 |                                   |             |        |
| O & M COSTS                             | *               | *                                 | *           | *      |
| 1. Operating Labor                      | *               | * 2 men @ \$30 / hr.              | *           | *      |
| a. Sampling                             | * \$1920.00     | * 32 hrs. 2 x yr.                 | *           | * 1-30 |
| b. Inspection                           | * \$1920.00     | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 2. Maintenance, Matl's<br>and labor     | *               | *                                 | *           | *      |
| a. Labor                                | * \$5600.00     | * @ 2% of Material<br>Direct Cost | *           | * 1-30 |
| b. Material                             | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 3. Auxiliary Materials<br>and Labor     | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 4. Purchased Services                   | *               | * Laboratory Analysis             | *           | *      |
| a. Equipment                            | * \$20000.00    | * 10 samples @                    | *           | * 1-30 |
| b.                                      | *               | * \$1000 / sample                 | *           | *      |
| c.                                      | *               | * 2 x yr.                         | *           | *      |
| *****                                   |                 |                                   |             |        |
| 5. Disposal                             | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 6. Administration                       | *               | * Report Preparation              | *           | *      |
|   | * \$960.00      | * 1 man @ \$60/hr                 | *           | * 1-30 |
|   | *               | * 8 hrs. 2 x yr.                  | *           | *      |
| *****                                   |                 |                                   |             |        |
| 7. Insurances, Taxes<br>Licenses        | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 8. Maintenance and<br>Contingency Costs | * \$1520.00     | * @ 5% of O&M Costs               | *           | * 1-30 |
| *****                                   |                 |                                   |             |        |
| 9. Other                                | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| ANNUALIZED CAPITAL<br>COST              | * \$31920.00    | *                                 | *           | * 1-30 |
| *****                                   |                 |                                   |             |        |

SITE: DRAKE CHEMICAL  
 ALTERNATIVE NO.: 3A  
 4535

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |         |       |       |       |       |       |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6       | 7     | 8     | 9     | 10    | 11    |
| 1. CAPITAL COSTS            | 4234                            |       |       |       |       |       |         |       |       |       |       |       |
| 2. O & M COSTS              | ---                             | 31.9  |       |       |       |       |         |       |       |       |       |       |
| 3. ANNUAL COSTS             | 4234                            | 31.9  | 31.9  | 31.9  | 31.9  | 31.9  | 31.9    | 31.9  | 31.9  | 31.9  | 31.9  | 31.9  |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564   | 0.513 | 0.467 | 0.424 | 0.386 | 0.35  |
| PRESENT WORTH =             | 4234                            | 29    | 26    | 24    | 22    | 20    | 18      | 16    | 15    | 14    | 12    | 11    |
| -----                       |                                 |       |       |       |       |       |         |       |       |       |       |       |
| 12                          | 13                              | 14    | 15    | 16    | 17    | 18    | 19      | 20    | 21    | 22    | 23    |       |
| O & M COSTS                 | 31.9                            | 31.9  | 31.9  | 31.9  | 31.9  | 31.9  | 31.9    | 31.9  | 31.9  | 31.9  | 31.9  | 31.9  |
| ANNUAL DISCOUNT RATE=10%    | 0.319                           | 0.29  | 0.263 | 0.239 | 0.218 | 0.198 | 0.18    | 0.164 | 0.149 | 0.135 | 0.123 | 0.112 |
| PRESENT WORTH =             | 10                              | 9     | 8     | 8     | 7     | 6     | 6       | 5     | 5     | 4     | 4     | 4     |
| -----                       |                                 |       |       |       |       |       |         |       |       |       |       |       |
| 24                          | 25                              | 26    | 27    | 28    | 29    | 30    | TOTAL   |       |       |       |       |       |
| O & M COSTS                 | 31.9                            | 31.9  | 31.9  | 31.9  | 31.9  | 31.9  | PRESENT |       |       |       |       |       |
| ANNUAL DISCOUNT RATE=10%    | 0.101                           | 0.092 | 0.084 | 0.076 | 0.069 | 0.063 | WORTH   |       |       |       |       |       |
| PRESENT WORTH =             | 3                               | 3     | 3     | 2     | 2     | 2     | (000's) |       |       |       |       |       |
| =====                       |                                 |       |       |       |       |       |         |       |       |       |       |       |
|                             |                                 |       |       |       |       |       |         |       |       |       |       | 4535  |
| =====                       |                                 |       |       |       |       |       |         |       |       |       |       |       |

ALTERNATIVE A4

B-25

AR301257

DRAKE CHEMICAL RAA4A  
 ONSITE DOUBLE LINED LANDFILL  
 DRARAA4

| ITEM                             | QUANTITY  | DIRECT UNIT PRICE |        |           |        | DIRECT COST |         |           |             | ITEM DIRECT COST | COMMENTS |  |
|----------------------------------|-----------|-------------------|--------|-----------|--------|-------------|---------|-----------|-------------|------------------|----------|--|
|                                  |           | MATERIALS         | LABOR  | EQUIPMENT | SUB.   | MATERIALS   | LABOR   | EQUIPMENT | SUB.        |                  |          |  |
| LANDFILL                         |           |                   |        |           |        |             |         |           |             |                  |          |  |
| SAND COLLECTION ZONES            | 18000 CY  | \$10.40           | \$1.54 | \$0.59    | \$0.80 | 187200      | 27720   | 10620     |             |                  | 225540   |  |
| 50 MIL MEMBRANES                 | 580000 SF |                   |        |           |        |             |         |           | \$464000.00 |                  | 464000   |  |
| COMPACTED CLAY                   | 10700 CY  | \$9.00            | \$3.76 | \$7.47    |        | 96300       | 40232   | 79929     |             |                  | 216461   |  |
| FILTER FABRIC                    | 48400 SY  | \$1.15            | \$0.16 |           |        | 55660       | 7744    |           |             |                  | 63404    |  |
| COLLECTION PIPE 4 IN             | 1500 LF   | \$0.65            | \$1.32 |           |        | 975         | 1980    |           |             |                  | 2955     |  |
| EXCAVATION                       | 71500 CY  |                   | \$1.26 | \$1.35    |        |             | 90090   | 96525     |             |                  | 186615   |  |
| REVEGETATION                     | 375 MSF   | \$24.60           | \$5.60 | \$4.45    |        | 9225        | 2100    | 1669      |             |                  | 12994    |  |
| TOPSOIL-6 IN                     | 5400 CY   | \$5.50            | \$1.20 | \$2.83    |        | 29700       | 6480    | 15282     |             |                  | 51462    |  |
| SOIL-30 IN.                      | 27000 CY  | \$1.50            | \$1.20 | \$2.83    |        | 40500       | 32400   | 76410     |             |                  | 149310   |  |
| DIKE CONSTRUCTION                |           |                   |        |           |        |             |         |           |             |                  |          |  |
| BACKFILL                         | 26400 CY  | \$1.50            | \$1.20 | \$2.83    |        | 39600       | 31680   | 74712     |             |                  | 145992   |  |
| BACKFILL-EXCAVATED AREA          | 69000 CY  | \$1.50            | \$1.20 | \$2.83    |        | 103500      | 82800   | 195270    |             |                  | 381570   |  |
| FILLING OF LANDFILL              | 71500 CY  |                   | \$1.20 | \$2.83    |        |             | 85800   | 202345    |             |                  | 288145   |  |
| SHEETPILE CUTOFF WALL            | 28000 SF  | \$3.50            | \$1.89 | \$2.19    |        | 98000       | 52920   | 61320     |             |                  | 212240   |  |
| Total                            |           |                   |        |           |        | 660660      | 461946  | 814082    | 464000      | 46400            | 2400688  |  |
| Subcontractor @ 10% of Sub.      |           |                   |        |           |        |             |         |           |             |                  | 46400    |  |
| Burden @ 13% of Labor Cost       |           |                   |        |           |        |             | 60053   |           |             |                  | 60053    |  |
| Labor @ 15% of Labor Cost        |           |                   |        |           |        |             | 69292   |           |             |                  | 69292    |  |
| Material @ 5% of Material Cost   |           |                   |        |           |        |             | 33033   |           |             |                  | 33033    |  |
| Total Direct Costs (TDC)         |           |                   |        |           |        | 693693      | 591291  | 814082    | 510400      |                  | 2609466  |  |
| Indirects 75% of Labor TDC       |           |                   |        |           |        |             | 443468  |           |             |                  | 443468   |  |
| Profit @ 10% of TDC              |           |                   |        |           |        |             |         |           |             |                  | 260947   |  |
| Total                            |           |                   |        |           |        | 693693      | 1034759 | 814082    | 510400      |                  | 3313880  |  |
| Working Level: C=0.70            |           |                   |        |           |        |             |         |           |             |                  | 1294189  |  |
| Health & Safety Monitoring @ .06 |           |                   |        |           |        |             |         |           |             |                  | 276484   |  |
| Total Field Cost (TFC)           |           |                   |        |           |        |             |         |           |             |                  | 4884553  |  |
| Contingency @ 20% of TFC         |           |                   |        |           |        |             |         |           |             |                  | 976911   |  |
| Engineering @ 5% of TFC          |           |                   |        |           |        |             |         |           |             |                  | 244228   |  |
| CAPITAL COST THIS PAGE           |           |                   |        |           |        |             |         |           |             |                  | 6105691  |  |

SENSITIVITY FACTORS

4A

| SENSITIVITY FACTOR         | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|----------------------------|---------------------------------|------------|---|
| Landfill Construction      | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Dike Construction          | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Backfill Excavation        | Major construction item         | -50<br>+50 | Actual field conditions may warrant changes in final design stage |
| <u>Filling of Landfill</u> |                                 |            |   |
| Sludges                    | Major construction item         | -50<br>+50 | Actual field conditions may warrant changes in final design stage |
| Leachate Lagoon            |                                 | -10<br>+20 |   |

DRAKE CHEMICAL LEACHATE LAGOON REMEDIATION  
EXCAVATION, E&S CONTROLS AND DISPOSAL AT DUPONT IN NJ  
DRAPREP

RAA 2

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |        |           | DIRECT COST |       |           | ITEM<br>DIRECT<br>COST | COMMENTS  |
|----------------------------------|----------|-------------------|--------|-----------|-------------|-------|-----------|------------------------|---|
|                                  |          | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |                        |   |
| LEACHATE LAGOON                  |          |                   |        |           |             |       |           |                        |   |
| EXCAVATE LAGOON SEDIMENTS        | 2500     |                   | \$2.16 | \$3.04    |             | 5400  | 7600      | 13000                  |   |
| EXCAVATE FOR E&S CONTROLS        | 2100     |                   | \$1.67 | \$2.58    |             | 3507  | 5418      | 8925                   |   |
| BACKFILL AREA                    | 4300     | \$1.50            | \$1.20 | \$2.83    | 6450        | 5160  | 12169     | 23779                  |   |
| REVEGETATION                     | 34       | \$24.60           | \$5.60 | \$4.45    | 836         | 190   | 151       | 1178.1                 |   |
| TOPSOIL                          | 630      | \$5.50            | \$1.20 | \$2.83    | 3465        | 756   | 1783      | 6003.9                 |   |
| SILT FENCES (TEMPORARY)          | 7000     | \$2.25            | \$0.16 |           | 15750       | 1120  | 6300      | 16870                  |   |
| VACUUM OFF AQUEOUS WASTES        | 280      |                   | \$3.00 | \$22.50   |             | 840   |           | 7140                   | 4,000 gal/TRL &<br>250 mt. @ \$4/mt.<br>1,000 gal/MGL @<br>\$.20 /' gal |
| HAULING                          | 70       |                   |        | \$800.00  |             |       |           | 56000                  |   |
| DISPOSAL                         | 280      |                   |        | \$200.00  |             |       |           | 56000                  |   |
| Total                            |          |                   |        |           | 26501       | 16973 | 33421     | 112000                 | 188896  |
| Subcontractor @ 10% of Sub.      |          |                   |        |           |             |       |           | 11200                  |   |
| Burden @ 13% of Labor Cost       |          |                   |        |           |             | 2207  |           | 2207                   |   |
| Labor @ 15% of Labor Cost        |          |                   |        |           |             | 2546  |           | 2546                   |   |
| Material @ 5% of Material Cost   |          |                   |        |           | 1325        |       |           | 1325                   |   |
| Total Direct Costs (TDC)         |          |                   |        |           | 27826       | 21726 | 33421     | 123200                 | 206174  |
| Indirects 75% of Labor TDC       |          |                   |        |           |             | 16294 |           | 16294                  |   |
| Profit @ 10% of TDC              |          |                   |        |           |             |       |           | 20617                  |   |
| Total                            |          |                   |        |           | 27826       | 38020 | 33421     | 123200                 | 243085  |
| Working Level: C=-.7             |          |                   |        |           |             |       |           | 50009                  |   |
| Health & Safety Monitoring at .1 |          |                   |        |           |             |       |           | 29309                  |   |
| Total Field Cost (TFC)           |          |                   |        |           |             |       |           | 322404                 |   |
| Contingency @ 20% of TFC         |          |                   |        |           |             |       |           | 64481                  |   |
| Engineering @ 5% of TFC          |          |                   |        |           |             |       |           | 16120                  |   |
| CAPITAL COST THIS PAGE           |          |                   |        |           |             |       |           | 403005                 |   |

DRAFT CAPITAL BLOW AND HAUL ROAD'S  
DPADELON

| ITEM                              | QUANTITY | DIRECT UNIT PRICE |        |           | DIRECT COST |       |           | ITEM DIRECT COST | COMMENTS  |
|-----------------------------------|----------|-------------------|--------|-----------|-------------|-------|-----------|------------------|---|
|                                   |          | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |                  |   |
| ACCESS ROAD                       |          |                   |        |           |             |       |           |                  |   |
| GRAVEL BROADCAST                  | 2000 CY  | \$10.00           | \$1.20 | \$2.83    | 20000       | 2400  | 5660      | 28060            |   |
| GEOTEXTILE MAT                    | 18700 SF | \$1.15            | \$0.16 | \$0.00    | 21505       | 2992  |           | 24497            |   |
| EXCAVATION & GRADING              | 2000 CY  | \$0.00            | \$1.20 | \$2.83    |             | 2400  | 5660      | 8060             |   |
| WATER                             |          |                   |        |           |             |       |           |                  |   |
| WATER STATION                     | 1 UNIT   |                   |        |           |             |       |           | 20000            |   |
| HYDRO BLASTING TO                 | 1 UNIT   |                   |        |           |             |       |           | 68840            |   |
| WATER PUMP HAULING                | 180 TRL  |                   |        |           |             |       |           | 144000           | 4,000 gal/TRL<br>250 ml. @ \$4/ml.<br>1,000 gal/MGL @<br>\$0.20 / gal |
| DISPOSAL                          | 720 MGL  |                   |        |           |             |       |           | 144000           |   |
| <b>Total</b>                      |          |                   |        |           | 41505       | 7792  | 11320     | 376840           | 437457  |
| Subcontractor @ 10% of Sub        |          |                   |        |           |             |       | 37684     |                  |   |
| Burden @ 13% of Labor Cost        |          |                   |        |           |             | 1013  |           | 1013             |   |
| Labor @ 15% of Labor Cost         |          |                   |        |           |             | 1169  |           | 1169             |   |
| Material @ 5% of Material Cost    |          |                   |        |           | 2075        |       |           | 2075             |   |
| <b>Total Direct Costs (IDC)</b>   |          |                   |        |           | 43580       | 9974  | 11320     | 414524           | 479398  |
| Indirects 75% of Labor IDC        |          |                   |        |           |             | 7480  |           | 7480             |   |
| Profit @ 10% of IDC               |          |                   |        |           |             |       |           | 47940            |   |
| <b>Total</b>                      |          |                   |        |           | 43580       | 17454 | 11320     | 414524           | 534818  |
| Working Level: D= .15             |          |                   |        |           |             |       |           | 4316             |   |
| Health & Safety Monitoring at .08 |          |                   |        |           |             |       |           | 43131            |   |
| <b>Total Field Cost (IFC)</b>     |          |                   |        |           |             |       |           | 582265           |   |
| Contingency @ 20% of IFC          |          |                   |        |           |             |       |           | 116453           |   |
| Engineering @ 5% of IFC           |          |                   |        |           |             |       |           | 29113            |   |
| <b>CAPITAL COST THIS PAGE</b>     |          |                   |        |           |             |       |           | 727831           |   |

SENSITIVITY FACTORS  
SITE PREP

| SENSITIVITY FACTOR               | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE  |
|----------------------------------|---------------------------------|------------|--|
| Access Roads                     | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| E & S Controls                   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Decontamination Station          | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Leachate Lagoon Area Remediation | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |

ORIGINAL  
(Red)

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 4A

| COST COMPONENT                          | * ESTIMATE (\$) | * BASIS OF ESTIMATE               | * FREQUENCY | * YEAR |
|---|-----------------|-----------------------------------|-------------|--------|
| *****                                   |                 |                                   |             |        |
| O & M COSTS                             | *               | *                                 | *           | *      |
| 1. Operating Labor                      | *               | * 2 men @ \$30 / hr.              | *           | *      |
| a. Sampling                             | * \$1920.00     | * 32 hrs. 2 x yr.                 | *           | * 1-30 |
| b. Inspection                           | * \$1920.00     | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 2. Maintenance, Matl's<br>and labor     | *               | *                                 | *           | *      |
| a. Labor                                | * \$13200.00    | * @ 2% of Material<br>Direct Cost | *           | * 1-30 |
| b. Material                             | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 3. Auxiliary Materials<br>and Labor     | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 4. Purchased Services                   | *               | * Laboratory Analysis             | *           | *      |
| a. Equipment                            | * \$20000.00    | * 10 samples @                    | *           | * 1-30 |
| b.                                      | *               | * \$1000 / sample                 | *           | *      |
| c.                                      | *               | * 2 x yr.                         | *           | *      |
| *****                                   |                 |                                   |             |        |
| 5. Disposal                             | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 6. Administration                       | *               | * Report Preparation              | *           | *      |
|   | * \$960.00      | * 1 man @ \$60/hr                 | *           | * 1-30 |
|   | *               | * 8 hrs. 2 x yr.                  | *           | *      |
| *****                                   |                 |                                   |             |        |
| 7. Insurances, Taxes<br>Licenses        | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 8. Maintenance and<br>Contingency Costs | * \$1900.00     | * @ 5% of O&M Costs               | *           | * 1-30 |
| *****                                   |                 |                                   |             |        |
| 9. Other                                | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| ANNUALIZED CAPITAL<br>COST              | * \$39900.00    | *                                 | *           | * 1-30 |
| *****                                   |                 |                                   |             |        |

ORIGINAL (Red)

SITE: DRAKE CHEMICAL  
ALTERNATIVE NO.: 3A  
7613

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | 0    | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
|-----------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 1. CAPITAL COSTS            | 7237 |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---  | 39.9  |       |       |       |       |       |       |       |       |       |      |
| 3. ANNUAL COSTS             | 7237 | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  | 39.9 |
| 4. ANNUAL DISCOUNT RATE=10% | 1    | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| PRESENT WORTH =             | 7237 | 36    | 33    | 30    | 27    | 25    | 23    | 20    | 19    | 17    | 15    | 14   |

|                 |      |       |       |       |       |      |       |       |       |       |       |
|-----------------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| 12              | 13   | 14    | 15    | 16    | 17    | 18   | 19    | 20    | 21    | 22    | 23    |
| 39.9            | 39.9 | 39.9  | 39.9  | 39.9  | 39.9  | 39.9 | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  |
| 0.319           | 0.29 | 0.263 | 0.239 | 0.218 | 0.198 | 0.18 | 0.164 | 0.149 | 0.135 | 0.123 | 0.112 |
| PRESENT WORTH = | 13   | 12    | 10    | 9     | 8     | 7    | 7     | 6     | 5     | 5     | 4     |

|                             |       |       |       |       |       |       |
|-----------------------------|-------|-------|-------|-------|-------|-------|
| 24                          | 25    | 26    | 27    | 28    | 29    | 30    |
| 39.9                        | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  | 39.9  |
| 0.101                       | 0.092 | 0.084 | 0.076 | 0.069 | 0.063 | 0.057 |
| PRESENT WORTH =             | 4     | 4     | 3     | 3     | 3     | 2     |
| TOTAL PRESENT WORTH (000's) |       |       |       |       |       |       |
| =====                       |       |       |       |       |       |       |
| 7613                        |       |       |       |       |       |       |
| =====                       |       |       |       |       |       |       |

ALTERNATIVE A5

B-33

AR301265

ORIGINAL  
(Red)

DRAKE CHEMICAL RAA 5A  
SOIL CAP  
DRARAA5

| ITEM                            | QUANTITY | DIRECT UNIT PRICE |         |           | DIRECT COST |       |           | ITEM DIRECT COST | COMMENTS |
|---------------------------------|----------|-------------------|---------|-----------|-------------|-------|-----------|------------------|----------|
|                                 |          | MATERIALS         | LABOR   | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |                  |          |
| SOIL COVER 18 IN.               | 15700    | CY                | \$1.50  | \$1.20    | \$2.83      | 23550 | 18840     | 4431             | 86821    |
| TOPSOIL                         | 5200     | CY                | \$5.50  | \$1.20    | \$2.83      | 28600 | 6240      | 14716            | 49556    |
| REVEGETATION                    | 280      | MSF               | \$24.60 | \$5.60    | \$4.45      | 6888  | 1568      | 1246             | 9702     |
| Total                           |          |                   |         |           |             | 59038 | 26648     | 60393            | 146079   |
| Subcontractor @ 10% of Sub.     |          |                   |         |           |             |       |           |                  |          |
| Burden @ 13% of Labor Cost      |          |                   |         |           |             |       |           |                  |          |
| Labor @ 15% of Labor Cost       |          |                   |         |           |             |       |           |                  |          |
| Material @ 5% of Material Cost  |          |                   |         |           |             |       |           |                  |          |
| Total Direct Costs (TDC)        |          |                   |         |           |             | 61990 | 34109     | 60393            | 156492   |
| Indirects                       |          |                   |         |           |             |       | 25582     |                  | 25582    |
| Profit @ 10% of TDC             |          |                   |         |           |             |       |           |                  | 15649    |
| Total                           |          |                   |         |           |             | 61990 | 59692     | 60393            | 197724   |
| Working Level: C=0.70           |          |                   |         |           |             |       |           |                  |          |
| Health & Safety Monitoring @ .1 |          |                   |         |           |             |       |           |                  |          |
| Total Field Cost (TFC)          |          |                   |         |           |             |       |           |                  | 309961   |
| Contingency @ 20% of TFC        |          |                   |         |           |             |       |           |                  | 61992    |
| Engineering @ 5% of TFC         |          |                   |         |           |             |       |           |                  | 15498    |
| CAPITAL COST THIS PAGE          |          |                   |         |           |             |       |           |                  | 387451   |

SENSITIVITY FACTORS

5A

| SENSITIVITY FACTOR | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|--------------------|---------------------------------|------------|---|
| Soil Cap           | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

DRAKE CHEMICAL LEACHATE LAGOON REMEDIATION  
EXCAVATION, E&S CONTROLS AND DISPOSAL AT DUPONT IN NJ  
DRAPREP

RAM 2

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |        |           |          | DIRECT COST |       |           | ITEM DIRECT COST | COMMENTS                     |
|----------------------------------|----------|-------------------|--------|-----------|----------|-------------|-------|-----------|------------------|------------------------------|
|                                  |          | MATERIALS         | LABOR  | EQUIPMENT | SUB.     | MATERIALS   | LABOR | EQUIPMENT |                  |                              |
| LEACHATE LAGOON                  |          |                   |        |           |          |             |       |           |                  |                              |
| EXCAVATE LAGOON SEDIMENTS        | 2500     | CY                | \$2.16 | \$3.04    |          | 5400        | 7600  | 13000     |                  |                              |
| EXCAVATE FOR E&S CONTROLS        | 2100     | CY                | \$1.67 | \$2.58    |          | 3507        | 5418  | 8925      |                  |                              |
| BACKFILL AREA                    | 4300     | CY                | \$1.20 | \$2.83    |          | 5160        | 12169 | 23779     |                  |                              |
| REVEGETATION                     | 34       | MSF               | \$4.60 | \$4.45    |          | 190         | 151   | 1178.1    |                  |                              |
| TOPSOIL                          | 630      | CY                | \$5.50 | \$2.83    |          | 3465        | 1783  | 6003.9    |                  |                              |
| SILT FENCES (TEMPORARY)          | 7000     | LF                | \$2.25 | \$0.16    |          | 1120        | 6300  | 16870     |                  |                              |
| VACUUM OFF AQUEOUS WASTES        | 280      | GAL               | \$3.00 | \$22.50   | \$800.00 | 840         |       | 7140      |                  | 4,000 gal/TRL &              |
| HAULING                          | 70       | TRL               |        |           |          |             |       | 56000     |                  | 250 mt. @ \$4/mt.            |
| DISPOSAL                         | 280      | MGL               |        |           | \$200.00 |             |       | 56000     |                  | 1,000 gal/MGL @ \$0.20 / gal |
| <b>Total</b>                     |          |                   |        |           |          | 26501       | 33421 | 112000    | 188896           |                              |
| Subcontractor @ 10% of Sub.      |          |                   |        |           |          |             |       | 11200     | 2207             |                              |
| Burden @ 13% of Labor Cost       |          |                   |        |           |          |             |       |           | 2546             |                              |
| Labor @ 15% of Labor Cost        |          |                   |        |           |          |             |       |           | 1325             |                              |
| Material @ 5% of Material Cost   |          |                   |        |           |          |             |       |           |                  |                              |
| <b>Total Direct Costs (TDC)</b>  |          |                   |        |           |          | 27826       | 33421 | 123200    | 206174           |                              |
| Indirects 75% of Labor TDC       |          |                   |        |           |          |             |       |           | 16294            |                              |
| Profit @ 10% of IDC              |          |                   |        |           |          |             |       |           | 20617            |                              |
| <b>Total</b>                     |          |                   |        |           |          | 27826       | 33421 | 123200    | 243085           |                              |
| Working Level: C=.7              |          |                   |        |           |          |             |       |           | 50009            |                              |
| Health & Safety Monitoring at .1 |          |                   |        |           |          |             |       |           | 29309            |                              |
| <b>Total Field Cost (TFC)</b>    |          |                   |        |           |          |             |       |           | 322404           |                              |
| Contingency @ 20% of TFC         |          |                   |        |           |          |             |       |           | 64481            |                              |
| Engineering @ 5% of TFC          |          |                   |        |           |          |             |       |           | 16120            |                              |
| <b>CAPITAL COST THIS PAGE</b>    |          |                   |        |           |          |             |       |           | 403005           |                              |

ORIGINAL (Red)

BRAKE CHEMICAL DECOR AND HARD ROADS  
BRANDICOR

| ITEM                              | QUANTITY | DIRECT UNIT PRICE |        |           | DIRECT COST |       |            | ITEM DIRECT COST | COMMENTS  |
|-----------------------------------|----------|-------------------|--------|-----------|-------------|-------|------------|------------------|---|
|                                   |          | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT  |                  |   |
| ACCESS ROAD                       |          |                   |        |           |             |       |            |                  |   |
| GRAVEL ROAD/COURSE                | 2000 CY  | \$10.00           | \$1.20 | \$2.83    | 20000       | 2400  | 5660       | 28060            |   |
| GEOTECHNICAL MAT                  | 18700 SF | \$1.15            | \$0.16 | \$0.00    | 21505       | 2992  |            | 24497            |   |
| EXCAVATION & GRADING              | 2000 CY  | \$0.00            | \$1.20 | \$2.83    |             | 2400  | 5660       | 8060             |   |
| DECOR                             |          |                   |        |           |             |       |            |                  |   |
| DECOR STATION                     | 1 UNIT   |                   |        |           |             |       | \$20000.00 | 20000            |   |
| HYDRO BLASTING EQ                 | 1 UNIT   |                   |        |           |             |       | \$68840.00 | 68840            |   |
| DECOR FLUID HAULING               | 100 TRI  |                   |        |           |             |       | \$800.00   | 144000           | 4,000 gal/TRI<br>250 mi. @ \$4/mi.<br>1,000 gal/MGL @<br>\$0.20 / gal |
| DISPOSAL                          | 720 MGL  |                   |        |           |             |       | \$200.00   | 144000           |   |
| -----                             |          |                   |        |           |             |       |            |                  |   |
| Total                             |          |                   |        |           | 41505       | 7792  | 11320      | 37684            | 437457  |
| Subcontractor @ 10% of Sub        |          |                   |        |           |             |       |            | 37684            |   |
| Burden @ 13% of Labor Cost        |          |                   |        |           |             | 1013  |            | 1013             |   |
| Labor @ 15% of Labor Cost         |          |                   |        |           |             | 1169  |            | 1169             |   |
| Material @ 5% of Material Cost    |          |                   |        |           | 2075        |       |            | 2075             |   |
| -----                             |          |                   |        |           |             |       |            |                  |   |
| Total Direct Costs (TDC)          |          |                   |        |           | 43580       | 9974  | 11320      | 414524           | 479398  |
| Indirects 75% of Labor IDC        |          |                   |        |           |             | 7480  |            | 7480             |   |
| Profit @ 10% of IDC               |          |                   |        |           |             |       |            | 47940            |   |
| -----                             |          |                   |        |           |             |       |            |                  |   |
| Total                             |          |                   |        |           | 43480       | 17454 | 11320      | 414524           | 534818  |
| Hauling level: 0.15               |          |                   |        |           |             |       |            | 4316             |   |
| Health & Safety Monitoring at .08 |          |                   |        |           |             |       |            | 43131            |   |
| -----                             |          |                   |        |           |             |       |            |                  |   |
| Total Field Cost (TFC)            |          |                   |        |           |             |       |            | 582265           |   |
| Contingency @ 20% of TFC          |          |                   |        |           |             |       |            | 116453           |   |
| Engineering @ 5% of TFC           |          |                   |        |           |             |       |            | 29113            |   |
| -----                             |          |                   |        |           |             |       |            |                  |   |
| CAPITAL COST THIS PAGE            |          |                   |        |           |             |       |            | 727831           |   |

ORIGINAL  
(Red)

SENSITIVITY FACTORS

SITE PREP

| SENSITIVITY FACTOR               | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE  |
|----------------------------------|---------------------------------|------------|--|
| Access Roads                     | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| E & S Controls                   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Decontamination Station          | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Leachate Lagoon Area Remediation | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 5A

| COST COMPONENT                          | * ESTIMATE (\$) | * BASIS OF ESTIMATE               | * FREQUENCY | * YEAR |
|---|-----------------|-----------------------------------|-------------|--------|
| *****                                   |                 |                                   |             |        |
| O & M COSTS                             | *               | *                                 | *           | *      |
| 1. Operating Labor                      | *               | * 2 men @ \$30 / hr.              | *           | *      |
| a. Sampling                             | * \$1920.00     | * 32 hrs. 2 x yr.                 | *           | * 1-30 |
| b. Inspection                           | * \$1920.00     | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 2. Maintenance, Matl's<br>and labor     | *               | *                                 | *           | *      |
| a. Labor                                | * \$1200.00     | * @ 2% of Material<br>Direct Cost | *           | * 1-30 |
| b. Material                             | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 3. Auxiliary Materials<br>and Labor     | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 4. Purchased Services                   | *               | * Laboratory Analysis             | *           | *      |
| a. Equipment                            | * \$20000.00    | * 10 samples @                    | *           | * 1-30 |
| b.                                      | *               | * \$1000 / sample                 | *           | *      |
| c.                                      | *               | * 2 x yr.                         | *           | *      |
| *****                                   |                 |                                   |             |        |
| 5. Disposal                             | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 6. Administration                       | *               | * Report Preparation              | *           | *      |
| a.                                      | * \$960.00      | * 1 man @ \$60/hr                 | *           | * 1-30 |
| b.                                      | *               | * 8 hrs. 2 x yr.                  | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 7. Insurances, Taxes<br>Licenses        | *               | *                                 | *           | *      |
| a.                                      | *               | *                                 | *           | *      |
| b.                                      | *               | *                                 | *           | *      |
| c.                                      | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| 8. Maintenance and<br>Contingency Costs | * \$1300.00     | * @ 5% of O&M Costs               | *           | * 1-30 |
| *****                                   |                 |                                   |             |        |
| 9. Other                                | *               | *                                 | *           | *      |
| *****                                   |                 |                                   |             |        |
| ANNUALIZED CAPITAL<br>COST              | * \$27300.00    | *                                 | *           | * 1-30 |
| *****                                   |                 |                                   |             |        |

ORIGINAL COPY

SITE: DRAKE CHEMICAL  
 ALTERNATIVE NO.: 5A  
 1776

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 1519                            |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 27.3  |       |       |       |       |       |       |       |       |       |      |
| 3. ANNUAL COSTS             | 1519                            | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  | 27.3 |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| PRESENT WORTH =             | 1519                            | 25    | 23    | 21    | 19    | 17    | 15    | .14   | 13    | 12    | 11    | 10   |

|                 |      |       |       |       |       |      |       |       |       |       |       |
|-----------------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| 12              | 13   | 14    | 15    | 16    | 17    | 18   | 19    | 20    | 21    | 22    | 23    |
| 27.3            | 27.3 | 27.3  | 27.3  | 27.3  | 27.3  | 27.3 | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  |
| 0.319           | 0.29 | 0.263 | 0.239 | 0.218 | 0.198 | 0.18 | 0.164 | 0.149 | 0.135 | 0.123 | 0.112 |
| 9               | 8    | 7     | 7     | 6     | 5     | 5    | 4     | 4     | 4     | 3     | 3     |
| PRESENT WORTH = |      |       |       |       |       |      |       |       |       |       |       |

|                             |       |       |       |       |       |       |
|-----------------------------|-------|-------|-------|-------|-------|-------|
| 24                          | 25    | 26    | 27    | 28    | 29    | 30    |
| 27.3                        | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  | 27.3  |
| 0.101                       | 0.092 | 0.084 | 0.076 | 0.069 | 0.063 | 0.057 |
| 3                           | 3     | 2     | 2     | 2     | 2     | 2     |
| PRESENT WORTH =             |       |       |       |       |       |       |
| TOTAL PRESENT WORTH (000's) |       |       |       |       |       |       |
| =====                       |       |       |       |       |       |       |
| 1776                        |       |       |       |       |       |       |
| =====                       |       |       |       |       |       |       |

ORIGINAL  
(Red)

ALTERNATIVE A6

B-41

AR301273

ORIGINAL  
(Red)

DRAKE CHEMICAL RAA 6A  
SYNTHETIC CAP  
DRARAA6

| ITEM                            | QUANTITY | DIRECT UNIT PRICE |         |           | DIRECT COST |        |           | ITEM DIRECT COST | COMMENTS |        |
|---------------------------------|----------|-------------------|---------|-----------|-------------|--------|-----------|------------------|----------|--------|
|                                 |          | MATERIALS         | LABOR   | EQUIPMENT | MATERIALS   | LABOR  | EQUIPMENT |                  |          |        |
| SOIL COVER 30 IN.               | 26100    | CY                | \$1.50  | \$1.20    | \$2.83      | 39150  | 31320     | 73863            | 144333   |        |
| TOPSOIL                         | 5200     | CY                | \$5.50  | \$1.20    | \$2.83      | 28600  | 6240      | 14716            | 49556    |        |
| REVEGETATION                    | 280      | MSF               | \$24.60 | \$5.60    | \$4.45      | 6888   | 1568      | 1246             | 9702     |        |
| FILTER FABRIC                   | 31300    | SY                | \$1.00  | \$0.20    |             | 31300  | 6260      |                  | 37560    |        |
| 50 MIL SYNTHETIC MEMBRANE       | 282000   | SF                |         |           |             |        |           | 225600           | 225600   |        |
|                                 |          |                   |         |           | \$0.80      |        |           |                  |          |        |
| <b>Total</b>                    |          |                   |         |           |             | 105938 | 45388     | 89825            | 225600   | 466751 |
| Subcontractor @ 10% of Sub      |          |                   |         |           |             |        |           |                  | 22560    | 5900   |
| Burden @ 13% of Labor Cost      |          |                   |         |           |             |        | 5900      |                  |          | 6808   |
| Labor @ 15% of Labor Cost       |          |                   |         |           |             |        |           |                  |          | 5297   |
| Material @ 5% of Material Cost  |          |                   |         |           |             |        |           |                  |          |        |
| <b>Total Direct Costs (TDC)</b> |          |                   |         |           |             | 111235 | 58097     | 89825            | 248160   | 507317 |
| Indirects 75% of Labor TDC      |          |                   |         |           |             |        | 43572     |                  |          | 43572  |
| Profit @ 10% of TDC             |          |                   |         |           |             |        |           |                  |          | 50732  |
| <b>Total</b>                    |          |                   |         |           |             | 111235 | 101669    | 89825            | 248160   | 601621 |
| Working Level: C=0.70           |          |                   |         |           |             |        |           |                  |          | 134046 |
| Health & Safety Monitoring      |          |                   |         |           |             |        |           |                  |          | 58853  |
| <b>Total Field Cost (TFC)</b>   |          |                   |         |           |             |        |           |                  |          | 794520 |
| Contingency @ 20% of TFC        |          |                   |         |           |             |        |           |                  |          | 158904 |
| Engineering @ 5% of TFC         |          |                   |         |           |             |        |           |                  |          | 39726  |
| <b>CAPITAL COST THIS PAGE</b>   |          |                   |         |           |             |        |           |                  |          | 993150 |

SENSITIVITY FACTORS

OR:  
(E)

6A

| SENSITIVITY FACTOR | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|--------------------|---------------------------------|------------|---|
| Synthetic Cap      | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

ORIGINAL  
(Red)

DRAKE CHEMICAL LEACHATE LAGOON REMEDIATION  
EXCAVATION, E&S CONTROLS AND DISPOSAL AT DUPONT IN NJ  
DRAWREP

RMA 2

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |        |           | DIRECT COST |       |           | ITEM DIRECT COST | COMMENTS          |  |
|----------------------------------|----------|-------------------|--------|-----------|-------------|-------|-----------|------------------|-------------------|--|
|                                  |          | MATERIALS         | LABOR  | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |                  |                   |  |
| LEACHATE LAGOON                  |          |                   |        |           |             |       |           |                  |                   |  |
| EXCAVATE LAGOON SEDIMENTS        | 2500     |                   | \$2.16 | \$3.04    |             | 5400  | 7600      | 13000            |                   |  |
| EXCAVATE FOR E&S CONTROLS        | 2100     |                   | \$1.67 | \$2.58    |             | 3507  | 5418      | 8925             |                   |  |
| BACKFILL AREA                    | 4300     | \$1.50            | \$1.20 | \$2.83    | 6450        | 5160  | 12169     | 23779            |                   |  |
| REVEGETATION                     | 34       | \$24.60           | \$5.60 | \$4.45    | 836         | 190   | 151       | 1178.1           |                   |  |
| TOPSOIL                          | 630      | \$5.50            | \$1.20 | \$2.83    | 3465        | 756   | 1783      | 6003.9           |                   |  |
| SILT FENCES (TEMPORARY)          | 7000     | \$2.25            | \$0.16 |           | 15750       | 1120  | 6300      | 16870            |                   |  |
| VACUUM OFF AQUEOUS WASTES        | 280      |                   | \$3.00 | \$22.50   |             | 840   |           | 7140             | 4,000 gal/TRL &   |  |
| HAULING                          | 70       |                   |        |           |             |       |           | 56000            | 250 mi. @ \$4/mi. |  |
| DISPOSAL                         | 280      |                   |        |           |             |       |           | 56000            | 1,000 gal/MGL @   |  |
|                                  |          |                   |        |           |             |       |           |                  | \$0.20 / gal      |  |
| Total                            |          |                   |        |           | 26501       | 16973 | 33421     | 112000           | 188896            |  |
| Subcontractor @ 10% of Sub.      |          |                   |        |           |             |       |           | 11200            | 11200             |  |
| Burden @ 13% of Labor Cost       |          |                   |        |           |             | 2207  |           | 2207             | 2207              |  |
| Labor @ 15% of Labor Cost        |          |                   |        |           |             | 2546  |           | 2546             | 2546              |  |
| Material @ 5% of Material Cost   |          |                   |        |           | 1325        |       |           | 1325             | 1325              |  |
| Total Direct Costs (TDC)         |          |                   |        |           | 27826       | 21726 | 33421     | 123200           | 206174            |  |
| Indirects 75% of Labor TDC       |          |                   |        |           |             | 16294 |           | 16294            | 16294             |  |
| Profit @ 10% of TDC              |          |                   |        |           |             | 20617 |           | 20617            | 20617             |  |
| Total                            |          |                   |        |           | 27826       | 38020 | 33421     | 123200           | 243085            |  |
| Working Level: C=.7              |          |                   |        |           |             |       |           | 50009            | 50009             |  |
| Health & Safety Monitoring at .1 |          |                   |        |           |             |       |           | 29309            | 29309             |  |
| Total Field Cost (TFC)           |          |                   |        |           |             |       |           | 322404           | 322404            |  |
| Contingency @ 20% of TFC         |          |                   |        |           |             |       |           | 64481            | 64481             |  |
| Engineering @ 5% of TFC          |          |                   |        |           |             |       |           | 16120            | 16120             |  |
| CAPITAL COST THIS PAGE           |          |                   |        |           |             |       |           | 403005           | 403005            |  |

ORIGINAL  
(Red)

UPAKE CHEMICAL DECOR AND HAUL ROADS  
DPADECOR

| ITEM                              | QUANTITY | DIRECT UNIT PRICE |        |            | DIRECT COST |       |           | ITEM DIRECT COST  | COMMENTS |
|-----------------------------------|----------|-------------------|--------|------------|-------------|-------|-----------|---|----------|
|                                   |          | MATERIALS         | LABOR  | EQUIPMENT  | MATERIALS   | LABOR | EQUIPMENT |   |          |
| ACCESS ROAD                       |          |                   |        |            |             |       |           |   |          |
| GRAVEL ROADCOURSE                 | 2000 CY  | \$10.00           | \$1.20 | \$2.83     | 20000       | 2400  | 5660      | 28060   |          |
| GEOTEXTILE MAT                    | 18700 SF | \$1.15            | \$0.16 | \$0.00     | 21505       | 2992  |           | 24497   |          |
| EXCAVATION & GRADING              | 2000 CY  | \$0.00            | \$1.20 | \$2.83     |             | 2400  | 5660      | 8060  |          |
| DECOR                             |          |                   |        |            |             |       |           |   |          |
| DECOR STATION                     | 1 UNIT   |                   |        | \$20000.00 |             |       |           | 20000   |          |
| HYDRO BLASTING EQ                 | 1 UNIT   |                   |        | \$68840.00 |             |       |           | 68840   |          |
| DECOR FLUID HAULING               | 100 TRL  |                   |        | \$8000.00  |             |       |           | 144000  |          |
| DISPOSAL                          | 720 MGL  |                   |        | \$200.00   |             |       |           | 144000  |          |
|                                   |          |                   |        |            |             |       |           | 4,000 gal/TRL<br>250 mt. @ \$4/mt.<br>1,000 gal/MGL @<br>\$0.20 / gal |          |
| Total                             |          |                   |        |            | 41505       | 7792  | 11320     | 437457  |          |
| Subcontractor @ 10% of Sub        |          |                   |        |            |             |       |           | 37684   |          |
| Burden @ 13% of Labor Cost        |          |                   |        |            |             | 1013  |           | 1013  |          |
| Labor @ 15% of Labor Cost         |          |                   |        |            |             | 1169  |           | 1169  |          |
| Material @ 5% of Material Cost    |          |                   |        |            | 2075        |       |           | 2075  |          |
| Total Direct Costs (TDC)          |          |                   |        |            | 43580       | 9974  | 11320     | 479398  |          |
| Indirects 75% of Labor TDC        |          |                   |        |            |             | 7480  |           | 7480  |          |
| Profit @ 10% of TDC               |          |                   |        |            |             |       |           | 47940   |          |
| Total                             |          |                   |        |            | 43580       | 17454 | 11320     | 534818  |          |
| Working level: 0-.15              |          |                   |        |            |             |       |           | 4316  |          |
| Health & Safety Monitoring at .08 |          |                   |        |            |             |       |           | 43131   |          |
| Total Field Cost (IFC)            |          |                   |        |            |             |       |           | 582265  |          |
| Contingency @ 20% of IFC          |          |                   |        |            |             |       |           | 116453  |          |
| Engineering @ 5% of IFC           |          |                   |        |            |             |       |           | 29113   |          |
| CAPITAL COST THIS PAGE            |          |                   |        |            |             |       |           | 727831  |          |

SENSITIVITY FACTORS  
SITE PREP

| SENSITIVITY FACTOR               | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE  |
|----------------------------------|---------------------------------|------------|--|
| Access Roads                     | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| E & S Controls                   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Decontamination Station          | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |
| Leachate Lagoon Area Remediation | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage. |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 6A

| COST COMPONENT                       | ESTIMATE (\$) | BASIS OF ESTIMATE            | FREQUENCY | YEAR |
|--------------------------------------|---------------|------------------------------|-----------|------|
| *****                                |               |                              |           |      |
| O & M COSTS                          | *             | *                            | *         | *    |
| 1. Operating Labor                   | *             | 2 men @ \$30 / hr.           | *         | *    |
| a. Sampling                          | \$1920.00     | 32 hrs. 2 x yr.              | *         | 1-30 |
| b. Inspection                        | \$1920.00     | *                            | *         | *    |
| c.                                   | *             | *                            | *         | *    |
| *****                                |               |                              |           |      |
| 2. Maintenance, Matl's and labor     | *             | *                            | *         | *    |
| a. Labor                             | \$2100.00     | @ 2% of Material Direct Cost | *         | 1-30 |
| b. Material                          | *             | *                            | *         | *    |
| *****                                |               |                              |           |      |
| 3. Auxiliary Materials and Labor     | *             | *                            | *         | *    |
| a.                                   | *             | *                            | *         | *    |
| b.                                   | *             | *                            | *         | *    |
| c.                                   | *             | *                            | *         | *    |
| *****                                |               |                              |           |      |
| 4. Purchased Services                | *             | Laboratory Analysis          | *         | *    |
| a. Equipment                         | \$20000.00    | 10 samples @ \$1000 / sample | *         | 1-30 |
| b.                                   | *             | 2 x yr.                      | *         | *    |
| c.                                   | *             | *                            | *         | *    |
| *****                                |               |                              |           |      |
| 5. Disposal                          | *             | *                            | *         | *    |
| a.                                   | *             | *                            | *         | *    |
| b.                                   | *             | *                            | *         | *    |
| c.                                   | *             | *                            | *         | *    |
| *****                                |               |                              |           |      |
| 6. Administration                    | *             | Report Preparation           | *         | *    |
| a.                                   | \$960.00      | 1 man @ \$60/hr              | *         | 1-30 |
| b.                                   | *             | 8 hrs. 2 x yr.               | *         | *    |
| c.                                   | *             | *                            | *         | *    |
| *****                                |               |                              |           |      |
| 7. Insurances, Taxes Licenses        | *             | *                            | *         | *    |
| a.                                   | *             | *                            | *         | *    |
| b.                                   | *             | *                            | *         | *    |
| c.                                   | *             | *                            | *         | *    |
| *****                                |               |                              |           |      |
| 8. Maintenance and Contingency Costs | \$1345.00     | @ 5% of O&M Costs            | *         | 1-30 |
| *****                                |               |                              |           |      |
| 9. Other                             | *             | *                            | *         | *    |
| *****                                |               |                              |           |      |
| ANNUALIZED CAPITAL COST              | \$28245.00    | *                            | *         | 1-30 |
| *****                                |               |                              |           |      |



ALTERNATIVE B1

B-49

AR301281

DRAKE CHEMICAL RAA B-1  
CONSTRUCTION GW LOWERING

DRARAB-1

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |          |           | DIRECT COST |        |           | ITEM DIRECT COST | COMMENTS |
|----------------------------------|----------|-------------------|----------|-----------|-------------|--------|-----------|------------------|----------|
|                                  |          | MATERIALS         | LABOR    | EQUIPMENT | MATERIALS   | LABOR  | EQUIPMENT |                  |          |
| EXTRACTION SYSTEM                |          |                   |          |           |             |        |           |                  |          |
| WELL CONSTRUCTION                | 600      |                   |          |           |             |        | 9840      | 9840             |          |
| EXTRACTION PUMPS                 | 20       |                   |          |           |             |        | 26000     | 26000            |          |
| CONNECTING PIPELINES             | 3500     |                   |          |           |             |        | 16625     | 16625            |          |
| TREATMENT PLANT                  |          |                   |          |           |             |        |           |                  |          |
| EQUIPMENT                        | 1        |                   |          |           |             |        |           |                  |          |
| PIPING                           | 1        |                   |          |           |             |        |           |                  |          |
| FOUNDATION                       | 1        |                   |          |           |             |        |           |                  |          |
| ELECTRICAL                       | 1        |                   |          |           |             |        |           |                  |          |
| DISCHARGE LINE                   |          |                   |          |           |             |        |           |                  |          |
| 6 IN. PIPE                       | 2000     | \$5.15            | \$2.75   |           | 10300       | 5500   | 15800     | 15800            |          |
| EXCAVATION                       | 2000     | \$2.79            | \$5.75   |           | 5580        | 11500  | 17080     | 17080            |          |
| RR PIPE SLEEVE JACKING           | 80       | \$17.00           | \$160.00 | \$130.00  | 1360        | 12800  | 24560     | 24560            |          |
| HIGHWAY PIPE SLEEVE JACKING      | 150      | \$17.00           | \$113.00 | \$92.00   | 2550        | 16950  | 33300     | 33300            |          |
| Total                            |          |                   |          |           | 683195      | 343275 | 35895     | 1098205          |          |
| Subcontractor @ 10% of Sub.      |          |                   |          |           |             |        | 3584      | 3584             |          |
| Burden @ 13% of Labor Cost       |          |                   |          |           |             | 44626  | 44626     | 44626            |          |
| Labor @ 15% of Labor Cost        |          |                   |          |           |             | 51491  | 51491     | 51491            |          |
| Material @ 5% of Material Cost   |          |                   |          |           |             | 34160  | 34160     | 34160            |          |
| Total Direct Costs (TDC)         |          |                   |          |           | 717355      | 439392 | 35895     | 1232066          |          |
| Indirects 75% of Labor TDC       |          |                   |          |           |             | 329544 |           | 329544           |          |
| Profit @ 10% of TDC              |          |                   |          |           |             |        |           | 123207           |          |
| Total                            |          |                   |          |           | 717355      | 768936 | 35895     | 1684816          |          |
| Working Level: C=0.70            |          |                   |          |           |             |        |           | 52727            |          |
| Health & Safety Monitoring @ .08 |          |                   |          |           |             |        |           | 139004           |          |
| Total Field Cost (TFC)           |          |                   |          |           |             |        |           | 1876547          |          |
| Contingency @ 20% of TFC         |          |                   |          |           |             |        |           | 375309           |          |
| Engineering @ 15% of TFC         |          |                   |          |           |             |        |           | 281482           |          |
| CAPITAL COST THIS PAGE           |          |                   |          |           |             |        |           | 2533339          |          |

SENSITIVITY FACTORS

ORIGINAL  
(Red)

3B

| SENSIVITY FACTOR  | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|-------------------|---------------------------------|------------|---|
| Excavation System | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Treatment Plant   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 1B

| COST COMPONENT                       | ESTIMATE (\$) | BASIS OF ESTIMATE             | FREQUENCY | YEAR |
|--------------------------------------|---------------|-------------------------------|-----------|------|
| *****                                |               |                               |           |      |
| 0 & M COSTS                          |               |                               |           |      |
| 1. Operating Labor                   |               | 2 men @ \$30 / hr.            |           |      |
| a. Sampling                          | \$1920.00     | 32 hrs. 2 x yr.               |           | 1-30 |
| b. Inspection                        | \$1920.00     |                               |           |      |
| c. Plant                             | \$62400.00    | 1 man @ \$30 / hr. - Fulltime |           | 1-30 |
| *****                                |               |                               |           |      |
| 2. Maintenance, Mat'l's and labor    |               |                               |           |      |
| a. Labor                             | \$13700.00    | @ 2% of Plant Costs           |           | 1-30 |
| b. Material                          |               |                               |           |      |
| *****                                |               |                               |           |      |
| 3. Auxiliary Materials and Labor     |               |                               |           |      |
| a. Materials                         | \$15000.00    | Electricity Consumption       |           | 1-30 |
| b.                                   |               |                               |           |      |
| c.                                   |               |                               |           |      |
| *****                                |               |                               |           |      |
| 4. Purchased Services                |               | Laboratory Analysis           |           |      |
| a. Equipment                         | \$20000.00    | 10 samples @ \$1000 / sample  |           | 1-30 |
| b.                                   |               |                               |           |      |
| c.                                   |               | 2 x yr.                       |           |      |
| *****                                |               |                               |           |      |
| 5. Disposal                          |               |                               |           |      |
| a.                                   |               |                               |           |      |
| b.                                   |               |                               |           |      |
| *****                                |               |                               |           |      |
| 6. Administration                    |               | Report Preparation            |           |      |
|                                      | \$960.00      | 1 man @ \$60/hr               |           | 1-30 |
|                                      |               | 8 hrs. 2 x yr.                |           |      |
| *****                                |               |                               |           |      |
| 7. Insurances, Taxes Licenses        |               |                               |           |      |
| a. NPDES Permit                      | \$10000.00    | Permitting & App. Fees        |           | 1    |
| b.                                   |               |                               |           |      |
| c.                                   |               |                               |           |      |
| *****                                |               |                               |           |      |
| 8. Maintenance and Contingency Costs | \$5795.00     | @ 5% of O&M Costs             |           | 1-30 |
| *****                                |               |                               |           |      |
| 9. Other                             |               |                               |           |      |
| *****                                |               |                               |           |      |
| ANNUALIZED CAPITAL COST              | \$10000.00    |                               |           | 1    |
|                                      | \$121695.00   |                               |           | 1-30 |
| *****                                |               |                               |           |      |

ORIGINAL (Red)

SITE: DRAKE CHEMICAL  
 ALTERNATIVE NO.: 1B  
 3692

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 2533                            |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 132   | 122   | 122   | 122   | 122   | 122   | 122   | 122   | 122   | 122   | 122  |
| 3. ANNUAL COSTS             | 2533                            | 132   | 122   | 122   | 122   | 122   | 122   | 122   | 122   | 122   | 122   | 122  |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| PRESENT WORTH =             | 2533                            | 120   | 101   | 92    | 83    | 76    | 69    | 63    | 57    | 52    | 47    | 43   |

|                 |      |       |       |       |       |      |       |       |       |       |       |
|-----------------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| 12              | 13   | 14    | 15    | 16    | 17    | 18   | 19    | 20    | 21    | 22    | 23    |
| 122             | 122  | 122   | 122   | 122   | 122   | 122  | 122   | 122   | 122   | 122   | 122   |
| 0.319           | 0.29 | 0.263 | 0.239 | 0.218 | 0.198 | 0.18 | 0.164 | 0.149 | 0.135 | 0.123 | 0.112 |
| PRESENT WORTH = | 39   | 35    | 32    | 29    | 27    | 24   | 22    | 20    | 18    | 16    | 14    |

|                             |       |       |       |       |       |       |
|-----------------------------|-------|-------|-------|-------|-------|-------|
| 24                          | 25    | 26    | 27    | 28    | 29    | 30    |
| 122                         | 122   | 122   | 122   | 122   | 122   | 122   |
| 0.101                       | 0.092 | 0.084 | 0.076 | 0.069 | 0.063 | 0.057 |
| PRESENT WORTH =             | 12    | 11    | 10    | 8     | 8     | 7     |
| TOTAL PRESENT WORTH (000's) |       |       |       |       |       |       |
| =====                       |       |       |       |       |       |       |
| 3692                        |       |       |       |       |       |       |
| =====                       |       |       |       |       |       |       |

ORIGINAL  
1977

ALTERNATIVE B2

B-54

AR301286

ORIGINAL (Red)

DRAKE CHEMICAL RAA B-2  
ZONE 1 PUMPING

DRARAB-2

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |         |           | DIRECT COST |        |           | ITEM DIRECT COST | COMMENTS |         |
|----------------------------------|----------|-------------------|---------|-----------|-------------|--------|-----------|------------------|----------|---------|
|                                  |          | MATERIALS         | LABOR   | EQUIPMENT | MATERIALS   | LABOR  | EQUIPMENT |                  |          |         |
| EXTRACTION SYSTEM                |          |                   |         |           |             |        |           |                  |          |         |
| WELL CONSTRUCTION                | 360      |                   |         |           |             |        | 5904      |                  |          |         |
| EXTRACTION PUMPS                 | 14       |                   |         |           |             |        | 18200     |                  |          |         |
| CONNECTING PIPELINES             | 2250     | LF                | \$0.43  | \$3.35    | \$0.97      | 968    | 7538      | 2183             |          |         |
| TREATMENT PLANT                  |          |                   |         |           |             |        |           |                  |          |         |
| EQUIPMENT                        | 1        | LS                |         |           |             | 240200 | 48200     | 288400           |          |         |
| PIPING                           | 1        | LS                |         |           |             | 26500  | 12800     | 39300            |          |         |
| FOUNDATION                       | 1        | LS                |         |           |             | 32400  | 44000     | 79000            |          |         |
| ELECTRICAL                       | 1        | LS                |         |           |             | 49300  | 36900     | 86200            |          |         |
| DISCHARGE LINE                   |          |                   |         |           |             |        |           |                  |          |         |
| 6 IN. PIPE                       | 2000     | LF                | \$5.15  | \$2.75    |             | 10300  | 5500      | 15800            |          |         |
| EXCAVATION                       | 2000     | LF                | \$2.79  | \$5.75    |             | 5580   | 11500     | 17080            |          |         |
| RR PIPE SLEEVE JACKING           | 80       | LF                | \$17.00 | \$160.00  | \$130.00    | 1360   | 12800     | 24560            |          |         |
| HIGHWAY PIPE SLEEVE JACKING      | 150      | LF                | \$17.00 | \$113.00  | \$92.00     | 2550   | 16950     | 33300            |          |         |
| Total                            |          |                   |         |           |             | 369158 | 196188    | 28983            | 24104    | 618432  |
| Subcontractor @ 10% of Sub.      |          |                   |         |           |             |        |           |                  | 2410     | 2410    |
| Burden @ 13% of Labor Cost       |          |                   |         |           |             |        | 25504     |                  |          | 25504   |
| Labor @ 15% of Labor Cost        |          |                   |         |           |             |        | 29428     |                  |          | 29428   |
| Material @ 5% of Material Cost   |          |                   |         |           |             | 18458  |           |                  |          | 18458   |
| Total Direct Costs (TDC)         |          |                   |         |           |             | 387615 | 251120    | 28983            | 26514    | 694232  |
| Indirects 75% of Labor TDC       |          |                   |         |           |             |        | 188340    |                  |          | 188340  |
| Profit @ 10% of TDC              |          |                   |         |           |             |        |           |                  |          | 69423   |
| Total                            |          |                   |         |           |             | 387615 | 439460    | 28983            | 26514    | 951996  |
| Working Level: C=0.70            |          |                   |         |           |             |        |           |                  |          | 29162   |
| Health & Safety Monitoring @ .08 |          |                   |         |           |             |        |           |                  |          | 78493   |
| Total Field Cost (TFC)           |          |                   |         |           |             |        |           |                  |          | 1059650 |
| Contingency @ 20% of TFC         |          |                   |         |           |             |        |           |                  |          | 211930  |
| Engineering @ 15% of TFC         |          |                   |         |           |             |        |           |                  |          | 158947  |
| CAPITAL COST THIS PAGE           |          |                   |         |           |             |        |           |                  |          | 1430527 |

SENSITIVITY FACTORS

2B

| SENSIVITY FACTOR  | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|-------------------|---------------------------------|------------|---|
| Extraction System | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Treatment Plant   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

ORIGINAL  
(Rec.)

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 2B

| COST COMPONENT                          | * ESTIMATE (\$) | * BASIS OF ESTIMATE                 | * FREQUENCY | * YEAR |
|---|-----------------|-------------------------------------|-------------|--------|
| *****                                   |                 |                                     |             |        |
| O & M COSTS                             | *               | *                                   | *           | *      |
| 1. Operating Labor                      | *               | * 2 men @ \$30 / hr.                | *           | *      |
| a. Sampling                             | * \$1920.00     | * 32 hrs. 2 x yr.                   | *           | * 1-30 |
| b. Inspection                           | * \$1920.00     | *                                   | *           | *      |
| c. Plant                                | * \$62400.00    | * 1 man @ \$30 / hr. -<br>Fulltime  | *           | * 1-30 |
| *****                                   |                 |                                     |             |        |
| 2. Maintenance, Matl's<br>and labor     | *               | *                                   | *           | *      |
| a. Labor                                | * \$7400.00     | * @ 2% of Plant<br>Costs            | *           | * 1-30 |
| b. Material                             | *               | *                                   | *           | *      |
| *****                                   |                 |                                     |             |        |
| 3. Auxiliary Materials<br>and Labor     | *               | *                                   | *           | *      |
| a. Materials                            | * \$15000.00    | * Power<br>Consumption              | *           | * 1-30 |
| b.                                      | *               | *                                   | *           | *      |
| c.                                      | *               | *                                   | *           | *      |
| *****                                   |                 |                                     |             |        |
| 4. Purchased Services                   | *               | * Laboratory Analysis               | *           | *      |
| a. Equipment                            | * \$20000.00    | * 10 samples @<br>\$1000 / sample   | *           | * 1-30 |
| b.                                      | *               | * 2 x yr.                           | *           | *      |
| c.                                      | *               | *                                   | *           | *      |
| *****                                   |                 |                                     |             |        |
| 5. Disposal                             | *               | *                                   | *           | *      |
| a.                                      | *               | *                                   | *           | *      |
| b.                                      | *               | *                                   | *           | *      |
| *****                                   |                 |                                     |             |        |
| 6. Administration                       | *               | * Report Preparation                | *           | *      |
|   | * \$960.00      | * 1 man @ \$60/hr<br>8 hrs. 2 x yr. | *           | * 1-30 |
| *****                                   |                 |                                     |             |        |
| 7. Insurances, Taxes<br>Licenses        | *               | *                                   | *           | *      |
| a. NPDES Permit                         | * \$10000.00    | * Permitting & App.<br>Fees         | *           | * 1    |
| b.                                      | *               | *                                   | *           | *      |
| c.                                      | *               | *                                   | *           | *      |
| *****                                   |                 |                                     |             |        |
| 8. Maintenance and<br>Contingency Costs | * \$5480.00     | * @ 5% of O&M Costs                 | *           | * 1-30 |
| *****                                   |                 |                                     |             |        |
| 9. Other                                | *               | *                                   | *           | *      |
| *****                                   |                 |                                     |             |        |
| ANNUALIZED CAPITAL<br>COST              | * \$10000.00    | *                                   | *           | * 1    |
|   | * \$115080.00   | *                                   | *           | * 1-30 |
| *****                                   |                 |                                     |             |        |

ORIG (Rev)

SITE: DRAKE CHEMICAL  
ALTERNATIVE NO.: 2B  
2524

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |         |       |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|-------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10      | 11    |
| 1. CAPITAL COSTS            | 1431                            |       |       |       |       |       |       |       |       |       |         |       |
| 2. O & M COSTS              |                                 | 125   | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115     | 115   |
| 3. ANNUAL COSTS             | 1431                            | 125   | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115     | 115   |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386   | 0.35  |
| PRESENT WORTH = 1431        | 114                             | 95    | 86    | 79    | 71    | 65    | 59    | 54    | 49    | 44    | 40      | 40    |
| -----                       |                                 |       |       |       |       |       |       |       |       |       |         |       |
| 12                          | 13                              | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23      | 23    |
| 115                         | 115                             | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115     | 115   |
| 0.319                       | 0.29                            | 0.263 | 0.239 | 0.218 | 0.198 | 0.18  | 0.164 | 0.149 | 0.135 | 0.123 | 0.112   | 0.112 |
| PRESENT WORTH = 37          | 33                              | 30    | 27    | 25    | 23    | 21    | 19    | 17    | 16    | 14    | 13      | 13    |
| -----                       |                                 |       |       |       |       |       |       |       |       |       |         |       |
| 24                          | 25                              | 26    | 27    | 28    | 29    | 30    | 30    | 30    | 30    | 30    | 30      | 30    |
| 115                         | 115                             | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115   | 115     | 115   |
| 0.101                       | 0.092                           | 0.084 | 0.076 | 0.069 | 0.063 | 0.057 | 0.057 | 0.057 | 0.057 | 0.057 | 0.057   | 0.057 |
| PRESENT WORTH = 12          | 11                              | 10    | 9     | 8     | 7     | 7     | 7     | 7     | 7     | 7     | 7       | 7     |
| -----                       |                                 |       |       |       |       |       |       |       |       |       |         |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | TOTAL   |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | PRESENT |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | WORTH   |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | (000's) |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | =====   |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | 2524    |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | =====   |       |

ALTERNATIVE B3

B-59

AR301291

ORIGINAL  
(REV)

DRAKE CHEMICAL RAA B-3  
ZONE 1 & 2 PUMPING

DRARAB-3

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |          |           | DIRECT COST |        |           | ITEM DIRECT COST | COMMENTS |
|----------------------------------|----------|-------------------|----------|-----------|-------------|--------|-----------|------------------|----------|
|                                  |          | MATERIALS         | LABOR    | EQUIPMENT | MATERIALS   | LABOR  | EQUIPMENT |                  |          |
| EXTRACTION SYSTEM                |          |                   |          |           |             |        |           |                  |          |
| WELL CONSTRUCTION                | 1080     |                   |          | \$16.40   |             |        | 17712     |                  |          |
| EXTRACTION PUMPS                 | 24       |                   |          | \$1300.00 |             |        | 31200     |                  |          |
| CONNECTING PIPELINES             | 7300     |                   |          |           |             | 7081   | 34675     |                  |          |
| TREATMENT PLANT                  |          |                   |          |           |             |        |           |                  |          |
| EQUIPMENT                        | 1        |                   |          |           |             |        | 955700    |                  |          |
| PIPING                           | 1        |                   |          |           |             |        | 202500    |                  |          |
| FOUNDATION                       | 1        |                   |          |           |             |        | 597600    |                  |          |
| ELECTRICAL                       | 1        |                   |          |           |             |        | 38500     |                  |          |
| DISCHARGE LINE                   |          |                   |          |           |             |        |           |                  |          |
| 6 IN. PIPE                       | 2000     | \$5.15            | \$2.75   |           | 10300       | 5500   | 15800     |                  |          |
| EKAVATION                        | 2000     | \$2.79            | \$5.75   |           | 5580        | 11500  | 17080     |                  |          |
| RR PIPE SLEEVE JACKING           | 80       | \$17.00           | \$160.00 | \$130.00  | 1360        | 12800  | 24560     |                  |          |
| HIGHWAY PIPE SLEEVE JACKING      | 150      | \$17.00           | \$113.00 | \$92.00   | 2550        | 16950  | 33300     |                  |          |
| Total                            |          |                   |          |           | 1193729     | 672905 | 53081     | 1968627          |          |
| Subcontractor @ 10% of Sub.      |          |                   |          |           |             |        | 48912     |                  |          |
| Burden @ 13% of Labor Cost       |          |                   |          |           |             |        | 4891      |                  |          |
| Labor @ 15% of Labor Cost        |          |                   |          |           |             |        | 87478     |                  |          |
| Material @ 5% of Material Cost   |          |                   |          |           |             |        | 100936    |                  |          |
| Total Direct Costs (TDC)         |          |                   |          |           |             |        | 59686     |                  |          |
| Indirects 75% of Labor TDC       |          |                   |          |           |             |        | 1253415   |                  |          |
| Profit @ 10% of TDC              |          |                   |          |           |             |        | 861318    |                  |          |
| Total                            |          |                   |          |           |             |        | 645989    |                  |          |
| Working Level: C=0.70            |          |                   |          |           |             |        | 1253415   |                  |          |
| Health & Safety Monitoring @ .06 |          |                   |          |           |             |        | 1507307   |                  |          |
| Total Field Cost (IFC)           |          |                   |          |           |             |        | 53081     |                  |          |
| Contingency @ 20% of IFC         |          |                   |          |           |             |        | 53803     |                  |          |
| Engineering @ 15% of IFC         |          |                   |          |           |             |        | 3089769   |                  |          |
| CAPITAL COST THIS PAGE           |          |                   |          |           |             |        | 91455     |                  |          |
|                                  |          |                   |          |           |             |        | 190873    |                  |          |
|                                  |          |                   |          |           |             |        | 3372097   |                  |          |
|                                  |          |                   |          |           |             |        | 674419    |                  |          |
|                                  |          |                   |          |           |             |        | 505815    |                  |          |
|                                  |          |                   |          |           |             |        | 4552331   |                  |          |

B-60

AR301292

SENSITIVITY FACTORS

ORIGIN

WEG,

1B

| SENSIVITY FACTOR  | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|-------------------|---------------------------------|------------|---|
| Extraction System | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Treatment Plant   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 3B

| COST COMPONENT                          | * ESTIMATE (\$) | * BASIS OF ESTIMATE                | * FREQUENCY | * YEAR |
|---|-----------------|------------------------------------|-------------|--------|
| *****                                   |                 |                                    |             |        |
| 0 & M COSTS                             | *               | *                                  | *           | *      |
| 1. Operating Labor                      | *               | * 2 men @ \$30 / hr.               | *           | *      |
| a. Sampling                             | * \$1920.00     | * 32 hrs. 2 x yr.                  | *           | * 1-30 |
| b. Inspection                           | * \$1920.00     | *                                  | *           | *      |
| c. Plant                                | * \$62400.00    | * 1 man @ \$30 / hr. -<br>Fulltime | *           | * 1-30 |
| *****                                   |                 |                                    |             |        |
| 2. Maintenance, Matl's<br>and labor     | *               | *                                  | *           | *      |
| a. Labor                                | * \$23900.00    | * @ 2% of Plant<br>Costs           | *           | * 1-30 |
| b. Material                             | *               | *                                  | *           | *      |
| *****                                   |                 |                                    |             |        |
| 3. Auxiliary Materials<br>and Labor     | *               | *                                  | *           | *      |
| a. Materials                            | * \$20000.00    | * Power<br>Consumption             | *           | * 1-30 |
| b.                                      | *               | *                                  | *           | *      |
| c.                                      | *               | *                                  | *           | *      |
| *****                                   |                 |                                    |             |        |
| 4. Purchased Services                   | *               | * Laboratory Analysis              | *           | *      |
| a. Equipment                            | * \$20000.00    | * 10 samples @<br>\$1000 / sample  | *           | * 1-30 |
| b.                                      | *               | *                                  | *           | *      |
| c.                                      | *               | * 2 x yr.                          | *           | *      |
| *****                                   |                 |                                    |             |        |
| 5. Disposal                             | *               | *                                  | *           | *      |
| a.                                      | *               | *                                  | *           | *      |
| b.                                      | *               | *                                  | *           | *      |
| c.                                      | *               | *                                  | *           | *      |
| *****                                   |                 |                                    |             |        |
| 6. Administration                       | *               | * Report Preparation               | *           | *      |
| a.                                      | * \$960.00      | * 1 man @ \$60/hr                  | *           | * 1-30 |
| b.                                      | *               | * 8 hrs. 2 x yr.                   | *           | *      |
| c.                                      | *               | *                                  | *           | *      |
| *****                                   |                 |                                    |             |        |
| 7. Insurances, Taxes<br>Licenses        | *               | *                                  | *           | *      |
| a. NPDES Permit                         | * \$10000.00    | * Permitting & App.<br>Fees        | *           | * 1    |
| b.                                      | *               | *                                  | *           | *      |
| c.                                      | *               | *                                  | *           | *      |
| *****                                   |                 |                                    |             |        |
| 8. Maintenance and<br>Contingency Costs | * \$6555.00     | * @ 5% of O&M Costs                | *           | * 1-30 |
| *****                                   |                 |                                    |             |        |
| 9. Other                                | *               | *                                  | *           | *      |
| *****                                   |                 |                                    |             |        |
| ANNUALIZED CAPITAL<br>COST              | * \$10000.00    | *                                  | *           | * 1    |
|   | * \$137655.00   | *                                  | *           | * 1-30 |
| *****                                   |                 |                                    |             |        |

ORIGINAL  
(Red)

SITE: DRAKE CHEMICAL  
ALTERNATIVE NO.: 3B  
5862

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |         |       |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|-------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10      | 11    |
| 1. CAPITAL COSTS            | 4552                            |       |       |       |       |       |       |       |       |       |         |       |
| 2. O & M COSTS              | ---                             | 148   | 138   | 138   | 138   | 138   | 138   | 138   | 138   | 138   | 138     | 138   |
| 3. ANNUAL COSTS             | 4552                            | 148   | 138   | 138   | 138   | 138   | 138   | 138   | 138   | 138   | 138     | 138   |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386   | 0.35  |
| PRESENT WORTH =             | 4552                            | 135   | 114   | 104   | 94    | 86    | 78    | 71    | 64    | 59    | 53      | 48    |
| -----                       |                                 |       |       |       |       |       |       |       |       |       |         |       |
| 12                          | 13                              | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23      |       |
| 138                         | 138                             | 138   | 138   | 138   | 138   | 138   | 138   | 138   | 138   | 138   | 138     | 138   |
| 0.319                       | 0.29                            | 0.263 | 0.239 | 0.218 | 0.198 | 0.18  | 0.164 | 0.149 | 0.135 | 0.123 | 0.112   | 0.112 |
| PRESENT WORTH =             | 44                              | 40    | 36    | 30    | 27    | 25    | 23    | 21    | 19    | 17    | 15      |       |
| -----                       |                                 |       |       |       |       |       |       |       |       |       |         |       |
| 24                          | 25                              | 26    | 27    | 28    | 29    | 30    |       |       |       |       |         |       |
| 138                         | 138                             | 138   | 138   | 138   | 138   | 138   |       |       |       |       |         |       |
| 0.101                       | 0.092                           | 0.084 | 0.076 | 0.069 | 0.063 | 0.057 |       |       |       |       |         |       |
| PRESENT WORTH =             | 14                              | 13    | 12    | 10    | 9     | 8     |       |       |       |       |         |       |
| -----                       |                                 |       |       |       |       |       |       |       |       |       |         |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | TOTAL   |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | PRESENT |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | WORTH   |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | (000's) |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | =====   |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | 5862    |       |
|                             |                                 |       |       |       |       |       |       |       |       |       | =====   |       |

ALTERNATIVE C1

B-64

AR301296

Original (Red)

DRAKE CHEMICAL RAA C-1  
 STRUCTURE AND BUILDING REMOVAL  
 DRUMS TO ROLLINS BRIDGEPORT, NJ  
 DEMO WASTES TO CECOS BUFFALO, NY  
 DRARAC-1

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |       |           | DIRECT COST |       |           | ITEM DIRECT COST | COMMENTS |
|----------------------------------|----------|-------------------|-------|-----------|-------------|-------|-----------|------------------|----------|
|                                  |          | MATERIALS         | LABOR | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT |                  |          |
| LIQUID AND SLUDGE REMOVAL        | 5000     |                   |       |           |             |       |           | 140000           |          |
| TANK SWIPE ANALYSIS              | 69       |                   |       |           |             |       | \$28.00   | 48300            |          |
| ROOF SHEETMETAL                  | 30500    |                   |       |           |             |       | \$700.00  | 11590            |          |
| SIDING SHEETS                    | 19500    |                   |       |           |             |       |           | 8580             |          |
| CONCRETE BLOCK                   | 17700    |                   |       |           |             |       |           | 16992            |          |
| STEEL FRAME AND GIRDER           | 3000     |                   |       |           |             |       |           | 19830            |          |
| FLOOR SLABS                      | 30500    |                   |       |           |             |       |           | 69845            |          |
| FOOTERS AND TANK FOUND.          | 240      |                   |       |           |             |       |           | 19200            |          |
| WOOD FRAME STRUCTURES            | 800      |                   |       |           |             |       |           | 2152             |          |
| HAULING/DISPOSAL DRUMS           | 800      |                   |       |           |             |       |           | 64000            |          |
| HAULING/DISPOSAL CONCR/WD        | 1900     |                   |       |           |             |       | \$80.00   | 328700           |          |
| HAULING/DISPOSAL STEEL           | 100      |                   |       |           |             |       | \$173.00  | 12200            |          |
|                                  |          |                   |       |           |             |       | \$122.00  |                  |          |
| <b>Total</b>                     |          |                   |       |           |             |       |           |                  |          |
| Subcontractor @ 10% of Sub       |          |                   |       |           |             |       |           | 593200           | 741389   |
| Burden @ 13% of Labor Cost       |          |                   |       |           |             |       |           | 59320            | 59320    |
| Labor @ 15% of Labor Cost        |          |                   |       |           |             |       |           | 14794            | 14794    |
| Material @ 5% of Material Cost   |          |                   |       |           |             |       |           | 17070            | 17070    |
|                                  |          |                   |       |           |             |       |           | 0                | 0        |
| <b>Total Direct Costs (TDC)</b>  |          |                   |       |           |             |       |           | 832573           | 832573   |
| Indirects 75% of Labor TDC       |          |                   |       |           |             |       |           | 109247           | 109247   |
| Profit @ 10% of IDC              |          |                   |       |           |             |       |           | 83257            | 83257    |
| <b>Total</b>                     |          |                   |       |           |             |       |           | 1025077          | 1025077  |
| Working Level: C=0.70            |          |                   |       |           |             |       |           | 202510           | 202510   |
| Health & Safety Monitoring @ .08 |          |                   |       |           |             |       |           | 98207            | 98207    |
| <b>Total Field Cost (TFC)</b>    |          |                   |       |           |             |       |           | 1325794          | 1325794  |
| Contingency @ 20% of TFC         |          |                   |       |           |             |       |           | 265159           | 265159   |
| Engineering @ 5% of TFC          |          |                   |       |           |             |       |           | 66290            | 66290    |
| <b>CAPITAL COST THIS PAGE</b>    |          |                   |       |           |             |       |           | 1657242          | 1657242  |

SENSITIVITY FACTORS

1C

| SENSIVITY FACTOR                           | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|--|---------------------------------|------------|---|
| <u>Demolition</u><br>Liquid sludge removal | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Building Materials                         | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Disposal                                   | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 1C

| COST COMPONENT                          | ESTIMATE (\$) | BASIS OF ESTIMATE    | FREQUENCY | YEAR   |
|---|---------------|----------------------|-----------|--------|
| *****                                   |               |                      |           |        |
| 0 & M COSTS                             | *             | *                    | *         | *      |
| 1. Operating Labor                      | *             | * 2 men @ \$30 / hr. | *         | *      |
| a. Sampling                             | * \$1920.00   | * 32 hrs. 2 x yr.    | *         | * 1-30 |
| b. Inspection                           | * \$1920.00   | *                    | *         | *      |
| c.                                      | *             | *                    | *         | *      |
| *****                                   |               |                      |           |        |
| 2. Maintenance, Matl's<br>and labor     | *             | *                    | *         | *      |
| a.                                      | *             | *                    | *         | *      |
| b.                                      | *             | *                    | *         | *      |
| *****                                   |               |                      |           |        |
| 3. Auxiliary Materials<br>and Labor     | *             | *                    | *         | *      |
| a.                                      | *             | *                    | *         | *      |
| b.                                      | *             | *                    | *         | *      |
| c.                                      | *             | *                    | *         | *      |
| *****                                   |               |                      |           |        |
| 4. Purchased Services                   | *             | *                    | *         | *      |
| a.                                      | *             | *                    | *         | *      |
| b.                                      | *             | *                    | *         | *      |
| c.                                      | *             | *                    | *         | *      |
| *****                                   |               |                      |           |        |
| 5. Disposal                             | *             | *                    | *         | *      |
| a.                                      | *             | *                    | *         | *      |
| b.                                      | *             | *                    | *         | *      |
| *****                                   |               |                      |           |        |
| 6. Administration                       | *             | * Report Preparation | *         | *      |
|   | * \$960.00    | * 1 man @ \$60/hr    | *         | * 1-30 |
|   | *             | * 8 hrs. 2 x yr.     | *         | *      |
| *****                                   |               |                      |           |        |
| 7. Insurances, Taxes<br>Licenses        | *             | *                    | *         | *      |
| a.                                      | *             | *                    | *         | *      |
| b.                                      | *             | *                    | *         | *      |
| c.                                      | *             | *                    | *         | *      |
| *****                                   |               |                      |           |        |
| 8. Maintenance and<br>Contingency Costs | * \$240.00    | * @ 5% of O&M Costs  | *         | * 1-30 |
| *****                                   |               |                      |           |        |
| 9. Other                                | *             | *                    | *         | *      |
| *****                                   |               |                      |           |        |
| ANNUALIZED CAPITAL<br>COST              | * \$5040.00   | *                    | *         | * 1-30 |
| *****                                   |               |                      |           |        |

ORIGINAL (Red)

SITE: DRAKE CHEMICAL  
 ALTERNATIVE NO.: 1C  
 1704

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 1657                            |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5    |
| 3. ANNUAL COSTS             | 1657                            | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               |       |       |       |       |       |       |       |       |       |       |      |
| PRESENT WORTH =             | 1657                            | 5     | 4     | 4     | 3     | 3     | 3     | 3     | 2     | 2     | 2     | 2    |

|                 |      |       |       |       |       |      |       |       |       |       |       |
|-----------------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| 12              | 13   | 14    | 15    | 16    | 17    | 18   | 19    | 20    | 21    | 22    | 23    |
| 5               | 5    | 5     | 5     | 5     | 5     | 5    | 5     | 5     | 5     | 5     | 5     |
| 0.319           | 0.29 | 0.263 | 0.239 | 0.218 | 0.198 | 0.18 | 0.164 | 0.149 | 0.135 | 0.123 | 0.112 |
| PRESENT WORTH = | 2    | 1     | 1     | 1     | 1     | 1    | 1     | 1     | 1     | 1     | 1     |

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 1657                            |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5    |
| 3. ANNUAL COSTS             | 1657                            | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               |       |       |       |       |       |       |       |       |       |       |      |
| PRESENT WORTH =             | 1657                            | 5     | 4     | 4     | 3     | 3     | 3     | 3     | 2     | 2     | 2     | 2    |

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 1657                            |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5    |
| 3. ANNUAL COSTS             | 1657                            | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               |       |       |       |       |       |       |       |       |       |       |      |
| PRESENT WORTH =             | 1657                            | 5     | 4     | 4     | 3     | 3     | 3     | 3     | 2     | 2     | 2     | 2    |

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |      |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11   |
| 1. CAPITAL COSTS            | 1657                            |       |       |       |       |       |       |       |       |       |       |      |
| 2. O & M COSTS              | ---                             | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5    |
| 3. ANNUAL COSTS             | 1657                            | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35 |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               |       |       |       |       |       |       |       |       |       |       |      |
| PRESENT WORTH =             | 1657                            | 5     | 4     | 4     | 3     | 3     | 3     | 3     | 2     | 2     | 2     | 2    |

TOTAL PRESENT WORTH (000's)  
 =====  
 1704  
 =====

ALTERNATIVE C2

B-69

AR301301

DRAKE CHEMICAL RAA C-2  
STRUCTURE AND BUILDING REMOVAL W/DECON  
DRUMS TO ROLLINS BRIDGEPORT, NJ  
DEMO WASTES TO CLASS 3 DEMOLITION SITE  
DRARAC-2

| ITEM  | QUANTITY | DIRECT UNIT PRICE |       |           | DIRECT COST |           |       | ITEM DIRECT COST | COMMENTS                  |
|---|----------|-------------------|-------|-----------|-------------|-----------|-------|------------------|---------------------------|
|   |          | MATERIALS         | LABOR | EQUIPMENT | SUB.        | MATERIALS | LABOR |                  |                           |
| LIQUID AND SLUDGE REMOVAL                   | 5000     |                   |       |           | \$28.00     |           |       | \$140000.00      |                           |
| TANK WIPE ANALYSIS                          | 69       |                   |       |           | \$700.00    |           |       | \$48300.00       |                           |
| ROOF SHEETMETAL                             | 30500    |                   |       |           |             |           | 3355  |                  |                           |
| SIDING SHEETS                               | 19500    |                   |       |           | \$0.27      | \$0.11    |       |                  |                           |
| CONCRETE BLOCK                              | 17700    |                   |       |           | \$0.44      |           |       |                  |                           |
| STEEL FRAME AND GIRDER                      | 3000     |                   |       |           | \$0.79      | \$0.17    |       |                  |                           |
| FLOOR SLABS                                 | 30500    |                   |       |           | \$4.69      | \$1.92    |       |                  |                           |
| FOOTERS AND TANK FOUND.                     | 240      |                   |       |           | \$1.87      | \$0.42    |       |                  |                           |
| WOOD FRAME STRUCTURES                       | 800      |                   |       |           | \$42.00     | \$38.00   |       |                  |                           |
| HAULING/DISPOSAL DRUMS                      | 800      |                   |       |           | \$2.27      | \$0.42    |       |                  |                           |
| HAULING/DISPOSAL CONGR/HD                   | 1900     |                   |       |           | \$1.71      | \$5.20    |       |                  |                           |
| HAULING/DISPOSAL STEEL                      | 100      |                   |       |           | \$20.71     | \$63.20   |       |                  |                           |
| HAULING/DISPOSAL OF DECON FLUIDS AND WASTES | 850000   |                   |       |           |             |           |       |                  |                           |
|   |          |                   |       |           | \$80.00     |           |       | \$64000.00       | 64000 ROLLINS INCINERATOR |
|   |          |                   |       |           |             |           |       | 13129            |                           |
|   |          |                   |       |           |             |           |       | 8391             |                           |
|   |          |                   |       |           |             |           |       | 340000           | DUPONT IN NJ              |
|   |          |                   |       |           | \$0.40      |           |       | \$340000.00      |                           |

Total  
Subcontractor @ 10% of Sub  
Burden @ 13% of Labor Cost  
Labor @ 15% of Labor Cost  
Material @ 5% of Material Cost

Total Direct Costs (TDC)  
Indirects 75% of Labor TDC  
Profit @ 10% of TDC

Total  
Working Level: C=0.70  
Health & Safety Monitoring @ .08  
Total Field Cost (TFC)  
Contingency @ 20% of TFC  
Engineering @ 5% of TFC

CAPITAL COST THIS PAGE

SENSITIVITY FACTORS

ORIGINAL  
(Red)

20

| SENSIVITY FACTOR      | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|-----------------------|---------------------------------|------------|---|
| <u>Demolition</u>     |                                 |            |   |
| Liquid Sludge Removal | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Building Materials    | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in field design stage |
| Disposal              | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 2C

| COST COMPONENT                          | * ESTIMATE (\$) | * BASIS OF ESTIMATE  | * FREQUENCY | * YEAR |
|---|-----------------|----------------------|-------------|--------|
| *****                                   |                 |                      |             |        |
| 0 & M COSTS                             | *               | *                    | *           | *      |
| 1. Operating Labor                      | *               | * 2 men @ \$30 / hr. | *           | *      |
| a. Sampling                             | * \$1920.00     | * 32 hrs. 2 x yr.    | *           | * 1-30 |
| b. Inspection                           | * \$1920.00     | *                    | *           | *      |
| c.                                      | *               | *                    | *           | *      |
| *****                                   |                 |                      |             |        |
| 2. Maintenance, Matl's<br>and labor     | *               | *                    | *           | *      |
| a.                                      | *               | *                    | *           | *      |
| b.                                      | *               | *                    | *           | *      |
| *****                                   |                 |                      |             |        |
| 3. Auxiliary Materials<br>and Labor     | *               | *                    | *           | *      |
| a.                                      | *               | *                    | *           | *      |
| b.                                      | *               | *                    | *           | *      |
| c.                                      | *               | *                    | *           | *      |
| *****                                   |                 |                      |             |        |
| 4. Purchased Services                   | *               | *                    | *           | *      |
| a.                                      | *               | *                    | *           | *      |
| b.                                      | *               | *                    | *           | *      |
| c.                                      | *               | *                    | *           | *      |
| *****                                   |                 |                      |             |        |
| 5. Disposal                             | *               | *                    | *           | *      |
| a.                                      | *               | *                    | *           | *      |
| b.                                      | *               | *                    | *           | *      |
| *****                                   |                 |                      |             |        |
| 6. Administration                       | *               | * Report Preparation | *           | *      |
|   | * \$960.00      | * 1 man @ \$60/hr    | *           | * 1-30 |
|   | *               | * 8 hrs. 2 x yr.     | *           | *      |
| *****                                   |                 |                      |             |        |
| 7. Insurances, Taxes<br>Licenses        | *               | *                    | *           | *      |
| a.                                      | *               | *                    | *           | *      |
| b.                                      | *               | *                    | *           | *      |
| c.                                      | *               | *                    | *           | *      |
| *****                                   |                 |                      |             |        |
| 8. Maintenance and<br>Contingency Costs | * \$240.00      | * @ 5% of O&M Costs  | *           | * 1-30 |
| *****                                   |                 |                      |             |        |
| 9. Other                                | *               | *                    | *           | *      |
| *****                                   |                 |                      |             |        |
| ANNUALIZED CAPITAL<br>COST              | * \$5040.00     | *                    | *           | * 1-30 |
| *****                                   |                 |                      |             |        |

ORIGINAL (Red)

SITE: DRAKE CHEMICAL  
ALTERNATIVE NO.: 2C  
1770

\*\*\*PRESENT WORTH ANALYSIS\*\*\*

| COST COMPONENT              | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |       |       |       |       |       |
|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                             | 0                               | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    |
| 1. CAPITAL COSTS            | 1723                            |       |       |       |       |       |       |       |       |       |       |       |
| 2. O & M COSTS              |                                 | 5     |       |       |       |       |       |       |       |       |       |       |
| 3. ANNUAL COSTS             | 1723                            | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     |
| 4. ANNUAL DISCOUNT RATE=10% | 1                               | 0.909 | 0.826 | 0.751 | 0.683 | 0.621 | 0.564 | 0.513 | 0.467 | 0.424 | 0.386 | 0.35  |
| PRESENT WORTH =             | 1723                            | 5     | 4     | 4     | 3     | 3     | 3     | 3     | 2     | 2     | 2     | 2     |
| -----                       |                                 |       |       |       |       |       |       |       |       |       |       |       |
| O & M COSTS                 | 12                              | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23    |
| ANNUAL DISCOUNT RATE=10%    | 5                               | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     |
| PRESENT WORTH =             | 0.319                           | 0.29  | 0.263 | 0.239 | 0.218 | 0.198 | 0.18  | 0.164 | 0.149 | 0.135 | 0.123 | 0.112 |

| COST COMPONENT           | COST/YEAR COST OCCURS (\$000's) |       |       |       |       |       |       |                             |  |  |  |  |
|--------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-----------------------------|--|--|--|--|
|                          | 24                              | 25    | 26    | 27    | 28    | 29    | 30    | TOTAL PRESENT WORTH (000's) |  |  |  |  |
| O & M COSTS              | 5                               | 5     | 5     | 5     | 5     | 5     | 5     |                             |  |  |  |  |
| ANNUAL DISCOUNT RATE=10% | 0.101                           | 0.092 | 0.084 | 0.076 | 0.069 | 0.063 | 0.057 |                             |  |  |  |  |
| PRESENT WORTH =          | 1                               | 0     | 0     | 0     | 0     | 0     | 0     |                             |  |  |  |  |
| =====                    |                                 |       |       |       |       |       |       |                             |  |  |  |  |
| 1770                     |                                 |       |       |       |       |       |       |                             |  |  |  |  |
| =====                    |                                 |       |       |       |       |       |       |                             |  |  |  |  |

AR301305

ALTERNATIVE C3

B-74

AR301306

ORIGINAL  
(Red)

DRAKE CHEMICAL RAA C-3  
STRUCTURE AND BUILDING REMOVAL W/DECON  
DRUMS TO ROLLINS BRIDGEPORT, NJ  
DISPOSAL ONSITE  
DRARAC-3

| ITEM                             | QUANTITY | DIRECT UNIT PRICE |       |           | DIRECT COST |       |             | ITEM DIRECT COST | COMMENTS            |
|----------------------------------|----------|-------------------|-------|-----------|-------------|-------|-------------|------------------|---------------------|
|                                  |          | MATERIALS         | LABOR | EQUIPMENT | MATERIALS   | LABOR | EQUIPMENT   |                  |                     |
| LIQUID AND SLUDGE REMOVAL        | 5000     |                   |       |           |             |       |             | 140000           |                     |
| TANK SWIPE ANALYSIS              | 69       |                   |       |           |             |       | \$140000.00 | 13800            |                     |
| ROOF SHEETMETAL                  | 30500    |                   |       |           |             |       | \$13800.00  | 11590            |                     |
| SIDING SHEETS                    | 19500    |                   |       |           |             |       |             | 8580             |                     |
| CONCRETE BLOCK                   | 17700    |                   |       |           |             |       |             | 16992            |                     |
| STEEL FRAME AND GIRDER           | 3000     |                   |       |           |             |       |             | 19830            |                     |
| FLOOR SLABS                      | 30500    |                   |       |           |             |       |             | 69845            |                     |
| FOOTERS AND TANK FOUND.          | 240      |                   |       |           |             |       |             | 19200            |                     |
| WOOD FRAME STRUCTURES            | 800      |                   |       |           |             |       |             | 2152             |                     |
| HAULING/DISPOSAL DRUMS           | 800      |                   |       |           |             |       |             | 64000            | ROLLINS INCINERATOR |
| HAULING/DISPOSAL CONCR/WD        | 1900     |                   |       |           |             |       |             | 1824             |                     |
| HAULING/DISPOSAL STEEL           | 100      |                   |       |           |             |       |             | 661              |                     |
| <hr/>                            |          |                   |       |           |             |       |             |                  |                     |
| Total                            |          |                   |       |           |             |       |             | 368474           |                     |
| Subcontractor @ 10% of Sub       |          |                   |       |           |             |       |             | 21780            |                     |
| Burden @ 13% of Labor Cost       |          |                   |       |           |             |       |             | 15050            |                     |
| Labor @ 15% of Labor Cost        |          |                   |       |           |             |       |             | 17365            |                     |
| Material @ 5% of Material Cost   |          |                   |       |           |             |       |             | 0                |                     |
| <hr/>                            |          |                   |       |           |             |       |             |                  |                     |
| Total Direct Costs (TDC)         |          |                   |       |           |             |       |             | 422669           |                     |
| Indirects 75% of Labor TDC       |          |                   |       |           |             |       |             | 111138           |                     |
| Profit @ 10% of TDC              |          |                   |       |           |             |       |             | 42267            |                     |
| <hr/>                            |          |                   |       |           |             |       |             |                  |                     |
| Total                            |          |                   |       |           |             |       |             | 576074           |                     |
| Working Level: C=0.70            |          |                   |       |           |             |       |             | 205959           |                     |
| Health & Safety Monitoring @ .08 |          |                   |       |           |             |       |             | 62563            |                     |
| <hr/>                            |          |                   |       |           |             |       |             |                  |                     |
| Total Field Cost (TFC)           |          |                   |       |           |             |       |             | 844596           |                     |
| Contingency @ 20% of TFC         |          |                   |       |           |             |       |             | 168919           |                     |
| Engineering @ 5% of TFC          |          |                   |       |           |             |       |             | 42230            |                     |
| <hr/>                            |          |                   |       |           |             |       |             |                  |                     |
| CAPITAL COST THIS PAGE           |          |                   |       |           |             |       |             | 1055746          |                     |

SENSITIVITY FACTORS

3C

| SENSIVITY FACTOR      | JUSTIFICATION FOR CONSIDERATION | RANGE      | JUSTIFICATION FOR RANGE   |
|-----------------------|---------------------------------|------------|---|
| <u>Demolition</u>     |                                 |            |   |
| Liquid Sludge Removal | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Building Materials    | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |
| Disposal              | Major construction item         | -10<br>+20 | Actual field conditions may warrant changes in final design stage |

SITE: DRAKE CHEMICAL  
Annual Operating Costs  
RAA 3C

| COST COMPONENT                       | * ESTIMATE (\$) | * BASIS OF ESTIMATE  | * FREQUENCY | * YEAR |
|--------------------------------------|-----------------|----------------------|-------------|--------|
| *****                                |                 |                      |             |        |
| 0 & M COSTS                          | *               | *                    | *           | *      |
| 1. Operating Labor                   | *               | * 2 men @ \$30 / hr. | *           | *      |
| a. Sampling                          | * \$1920.00     | * 32 hrs. 2 x yr.    | *           | * 1-30 |
| b. Inspection                        | * \$1920.00     | *                    | *           | *      |
| c.                                   | *               | *                    | *           | *      |
| *****                                |                 |                      |             |        |
| 2. Maintenance, Matl's and labor     | *               | *                    | *           | *      |
| a.                                   | *               | *                    | *           | *      |
| b.                                   | *               | *                    | *           | *      |
| *****                                |                 |                      |             |        |
| 3. Auxiliary Materials and Labor     | *               | *                    | *           | *      |
| a.                                   | *               | *                    | *           | *      |
| b.                                   | *               | *                    | *           | *      |
| c.                                   | *               | *                    | *           | *      |
| *****                                |                 |                      |             |        |
| 4. Purchased Services                | *               | *                    | *           | *      |
| a.                                   | *               | *                    | *           | *      |
| b.                                   | *               | *                    | *           | *      |
| c.                                   | *               | *                    | *           | *      |
| *****                                |                 |                      |             |        |
| 5. Disposal                          | *               | *                    | *           | *      |
| a.                                   | *               | *                    | *           | *      |
| b.                                   | *               | *                    | *           | *      |
| *****                                |                 |                      |             |        |
| 6. Administration                    | *               | * Report Preparation | *           | *      |
|                                      | * \$960.00      | * 1 man @ \$60/hr    | *           | * 1-30 |
|                                      | *               | * 8 hrs. 2 x yr.     | *           | *      |
| *****                                |                 |                      |             |        |
| 7. Insurances, Taxes Licenses        | *               | *                    | *           | *      |
| a.                                   | *               | *                    | *           | *      |
| b.                                   | *               | *                    | *           | *      |
| c.                                   | *               | *                    | *           | *      |
| *****                                |                 |                      |             |        |
| 8. Maintenance and Contingency Costs | * \$240.00      | * @ 5% of O&M Costs  | *           | * 1-30 |
| *****                                |                 |                      |             |        |
| 9. Other                             | *               | *                    | *           | *      |
| *****                                |                 |                      |             |        |
| ANNUALIZED CAPITAL COST              | * \$5040.00     | *                    | *           | * 1-30 |
| *****                                |                 |                      |             |        |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
841 Chestnut Building  
Philadelphia, Pennsylvania 19107

JUL 18 1985

Mr. Richard Ninesteel  
NUS Corporation  
Park West Two - Cliff Mine Road  
Pittsburgh, PA 15275

RECEIVED  
JUL 21 1985  
REGION III  
PHILADELPHIA  
STAFF TO \_\_\_\_\_

Dear Rich:

Below are EPA's comments concerning the draft Phase II Feasibility Study for Drake Chemical. These comments should be used in conjunction with any verbal comments made in our meeting on July 11. Comments from our hydrogeologist (Doug Hill) were mainly addressed in the meeting, however, further comments may be forwarded as soon as possible.

Please inform me how all comments were addressed in a letter to me subsequent to the revision of the draft documents.

Page/Para.

- 1-5/2 "(Water table)" should come after "aquifer" not before.
- 1-5/4 Residue of what?
- 1-6/2 The detection of non-site specific compounds in offsite wells could mean several things and all possibilities should be mentioned or none at all.
- 1-7/3 Rewrite this paragraph (or eliminate). It seems contradictory to a justifiable cause for remedial action.
- 2-10/3 Typo: ... discharges to nearby steams .....
- 2-18/7 Change last sentence to: There is a potential risk of exposure to vapors or particulates during onsite removal or excavation activities.
- 2-20/2 Actual permitting of CERCLA actions is not necessary in the State of Pennsylvania. However, meeting the substantive requirements of the permit is required.
- 2-28/1 Can Chemical Dechlorination be applied to chlorinated hydrocarbons other than PCB's. The revised NCP now allows EPA to select technologies which are not yet highly developed. Therefore, screening this option out purely on that rationale is not justified.
- 2-35/1 Charge this sentence (see comment 2-18/7)

AR301310

- 3-2/2 add ... will not be implemented before remedial action takes place at Drake.
- 3-3/1 All references to the leachate stream sediments should be deleted.
- 3-3/2 Can sediment/soil from the leachate lagoon be temporarily stored onsite if onsite disposal is the option of choice?
- 3-7/4 Permanent lowering of water table in this alternative should be expanded as to costs, implementability, O&M etc.
- 3-14/  
(Category III) Please explain "why no RAA's are available for this category.
- 3-22/3 Why don't organics require treating?
- 4-8/4 Implementation phase should include possibility of encountering buried drums, tanks etc. during excavation.
- 4-13/2 Why wasn't onsite incineration developed as a full alternative with technical, institutional etc. analysis.
- 4-14/4 Please change "will require authorization" to must meet substantive requirements of ...
- 4-15/3 Sentence beginning "There will be no remediation" ....; should be rewritten for clarification.
- 4-17/5 Sequence of flood dike construction does not seem to coorespond with phased sequence as described in 3-11/3.
- 4-38/  
(4th bullet) Please explain 8 pore volume.
- 4-42/ What about costs of discharging to POTW.  
4-44 (costs)

If you have any questions, please call me.

Sincerely,



William A. Hagel  
Remedial Project Manager

AR301311

Received -11-85 @ review meeting

Philadelphia

ORIGINAL  
(Red)

| <input type="checkbox"/> MRD  |                | <b>CORPS OF ENGINEERS<br/>ENGINEERING REVIEW COMMENTS</b>   |   | TO: <b>B. Little<br/>MROED-E</b> |                                  |
|---|----------------|---|---|----------------------------------|----------------------------------|
| <input type="checkbox"/> _____ District   |                |   |   |                                  |                                  |
| PLANS & SPECIFICATIONS AND/OR DESIGN REPORT   |                |   | DESIGNED BY:  |                                  | PROJECT:                         |
| <input type="checkbox"/> PRELIM <input type="checkbox"/> FINAL <input type="checkbox"/> AS-ADV. |                |   | <input type="checkbox"/> AE <input type="checkbox"/> DIST |                                  | <b>DRAKE - Phase II Draft FS</b> |
| LOCATION OR BASE:   |                | INVITATION NO.:   |   | BID OPENING DATE:                |                                  |
| COMMENTS BY:<br><b>J. Carroll</b>   |                | BRANCH OR SECTION:<br><b>MRDED-L</b>  |   | DATE:<br><b>6/17/85</b>          |                                  |
| DRAWING NUMBER OR<br>PARAGRAPH NUMBER   | ITEM<br>NUMBER | COMMENTS  | SHEET <u>1</u> OF <u>2</u>                                |                                  | PHONED TO:<br>(Name/Date)        |
| 2.1.1   |                | Monitoring and Analysis. Monitoring of surface water and ground water are noted, but not air/dust samples, though air/dust is an identified exposure pathway (See ES-2,3).  |   |                                  |                                  |
| 3.2   |                | There is no statement as to how "contaminated soils" are to be identified during remedial work. A statement of action levels should specify the identity of contaminant substances to be tested and levels above which excavation must be continued.  |   |                                  |                                  |
| 3.3.1   |                | Surface water discharge. Water treatment is assumed to be to 10X aquatic life tolerance, with dilution in Bald Eagle Creek required to lower contaminant levels to acceptable values.<br>(i) Bald Eagle Creek flow should be stated in the FS. The RI did not report flows in Bald Eagle Creek, as required to justify the assumption of 10X dilution during dry weather periods .<br>(ii) The FS includes no mention of the necessity to assure efficient mixing of treated water with Creek water. The remedial work should include |   |                                  |                                  |

| <input type="checkbox"/> MRD<br><input type="checkbox"/> _____ District  |             | <b>CORPS OF ENGINEERS<br/>ENGINEERING REVIEW COMMENTS</b>   |                            | TO: <b>B. Little<br/>MROED-E</b>             |
|--|-------------|---|----------------------------|--|
| PLANS & SPECIFICATIONS AND/OR DESIGN REPORT<br><input type="checkbox"/> PRELIM <input type="checkbox"/> FINAL <input type="checkbox"/> AS-ADV. |             | DESIGNED BY:<br><input type="checkbox"/> AE <input type="checkbox"/> DIST   |                            | PROJECT:<br><b>DRAKE - Phase II Draft FS</b> |
| LOCATION OR BASE:  |             | INVITATION NO.:   |                            | BID OPENING DATE:                            |
| COMMENTS BY:<br><b>J. Carroll</b>  |             | BRANCH OR SECTION:<br><b>MRDED-L</b>  |                            | DATE:<br><b>6/17/85</b>                      |
| DRAWING NUMBER OR PARAGRAPH NUMBER   | ITEM NUMBER | COMMENTS  | SHEET <u>2</u> OF <u>2</u> | PHONED TO:<br>(Name/Date)                    |
|  |             | construction to produce rapid mixing.   |                            |  |
| 3.3.1  |             | POTW Discharge. The Lock Haven POTW is barely capable of taking an additional 0.5 MGD (RAA3B, about 330 GPM) during dry weather. Residual contaminant levels in pretreated water released to POTW must be low enough to prevent lowering the efficiency of the plant due to killing of water-treatment microorganisms. Allowed contaminant levels in pretreated water have not been and should be stated for POTW discharge.                              |                            |  |
| 4.3.1.2  |             | Before discharge to the POTW, the water is to undergo no pretreatment for organics, though Fenac, chlorobenzene and aldrin are all at substantially elevated levels (Table 4-2). The FS should address directly the distinct possibility that a discharge permit would not be granted without pretreatment for these organics. State the cost of organic pretreatment or the efficacy of water treatment of this concentration of herbicide, for example. |                            |  |

| <input checked="" type="checkbox"/> MRD<br><input type="checkbox"/> _____ District  |             | CORPS OF ENGINEERS<br>ENGINEERING REVIEW COMMENTS  |                            | TO:  |
|---|-------------|--|----------------------------|--|
| PLANS & SPECIFICATIONS AND/OR DESIGN REPORT<br><input type="checkbox"/> PRELIM <input checked="" type="checkbox"/> FS <input type="checkbox"/> FINAL <input type="checkbox"/> AS-ADV. |             | DESIGNED BY:<br><input checked="" type="checkbox"/> AE <input type="checkbox"/> DIST   |                            | PROJECT: SUPERFUND<br>ORANGE CHEMICAL SITE |
| LOCATION OR BASE:   |             | INVITATION NO.:  |                            | BID OPENING DATE:                          |
| LOCK HAVEN, PA  |             |  |                            |  |
| COMMENTS BY:  |             | BRANCH OR SECTION:   |                            | DATE:                                      |
| EO MEAD   |             | MRPED-TE   |                            | 24 JUNE 85                                 |
| DRAWING NUMBER OR PARAGRAPH NUMBER  | ITEM NUMBER | COMMENTS   | SHEET <u>1</u> OF <u>2</u> | PHONED TO:<br>(Name/Date)                  |
| P3-24 →   | 1           | <p>RAA2B vs RAA3B cost difference is 12,502 - 2,939 = *9,563,000 (p4-58).<br/>         Recommended that some modeling be done on the plume to see if pumping all areas vs only the highly contaminated areas vs no pumping (except to lower the water table <del>is</del> during excavation) is best.<br/>         The models are not very accurate for this type of modeling. However, if the models are run with optimistic assumptions and again with pessimistic assumptions a range of plume <del>are</del> concentrations can be estimated and the <del>more</del> subsequent benefit of the various pumping/no pumping options evaluated. If the modeling indicates limited or no pumping, monitoring wells</p> |                            |  |





| <input type="checkbox"/> MRD<br><input checked="" type="checkbox"/> <u>OMAHA</u> District   |                | CORPS OF ENGINEERS<br>ENGINEERING REVIEW COMMENTS   |  | TO: CH. ENVIRONMENTAL<br>(S.F.) OFFICE |   |
|---|----------------|---|--|--|---|
| PLANS & SPECIFICATIONS AND/OR DESIGN REPORT<br><input checked="" type="checkbox"/> PRELIM <input type="checkbox"/> FINAL <input type="checkbox"/> AS-ADV. |                |   | DESIGNED BY:<br><input checked="" type="checkbox"/> AE <input type="checkbox"/> DIST |  | PROJECT: <u>DRACE CHEMICAL SITE</u><br><u>PHASE II, REVIEW F.S.</u> |
| LOCATION OR BASE: <u>LOCE HAVEN,</u><br><u>CLINTON Co., PENNSYLVANIA</u>  |                |   | INVITATION NO.:  |  | BID OPENING DATE:   |
| COMMENTS BY:<br><u>MICHAEL E. CRAIN</u> <u>K4496</u>  |                |   | BRANCH OR SECTION:<br><u>GEOLOGY SEC., GEOTECH. BE</u>                               |  | DATE:<br><u>6-19-85</u>   |
| DRAWING NUMBER OR<br>PARAGRAPH NUMBER   | ITEM<br>NUMBER | COMMENTS  | SHEET <u>1</u> OF <u>2</u>   | PHONED TO:<br>(Name/Date)---           |   |
| <u>page 3-3</u>   | <u>1.</u>      | <p>It may be necessary to include provision for pumping out rain water that may fall within any excavations on site. This water may become contaminated and require treatment prior to discharge. The storm water management controls in the report seemed to only prevent runoff from entering the excavation. You will still have to deal with the precipitation that falls directly into the excavation pit.</p> |  |  |   |
| <u>pg 3-24 par. 2</u>   | <u>2.</u>      | <p>What is this dewatering estimate based on? Give background on how this was determined.</p>   |  |  |   |



| <input type="checkbox"/> MRD<br><input checked="" type="checkbox"/> <u>OMAHA</u> District   |             | CORPS OF ENGINEERS<br>ENGINEERING REVIEW COMMENTS   |  | TO:<br><u>Bruce Little</u> |
|---|-------------|---|--|----------------------------|
| PLANS & SPECIFICATIONS AND/OR DESIGN REPORT<br><input type="checkbox"/> PRELIM <input checked="" type="checkbox"/> FINAL <input type="checkbox"/> AS-ADV. |             | DESIGNED BY:<br><input checked="" type="checkbox"/> AE <input type="checkbox"/> DIST  | PROJECT:<br><u>Brake Chemical Site</u> |                            |
| LOCATION OR BASE:<br><u>Lock Haven, Pennsylvania</u>  |             | INVITATION NO.:   | BID OPENING DATE:                      |                            |
| COMMENTS BY:<br><u>R. J. Waples P.E.</u>  |             | BRANCH OR SECTION:<br><u>Environmental Section</u>  | DATE:<br><u>24 June 1985</u>           |                            |
| DRAWING NUMBER OR PARAGRAPH NUMBER  | ITEM NUMBER | COMMENTS  | SHEET <u>1</u> OF <u>   </u>           | PHONED TO:<br>(Name/Date)  |
| <u>Page ES-7</u>  | <u>1</u>    | <u>Verify that capital costs for "No Action Alternatives" should be zero. Verify that additional monitoring wells would not be required.</u>        |  |                            |
| <u>Page 2-20</u>  | <u>2.</u>   | <u>Recommend offsite incinerators that are permitted and close to the site be listed. Verify that EPA portable incinerator can not be used.</u>     |  |                            |
| <u>Page 3-2</u>   | <u>3.</u>   | <u>Unclear what US Army Corps of Engineers plan for flood protection is. The impact on the groundwater and 100 year flood elevation is unclear.</u> |  |                            |
| <u>Page 4-13</u>  | <u>4.</u>   | <u>Verify that residue after incineration can't be reclassified and disposed of on site.</u>  |  |                            |
| <u>Page 4-18</u>  | <u>5.</u>   | <u>Recommend documentation be included in the feasibility study that landfill</u>   |  |                            |

AR 301319

