Technology Section ROD file J. Harrington

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Carroll and Dubies Superfund Site (the Site), which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal bases for selecting the remedy for this Site. The information supporting this remedial action decision is contained in the administrative record for this Site. The administrative record index is attached (Appendix III).

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy as per the attached letter (Appendix IV).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present a imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This operable unit (OU1) represents the first of two operable units planned for the Site. This operable unit addresses the source areas (lagoons and surrounding impacted soils) at the Site and actions needed to ensure that the source areas do not pose a threat to human health or the environment, including any potential cross media impacts to groundwater. The second operable unit (OU2), which is currently in progress, will further characterize the fate and transport of the contaminants emanating from the Site and will serve as the basis for the decision on a final groundwater remedy.

The major components of the selected remedy include:

o Excavation of all materials from lagoons 1, 2, 3, 4, 6, 7 and 8, as well as the soils in the vicinity of those lagoons, which exceed the excavation levels specified in the

Selected Remedy section of the Decision Summary. EPA's current estimate of the volume of the materials requiring excavation is approximately 20,300 cubic yards (cy). However, the actual volume will be further determined during the implementation of the remedy.

o Treatment of excavated soil/sludges which contain organic constituents above the treatment levels specified in the Selected Remedy Section of the Decision Summary (estimated at 13,800 cy) via on-Site ex-situ vapor extraction.

o Additional treatment of lagoon 7 soils/sludges (estimated at 3,400 cy) via on-Site ex-situ bioslurry (treatment targeted primarily for semi-volatile contaminants).

o Stabilization/solidification of soils/sludges which fail the Resource Conservation and Recovery Act's Toxicity Characteristic Leaching Procedure (TCLP) for inorganic constituents (estimated at 5,700 cy).

o Placement of treated and untreated soils/sludges in a lined and capped cell consistent with modified requirements of New York Code of Rules and Regulations Part 360. The base of the cell will consist of a high density polyethylene (HDPE) liner and a sand drainage layer. The cell will be sloped to a leachate collection system. The cap will consist of a low-permeability clay layer, an HDPE membrane, a sand drainage layer and a topsoil cover layer.

o Development of an air-monitoring system and installation of air pollution control equipment to ensure compliance with air pollution control regulations; and

o Recommendations that deed and well restrictions be imposed to protect the integrity of the cap.

Although the use of the bioslurry process to treat lagoon 7 materials appears to be a promising means of treating the semi-volatile organics, further treatability studies are necessary to demonstrate that this process can reduce the complex mix of constituents in lagoon 7 to remediation goals. Because of the existing uncertainty, a contingency remedy will be implemented if treatability study results indicate that bioslurry will not be effective in reducing the levels of contaminants in lagoon 7 materials, particularly semi-volatile contaminants, to remediation goals. The major components of the contingency remedy are identical to those of the selected remedy with the following exception:

Excavation and off-Site treatment (as necessary) and disposal of lagoon 7 materials at a RCRA (Subtitle C) permitted treatment, storage and disposal facility; it is assumed that thermal treatment, i.e., incineration or low temperature thermal treatment, will be necessary to reduce the contaminants to appropriate Land Disposal Restriction (LDR) levels.

STATUTORY DETERMINATIONS

The selected remedy and contingency remedy are protective of human health and the environment, comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action and are cost-effective. The selected remedy and contingency remedy utilize permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because the selected remedy and contingency remedy will necessitate restrictions on the use of the site, a five-year review will be required to ensure the integrity of the containment system.

Jeanne M. Fox
Regional Administrator

3/31/95
Date

DECISION SUMMARY

Carroll and Dubies Superfund Site

Town of Deerpark
Orange County, New York

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region II
New York, New York

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SITE NAME, LOCATION AND DESCRIPTION

The Carroll and Dubies Superfund Site (the Site) occupies approximately 3 acres in the Neversink Valley, just northeast of the City of Port Jervis on Canal Street in the Town of Deerpark, Orange County, New York (see Figure 1). The Site is occupied by an office building and a garage. The waste disposal areas at the Site include seven lagoons. Several automobiles from previous salvage operations have been abandoned on-Site. Numerous portable toilets are also stored on-Site.

The northwest boundary of the Site is formed by the valley wall, which consists of exposed bedrock with talus comprising the base. The southeast boundary and a portion of the northeast boundary of the Site are formed by remnants of the former Delaware and Hudson (D&H) Canal and towpath. The remainder of the northeast property boundary is formed by the valley wall and an active sand and gravel quarry. Adjacent to the southern boundary of the Site is the City of Port Jervis Landfill. The landfill is no longer active; however, Orange County currently operates a solid waste transfer station on a portion of the landfill property. Approximately 1,500-feet to the east of the Site is Gold Creek and its associated wetlands. The Neversink River is located approximately 2,000-feet beyond Gold Creek. Gold Creek and the Neversink River drain into the Delaware River.

The Site ranges from approximately 440 to 520 feet above mean sea level. The materials encountered underlying the Site consist of glacially derived unconsolidated materials underlain by consolidated bedrock. The thickness of the unconsolidated overburden materials ranges from zero feet at the exposed bedrock slope forming the northwestern Site boundary, to over 60 feet along the towpath. The glacially derived materials consist of two distinct units, including a glacial till unit overlain by glacial outwash deposits. The outwash deposit was observed to vary in thickness from 31 feet to 52 feet along the downgradient edge of the Site. The outwash deposits typically consist of medium dense to very dense brown sand with some clayey silt and gravel. The glacial till deposits are characterized as dense to very dense dark grey silt with sand and gravel. The glacial till is not continuous beneath the Site, and appears to pinch out toward the northwestern edge of the Site. The depth to groundwater from ground surface ranges from approximately 30 to 40 feet along the southeastern boundary of the Site. Groundwater movement is generally towards the southeast.

The major aquifer system used for potable water supply in Orange County is comprised of the bedrock and the sand and gravel deposits in the valley. No residential wells have been found to exist between the Site and Gold Creek. However, approximately 90 residential wells exist downgradient of the Site between Gold Creek and the Neversink River. The nearest residence and residential well is located approximately a quarter of a mile downgradient of the Site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

From approximately 1970 to 1979, the Site was used for the disposal of septic and municipal sewage sludge, as well as industrial wastes, primarily from the cosmetic industry. The industrial wastes were deposited in one or more of the seven lagoons located at the Site (lagoons 1 through 4 and 6 through 8 depicted in Figure 2). Initially, it was believed that the industrial wastes were deposited only in lagoons 1 through 4. In July 1992, however, the Site was expanded to include the investigation of areas believed to contain four additional filled-in lagoons (lagoons 5, 6, 7 and 8). These lagoons were tentatively identified in historical aerial photographs. Trenching in the area of lagoons 6, 7 and 8 confirmed the presence of sewage sludge and industrial waste; trenching in the area of lagoon 5 revealed the presence of tires instead of industrial waste. The dimensions of lagoons 1, 2, 3, 4, 6, 7 and 8 are approximately 100 feet by 60 feet, 200 feet by 60 feet, 100 feet by 35 feet, 100 feet by 40 feet, 60 feet by 20 feet, 100 feet by 45 feet, and 150 feet by 40 feet, respectively.

In 1978, lagoon 3 was ignited by the Port Jervis Fire Department in order to practice suppression of chemical fires. After this incident, lagoons 3 and 4 were filled in with soil and the area was revegetated. With the exception of lagoons 1 and 2, all of the lagoons have been covered with soil. Lagoons 1 and 2 were left uncovered and are surrounded by a wooden fence. In June 1979, the New York State Department of Environmental Conservation (NYSDEC) prohibited the disposal of industrial wastes at the Site. The Site continued to be used for the disposal of septic and municipal sewage wastes until 1989.

In February 1987, NYSDEC issued a Phase II Investigation Report which summarized past investigations and included a Hazard Ranking System (HRS) score for the Site. Based on the HRS score, the Site was proposed for inclusion on the National Priorities List (NPL) in June 1988 and was placed on the NPL in February 1990.

On September 25, 1989, the United States Environmental Protection Agency (EPA) sent "special notice" letters pursuant to Section 122(e) of CERCLA, 42 U.S.C. §9622(e), to four potentially responsible parties (PRPs), Kolmar Laboratories, Inc. (Kolmar), Wickhen Products, Inc. (Wickhen), Reynolds Metals Company, Inc., and Carroll and Dubies Sewage Disposal Facility, Inc., affording them the opportunity to conduct the Remedial Investigation and Feasibility Study (RI/FS) for the Site. (PRPs are companies or individuals who are potentially liable under CERCLA for the costs of responding to the release and threat of release of hazardous substances at and from a site.) The PRPs were given 60 days in which to submit a good faith offer to undertake or finance the RI/FS for the Site.

On November 30, 1989, two of the four PRPs, Kolmar and Wickhen, submitted to EPA a good faith offer to perform the RI/FS. An Administrative Order on Consent, Index No II-CERCLA 00202, was signed by the two PRPs and by EPA in February 1990. This work has been conducted under EPA's supervision.

During the RI, EPA learned from the City of Port Jervis that it owned a major portion of the Site property where the lagoons are located. In an April 22, 1993 letter, EPA notified the City that it was also a PRP for the Site. After issuance of the ROD, all the PRPs will be offered the opportunity to design and implement the selected remedial alternative for the Site.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS reports and the Proposed Plan for the Site were released for public comment on August 4, 1994. These documents were made available to the public in the administrative record file at the EPA Docket Room in Region II, 26 Federal Plaza, Room 2900, New York, New York and at the Deerpark Town Hall, Drawer A, Huguenot, New York. The Proposed Plan was sent to members of the public on EPA's mailing list on August 3, 1994. A public notice announcing the availability of these documents was issued on August 15, 1994 in The Times Herald Record. The public comment period was held from August 4, 1994 through September 2, 1994.

During the public comment period, EPA held a public meeting to present the RI/FS reports and the Proposed Plan, answer questions, and accept both oral and written comments. The public meeting was held in the auditorium of the Port Jervis High School, Port Jervis, New York on August 23, 1994. At this meeting, representatives from the NYSDEC, EPA and the New York State Department of Health (NYSDOH) answered questions about concerns related to the Site and the remedial alternatives under consideration. Responses to the comments received at the public meeting and to written comments received during the public comment period are included in the Responsiveness Summary (see Appendix V).

SCOPE AND ROLE OF OPERABLE UNIT

This ROD addresses the first of two operable units planned for this Site. This operable unit (OU1) addresses the source areas (lagoons and surrounding impacted soils) at the Site and actions needed to ensure that the source areas do not pose a threat to human health or the environment, including any potential cross media impacts to groundwater. The second operable unit (OU2) investigation, which is currently underway, will address the need for remediating contaminated groundwater underlying the Site.

The two PRPs who performed the RI/FS for the first operable unit are currently performing the RI/FS for the second operable unit under supervision by EPA.

The purpose of the response action under OU1 is to prevent leaching of contaminants in the soils/sludges at levels which will contribute to the contravention of groundwater quality and drinking water standards in the groundwater in the vicinity of the Site, as well as to minimize potential risks to hypothetical workers who might take part in excavation activities in contaminated areas in the future.

SUMMARY OF SITE CHARACTERISTICS

The intent of the investigation was to characterize the soil quality of the seven lagoons at the Site and any potential cross media impacts to the groundwater quality in the vicinity of these lagoons. The remedial investigation consisted of drilling borings and constructing monitoring wells, collecting soil and groundwater samples, and conducting ambient air quality and seismic surveys. The PRPs hired Blasland & Bouck Engineers to implement the RI/FS.

Soil

Between July and September 1991, approximately 20 soil/sludge samples were collected from lagoons 1 through 4 and the surrounding soils; these samples were analyzed for organic and inorganic constituents. During January and February 1993, 54 additional soil samples were collected to further delineate the horizontal extent of lagoons 1 through 4 and to characterize the berm soil around lagoons 1 and 2. Various organic constituents were detected in these lagoons and the surrounding soils. Some of the highest concentrations of organic contaminants detected included benzene (650 parts per million (ppm)), 1,2-dichlorobenzene (430 ppm), 1,4-dichlorobenzene (250 ppm), tetrachloroethene (290 ppm), and toluene (370 ppm). Inorganic constituents detected in lagoons 1 through 4 and surrounding soils included arsenic (10.7 ppm), barium (1,290 ppm), chromium (137 ppm), cyanide (320 ppm), lead (1,400 ppm), and nickel (368 ppm).

Higher levels of organic and inorganic constituents were detected in lagoons 6, 7 and 8. Approximately 45 soil and sludge samples were collected from within and around the perimeter of lagoons 6, 7 and 8 during January and February 1993. Some of the highest concentrations of organic contaminants detected included benzene (2,800 ppm), tetrachloroethene (12,000 ppm), and toluene (13,000 ppm). Inorganic constituents detected in lagoons 6, 7 and 8 included arsenic (9.7 ppm), barium (933 ppm), chromium (16,000 ppm), and lead (609 ppm). In general, organic compounds were detected at higher concentrations in lagoon 7, and inorganic compounds were detected at higher concentrations in lagoon 8.

Five background soil samples were collected from areas not affected by Site contamination to use as a point of reference. One of the five soil samples was analyzed for organic constituents. All five background soil samples were analyzed for inorganic constituents. Other than 0.01 ppm of methylene chloride, organic compounds were not detected in the soil sample collected to assess background concentrations of organic compounds. The highest concentrations of various inorganic constituents detected in the background soil samples included 7.0 ppm of arsenic, 43.1 ppm of barium, 61.9 ppm of chromium, 45.6 ppm of lead, and 36.7 ppm of nickel. Cyanide was not detected in any of the background soil samples.

Tables 1 and 2 summarize the contaminant concentration averages and ranges for the source area materials and the background soil samples. In Tables 1 and 2, the NYSDEC soil cleanup levels (Technical and Administrative Guidance Memorandum (TAGM) No. 4046) are provided in place of the background soil concentrations for organics since only one organic compound was detected in the background soil sample. Figure 2 shows the location of the soil borings.

The source materials from lagoons 1, 2, 7 and 8 were tested using the toxicity characteristic leaching procedure (TCLP) to determine if these materials would be considered Resource Conservation and Recovery Act (RCRA) hazardous waste based on the characteristic of toxicity. The source materials from lagoons 1 and 2 did not leach organic or inorganic constituents at concentrations above the regulatory criteria for determining waste to be a RCRA characteristic waste. The source materials from lagoon 7 failed the TCLP for benzene, tetrachloroethene, trichloroethene and vinyl chloride and are therefore considered RCRA hazardous waste based on the characteristic of toxicity. Lagoon 8 failed the TCLP for benzene and chromium; therefore, these materials would be considered RCRA hazardous waste based on the characteristic of toxicity. All materials which exceed TCLP levels would be subject to pretreatment in order to satisfy RCRA land disposal restrictions (LDRs).

<u>Groundwater</u>

During August 1991, December 1991, March 1993 and October 1993, groundwater samples were collected from the vicinity of the lagoons and analyzed for organic and inorganic compounds. Monitoring wells located downgradient of lagoons 1 through 4 were sampled during August 1991, December 1991 and March 1993, and monitoring wells located downgradient of lagoons 6, 7 and 8 were sampled in October 1993. These monitoring wells monitor the bedrock, the glacial till, the glacial outwash or both the glacial till and outwash units. Figure 3 shows the location of the monitoring wells at the Site.

Four organic compounds, benzene, 1,2-dichloroethene (total), tetrachloroethene and trichloroethene, were detected above the Federal and/or State drinking water standards in the monitoring wells located downgradient of lagoons 1 through 4 during August and December 1991 and March 1993. These four organic compounds were detected in the monitoring wells that monitor the glacial outwash or both the glacial till and outwash. Organic contaminants were not detected above Federal or State drinking water standards in any of the bedrock or glacial till monitoring wells. Aside from tetrachloroethene detected in monitoring well OW-6, organic compounds were only detected above the Federal and/or State drinking water standards at monitoring wells located along the D&H towpath (e.g., OW-2, OW-3 and MW-4). The monitoring wells located downgradient of the D&H towpath (e.g., OW-5, OW-6, OW-7 and OW-8) were installed in 1993 and were only sampled in the October 1993 sampling event. The four organic contaminants noted above were detected in higher concentrations in 1991 than in 1993. The highest concentrations of organic compounds detected above drinking water standards were benzene at 52 parts per billion (ppb) in monitoring well OW-3, 1,2-dichloroethene (total) at 230 ppb in monitoring well OW-2, tetrachloroethene at 130 ppb in monitoring well OW-2, and trichloroethene at 41 ppb in monitoring well MW-2. The Federal and State drinking water standards for benzene, tetrachloroethene and trichloroethene are all 5 ppb. The State drinking water standard for 1,2-dichloroethene isomers is 5 ppb, which is more stringent than the Federal standard.

Inorganic compounds (arsenic, beryllium, chromium, lead and nickel) were detected above the Federal and/or State drinking water standard in monitoring wells located downgradient of lagoons 1 through 4 only during the 1991 sampling events. During the March 1993 sampling, only cadmium was detected above drinking water standards. Cadmium was detected in monitoring well OW-3 at 6 ppb, which is slightly higher than the Federal and State drinking water standard of 5 ppb.

During the October 1993 sampling of monitoring wells located downgradient of lagoons 6, 7 and 8 (OW-9, OW-10, OW-11, OW-12, OW-13, OW-14 and BW-5), benzene was detected above both the Federal and State drinking water standards; seven other organic compounds were detected above the State drinking water standards but below the Federal drinking water standards. The highest concentrations of organic compounds detected were benzene at

1,300 ppb in monitoring well OW-12; 1,3,5-trimethylbenzene at 12 ppb in monitoring well OW-11; 1,2,4-trimethylbenzene at 44 ppb in monitoring well OW-12; 1,2-dichloroethene (total) at 12 ppb in monitoring well OW-13; ethylbenzene at 9.8 ppb in monitoring well OW-12; toluene at 9.6 ppb in monitoring well OW-12; and xylene at 40 ppb in monitoring well OW-12. The State drinking water standard for 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, ethylbenzene, toluene, and xylene is 5 ppb. The Federal drinking water standard is 700 ppb for ethylbenzene, 1,000 ppb for toluene and 10,000 ppb for xylene. A Federal drinking water standard does not exist for 1,3,5-trimethylbenzene or 1,2,4-trimethylbenzene.

Nine inorganic compounds were detected above Federal and/or State drinking water standards in the seven monitoring wells located downgradient of lagoons 6, 7 and 8. However, six of the nine inorganic compounds were detected above standards only in monitoring well OW-10. Chromium, lead and nickel were detected above drinking water standards in more than one monitoring well and were detected at levels that ranged from 106 to 2,930 ppb, 19.1 to 924 ppb and 100 to 1,560 ppb, respectively. The inorganic compounds detected above drinking water standards in monitoring well OW-10 were about an order of magnitude higher than the levels detected in the other monitoring wells. The Federal drinking water standards for chromium and nickel are set at 100 ppb; the Federal action level for lead is 15 ppb. The State drinking water standards for chromium and lead are 100 and 50 ppb, respectively. A State drinking water standard does not exist for nickel.

The NYSDOH performed a limited sampling of off-Site private wells in 1991 and again in 1993 for organic and inorganic constituents. Organic constituents were not detected in the groundwater from these wells, and inorganic constituents were detected below drinking water standards.

As previously mentioned, an investigation to determine the lateral and downgradient extent of the groundwater plume is currently underway and will be reported in the RI for the second operable unit.

Ambient Air Monitoring and Geophysical Surveys

A seismic survey and an ambient air survey were conducted at the Site. The ambient air survey indicated that the Site does not have an adverse impact on air quality. The seismic survey provided additional information on the Site geology.

SUMMARY OF SITE RISKS

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future Site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the Site, if no remedial action were taken.

As part of the baseline risk assessment, the following four-step process is utilized for assessing Site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification*--identifies the contaminants of concern at the Site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment*--estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathway (e.g, ingesting contaminated well-water) by which humans are potentially exposed. *Toxicity Assessment*--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization*--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of Site-related risks.

The risk assessment was prepared before the analytical soil data associated with lagoons 6, 7 and 8 were available. Therefore, only the data collected from lagoons 1 through 4 during July and September 1991 were used in the risk assessment. A separate risk assessment was not prepared for lagoons 6, 7 and 8, since it was anticipated that remedial action would be taken at these lagoons due to the levels of contaminants found, the presence of hazardous waste and cross media impacts to groundwater. Higher baseline risk levels would be expected if the analytical soil data from lagoons 6, 7 and 8 were included in the risk assessment.

The baseline risk assessment began with selecting contaminants of concern which would be representative of Site risks. These contaminants included, but were not limited to benzene, 1,2-dichlorobenzene, tetrachloroethene, toluene, arsenic, barium, chromium, cyanide, lead, and nickel. The summary of the contaminants of concern (COCs) is provided in Table 3.

The baseline risk assessment addressed the potential risk to human health by identifying potential exposure pathways by which the public might be exposed to contaminant releases at the Site under current and future land-use conditions. The exposure pathways under the current land-use conditions included the exposure to adult and child trespassers through the dermal contact with standing water contained in lagoon 1, and through the ingestion, inhalation and dermal contact of soils and sludges. When considering future land use, the exposure pathways included the ingestion, inhalation and dermal contact of soils and sludges by construction workers. Because the Site is surrounded by a cliff, a landfill and a quarry, future residential use of the property was not considered as a reasonable scenario. The exposure pathways considered under future and current land-use conditions are listed in Table 4.

Under current EPA guidelines, the likelihood of carcinogenic (cancer causing) and non-carcinogenic effects due to exposure to Site chemicals are considered separately. It was assumed that the toxic effects of the Site-related chemicals would be additive. Thus, carcinogenic and non-carcinogenic risks associated with exposures to individual compounds of concern were summed to indicate the potential risks associated with mixtures of potential carcinogens and non-carcinogens, respectively. Potential carcinogenic risks were evaluated using the cancer potency factors developed by EPA for the compounds of concern. Cancer slope factors (SFs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes the underestimation of the risks highly unlikely. The SF for the compounds of concern are presented in Table 5.

EPA's acceptable cancer risk range is 10^{-4} to 10^{-6} which can be interpreted to mean that an individual may have a one in ten thousand to a one in a million increased chance of developing cancer as a result of a site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. The results of the baseline risk assessment indicated that the soils and sludges associated with lagoons 1 through 4 pose no unacceptable carcinogenic risk to human health. The sum of the current cancer risks for the exposure pathways for adult and child trespassers was 5×10^{-7} (five in ten million) and 3×10^{-6} (three in a million), respectively. The overall future carcinogenic risk for construction workers, through ingestion, inhalation and dermal contact of contaminated soils and sludges, was estimated to be 4×10^{-6} (four in a million). These carcinogenic risks are within EPA's acceptable risk range. A summary of the carcinogenic risks are presented in Table 6.

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of mg/kg-day, are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated soil) are compared with the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds across all media. An HI greater than 1 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures. The reference doses for the compounds of concern at the Site are presented in Table 7.

The calculated HI values for adult and child trespassers are less than 1, which EPA has determined to be acceptable. The total exposure HI for construction workers assumed to be participating in excavation and grading activities was estimated to be 3.0. Therefore, there may be unacceptable noncarcinogenic risks associated with the construction worker scenario. The primary contributor to this risk is chromium-containing dust which could be inhaled during excavation activities. Chromium containing dust contributed approximately 70 percent to the HI. A summary of the noncarcinogenic risks are presented in Table 8.

As previously noted, higher risk levels from exposure to contaminated soil would have resulted if the analytical soil data from lagoons 6, 7 and 8 were included in the risk assessment. A risk assessment to identify the potential risk to human health through groundwater exposure pathways will be prepared during the second operable unit. As indicated by the groundwater sampling data, contaminants from the soil are migrating into the groundwater at concentrations above Federal and State health-based drinking water standards.

The qualitative ecological assessment concluded that the Site provides low to moderate habitat value to wildlife. The degree of physical disturbance on-Site and lack of continuous quality habitat in adjacent areas restrict the diversity and extent of wildlife use at the Site. Therefore, only minor impacts on wildlife are expected to occur.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the COCs, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the contaminants of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the Risk Assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in the Record of Decision (ROD), may present a imminent and substantial endangerment to the public health, welfare, or the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs) and risk-based levels established in the risk assessment. The remedial action objectives for the source areas at the Site are (1) to prevent leaching of contaminants in the soils/sludges at levels which will contribute to the contravention of groundwater quality and drinking water standards in the groundwater in the vicinity of the Site; and (2) to minimize potential risks to hypothetical excavation workers.

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with other statutory laws, and utilize permanent solutions and alternative technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

This ROD evaluates in detail six remedial alternatives for addressing the soil and sludge contamination at the Carroll and Dubies Superfund site. As used in the following text, the time to implement reflects only the time required to implement the remedy, and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy, conduct operation and maintenance, or conduct long-term monitoring.

Alternative 1: No Action

Capital Cost:	$ 0
O & M/yr Cost:	$ 0
Present Worth:	$ 0
Time to Implement:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with other alternatives. Under this alternative, the contaminated soil would be left in place without treatment. The Site would remain in its current condition and no effort would be made to change the current Site conditions.

Alternative 2: Limited Action

Capital cost:	$ 52,000
O & M/yr Cost:	$ 18,000
Present Worth:	$ 328,660
Time to Implement:	6 months

This alternative consists of institutional controls such as deed restrictions to limit future use of the Site and complete fencing of the Site to minimize potential human exposure to the source area materials. The limited action alternative would not utilize any remedial technologies for the treatment of the source areas. A long-term groundwater monitoring program would be implemented to track the migration of contaminants from the source areas into the groundwater utilizing existing monitoring wells at the Site

(This monitoring program may be addressed as part of OU2 groundwater remedial activities.)

Alternative 3: Low-Permeability Cap with Slurry Cut-Off Wall

Capital Cost:	$ 3,299,816
O & M/yr Cost:	$ 147,060
Present Worth:	$ 5,560,128
Time to Implement:	12 months

This alternative includes the construction of a low-permeability cap over the source materials to minimize the infiltration of precipitation. Limiting the amount of water which percolates through the source materials would reduce the leaching of the chemical constituents into the groundwater underlying the Site. In addition to the cap, a slurry cut-off wall would be installed around the source area to minimize the migration of soil gas and leachate from the impacted source areas into the surrounding soils and to minimize the movement of groundwater through the source area materials. The cap would be constructed of a low-permeability material such as natural clay, geosynthetics, asphalt or combinations of these materials. Additional drainage and top soil layers would be included to achieve a well drained, vegetated surface upon completion. Deed restrictions would be recommended to limit future use of the Site in order to protect the integrity of the cap.

The slurry cut-off wall would be constructed by excavating vertical trenches while filling the excavation with a soil-bentonite slurry. The slurry wall would be keyed into the bedrock unit which underlies the Site. This bedrock unit consists of shale and silt stone and ranges from ground surface to 60 feet below grade. Groundwater at the Site is present within the overburden soil materials. Therefore, hydrodynamic controls to maintain an inward groundwater flow gradient within the cell would be required to prevent any leakage from the cell into downgradient groundwater. Hydrodynamic controls would include pumping groundwater from within the capped area. The collected water would be treated on-Site in a granular activated carbon (GAC) adsorption treatment system to meet New York State Pollution Discharge Elimination System (SPDES) requirements prior to discharge. The spent carbon would be regenerated or shipped off-Site to an appropriate disposal facility. Groundwater monitoring would be performed annually in coordination with OU2 groundwater remedial activities.

Alternative 4: Stabilization/Solidification and Placement into an On-Site Containment Cell

Capital Cost:	$ 5,389,215
O & M/yr Cost:	$ 26,400
Present Worth:	$ 5,794,983

Time to Implement: 12 months

This alternative involves the physical removal of approximately 20,300 cubic yards (cy) of source area materials and treatment of these materials through stabilization/solidification. Stabilization/solidification is a process by which stabilizing agents such as cement-based, pozzolanic-based, asphalt-based, and organic-polymer-based agents are mixed with the source area materials to convert the waste to a more stable form. To ensure compliance with air pollution control regulations, capture and control mechanisms would be installed, as necessary, to control air emissions containing organic constituents emitted during the stabilization/solidification process. Air monitoring would also be conducted during implementation of this alternative to determine the need for additional engineering controls.

The stabilized mass would then be placed into a lined and capped cell, which would comply with modified requirements specified in the New York Code of Rules and Regulations (Part 360). The base of the cell would consist of a high density polyethylene (HDPE) liner and a sand drainage layer. The cell would be sloped to a leachate collection system located adjacent to the cell to collect any leachate that is generated by the solidified materials. Once the source area materials are placed into the cell, a cap would be constructed over the cell to minimize the infiltration of rainwater. The cap would consist of a low-permeability clay layer, an HDPE membrane, a sand drainage layer, and a topsoil cover layer. Deed restrictions would be recommended to limit future use of the Site in order to protect the integrity of the cap. Leachate would be removed periodically from the leachate collection system and sent off-Site for treatment and disposal in compliance with applicable regulations. Groundwater monitoring would be performed annually in coordination with OU2 groundwater remedial activities.

Alternative 5: Organics Treatment via Ex-Situ Vapor Extraction, Ex-Situ Bioslurry or Low-Temperature Thermal Desorption; Inorganic Treatment via Stabilization/Solidification, and Placement into an On-Site Containment Cell

Capital Cost:	$ 8,105,000
O & M/yr Cost:	$ 28,000
Present Worth:	$ 8,535,000
Time to Implement:	12 months

The title/name and description of this alternative has been modified from that presented in the Proposed Plan and FS to reflect the change in emphasis on the likely type of process to treat organic contaminants. This change was warranted by additional information that was presented during and subsequent to the August 23, 1994 public meeting. (Please refer to the community acceptance and Documentation of Significant changes sections of this document, as well as Appendix V, the Responsiveness Summary.) The Proposed Plan and other information disseminated at the public meeting indicated that one or a mixture of three different processes might be used to treat organic contaminants. At that time, the emphasis was placed on the use of Low-Temperature Thermal Desorption (LTTD) as the treatment process; the current emphasis is on the use of a mixture of ex-situ vapor extraction and bioslurry as the treatment processes for the organics. The costs of implementing this alternative have also been refined to reflect the change in emphasis on treatment from the higher cost portion of LTTD to the lower cost options of vapor extraction combined with bioslurry.

This alternative consists of excavating materials from lagoons 1, 2, 3, 4, 6, 7 and 8 and soils in the vicinity of these lagoons (estimated to be 20,300 cy). Materials, which exceed organic contaminant treatment levels (estimated to be 13,800 cy) and/or inorganic contaminant treatment levels, would undergo treatment prior to disposition into a lined cell; the remaining materials would be deposited directly into the lined cell without treatment. Materials from lagoons 1, 3, 7 and 8 (approximately 13,500 cubic yards) which contain high concentrations of organic contaminants would be treated to reduce the levels of organic contaminants. Three options are included under this alternative as options for organic treatment: LTTD, vapor extraction, and bioslurry. These processes are described below.

LTTD is a process by which soils/sludges are heated and the organic constituents are desorbed from the soils/sludges and volatilized into an induced air flow. The soils/sludges are heated to temperatures ranging from 200°F to 1,200°F. Air or nitrogen carrier gas is passed over the soils/sludges to collect the volatilized organic constituents. The carrier gas is then passed through a condenser, carbon adsorption bed, cyclone and/or a baghouse to limit emissions to within the air pollution control regulatory requirements. In vapor extraction, air is drawn through the soil to vaporize and remove organic contaminants in the soil. The air flow also provides indigenous microorganisms with sufficient oxygen to degrade organic contaminants present in the soil. In bioslurry treatment, the contaminated soil is mixed with water to form a slurry which is fed to a bioreactor and aerated. The principal objective of aeration is to supply sufficient oxygen throughout the slurry to promote aerobic microbial activity that will degrade the organic contaminants in the soil. Nutrients for the microorganisms are also added to the bioreactor.

Any air emissions generated from organics treatment via LTTD, vapor extraction, or bioslurry treatment would be treated as necessary to meet air pollution control regulations. Regardless of whether LTTD, vapor extraction or bioslurry treatment is utilized, the cleanup criteria for organic compounds presented later in this document would have to be met (see Remediation Goals under Selected Remedy). Air monitoring would be conducted during implementation of this alternative to ensure air emissions are within regulatory limits. Further treatability studies would be required to demonstrate the ability of any of these processes to effectively treat the organic constituents in the waste, particularly the lagoon 7 materials.

Upon completion of the treatment of lagoons 1, 3, 7 and 8 for their organic constituents, lagoons 6 and 8 (approximately 5,700 cy) would be treated through stabilization/solidification to reduce the mobility of the inorganic constituents. Additionally, if source area materials from lagoons 1, 2, 3, 4 and 7 exceed the RCRA-Regulated Levels for TCLP for inorganic constituents, they would also be stabilized/solidified. Additional source area materials may also be stabilized/solidified in order to achieve adequate load bearing capacity. All excavated source area materials (estimated to be 20,300 cubic yards) would then be placed in a lined cell with a well for leachate collection, and then capped. The lined cell and cap are the same as that described in Alternative 4. Deed restrictions would be recommended to limit future use of the Site in order to protect the integrity of the cap. Leachate would be removed periodically from the leachate collection system and sent off-Site for treatment and disposal in compliance with applicable regulations. Groundwater monitoring would be performed annually in coordination with OU2 groundwater remedial activities.

Alternative 6: Off-Site Disposal at a Permitted Landfill

Capital Cost:	$ 32,679,764
O & M/yr Cost:	$ 0
Present Worth:	$ 32,679,764
Time to Implement:	12 months

This alternative consists of excavating 20,300 cy of source area materials and transporting these materials off-Site to a RCRA-permitted treatment, storage and disposal facility for treatment and disposal, as appropriate. The majority of the excavated materials would be placed directly into lined 20 cy roll-offs. Some of the source area materials might need to be dewatered prior to off-Site transportation. Each roll-off would be sampled to characterize the source area materials prior to transportation off-Site. Based on the analytical data available for the source area materials, the materials from Lagoons 6, 7 and 8 would require pretreatment to meet the LDRs prior to disposal at a RCRA-permitted landfill. Air monitoring would also be conducted during implementation of this alternative to determine the need for engineering controls.

It is estimated that the volume of source area materials that would require pretreatment prior to land disposal is approximately 9,130 cy. For purposes of evaluating this alternative, incineration and solidification were considered to be the appropriate pre-treatment methods to address the source area materials which do not meet LDRs.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in the National Contingency Plan, 40 CFR §300.430(e)(9)(iii) and the Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01. These criteria were developed to address the requirements of Section 121 of CERCLA, 42 U.S.C. §9621 to ensure all important considerations are factored into remedy selection decisions.

The following "threshold" criteria are the most important, and must be satisfied by any alternative in order to be eligible for selection:

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with Applicable or Relevant and Appropriate Requirements addresses whether or not a remedy would meet all of the applicable, or relevant and appropriate requirements of federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of a remedial technology, with respect to these parameters, that a remedy may employ.

5. Short-term effectiveness addresses the period of time needed

to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation periods until-cleanup goals are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

7. Cost includes estimated capital and operation and maintenance costs, and the present worth costs.

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

8. State acceptance indicates whether, based on its review of the RI/FS and the Proposed Plan, the State supports, opposes, and/or has identified any reservations with the preferred alternative.

9. Community acceptance refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Factors of community acceptance to be discussed include support, reservation, and opposition by the community.

A comparative analysis of the remedial alternatives based upon the above evaluation criteria follows.

Overall Protection of Human Health and the Environment

All alternatives, except for no action, would offer some degree of protection of human health and the environment; Alternative 1, no action, offers no protection. Alternative 6 would be most protective of human health and the environment in the vicinity of the Site, since source area materials would be removed from the Site. Alternatives 4 and 5 would mitigate cross-media impacts to the groundwater from the source and therefore would be protective of human health and the environment. Alternative 5 would, however, provide a higher degree of overall protection of human health and the environment than Alternative 4, since it would permanently remove organic contaminants from source area materials having high levels of organic contamination. Alternative 3 does not include any treatment, therefore it would not be as protective to human health and the environment as Alternatives 4, 5 and 6. Alternative 2 would be less protective of human health and the environment than Alternatives 3, 4, 5, and 6, since it would rely on the proper enforcement of institutional controls and would not reduce the leaching of chemical contaminants to the Site groundwater.

Compliance with ARARs

All remedial technologies proposed for use in Alternatives 3, 4, 5 and 6 would be designed and implemented to meet ARARs and are therefore similar in their compliance with ARARs. Wastes would be treated using specific technologies or treated to specific treatment levels, as appropriate, to comply with air pollution control and RCRA hazardous waste regulations. Federal and State regulations dealing with the handling and transportation of hazardous wastes to an off-Site treatment facility would be followed with regard to Alternative 6. Alternative 2, 3, 4 and 5 would require compliance with various state and/or local requirements for implementing deed restrictions. Alternatives 1 and 2 would not comply with State closure ARARs. In addition, for reasons discussed below under Long-Term Effectiveness and Permanence, Alternative 6 followed by Alternatives 5, 4, and 3 would best minimize cross-media impacts of contaminants migrating from soil to groundwater, thereby enabling groundwater standards to be achieved in a shorter time frame. Alternatives 1 and 2 would not provide this benefit.

Long-Term Effectiveness and Permanence

Alternative 6 would provide the highest degree of long-term effectiveness and permanence, since the contaminated soils would be permanently removed from the Site and, following any necessary treatment, disposed of at a RCRA permitted disposal facility. Alternatives 4, 5 and 6 would mitigate the leaching of contaminants to the underlying groundwater. Alternative 5 would, however, provide the highest degree of long-term effectiveness and permanence among the on-Site alternatives, since organic contaminants would be permanently removed from the source area materials having high levels of organic contamination; it would also effectively address inorganic contaminants. Unlike Alternative 5, Alternative 4 has not been proven effective for treatment of organic contaminants and relies on the containment cell and the leachate collection system to prevent the leaching of organic contaminants into the groundwater; Alternative 4 does, however, effectively address inorganic contaminants over the long-term. Alternative 3 does not include any treatment of contaminants; the permanence of Alternative 3 would rely on the continued maintenance of the cap and slurry cutoff wall, and the operation and maintenance of the hydraulic control system. Alternatives 1 and 2 would not provide any active treatment or containment and therefore would not be effective over the long-term or provide permanent protection of the groundwater underlying the Site.

Reduction in Toxicity, Mobility, or Volume Through Treatment

To the extent that the materials disposed of off-site would be treated prior to disposal, Alternative 6 would provide a reduction in mobility, toxicity, and volume of the organic and inorganic chemical contaminants present at the Site. Alternative 5 would significantly reduce the mobility, toxicity, and volume of organic contaminants in the source areas having high levels of organic contamination by permanently removing the organics from these materials. Alternative 5 would provide a reduction in the mobility of the inorganic contaminants through stabilization/solidification of the source area materials failing TCLP and placement of all source area materials in a lined containment cell with a leachate collection system. Alternative 4 would provide a reduction in the mobility of the organic and inorganic contaminants present in the source area materials through stabilization/solidification of the materials and placement of the solidified materials in a lined containment cell with a leachate collection system. However, as noted previously, the long-term effectiveness of stabilization/solidification for immobilizing organic contaminants has not been demonstrated. Alternative 3 would not provide a reduction in the toxicity or volume of the organic and inorganic contaminants in the source area materials; however, this alternative would reduce the mobility of the chemical constituents through capping, installing a slurry cut-off wall and pumping groundwater from within the capped area. Alternatives 1 and 2 would provide no reduction in contaminant mobility, toxicity, or volume.

Short-term Effectiveness

Alternatives 1 and 2 would result in no additional risk to the community or workers during implementation (0 months and six months, respectively), since source area materials would not be disturbed. Alternatives 3, 4, 5 and 6 would each require approximately one year to implement and would include activities such as excavation and handling of contaminated soils/sludges that could result in short-term exposures to on-Site workers and the community during implementation due to the generation of fugitive dust. Mitigation measures such as water sprays to suppress dust would be implemented to control short-term environmental impacts associated with off-Site dust migration. Alternative 5 would also result in the potential exposure to on-Site workers and the community to air emissions associated with the ex-situ vapor extraction and bioslurry treatment systems. The air emissions from these units would be controlled by implementing air emission treatment systems and air emission monitoring programs in accordance with Federal and State regulations. Alternative 6 would also include activities such as off-Site transport of contaminated soils/sludges that could result in potential exposure to the community. To reduce the potential risks to the community and the environment resulting from an accident during transportation, a traffic control plan would be developed.

Implementability

All alternatives are technically feasible and could be implemented at the Site. Alternatives 1 and 2 are the easiest to implement, followed by Alternative 6. A treatability study would be necessary to demonstrate that Alternative 4 (stabilization/solidification) is able to render the lagoon 7 material nonhazardous based on the characteristic of toxicity. The nature of the materials, particularly the lagoon 7 materials, may also pose some problems with the organic treatment options specified under Alternative 5. Although additional treatability studies are warranted to demonstrate the effectiveness of the Alternative 5 treatment options, it is anticipated that each of the options could effectively treat all but the lagoon 7 materials. Lagoon 7 materials could be effectively treated with a combination of technologies.

A combination of physical and chemical factors make the lagoon 7 materials highly problematic to treat: the materials have a high clay and moisture content, and significant concentrations of both volatile and semivolatile organic compounds. As a result, problems are likely to arise with implementation of each of the Alternative 5 processes, if utilized singly to address the lagoon 7 materials. While it is believed that lagoon 7 materials that are processed through the LTTD could be treated to remedial action objectives, treatability studies have indicated that some commonly used LTTD units could experience materials handling problems while processing the lagoon 7 materials; prior to implementing LTTD, additional treatability studies would be required to assure that such material handling problems could be minimized. Ex-situ vapor extraction is likely to be effective in handling the volatile fraction of contaminants in the lagoon 7 materials; however, it would not likely be effective at treating the semi-volatile fraction. Bioslurry, on the other hand, would be expected to be effective in handling the semivolatile fraction of the lagoon 7 materials. Therefore, it appears as though use of ex-situ vapor extraction for treatment of volatiles, and subsequent treatment of semivolatiles with bioslurry, would be the most implementable combination of treatment options under Alternative 5; this combination would avoid the material handling problems which would be expected to be encountered with LTTD.

Cost

According to the present worth cost estimates for all alternatives evaluated, Alternative 6 ($32,679,764) would be the most costly alternative to implement, followed by Alternative 5 ($8,535,000). The present worth cost for Alternatives 4 and 3 would be about the same ($5,794,983 and $5,560,128, respectively). Alternatives 2 and 1 would be the least costly to implement ($328,660 and $0, respectively). Present worth considers a 5% discount rate, and a 30-year operational period for Alternatives 2, 3, 4 and 5. Since Alternatives 6 and 1 do not require any O & M costs, their present worth costs are equivalent to their capital cost.

State Acceptance

The State of New York, through the NYSDEC, concurs with EPA's selected remedy. The NYSDEC's letter of concurrence is in Appendix IV.

Community Acceptance

The Proposed Plan indicated that EPA's preferred alternative was Alternative 5 with the LTTD treatment option. A number of commenters voiced their opposition to any on-Site treatment which consisted of combustion of contaminants and subsequent emission of any quantity of hazardous materials. The residents were concerned that some of the potential LTTD units were in effect incinerators. The community preferred that the materials be excavated and transported off-Site for treatment and/or disposal (i.e., Alternative 6). However, EPA received a letter from the Deerpark Environmental Commission stating that "...all things considered, Alternative 5 is the best one." Other commenters, notably some of the PRPs for the Site, indicated their preference for on-Site treatment so long as the organics treatment process incorporated the bioslurry and vapor extraction treatment options, rather than LTTD. These and other comments and concerns received from the community during the public comment period are identified and addressed in the Responsiveness Summary which is attached as Appendix V to this document.

SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comment, EPA and NYSDEC have determined that Alternative 5 (excluding the LTTD option), which calls for remediation of the contaminated source area materials via stabilization/solidification of inorganics and ex-situ vapor extraction and bioslurry of organics, is the appropriate remedy for the first operable unit of the Carroll and Dubies Superfund Site. It is important to highlight that materials from lagoons 1, 3 and 8 (approximately 10,100 cy) which contain high concentrations of organic contaminants would be treated via ex-situ vapor extraction, while the lagoon 7 materials (approximately 3,400 cy of highly contaminated materials) will be treated via ex-situ vapor extraction (treatment primarily targeted at the volatile organic fraction of organics) followed by bioslurry (treatment targeted at the semivolatile fraction of organics). LTTD has been specifically excluded from the selected remedy due to potential implementation problems, significant cost, and public (including responsible party) opposition.

The selected remedy permanently removes organic contaminants from source area materials and reduces the mobility of inorganic contaminants through stabilization/solidification and placement of source area materials in a lined containment cell constructed on-Site. Alternative 5 ensures that no leaching of contaminants to the underlying aquifer will occur. The elimination of cross-media impacts will have a positive impact on the effectiveness of any future groundwater restoration program that could be implemented at the Site.

Aside from Alternative 6, Alternative 5 is the only alternative that permanently removes the significant levels of organic contaminants from the source area. However, Alternative 6 is over three times the cost of Alternative 5 and will not comply with the statutory preference for treatment as a principal element, if the materials are not treated prior to disposal. The other proposed alternatives which cost much less than the preferred alternative do not permanently remove contaminants from the source area materials. The preferred alternative will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and NYSDEC believe that the preferred alternative will be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also will meet the statutory preference for the use of treatment as a principal element.

The major components of the selected remedy include:

- Excavation of all materials from lagoons 1, 2, 3, 4, 6, 7 and 8, as well as the soils in the vicinity of those lagoons, which exceed the excavation levels specified in the Selected Remedy section of the Decision Summary. EPA's current estimate of the volume of the materials requiring excavation is approximately 20,300 cubic yards (cy). However, the actual volume will be further determined during the implementation of the remedy.

- Treatment of excavated soil/sludges which contain organic constituents above the treatment levels specified in the

Selected Remedy Section of the Decision Summary (estimated at 13,800 cy) via on-Site ex-situ vapor extraction.

o Additional treatment of lagoon 7 soils/sludges (estimated at 3,400 cy) via on-Site ex-situ bioslurry (treatment targeted primarily for semi-volatile contaminants).

o Stabilization/solidification of soils/sludges which fail the Resource Conservation and Recovery Act's TCLP for inorganic constituents (estimated at 5,700 cy).

o Placement of treated and untreated soils/sludges in a lined and capped cell consistent with modified requirements of New York Code of Rules and Regulations Part 360. The base of the cell will consist of a high density polyethylene (HDPE) liner and a sand drainage layer. The cell will be sloped to a leachate collection system. The cap will consist of a low-permeability clay layer, an HDPE membrane, a sand drainage layer and a topsoil cover layer.

o Development of an air-monitoring system and installation of air pollution control equipment to ensure compliance with air pollution control regulations; and

o Recommendations that deed and well restrictions be imposed to protect the integrity of the cap.

Although the use of the bioslurry process to treat lagoon 7 materials appears to be promising, further treatability studies are necessary to demonstrate that this process can reduce the complex mix of constituents in lagoon 7 to remediation goals. Because of the existing uncertainty, a contingency remedy will be implemented if treatability study results indicate that bioslurry in combination with ex-situ vapor extraction will not be effective in reducing the levels of contaminants in lagoon 7 materials, particularly semi-volatile contaminants, to remediation goals. The major components of the contingency remedy are identical to those of the selected remedy with the following exception:

Excavation and off-Site treatment (as necessary) and disposal of lagoon 7 materials at a RCRA (Subtitle C) permitted treatment, storage and disposal facility; it is assumed that thermal treatment, i.e., incineration or low temperature thermal treatment, will be necessary to reduce the contaminants to appropriate LDR levels.

Off-Site thermal treatment was selected as the contingency remedy rather than on-Site LTTD, due to implementability concerns, as well as community and responsible party opposition to treatment of these or other materials on-Site with a thermal treatment unit. Although the cost estimate for treating these materials off-Site appears to be much higher than on-Site treatment with LTTD (approx. $5.7M vs $3.2M), the off-Site cost estimate was very conservative, and assumed that all lagoon 7 materials would require incineration. If the materials were treated off-Site via LTTD or other means, the cost could be similar to or less than that for on-Site treatment with LTTD. This similarity in costs results from the significant costs ($1.6M) solely related to mobilizing a LTTD unit to the Site.

Remediation Goals

Two types of remediation criteria have been established. The first criterion delineates the source area materials that require excavation for treatment and/or containment. The second criterion determines the cleanup level for the excavated source area materials; those materials above the cleanup level will require treatment.

All lagoon materials are to be excavated for treatment and/or placement into an on-site containment cell. The NYSDEC TAGM soil cleanup levels for organic compounds were utilized to derive excavation levels that will be used to determine the volume of soils impacted by the lagoon materials which will also require excavation for treatment and/or containment. The TAGM soil cleanup levels are objectives which were established by NYSDEC and are conservatively set at concentrations that are protective of human health and groundwater quality. Therefore, contaminants of concern (COCs) were selected for comparison to the NYSDEC TAGM levels based on: their mobility (propensity to migrate from the soil to the groundwater); their frequency of detection in the soil and in the groundwater, and their concentration level. The organic indicator COCs and their excavation levels are as follows:

Indicator COCs	Excavation Level (ppm)
Benzene	0.06*
1,2-Dichlorobenzene	7.9
1,4-Dichlorobenzene	6.0
Di-n-butylphthalate	8.1
Naphthalene	13.0
Tetrachloroethene	1.4
Toluene	1.5
Trichloroethene	1.0

*The practicality of excavating to this level will be evaluated upon obtaining additional environmental data during the remedial design.

All excavated source area materials will be placed into an on-site containment cell which will further mitigate the leaching of contaminants to the underlying groundwater. Source area materials containing contaminants which exceed the treatment levels will be treated prior to placement in the on-site containment cell. The NYSDEC TAGM levels and the RCRA-universal treatment standard (UTS), were utilized to derive treatment levels for the organic indicator COCs. The UTS were recently promulgated (September 19, 1994) under the RCRA LDRs program for listed wastes, as well as for those materials (including soil and debris) containing organic constituents at levels which a waste is considered hazardous based on the characteristic of toxicity, i.e., those identified with the RCRA codes D010 through D043 based on TCLP (organic TCLP constituents). The UTS for TCLP constituents are considered to be applicable treatment standards for characteristic wastes present at the site. The least stringent TAGM or UTS number was utilized as the treatment level for those organic indicator COCs which are not TCLP constituents.

The treatment levels for the organic compounds are as following:

Indicator COCs	Soil Treatment Levels (ppm)
Benzene	10.0
1,2-Dichlorobenzene	7.9
1,4-Dichlorobenzene	6.0
Di-n-butylphthalate	28.0
Naphthalene	13.0
Tetrachloroethene	6.0
Toluene	10.0
Trichloroethene	6.0

Additional indicator COCs may be added to this list at the conclusion of the bioslurry treatability study, if the study indicates that significant levels of degradation products are generated during the biodegradation of the lagoon 7 materials. Additionally, if treatability study data indicate that bioslurry combined with ex-situ vapor extraction will not effectively treat lagoon 7 materials, the contingency remedy will be implemented; under this scenario, the lagoon 7 materials would be excavated and treated off-Site via a specific technology or to treatment levels specified by the LDRs.

For the inorganic contaminants, the highest level of indicator contaminants detected in the background soil samples collected from the Site will be utilized to determine the extent of excavation. Chromium and nickel are being used as indicator chemicals. The highest levels of chromium and nickel detected in background samples were 61.9 ppm and 36.7 ppm, respectively. Lagoons 6 and 8 and any other excavated materials which fail the RCRA-TCLP levels for inorganic constituents will require stabilization/solidification. Stabilized/solidified materials will be subject to further TCLP testing prior to placement in the lined cell to ensure that the treated material no longer exceeds the RCRA-regulated TCLP levels (e.g., 5.0 ppm for chromium and for lead). In addition, materials treated to reduce the leachate concentration are required to have an unconfined compressive strength of at least 3,500 pounds per square foot as determined by ASTM D-2166.

The estimated amount of source area material that would be excavated for treatment and/or containment is 20,300 cy. The breakdown of the 20,300 cy by lagoon is as follows: 2,600 cy from lagoon 1; 3,950 cy from lagoon 2; 2,300 cy from lagoon 3; 2,310 cy from lagoon 4; 520 cy from lagoon 6; 3,420 cy from lagoon 7; and 5,200 cy from lagoon 8. This estimate will be refined during the soil sampling to be conducted during the implementation of the remedy.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for the Site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

Alternative 5 and the contingency remedy are considered to be fully responsive to this criterion and to the identified remedial response objectives. The selected remedy and contingency remedy protect human health and the environment through the treatment of the more highly concentrated organic contaminants in the source area materials, the immobilization of the more highly concentrated inorganic contaminants and the placement of source area materials into a lined containment cell with a multi-layered cap and a leachate collection system.

Compliance with ARARs

Alternative 5 and the contingency remedy will comply with all the chemical-, action-, and location-specific ARARs. Chemical specific ARARs are usually health- or risk-based numerical values used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment (e.g., maximum contaminant levels (MCLs) that establish safe levels of contaminants in drinking water); location-specific ARARs restrict actions or contaminant concentrations in certain environmentally sensitive areas (e.g., floodplains and wetlands); action-specific ARARS are usually technology- or activity-based requirements or limitations on actions or conditions involving specific substances (e.g., RCRA standards applicable to generators of hazardous waste). The specific ARARs for the selected remedy and contingency remedy are the same and are listed below.

Action-specific ARARs:

* CAA-National Ambient Air Quality Standards (40 CFR 1-99)
* CAA-Prevention of Significant Deterioration of Air Quality (40 CFR 51.2)
* CAA-New Source Performance Standards (40 CFR 60)
* CAA-National Emission Standards for Hazardous Air Pollutants (40 CFR 61)
* DOT-Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1-172.558)
* New York State Air Resources Regulations - General Provisions (6 NYCRR Part 200)
* New York Emissions Testing, Sampling, and Analytical Determinations (6 NYCRR Part 202)
* New York General Prohibitions (6 NYCRR Part 211)
* New York Regulations for General Process Emission Sources (6 NYCRR Part 212)
* New York Air Quality Classification System (6 NYCRR Part 256)
* New York Air Quality Standards (6 NYCRR Part 257)
* New York Air Quality Area Classifications - Orange County (6 NYCRR Part 293)
* Solid Waste Management Facilities (6 NYCRR Part 360)

* Waste Transporter Permits (6 NYCRR Part 364)

* New York Hazardous Waste Management System_(6 NYCRR Part 370)

* Identification and Listing of Hazardous Wastes (6 NYCRR Part 371)

* Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities (6 NYCRR Part 372)

* Final Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (6 NYCRR Part 373)

* Land Disposal Restrictions (6 NYCRR Part 376)

* NYSDEC Water Quality Regulations for Surface Waters and Groundwater (6 NYCRR Part 700-705)

* OSHA-General Industry Standards (29 CFR 1910)

* OSHA-Safety and Health Standards (29 CFR 1926)

* OSHA-Recordkeeping, Reporting, and Related Regulations (29 CFR 1904)

* RCRA Section 3003-Standards Applicable to Transporters of Applicable Hazardous Wastes (40 CFR 170 to 179, 40 CFR 262 and 263)

* RCRA-Standards Applicable to Generators of Hazardous Waste (40 CFR 262)

* RCRA-Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 264)

* RCRA-Organic Air Emissions Standards for Process Vents and Equipment Leaks (40 CFR 264, Subparts AA and BB)

* RCRA-Miscellaneous Units (40 CFR 264, Subpart X)

* RCRA-Surface Impoundments, Waste Piles, Landfills and Land Treatment Units (40 CFR 264)

* RCRA-Preparedness and Prevention (40 CFR 264.30-264.31)

* RCRA-Contingency Plan and Emergency Procedures (40 CFR 264.50-264.56)

* RCRA-General Standards (40 CFR 264.111)

* RCRA-Closure and Post-Closure (40 CFR 264.110-264.120)

* RCRA-Land Disposal Restrictions (40 CFR 268)

* RCRA-Identification and Listing of Hazardous Wastes (6 NYCRR Part 371)

Chemical-Specific ARARs

* CAA-National Ambient Air Quality Standards (40 CFR 1-99)

* CAA-Prevention of Significant Deterioration of Air Quality (40 CFR 51.2)

* CAA-New Source Performance Standards (40 CFR 60)

* CAA-National Emission Standards for Hazardous Air Pollutants (40 CFR 61)

* New York Emissions Testing, Sampling, and Analytical Determinations (6 NYCRR Part 202)

* New York General Prohibitions (6 NYCRR Part 211)

* New York Regulations for General Process Emission Sources (6 NYCRR Part 212)

* New York Air Quality Classification System (6 NYCRR Part 256)

* New York Air Quality Standards (6 NYCRR Part 257)

* New York Air Quality Area Classifications - Orange County (6 NYCRR Part 293)

* RCRA-Regulated Levels for Toxic Characteristics Leaching Procedure Constituents (40 CFR 261)

* RCRA-Land Disposal Restrictions (40 CFR 268)

Location-Specific ARARs

* Clean Water Act (Section 404, 33 USC 1344)

* Fish and Wildlife Coordination Act (16 USC 661)

* National Historic Preservation Act (16 USC 470)

Other Criteria, Advisories, or Guidance To Be Considered

* Executive Order 11990 - Protection of Wetlands

* Executive Order 11988 (Floodplain Management)

* NYSDEC Technical and Operations Guidance Series (TOGS)

* NYSDEC Technical and Administration Guidance Memoranda (TAGMs)

* NYSDEC Air Guide 1 - Guideline for the Control of Toxic Ambient Air Contaminants

Cost-Effectiveness

The selected remedy and contingency remedy provide overall effectiveness proportional to cost. The estimated present worth cost of the selected remedy is $8,535,000, which represents capital and present worth O & M costs of $8,105,000 and $430,000, respectively. A detailed estimate of the cost of the selected remedy is provided in Table 9. The estimated present worth cost of the contingency remedy is $14,194,600, which represents capital and present worth O & M costs of $13,764,600 and $430,000 respectively. A detailed estimate of the cost of the contingency remedy is presented in Table 10.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA and NYSDEC have determined that the selected remedy, followed by the contingency remedy, represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the source control operable unit at the Site. Of those alternatives that are protective of human health and the environment, EPA and NYSDEC have determined that this selected remedy, followed by the contingency remedy, provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility or volume achieved through treatment, short-term effectiveness, implementability, and cost, also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

Preference for Treatment as a Principal Element

The selected remedy and the contingency remedy address the principal threats posed by the Site lagoon sludges and soils by achieving significant reductions in the concentration of organic contaminants and by stabilizing/solidifying the inorganic contaminants. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

DOCUMENTATION OF SIGNIFICANT CHANGES

The preferred alternative presented in the Proposed Plan was modified to reflect the change in emphasis on the likely type of process to treat organic contaminants; this change was warranted by additional information that was presented during and subsequent to the August 23, 1994 public meeting. The Proposed Plan and other information disseminated at the public meeting indicated that one or a mixture of three different processes might be used to treat organic contaminants under Alternative 5. At that time, the emphasis was placed on the use of LTTD as the likely treatment process with the option for vapor extraction or bioslurry to be used in place of, or in combination with, LTTD. As detailed in the Responsiveness Summary, significant public comment was received during the comment period which opposed the use of any type of on-Site thermal treatment. Other comments were received indicating that vapor extraction and bioslurry could be used effectively and at considerably less cost than LTTD.

Additionally, some preliminary Site-specific treatability study data indicated that treatment of lagoons 1, 3, and 8 via ex-situ vapor extraction, and treatment of lagoon 7 materials via ex-situ vapor extraction (primarily targeted for volatile organic contaminants) and bioslurry (primarily targeted at semivolatile organic compounds) could be effective. Therefore, Alternative 5 was modified to reflect the use of bioslurry and vapor extraction to treat the materials significantly contaminated with organic compounds. In addition, Alternative 5 was further modified to specifically exclude LTTD from the selected remedy due to potential implementation problems, significant cost, and public (including responsible party) opposition.

Due to the uncertainty regarding the ability of any on-Site treatment process (excluding high temperature incineration) to effectively treat the lagoon 7 materials, excavation with off-Site treatment (as necessary) and disposal is being selected as a contingency remedy for these materials. This component of the contingency remedy was adapted from Alternative 6. Under the contingency remedy, as in Alternative 6, it was assumed that the lagoon 7 materials would need to be treated via incineration, although other means of less costly treatment (if necessary) could be utilized in order to satisfy LDRs.

APPENDIX I

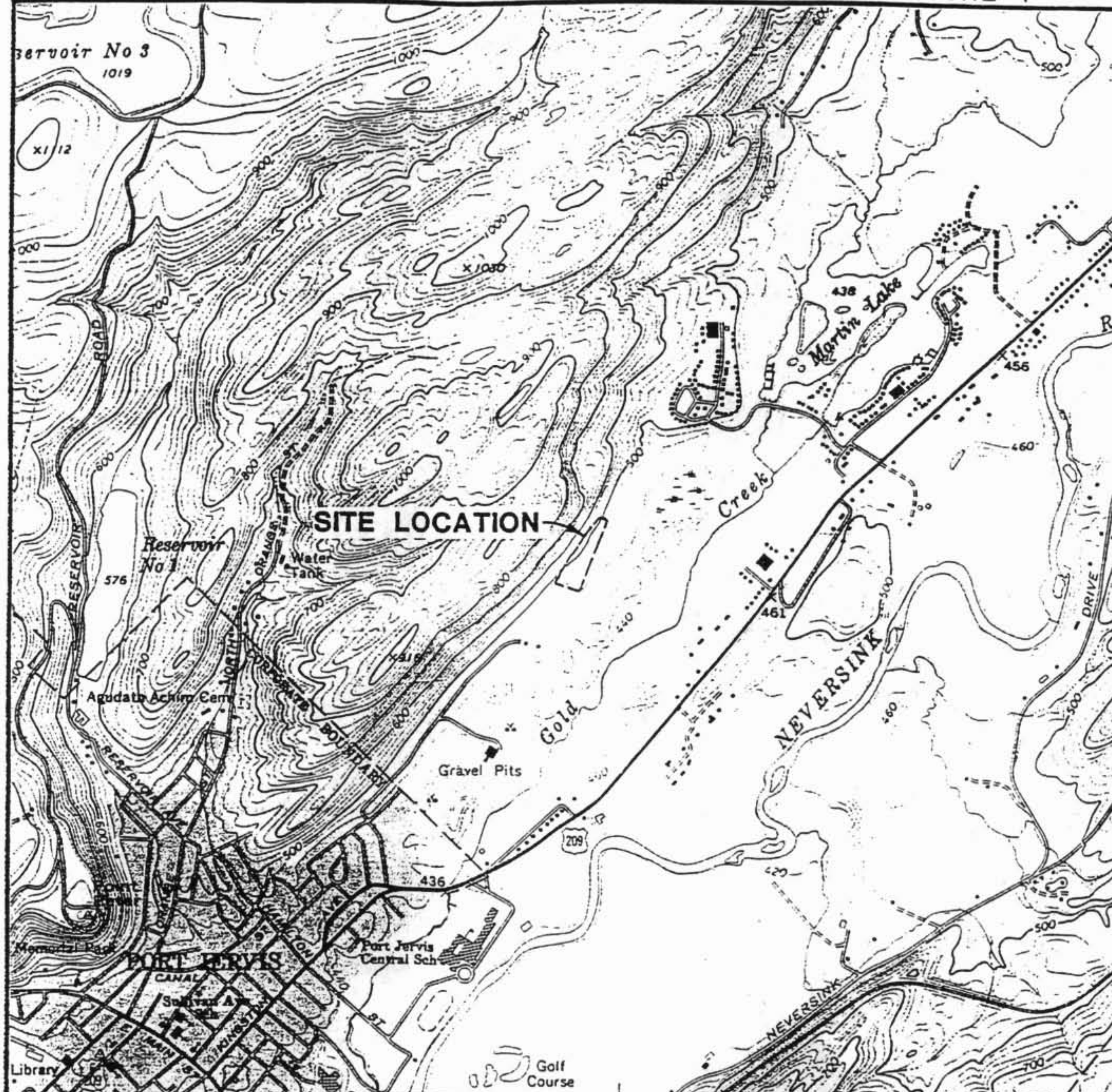
FIGURES

APPENDIX I

FIGURES

FIGURES

FIGURE 1



CARROLL AND DUBIES SITE
PORT JERVIS, NEW YORK

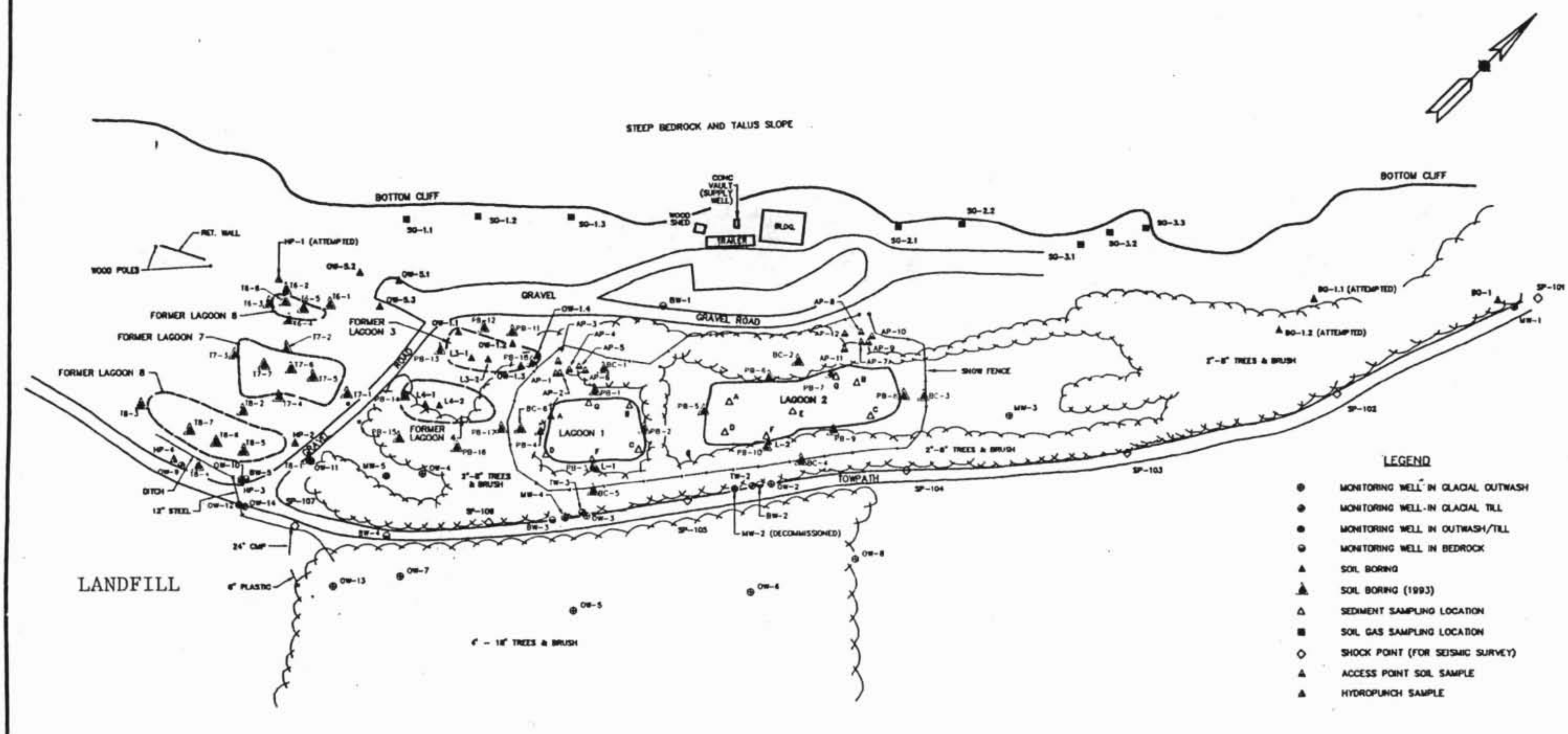
SITE LOCATION MAP

SCALE

2000' 0 2000'

SOURCE: USGS 7 1/2 MIN. TOPOGRAPHIC QUAD.
PORT JERVIS NORTH, NY-PA 1969.

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS



NOTES: ELEVATIONS BASED ON NATIONAL VERTICAL DATUM of 1929.

8/18/94 54-OMW
810081OC\81008MI.DWG

GRAPHIC SCALE - FEET (50 0 50 100)	In charge of____
	Designed by____
	Drawn by____
NO ALTERATIONS PERMITTED EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW	Checked by____

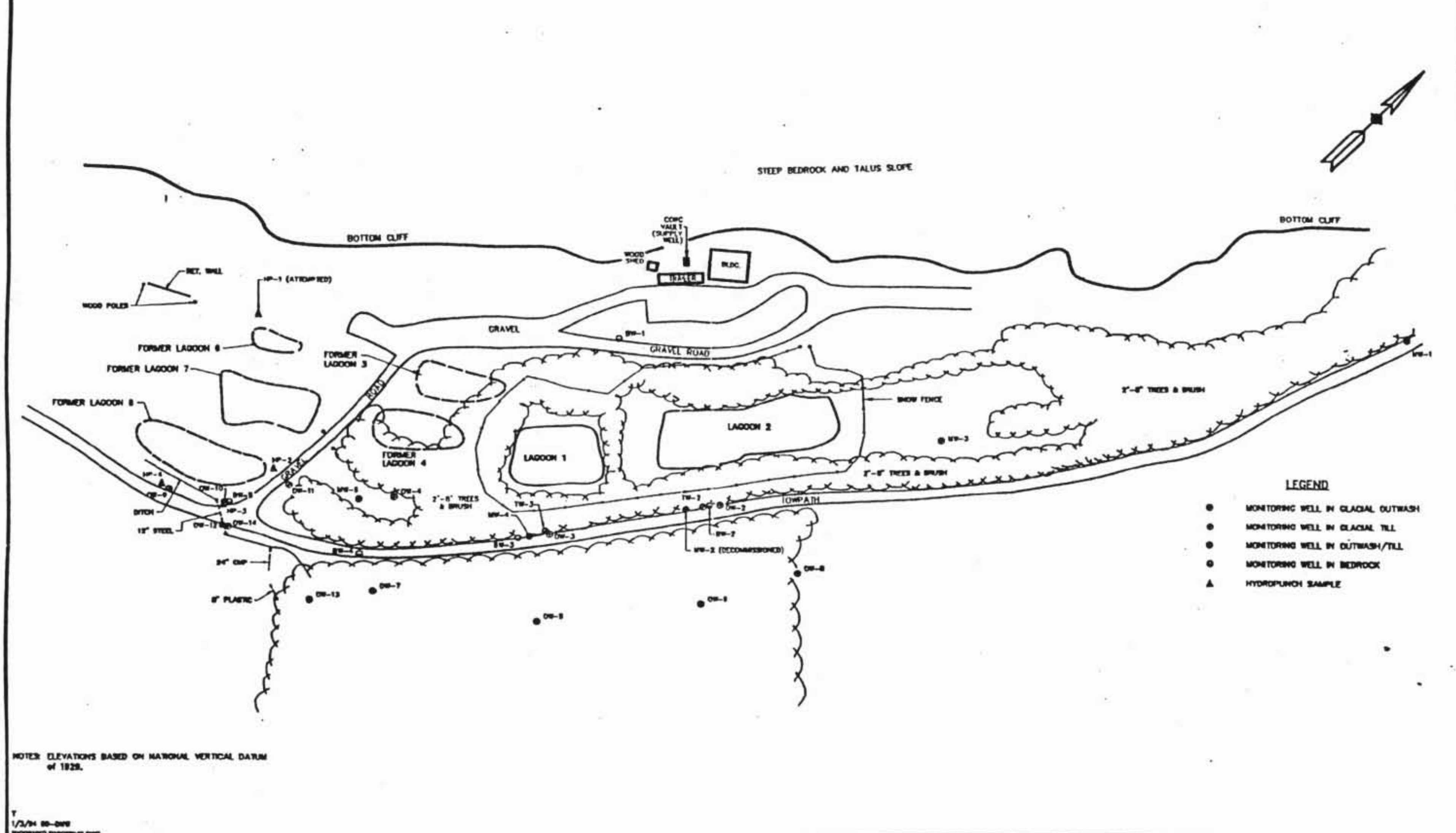
BLASLAND & BOUCK ENGINEERS, P.C.
Syracuse, New York
White Plains, New York

CARROLL AND DUBIES SITE
PORT JERVIS, NEW YORK

SAMPLE LOCATION MAP

File Number 810.06
Date NOVEMBER 1993

FIGURE 2



GRAPHIC SCALE - FEET

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Designed by______
Drawn by______
Checked by______

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

CARROLL AND DUBIES SITE
PORT JERVIS, NEW YORK

GROUND-WATER MONITORING WELL LOCATION MAP

File Number: 810.06

Date: JANUARY 1994

FIGURE 3

APPENDIX II

TABLES

TABLES

TABLE 1

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - INORGANICS

Inorganic	Lagoon 1		Lagoon 2		Lagoon 3		Lagoon 4		Background[3]	
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]
Aluminum	5,600-14,100	9,238	5,530-10,600	8339.23	7,650-28,200	13,225.71	11,200-<14,400	13,375	7,730-14,200	12,286
Antimony	<11.2-16.3[4]	10.01	8.7-13.5[4]	8.97	<10.8-14.8	7.29	11.9-17.7	7.14	2.45-12.1	4.73
Arsenic	3.8-7.3	4.64	2.7-10.7	5.06	4.1-8.5	5.7	3.0-7.1	5.2	3.1-7.0	5.3
Barium	10.8-1,290	351.33	14.5-821	240.89	16.5-48.3	27.59	30.4-80	33.7	21.5-43.1	35.86
Beryllium	<0.23-0.86	0.48	<0.21-0.59[4]	0.40	0.42-1.0	0.58	0.46-0.89	0.57	0.28-0.96	0.58
Cadmium	<0.8-16.8	3.96	<0.38-13	2.15	<1.0-<1.3	<0.54	<1.1-<1.5	<0.61	0.63-0.98	0.694
Calcium	137-14,400	5,258.9	75.3-22,100	7,585	77.4-323[4]	321.49	405-1,750	939.75	125-671	431.1
Chromium	7.1-113	36.53	8-137	39.08	8.7-57.3	24.64	14.6-25.3	19.7	11.0-61.9	26.5
Cobalt	5.1-11.0	8.72	4.9-11.8	8.16	8.0-13.7	11.83	7.5-16	12.23	6.0-14.5	11.82
Copper	11.3-1,490	400.58	8.0-1,470	482.22	6.5-23.2	11.83	5.9-169	60.58	7.0-19.1	13.26
Iron	395-29,200	13,954	10,900-22,900	17,500	12,000-28,900	20,442.86	17,000-33,000	25,300	17,000-31,800	25,620
Lead	6.9-1,400	278.18	13.4-286	131.29	12.1-70.8	25.98	see note 5	10.2	6.6-45.6	27.14
Magnesium	1,710-3,630	2,353	1,400-3,440	2,150	2,020-4,120	3,144.29	2,170-5,090	3,810	2,660-4,350	3,866
Manganese	150-472	304.33	143-1,360	418.54	157-346	248.71	201-589	445.5	297-764	518.4
Mercury	<0.12-7.2	2.38	<0.11-13.9	3.29	<0.10-0.14	0.075	<0.11-0.30	0.16	0.1-0.12	0.098
Nickel	<9.1-368	99.46	12.9-87.6	36.26	<8.3-107	33.24	9.1-32.9	23.28	15.3-36.7	27.38
Potassium	<193-1,490	521.72	<222-1,480	600.08	487-1,250	845.86	637-1,070	801.5	584-1,260	968.6
Selenium	<1.1-9.2	2.05	<0.54-3.2[4]	1.29	<1.1-<1.4	<0.57	<1.1-<1.5	<0.63	0.87-1.0	0.834
Silver	<1.6-35.9	10.4	<0.5-12.9	4.09	<1.5-4.7	1.35	<1.6-<2.1	<0.89	0.63-1.5	0.746
Sodium	<153-1,240	481.61	<144-723	167.62	<151-<240	<93.14	<152-<208	<89.88	63.8-182	92.86
Thallium	<1.1-1.4[4]	0.99	<1.1-1.7	1.06	<1.1-<1.4	<0.57	<1.1-<1.5	<0.63	0.87-1.0	0.834
Vanadium	7.3-17.1	10.59	5.3-14.6	9.29	8.9-17.8	13.91	12.5-18.6	16.48	9.1--18.8	16.38
Zinc	32.5-3,560	739.13	34.2-3,560	828.58	34.2-189	85.94	53.4-373	156.98	40.4-83.1	68.22
Cyanide	<0.44-320	45.97	<0.42-25.6	2.85	<0.48-<0.73	<0.29	<0.54-<0.77	<0.32	0.33-0.52	0.37

Notes:

1. The lower range value is the lower of either the lowest detected concentration or the lowest detection limit observed. The upper range value is limited to the highest detected concentration observed (unless otherwise noted), and in instances where no detectable concentrations exist, the highest non-detect value is presented as the upper range value.
2. Sample results reported as non-detect were included in the determination of average concentrations by using one-half the detection limit for each specific constituent.
3. Soil background concentration averages and ranges were determined using the results obtained from the analysis of the following background soil samples: BG-1 (0-2'), BG-1 (6-8'), BG-1 (17-18.5'), BG-2 (0-2'), and BG-2 (6-8').
4. The upper range value is the highest detected concentration. Reported laboratory detection limit values greater than this highest detected concentration exists due to matrix interface or other reasons and have been included in the calculation of the average concentration but not in the determination of the concentration range.
5. No concentration range exists for this data set. Only one data point exists (L4-1, 10-12' depth, 10.2 ppm lead); all other results were rejected based on data validation.
6. This table includes data collected for only those samples located within the limits of the source area materials above cleanup levels for each lagoon.
7. All concentrations are reported in mg/kg (ppm).

TABLE 1
(Continued)

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - INORGANICS

Inorganic	Lagoon 6		Lagoon 7		Lagoon 8		Background[3]	
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]
Aluminum	5,160-9,620	7,418.57	4,580-95,200	27,488.46	5,010-63,800	16,590	7,730-14,200	12,286
Antimony	<13.5-41.9	24.87	13.1-61.5	25.45	<13.1-76.1	24.97	2.45-12.1	4.73
Arsenic	3.0-5.8	4.5	2.9-6.2[4]	4.05	2.8-9.7	5.60	3.1-7.0	5.3
Barium	32.1-557	191.16	9.0-301	62.73	16.1-933	121.02	21.5-43.1	35.86
Beryllium	<0.32-1.1	0.68	<0.30-0.99	0.41	<0.62-1.8	1.05	0.28-0.96	0.58
Cadmium	<1.0-<1.5	<0.61	<0.97-3.4	0.86	<1.0-11.8	1.03	0.63-0.98	0.694
Calcium	388-15,500	6,642.57	219-7,350	1,293.43	111-16,600	2,205.62	125-671	498.2
Chromium	8.9-35.6	18.93	4.8-1,540	229.82	17.8-16,000	2,361.28	11.0-61.9	26.5
Cobalt	6.7-18.5	11.23	<3.7-13.0	8.27	<2.1-10.8	6.77	6.0-14.5	11.82
Copper	17-243	131.8	10.0-1,930	274.18	8.8-7,820	1,607.49	7.0-19.1	13.26
Iron	12,100-28,000	18,185.71	9,590-24,300	16,760.77	8,060-23,700	16,258.46	17,000-31,800	25,620
Lead	52.3-609	344.86	7.7-67.3	25.8	5.4-149	52.67	6.6-45.6	27.14
Magnesium	1,680-3,360	2,110	816-3,380	2,113.54	741-3,300	2,340.08	2,660-4,350	3,866
Manganese	358-916	516.4	69.6-266	156.52	115-617	287.75	297-764	518.4
Mercury	<0.11-1.5	0.41	<0.11-4.0	0.48	<0.10-4.5	1.15	0.1-0.12	0.098
Nickel	13.3-130	36.2	16.0-108	36.02	<9.0-105	33.94	15.3-36.7	27.38
Potassium	435-947	741	<221-901	509.15	239-1,040	468.5	584-1,260	968.6
Selenium	<1.1-<1.5	<0.62	<1.1-<2.6	<0.73	<1.0-<2.2	<0.67	0.87-1.0	0.834
Silver	<1.6-<1.7	<0.825	<1.5-<2.6	<0.95	<1.5-<1.6	<0.78	0.63-1.5	0.746
Sodium	153-203	174	<144-355	132.46	<149-256[4]	115.88	63.8-182	92.86
Thallium	<1.2-1.9	1.39	<1.1-6.5	1.90	<1.1-5.2	1.82	<0.87-<1.0	<0.48
Vanadium	7.3-14.0	10.36	5.5-16.5	9.92	<2.4-13.3	7.33	9.1--18.8	16.38
Zinc	60.5-89.8	75.15	30.3-243	128.13	65.2-2,630	972.73	40.4-83.1	68.22
Cyanide	<0.45-0.55[4]	0.34	<0.34-<1.5	<0.36	<0.43-<1.3	<0.36	0.33-0.52	0.37

Notes:

1. The lower range value is the lower of either the lowest detected concentration or the lowest detection limit observed. The upper range value is limited to the highest detected concentration observed (unless otherwise noted), and in instances where no detectable concentrations exist, the highest non-detect value is presented as the upper range value.
2. Sample results reported as non-detect were included in the determination of average concentrations by using one-half the detection limit for each specific constituent.
3. Soil background concentration averages and ranges were determined using the results obtained from the analysis of the following background soil samples: BG-1 (0-2'), BG-1 (6-8'), BG-1 (17-18.5'), BG-2 (0-2'), and BG-2 (6-8').
4. The upper range value is the highest detected concentration. Reported laboratory detection limit values greater than this highest detected concentration exists due to matrix interface or other reasons and have been included in the calculation of the average concentration but not in the determination of the concentration range.
5. This table includes data collected for only those samples located within the limits of the source area materials above cleanup levels for each lagoon.
6. All concentrations are reported in mg/kg (ppm).

TABLE 2

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 1		Lagoon 2		Lagoon 3		Lagoon 4		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Volatile Organics									
Vinyl Chloride	<0.011-<14.0	<0.93	<0.011-<4.8	<0.36	<0.011-<3.3	<0.39	<0.011-<0.058	<0.012	0.12
Methylene Chloride	<0.011-14.0	1.44	<0.011-2.2	0.24	0.006-67.0	9.67	0.007-<0.058	0.008	0.1
Acetone	<0.011-<14.0	<0.93	<0.011-2.8[5]	0.70	<0.01-61	9.60	0.007-0.22	0.060	0.11
Carbon Disulfide	<0.011-1.4[5]	0.39	<0.011-1.7[5]	0.41	<0.009-<3.3[5]	0.33	<0.001-<0.058	<0.012	2.7
1,1-Dichloroethene	<0.011-<14.0	<0.93	<0.011-<4.8	<0.36	<0.011-<3.3	<0.39	<0.001-<0.058	<0.012	0.4
1,1-Dichlororethane	<0.011-<14.0	<0.93	<0.011-<4.8	<0.36	<0.011-<3.3	<0.39	<0.001-<0.058	<0.012	0.2
1,2-Dichloroethene (total)	<0.011-<14.0	<0.93	<0.011-0.38[5]	0.38	0.011-2.7	0.50	<0.001-<0.058	<0.012	0.3
Chloroform	<0.011-<14.0	<0.93	<0.011-<4.8	<0.36	<0.011-<3.3	<0.39	<0.001-<0.058	<0.012	0.30
2-Butanone	0.008-<14.0[4]	0.93	<0.011-1.2	0.43	0.002-<3.3[4]	0.33	<0.011-0.038	0.014	0.3
1,1,1-Trichloroethane	<0.011-<14.0	<0.93	<0.011-<4.8	<0.36	<0.011-<3.3	<0.39	<0.001-<0.058	<0.012	0.76
Trichloroethene	<0.011-<14.0	<0.93	<0.011-<4.8	<0.36	0.002-7.8	1.21	<0.001-<0.058	<0.012	0.70
1,1,2-Trichloroethane	<0.011-<14.0	<0.93	<0.011-<4.8	<0.36	<0.011-<3.3	<0.39	<0.001-<0.058	<0.012	NA
Benzene	<0.011-<14.0	<0.93	<0.011-0.025[5]	0.36	<0.011-650	92.92	<0.011-0.035	0.014	0.06
4-Methyl-2-Pentanone	0.0055-3.0	0.39	<0.011-<4.8	<0.36	<0.011-<3.3	<0.39	<0.001-<0.058	<0.012	1.0
2-Hexanone	<0.011-<14.0	<0.93	<0.011-<4.8	<0.36	<0.011-0.079[5]	0.34	<0.001-<0.058	<0.012	NA
Tetrachloroethene	<0.011-<14.0	<0.93	0.003-0.005[5]	0.35	0.003-290	41.49	<0.001-<0.058	<0.012	1.4
Toluene	<0.011-240	21.96	<0.011-27.0	3.79	0.002-370	52.94	0.002-0.014	0.0061	1.5
Chlorobenzene	0.002-8.7	1.27	<0.011-27.0	3.25	<0.011-<3.3	<0.39	0.005-0.32	0.084	1.7
Ethylbenzene	<0.011-3.2[4]	0.59	<0.011-0.24[5]	0.37	<0.011-<3.3	<0.39	<0.011-<0.058	<0.012	5.5

TABLE 2
(Continued)

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 1		Lagoon 2		Lagoon 3		Lagoon 4		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Total Xylenes	<0.011-7.0	0.74	<0.011-2.5[5]	0.36	<0.011-2.5	0.45	0.004-<0.015[6]	0.0058	1.2
Semi-Volatile Organics									
Phenol	0.08-2.0[5]	0.91	0.26-<1.4	0.87	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	0.03
1,3-Dichlorobenzene	0.064-32.0	4.18	0.21-8.2	1.24	<0.35-<0.45	<0.19	0.033-<0.49[6]	0.16	1.6
1,4-Dichlorobenzene	0.10-120	16.37	0.049-250	22.73	<0.35-1.4	0.35	0.19-<0.49[6]	0.20	8.5
1,2-Dichlorobenzene	0.22-430	57.54	<0.35-44.0	9.61	0.13-<3.7[6]	0.17	0.38-<0.49[6]	0.25	7.9
2-Methylphenool	<0.37-<8.3	<0.91	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	0.1
2,2-Oxybis(1-chloropropane)	<0.37-<8.3	<0.91	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	NA
4-Methylphenol	<0.37-98.0	11.6	0.032-74.0	6.33	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	0.9
Nitrobenzene	<0.37-<8.3	<0.91	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	0.2
Isophorone	<0.37-<8.3	<0.91	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	NA
1,2,4-Trichlorobenzene	<0.37-24.0	3.15	0.17-6.0	0.95	<0.35-<0.45	<0.19	0.064-<0.39[6]	0.16	3.4
Naphthalene	0.37-24.0	3.25	0.045-3.2	0.62	0.064-<0.45	0.17	<0.37-<0.49	<0.20	13.0
4-Chloroaniline	0.12-200	23.72	0.064-43	5.02	<0.35-<0.45	<0.19	0.1-0.78	0.32	0.22
2-Methylnaphthalene	<0.37-89.0	10.34	0.002-4.4	0.93	0.026-0.082	0.15	0.013-0.016[5]	0.10	36.4
2-Chloronaphthalene	<0.37-3.0[5]	0.78	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	NA
Acenaphthylene	0.021-<8.3[6]	0.68	0.008-0.072[5]	0.81	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	41.0
Acenaphthene	0.014-0.3[5]	0.64	0.033-0.39	0.17	<0.35-<0.45	<0.19	0.018-<0.39[6]	0.15	90.0
Dibenzofuran	0.01-<8.3[6]	0.87	0.014-0.055[5]	0.73	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	6.2

TABLE 2
(Continued)

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 1		Lagoon 2		Lagoon 3		Lagoon 4		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
2,4-Dinitrotoluene	<0.37-<8.3	<0.91	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	NA
Diethylphthalate	<0.37-<8.3	<0.91	0.098-0.10[5]	0.75	<0.35-<0.45	<0.19	0.017-<0.39[5]	0.15	7.1
4-Chlorophenyl-phenylether	<0.37-<8.3	<0.91	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	NA
Fluorene	<0.37-<8.3	<0.91	0.03-1.8	0.42	0.03-0.27[5]	0.17	<0.37-<0.49	<0.20	350.0
N-Nitrosodiphenylamine (1)	<0.37-<8.3	<0.91	0.004-<6.9[5]	0.84	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	NA
Phenanthrene	0.021-22.0	2.72	0.015-1.9	0.54	0.12-<0.45[5]	0.18	0.12-<0.39[5]	0.17	220.0
Anthracene	0.025-5.0	0.68	0.005-0.45	0.25	0.017-0.12[5]	0.15	0.015-<0.39[5]	0.15	700.00
Carbazole	0.003-7.5	1.37	0.027-0.52[5]	0.51	0.018-<0.45[5]	0.16	<0.37-<0.49	<0.20	NA
Di-n-butylphthalate	0.009-48.0	5.76	0.009-6.2	0.75	0.13-3.2	0.79	0.047-0.29	0.18	8.1
Fluoranthene	0.037-21.0	2.68	0.014-2.0	0.70	0.027-<0.45[5]	0.16	0.07-<0.39[5]	0.16	1,900.0
Pyrene	0.037-28.0	3.41	6.043-2.5	0.70	0.026-<0.45[5]	0.16	0.24-<0.39[5]	0.20	665.0
Butylbenzylphthalate	0.18-0.98[5]	0.90	0.18-0.26[5]	0.75	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	122.0
3,3'-Dichlorobenzidine	<0.37-<8.3	<0.91	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	0.014
Benzo(a)anthracene	0.08-8.6	1.40	<0.35-1.35[5]	0.88	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	3.0
Chrysene	0.11-10.0	1.54	<0.35-1.9[5]	1.00	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	0.4
bis(2-Ethylhexyl)phthalate	0.048-130	16.28	0.084-7.3	1.26	0.22-2.4	0.73	0.033-0.034[5]	0.14	435.0
Di-n-octylphthalate	0.054-0.36[5]	0.66	0.11-0.23[5]	0.35	0.004-0.023[5]	0.14	<0.37-<0.49	<0.20	120.00
Benzo(b)fluoranthene	<0.37-6.5	1.10	<0.35-1.9[5]	0.94	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	1.1
Benzo(k)fluoranthene	<0.37-5.0	1.01	<0.35-0.45[5]	0.79	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	1.1

TABLE 2
(Continued)

CARROLL & DUBIES SITE
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CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 1		Lagoon 2		Lagoon 3		Lagoon 4		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Benzo(a)pyrene	0.29-4.2	0.90	0.31-1.4[5]	0.83	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	11.0
Indeno(1,2,3-cd)pyrene	<0.37-<8.3	<0.91	<0.35-1.0[5]	0.87	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	3.2
Benzo(g,h,i)perylene	<0.37-<8.3	<0.91	<0.35-<6.9	<0.82	<0.35-<0.45	<0.19	<0.37-<0.49	<0.20	800
Pesticides/PCBs									
alpha-BHC	<0.0019-<0.076	<0.009	<0.0018-<0.061	<0.007	<0.0018-<0.0023	<0.001	<0.0019-<0.0025	<0.001	0.2
beta-BHC	<0.0019-<0.076	<0.009	<0.0018-<0.061	<0.007	<0.0018-<0.0023	<0.001	<0.0019-<0.0025	<0.001	0.2
gamma-BHC	<0.0019-<0.076	<0.009	<0.0018-0.007[5]	0.011	<0.0018-<0.0023	<0.001	<0.0019-<0.0025	<0.001	0.06
Heptachlor	<0.0019-<0.076	<0.009	<0.0018-<0.061	<0.007	<0.0018-<0.0023	<0.001	<0.0019-<0.0025	<0.001	0.1
Endosulfan I	<0.0019-<0.076	<0.009	<0.0018-<0.061	<0.007	<0.0018-<0.0023	<0.001	<0.0019-<0.0025	<0.001	0.9
Dieldrin	<0.0037-<0.77	<0.081	<0.0035-<0.14	<0.02	<0.0035-<0.0045	<0.002	<0.0037-<0.0049	<0.002	0.1
4,4'-DDE	<0.0037-<0.77	<0.081	<0.0035-<0.14	<0.02	<0.0035-<0.0045	<0.002	<0.0037-<0.0049	<0.002	4.4
4,4'-DDD	<0.0037-0.0043[5]	0.019	<0.0035-0.073[5]	0.029	<0.0035-<0.0045	<0.002	<0.0037-<0.0049	<0.002	7.7
Endosulfan Sulfate	<0.0037-<0.77	<0.081	<0.0035-<0.14	<0.02	<0.0035-<0.0045	<0.002	<0.0037-<0.0049	<0.002	1.0
4,4-DDT	<0.0037-<0.77	<0.081	<0.0035-<0.14	<0.02	<0.0035-<0.0045	<0.002	<0.0037-<0.0049	<0.002	2.5
Endrin Aldehyde	<0.0037-<0.77	<0.081	<0.0035-<0.14	<0.02	<0.0035-<0.0045	<0.002	<0.0037-<0.0049	<0.002	NA
Alpha-Chlordane	<0.0019-0.0085[5]	0.010	<0.0018-0.02[5]	0.012	<0.0018-<0.0023	<0.001	<0.0019-0.0052[5]	0.0020	NA
Gamma-Chlordane	<0.0016-<0.076	<0.0095	<0.0018-0.024[5]	0.015	<0.0018-<0.0023	<0.001	<0.0019-<0.0025	<0.001	14.0
Aroclor-1248	<0.037-<1.5	<0.17	<0.035-<1.4	<0.20	<0.035-<0.045	<0.02	<0.037-<0.049	<0.020	10.0[4]
Aroclor-1254	0.012-0.50[5]	0.22	<0.036-0.74[5]	0.22	<0.035-<0.045	<0.02	<0.037-0.20	0.064	10.0[4]

TABLE 2
(Continued)

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 1		Lagoon 2		Lagoon 3		Lagoon 4		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Aroclor-1260	<0.037-<1.5	<0.17	<0.035-<1.4	<0.20	<0.035-<0.045	<0.02	<0.038-0.055	0.030	10.0

Notes:

1. The lower range value is the lower of either the lowest detected concentration or the lowest detection limit observed. The upper range is limited to the highest detected concentration observed.
2. Sample results reported as non-detect were included in the determination of average concentrations by using one-half the detection limit for each specific constituent.
3. TAGM cleanup objective = NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4046, November 16, 1992; recommended soil cleanup objective to protect ground-water quality.
4. TAGM cleanup objective for total PCBs in subsurface soil. The TAGM cleanup objective for PCBs in surface soil is 1.0 ppm.
5. The upper range value is the highest detected concentration. Reported laboratory detection limit values greater than this highest detected concentration exists due to matrix interferences or other reasons, and have been included in the calculation of the average concentration but not in the determination of the concentration range.
6. The only detected concentration for this data set is the lowest value of the data set. Non-detect values greater than this detected concentration exist and have been included in the determination of the concentration average and range.
7. This table includes data collected for only those samples located within the limits of the source area materials above cleanup levels for each lagoon.
8. All concentrations are reported in mg/kg (ppm).
9. NA = not available.

TABLE 2
(Continued)

CARROLL & DUBIES SITE
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CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 6		Lagoon 7		Lagoon 8		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Volatile Organics							
Vinyl Chloride	<0.011-<0.015	<0.0062	<0.011-0.36[5]	26.09	<0.010-<120	<4.76	0.12
Methylene Chloride	<0.011-<0.017	<0.013	<0.011-140[5]	440.15	<0.010-0.110[5]	5.54	0.1
Acetone	<0.011-0.26	0.048	0.097-200[5]	110.49	<0.022-6.3[5]	6.35	0.11
Carbon Disulfide	<0.011-0.016	0.0076	<0.011-3.3[5]	83.12	0.003-0.044[5]	4.76	2.7
1,1-Dichloroethene	<0.011-<0.015	<0.0062	<0.011-0.02[5]	26.06	<0.010-<120	<4.76	0.4
1,1-Dichlororethane	<0.011-<0.015	<0.0062	<0.011-0.041[5]	26.06	<0.010-<120	<4.76	0.2
1,2-Dichloroethene (total)	0.001-0.006[5]	0.0055	<0.011-1,100[5]	217.43	<0.010-0.14[5]	4.72	0.3
Chloroform	<0.011-<0.015	<0.0062	<0.011-12[5]	26.16	<0.010-0.015[5]	4.76	0.30
2-Butanone	<0.011-0.013[5]	0.0071	0.007-0.32[5]	26.25	<0.010-1.1[5]	4.80	0.3
1,1,1-Trichloroethane	<0.011-<0.015	<0.0062	<0.011-0.18[5]	26.08	<0.010-<120	<4.76	0.76
Trichloroethene	<0.011-<0.015	<0.0062	0.011-2,400	267.52	<0.010-0.039[5]	16.60	0.70
1,1,2-Trichloroethane	<0.011-<0.015	<0.0062	<0.011-<640	<26.07	<0.010-0.54[5]	4.75	NA
Benzene	0.004-0.10	0.020	0.002-2,800	288.38	0.001-1,900	153.03	0.06
4-Methyl-2-Pentanone	<0.011-<0.015	<0.0062	<0.011-7.7[5]	25.81	<0.010-<120	<4.76	1.0
2-Hexanone	<0.011-<0.015	<0.0062	<0.011-0.77[5]	26.12	<0.010-0.027[5]	4.76	NA
Tetrachloroethene	<0.001-0.002[5]	0.0049	0.002-12,000	1,044.85	0.001-0.16[5]	4.77	1.4
Toluene	0.002-200	28.58	0.004-13,000	331.92	0.003-350	34.89	1.5
Chlorobenzene	<0.011-<0.015	<0.0062	<0.011-<640	<26.07	0.003-0.018[5]	4.76	1.7

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TABLE 2
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CARROLL & DUBIES SITE
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CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 6		Lagoon 7		Lagoon 8		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Ethylbenzene	0.008-<0.015[6]	0.0064	<0.011-68[5]	30.50	<0.010-0.047[5]	4.72	5.5
Total Xylenes	<0.011-0.02	0.0081	0.002-310[5]	49.54	<0.010-4.72[6]	5.10	1.2
Semi-Volatile Organics							
Phenol	<0.37-<3.1	<0.64	<0.35-24.00	4.12	<0.34-<6.5	<0.75	0.03
1,3-Dichlorobenzene	0.034-<3.1[6]	0.58	<0.35-<17.0	<2.21	0.008-0.72	0.21	NA
1,4-Dichlorobenzene	0.02-0.15[5]	0.48	0.055-3.3[5]	1.84	0.031-7.4	0.93	NA
1,2-Dichlorobenzene	0.29-<3.1[6]	0.62	0.35-9.1[5]	2.21	0.14-3.1	0.62	NA
2-Methylphenol	<0.37-<3.1	<0.64	0.1-0.33[5]	1.67	<0.34-<6.5	<0.75	0.1
2,2-oxybis(1-Chloropropane)	<0.37-<3.1	<0.64	<0.35-<17.0	<2.21	<0.34-<6.5	<0.75	NA
4-Methylphenol	0.093-0.42[5]	0.37	0.073-0.33[5]	38.23	0.035-0.051[6]	0.58	0.9
Nitrobenzene	0.14-<3.1[6]	0.59	<0.35-<17.0	<2.21	<0.34-<6.5	<0.75	0.2
Isophorone	<0.37-<3.1	<0.64	0.033-4.7[5]	1.93	<0.34-<6.5	<0.75	NA
1,2,4-Trichlorobenzene	0.043-<3.1[6]	0.58	<0.35-<17.0	<2.21	0.026-1.1[5]	0.55	NA
Naphthalene	0.055-0.16[5]	0.31	0.043-810	63.90	0.014-3.0[5]	0.83	13.0
4-Chloroaniline	0.013-0.36[5]	0.39	<0.35-<17.0	<2.21	0.22-6.5	0.99	0.22
2-Methylnaphthalene	0.038-0.110[5]	0.30	0.033-610	61.98	0.039-9.50	1.71	36.4
2-Chloronaphthalene	0.032-<3.1[6]	0.58	0.059-270	20.49	<0.34-<4.2	<0.39	NA
Acenaphthylene	0.12-0.87[5]	0.27	0.041-0.054[5]	1.50	0.055-<4.2[6]	0.52	41.0
Acenaphthene	0.027-0.14[5]	0.36	0.10-<17.0[6]	2.12	0.071-1.8[5]	0.48	90.0

TABLE 2
(Continued)

CARROLL & DUBIES SITE
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CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 6		Lagoon 7		Lagoon 8		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Dibenzofuran	0.062-0.46[5]	0.22	0.023-63	6.17	0.071-1.8[5]	0.48	6.2
2,4-Dinitrotoluene	<0.37-<3.1	<0.64	<0.35-<17.0	<2.21	<0.34-<6.5	<0.75	NA
Diethylphthalate	0.011-0.38[5]	0.57	0.078-690	62.34	0.017-3.1[5]	0.57	7.1
4-Chlorophenyl-phenylether	<0.37-<3.1	<0.64	<0.35-<17.0	<2.21	<0.34-<6.5	<0.75	NA
Fluorene	0.042-0.37[5]	0.36	0.066-110	10.60	0.005-1.5[5]	0.52	350.0
N-Nitrosodiphenylamine (1)	<0.37-<3.1	<0.64	<0.36-35	4.25	<0.34-<16.0	<1.05	NA
Phenanthrene	0.11-11.0	3.04	0.065-650	58.81	<0.34-3.3[5]	1.12	220.0
Anthracene	0.008-0.89[5]	0.34	0.042-5.6[5]	1.73	<0.34-0.41[5]	0.42	700.00
Carbazole	0.008-0.88	0.26	<0.35-<17.0	<1.60	0.009-0.18[5]	0.39	NA
Di-n-butylphthalate	0.018-0.10[5]	0.39	0.34-61,000	4,940.83	0.83-<4.2[4]	0.52	8.1
Fluoranthene	0.088-12.0	3.09	0.022-490	39.72	0.12-2.7[5]	0.70	1,900.0
Pyrene	0.11-8.9	2.78	0.08-<17.0[4]	1.66	0.022-5.1	0.72	665.0
Butylbenzylphthalate	0.014-0.10[5]	0.34	0.033-9.2[5]	2.30	0.042-0.63[5]	0.63	122.0
3,3'-Dichlorobenzidine	<0.37-<3.1	<0.64	<0.35-<17.0	<2.21	0.31-<4.2[4]	0.54	NA
Benzo(a)anthracene	0.061-3.9	1.24	<0.35-<17.0	<2.21	0.11-0.33[5]	0.52	3.0
Chrysene	0.065-6.5	1.88	<0.35-<17.0	<2.21	0.075-0.33[5]	0.49	0.4
bis(2-Ethylhexyl)phthalate	<0.37-2.0[5]	1.03	<0.36-47[5]	59.29	0.027-260	25.26	435.0
Di-n-octylphthalate	0.024-0.083[5]	0.47	0.023-0.15[5]	2.19	0.032-0.29[5]	0.38	120.00
Benzo(b)fluoranthene	<0.37-4.4	1.23	<0.35-<17.0	<2.21	0.076-0.51[5]	0.54	1.1

TABLE 2
(Continued)

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 6		Lagoon 7		Lagoon 8		TAGM Cleanup Objective[3]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Benzo(k)fluoranthene	<0.37-4.4	1.28	<0.35-<17.0	<2.21	0.057-0.44[5]	0.53	1.1
Benzo(a)pyrene	<0.37-3.9	1.20	<0.35-<17.0	<2.21	0.14-0.35[5]	0.54	11.0
Indeno(1,2,3-cd)pyrene	<0.37-2.3	0.87	<0.35-<17.0	<2.21	<0.34-<6.5	<0.75	3.2
Benzo(g,h,i)perylene	<0.37-3.1	0.69	<0.35-<17.0	<2.21	0.19-<4.2[5]	0.53	800
Pesticides/PCBs							
alpha-BHC	<0.0018-<0.038	<0.0056	0.0018-0.0025[5]	0.0081	<0.0018-<0.015	<0.0027	0.2
beta-BHC	<0.0018-<0.038	<0.0056	<0.0018-<0.094	<0.0077	<0.0018-<0.015	<0.0027	0.2
gamma-BHC	<0.0018-<0.038	<0.0056	<0.0018-<0.094	<0.0082	<0.0018-<0.015	<0.0027	0.06
Heptachlor	<0.0018-<0.038	<0.0056	<0.0018-0.0072[5]	0.0090	<0.0018-<0.015	<0.0027	0.1
Endosulfan I	<0.0018-<0.038	<0.0056	<0.0018-<0.094	<0.0082	<0.0018-0.0068[5]	0.0045	0.9
Dieldrin	<0.0016-<0.048	<0.0057	<0.0035-0.096	0.018	0.0034-0.0066[5]	0.0059	0.1
4,4'-DDE	<0.0016-<0.048	<0.0057	<0.0035-<0.180	<0.016	<0.0034-0.078	0.013	4.4
4,4'-DDD	<0.0016-<0.048	<0.0057	0.0035-0.0047[5]	0.016	<0.0034-0.029	0.0057	7.7
Endosulfan Sulfate	<0.0016-<0.048	<0.0057	<0.0035-<0.180	<0.016	0.0034-0.028	0.007	1.0
4,4'-DDT	<0.0016-<0.048	<0.0057	0.0036-<0.180[5]	0.016	<0.0034-<0.029	<0.0055	2.5
Endrin Aldehyde	<0.0035-<0.048	<0.0074	<0.0035-<0.180	<0.016	<0.0034-0.098	0.014	NA
Alpha-Chlordane	0.0022-0.13	0.024	<0.0018-<0.094	<0.0082	<0.0018-0.03	0.0047	NA
Gamma-Chlordane	0.002-0.14	0.024	<0.0018-<0.094	<0.0082	<0.0018-<0.015	<0.0054	14.0
Aroclor-1248	<0.037-0.48	0.14	<0.035-<1.80	<0.016	0.034-7.0	0.69	10.0[4]

TABLE 2
(Continued)

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

CONCENTRATION AVERAGES AND RANGES FOR LAGOONS 1-4, 6, 7, AND 8 - VOLATILE ORGANICS, SEMI-VOLATILE ORGANICS, PCBS, AND PESTICIDES

Parameter	Lagoon 6		Lagoon 7		Lagoon 8		TAGM Cleanup Objective[9]
	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	Concentration Range[1]	Average Concentration[2]	
Aroclor-1254	0.014-<0.74[6]	0.12	0.025-<1.8[6]	0.016	<0.034-1.6	0.18	10.0[4]
Aroclor-1260	0.025-<0.74[6]	0.12	<0.036-0.65[5]	0.19	<0.034-0.13[5]	0.094	10.3[4]

Notes:

1. The lower range value is the lower of either the lowest detected concentration or the lowest detection limit observed. The upper range is limited to the highest detected concentration observed.
2. Sample results reported as non-detect were included in the determination of average concentrations by using one-half the detection limit for each specific constituent.
3. TAGM cleanup objective = NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4046, November 16, 1992; recommended soil cleanup objective to protect ground-water quality.
4. TAGM cleanup objective for total PCBs in subsurface soil. The TAGM cleanup objective for PCBs in surface soil is 1.0 ppm.
5. The upper range value is the highest detected concentration. Reported laboratory detection limit values greater than this highest detected concentration exists due to matrix interferences or other reasons, and have been included in the calculation of the average concentration but not in the determination of the concentration range.
6. The only detected concentration for this data set is the lowest value of the data set. Non-detect values greater than this detected concentration exist and have been included in the determination of the concentration average and range.
7. The detection limit of 1,300 ppm reported for this constituent, which was not detected in the analysis of sample T7-6 (6-8') was not included in the determination of the concentration average and range.
8. The detection limit of 980 ppm reported for this constituent, which was not detected in the analysis of sample T7-7 (2-4') was not included in the determination of the concentration average and range.
9. This table includes data collected for only those samples located within the limits of the source area materials above cleanup levels for each lagoon.
10. All concentrations are reported in mg/kg (ppm).
11. NA = not available.

TABLE 3

CARROLL & DUBIES SUPERFUND SITE -
TOWN OF DEERPARK, NEW YORK

SUMMARY OF CHEMICALS OF CONCERN IN SOIL/SLUDGE

Volatiles

1,2-dichoroethene (total)
2-butanone
2-hexanone
4-methyl-2-pentanone
acetone
benzene
carbon disulfide
chlorobenzene
ethylbenzene
methylene chloride
tetrachloroethene
toluene
trichloroethene
xylenes (total)

Semivolatiles

1,2-dichlorobenzene
1,2,4-trichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
2-chloronaphthalene
2-methylnaphthalene
4-chloroaniline
4-methylphenol
acenaphthene
anthracene
benz(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
benzo(k)fluoranthene
bis(2-ethylhexyl)phthalate
butylbenzylphthalate
carbazole
chrysene
di-n-butylphthalate
di-n-octylphthalate
fluoranthene
fluorene
naphthalene
phenanthrene
phenol
pyrene

Inorganics

aluminum
antimony
arsenic
barium
beryllium
cadmium
chromium
cobalt
copper
cyanide
iron
lead
magnesium
manganese
mercury
nickel
selenium
silver
vanadium
zinc

Pesticides/PCBs

Aroclor 1254

TABLE 4

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

SUMMARY OF EXPOSURE PATHWAYS

Pathway	Receptor	Time-Frame Evaluated Present	Future	Degree of Assessment Quant.	Qual.	Rationale for Selection or Exclusion	Data Evaluated
Ground water							
Ingestion	Resident (Adult and Child)	No	Yes	X		Private wells exist in adjacent areas, and although contamination has not currently reached these wells, it may in the future.	Pending
Dermal contact during bathing.	Resident (Adult only)	No	Yes	X		See ingestion pathway for this medium.	Pending
Inhalation of ground water contaminants during showering.	Resident (Adult only)	No	Yes	X		Presence of VOCs in ground water.	Pending
Soils							
Incidental ingestion	Trespasser (Adult and Youth)	Yes	Yes	X		Acces to the site is not eliminated, and the junk cars and open land around the site may be an attraction to adolescents.	All on-site soil samples.
	Excavation Worker	No	Yes	X		Construction and excavation activities may occur in the future.	All on-site soil samples
Dermal contact	Trespasser (Adult and Youth)	Yes	Yes	X		See ingestion pathway for this medium and receptor.	All on-site soil samples.
	Excavation worker	No	Yes	X		See ingestion pathway for this medium and receptor.	All on-site soil samples.
Surface Sludge							
Incidental ingestion	Trespasser (Adult and Youth)	Yes	Yes	X		Acces to the site is not eliminated, and the junk cars and open land around the site may be an attraction to adolescents.	Surficial sludge samples.
Dermal contact	Trespasser (Adult and Youth)	Yes	Yes	X		See ingestion pathway	Surficial sludge samples.

TABLE 4 (Cont'd)

Pathway	Receptor	Time-Frame Evaluated Present	Future	Degree of Assessment Quant.	Qual.	Rationale for Selection or Exclusion	Data Evaluated
Subsurface and surface Sludge. (continued)							
Incidental ingestion	Excavation worker	No	Yes	X		Construction and excavation activities may occur in the future.	All sludge samples.
Dermal contact	Excavation worker	No	Yes	X		See ingestion pathway for this medium.	All sludge samples.
Lagoon 1 standing water							
Dermal contact	Trespasser (Adult and Youth)	Yes	Yes	X		Access to Lagoon 1 is not eliminated and may be an attraction to adolescents especially.	Lagoon 1 standing water sample and its duplicate.
Air Inhalation of Emissions and Particulates from Soils	Trespasser (Adult and Youth)	Yes	Yes	X		Dry soil conditions and winds could generate dusts.	All soil samples.
	Excavation worker	No	Yes	X		Dry soil conditions, winds, and use of heavy machinery and vehicles could generate dusts.	All soil samples.
Inhalation of emissions and Particulates from Sludges	Trespasser (Adult and Youth)	Yes	Yes	X		Dry sludge conditions and winds could generate dusts.	Surficial sludge samples.
	Excavation worker	No	Yes	X		Dry sludge conditions, winds, and use of heavy machinory and vohiclus could genurate dusts.	All sludge samples.

TABLE 5

CARROLL & DUBIES
PORT JERVIS, NEW YORK

AVAILABLE TOXICITY CRITERIA FOR THE CARCINOGENIC CHEMICALS OF INTEREST

	Oral Route				Inhalation Route		
Chemical	Slope Factor 1/(mg/kg/day)	Reference	HHEG Class	Reference	Unit Risk Factor 1/(mg/m(3))	Calculated (a) Slope Factor 1/(mg/kg/day)	Reference
VOLATILES							
Methylene chloride	0.0075	*	B2	*	0.00047	(b)	*
Benzene	0.029	*	A	*	0.0083	0.029	*
Tetrachloroethene	0.051	**	B2	**	0.00052	0.00182	**
Trichloroethene	0.011	**	B2	**	0.0017	0.017 (c)	**
SEMIVOLATILES							
1,4-Dichlorobenzene	0.024	**	C	**	ND		
Bis(2-ethylhexyl)phthalate	0.014	*	B2	*	ND		
Carbazole	0.02	**	B2	**	ND		
n-Nitrosodiphenylamine	0.0049	**	B2	**	ND		
Benzo(a)pyrene	11.5	**	B2	*	1.7	6.1	**
Benzo (a)anthracene	1.15	***	B2	*	0.17	0.61	***
Benzo(b)fluoranthene	1.15	***	B2	*	0.17	0.61	***
Benzo(k)fluoranthene	1.15	***	B2	*	0.17	0.61	***
Chrysene	1.15	***	B2	*	0.17	0.61	***
PCBs							
Aroclor 1254	7.7	*	B2	*	ND		
INORGANICS							
Arsenic	ND		A	**	4.3	15	*
Beryllium	4.3	*	B2	*	2.4	8.4	*
Cadmium	ND		B2	*	1.8	6.3	*
Chromium (VI)	ND		ND	*	12	42	*
Nickel							
subsulfide	ND		B2	**	0.48	1.7	**
refinery dust	ND		ND	**	0.24	0.84	**

Notes:
(a) Calculated using the following equation:
SF 1/(mg/kg/day) = URF (m(3)/mg) x 70 kg ÷ 20 m(3)/day
(b) As per USEPA (IRIS, 1992) guidance, it is not appropriate to calculate a slope factor.
(c) URF is based on a metabolized dose, therefore the slope factor has not been calculted using the unit risk factor.

References:
* IRIS, 1992
** USEPA, 1991d
*** Criteria based on toxic equivalency to benzo(a)pyrene (USEPA, 1991b).

TABLE 6

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

SUMMARY OF CANCER RISKS

EXPOSURE PATHWAY	CURRENT RECEPTOR			FUTURE RECEPTORS	
	Trespassers			Residents (b)	
	Adult	Youth	Workers (a)	Adult	Youth
Soil					
Incidental Ingestion	3E−08	5E−07	9E−08	NE (c)	NE
Dermal contact	NA	NA	NA	NE	NE
Dust Inhalation	6E−09	3E−08	3E−06	NE	NE
Surficial Sludge					
Incidental Ingestion	2E−08	3E−07	NE	NE	NE
Dermal Contact	4E−07	2E−06	NE	NE	NE
Dust Inhalation	6E−09	3E−08	NE	NE	NE
Combined Surface/ Subsurface Sludge					
Incidental Ingestion	NE	NE	7E−07	NE	NE
Dermal contact	NE	NE	3E−07	NE	NE
Dust Inhalation	NE	NE	8E−08	NE	NE
Lagoon 1 Standing Water					
Dermal Contact	7E−08	4E−07	NE	NE	NE
Ground Water					
Ingestion	NE	NE	NE	TBC (d)	TBC
Dermal Contact	NE	NE	NE	TBC	NE
Vapor Inhalation	NE	NE	NE	TBC	NE
Total Site Risk	5E−07	3E−06	4E−06	TBC	TBC

Notes:

(a) Hypothetical excavation worker.
(b) Hypothetical use of on−site ground water.
(c) NE = Exposure pathway is not evaluated for this receptor.
(d) TBC = To be completed following additional ground−water investigation.
(e) NA = Not applicable. Dermal exposure to soil and sludges only evaluated for cadmium and PCBs.

TABLE 7

CARROLL & DUBIES
PORT JERVIS, NEW YORK

AVAILABLE TOXICITY CRITERIA FOR THE NONCARCINOGENIC CHEMICALS OF INTEREST

Chemical	Oral Route RfD (mg/kg/day)	Oral Route Reference	Inhalation Route RfC (mg/m(3))	Inhalation Route Calculated (a) RfD (mg/kg/day)	Inhalation Route Reference
VOLATILES					
1,2-Dichloroethene					
cis-	0.01	**	ND		
trans-	0.02	*	ND		
1,1-Dichloroethane	0.1	**	0.5	0.1	**
2-Butanone	0.05	*	0.3	0.09	**
4-Methyl-2-pentanone	0.05	**	0.08	0.02	**
Acetone	0.1	*	ND		
Carbon disulfide	0.1	*	0.01	0.003	**
Chlorobenzene	0.02	*	0.02	0.006	**
Ethylbenzene	0.1	*	1	0.3	*
Methylene chloride	0.06	*	3	0.9	**
Tetrachloroethene	0.01	*	ND		
Toluene	0.2	*	2	0.6	**
Xylenes (total)	2	*	0.3	0.09	**
SEMIVOLATILES					
1,2-Dichlorobenzene	0.09	*	0.2	0.06	**
1,2,4-Trichlorobenzene	0.00131	**	0.009	0.003	**
1,4-Dichlorobenzene	ND		0.7	0.2	**
2-Chloronaphthalene	0.08	*	ND		
2-Methylnaphthalene	0.004	***	ND		
4-Chloroaniline	0.004	*	ND		
4-Methylphenol	0.05	**	ND		
Acenaphthene	0.06	*	ND		
Anthracene	0.3	*	ND		
Bis(2-ethylhexyl)phthalate	0.02	*	ND		
Butylbenzylphthalate	0.2	**	ND		
Diethylphthalate	0.8	*	ND		
Di-n-butylphthalate	0.1	*	ND		
Di-n-octylphthalate	0.02	**	ND		
Fluoranthene	0.04	*	ND		
Fluorene	0.04	*	ND		
Naphthalene	0.004	**	ND		
n-Nitrosodiphenylamine	ND	*	ND		
Phenol	0.6	*	ND		
Pyrene	0.03	*	ND		
INORGANICS					
Antimony	0.0004	**	ND		
Arsenic	0.0003	*	ND		
Barium	0.05	**	0.0005	0.0001	**
Beryllium	0.005	*	ND		
Cadmium					
food	0.001	*	ND		
water	0.0005	*	ND		
Chromium (III)	1	*	2.0E-06	6E-07	**
Chromium (VI)	0.005	*	2.0E-06	6E-07	**
Copper	ND	****	ND		
Cyanide	0.02	*	ND		
Manganese	0.1	*	0.0004	0.0001	*
Mercury	0.0003	**	0.0003	9E-05	**
Nickel	0.02	*	ND		
Selenium	0.005	*	ND		
Silver	0.003	**	ND		
Thallium	0.00007	**	ND		
Vanadium	0.007	**	ND		
Zinc	0.2	**	ND		

Notes:
(a) Calculated using the following equation:
RfD (mg/kg/day) = RfC (mg/m(3)) x 20 m(3)/day ÷ 70 kg

References:
* IRIS, 1992
** USEPA, 1991d
*** 2-Methylnaphthalene is evaluated using criteria for naphthalene.
**** USEPA Maximum Contaminant Level is 1.3 mg/L. This is based on organoleptic properties and therefore cannot be converted to a health-based toxicity criterion.

TABLE 8

CARROLL & DUBIES SITE
PORT JERVIS, NEW YORK

SUMMARY OF HAZARD INDICES

EXPOSURE PATHWAY	CURRENT RECEPTORS			FUTURE RECEPTORS	
	Trespassers			Residents (B)	
	Adult	Youth	Workers (a)	Adult	Youth
Soil					
Incidental Ingestion	0.002	0.02	0.05	NE	NE
Dermal Contact	(d) NA	NA	NA	NE	NE
Dust Inhalation	0.01	0.06	0.8	NE	NE
Surficial Sludge					
Incidental Ingestion	0.004	0.06	NE	NE	NE
Dermal Contact	6E−05	0.0003	NE	NE	NE
Dust Inhalation	0.02	0.1	NE	NE	NE
Combined Surface/ Subsurface Sludge					
Incidental Ingestion	NE	NE	0.2	NE	NE
Dermal Contact	NE	NE	0.0008	NE	NE
Dust Inhalation	NE	NE	2	NE	NE
Lagoon 1 Standing Water					
Dermal Contact	0.004	0.02	NE	NE	NE
Ground Water					
Ingestion	NE	NE	NE	TBC (e)	TBC (e)
Dermal Contact	NE	NE	NE	TBC	NE
Vapor Inhalation	NE	NE	NE	TBC	NE
Total Site Hazard Indices	0.04	0.3	3	TBC	TBC

Notes:

(a) Hypothetical excavation worker.
(b) Hypothetical use of on−site ground water.
(c) NE = Exposure pathway is not evaluated for this receptor.
(d) NA = Not applicable. Dermal absorption from soil and sludges is only evaluated for cadmium and PCBs.
(e) TBC = To be completed following supplemental ground−water investigation.

TABLE 9

Detailed Cost Estimate for Selected Remedy, Alternative 5,

Ex-Situ Vapor Extraction, BioSlurry Treatment, Stabilization, and On-Site Containment –

Item No	Description	Est Quantity	Unit	Unit Price Mat & Lab ($)	Estimated Amount ($)
	EXCAVATION				
1	Mobilization/Demobilization		LS		125,000
2	Site Clearing	1	Acre	4,000.00	4,000
3	Erosion Control		LS		5,000
4	Construct Equipment Decontamination Pad		LS		10,000
5	Pre Treatment Verification Sampling	66	Samples	2,500.00	165,000
6	Excavation of Soil	20,300	CY	15.00	305,000
7	Debris Management	2,000	CY	50.00	100,000
	CONTAINMENT (FOR TREATMENT AND CLOSURE)				
8	Excavation for On-Site Containment Pad	1,500	CY	15.00	23,000
9	Install 20 mil HDPE Geomembrane	40,000	SF	0.30	12,000
10	Install 1'Sand Drainage Layer	1,500	CY	15.00	23,000
11	Leachate Collection System Wet Well		LS		50,000
	VAPOR EXTRACTION				
12	Pilot Study for Vapor Extraction		LS		25,000
13	Install 6" PVC Perforated Pipes	1,906	LF	11.00	21,000
14	Install 6" PVC Non Perforated Pipes	762	LF	13.00	10,000
15	Install 8 Blowers	8	Numbers	7,500.00	60,000
16	Air Water Separator, Heat Exchanger, Control Panels, Wiring Etc.		LS		48,000
17	Weatherproof Housing for Blowers		LS		5,000
18	Electricity Charges for 1 Year	381,132	kWh	0.10	38,000
19	Operator for 1 Year for Vapor Extraction System	2,000	MH	30.00	60,000
20	Soil Amendments, Mixing Amendments, and Fertilizer for 1 Year		LS		25,000
21	Activated Carbon Units for Treatment of Vented Air	8	Numbers	6,000.00	48,000
22	Install 20 mil HDPE Geomembrane	19,000	SF	0.30	6,000
23	Post Treatment Verification Sampling	126	Samples	1,400.00	177,000
	SLURRY TREATMENT				
24	Pilot Study for Slurry Treatment		LS		100,000
25	Construct Bioslurry Treatment Pad and Tanks		LS		326,000
26	Install Pumps, Augers, Piping, Electrical Appurtenances, etc.		LS		51,000
27	Operating Costs for Bioslurry, Chemicals, Power, Labor, etc.		LS		774,000
28	Slurry Dewatering/Water Treatment		LS		269,000

29	Post Treatment Verification Sampling	43	Samples	1,400.00	60,000
	STABILIZATION			-	
30	Pilot Study for Stabilization		LS		25,000
31	Stabilization of Excavated Soil	17,600	CY	100.00	1,760,000
32	Stabilization of Soil Amendments	800	CY	100.00	80,000
33	Post Stabilization Verification Sampling	18	Samples	1,400.00	25,000
	CLOSURE				
34	Install 2' Clay Layer	3,000	CY	25.00	75,000
35	Install 20 mil HDPE Geomembrane	46,000	SF	0.30	14,000
36	Install 1' Sand Layer	1,800	CY	15.00	27,000
37	Install Geotextile	46,000	SF	2.00	92,000
38	Install 24" Cover Layer	3,600	CY	15.00	54,000
39	Install 6" Topsoil Layer	900	CY	20.00	18,000
40	Backill and Compact Select Fill	20,300	CY	15.00	305,000
41	Hydroseed Cap	1	Acre	2,500.00	3,000
	Subtotal Capital Cost				5,403,000
	Administration and Engineering 25%				1,351,000
	Contingencies 25%				1,351,000
Total Capital Cost					$8,105,000
	ANNUAL OPERATION AND MAINTENANCE COST				
42	Annual Groundwater Monitoring		LS		15,000
43	Cap Maintenance		LS		5,000
44	Maintenance of Leachate Collection System		LS		2,000
	Subtotal Operation and Maintenance Cost				22,000
	Contingencies 25%				6,000
	Total Operation Maintenance Cost Present Worth Factor for 30 Years @ 5% = 15.37				28,000
	Total Present Worth of Operation and Maintenance				430,000
	TOTAL COST				$8,5335,000

Notes:

CF = cubic foot
CY = cubic yard
LF = linear foot
LS = lump sum
SF = square foot
SY = squart yard

TABLE 10

Detailed Cost Estimate for Contingency Remedy

Off-Site Incineration of Lagoon 7 Materials; Ex-Situ Vapor Extraction, Stabilization, and On-Site Containment

Item No	Description	Est Quantity	Unit	Unit Price Mat & Lab ($)	Estimated Amount ($)
	EXCAVATION				
1	Mobilization/Demobilization		LS		125,000
2	Site Clearing	1	Acre	4,000.00	4,000
3	Erosion Control		LS		5,000
4	Construct Equipment Decontamination Pad		LS		10,000
5	Pre Treatment Verification Sampling	66	Samples	2,500.00	165,000
6	Excavation of Soil	20,300	CY	15.00	305,000
7	Debris Management	2,000	CY	50.00	100,000
	CONTAINMENT (FOR TREATMENT AND CLOSURE)				
8	Excavation for On-Site Containment Pad	1,500	CY	15.00	23,000
9	Install 20 mil HDPE Geomembrane	40,000	SF	0.30	12,000
10	Install 1'Sand Drainage Layer	1,500	CY	15.00	23,000
11	Leachate Collection System Wet Well		LS		50,000
	VAPOR EXTRACTION				
12	Pilot Study for Vapor Extraction		LS		25,000
13	Install 6" PVC Perforated Pipes	1,906	LF	11.00	21,000
14	Install 6" PVC Non Perforated Pipes	762	LF	13.00	10,000
15	Install 8 Blowers	8	Numbers	7,500.00	60,000
16	Air Water Separator, Heat Exchanger, Control Panels, Wiring Etc.		LS		48,000
17	Weatherproof Housing for Blowers		LS		5,000
18	Electricity Charges for 1 Year	381,132	kWh	0.10	38,000
19	Operator for 1 Year for Vapor Extraction System	2,000	MH	30.00	60,000
20	Soil Amendments, Mixing Amendments, and Fertilizer for 1 Year		LS		25,000
21	Activated Carbon Units for Treatment of Vented Air	8	Numbers	6,000.00	48,000
22	Install 20 mil HDPE Geomembrane	19,000	SF	0.30	6,000
23	Post Treatment Verification Sampling	126	Samples	1,400.00	177,000
	OFF-SITE INCINERATION (LAGOON 7)				
24	Transportation	5,100*	Ton	14.00	71,400
25	Incineration	5,100*	Ton	1,100.00	5,610,000
26	Soil Characterization and Verification at Incinerator Facility		LS		12,000
	STABILIZATION				
27	Pilot Study for Stabilization		LS		25,000
28	Stabilization of Excavated Soil	14,200	CY	100.00	1,420,000

29	Stabilization of Soil Amendments	800	CY	100.00	80,000
30	Post Stabilization Verification Sampling	18	Samples	1,400.00	25,000
	CLOSURE				
31	Install 2' Clay Layer	3,000	CY	25.00	75,000
32	Install 20 mil HDPE Geomembrane	46,000	SF	0.30	14,000
33	Install 1' Sand Layer	1,800	CY	15.00	27,000
34	Install Geotextile	46,000	SF	2.00	92,000
35	Install 24" Cover Layer	3,600	CY	15.00	54,000
36	Install 6" Topsoil Layer	900	CY	20.00	18,000
37	Backill and Compact Select Fill	20,300	CY	15.00	305,000
38	Hydroseed Cap	1	Acre	2,500.00	3,000
	Subtotal Capital Cost				9,176,400
	Administration and Engineering 25%				2,294,100
	Contingencies 25%				2,294,100
Total Capital Cost					13,764,600
	ANNUAL OPERATION AND MAINTENANCE COST				
39	Annual Groundwater Monitoring		LS		15,000
40	Cap Maintenance		LS		5,000
41	Maintenance of Leachate Collection System		LS		2,000
	Subtotal Operation and Maintenance Cost				22,000
	Contingencies 25%				6,000
	Total Operation Maintenance Cost Present Worth Factor for 30 Years @ 5% = 15.37				28,000
	Total Present Worth of Operation and Maintenance				430,000
	TOTAL COST				14,194,600

Notes:

CF = cubic foot
CY = cubic yard
LF = linear foot
LS = lump sum
SF = square foot
SY = square yard

[1] *3,400 cu. yd soil (Lagoon 7) is assumed to weigh 5,100 tons.

APPENDIX III

ADMINISTRATIVE RECORD INDEX

CARROLL & DUBIES SITE
OPERABLE UNIT ONE
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

1.0 SITE IDENTIFICATION

1.4 Site Investigation Reports

P. 100001 - 100322 Report: Engineering Investigations at Inactive Hazardous Waste Sites in the State of New York, Phase II Investigations, Carroll and Dubies Site, Town of Deerpark, Orange County, New York, prepared by Wehran Engineering, P.C., prepared for Project Sponsors for Submission to Division of Solid and Hazardous Waste, New York State Department of Environmental Conservation, February 1987.

P. 100323 - 100429 Report: Preliminary Investigation of the Carroll and Dubies Site, City of Port Jervis, Orange County, New York, Phase I Summary Report, prepared by Ecological Analysts, Inc., prepared for New York State Department of Environmental Conservation, November 1983.

3.0 REMEDIAL INVESTIGATION

3.3 Work Plans

P. 300001 - 300053 Report: Health & Safety Plan, Remedial Investigation/Feasibility Study, Carroll & Dubies Site, Port Jervis, New York, prepared by Blasland & Bouck Engineers, P.C., January 1991 (Revised June 1991).

P. 300054 - 300250 Report: Quality Assurance Project Plan, Remedial Investigation/Feasibility Study, Carroll & Dubies Site, Port Jervis, New York, prepared by Blasland & Bouck Engineers, P.C., January 1991 (Revised June 1991).

P. 300251 - 300325 Report: Work Plan, Remedial Investigations/ Feasibility Study, Carroll & Dubies Site, Port Jervis, New York, prepared by Blasland & Bouck Engineers, P.C., November 1990.

3.4 Remedial Investigation Reports

P. 300326 - 300762 Report: <u>Source Area Remedial Investigation, Carroll and Dubies Superfund Site, Port Jervis, New York</u>, prepared by Blasland & Bouck Engineers, P.C., December 1993.

P. 300763 - 300948 Report: <u>Preliminary Remedial Investigation Results, Carroll & Dubies Superfund Site, Port Jervis, New York, Volume 1 of 2</u>, prepared by Blasland & Bouck Engineers, P.C., October 1992.

P. 300949 - 301359 Report: <u>Preliminary Remedial Investigation Results, Carroll & Dubies Superfund Site, Port Jervis, New York, Volume 2 of 2</u>, prepared by Blasland & Bouck Engineers, P.C., October 1992.

3.5 Correspondence

P. 301360 - 301361 Letter to Ms. Sharon L. Trocher, Remedial Project Manager, Eastern New York/Caribbean Section I, Region II, U.S. EPA, from Mr. Frederick J. Kirschenheiter, Senior Project Engineer II, Blasland, Bouck & Lee, Inc., re: validated soil data tables from the Supplemental Hydrogeologic Investigation for the Carroll and Dubies Site, January 17, 1994.

P. 301362 - 301362 Letter to Mr. Tyler E. Gass, C.P.G., Vice President, Blasland & Bouck Engineers, P.C., from Ms. Sharon Trocher, Remedial Project Manager, Eastern New York/Caribbean Superfund Section I, Region II, U.S. EPA, re: correction to item 3 of the January 8, 1993 letter from Mr. Gass, January 12, 1993.

P. 301363 - 301365 Letter to Mr. Tyler E. Gass, C.P.G., Vice President, Blasland & Bouck Engineers, P.C., from Mr. Doug Garbarini, Chief, Eastern New York/Caribbean Superfund Section I, Region II, U.S. EPA, re: the New York State Department of Environmental Conservation's and the U.S. Environmental Protection Agency's comments on the December 29, 1992 letter transmitting modifications to the scope of work for supplemental groundwater and on-site soil sampling, January 11, 1993.

P. 301366 - 301368 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., Executive Vice President, Blasland & Bouck Engineers, P.C., re: response to the January 5, 1993 letter from Doug Garbarini and subsequent telephone conversations which have modified some of the items addressed in that particular letter, January 8, 1993.

P. 301369 - 301372 Letter to Mr. Tyler E. Gass, C.P.G., Vice President, Blasland & Bouck Engineers, P.C., from Mr. Doug Garbarini, Chief, Eastern New York/Caribbean Superfund Section I, Region II, U.S. EPA, re: the New York State Department of Environmental Conservation's and the U.S. Environmental Protection Agency's comments on the December 16, 1992 scope of work for the four tentatively identified former lagoons (TIFLs) located adjacent to the Carroll and Dubies property, January 5, 1993. (Attached: Figure 1, New Potential Source Area, Site Map and Proposed Sampling Locations, prepared by Blasland & Bouck Engineers, P.C., October 19, 1992.)

P. 301373 - 301378 Letter to Mr. Doug Garbarini, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., Executive Vice President, Blasland & Bouck Engineers, P.C., re: submission of various documents to Ms. Sharon Trocher regarding the tentatively identified former lagoons (TIFLs), and a response to Attachment 1 of Mr. Garbarini's November 20, 1992 letter entitled, "Additional Issues to be Included in the Supplemental Work Proposed on October 13, 1992", December 29, 1992. (Attached: Figure 1, prepared by Blasland & Bouck Engineers, P.C., (undated).)

P. 301379 - 301383 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., Executive Vice President, Blasland & Bouck Engineers, P.C., re: potential investigation of possible adjacent lagoon area, Carroll and Dubies Site, December 16, 1992. (Attached: Figure 1, New Potential Source Area, Site Map and Proposed Sampling Locations, prepared by Blasland & Bouck Engineers, P.C., October 19, 1992.)

P. 301384 - 301392 Letter to Mr. Tyler E. Gass, C.P.G., Vice President, Blasland & Bouck Engineers, P.C., from Mr. Doug Garbarini, Chief, Eastern New York/Caribbean Superfund Section I, Region II, U.S. EPA, re: response to the October 13, 1992 letter which transmitted the proposed schedule for completing the Remedial Investigation and Feasibility Study (RI/FS) and the proposed scope of supplemental work for the Carroll and Dubies Superfund Site, November 20, 1992. (Attached: 1. Enclosure 1, Report: Additional Issues to be Included in the Supplemental Work Proposed on October 13, 1992; 2. Figure 1, prepared by Blasland & Bouck Engineers, P.C., (undated); 3. Figure 2, Rock Aquifer Monitoring Well, (undated).)

P. 301393 - 301398 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., Executive Vice President, Blasland & Bouck Engineers, P.C., re: Carroll & Dubies Site, Port Jervis, New York, Supplemental Investigation, Scope of Work, October 13, 1992. (Attached: Site Map and Proposed Supplemental Sampling Locations, prepared by Blasland & Bouck, Engineers, P.C., October 6, 1992.)

P. 301399 - 301400 Letter to Ms. Vita DeMarchi, Senior Project Hydrogeologist, Blasland & Bouck Engineers, P.C., from Ms. Sharon Trocher, Remedial Project Manager, Eastern New York & Caribbean Section I, Region II, U.S. EPA, re: response to Ms. DeMarchi's December 6, 1991 letter proposing the analytical parameters for the second round of groundwater samples to be obtained from the Carroll and Dubies Site, December 13, 1991.

P. 301401 - 301403 Letter to Mr. Tyler E. Gass, C.P.G., Project Director, Blasland & Bouck Engineers, P.C., from Ms. Sharon L. Trocher, Remedial Project Manager, Eastern New York and Caribbean Section I, Region II, U.S. EPA, re: summary of the agreement reached between Mr. William McCune and Ms. Sharon L. Trocher during telephone conversations occurring on September 17 and 18, 1991, September 18, 1991.

P. 301404 - 301408 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., Vice President, Blasland & Bouck Engineers, P.C., re: proposed methods of resolving the outstanding concerns raised in Ms. Trocher's letter dated August 21, 1991 and the subsequent meeting of September 5, 1991, September 16, 1991.

P. 301409 - 301410 Memorandum to Mr. Tyler E. Gass, C.P.G., Project Director, Blasland & Bouck Engineers, P.C., and Ms. Debra L. Rothenberg, Esq., Winston & Strawn, from Ms. Sharon Trocher, Remedial Project Manager, Region II, U.S. EPA, re: Carroll and Dubies Site - summary of 9/5/91 meeting, September 9, 1991.

P. 301411 - 301413 Letter to Mr. Tyler E. Gass, C.P.G., Project Director, Blasland & Bouck Engineers, P.C., from Ms. Sharon L. Trocher, Remedial Project Manager, Region II, U.S. EPA, re: concerns of the U.S. EPA and the New York State Department of Environmental Conservation regarding the sampling depth of the sludge samples obtained from lagoons 1 and 2, and the limited recharge rate of monitoring well OW-4, August 21, 1991.

P. 301414 - 301415 Letter to Mr. Tyler E. Gass, C.P.G., Project Director, Blasland & Bouck Engineers, P.C., from Ms. Sharon Trocher, Remedial Project Manager, Eastern New York and Caribbean Section I, Region II, U.S. EPA, re: summary of discussion between Mr. Robert Patchett of Blasland & Bouck Engineers and Mr. Robert Cunningham, an Environmental Protection Agency representative, concerning the development of monitoring wells for the Carroll and Dubies Superfund Site, August 9, 1991. (Attached: Transmission Confirmation Report, August 12, 1991.)

P. 301416 - 301417 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., Vice President, Blasland & Bouck Engineers, P.C., re: an addendum to the Work Plan and Sampling and Analysis Plan (SAP) for the Carroll and Dubies Superfund Site in Port Jervis, New York, August 7, 1991.

P. 301418 - 301419 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., Vice President, Blasland & Bouck Engineers, P.C., re: acknowledgement of U.S. EPA's letter dated July 29, 1991 granting approval for use of mud rotary drilling method during advancement of the boreholes for the till monitoring wells, July 30, 1991.

P. 301420 - 301421 Letter to Mr. Tyler E. Gass, C.P.G., Project Director, Blasland & Bouck Engineers, P.C., from Ms. Sharon Trocher, Remedial Project Manager, Eastern New York & Caribbean Section I, Region II, U.S. EPA, re: approval of the use of mud rotary drilling techniques for the construction of the till monitoring wells, July 29, 1991.

P. 301422 - 301425 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. William T. McCune, Senior Project Geologist II, Blasland & Bouck Engineers, P.C., re: drilling methods considered for use in drilling three glacial till boreholes at the Carroll and Dubies Site in Port Jervis, New York, July 26, 1991.

4.0 FEASIBILITY STUDY

4.3 Feasibility Study Reports

P. 400001 - 400096 Letter to Ms. Sharon Kivowitz, Office of Regional Counsel, U.S. EPA, from Ms. Debra L. Rothberg, Attorney at Law, and Mr. Robert J. Glasser, Gould & Wilkie, re: submission of the Technical Memorandum on behalf of Respondents, Kolmar Laboratories, Inc. and Wickhen Products, Inc., July 18, 1994. (Attached Report: Technical Memorandum, Alternative Remedial Technology Evaluation, Carroll and Dubies Site, Port Jervis, New York, prepared by Remediation Technologies, Inc., prepared for Mr. Robert J. Glasser, Gould and Wilkie, and Ms. Debra L. Rothberg, July 15, 1994.)

P. 400097 - 400113 Report: Technical Memorandum, Carroll & Dubies Site, Port Jervis, New York, prepared by Blasland, Bouck & Lee, Inc., February 1994 (Revised March 1994).

P. 400114 - 400438 Report: Source Area Feasibility Study, Carroll & Dubies Site, Port Jervis, New York, prepared by Blasland, Bouck & Lee, Inc., January 1994 (Revised May 1994; Revised July 1994).

4.6 Correspondence

P. 400439 - 400440 Letter to Ms. Sharon L. Trocher, Remedial Project Manager, Eastern New York/Caribbean Section I, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G, Ph.G., Executive Vice President, Blasland, Bouck & Lee, Inc., re: Carroll & Dubies Site, Port Jervis, New York, Source Area Feasibility Study, June 17, 1994.

P. 400441 - 400446 Letter to Ms. Sharon Trocher, Remedial Project Manager, Eastern New York/Caribbean Section I, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G.S., Executive Vice President, Blasland, Bouck & Lee, Inc., re: Source area feasibility study, Carroll & Dubies Site, Port Jervis, New York, March 23, 1994. (The following are attached: 1. Table 1, Carroll & Dubies Site, Port Jervis, New York, Comparison of Volume of Source Area Materials Above Cleanup Levels Proposed in Source Area Feasibility Study vs. U.S. EPA Proposed Alternative Approaches, (undated); 2. Table 2, Carroll & Dubies Site, Port Jervis, New York, Soil Sample Data Above the Source Area Feasibility Study Inorganic Cleanup Levels but not Above U.S. EPA Alternative Inorganic Cleanup Levels, (undated); 3. Figure 1, Carroll and Dubies Site, Port Jervis, New York, Horizontal and Vertical Extent of Source Area Materials Above Cleanup Levels Using U.S. EPA Alternative 1, prepared by Blasland, Bouck & Lee, Inc., March 1994; 4. Figure 2, Carroll & Dubies Site, Port Jervis, New York, Horizontal and Vertical Extent of Source Area Materials Above Cleanup Levels Using U.S. EPA Alternative 2, prepared by Blasland, Bouck & Lee, Inc., March 1994.)

P. 400447 - 400450 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., Executive Vice President, Blasland & Bouck Engineers, P.C., re: proposed soil cleanup values for priority pollutant inorganics for the Carroll & Dubies Site, November 30, 1993. (Attached: 1. Table 1, Carroll & Dubies Site, Port Jervis New York, Proposed Priority Pollutant Inorganic Cleanup Levels, (undated); 2. Table 2, Carroll & Dubies Site, Port Jervis, New York, Risk-Based Preliminary Remediation Goals (PRGs) for Inorganics in Soils, (undated).)

P. 400451 - 400454 Letter to Ms. Sharon L. Trocher, Remedial Project Manager, Eastern New York/Caribbean Section 1, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., PHg, Executive Vice President, Blasland & Bouck Engineers, P.C., re: addendum to correspondence dated September 24, 1993 pertaining to remedial action objectives, Carroll & Dubies Site, October 1, 1993.

P. 400455 - 400466 Letter to Ms. Sharon Trocher, Eastern New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Mr. Tyler E. Gass, C.P.G., PHg, Executive Vice President, Blasland & Bouck Engineers, P.C., re: proposed approach for establishing cleanup criteria to determine the extent of source area materials that need to be addressed as part of the Carroll & Dubies Site remedy, September 24, 1993. (Attached: 1. Memorandum to Regional Hazardous Waste Remediation Engineers, Bureau Directors, and Section Chiefs, from Mr. Michael J. O'Toole, Jr., Director, Division of Hazardous Waste Remediation, New York State Department of Environmental Conservation, re: division technical and administrative guidance memorandum: determination of soil cleanup objectives and cleanup levels, November 16, 1992; 2. Appendix A, Table 4, Recommended Soil Cleanup Objectives (mg/kg or ppm.) for Heavy Metals, (undated); 3. Conventional Sediment Variables, Total Organic Carbon (TOC), March 1986.)

P. 400467 - 400468 Letter to Mr. Tyler E. Gass, C.P.G., Vice President, Blasland & Bouck Engineers, P.C., from Ms. Sharon L. Trocher, Remedial Project Manager, Eastern New York/Caribbean Section I, Region II, U.S. EPA, re: the development of soil cleanup numbers for the Carroll & Dubies Sewage Disposal Site, May 21, 1993.

7.0 ENFORCEMENT

7.3 Administrative Orders

P. 700001 - 700030 Administrative Order on Consent, in the matter of Kolmar Laboratories, Inc., and Wickhen Products, Inc., Respondents, Index No. II CERCLA - 00202, February 8, 1990. (Attached: 1. Figure 1, Map: Site Location Map, Carroll and Dubies Site, (undated); 2. Appendix II, Outline of Modifications to EPA RI/FS Work Plan, Carroll and Dubies Site, (undated); 3. Map: Field Investigation Location Map, prepared by Blasland & Bouck Engineers, P.C., (undated).)

7.7 Notice Letters and Responses - 104e's

P. 700031 - 700032 Notice letter to Honorable R. Michael Worden, Mayor, City of Port Jervis, from Mr. William McCabe, signing for Mr. George Pavlou, Acting Director, Emergency and Remedial Response Division, Region II, U.S. EPA, re: notification that the City of Port Jervis may be a potentially responsible party of the Carroll & Dubies Superfund Site, April 22, 1993.

P. 700033 - 700037 Notice letter to Messrs Joseph Carroll and Gustave Dubies, Carroll and Dubies Sewage Disposal Facility, Inc., Mr. Adolf A. Maruszewski, President, Kolmar Laboratories, Inc., Mr. Richard G. Holder, President, Reynolds Metal Company, Mr. Jere D. Marciniak, President, Wickhen Products, Inc., from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, Region II, U.S. EPA, re: offer to conduct a remedial investigation and feasibility study at the Carroll & Dubies Superfund Site, September 25, 1989.

8.0 HEALTH ASSESSMENTS

8.1 ATSDR Health Assessments

P. 800001 - 800025 Report: Preliminary Health Assessment for Carroll & Dubies, Port Jervis, Orange County, New York, prepared by New York State Department of Health Under Cooperative Agreement with the Agency for Toxic Substances and Disease Registry, July 31, 1991.

10.0 PUBLIC PARTICIPATION

10.2 Community Relations Plans

P. 10.00001- 10.00027 Report: Community Relations Plan, Carroll and Dubies Sewage Disposal Site, Deerpark, Orange County, New York, prepared by Alliance Technologies Corporation, prepared for U.S. EPA, June 14, 1991.

10.6 Fact Sheets and Press Releases

P. 10.00028- 10.00033 Fact Sheet: Superfund Update, Carroll and Dubies Site, Town of Deerpark, Orange County, New York, Fact Sheet #2, Status of Current EPA Remedial Activities, at the Carroll and Dubies Site, January 1993.

P. 10.00034- 10.00039 Fact Sheet: Superfund Update, Carroll and Dubies Site, Town of Deerpark, Orange County, New York, Fact Sheet #1, EPA to Conduct Investigation of Carroll and Dubies Site, May 1991.

10.10 Correspondence (FOIA)

P. 10.00040- 10.00042 Letter to Ms. Frances Hodson, from Ms. Sharon Trocher, Remedial Project Manager, Eastern New York/Caribbean Section, Region II, U.S. EPA, re: response to Ms. Hodson's March 28, 1994 letter requesting information on the status of the Carroll and Dubies Site, April 22, 1994. (Attached: Letter to Ms. Sharon Trocher, Remedial Project Manager, U.S. EPA, from Ms. Frances Hodson, re: request for information regarding the Carroll and Dubies Superfund Site, March 28, 1994.)

P. 10.00043- 10.00045 Letter to Ms. Frances Hodson, from Mr. Doug Garbarini, Chief, Eastern New York/Caribbean Section I, Region II, U.S. EPA, re: response to Ms. Hodson's September 23, 1992 letter requesting an update on the Carroll and Dubies Superfund Site, November 16, 1992. (Attached: 1. Update for the Carroll and Dubies Superfund Site, November 1992; 2. Letter to Mr. William McCabe, Chief, New York/Caribbean Remedial Action Branch, Region II, U.S. EPA, from Ms. Frances Hodson, re: request for information regarding the Carroll and Dubies Superfund Site, September 23, 1992.)

P. 10.00046- 10.00047 Letter to Ms. Frances J. Hodson, from Ms. Sharon Trocher, Eastern New York/Caribbean Section I, Region II, U.S. EPA, re: response to Ms. Hodson's November 12, 1991 letter concerning the status of the Carroll and Dubies Superfund Site, November 17, 1991. (Attached: Letter to Ms. Sharon Trocher, Remedial Project Manager, Eastern New York/Caribbean Section I, Region II, U.S. EPA, re: request for information regarding the Carroll and Dubies Superfund Site, November 12, 1991.)

CARROLL & DUBIES SITE
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4.0 FEASIBILITY STUDY

4.6 Feasibility Correspondence

P. 400469 - 400474 Fax transmittal to Ms. Sharon Trocher, Remedial Project Manager, U.S. EPA, Region II, from K. Jones, Remediation Technologies Incorporated, re: Cost Estimates for Modified Remedial Alternatives, plus LTTD, August 3, 1994. (Attached: Cost Estimates for Modified Remedial Alternatives, (undated).

10.0 PUBLIC PARTICIPATION

10.9 Proposed Plan

P. 10.00048- 10.00059 Plan: Superfund Proposed Plan, Carroll and Dubies Sewage Disposal Inc., Town of Deerpark, Orange County, New York, prepared by U.S. EPA, Region II, August 4, 1994.

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4.0 FEASIBILITY STUDY

4.2 Feasibility Study Work Plans

P. 400475 - 400495 Plan: Vapor Extraction and Bioslurry Treatability Investigation Workplan, Carroll and Dubies Site, Port Jervis, New York, prepared for Mr. Robert J. Glasser, Gould and Wilkie, and Ms. Debra L. Rothberg, Periconi & Rothberg, P.C., prepared by Remediation Technologies, Inc., July 25, 1994.

4.3 Feasibility Study Reports

P. 400496 - 400513 Letter to Ms. Sharon Trocher, Carroll and Dubies Site Project Manager, U.S. EPA, from Ms. Brenda B. McDevitt, Environmental Scientist, Remediation Technologies, Inc., and Ms. Barbara H. Jones, Project Engineer, Remediation Technologies, Inc., re: Addendum to Treatability Study Report, November 8, 1994. (Attached report: Addendum to: Technology Evaluation Laboratory Treatability Study, Carroll and Dubies Superfund Site, Final Report (October 10, 1994.), November 8, 1994.

P. 400514 - 400539 Report: Cost Estimates for Modified Remedial Alternatives, prepared for Mr. Robert J. Glasser, Gould and Wilkie, and Ms. Debra L. Rothberg, Periconi & Rothberg, P.C., prepared by Remediation Technologies, Inc., October 13, 1994.

P. 400540 - 400675 Report: Technology Evaluation Laboratory Treatability Study, Carroll and Dubies Superfund Site, Final Report, prepared for Mr. Robert J. Glasser, Gould and Wilkie, and Ms. Debra L. Rothberg, Periconi & Rothberg, P.C., prepared by Remediation Technologies, Inc., October 10, 1994.

4.6 Correspondence

P. 400676 - 400681 Letter to Mr. Doug Garbarini, Carroll and Dubies Site Contact, U.S. EPA, from Ms. Brenda B. McDevitt, Environmental Scientist, Remediation Technologies, Inc., and Mr. Kevin R. Jones, Associate, Remediation Technologies, Inc., re: ARARs Summary, December 21, 1994. (Attached: Table 2-1, Carroll and Dubies Site, Port Jervis, New York, Action-Specific ARARs, undated.)

P. 400682 - 400684 Letter to Ms. Sharon Trocher, Carroll and Dubies Site Project Manager, U.S. EPA, from Ms. Brenda B. McDevitt, Environmental Scientist, Remediation Technologies, Inc., re: Cost Estimate for Off-Site Incineration of Lagoon 7 Material, December 9, 1994. (Attached: 1. Table 2-1A, Carroll & Dubies Site, Port Jervis, New York, Detailed Cost Estimate, Slurry Treatment for Lagoon 7 Soil, undated; 2. Table 2-1B, Carroll & Dubies Site, Port Jervis, New York, Detailed Cost Estimate, Incineration for Lagoon 7 Soil, undated.)

10.0 PUBLIC PARTICIPATION

10.4 Public Meeting Transcripts

P. 1000060 - 1000157 Transcript: "Public Meeting for the Carroll and Dubies Superfund Site, Port Jervis, New York," transcribed by Rockland and Orange Reporting, transcribed on August 23, 1994.

10.9 Proposed Plan

P. 1000158 - 1000169 Report: Superfund Proposed Plan, Carroll and Dubies Sewage Disposal Inc., Town of Deerpark, Orange County, New York, prepared by U.S. EPA - Region II, August 1994.

<u>APPENDIX IV</u>

STATE LETTER OF CONCURRENCE

-CBYMCCABL
-ORIGINAL FILE

Doug John

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road, Albany, New York 12233

Langdon Marsh
Commissioner

JAN 30 1995

Ms. Kathleen Callahan
Director
Emergency & Remedial Response Division
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10278

Re: Carroll & Dubies Site ID No. 336015
Record of Decision

Dear Ms. Callahan:

The New York State Department of Environmental Conservation (NYSDEC) has reviewed the Record of Decision (ROD) for Operable Unit 1 of the Carroll & Dubies site, which addresses the source areas (lagoons and surrounding impacted soil). Alternative number 5 as described in the ROD is NYSDEC's preferred alternative, which is also the USEPA's preferred option. NYSDEC concurs with the ROD as written.

Please call Victor Cardona at (518) 457-3976 with any questions you may have.

Sincerely,

Ann Hill DeB

Ann Hill DeBarbieri
Deputy Commissioner
Office of Environmental Remediation

APPENDIX V

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

CARROLL AND DUBIES SUPERFUND SITE

RESPONSIVENESS SUMMARY

CARROLL AND DUBIES SEWAGE DISPOSAL INC. SITE

INTRODUCTION

A responsiveness summary, required by the National Contingency Plan (NCP) at 40 CFR §300.430 (f)(3)(F), provides a summary of public comments and concerns received during the public comment period, and the United States Environmental Protection Agency's (EPA's) and the New York State Department of Environmental Conservation's (NYSDEC's) responses to those comments and concerns. All comments summarized in this document have been considered in EPA's and NYSDEC's final decision for selection of a remedial alternative for the Carroll and Dubies Sewage Disposal Inc. site (the site).

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

The Remedial Investigation and Feasibility Study (RI/FS) reports and the Proposed Plan for the site were made available for public review on August 4, 1994. The documents were placed in information repositories located at the Deerpark Town Hall, Drawer A, Huguenot, New York and the EPA Document Control Center, 26 Federal Plaza, Room 2900, New York, New York, and the Proposed Plan was mailed to all names on EPA's community relations mailing list. A public meeting was held at the Port Jervis High School on August 23, 1994, to discuss the results of the RI/FS, to present EPA's preferred remedial alternative and to provide an opportunity for the interested parties to present oral comments and questions to EPA on the Proposed Plan for remediation of the site. A period for public review and comment on these documents was held from August 4, 1994 to September 2, 1994.

The notice of the public meeting and the availability of the above-referenced documents appeared in The Times Herald Record on August 15, 1994.

Attached to the Responsiveness Summary are the following Appendices:

- o Appendix A - Proposed Plan,
  Carroll and Dubies Sewage Disposal Inc.
  Town of Deerpark,
  Orange County, New York
- o Appendix B - Public Notice
- o Appendix C - August 23, 1994 Public Meeting
  Attendance Sheet

SUMMARY OF COMMENTS AND RESPONSES

The following section is a summary of comments and questions received from the public, with EPA's responses. The comments provided below are a summary of statements made at the public meeting and written comments received during the public comment period. In several cases, the responses provided at the meeting have been supplemented with additional information.

Comments Regarding the Nature and Extent of Contamination

1. **COMMENT:** A resident requested that the existing results of the groundwater sampling conducted at the site be summarized. The resident was also interested in the location and depth of the monitoring wells, as well as any plans to install monitoring wells further downgradient of the existing monitoring wells.

   EPA RESPONSE: It should be noted that the groundwater contamination will be addressed in operable unit II, as such the groundwater investigation is not yet complete. A significant amount of data have already been generated from the on-going investigation. During 1991 and 1993, groundwater samples were collected from monitoring wells located within approximately 150 feet of the lagoons at the site and were analyzed for organic and inorganic compounds. (Refer to Figure 3 contained in the Record of Decision (ROD) for the location of the monitoring wells.) Results can best be described relative to lagoons 1 through 4 and 6 through 8. (Lagoon 5 is not considered here since it contained tires and not industrial wastes.) Results indicated that organic compounds (benzene, 1,2-dichloroethene, tetrachloroethene and trichloroethene) were detected above drinking water standards in the groundwater samples collected from the monitoring wells located nearest to lagoons 1 through 4 (e.g., MW-4, OW-2, OW-3), but were detected at or near the State or Federal drinking water standards in the groundwater samples collected from the wells located furthest from lagoons 1 through 4 (e.g., OW-5, OW-6, OW-7 and OW-8). During the 1993 sampling event, inorganic compounds were detected at or near the drinking water standards. Based on the results of this sampling, the horizontal extent of the groundwater contamination plume was determined to extend no farther than approximately 150 feet downgradient of lagoons 1 through 4.

   Benzene, chromium, lead and nickel were the primary contaminants detected in the groundwater samples collected from monitoring wells located downgradient of lagoons 6, 7 and 8 (e.g., OW-9 through OW-13). These contaminants were detected above drinking water standards. Since contaminants were detected above the drinking water standards in the furthest downgradient monitoring wells, it is evident that a plume extends beyond the existing monitoring wells. In August and September of 1994, additional monitoring wells were installed (not shown in Figure 3) and groundwater samples were collected to determine the extent of the groundwater contamination plume. These monitoring wells extended as far as the downgradient edge of the City of Port Jervis landfill (approximately 1,000 feet from the site). Additional monitoring wells will be installed if the results of the recent sampling indicate that the site groundwater contamination plume extends beyond the downgradient edge of the landfill. A RI report which summaries the groundwater sampling data from the site is expected to be completed in mid 1995, while a Proposed Plan which addresses the groundwater at the site is expected to be completed shortly thereafter.

The materials encountered underlying the site consist of glacially derived unconsolidated materials (e.g., sand, gravel and clay) underlain by consolidated bedrock. The glacially derived materials consist of two distinct units, a glacial till unit overlain by glacial outwash deposits. The monitoring wells installed during 1991 and 1993 monitor the bedrock, the glacial till, the glacial outwash or both the glacial till and outwash units. The monitoring wells installed in 1994 primarily monitor the water table. The deepest monitoring well at the site is located in the bedrock and is approximately 87 feet below ground surface.

2. **COMMENT:** One commenter questioned whether EPA had overestimated the depth to groundwater at the site (30 to 40 feet). The commenter has installed shallow wells at less than 25 feet on Route 209 in Hugenot.

   EPA RESPONSE: The depth to groundwater varies significantly in the vicinity of the site. Along the southeastern boundary of the site, the depth to groundwater from ground surface ranged from approximately 30 to 40 feet. Whereas, approximately 1000 feet from the site (towards Gold Creek) the depth to groundwater from ground surface ranged from 10 to 20 feet. The reduction in depth to groundwater is due to the proximity to the Creek. The water table is located at a shallower depth near the Creek since groundwater is discharging into it.

3. **COMMENT:** A resident asked whether residential wells in the area would be tested.

   EPA RESPONSE: The New York State Department of Health (NYSDOH) has sampled a few private wells near the site along Route 209. NYSDOH did not detect contaminants above drinking water standards in any of the wells tested. During the August 23, 1994 public meeting, NYSDOH indicated that they would sample residential wells located a reasonable distance from the site if so requested by the property owners.

<u>Comments Regarding the Evaluation of Remedial Alternatives and the Preferred Alternative</u>

4. **COMMENT:** Commenter objected to burning contaminated soil at the site and to any process that would release contaminants into the ambient air. (One commenter agreed that, all things considered, Alternative 5 is the best alternative.) Commenters wanted to know where the contaminants that were removed from the soil during the low-temperature thermal desorption (LTTD) process ended up. These commenters were concerned that the thermal inversions which frequently occur in the Neversink Valley would inhibit dispersion of the air emissions released during the remediation process, affecting the nearby residents and school children.

   EPA RESPONSE: In addition to the factors set forth in the <u>Summary of Comparitive Analysis of Alternatives</u> Section of the ROD, the significant public opposition to the use of any type of on-site thermal treatment unit has been taken into consideration in selecting the remedy. As noted in the ROD, the remedy has been modified from that proposed in the Proposed Plan (see Public Acceptance and Documentation of Significant Changes sections of the Decision Summary.) Nonetheless, in response to the question, it should be noted that the thermal desorption process described in Alternative 5 is not incineration, since the destruction of organic contaminants is not the desired result. Thermal desorption is a process that uses either an indirect or direct heat exchange to heat organic contaminants to a temperature high enough to volatilize and separate them from the contaminated soil. Air or an inert gas is used as the transfer medium for the vaporized components. Thermal desorption systems are physical separation processes, that transfer contaminants from one phase to another, and are not designed to provide high levels of organic destruction. As the soil is heated, the contaminants reach their respective boiling points, vaporize, and then become part of the gas stream which flows through the air pollution control equipment.

   In evaluating the alternatives, it was anticipated that any LTTD unit utilized at the site would be capable of treating all the soil and sludge contaminated with organic compounds in less than one year. Thermal desorption units have extensive air pollution control systems which would comply with all State and Federal air pollution control regulations. Two different types of LTTD units, an anaerobic thermal processor (ATP) and a typical screw LTTD were considered. Flue gases from the ATP are extensively treated prior to discharge. Treatment is by (1) cyclone and baghouse for particle removal, (2) wet scrubber for removal of acid gases, and (3) carbon adsorption bed for removal of trace organic compounds. The screw-type LTTD unit uses condensation and carbon adsorption to treat flue gases. The air pollution control equipment associated with the LTTD can achieve greater than 99 percent removal efficiencies. The purpose of the separation process is to obtain a significantly reduced volume of waste that can be treated on-site or sent off-site for treatment and/or disposal. The spent carbon would be regenerated off-site. Particulates that are collected in the baghouse and cyclone are recycled back to the LTTD unit or blended with the treated soil.

5. **COMMENT:** One commenter asked whether LTTD was the same process included in a 1991 proposal to burn contaminated soil in an area near the site. The proposal was withdrawn since the residents were opposed to burning contaminated soil.

   EPA RESPONSE: It is EPA's understanding from the discussion at the meeting, that the 1991 proposal included high temperature combustion i.e, incineration. As noted above, the LTTD process is not an incineration process.

6. **COMMENT:** A resident asked whether the LTTD process would comply with provisions contained in the Town of Deerpark Zoning law which prohibit the use of any equipment which involves the burning or incineration of garbage or solid waste.

   EPA RESPONSE: EPA and NYSDEC believe that the LTTD units would comply with the Town of Deerpark Zoning law since they are physical separation systems and are not designed to incinerate or decompose the organic contaminants. Refer to response #4 for a further discussion on the LTTD unit.

7. **COMMENT:** A representative of Clean Earth of New York, Inc. (CENY) stated that it currently operates a mobile thermal treatment unit and expects a permit to operate a stationary thermal treatment unit by October 1994. CENY presented the option of treating the contaminated materials off-site at its stationary soil remediation facility instead of on-site as proposed by EPA.

   EPA RESPONSE: The off-site treatment and disposal of the contaminated soil was evaluated. It was determined that the on-site treatment of the contaminated soils was protective of human health and the environment, will comply with applicable or relevant and appropriate requirements (ARARs), will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, meets the statutory preference for treatment, and was much less expensive than treating and disposing of the materials off-site. The selected remedy calls for on-site treatment of the source area materials utilizing ex-situ vapor extraction, bioslurry, and solidification/ stabilization; on-site LTTD was removed from consideration as an option for treatment of the source area materials in the selected remedy. However, as noted in the contingency remedy, if it is determined that the combination of ex-situ vapor extraction and bioslurry will not effectively treat the lagoon 7 materials, then the contingency remedy will need to be implemented. The contingency remedy would require that the lagoon 7 materials be sent off-site for treatment (as necessary) prior to disposal in accordance with Land Disposal Requirements (LDRs). The contingency remedy does not specify the type of treatment to be used in treating the lagoon 7 materials (although incineration was utilized for developing a conservative cost estimate), so long as LDRs are achieved. Therefore, if the contingency remedy is implemented, it is possible that some or all of the lagoon 7 materials could be treated off-site via LTTD.

8. **COMMENT:** A commenter asked why Alternative 6 wasn't the preferred remedial alternative since it is permanent, provides the greatest protection, transports the contaminated soil to a facility which specializes in handling this kind of waste, and avoids on-site containment of lagoon material at a site where the water table is located not far from the ground surface. The commenter also asked whether cost is the deciding factor in selecting Alternative 5 as the preferred remedy over Alternative 6.

   EPA RESPONSE: Each of the proposed remedial alternatives was assessed utilizing the nine evaluation criteria set forth in the NCP. The primary criteria that must be satisfied by any alternative are: 1) overall protection of human health and the environment and 2) compliance with ARARs. The remaining seven criteria: 1) long-term effectiveness and permanence, 2) reduction of toxicity, mobility or volume, 3) short-term effectiveness, 4) implementability, 5) cost, 6) State acceptance, and 7) community acceptance are used to make comparisons and to identify the major trade-offs between alternatives. The cost of the alternative is considered only after it has been determined that the remedy would be protective of human health and the environment and meet ARARs.

Although Alternative 6 would provide the greatest protection to human health and the environment in the vicinity of the site, Alternative 5 is considered to be fully protective of human health and the environment. The selected remedy (Alternative 5) protects human health and the environment through the permanent removal of organic contaminants from soils containing levels of organic contaminants in excess of the treatment standards set forth in the Decision Summary; the immobilization of the concentrated inorganic contaminants that fail the RCRA TCLP for inorganic constituents, and the placement of the source area materials into a lined and capped containment cell with a leachate collection system. Both of these alternatives satisfy the primary criteria and are similar in their abilities to satisfy the other criteria with the exception of cost. Therefore, cost was the deciding factor in selecting Alternative 5 as the preferred alternative over Alternative 6.

The depth to groundwater at the site is deep enough to allow the installation of a lined containment cell above the water table while maintaining a sufficient protection zone. The depth to groundwater from ground surface ranged from approximately 30 to 40 feet along the southeastern boundary of the site. Along the northwestern boundary of the site, the water table was not encountered before bedrock was reached.

9. **COMMENT:** A resident questioned whether the long-term effectiveness of stabilization/solidification had been demonstrated for immobilizing organic and inorganic contaminants.

EPA RESPONSE: The long-term effectiveness of immobilizing organic contaminants through stabilization/solidification has not been demonstrated. However, stabilization/solidification is not being used to immobilize the organic contaminants. The organic contaminants will be removed from the source area materials via ex-situ vapor extraction or in the case of lagoon 7 materials via a combination of ex-situ vapor extraction and bioslurry. Stabilization/solidification will only be utilized to immobilize the inorganics. The long-term effectiveness of stabilization/solidification has been demonstrated for immobilizing inorganic contaminants.

It should be noted that the selected remedy contains redundancy in the treatment system to protect human health and the environment. The mobility of organic contaminants from the more highly contaminated source areas will be reduced through treatment via ex-situ vapor extraction and bioslurry, and placement into a lined and capped containment cell. The mobility of inorganic contaminants will be reduced through stabilization/solidification and/or placement into a lined and capped containment cell. Additionally, the containment cell will be sloped to a well where any leachate (if generated) from the source area materials will be collected. A groundwater monitoring program will also be implemented to monitor the groundwater (although it is unlikely that any appreciable amount of contamination could migrate to the groundwater from these materials).

10. **COMMENT:** A resident asked if it wouldn't be cheaper in the long run to treat and dispose of the waste off-site, since we may learn later that what appears to be a permanent solution for addressing the waste is not. The resident indicated that the deposition of the industrial waste in the ground at the site was deemed acceptable at the time of deposition; however, we are currently examining alternatives to remediate this same waste.

EPA RESPONSE: At the time of the original disposal of this material, there were no safeguards in place to ensure that the materials did not leach. Alternative 5 permanently removes organic contaminants from source area materials through ex-situ vapor extraction and bioslurry, reduces the mobility of inorganic contaminants through stabilization/solidification and further reduces the mobility of the organic and inorganic contaminants through placement of source area materials in an on-site lined containment cell with a cap and a leachate collection system. Both ex-situ vapor extraction and bioslurry, and stabilization/solidification are proven technologies for removing organic contaminants and immobilizing inorganic contaminants, respectively. A proven technology is a technology for which there is extensive experience available demonstrating its effectiveness. Additionally, further treatability studies will be conducted to ensure that these technologies will effectively treat the on-site contaminants. The on-site containment cell is also a proven technology for reducing the migration of contaminants, and it provides redundancy in the treatment system for the protection of the groundwater. After thoroughly evaluating the various alternatives for addressing the contamination at the site, EPA believes that Alternative 5 provides a technically sound solution for treating the waste.

EPA and DEC do have particular concerns regarding the ability to effectively treat the lagoon 7 materials. As such, a contingency remedy has been selected in the event ex-situ vapor extraction and bioslurry cannot effectively treat the complex mixture of contaminants in lagoon 7; the contingency remedy requires that the materials be sent off-site for treatment (as necessary) to comply with LDRs prior to off-site disposal.

11. **COMMENT:** A resident asked why the slurry cut-off wall proposed in Alternative 3 was not included in Alternatives 4 or 5.

EPA RESPONSE: Under Alternative 3, a cap and slurry cut-off wall would be utilized to minimize the migration of leachate from the untreated contaminated source area materials into the surrounding soils and groundwater. The cap restricts the infiltration of rainwater through the impacted soils and sludges. The slurry cut-off wall is a vertical wall constructed by filling excavated vertical trenches with low permeable material which minimizes the migration of leachate from the impacted soils and sludges into the surrounding soils and groundwater. Alternatives 4 and 5 would curtail the migration of contaminants through treatment of the source area materials (stabilization/solidification under Alternative 4 and ex-situ vapor extraction and bioslurry, and stabilization/solidification under Alternative 5) and through placement of the materials in an on-site lined containment cell with a cap and leachate collection system. Therefore, a slurry wall would not be needed under Alternatives 4 or 5.

12. **COMMENT:** In reference to the preferred alternative, a resident requested information regarding the location of the containment cell, whether the cap would be extended over all the lagoons, and whether the containment cell would leak.

EPA RESPONSE: It is anticipated that the source area materials will be consolidated to reduce the size of the cap and that the cap will be installed in the area of lagoons 1 and 2. The actual location and size of the containment cell will be determined during the design phase.

If leaks develop in the liner, it is unlikely that this would result in significant degradation of the groundwater. This is because prior to the source area materials being placed into the lined cell, the more contaminated source area materials will be treated via one or more of the following treatment processes: ex-situ vapor extraction, bioslurry and solidification/stabilization. In addition, a cap will be installed over the lined cell. The cap will reduce the migration of untreated contaminants in the cell to the groundwater by restricting the percolation of rainwater through the source area materials. The containment cell will also be sloped to a well where any leachate, if generated, will be collected. Finally, a groundwater monitoring program will be implemented under the groundwater operable unit.

13. **COMMENT:** One commenter felt that the most economical approach for implementing the preferred alternative would be to locate a single centrally located cell large enough to hold the 20,300 cubic yards of contaminated material. The commenter believed that the cap should extend well past the containment cell and over all the lagoons as well. The commenter would like the cap to be keyed into the bottom cliff bedrock to the northwest, so that no runoff penetrates underneath the lagoons or the containment cell. The commenter believed this would minimize the future leaching of pollutants into the groundwater and could possibly reduce the amount of soil that would be subjected to the thermal desorption. The commenter also believed that the minimum temperature used in the thermal desorption should be increased considerably; suggesting that the minimum of 200°F given in the proposed plan would be too low to boil off all the water, and would not vaporize many oily organics.

EPA RESPONSE: EPA also believes that the best approach would be to consolidate the source area materials into a single containment cell and is pursuing this approach. It is difficult to determine whether keying the cap into the bedrock would provide any additional benefits beyond those afforded from a typical cap design; this approach could present problems which would not be encountered with a standard design. For instance, the presence of fractured bedrock would prevent a good seal and could create movement along the interface of the liner and the cap, resulting in runoff entering the containment cell. Typical ways to prevent runoff from entering the containment cell is through joining the liner and the cap (e.g., heat bonding) or by overlapping the cap over the liner. Additionally, the drainage layer which is one of the layers of the cap and the drainage system (e.g., trench around the perimeter of the cap) diverts runoff away from the containment cell. The location, size and other design details of the containment cell will be determined during the remedial design of the remedy.

As noted above, the selected remedy does not incorporate LTTD. In any case, EPA agrees that if LTTD had been selected as the treatment process, the temperature of the soils would have to be heated above 200°F to remove organic contaminants to attain the cleanup standards established for the site. The 200°F was given as the bottom end of the range to which soils are heated in LTTD units. The upper end of the range provided in the Proposed Plan was 1200°F.

14. **COMMENT:** A resident questioned how bioslurry treatment would work and whether it is a proven technology.

EPA RESPONSE: In bioslurry treatment, the contaminated soil is mixed with water to form a slurry which is fed to a bioreactor. Air and nutrients are added to the bioreactor to promote aerobic microbial activity. Certain microorganisms can digest organic substances that are hazardous to humans. Microorganisms digest organic substances for nutrients and energy thereby breaking down hazardous substances into less toxic or nontoxic substances. Bioslurry treatment has been used successfully at other sites for the treatment of contaminated soil. The success of bioremediation depends on the types and mixture of contaminants present, the type of soil and other soil conditions at the site.

15. **COMMENT:** One commenter questioned whether bioremediation is applicable to a 20 year old toxic site that contained everything from batteries to cosmetic dyes and anti-perspirant chemicals. The commenter pointed out that microbes are selective about what chemicals they degrade and bioremediation would be more appropriate for a site that has a single contaminant. The commenter also raised the concern that the contaminants at the site may be too toxic for the microorganisms.

EPA RESPONSE: Although a single contaminant that readily biodegrades would be preferable for bioremediation, bioremediation can occur under conditions where there are multiple contaminants. Microorganisms are selective about what chemicals they degrade. However, there is usually more than one type of microorganism found in a given soil. The growth of microorganisms can be stimulated to accelerate bioremediation by adjusting soil conditions such as temperature, pH, and oxygen and nutrient content. Therefore, bioremediation can work at an old hazardous waste site that contains everything from batteries (batteries were not detected in the lagoons at the site) to cosmetic dyes and anti-perspirant chemicals. However, the soil would require pretreatment. Pretreatment would include removing large objects, such as batteries, if they were present. Additionally, if the contamination level is too toxic for the microorganisms, pretreatment would also be necessary to reduce the toxicity of the soil. For instance, if the levels of volatile organic contaminants were unfavorable for sustaining microorganisms, air could be drawn through the soil to vaporize and remove volatile organic contaminants present in the soil to nontoxic levels prior to implementing bioremediation. It is for this reason that ex-situ vapor extraction will be utilized to treat the lagoon 7 materials prior to their treatment via bioslurry.

16. **COMMENT:** Two of the potentially responsible parties (PRPs) believe that vapor extraction and bioslurry treatment are alternatives to LTTD that will achieve the same remedial objectives as LTTD and will satisfy the nine Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) evaluation criteria as well as, or better than, LTTD. The two PRPs submitted preliminary test results to demonstrate the capability of vapor extraction and bioslurry in reducing the concentration of organic contaminants in the soil.

The two PRPs believe that vapor extraction and bioslurry technologies have been successfully demonstrated for actual site source area materials; whereas, the treatability study for LTTD encountered both treatment and implementation problems. The problems encountered included: 1) the sludge matrix did not reach the target treatment temperature due to the high moisture content in the sludge and 2) the thermally treated sludge could not be solidified due to the characteristics of the material. The two PRPs believe that selection of LTTD is not supportable given the existing treatability information on the site source area materials.

The two PRPs also indicated that additional support for the selection of soil vaporization and bioslurry technologies in lieu of LTTD is provided by USEPA guidance. Vapor extraction is one of the presumptive remedies for the treatment of organics in soils (USEPA, 1993; OSWER Directive 9355.048FS). In addition, bioslurry represents one of the proven treatment technologies for organic impacted soils that are subject to land disposal restrictions (Federal Register, Vol. 58, No. 176).

EPA RESPONSE: Although additional treatability studies are warranted to demonstrate the effectiveness of each of the Alternative 5 treatment options, EPA believes that each of the options could effectively treat all but the lagoon 7 materials.

A combination of physical and chemical factors make the lagoon 7 materials highly problematic to treat: the materials have a high clay and moisture content, and significant concentrations of both volatile and semivolatile organic compounds. As a result, none of the Alternative 5 processes, in and of themselves, appear to be particularly well suited for implementation at the site. While it is believed that lagoon 7 materials that are processed through the LTTD could be treated to remedial action objectives, EPA agrees that treatability studies have indicated that commonly used LTTD units could experience significant materials handling problems while processing the lagoon 7 materials; prior to implementing LTTD, additional treatability studies would be required to assure that such material handling problems could be addressed/minimized e.g., via blending the material with additives, or utilization of an LTTD unit better designed to handle such problems. Ex-situ vapor extraction is likely to be effective in handling the volatile fraction of contaminants in the lagoon 7 materials, however, it would not likely be effective at treating the semi-volatile fraction. Bioslurry, on the other hand, would be expected to be effective in handling the semivolatile fraction of the lagoon 7 materials. Therefore, it appears as though use of ex-situ vapor extraction for treatment of volatiles, and subsequent treatment of semivolatiles with bioslurry, would be the most implementable combination of treatment options under Alternative 5; this combination would avoid the material handling problems which would be expected to be encountered with LTTD. Based upon this assessment, and the significant public comment opposed to the use of any type of on-site thermal treatment unit, the bioslurry and ex-situ vapor extraction options of Alternative 5 were specified as the treatment options to be implemented in the selected remedy; the LTTD option was specifically excluded from the selected remedy.

Comments Regarding Site Risks

17. **COMMENT:** A resident asked for a summary of the results of the risk assessment conducted at the site.

EPA RESPONSE: A baseline risk assessment was conducted using the soil data associated with lagoons 1 through 4. Baseline risk assessments estimate the human health risk which could result from the contamination at the site, if no remedial action were taken. The baseline risk assessment addressed the potential risk to human health by identifying potential exposure pathways by which the public might be exposed to contaminant releases at the site under current and future land-use conditions. The exposure pathways evaluated under the current land-use conditions included exposure to trespassers through ingestion, inhalation and dermal contact of soils and sludges. When considering future land use, the exposure pathways included the ingestion, inhalation and dermal contact of soils and sludges by hypothetical construction workers. Because the site is surrounded by a cliff, a landfill and a quarry, future residential use of the property was not considered as a reasonable scenario.

The results of the baseline risk assessment indicated that the soils and sludges associated with lagoons 1 through 4 pose an unacceptable noncarcinogenic risk for hypothetical construction workers at the site. The primary contributor to the unacceptable noncarcinogenic risk is chromium-containing dust which could be inhaled during excavation activities. The risk assessment indicated that there are no unacceptable noncarcinogenic risk to trespassers; nor were there any unacceptable carcinogenic risks under any of the scenarios evaluated.

The risk assessment was prepared before the analytical data associated with lagoons 6 through 8 were available. Therefore, only the data collected from lagoons 1 through 4 during July and September 1991 were used in the risk assessment. A separate risk assessment was not prepared for lagoons 6 through 8 since it was anticipated that remedial action would be taken at these lagoons due to the levels of contaminants found, the presence of hazardous waste and cross media impacts to groundwater. Higher baseline risk levels would be expected if the analytical soil data from lagoons 6, 7 and 8 were included in the risk assessment. A risk assessment to identify the potential risk to human health through groundwater pathways will be prepared as part of the RI for the groundwater; it is anticipated that the RI will be released to the public in the summer of 1995.

18. **COMMENT:** A Town official asked whether the recreational use of the towpath which forms the southeast border of the site would result in exposure to site contaminants. He indicated that the towpath has been designated to become a multiple use pathway across the County.

EPA RESPONSE: The results of the baseline risk assessment indicated that there are no unacceptable carcinogenic or noncarcinogenic risk to trespassers. The remedial alternative that was selected for the site eliminates the pathway for exposure to site contaminants by trespassers through the treatment of the contaminated source area materials and the placement of the source area materials into an on-site lined containment cell with a cap.

19. **COMMENT:** A resident asked whether it is better to leave the contaminants in the soil to migrate to the groundwater or to release the contaminants into the ambient air. The resident indicated that he drinks six glasses of water a day while he breathes twenty or thirty times a minute.

EPA RESPONSE: Neither is preferable. The selected alternative will reduce the toxicity, mobility and volume of contaminants in the soil via treatment. As an added measure of safety, the source area materials will be placed in a lined cell to minimize the potential for the remaining low level contamination to migrate into the groundwater. Measures will be taken during the implementation of the remedy, to ensure that releases of contaminants into the air are insignificant. EPA believes that implementation of the selected remedy will be fully protective of human health and the environment over the short and long-term.

20. **COMMENT:** A resident asked if excavation of the soil under the preferred alternative would continue down to the bedrock and if not, whether contaminated soil would be left at the site.

EPA RESPONSE: All lagoon materials are to be excavated for treatment and/or placement into an on-site containment cell. The NYSDEC TAGM soil cleanup levels for organic compounds were utilized to derive excavation levels which will be used to determine the volume of soils impacted by the lagoon materials, that also require excavation for treatment and/or containment. The TAGM soil cleanup levels are objectives which were established by NYSDEC and are conservatively set at concentrations that are protective of human health and groundwater quality. Therefore, contaminants of concern (COCs) were selected for comparison to the NYSDEC TAGM levels based on: their mobility (propensity to migrate from the soil to the groundwater); their frequency of detection in the soil and in the groundwater, and their concentration level. The organic indicator COCs and their excavation levels are as follows:

Table 1
Excavation Criteria for Organic Compounds

Indicator COCs	Excavation Level (ppm)
Benzene	0.06
1,2-Dichlorobenzene	7.9
1,4-Dichlorobenzene	6.0
Di-n-butylphthalate	8.1
Naphthalene	13.0
Tetrachloroethene	1.4
Toluene	1.5
Trichloroethene	1.0

The excavation criteria for the inorganic contaminants was determined utilizing the highest levels of indicator contaminants (chromium and nickel) detected in the background soil samples collected from the site. The highest levels of chromium and nickel detected in background samples were 61.9 parts per million (ppm) and 36.7 ppm, respectively. Soil that has contaminants above the levels listed in Table 1 or levels above the highest background level for chromium and nickel will require excavation. Therefore, only soils below the excavation criteria will remain on-site without being treated or placed into an on-site containment cell. EPA and NYSDEC believe that these excavation criteria will be fully protective of human health and the environment.

Comments Regarding Funding of Remedial Alternatives, Timeframes for Implementing the Site Cleanup and Enforcement

21. COMMENT: A resident wanted to know the potentially responsible parties (PRPs) for the site and which of the PRPs had funded the remedial investigation to date. (Note: PRPs are companies or individuals who are potentially liable under CERCLA for the costs of responding to the release and threat of release of hazardous substances at and from a site)The resident also wanted to know the extent of participation by the City of Port Jervis in the investigation of the site.

EPA RESPONSE: The five PRPs for the site are: 1) Carroll and Dubies Sewage Disposal, Inc., 2) Kolmar Laboratories, Inc., 3) Wickhen Products, Inc., 4) Reynolds Metals Company, and 5) the City of Port Jervis. In September 1989, all the PRPs, with the exception of the City of Port Jervis were provided an opportunity to fund and/or perform the RI/FS for the site. The City of Port Jervis was not offered an opportunity to participate in the RI/FS since it was not determined that it was one of the owners of the site property until February 1993, well after the RI/FS was underway. To date, the extent of participation in the RI/FS by the City of Port Jervis has been limited to its granting access and use of its property to install monitoring wells for groundwater sampling.

Of the four remaining PRPs, only Kolmar Laboratories, Inc. and Wickhen Products, Inc. have funded and performed the RI/FS for the site pursuant to Administrative Order on Consent, Index #II CERCLA 00202. All the PRPs will be offered the opportunity to fund and/or perform the cleanup of the contaminated soils at the site.

22. COMMENT: A resident questioned who would pay for the remedial investigation and the remediation of the site and whether taxes would go up in the area to pay for the cleanup of the site.

EPA RESPONSE: First, EPA looks for PRPs to fund the RI/FS and the remediation of the site. If the PRPs are not willing to pay for the RI/FS or the cleanup of the site, then EPA can order them to perform the response action, or EPA can use Superfund monies to perform the work. When the Agency uses its money for a response action at a site where there are financially viable PRPs, it is authorized to take an enforcement action against those PRPs to recover its costs. EPA can ultimately recover these costs through administrative settlements, judicial settlements or litigation. The Superfund monies are primarily generated from taxes on petroleum and chemical industries; a small portion of the monies are contributed from general tax revenues. Therefore, local taxes would not increase to fund this remediation.

During the RI, EPA learned from the City of Port Jervis that it owns a major portion of the site property where the lagoons are located. As owner of the majority of the site property, the City of Port Jervis is one of the five PRPs that is responsible for the cost of the cleanup of the site. The City of Port Jervis was not offered an opportunity to fund or to conduct the RI/FS at the site since, it was not determined that it was a PRP until after the RI/FS was underway. The City of Port Jervis will be offered an opportunity, along with the other four PRPs, to participate in the clean up of the site. This participation can include funding and/or providing services to assist in the cleanup of the site. For qualifying municipalities, the State has a program to cover 75 percent of the municipality's share of the cost to cleanup a site. Since the City's participation in the cleanup, and subsequent sources of revenues for participation are unclear, it is impossible for EPA to know if taxes in the area would be increased to pay for the cleanup of the site.

23. **COMMENT:** Two PRPs jointly provided the following comment: to date, only two (Kolmar Laboratories, Inc. and Wickhen Products, Inc.) of the five PRPs for the site have cooperated with the EPA and have expended substantial sums in the investigation of the site. The EPA has the authority under CERCLA to compel PRPs to participate in remediation of hazardous substance disposal sites. Although the Agency has long represented to the cooperating PRPs that it intends to exercise its CERCLA authority against non-participating PRPs and affirmed its intentions again at the August 23, 1994 Public Meeting, no action to involve these additional parties, other than notice letters, has been taken by EPA. Both fairness and economic reality mandate that the EPA exercise its CERCLA authority and compel other PRPs to contribute to the costs of addressing the site. Following issuance of the ROD, the EPA has indicated that it will afford the PRPs the "opportunity" to conduct the remedial design and remedial action. In the event that other PRPs again fail to avail themselves of the opportunity, the EPA

should exercise its CERCLA authority and compel participation of all PRPs.

EPA RESPONSE: EPA's policy is to seek the participation of all PRPs in addressing sites. CERCLA authorizes EPA to negotiate with and enter into settlements with PRPs to perform and/or fund the work to be performed at a site, as well as order PRPs to perform the work if negotiations fail and a settlement cannot be reached. EPA will also, when circumstances warrant, issue Administrative Orders requiring those PRPs that have failed to reach a settlement, to cooperate and coordinate with the PRPs that have settled with EPA. EPA cannot, at this time, state definitively whether such orders will be necessary in this matter. However, it is EPA's intent to involve all PRPs in a settlement for the implementation of the remedial design and remedial action for the site.

24. **COMMENT:** A commenter expressed that until more definitive property lines are established, it is uncertain as to who is responsible for what and a decision of any sort would be inappropriate.

EPA RESPONSE: The owners of the property on which the lagoons are located have been determined. In February, 1993 the City of Port Jervis provided EPA with a survey map that shows property boundary lines in the area of the site. The City of Port Jervis owns the property encompassing lagoons 1, 3, 4, 5, 6, 7 and 8 and part of lagoon 2. The Carroll and Dubies Sewage Disposal, Inc. owns the remaining portion of the site property (i.e., that property on which the remaining portion of lagoon 2 is located).

25. **COMMENT:** A commenter questioned how long it would take to begin remediating the soils at the site and to complete the remediation. The commenter also questioned whether attempting to have the PRPs clean up the site would hold up the remediation of the site.

EPA RESPONSE: After the ROD is signed, EPA will send out notice letters to the PRPs providing them with an opportunity to implement the selected remedy under EPA supervision or to fund the remediation. From the time notice letters are delivered to the PRPs it usually takes approximately four to six months to initiate and complete negotiations with PRPs. If the PRPs decide not to fund the cleanup of the site, EPA can either order them to do it or pay for the cleanup itself and later seek to recover the cost from the PRPs. In either case, the design of the remedy would be initiated shortly after the conclusion of negotiations. The period from signing the ROD to completing the remedial design is about 2 years (or longer if treatability studies are required) regardless of who performs the cleanup of the site. It is anticipated that it would take another year to complete the cleanup of the site utilizing ex-situ vapor extraction, bioslurry, and solidification/stabilization.

26. **COMMENT:** One commenter stated that the portion of the City of Port Jervis property which, in essence, constitutes the Carroll and Dubies site, is just a small contributor to the overall contamination in the area caused by the City of Port Jervis Landfill. The commenter believed that everyone who disposed of waste in the landfill is responsible for contamination in the area of the site and not just Joe Carroll and Gustave Dubies. The commenter indicated that the cost to clean up the landfill will be much greater than the cost to clean up the Carroll and Dubies site.

EPA RESPONSE: This ROD addresses only the Carroll and Dubies site. The landfill is not being considered as part of the site, and therefore, is not being investigated at this time. However, given the close proximity of the site to the landfill, monitoring wells which were installed to delineate the groundwater plume migrating from the site are located downgradient of both the site and the landfill. The groundwater sampling results from these wells will provide information on the levels and types of contaminants detected in the groundwater downgradient of the site and at the landfill. These monitoring wells were recently installed and were sampled in September 1994. The groundwater sampling results and alternatives proposed to address the groundwater at the site will be presented in a Proposed Plan which is expected to be completed by the fall of 1995.

It should be noted that landfills are subject to New York State regulations for the management of solid waste facilities (Part 360 of the New York Code of Rules and Regulations). These regulations include landfill closure requirements which include installing a landfill cap. To date, the City of Port Jervis has not installed a landfill cap. Since the landfill is not part of the investigation conducted to date, there are no costs available for remediating the landfill. Typically, landfills are addressed by installing a multi-layered cap over the landfill to prevent the percolation of rainwater through the landfill waste, thereby reducing the migration of contaminants from the landfill to the groundwater. Given the size of landfills, it is not practical to excavate and treat the landfill waste. It is probable that the proper closure of the landfill would be a multi-million dollar effort. See response to comment 31 for further discussion regarding closure of the landfill.

EPA does not generally consider private parties who deposit municipal solid waste (MSW) in landfills to be PRPs if they only deposited household hazardous substances. However, such parties may be considered PRPs if the MSW contains hazardous substances from non-household sources. These sources include, but are not limited to, wastes from commercial or industrial processes or activities, or used oil or spent solvents from private or municipally-owned maintenance shops.

27. **COMMENT:** A commenter expressed concern that it had been twelve years since the first sampling was conducted at the site, and wanted to know how long it would be before the groundwater was addressed and why the groundwater wasn't being addressed along with the contaminated soil.

EPA RESPONSE: NYSDEC first conducted sampling at the site in 1982 to assess the site for inclusion on the National Priorties List (NPL). This sampling was very limited and consisted of the collection of only one sludge sample and one groundwater sample. The resulting sampling data was not considered adequate to evaluate the site. More in-depth sampling was conducted by NYSDEC in 1986. Based on the 1986 sampling results, the site was proposed for inclusion on the NPL in June 1988 and placed on the NPL in February 1990. After the site was listed on the NPL, the RI/FS for the site was conducted by the PRPs under EPA's supervision. The RI/FS was completed in 1994 with the issuance of this ROD which presents the selected remedy for addressing the contaminated soils at the site. Although it has been 12 years since the first sample was collected from the site, it has taken EPA four years from the time the site was listed on the NPL to investigate and select a remedy for the site. EPA, however, acknowledges that the remediation at Superfund sites is a lengthy program and is taking measures to streamline the process.

In July 1992, it was determined that it would take longer to collect additional data to complete the delineation of the groundwater contamination plume than to finish delineating the contaminated source areas. Therefore, instead of delaying the selection of a remedy for the remediation of the soils and sludges, EPA divided the site into two distinctive components or operable units (i.e., soils/sludges and groundwater). Following completion of the additional groundwater investigation, a ROD formalizing the selection of a remedy to address the groundwater will be completed (late 1995). The period from signing the ROD to completing the design for the groundwater remedy would be about 2-3 years (refer to response #25). How long it takes to clean up the groundwater is extremely variable and depends on a number of factors such as the extent of contamination, type of contaminants, and the geology of the site. At sites where dense non-aqueous phase liquids (DNAPL) are present, it may not be practicable to clean the groundwater to drinking water standards, as timeframes to achieve such levels can be on the order of centuries. Other sites are much better suited for treatment, and may require a much shorter cleanup timeframes (on the order of years). The estimated timeframe for remediating the Carroll & Dubies site groundwater (if necessary) will be estimated in the FS and Proposed Plan for the groundwater operable unit II.

Miscellaneous Comments

28. **COMMENT:** Joe Carroll, one of the owners of Carroll & Dubies Sewage Disposal Facility Inc., requested that the site name be changed to one that does not refer to Carroll and Dubies, since the City of Port Jervis owns the property where the Carroll and Dubies facility is located. In addition, he claimed that the City of Port Jervis created the first lagoon (lagoon 8) at the Carroll and Dubies site to use to deposit sewage sludge. Mr. Carroll and Gustave Dubies used this lagoon to deposit waste along with other companies. Thereafter, Mr. Carroll and Mr. Dubies started depositing waste on adjoining City of Port Jervis land, which at the time they believed they owned.

EPA RESPONSE: When the site was initially listed on the NPL, it was only believed to consist of lagoons 1 through 4; it was also believed that the site was owned and operated by Carroll and Dubies Sewage Disposal Facility Inc. The site was listed on the NPL as the Carroll and Dubies Superfund site in February 1990. In 1992, the site was expanded to include three additional lagoons (lagoon 6 through 8) which were identified in historical aerial photographs. Shortly thereafter (February 1993), it was determined that the City of Port Jervis owned a major portion of the property where all the lagoons are located. Carroll and Dubies Sewage Disposal Facility Inc. owned only a small portion of the site property. Although the property owners are different than originally believed, Carroll and Dubies Sewage Disposal Facility Inc. was the operator of, and transporter of all the waste in lagoons 1 through 4 and to EPA's knowledge, the operation and the transporter of all the waste present in lagoons 6 through 8. As such, EPA believes that the name of the site is appropriate and has no reason to change that designation.

29. **COMMENT:** Joe Carroll suggested that his remaining property, approximately thirty-two acres, should not be eliminated from any further use such as building a small summer home, as this property was not used for disposal. The commenter believed that "No Action" should be selected for the thirty-two acres of land owned by Joseph Carroll and Gustave Dubies.

EPA RESPONSE: EPA is considering remedial alternatives to address only the seven lagoons at the site. EPA is not restricting any use of property owned by Joseph Carroll and Gustave Dubies, so long as the use of this property does not interfere with any remedial action that may be taken to remediate the groundwater, lagoons or impacted soils at the site.

30. **COMMENT:** A resident wanted to know what was being done to prevent future Superfund sites.

EPA RESPONSE: CERCLA was enacted in December 1980 to provide EPA with a powerful means of responding to cases of environmental contamination. The CERCLA remedial program is generally retroactive in nature, addressing previously-contaminated sites. On the other hand, the Resource Conservation and Recovery Act ("RCRA"), enacted in 1976, (implementing regulations effective November 1980) regulates hazardous waste from cradle (generation) to grave (disposal/treatment) thereby minimizing the potential for Superfund sites in the future. RCRA regulations also require owners and operators of RCRA regulated facilities to maintain financial assurance in amounts sufficient to cover the cost of "closing" the facility and thus avoiding the need for a CERCLA clean up.

31. **COMMENT:** A resident indicated that we have studied only a small area of Deerpark and that there exist a number of other areas that should not be ignored. The resident identified a number of areas along Route 209 that are potentially adversely impacting human health and the environment.

Another commenter was concerned about the hundreds of pounds of lead shot and bullets on the site associated with the shooting ranges as well as the informal ones at the site. The commenter also identified the continuing Carroll and Dubies operation, lagoons located to the North of the site a few hundred feet, dozens of freon leaking refrigerators located to the south of the site, and the landfill which has never been capped as other pollution problems in and around the site.

EPA RESPONSE: CERCLA authorized EPA to identify hazardous waste sites that threaten public health and the environment, and to locate and properly dispose of the wastes found therein. The first step of that identification process is called the Preliminary Assessment (PA). In a PA, EPA attempts to verify the existence of released hazardous waste at a site that may fall under Superfund. Any person or organization can petition EPA to conduct a PA at a site; this is called a PA petition. After receiving a PA petition, EPA will decide if there is reason to believe that an actual/potential site exists, and whether EPA has the legal authority under Superfund to respond to the site. If the petition is approved, EPA will conduct a PA and provide a copy of the PA to the petitioner. Based upon the results of the PA, EPA will determine if the next step, a site investigation (SI), needs to be conducted. Following the SI, EPA would prepare a hazard ranking system score for the site to determine its eligibility for inclusion on the NPL.

The site has not been used for the disposal of septic and municipal sewage wastes since 1989. The referenced lagoons are actually lagoons 1 and 2. They are the only lagoons at the site which were not covered with soil. These lagoons are no longer actively used and will be addressed as part of the remedy being selected for this site.

It is true that the Port Jervis Landfill has not yet been properly capped. The landfill will be closed (including capping) as required by the New York Code of Rules and Regulations (6 NYCRR Part 360) requirements for Solid Waste Management Facilities. The NYSDEC has not yet developed a schedule for the closure of the landfill. However, NYSDEC has requested that any questions regarding the closure of the landfill be directed to:

Mr. Victor Cardona
Federal Projects Section
Bureau of Eastern Remedial Action
Division of Hazardous Waste Remediation
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York, 12233-7010
Telephone # (518) 457-3976

Problems related to discarded refrigerators, and other pollution problems encountered around the site are best referred to local authorities such as the City of Port Jervis, or Orange County. If necessary, the City or County would elevate these issues to NYSDEC. If NYSDEC determined that the problem is best addressed by EPA, NYSDEC could then refer the problem to EPA.

APPENDIX A

Proposed Plan
Carroll and Dubies Superfund Site

Superfund Proposed Plan

Carroll and Dubies Sewage Disposal Inc.

Town of Deerpark
Orange County, New York

EPA Region 2 | August 1994 | NYSDEC

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the Carroll and Dubies Sewage Disposal (C&D) Superfund site (the site) and identifies the preferred remedial alternative for the soils with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing the Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, 42 U.S.C. §§ 9601-9675, and the National Contingency Plan (NCP), 40 C.F.R. § 300.430(f). The alternatives summarized here are described in the Remedial Investigation and Feasibility Study (RI/FS) reports which should be consulted for a more detailed description of all the alternatives. As part of the Administrative Record for the site, the RI/FS can be found in the public repositories listed on page 2.

This Proposed Plan is being provided as a supplement to the RI/FS reports to inform the public of EPA's and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, as well as the preferred alternative.

The remedy described in this Proposed Plan is the preferred remedy for the site. Changes to the preferred remedy or a change from the preferred remedy to another remedy may be made, if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. We are soliciting public comment on all of the alternatives considered in the detailed analysis of the RI/FS because EPA and NYSDEC may select a remedy other than the preferred remedy.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI/FS reports, Proposed Plan, and supporting documentation have been made available to the public for a public comment period which begins on August 4, 1994 and concludes on September 2, 1994.

A public meeting will be held during the public comment period at the auditorium of the Port Jervis High School, Route 209, Port Jervis, New York on Tuesday, August 23, 1994 at 7:00 p.m. to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred remedial alternative, and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

MARK YOUR CALENDAR

August 4, 1994 to September 2, 1994
Public comment period on RI report, Proposed Plan, and remedy considered.

Tuesday, August 23, 1994
Public meeting to be held at 7:00 p.m. in the auditorium of the Port Jervis High School, Route 209, Port Jervis, New York.

located at the site (lagoons 1 through 4 and 6 through 8 depicted in Figure 1). Initially, EPA believed that the industrial wastes were deposited only in lagoons 1 through 4. In July 1992 however, the site was expanded to include the investigation of areas believed to contain four additional filled-in lagoons (lagoons 5, 6, 7 and 8). These lagoons were tentatively identified in historical aerial photographs. Trenching in the area of lagoons 6, 7 and 8 confirmed the presence of sewage sludge and industrial waste; trenching in the area of lagoon 5 revealed the presence of tires instead of industrial waste. The dimensions of lagoons 1, 2, 3, 4, 6, 7 and 8 are approximately 100 feet by 60 feet, 200 feet by 60 feet, 100 feet by 35 feet, 100 feet by 40 feet, 60 feet by 20 feet, 100 feet by 45 feet, and 150 feet by 40 feet, respectively.

In 1978, lagoon 3 was ignited by the Port Jervis Fire Department in order to practice suppression of chemical fires. After this incident, lagoons 3 and 4 were filled in with soil and the area was revegetated. With the exception of lagoons 1 and 2, all of the lagoons have been covered with soil. Lagoons 1 and 2 were left uncovered and are surrounded by a wooden fence. In June 1979, NYSDEC prohibited the disposal of industrial wastes at the site. The site continued to be used for the disposal of septic and municipal sewage wastes until 1989.

In February 1987, NYSDEC issued a Phase II Investigation Report which summarized past investigations and included a Hazard Ranking System (HRS) score for the site. Based on the HRS score, the site was proposed for inclusion on the National Priorities List (NPL) in June 1988 and was placed on the NPL in February 1990.

On September 25, 1989, EPA sent "special notice" letters to four potentially responsible parties (PRPs), affording them the opportunity to conduct the RI/FS for the site. (PRPs are companies or individuals who are potentially responsible for contributing to the contamination at the site and/or are past or present owners of the property.) The PRPs were given 60 days in which to submit a good faith offer to undertake or finance the RI/FS for the site.

On November 30, 1989, two of the four PRPs submitted to EPA a good faith offer to perform the RI/FS. An Administrative Consent Order was signed by the two PRPs and by EPA in February 1990. The PRPs conducted the RI/FS under EPA's supervision.

During the RI, EPA learned from the City of Port Jervis that it owned a major portion of the site property where the lagoons are located. In an April 22, 1993 letter, EPA notified the City that it was also a PRP for the site. After issuance of the ROD, all the PRPs will be offered the opportunity to design and implement the selected remedial alternative for the site.

SCOPE AND ROLE OF ACTION

This is the first of two planned operable units for the site. This operable unit addresses the source areas (lagoons and surrounding impacted soils) at the site and actions needed to ensure that the source areas do not pose a threat to human health or the environment, including any potential cross media impacts to groundwater. The second operable unit investigation which is currently underway, will address the need for remediating contaminated groundwater underlying the site. The two PRPs which performed the RI/FS for the first operable unit are currently performing the RI/FS for the second operable unit with supervision by EPA.

REMEDIAL INVESTIGATION SUMMARY

The intent of the investigation was to characterize the soil quality of the seven lagoons at the site and any potential cross media impacts to the groundwater quality in the vicinity of these lagoons. The remedial investigation consisted of drilling borings and constructing monitoring wells, collecting soil and groundwater samples, and conducting a geophysical survey. The PRPs hired Blasland & Bouck Engineers (B&B) to implement the RI/FS.

The geophysical survey determined that the elevation of the site ranges from approximately 440 to 520 feet above mean sea level. The materials encountered underlying the site consist of glacially derived unconsolidated materials underlain by consolidated bedrock. The thickness of the unconsolidated overburden materials ranges from zero feet at the exposed bedrock slope forming the northwestern site boundary, to over 60 feet along the towpath. The glacially derived materials consist of two distinct units, including a glacial till unit overlain by glacial outwash deposits. The outwash deposit was observed to vary in thickness from 31 feet to 52 feet along the downgradient edge of the site. The outwash deposits typically consist of medium dense to very dense brown sand with some clayey silt and gravel. The glacial till deposits are characterized as dense to very dense dark grey silt with sand and gravel. The glacial till is not continuous beneath the site, and appears to (ppb) in monitoring well OW-3, 1,2-dichloroethene (total) at 230 ppb in monitoring well OW-2, tetrachloroethene at 130 ppb in monitoring wells OW-2, and trichloroethene at 41 ppb in monitoring well MW-2. The Federal and State drinking water standards for benzene, tetrachloroethene and trichloroethene are all 5 ppb. The State drinking water standard for 1,2-dichloroethene isomers is 5 ppb, which is more stringent than the Federal standard.

Inorganic compounds (arsenic, beryllium, chromium, lead and nickel) were detected above the Federal and/or State drinking water standard in monitoring wells downgradient of lagoons 1 through 4 only during the 1991 sampling events. During the March 1993 sampling, only cadmium was detected above drinking water standards. Cadmium was detected in monitoring well OW-3 at 6 ppb, which is slightly higher than the Federal and State drinking water standard of 5 ppb.

During the October 1993 sampling of monitoring wells located downgradient of lagoons 6, 7 and 8 (OW-9, OW-10, OW-11, OW-12, OW-13, OW-14 and BW-5), benzene was detected above both the Federal and State drinking water standards; seven other organic compounds were detected above the State drinking water standards but below the Federal drinking water standards. The highest concentrations of organic compounds detected were benzene at 1,300 ppb in monitoring well OW-12; 1,3,5-trimethylbenzene at 12 ppb in monitoring well OW-11; 1,2,4-trimethylbenzene at 44 ppb in monitoring well OW-12; 1,2-dichloroethene (total) at 12 ppb in monitoring well OW-13; ethylbenzene at 9.8 ppb in monitoring well OW-12; toluene at 9.6 ppb in monitoring well OW-12; and xylene at 40 ppb in monitoring well OW-12. The State drinking water standard for 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, ethylbenzene, toluene, and xylene is 5 ppb. The Federal drinking water standard is 700 ppb for ethylbenzene, 1,000 ppb for toluene and 10,000 ppb for xylene. A Federal drinking water standard does not exist for 1,3,5-trimethylbenzene or 1,2,4-trimethylbenzene.

Nine inorganic compounds were detected above Federal and/or State drinking water standards in the seven monitoring wells located downgradient of lagoons 6, 7 and 8. Nine inorganic compounds were detected above drinking water standards. However, six of these inorganic compounds were detected above standards only in monitoring well OW-10. Chromium, lead and nickel were detected above drinking water standards in more than one monitoring well and were detected at levels that ranged from 106 to 2,930 ppb, 19.1 to 924 ppb and 100 to 1,560 ppb, respectively. The inorganic compounds detected above drinking water standards in monitoring well OW-10 were about an order of magnitude higher than the levels detected in the other monitoring wells. The Federal drinking water standards for chromium and nickel are set at 100 ppb; the Federal action level for lead is 15 ppb. The State drinking water standards for chromium and lead are 100 and 50 ppb, respectively. A State drinking-water standard does not exist for nickel. As previously mentioned, an investigation to determine the lateral and downgradient extent of the groundwater plume is currently underway and will be reported in the RI for the second operable unit.

The New York State Department of Health sampled several off-site private wells in 1991 and again in 1993 for organic and inorganic constituents. Organic constituents were not detected in the groundwater from these wells, and inorganic constituents were detected below drinking water standards.

SUMMARY OF SITE RISKS

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the site, if no remedial action were taken.

As part of the baseline risk assessment, the following four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification*--identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment*--estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathway (e.g, ingesting contaminated well-water) by which humans are potentially exposed. *Toxicity Assessment*--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization*--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of site-related risks.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with other statutory laws, and utilize permanent solutions and alternative technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

This Proposed Plan evaluates in detail six remedial alternatives for addressing the soil/sludge contamination at the Carroll and Dubies Sewage Disposal Inc. site. As used in the following text, the time to implement reflects only the time required to implement the remedy, and does not include the time required to procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy.

Alternative 1: No Action

Capital Cost:	$ 0
O & M/yr Cost:	$ 0
Present Worth:	$ 0
Time to Implement:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with other alternatives. Under this alternative, the contaminated soil would be left in place without treatment. The site would remain in its current condition and no effort would be made to change the current site conditions.

Alternative 2: Limited Action

Capital cost:	$ 52,000
O & M/yr Cost:	$ 18,000
Present Worth:	$ 328,660
Time to Implement:	6 months

This alternative consists of institutional controls such as deed restrictions to limit future use of the site and complete fencing of the site to minimize potential human exposure to the source area materials. The limited action alternative would not utilize any remedial technologies for the treatment of the source areas. A long-term groundwater monitoring program would be implemented to track the migration of contaminants from the source areas into the groundwater utilizing existing monitoring wells at the site.

Alternative 3: Low-Permeability Cap with Slurry Cut-Off Walls

Capital Cost:	$ 3,299,816
O & M/yr Cost:	$ 147,060
Present Worth:	$ 5,560,128
Time to Implement:	12 months

This alternative includes the construction of a low-permeability cap over the source materials to minimize the infiltration of precipitation. Limiting the amount of water which percolates through the source materials may reduce the leaching of the chemical constituents into the groundwater underlying the site. In addition to the cap, slurry cut-off walls would be installed around the source area to minimize the migration of soil gas and leachate from the impacted source areas into the surrounding soils and to minimize the movement of precipitation from outside the cap through the source area materials. The cap would be constructed of a low-permeability material such as natural clay, geosynthetics, asphalt or combinations of these materials. Additional drainage and top soil layers would be included to achieve a well drained, vegetated surface upon completion. Deed restrictions would be recommended to limit future use of the site in order to protect the integrity of the cap.

The cut-off walls would be constructed by excavating vertical trenches while filling the excavation with a soil-bentonite slurry. The slurry walls would be keyed into the bedrock unit which underlies the site. This bedrock unit consists of shale and silt stone and ranges from ground surface to 60 feet below grade. Groundwater at the site is present within the overburden soil materials. Therefore, hydrodynamic controls would be required to maintain the effectiveness of the cap and slurry wall. Hydrodynamic controls would include pumping groundwater from within the capped area to maintain a static water level within the capped area. The collected water would be treated on-site in a granular activated carbon (GAC) adsorption treatment system prior to discharge. The spent carbon would be regenerated or shipped off-site to an appropriate disposal facility. Groundwater monitoring would be performed annually utilizing existing monitoring wells at the site.

lined cell with a wet well for leachate collection, and then capped. The lined cell and cap are the same as that described in Alternative 4. Deed restrictions would be recommended to limit future use of the site in order to protect the integrity of the cap. Groundwater monitoring would be performed annually utilizing existing monitoring wells at the site.

Alternative 6: Off-Site Disposal at a Permitted Landfill

Capital Cost:	$ 32,679,764
O & M/yr Cost:	$ 0
Present Worth:	$ 32,679,764
Time to Implement:	12 months

This alternative consists of excavating 20,300 cy of source area materials and transporting these materials off-site to a RCRA-permitted treatment, storage and disposal facility for treatment and disposal, as appropriate. Excavated materials would be placed directly into lined 20 cy roll-offs. Some of the source area materials might need to be dewatered prior to off-site transportation. Each roll-off would be sampled to characterize the source area materials prior to transportation off-site. Based on the analytical data available for the source area materials, the materials from Lagoons 6, 7 and 8 would require pre-treatment to meet the land disposal restrictions (LDRs) prior to disposal at a RCRA-permitted landfill. Air monitoring would also be conducted during implementation of this alternative to determine the need for engineering controls.

For purposes of evaluating this alternative, incineration and solidification were considered to be the appropriate pre-treatment methods to address the source area materials which do not meet LDR requirements. It is estimated that the volume of source area materials that would require pretreatment prior to land disposal is approximately 9,130 cy.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; short-term effectiveness; implementability; cost; and community and state acceptance. For a more detailed explanation, see the comparative analysis contained in the FS.

Glossary of Evaluation Criteria

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements and/or provide grounds for invoking a waiver.
- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.
- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies a remedy may employ.
- Short-term effectiveness addresses the period of time needed to achieve protection from any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.
- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
- Cost includes both estimated capital and operation and maintenance costs, and net present worth costs.
- State acceptance indicates whether, based on its review of the RI/FS report and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.
- Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the RI/FS report and the Proposed Plan.

A comparative analysis of the remedial alternatives based upon the evaluation criteria noted above follows.

organic contaminants has not been demonstrated. Alternative 3 would not provide a reduction in the toxicity or volume of the organic and inorganic contaminants in the source area materials; however, this alternative would reduce the mobility of the chemical constituents through capping, installing slurry cut-off walls and pumping groundwater from within the capped area. Alternatives 1 and 2 would provide no reduction in contaminant mobility, toxicity, or volume.

- Short-term Effectiveness

Alternatives 1 and 2 would result in no additional risk to the community or workers during implementation, since source area materials would not be disturbed. Alternatives 3, 4, 5 and 6 would include activities such as excavation and handling of contaminated soils/sludges that could result in short-term exposures to on-site workers and the community during implementation due to the generation of fugitive dust. Mitigation measures such as water sprays to suppress dust would be implemented to control short-term environmental impacts associated with off-site dust migration. Alternative 5 would also result in the potential exposure to on-site workers and the community to air emissions associated with the LTTD treatment system. The air emissions from the LTTD unit would be controlled by implementing air emission treatment systems and air emission monitoring programs. Alternative 6 would also include activities such as off-site transport of contaminated soils/sludges that could result in potential exposure to the community. To reduce the potential risks to the community and the environment resulting from an accident during transportation, a traffic control plan would be developed.

- Implementability

All alternatives are technically feasible and could be implemented at the site. Alternatives 1 and 2 are the easiest to implement. A treatability study would be necessary to demonstrate that Alternative 4 (stabilization/solidification) is able to render the lagoon 7 material nonhazardous based on the characteristic of toxicity. The high moisture content and clay-like material properties of some of the source area materials may make Alternative 5 (LTTD process) difficult to implement. The implementability of LTTD would need to be confirmed by treatability study testing.

- Cost

According to the present worth cost estimates for all alternatives evaluated, Alternative 6 ($32,679,764) would be the most costly alternative to implement, followed by Alternative 5 ($11,756,900). The present worth cost for Alternatives 4 and 3 would be about the same ($5,794,983 and $5,560,128, respectively). Alternatives 2 and 1 would be the least costly to implement ($328,660 and $0, respectively). Present worth considers a 5% discount rate, and a 30-year operational period for Alternatives 2, 3, 4 and 5. Since Alternatives 6 and 1 do not require any O & M costs, their present worth costs are equivalent to their capital cost.

- Community Acceptance

Community acceptance of the preferred soil alternative will be assessed in the ROD following a review of the public comments received on the RI/FS report and the Proposed Plan.

- State Acceptance

NYSDEC concurs with the preferred alternative for remediating the soils and sludges at the site.

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternative 5 (Low-Temperature Thermal Desorption, Stabilization/Solidification, and Placement into an On-site Containment Cell). Alternative 5 permanently removes organic contaminants from source area materials and reduces the mobility of inorganic contaminants through stabilization/solidification and placement of source area materials in a lined containment cell constructed on-site. Alternative 5 ensures that no leaching of contaminants to the underlying aquifer will occur. The elimination of cross-media impacts will have a positive impact on the effectiveness of any future groundwater restoration program that could be implemented at the site.

Alternative 5 is the only alternative that permanently removes the organic contaminants from source area materials except for Alternative 6 which is over twice the cost of the preferred alternative and may not comply with the statutory preference for treatment as a principal element. The other proposed alternatives which cost much less than the preferred alternative do not permanently remove contaminants from the source area

Appendix B

Public Notice

8/15/94 The Times Herald Record

The U.S. Environmental Protection Agency (EPA) will hold a public meeting to discuss the Proposed Plan for the Carroll and Dubies Sewage Disposal Inc. Superfund site, located in Port Jervis, New York.

EPA has scheduled a public meeting to discuss the findings of the Remedial Investigation/Feasiblity Study at 7 p.m., on Tuesday, August 23, 1994, at the Port Jervis High School in Port Jervis, New York. The release of the Proposed Plan and the scheduled public meeting are in accordance with EPA's public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980.

EPA reviewed several alternatives to address the contaminated soil at the site. Alternatives included: 1) No Action; 2) Limited Action; 3) Low-Permeability Cap with Slurry Cut-Off Walls; 4) Stabilization/Solidification and Placement into an On-Site Containment Cell; 5) Low-Temperature Thermal Desportion (LTTD), Stabilization/Solidification, and Placement into an On-Site Containment Cell; and 6) Off-Site Disposal at a Permitted Landfill.

Based upon an evaluation of these alternatives, EPA is recommending: Low-Temperature Thermal Desorption, Stabilization/Solidification and Placement into an On-Site Containment Cell.

EPA, in consultation with NYSDEC, may modify the preferred alternative or select another response action based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified herein. Documentation of the project findings is presented in the Administrative Record File. These documents are available at the:

Town Hall
Drawer A
Huguenot, New York 12746
(914) 856-2210

Comments on the Proposed Plan will be summarized and responses provided in the Responsiveness Summary section of the Record of Decision. The Record of Decision is the document that presents EPA's final selection for response actions. Written comments on this Proposed Plan should be sent by close of business, September 2, 1994 to:

Sharon Trocher, Project Manager
U.S. Environmental Protection Agency
26 Federal Plaza, Room 29-100
New York, New York 10278

<u>Appendix C</u>

August 23, 1994
Public Meeting Attendance Sheet

United States Environmental Protection Agency
Region II

Meeting

For
Public Meeting for Carroll & Dubies Superfund Site

August 11, 1994

7pm

Please Print Clearly

Sign In Sheet

NAME	STREET	CITY	ZIP	PHONE 914	
Ruth Carrington	47 Big Pond Rd	Huguenot	12746	856-5988	
Joellen Snow	288 Oakland Valley Rd	Cuddebackville	12729	754-8065	
Edmund Wilson	192 Wilson Rd	Sparrow Bush	12780	856-1789	
Phil Chase	11 Evergreen Lane	Port Jervis	12771	856-8767	
Margaret J. Peil	P.O. Box 209	Cuddebackville NY	12729	754-8775	
Robert J. Honders	129 Kennel Rd.	Cuddebackville N.Y.	12729	754 7106	
John Olcanick	187 E. Main	P.J.	12771	852-2226	
Ken Klaiber	PO Box 14	Cuddebackville	12729	914-754-[illegible]10	
Ruth Manfredi	73 Boutonville Rd	So Salem NY	10590	914-763-3382	
James McKeon	Meeker Ln	[illegible]	12584	914 561-7680	Clean Earth of NY Inc
Richard Penalum	159 Pellet Island Rd	New Hampton, NY	10958	374-5966	
Rick Freeman	PO Box 186	Milford	PA 18337	717-296-6641	Pike County Dispatch

United States Environmental Protection Agency
Region II

Meeting

For
Public Meeting for Carroll & Dubies Superfund Site

August 11, 1994

7pm

Please Print Clearly

Sign In Sheet

NAME	STREET	CITY	ZIP	PHONE
[illegible] / Congressman Gilman's Office	P.O Box 358	Middletown NY	10940	914-343-6666
Andrea Lambert	6 Stoll Street	Port Jervis	N.Y. 12771	914- 856-7969
Steve Bates	2 UNIV PLACE	Albany	12233	518-458-6305
Charles & Georgette St. John	21 LANE ST	Port Jervis	NY 12771	914-856-3903
Wayne G. Decker	Drawer A	Huguenot, NY	12746	914 856-2210
Albert J. [illegible]	28 Taylor Rd	Huguenot	N.Y 12746	(914) 858-2789
[illegible] Santiago	34 Main St	[illegible] NY	12780	
David Lambert	[illegible] Delaware Dr	Matamoras PA	15336	
Mark House	747 Oakland Valley Rd	Cuddebackville NY	12729	914-754-8824
[illegible]	Van Bend -	P. Jervis	12771	856-3218
LINDA KOZAK	707 AVE K	MATAMORAS PA	18336	