DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Sarney Farm, Amenia, New York

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Sarney Farm site, in Amenia, New York, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, and, to the extent practicable, the National Contingency Plan. The attached index (Appendix C) identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

The State of New York has concurred with the selected remedy.

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, may present an imminent and substantial endangerment of public health, welfare, or the environment.

Description of the Selected Remedy

A remedial action will be undertaken for contaminated soil and buried drummed wastes found at localized areas of the Site. In addition, ground and surface water will be sampled and monitored periodically; hydrogeological testing will also be performed. This action complements a removal action initiated in October 1987, consisting of the installation of a soil flushing system which collects and treats leachate emanating from two areas of the Site. The remedy addresses the principal threat posed by the drummed waste and contaminated soil.

The major components of the selected remedy include:

- Excavation of contaminated soil and buried drums.
- Transportation of contaminated drums to an off-site treatment and disposal facility.

- On-site low temperature thermal treatment of contaminated soil.
- Grading of the excavated areas with the treated soil.
- Long-term monitoring program for surface water, groundwater, and residential wells to verify that contaminants are not migrating from the site, installation of additional monitoring wells (if necessary), and hydrogeological testing to ensure that the remedy continues to be protective of human health and the environment.

Declaration

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because the remedy for this site will result in hazardous substances remaining on-site above health based levels in the groundwater, the five-year review will apply to this action.

Constantine Sidamon-Eristoff
Regional Administrator

9/27/9.
Date

DECISION SUMMARY
SARNEY FARM SITE

AMENIA, NEW YORK

United States Environmental Protection Agency
Region II, New York

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SITE NAME AND LOCATION

The Sarney Farm site (see Figure 1) is located 90 miles north of New York City, on a westward sloping ridge of farming and grazing land in the Town of Amenia, in rural Dutchess County, New York. It is bordered by Benson Hill Road to the south, a treeline and cultivated fields to the west, Cleaver Swamp to the northwest, and the steeply sloping east flank of the ridge to the east. The site contains four areas denoted as Areas 1-4 in Figure 2, where former dumping of waste reportedly took place. According to 1980 Census data over 2000 people live within 1 mile of the Site. The bedrock aquifer is the sole source of local groundwater supplies.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

In February 1968, Richard and John Giannattasio (doing business as Haul-A-Way Company, Inc.) applied for a permit to operate a five-acre sanitary landfill on the property which at the time was owned by Herbert Davidson. In April 1968 the Dutchess County Health Department (DCHD) issued a permit with the provision that no industrial waste was to be deposited at the Site. Subsequently, in June 1968, Haul-A-Way Company, Inc. purchased a 143-acre parcel containing the approved five-acre landfill site.

In November 1968, dumping of industrial waste on the Site was reported. A subsequent DCHD inspection confirmed that barrels of waste solvents were dumped in and alongside a trench in the northern end of the large pasture south/southwest of Cleaver Swamp. Also, the DCHD received a complaint that barrels were being taken into a wooded area on the Site northeast of the large pasture in June 1969. A subsequent inspection in this area revealed another excavated trench at the Site containing several drums. The DCHD informed Haul-A-Way that this form of waste disposal was not permitted and a subsequent investigation in January, 1970 revealed that illegal dumping had stopped.

Ownership of the property was transferred to Joseph A. Frumento and Charles J. Miller in August, 1970 and in March, 1971 the land was purchased by the present owners, Arthur and Joan Sarney, for use as a pasture.

As a result of DCHD analyses of water samples from the Site in 1980 and 1982, the NYSDEC placed the property on a list of twelve Dutchess County hazardous waste sites to be considered for further investigation and possible clean-up. The site was proposed for inclusion on the National Priorities List (NPL), in October, 1984 and received a final listing status in June, 1986.

The potentially responsible parties (PRPs) were notified in writing in June 1985 via a notice letter and given the opportunity to conduct a remedial investigation (RI) and feasibility study (FS) under EPA supervision. However, none elected to undertake the activities. EPA is actively searching for additional potentially responsible parties. To that regard information request letters were issued in May 1990. A notice letter will be mailed to the identified PRPs asking them to notify EPA of their interest or lack of interest in conducting the remedial design and remedial action.

In 1984 Camp, Dresser, and Mckee (CDM) was retained by EPA as a contractor to conduct work at the Site. CDM obtained 13 surface water samples and 14 sediment samples from the Site, as well as water samples from 21 private wells surrounding the Site and issued a report on October 1985. In addition, CDM completed a geophysical study of the Site and issued a report of the findings in October 1986.

In October 1987, based on the sampling results, EPA initiated a Superfund removal/treatment action for organic contaminants at the Site. EPA installed a treatment process consisting of an in situ soil washing system for organic contamination at Areas 1 and 2. The siting of the treatment facility at the lowest elevation point of the pasture permits collection of leachate from areas further south, including Area 3. An examination of the subsurface soils during the construction of the treatment system around Area 1 revealed little or no evidence of contamination in this area. The treatment system was not utilized in Area 4 since its application was not believed to be well suited for the site conditions in this area. The treatment system is currently operating. When operating, samples of the treated effluent stream that is recirculating to the soil have shown that all detectable organic contaminants are being removed from the influent through the aeration treatment process. Due to contractual budget limitations, the Agency transferred responsibility for completing the RI/FS to Ebasco Services, Inc. and completed the study in May, 1990. Field activities included additional sampling of ground and surface water, residential wells, soils and sediment.

SCOPE AND ROLE OF RESPONSE ACTION

The FS for the Site focuses on reviewing and evaluating alternative methods for remediating all the contaminated areas of the Site. The areas of concern addressed by this response action include soil and groundwater. These areas of the Site pose the principal threat to human health and the environment because of risk from possible ingestion, inhalation or dermal contact with the soils and/or groundwater.

The overall objective of this response action is to reduce the concentrations of contaminants in the soils to levels which are protective of human health and the environment and to prevent current and future exposure to the contaminated groundwater.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS and Proposed Plan for the Sarney Farm site were released to the public on May 11, 1990. These documents were made available to the public in both the administrative record file and the information repositories maintained at the EPA docket room in Region 2 and at the Town Halls of Amenia and Dover Plains. A press release concerning the availability of the RI/FS reports, the Proposed Plan, and the initiation of the public comment period was issued on May 11, 1990. In addition, a public meeting was held on May 23, 1990. At this meeting, representatives from EPA and NYSDEC answered questions about problems at the site and the remedial alternatives under consideration. A 30-day public comment period was provided, ending on June 10, 1990. All comments which were received by EPA prior to the end of the public comment period, including those expressed verbally at the public meeting, are addressed in the Responsiveness Summary (Appendix E).

This decision document presents the selected remedial action for the Sarney Farm site, in Amenia, New York, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the administrative record.

SUMMARY OF SITE CHARACTERISTICS

In general, the Remedial Investigation concluded that the wastes present at the Sarney Farm site were comprised of soil contaminated with volatile organic compounds (VOCs) and approximately forty drums containing liquid solvents. These sources of contamination were localized in two areas: a trench in the northern end of the large pasture (Area 2), and a trench in the woods northeast of the large pasture (Area 4). Based on the soil gas data and trench work (done during the removal and the RI), further evaluation of Areas 1 and 3 was not deemed necessary.

The soil contaminants can be transported by infiltration into the underlying overburden and bedrock aquifers at the Site. Although contamination in the trenches was quite extensive, sample results for the groundwater indicated limited contamination in this medium. The wastes present at the site are not considered to be listed waste as defined under the Resource Conservation and Recovery Act (RCRA).

The soil contamination in Area 2 was estimated to be 80 feet long, 30 feet wide and 10 feet deep for a total of 890 cubic yards. The extent of contamination in Area 4 was contained in an area 100 feet long, 20 feet wide and 10 feet deep, with a total volume of 740 cubic yards. Due to a bulking factor of 1.45, the quantity of contaminated soil which will be treated totals, approximately 2,365 cubic yards. This estimate is subject to change as more information is obtained during the remedial design phase.

Groundwater contamination within the overburden aquifer was limited to the areal limits of the site study area. It should be noted that the overburden aquifer was not found to be sufficiently productive so as to support a well for residential use because of the aquifer's low productivity and hydraulic conductivity. The depth of the overburden aquifer ranges from 2 to 48 feet in depth at the site. The bedrock aquifer is classified as a Class IIa aquifer, since it is currently utilized as a source of drinking water while the overburden aquifer is classified as IIb due to its potential as a source of drinking water. The on-site bedrock aquifer was contaminated in the areas north of Areas 2 and 4 in the vicinity of the swamp. No contaminants were detected above the State or Federal maximum contaminant limit (MCLs) of 5 parts per billion (ppb) in the residential wells in the bedrock aquifer.

The 110 acre state regulated wetland represents the most valuable on-site ecological habitat. Commonly referred to as Cleaver Swamp, the area is actually a Class II palustrine emergent marsh dominated by common cattail (<u>Typha</u> <u>latifolia</u>). Preliminary hydrologic investigations suggest that the majority of overland and groundwater flow from disposal areas is discharged northwest into the wetland, along with some discharge into the unnamed stream (or ponds) to the west. The flow of overburden groundwater through Areas 1 and 2 is interrupted by the in-situ soil washing system currently operating there.

In general, the surface water and the sediments from Cleaver swamp (a 110 acre state regulated wetland), ponds and a stream on the western side of the site did not indicate the presence of contaminants in significant levels.

A more detailed discussion of the nature and extent of contamination in each medium is presented below.

SOILS

Previous investigations by EPA indicated that there were four potential areas where liquid wastes and/or buried drums could be found at the site. The soil gas survey conducted by Ebasco as part of this RI/FS and covering the totality of the site, further defined Areas 2, 3 and 4 as the potential sources of contamination. Based on the results of the soil gas survey and the examination of subsurface soils during the removal action no further evaluation of Area 1 was deemed necessary . Therefore, Areas 2, 3 and 4 were the object of a more detailed evaluation. Soil sampling and well borings were also performed throughout the Site. Samples were analyzed for EPA's target compound list (TCL) including the following parameters: volatile organic compounds (VOC), base neutral or extractable aromatic compounds (BNA), and metals.

Surface Soils

The test pits confirmed the presence of liquid wastes and filled drums in Areas 2 and 4. Within these areas, soils close to and around the areas of buried drums were indicated to be the hot spot areas. The test pit soil samples were all collected from a depth of less than 4 feet, and for the purposes of this discussion are considered to be surface soil samples. High concentrations of toluene (3,300 ppm), 2-butanone (14,000 ppm), 4-methyl-2-pentanone (6,600 ppm), trichloroethene (220 ppm), bis(2-ethylhexyl) phthalate (84 ppm), di-n-butylphthalate (2.7 ppm), naphthalene (10 ppm) and 2-methyl-naphthalene (15 ppm) and other compounds were present in Areas 2 and 4. No significant levels of contaminants were detected in Area 3. Table 1 present a summary of the compounds detected in the test pit soil samples.

The contents of the drums found in areas 2 and 4 were not sampled. However, visibly stained soils surrounding the drums were sampled and it was assumed that some of the same compounds found in the soils were also present in the drums. It was estimated that approximately forty drums, some visibly intact and other crushed, were buried within Areas 2 and 4.

Subsurface Soils

Ten soil borings were drilled in Area 2, and monitoring well borings were also drilled in other areas to determine the extent of subsurface soil contamination. The soil borings closest to Areas 2 and 4 exhibited the highest concentrations of organic contaminants. Contaminants were predominantly present up to a depth of 8 feet in appreciable amounts (greater than 100 ppb) of volatile organic compounds). A soil boring in Area 2 (highest detected concentration), at a depth of 2 to 3.5 ft, indicated the presence of organic compounds such as toluene (2,600 ppm), 4-methyl-2-pentanone (18 ppm), naphthalene (43 ppm), 2-methylnaphthalene (4.5 ppm), di-n-butylphthalate (43 ppm), and bis(2-ethyl-hexyl)phthalate (6.2 ppm). Tentatively identified compounds (TIC) encountered in soil boring samples included triphenyl phosphate acetic acid (1.5 ppm), and tetrahydrofuran (0.012 ppm). A summary of the analytical results is presented in Tables 2 and 3.

The most frequent contaminants were bis(2-ethylhexyl)phthalate which was detected in 6 of 21 samples (6/21), toluene (8/23), 2-butanone (6/23), 4-methyl-2-pentanone (6/23), chloroform (5/23), and acetone (10/23). None of the samples indicate the presence of any pesticides or PCBs.

Among the inorganics, chromium was the only metal of concern present in the soil boring samples. Chromium was detected in all of the samples at estimated concentrations ranging from 8.7 to 24.4 ppm. The highest detected level was less than half the average U.S. Soils range of 150 ppm (see Table 4) but was above the site background levels of up to 15.3 ppm, as shown in Table 5. The highest concentration was obtained close to the surface (2-2.6 ft) while the sample with the lowest concentration was collected at a depth of 15-15.8 ft. There was no apparent trend in the spatial distribution of this metal. Lead was not detected in any of the soil boring samples above U.S. background levels (30 ppm) but was detected in 7 of 15 samples above the site background of 6.5 ppm.

GROUNDWATER

Previous investigations of the Sarney site groundwater concentrated on the overburden groundwater and leachate water (see Figure 3; Tables 6 and 7). No monitoring wells were drilled to test on-site bedrock aquifer groundwater during prior investigations. For the bedrock aquifer groundwater, samples were collected from the residential wells in and around the site (see Table 8).

A total of 12 on-site wells and 10 residential wells were sampled for over 120 contaminants during the RI groundwater sampling program. The on-site wells that were sampled are as follows: three existing overburden wells, four newly installed overburden wells, and five newly installed bedrock wells. Two rounds of groundwater samples were obtained on two thirds of the monitoring wells.

As noted above, there are two distinct aquifers at the site, the overburden aquifer and the bedrock aquifer. The sampling results for the bedrock aquifer are broken into two distinct categories (on-site bedrock aquifer and residential bedrock aquifer) in order to facilitate the discussion.

On-site Overburden Aquifer

Based on the first round of sampling the overburden aquifer was not contaminated above New York State or Federal MCLs for organic compounds (see Table 9A). All the organic contaminants that were detected had concentrations of less than 5 ppb except for di-n-butylphthalate, which was detected in the existing monitoring wells, MW-01 and MW-03 with a maximum concentration of 120 ppb. Based on the second round of sampling only monitoring well 2, which was located north of Area 2 towards Cleaver Swamp, indicated the presence of 1,2-dichloroethane (380 ppb), toluene (130 ppb), and trichloroethene (11 ppb) at high estimated concentrations (see Table 9B). Both MW-03, located east of Area 2, and EW-2S, located northeast of Area 4, indicated the presence of bis(2-ethylhexyl)phthalate (14 ppb). Based on the available data, it is believed that within the overburden aquifer, the groundwater contamination was confined to the areal limits of the on-site study area.

No tentatively identified compounds were detected in the overburden aquifer for either the VOC or BNA fractions. None of the samples indicated the presence of pesticides or PCBs.

On-site Bedrock Aquifer

The on-site bedrock aquifer was contaminated (greater than MCL levels) by 1,2-dichloroethane (131 ppb) and vinyl chloride (14 ppb), in the areas northeast of Area 4 and north of Area 2 towards the Cleaver Swamp (see Table 9A). No other compounds were found above the MCLs. Both bedrock aquifer monitoring wells (EW-3D and EW-4D) located north and northeast of Area 2 indicated the presence of bis(2-ethylhexyl)phthalate (17 ppb), in the second round of sampling (see Table 9B).

Lead as total metal was detected in concentrations ranging from 2.5 to 12.7 ppb. Lead as dissolved metal was not detected in any of the samples.

In Area 4, the disposal pits are believed to be the sources of contamination affecting the soil and groundwater media within the areal limits of the pits. The proximity of the bedrock surface in this area, and exposed bedrock outcrops in the vicinity, suggest that the contamination from this area migrates downward into the underlying bedrock. It is probable that part of this contamination may flow in limited areas towards the swamp due to a potential upward hydraulic gradient, as evidenced by existence of "artesian" conditions at EW-2D.

Residential Bedrock Aquifer

All the residential wells were located in the bedrock aquifer (see Figure 4). Ten of the previously tested 20 residential wells in the vicinity of the site were sampled by Ebasco. Table 10 presents a summary of the compounds detected in residential well water samples.

None of the residential wells sampled by Ebasco indicated the presence of any organic or inorganic contaminants that were above State or Federal drinking water standards. Contrary to the on-site bedrock aquifer, residential wells in the bedrock aquifer were not contaminated with 1,2-dichloroethane or vinyl chloride. Among the organic compounds detected in trace amounts were di-n-butylphthalate (3 ppb), 2-hexanone (0.9 ppb), diethylphthalate (4 ppb), chloromethane (0.9 ppb), carbon disulfide (0.1 ppb), chloroform (0.2 ppb), 1,2-dichloroethene (3 ppb), 1,2-dichloro-propane (0.2 ppb), trichloroethene (2.1 ppb), chlorobenzene (0.1 ppb), and cis-1,2-dichloroethene (1.4 ppb). All the samples were negative to the presence of pesticides or PCBs. No TICs were identified in either the VOC and BNA fractions for the residential well samples. None of the residential well water samples indicated the presence of arsenic. Other metals were detected at trace levels, including lead (5 ppb) and nickel (10 ppb).

This information was consistent with past sampling conducted by EPA and others. A complementary sampling of the residential wells was conducted by the New York State Department of Health (NYSDOH) in June 1990. 1,1-Dichloroethane (2 ppb) was the only compound reported by NYSDOH to be found above the analytical detection limit (0.5 ppb) in the residential wells. This value is below the current New York State Maximum Contaminant Limit (MCL) of 5 ppb.

Surface Water

Under this investigation, a total of 12 surface water samples were taken from Cleaver Swamp, ponds and a stream situated on the western side and adjacent to the site under investigation. Of these twelve samples, one was positive for vinyl chloride (68 ppb). Trace amounts of 1,2-dichloroethane were detected in almost all sample locations within Cleaver Swamp for surface water at concentrations less than 5 ppb, indicating that the surface water in Cleaver Swamp was not contaminated at levels of concern with this compound. Some of the samples indicated the presence of 2-butanone at low concentrations (less than 5 ppb). Surface water samples taken from Pond I, III, & IV and also from the stream indicated that the surface water was not contaminated with these compounds. A summary of the chemicals detected in previous and current investigations is presented in Tables 11 and 12. Aside from a single sample collected within the marsh, none of the recent sampling results indicated inorganic contamination at significant levels. This 1 sample was of concern due to arsenic detected at a concentration of 52 ppb.

Sediment

The only compound of concern was di-n-butylphthalate whose concentrations were relatively high (150 ppb) within the wetland region at depths of 1-2 feet. Previous site history indicated the presence of phthalates. Sediment samples taken from Pond I and Pond III also indicate the presence of pyrene (87 ppb). The analyses of the sediment samples (see Table 13) indicate that sediments from Cleaver Swamp and the ponds west of the Sarney Property Site are not contaminated by volatile organics.

Inorganic sediment data indicate that metals, although varying in concentration throughout the site, do not exceed background levels for glacial till, with the exception of lead which was found throughout the marsh and unnamed stream, and selenium which was found at elevated levels for two sites within the marsh. As selenium was not detected in any of the surface water samples, and demonstrated limited occurrence within the marsh sediments, it is assumed to be largely unavailable for biological uptake.

Based on inspection of available data sets, the majority of on-site contaminants appears to enter the marsh and become contained relatively close to the disposal areas. It is not known whether this is attributable to a "filtering effect" often associated with wetland ecosystems, or a constant influx of contaminants from overland flow and groundwater discharge (coupled with continuous transport out of the marsh ecosystem). The insignificant levels of contaminants found in the stream suggests that transport of contaminants via the marsh is limited.

SUMMARY OF SITE RISKS

A baseline risk assessment was conducted to estimate the potential human health impact associated with Sarney Farm if the contamination at the Site is not remediated.

Selection of Indicator chemicals

Indicator chemicals (compounds and chemical classes for which quantitative risk assessments were constructed) were identified for each medium on the basis of their frequency of occurrence, levels of occurrence, demonstrated relationship to site activities, local and regional background levels, and availability of toxicological parameters for risk assessment. The selected indicator chemicals are listed in Table 14A.

Dose Response Evaluation

Under current EPA guidelines, the likelihood of carcinogenic (cancer causing) and noncarcinogenic 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 noncarcinogenic risks associated with exposures to individual indicator compounds summed to indicate the potential risks associated with mixtures of potential carcinogens and noncarcinogens, respectively.

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 drinking water) are compared with the RfD to derive the hazard quotient for the contaminant in the particular media. The hazard index is obtained by adding the hazard quotients for all compounds across all media. A hazard index greater than 1 indicates that potential exists for non-carcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The reference doses for the indicator chemicals at the Sarney Farm Site are presented in Table 14B.

Potential carcinogenic risks were evaluated using the cancer potency factors developed by the EPA for the indicator compounds. Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, 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 CPF. Use of this approach makes the underestimation of the risk highly unlikely. The CPFs for the indicator chemicals at the Sarney Farm Site are presented in Table 14C.

For known or suspected carcinogens, the EPA considers excess upper bound individual lifetime cancer risks of between 10^{-4} to 10^{-6} to be acceptable. This level indicates that an individual has not greater than a one in ten thousand to one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year period under specific exposure conditions at the site. The 10^{-6} risk level is the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure.

Exposure Assessment

Two basic scenarios were developed based on present (agricultural) and potential (residential) land use at the Site. Under both scenarios several pathways (direct contact, inhalation and ingestion) were evaluated for exposure to surface and subsurface soils; sediments and surface waters in the pond, streams, and wetland areas; and groundwater used for drinking and domestic purposes from the bedrock aquifer on the Site. Exposed populations included on-site and off-site residents, farm workers and construction workers. Two estimates were developed, corresponding to the maximum concentration detected or "worst case scenario" and a representative exposure or "most reasonable case". Worst-case exposure scenarios were developed using the highest observed concentrations, or the arithmetic mean in the case of site soils, for each contaminant in the medium of interest. Representative-case exposure scenarios were developed using a more realistic but still conservative exposure assumptions, and taking as their inputs the geometric mean of all the analyses of the indicator chemicals in the medium of interest. The specific exposure scenarios considered are described in detail in Tables 15A and 15B.

Risk Characterization Results

The results of the baseline risk assessment for the Sarney Farm site are summarized below by medium of exposure and exposure pathway. A more detailed summary is presented in Table 16.

- Groundwater

Of all the exposure pathways considered, including both current and future use scenarios, only one presented a risk which was not within EPA's acceptable representative-case excess cancer risk range. Under this scenario, future use of bedrock groundwater, the calculated potential representative-case excess cancer risk posed was 3.44×10^{-3}. The worst-case excess lifetime cancer risk associated with the same scenario was 1.07×10^{-2}. Under the present use scenario, the representative and worst-case excess cancer risks were 1.55×10^{-6} and 3.09×10^{-6}, respectively. More than 99% of the risk was associated with ingestion of groundwater containing arsenic, vinyl chloride and 1,2-dichloroethane. However, arsenic was not recommended for cleanup because of the following: the risk was calculated with the CPF for inhalation of arsenic since there is currently no CPF for arsenic exposure via ingestion, yielding overestimates of risk; and dissolved arsenic levels were all below the Federal or State MCLs.

Non-carcinogenic health effects were also a concern for bedrock groundwater utilization under the future-use worst-case exposures. The worst case CDI/RfD ratio was 5.55, stemming largely from the ratio of 5.22 for lead exposure. The representative-case just slightly exceeded the hazard index threshold at 1.14, with the lead CDI/RfD ratio at 1.07.

The risk assessment concluded that based on the residential well sampling results there was no unacceptable risk to residents currently utilizing these sources as a drinking water supply.

- Soils

Under the worst-case, present-use scenario, residential or worker exposure to surface soils resulted in lifetime cancer risks significantly below EPA target range. The total potential excess cancer risk associated with each of these pathways was approximately 4×10^{-7}. For residents, the representative-case future-use scenario represented no significant excess cancer risk (2.08×10^{-8}); however, the worst-case future-use scenario resulted in life time potential excess cancer risk significantly greater than the target risk range, at 3.04×10^{-3}. This risk was associated with inhalation of volatile organic compounds emanating from subsurface soils into home basements built on Areas 2 and 4. The representative-case and worst-case risk to residents exposed to soils under the current use scenario were 1.41×10^{-9} and 3.86×10^{-7}.

Worst-case future use exposure estimates for residents to site soils also indicated a significant potential concern for non-cancer health effects. This risk was associated with inhalation of volatile organic compounds emanating from subsurface soils into home basements built on Areas 2 and 4. The CDI/RfD ratios for 2-butanone and 4-methyl-2-pentanone exceeded the hazard index threshold of 1 by more than two orders of magnitude at 436 and 233, respectively. The CDI/RfD for toluene was about one order of magnitude greater than the threshold at 7.8. No non-cancer risks were found for the worst-case present-use scenario for site residents.

None of these compounds presented significant risks for residents under representative-case present-use or future-use exposures.

o Surface Water

The worst-case and the representative-case present-use potential excess cancer risks were 4.68×10^{-4} and 1.36×10^{-5}, respectively. In both representative and worst-case risks, the majority of the risk results from exposure to arsenic. Only 1 of 12 samples collected had detectable levels of vinyl chloride. This one sample resulted in vinyl chloride posing a risk under the worst case scenario. This did not occur in the representative case. As noted above, there are large uncertainties associated with the risk estimates for arsenic, especially in regard to the use of a CPF for inhalation since no CPF is available for the oral route of exposure to arsenic. Therefore, neither arsenic or vinyl chloride was recommended for cleanup in the swamp. No other risks were associated with exposure to swamp water or swamp sediments. No health risks were posed by exposure to the sediments and surface water of the ponds and stream associated with the site.

In no case did the current uses of the site (the present-use pathways) pose a health risk to any receptor under the representative case exposures.

Environmental Risks

As noted above, Cleaver swamp represents the most valuable on-site ecological habitat. Sampling data for the swamp and other on-site surface water bodies indicate infrequent detection of indicator compounds at low concentrations in this media and further suggest that contaminants entering the marsh are contained relatively close to the disposal area and that contaminant transport to the nearby stream is limited.

The available data on the effects of compounds on aquatic and terrestrial flora and fauna is limited. However, the high functional ecological value of the marsh as wildlife habitat, in conjunction with relatively low levels (and numbers) of known contaminants, indicates that the adverse impacts caused by physical disturbance of this ecosystem (through remediation alternatives involving excavation of the wetlands) would significantly outweigh the potential benefits of subsequent surface water/sediment treatment. Furthermore, assuming the sources(s) of contaminants are removed or immobilized (i.e., contaminated drums and soils), it appears that current contaminant levels within the marsh and stream pose negligible risks to flora and fauna. All alternatives for remediating the sources of contamination should incorporate measures to ensure that the habitat is not negatively impacted during the remediation. Remediation of these sources would effectively reduce the loading of contaminants to the wetland.

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 chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals 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. In the risk assessment for Sarney Farm, arsenic posed a high level of cancer risk due in part to the use of an inhalation Cancer Potency Factor for arsenic in the absence of appropriate criteria for evaluating oral exposures. It is uncertain to what extent the risks due to arsenic are overestimated due to the use of the inhalation CPF. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the baseline risk assessment provides upper bound estimates of the risks to populations near the Sarney Farm 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 this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF ALTERNATIVES

Following a screening of remedial technologies in accordance with the NCP, five remedial alternatives were developed for contaminated groundwater; three remedial alternatives were developed for treatment of soil and disposal of drums. The alternatives were further screened based on technical considerations such as effectiveness, implementability and cost. The remedial alternatives not retained for a detailed evaluation were: land use restrictions, fencing and posting of warning signs (SC-2); and, excavation, off-site incineration and disposal of soils and drums (SC-3).

A description of the remedial alternatives retained and evaluated in detail is provided below. The time to implement as used herein means the time required for site preparation and for actual on-site construction and start-up activities. It does not include the remedial design phase which typically takes 12-18 monts to complete.

CONTAMINATED DRUMS AND SOILS ALTERNATIVES (SC)

- SC-1 No further action
- SC-4 Off-site treatment/disposal of drums and on-site low temperature thermal treatment of soils
- SC-5 Off-site treatment/disposal of drums and off-site soils treatment/disposal

SC-1 NO FURTHER ACTION

Capital Cost: none
Present Worth Cost: $264,000
Time to Implement: Immediate

In this alternative, no further remediation of soils and drums beyond the current EPA removal action would occur. Contaminated soil and drums would remain in place and continue to act as a source of groundwater contamination. A long-term monitoring program would be implemented in order to assess the migration of the contaminated groundwater. The monitoring program would include an annual inspection of the Site as well as sampling and testing of the surface water and groundwater every six months for 30 years, or as deemed necessary. In addition, because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every 5 years to assure that the remedy continues to be protective of human health and the environment. This five year review would be accomplished through the monitoring program.

SC-4 OFF-SITE TREATMENT OF DRUMS AND ON-SITE LOW TEMPERATURE THERMAL TREATMENT OF SOILS

Capital Cost: $644,000
Present Worth Cost: $644,000
Time to Implement: 14 months

This alternative involves excavating the drums in Areas 2 and 4 and approximately 2,365 cubic yards (cy) of contaminated soil. The excavated drums would then be placed in overpack containers and transported to a Resource Conservation and Recovery Act (RCRA) permitted off-site treatment and disposal facility. The facility would incinerate, or treat in some other way, the drummed wastes and then dispose of the drum residues. The contaminated soil would be treated on-site using a low temperature thermal treatment unit. In the soil treatment facility, hot air would be injected into the soils at a temperature of 260 degrees Centigrade. Volatile organic compounds in the soil (e.g. toluene) would be volatized into the air stream and combusted in an afterburner where they would be destroyed. The off-gas from the afterburner would be treated in a scrubber for particulate adsorption and gas removal. After treatment the soil, which would no longer contain hazardous substances above health based levels, would be used to back fill and regrade the excavated areas. Proper engineering measures would be implemented to control air emissions, fugitive dust, run-off, erosion and sedimentation. The RCRA land disposal restrictions would not be applicable since the treated soil would not be a RCRA hazardous waste.

SC-5 OFF-SITE TREATMENT OF DRUMS AND SOILS

Capital Cost: $1,657,100
Present Worth Costs: $1,657,100
Time to Implement: 14 months

This alternative consists of excavating the contaminated drums and soils as described in SC-4. The drums would then be placed acks and transported to an off-site RCRA permitted treatment and disposal facility. For the purpose of developing a cost for this alternative, low temperature thermal treatment was chosen as the most cost-effective technology for the off-site treatment of soils. Treated soils would be disposed of by the treatment facility operator in accordance with RCRA regulations. Clean fill would be brought in to back fill and regrade the excavated areas. Proper engineering measures would be implemented to control fugitive dust, run-off, erosion and sedimentation.

CONTAMINATED GROUNDWATER ALTERNATIVES (GW)

- o GW-1 No further action
- o GW-2 Carbon adsorption treatment systems at residential wells
- o GW-3 Collection and treatment of groundwater using an air stripper
- o GW-4 Collection and treatment of groundwater using hydrogen peroxide with UV light
- o GW-5 Collection and treatment of groundwater at existing on-site aeration system

A description of the remedial alternatives retained and evaluated in detail is provided below. The time to implement as used herein means the time required for site preparation and for actual on-site construction and start-up activities. It does not include the remedial design phase which typically takes 12-18 months to complete, long-term operation of the treatment system, or long-term monitoring.

GW-1 NO FURTHER ACTION

Capital Cost: none
Present Worth Cost: $263,500
Time to Implement: Immediate

A no further action alternative would involve conducting a long-term program to monitor the migration of contaminants in the bedrock aquifer underlying the Site. The monitoring program would involve the sampling of existing monitoring wells installed on-site plus the residential wells located in the vicinity of the site. In addition, testing would be performed to further delineate site-specific hydrogeological conditions, including: evaluation of topographical features (i.e., bedrock outcrops), measurement of water levels in the bedrock wells, and performance of "Packer Tests" in the bedrock wells. Pending the results from this testing, additional monitoring wells may be installed; the number and location would be determined at the time. This testing would provide more information on fracture angles and patterns, and extent of contamination.

Under no further action, the existing on-site treatment system would be disconnected once the buried drums were excavated and properly disposed of in an off-site facility. For the purposes of evaluating this alternative, it was assumed that the wells would be sampled every six months for 30 years. However, the frequency and duration of sampling could be altered based upon the results of the monitoring program. Surface water samples would also be collected and analyzed for contaminants. The information generated as part of the monitoring program and the hydrogeological testing would be used to ensure that the alternative is protective of human health and the environment. Deed restrictions would be placed on the property in order to prevent groundwater use in Areas 2 and 4. A five year review would also be performed, as required by CERCLA, since contaminated groundwater would be left on-site. Fact sheets would be distributed to the public, Town and County to inform them of the results of the monitoring program and to indicate whether contamination is spreading or otherwise causing a problem which must be addressed.

GW-2 CARBON ADSORPTION TREATMENT AT RESIDENTIAL WELLS

Capital Cost: $50,000
Present Worth Costs: $310,000
Time to Implement: 14 months

This alternative would involve setting up small individual carbon adsorption systems at existing residential wells as a point-of-use water treatment alternative. The water would be pumped from the individual well using the existing pump through a residential carbon adsorption system which would remove the organic contaminants. In addition, the installation of new wells in potentially affected areas would be discouraged through the release of routine site fact sheets to the Town and County if the results of the monitoring program indicate that contamination is spreading or otherwise causing a problem.

GW-3 COLLECTION AND TREATMENT OF GROUNDWATER USING AN AIR STRIPPER

Capital Cost: $632,900
Present Worth Costs: $1,640,000
Time to Implement: 14 months

This alternative is to pump and treat the groundwater from the plume area to prevent the migration of the contaminants. The major features of this alternative include groundwater pumping, collection, treatment and on-site discharge to Cleaver Swamp, and a long-term monitoring program. The groundwater would be pretreated using lime and polymers to remove iron. Following pre-treatment the water would be pumped to an air stripper where the volatile organic contaminants (e.g. 1,2-DCA and vinyl chloride) would be removed.

This alternative would treat contaminated groundwater to levels required by the Federal and State MCLs for public drinking water supply systems and the State surface water quality standards for discharge of effluent to surface water. However, it should be noted that engineering practicability and cost effectiveness of pump and treatment is questionable in lieu of the Site hydrogeological characteristics. The productive aquifer underlying the Site consists of medium to coarse grained fractured limestone bedrock. The movement of contaminants in this type of geology is highly influenced by the extent and location of the fractures, something extremely difficult if not impossible to determine accurately. The estimated time frame for treatment of the groundwater is 20 years, however this number is subject to much uncertainty.

GW-4 COLLECTION AND TREATMENT OF GROUNDWATER USING HYDROGEN PEROXIDE AND UV LIGHT

Capital Cost: $734,000
Present Worth Costs: $2,250,000
Time to Implement: 14 months

This alternative is similar to Alternative GW-3 in that it would attempt to clean up the contaminated bedrock aquifer. The major features of this alternative include groundwater pumping, collection, pre-treatment and a monitoring program as in Alternative GW-3. However, in this alternative the water would be treated using chemical oxidation with hydrogen peroxide and UV light. This treatment would reduce the volatile organic contaminants (e.g. 1,2-DCA and vinyl chloride) to levels required by the Federal and State MCLs for public drinking water supply and State surface water quality standards. The water would then be discharged to Cleaver Swamp. The same engineering limitations discussed under Alternative GW-3 apply to Alternative GW-4. The estimated aquifer restoration timeframe for this alternative is also 20 years.

GW-5 COLLECTION OF GROUNDWATER AND TREATMENT AT EXISTING ON-SITE SYSTEM

Capital Cost: $482,900
Present Worth Costs: $1,380,000
Time to Implement: 14 months

The major features of this alternative include groundwater pumping, collection, treatment and on-site discharge, and a long-term monitoring program. The groundwater would be pumped to the existing on-site aeration system. This system would remove the volatile organic contaminants (e.g. 1,2-DCA and vinyl chloride) from the groundwater.

The aeration system would be part of the existing treatment system consisting of an in situ soil washing system for organic contamination. The system as constructed consists of a network of french drains tied into a 1500 gallon collection/treatment tank (Figure 5). The tank incorporates three treatment processes consisting of two air lifts, floating absorbent blankets, and biological treatment. This system is currently operating at a flow rate of less than 12 gallons per minute. The current system would be modified (i.e., to increase contact time between groundwater and the packing) in order to ensure that the contaminants would be reduced to the required levels. From the collection/treatment tank the groundwater is pumped through packed beds of imbiber beads. The beads are made of an organic resin which adsorbs most of the remaining contaminants in the groundwater. The groundwater is then pumped through a carbon adsorption bed for final polishing before being discharged to Cleaver Swamp.

This alternative would reduce contaminated groundwater to levels required by the Federal and State MCLs for public drinking water supply. The pumping, collection, discharge system and monitoring program would be the same as discussed in Alternative GW-3. The same engineering limitations discussed previously under GW-3 apply to Alternative GW-5. The estimated aquifer restoration timeframe for this alternative is also 20 years.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

EPA has developed nine criteria (OSWER Directive 9355.3-01), codified in the NCP §300.430 (e) and (f), to evaluate potential alternatives to ensure all important considerations are factored into remedy selection decisions.

They are summarized below:

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. A comprehensive risk analysis is included in the RI.

Compliance with ARARs

Addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements (ARARs) and/or provide grounds for invoking a waiver. A complete listing of ARARs for this Site can be found in section 3 of the FS.

Short-term effectiveness

Involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period of this alternative.

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

Refers to the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

Implementability

Involves the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost

Includes both capital and operation and maintenance costs. Cost comparisons are made on the basis of present worth values. Present worth values are equivalent to the amount of money which must be invested to implement a certain alternative at the start of construction to provide for both construction costs and O and M costs over a 30 year period.

Community Acceptance

Indicates whether, based on a review of the comments received on the RI/FS and Proposed Plan during the public comment period, the community supports or opposes the preferred alternative.

State Acceptance

Indicates whether, based on its review of the RI/FS and Proposed Plan, the state concurs with, opposes, or has no comment on the preferred alternative.

ANALYSIS

CONTAMINATED DRUMS AND SOILS ALTERNATIVES

1. Overall Protection of Human Health and the Environment

Alternatives SC-4 and SC-5 provide treatment of contaminated soils and drums and would reduce the concentration of contaminants in the soils to levels which would be protective of human health and the environment under both current and potential future uses. SC-4 involves on-site low temperature soil treatment whereas SC-5 involves soil treatment off-site. The no-action alternative would leave hazardous substances on-site which would continue to leach into the aquifer and also continue to pose a threat under the future use scenario. Therefore, the no action alternative would not be protective of human health and the environment.

2. Compliance with ARARs

Alternatives SC-4 and SC-5 would de designed and implemented to comply with all action-specific ARARs since the sources of the contamination would be removed and the threat to human health and the environment posed by those sources would be eliminated. There are no applicable Federal or State regulations that can be utilized to specify the numerical cleanup levels for contaminants in soils at the site. ARARs pertinent to air quality standards would be attained. The transportation and treatment of wastes at an off-site facility would be accomplished in accordance with State and Federal hazardous waste management requirements. The off-site facility would be fully RCRA permitted and, therefore, would meet applicable regulations. Drummed wastes would be treated using specific technologies or specific treatment levels, as appropriate. Under alternative SC-4, contaminated soils will be treated to health-based levels. Since the treated soils would no longer contain hazardous constituents above health-based levels, they could be redeposited on-site in compliance with all RCRA standards. As noted above, the land disposal restrictions would not be applicable to the disposal of the treated soils.

No action-specific ARARs would be triggered by the no action alternative. The leaking drums and contaminated soil would continue to severely damage the existing environment as contaminants would continue leaching into the groundwater and surface water.

A list of all the ARARs is provided in Table 17.

3. Long-Term Effectiveness

Alternatives SC-4 and SC-5 would be similar in their effectiveness over the long-term, as wastes would be removed and treated, thereby eliminating the potential threat to human health and the environment both through direct contact and leaching of contaminants into the groundwater. There are no long-term effects on human health that would result from the implementation of these alternatives.

Alternative SC-1 would not be effective over the long term. There is potential for exposure to contaminants through direct contact and leaching of contaminants into the groundwater under current and future land uses.

Reduction in Toxicity, Mobility, or Volume

Treatment represents a permanent remedy. Treatment would reduce the toxicity, mobility and volume of the contaminants in the soil. Alternative SC-4 would involve on-site low temperature thermal treatment, whereas alternative SC-5 would involve off-site low temperature thermal treatment, or some similar treatment technology. Under alternative SC-4, soils would be treated to reduce concentrations of contaminants such that the soil would no longer contain hazardous substances above health based levels, thereby, reducing the toxicity, mobility and volume of contaminants. The same goal would be accomplished through alternative SC-5. Therefore, both alternatives would reduce concentrations in soils to the same action levels and would be very similar in their ability to reduce the mobility, toxicity, and volume of contaminants. In each alternative, the drums would be treated off-site, thereby reducing the mobility, toxicity and volume of the contaminants. The no-action alternative would not result in a reduction of toxicity, mobility, or volume, since there would be no treatment associated with the alternative.

5. Short-Term Effectiveness

The short-term effectiveness concerns for the alternatives SC-4 and SC-5 include human health threats, adverse impacts on the environment, and safety of workers during implementation activities. The major activities of these alternatives are treatment of contaminated soil and off-site disposal of drums. A potential health threat to area residents would be direct contact with spilled wastes. However, this exposure pathway would be eliminated by restricting access to the site to authorized personnel only. The implementation of the alternatives would be monitored to ensure that all regulations are followed and to minimize worker exposure. Therefore, the short-term human health threat resulting from these alternatives would not be significant.

The short-term impacts on the environment would consist mostly of traffic-related problems during transportation. Although decontaminated and covered, passage of trucks through communities might raise community concerns. Alternative SC-4 would have less impact in this regard, since soils would be treated on-site resulting in less truck traffic.

Workers on-site during activities could be potentially exposed to contaminants. To minimize and/or prevent such exposures, use of personal protection equipment would be necessary. There is a potential impact to air associated with alternative SC-4 due to volatile organic compounds which would vaporize. However, these would be treated by a carbon adsorption system and properly disposed of. There are no short term impacts associated with the no action alternative.

6. Implementability

Alternatives SC-4 and SC-5 would not require substantial construction, institutional controls or a monitoring program. Alternative SC-5 is more easily implementable than SC-4, since SC-4 would require design and testing on-site for the treatment unit. Commercial treatment facilities are already in existence. No technological problems should arise as all the treatment technologies are well established and possess proven track records.

The quantity of waste to be treated from this site is not expected to be affected by the general market availability. However, depending on the facility, a lead time for waste acceptance at the treatment facility may be needed. Alternative SC-4 is better than SC-5 in this regard, since contaminated soil would be treated on-site. Under the no action alternative, there would be nothing to implement and therefore no implementability concerns.

7. Cost

Capital and present worth costs associated with alternatives SC-4 and SC-5 are $644,000 and $1,657,000, respectively (Table 18). These include costs for mobilization, sampling and handling, disposal, demobilization, contingency, and other costs associated with site remediation. Present worth costs for the no action alternative are $264,000. There are no capital costs for this alternative.

8. State Acceptance

The State of New York concurs with the selection of treatment alternative SC-4. This alternative is in agreement with the State's interest in public and environmental protection, since this remedy utilizes permanent treatment to the maximum extent possible.

9. Community Acceptance

The community has raised no objections to alternative SC-4 as the preferable treatment alternative. Several concerns were raised during the public comment period. These concerns are addressed in detail in the Responsiveness Summary (Appendix E). In general, the principal concerns are related to the potential health risk to the people living or working around the site. The residents also urged that the drums be removed from the Site as soon as possible to prevent further degradation of the aquifer.

CONTAMINATED GROUNDWATER ALTERNATIVES

1. Overall Protection of Human Health and the Environment

The results of the RI show that only on-site wells near the sources of contamination(i.e., soils and drums in Areas 2 and 4) were found to contain levels of indicator chemicals above the MCLs. If the sources of contamination were removed from the Site, natural processes such as biodegradation, volatilization, dilution and flushing would attenuate the aquifer contamination, and the potential risk to future site residents via groundwater would be eliminated. The nature of the flow at the Site would serve to maximize the effectiveness of biodegradation and volatilization processes. As a result, all the alternatives for groundwater remediation, including GW-1 (no further action), would be protective of human health and the environment assuming the sources of contamination are removed. The no further action alternative would "remediate" the aquifer in approximately 30 years through natural attenuation, a slightly longer period of time than required under alternatives GW-3, GW-4, and GW-5. Deed restrictions would prevent the use of ground water in Areas 2 and 4 until natural attenuation reduced the level of contaminants below MCLs.

The point of use treatment in Alternative GW-2 would provide the same protection to human health and the environment as alternative GW-1 since none of the residential wells are currently contaminated. Continued monitoring would ensure that the remedy remains protective. GW-2 would also gradually restore the site groundwater via natural processes. It provides extra assurances that residential well water would remain suitable for drinking in the future. However, the long-term monitoring aspects of GW-1 would also provide sufficient assurances for the same. Alternatives GW-3, GW-4, and GW-5 would also provide an uncertain degree of aquifer remediation within 20 years. However, due to the hydrogeological conditions at the Site (fractured bedrock aquifer), it is uncertain whether any pump and treat alternative would achieve a significantly greater and/or faster aquifer restoration than GW-1 or GW-2.

2. Compliance with ARARs

Alternative GW-1 would bring site groundwater into compliance with State and Federal ARARs via naturally-occurring contaminant attenuation processes after removal of the source material. The inherently slow groundwater flow is expected to passively control the migration of contaminants offsite. By definition, no action-specific ARARs would be triggered by the no action alternative. Alternative GW-2 would be designed to meet all contaminant-specific and action-specific ARARs. It would take approximately 30 years for both alternatives to meet the chemical-specific ARARs in the aquifer.

Alternatives GW-3, GW-4 and GW-5 would be designed to meet all contaminant-specific and action-specific ARARs by removing the volatiles from the groundwater. The groundwater would be treated to satisfy the drinking water standards thus eliminating contaminants before they reach the tap. These alternatives would eventually bring the aquifer into compliance with chemical-specific ARARs via active restoration and source control in approximately 20 years. However, this number would be subject to much uncertainty due to the Site hydrogeological conditions.

A summary of State and Federal ARARs is provided in Table 19.

3. Long-Term Effectiveness

The no action alternative (GW-1) would diminish the level of contaminants in the groundwater through natural attenuation processes (biodegradation, dilution and dispersion) in approximately 30 years. A monitoring program involving sampling of on-site monitoring wells and residential wells in the vicinity of the site every six months for thirty years, as necessary, would take place. Additional testing would also be conducted to better assess the site hydrogeological characteristics. The monitoring program and the hydrogeological testing would insure that contaminants in the residential wells do not exceed maximum contaminant levels (MCLs), and that action is not otherwise necessary to protect human health and the environment.

Alternative GW-2 would permanently protect the individual residents using the groundwater as a potable water source if contaminants reached the residential wells at levels above MCLs. Long-term maintenance of the treatment units such as replacing the filters would be necessary. GW-2 would meet the State and Federal standards for safe drinking water. In order to prevent exposure to contaminants through groundwater migrating into the site surface waters and off-site, both GW-1 and GW-2 rely on extensive monitoring and will continually assess any adverse impact to human health and the environment.

Upon completion of the treatment alternatives (GW-3 through 5) the concentration of the contaminants (e.g., 1,2-DCA and vinyl chloride) would be reduced to a level which meets or is less than the Federal and State MCLs. All potential risks to the public health and the environment would be eliminated upon completion of these treatment remedial actions; however, due to site-specific hydrogeological conditions (fractured bedrock aquifer) their effectiveness would be reduced to a certain degree. Some of the difficulties encountered by the treatment alternatives would be the lack of detailed data on the bedrock fractures, and the difficulties of mapping the fractures in the bedrock aquifer and placing the wells in the proper areas to capture all of the contaminated groundwater. In addition, flow through a fractured aquifer is generally highly variable. On account of this, the estimated period of time needed before meeting the MCLs under the treatment alternatives (20 years) may be comparable to that achieved under the natural attenuation (no action) alternative.

Alternatives GW-3 through GW-5 would be similar in that they are well developed and commercially available technologies widely used for the treatment of VOCs present in groundwater. These treatment systems are very reliable but monitoring would be performed to verify their performance. Alternative GW-1 would be the easiest to implement, followed by GW-2.

4. Reduction in Toxicity, Mobility, or Volume

Under GW-1 there is no treatment which reduces toxicity, mobility or volume, however natural attenuation would dilute contaminant volume over time such that it does not pose a threat to human health and the environment. Alternative GW-2 involves treatment of the groundwater at the point of use and potential restrictions on future use, which would reduce the toxicity and volume of contaminants in the groundwater used by individual residents. However, this reduction only protects those individuals who use the groundwater as a potable water source if contaminants were to reach residential wells at levels above MCLs. Both alternatives GW-1 and GW-2 make use of natural attenuation processes (e.g., biodegradation, dilution, volatilization) to reduce the toxicity and mobility of the contaminated groundwater.

Alternatives GW-3 and GW-4 would remove greater than 90% of the 1,2-DCA and greater than 99% of the vinyl chloride from the groundwater. The performance of the currently operating on-site facility (alternative GW-5) indicates it can remove the contaminants from the groundwater at above 90% efficiency. Alternatives GW-3, GW-4 and GW-5 would result in reduction in the toxicity of the groundwater, and the volume of contaminants in the groundwater would be reduced as the water is remediated. It should be noted that the success of any of the treatment alternatives would depend on their ability to capture the totality of the contaminant plume. Due to the site-specific hydrogeological conditions mentioned previously, it is uncertain whether any of the treatment alternatives would successfully locate and extract all of the contaminated plume.

5. Short-Term Effectiveness

None of the alternatives would remediate the aquifer in the short term. There would be no construction involved in the implementation of alternative GW-1, therefore, there are no short-term threats to workers, neighboring communities or adverse impacts on the environment. The implementation of this alternative would have no impacts on the environment or the public health. Alternatives GW-2 to GW-5 involve construction in implementation and pose minimal short-term threats to the workers, neighboring communities and the environment. The no action alternative would be implemented immediately, whereas alternatives GW-2 to GW-5 would be implemented in about fourteen months from initiation of construction.

6. Implementability

Alternative GW-1 would not entail the installation of any additional equipment, therefore, it would be easiest to implement. The monitoring program and hydrogeological testing designed for the site could be easily implemented and would be effective at monitoring contaminant migration from the groundwater into the surface water as well as off site. All technologies for alternative GW-2 are proven and are commercially available. The small carbon adsorption systems are capable of handling flows in the range of 0.1 gpm to 10 gpm and could be easily installed if contaminants appear at wells above MCLs. A proper maintenance program for the carbon adsorption units (e.g. replacement of expended filters) would need to be implemented. All components of this alternative would be carefully selected to meet the site specific constraints. Conditions external to the site, such as equipment availability, materials and services would present no problems at this time.

All technologies for alternative GW-3 are proven and commercially available. Air stripping is considered a cost-effective technology for removing volatile organics. The ultra violet light hydrogen-peroxide oxidation process involved in alternative GW-4 is relatively new, and, only a few vendors can supply the equipment and services. This process also requires that a high voltage line be brought in to operate the oxidation chamber. The existing on-site treatment system may have to be modified slightly in alternative GW-5; however, this is not expected to pose any problems.

Each of the treatment technologies have been proven effective in treating groundwater. However, in view of the complex hydrogeological conditions at the site, resulting from the presence of a fractured bedrock aquifer, it is uncertain whether the totality of the contaminant plume would be captured. Therefore, it is impossible to determine whether these alternatives, if implemented, would be more successful in remediating the aquifer than GW-1 or GW-2.

7. Cost

There are no capital costs in alternative GW-1. The capital costs involved in alternatives GW-2 to GW-5 are: $50,000,

$532,000, $734,000, and $482,900, respectively. The present worth cost in alternative GW-1 is $263,500. The present worth costs in alternatives GW-2 to GW-5 are: $310,000, $1,640,000, $2,250,000, and $1,380,000, respectively (see Table 20). Of the treatment alternatives, GW-5 would be the most cost effective. Overall, GW-1 would be the most cost efficient proportional to its effectiveness.

8. State Acceptance

The State of New York concurs with the selection of alternative GW-1. The State believes additional hydrogeological investigations are necessary to ensure that the selection of GW-1 is protective of human health and the environment.

9. Community Acceptance

The community has raised no objections to alternative GW-1 as the preferable alternative. Several concerns were raised during the public comment period. These concerns are addressed in detail in the Responsiveness Summary (Appendix E). In general, the principal concerns are related to the potential health risk to the people living or working around the site.

SELECTED REMEDY

The selected remedy combines the drums and soil treatment alternative SC-4 with the no further action alternative for groundwater GW-1. The EPA believes that this combination of alternatives best satisfies the criteria used to evaluate alternatives. Cost estimates associated with the preferred alternative are:

Capital Cost: $644,000
Present Worth: $907,500

The preferred alternative will involve the following actions:

Drums located in two areas of the Site will be removed, overpacked as necessary, and transported off-site to a permitted treatment and disposal facility. The drums in both areas are close to the surface. A shovel and a backhoe will be used to remove the overlying soil. In some areas of the Site the groundwater is very close to the surface, therefore it may be necessary to construct dewatering trenches upgradient of drum excavation areas in order to control groundwater intrusion. The soil surrounding the drums will be placed in a designated area and tested. If found to be contaminated it will be placed with the other contaminated soil and treated using on-site low temperature thermal treatment. Highly contaminated soil contiguous to the drums (if present) may be sent off-site with the drums.

An initial cleanup level has been established which will result in all soils being treated at acceptable risk-based levels, i.e. 10^{-6} risk levels. For the indicator chemicals, this will result in cleanup levels of 14 ppm for 2-butanone, 0.2 ppm for trichloroethene, 3.3 ppm for toluene, and 6.6 ppm for 2-methyl-2-pentanone. These numbers are based on the maximum soil concentrations encountered and a treatment efficiency of 99.9%, using a low temperature thermal treatment system. Average cleanup levels (reflecting lower contaminant concentrations) will be proportionally lower.

During the design phase, a more sophisticated soil-to-groundwater model will be used to determine whether different soil quantities and/or greater treatment efficiencies are required in order to protect the groundwater. The cleanup levels derived from the modeling effort will represent average contaminant concentrations of the indicator chemicals in the soil which will theoretically produce contaminant concentrations in the groundwater at the nearest receptor which meet potable water standards. The nearest receptor is considered to be the Sarney residence.

It is estimated that 2,365 cubic yards of soil will require treatment. However, this estimate will be refined during the soil sampling to be conducted as part of the design phase (including soil gas locations Z-0 to Z-18). Excavated soil will be transported to an on-site treatment facility i.e., a low temperature thermal treatment system. The thermal treatment process will be designed to handle 5 cubic yards of soil per hour. The treated soil will then be removed and tested to ensure that the soil no longer contains hazardous constituents above health-based levels and has achieved the health based clean up levels specified. This treatment will reduce the level of all indicator chemicals to below the health based clean-up criteria. The treated soil will then be used to backfill the excavated areas on site. This will eliminate the potential migration of contaminants from the contaminated drums and soils into the groundwater or surface water.

Natural attenuation of the groundwater contamination (e.g. biodegradation, dilution, dispersion) will reduce the levels of contaminants in the Site aquifer and the potential risk to the public from contamination will be eliminated. The slow nature of the groundwater flow on the site will serve to maximize the effectiveness of natural attenuation processes via biodegradation, volatilization and groundwater dilution. These naturally occurring processes should serve to attenuate the groundwater contaminant concentrations to acceptable levels over time (approximately 30 years). Until that time, deed restrictions will be placed on the property to prevent the use of ground water in Areas 2 and 4. The long-term monitoring program will be designed to include surface water, groundwater, and residential well sampling to verify that the remedy continues to be protective. The remedy will also include testing to better define the site hydrogeological conditions, including: evaluation of topographical features (i.e., bedrock outcrops), the measurement of water levels and the performance of "Packer Tests" in the bedrock wells. Pending the results from this testing, additional monitoring wells may be installed; the number and location would be determined at the time. The monitoring program and the hydrogeological testing, which will incorporate the five year review, will be further delineated during the remedial design phase of the project. These activities and the required five year review process will ensure that in the future, if there is evidence of significant changes in conditions which present a significant risk to human health or the environment, appropriate remedial action will be taken.

STATUTORY DETERMINATIONS

1. Protection of Human Health and the Environment

Alternative SC-4 is considered fully responsive to this criterion and to the identified remedial response objectives. Removal of the drums and treatment of soils on-site will prevent the release of contaminants to the environment and will constitute excellent protection of both human health and the environment. Natural attenuation of the groundwater contamination (GW-1) will reduce the levels of contaminants in the Site aquifer. The minor potential risk to the public from groundwater contamination should be eliminated by removal of the source and natural attenuation. The long-term monitoring program will ensure that public health is protected.

2. Compliance with ARARs

The selected remedy for source control, SC-4: off-site treatment/disposal of drummed wastes and on-site treatment of contaminated soils via low temperature enhanced volatilization, will comply with all related chemical-, action-, and location-specific ARARs. The off-site facility will be fully RCRA permitted and, therefore, will meet applicable regulations. Wastes will be treated using specific technologies or specific treatment levels. The selected source control remedy will be in compliance with ARARs such as the National Ambient Air Quality Standards for Hazardous Air Pollutants. In addition, contaminated soils will be treated to health-based levels. Since the treated soils would no longer contain hazardous constituents above health-based levels, they could be redeposited onsite in compliance with all RCRA standards.

The selected groundwater remedy, GW-1: no action with provisions for long-term monitoring and hydrogeological testing, will comply with the associated ARARs over time. They include: NY

Groundwater Quality Standards; and Federal Maximum Contaminant Levels (MCLs).

A summary of ARARs associated with the selected remedy is presented in Table 21.

3. Cost Effectiveness

The selected remedy is cost effective in that it provides overall effectiveness proportional to its cost. Alternative SC-4 is less expensive to implement than SC-5 and treatment will be conducted primarily on-site. Alternative GW-1 is the least expensive groundwater alternative and it is not expected to have any long-term impact on human health or the environment. Based on the information generated during the RI/FS, the estimated present worth cost for this remedy is $907,500, and the capital cost is $644,000.

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

The selected remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable. The selected remedy is considered to be a permanent remedial action, since the drums will be permanently removed off-site and treated and the contaminated soils will be treated on-site. The potential for future release of the waste to the environment will be eliminated. Treatment will reduce and/or eliminate the toxicity, mobility, and volume of the contaminants. Treatment of contaminated groundwater at the site is not considered practicable for treatment due to technical factors such as locating the "plume" and properly placing extraction wells. For this reason, and because EPA believes that natural attenuation will restore the aquifer within 30 years, a no action alternative which includes a monitoring program and deed restrictions, is considered to be protective.

No adverse impacts and threats to human health and the environment are foreseen as the result of implementing the selected remedy. Workers on-site during activities could potentially be exposed to contaminants. However, to minimize and/or prevent such exposures, personal protection equipment will be used.

The selected remedy will require some construction for on-site soil treatment and a monitoring program for groundwater. No technological problems should arise as all the treatment technologies are well established and possess a proven track record.

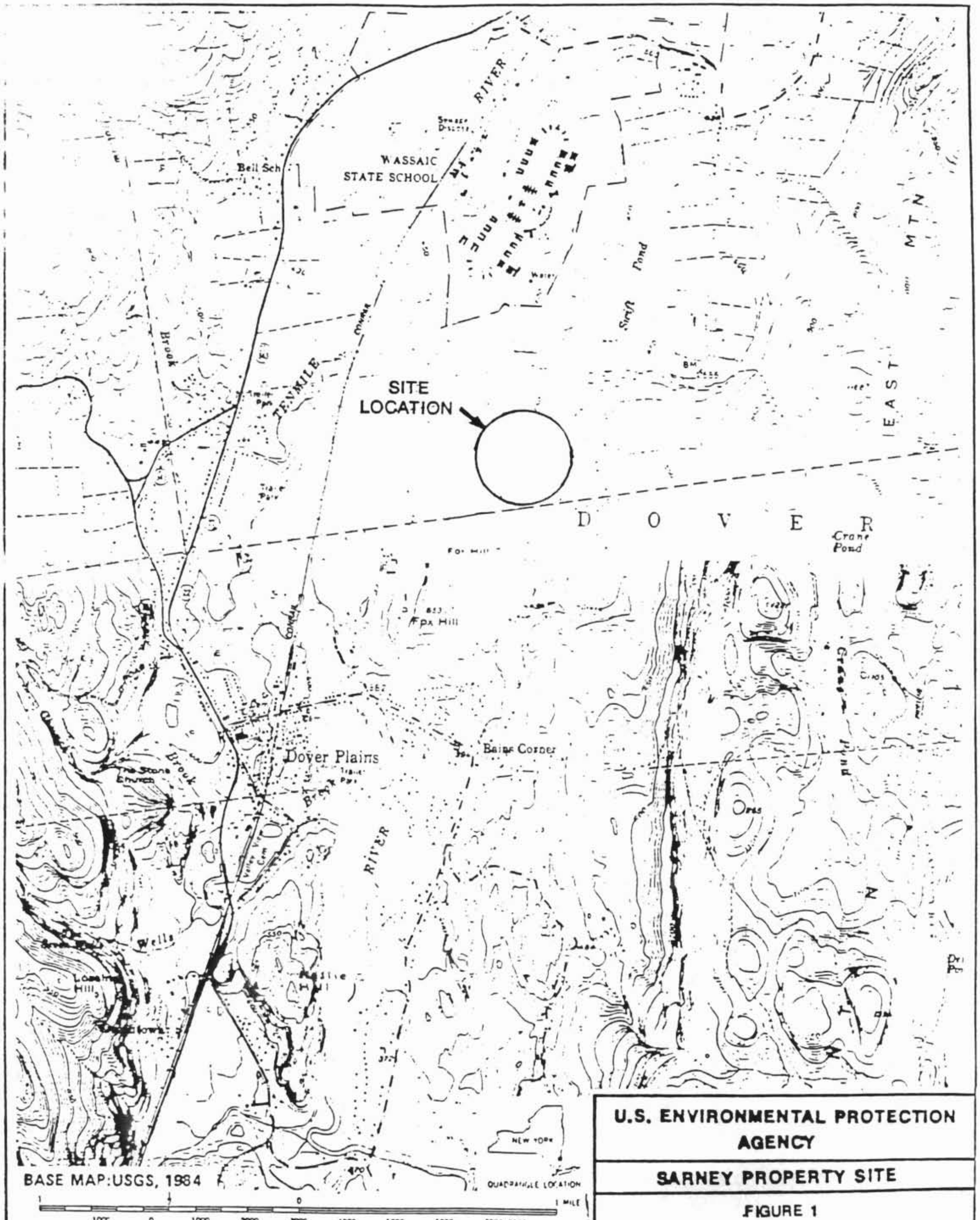
5. Preference for Treatment as the Principal Element

The selected remedy fully satisfies this criterion for the source of contamination which is considered the principal threat at the site. Groundwater will not be treated due to minimal contamination and because EPA believes that natural attenuation will restore the aquifer within 30 years. The groundwater will be carefully monitored to ensure protection of human health and the environment. If deemed necessary and feasible groundwater treatment will be provided in the future. The wastes found at the site indicate that treatment methods (e.g. off-site incineration, low-temperature soil treatment) will need to be used. Incineration will be the preferred technology for drums located in two areas of the site. The drums will be sent off-site to a RCRA permitted treatment and disposal facility. Groundwater will be monitored on a long-term basis to see if there is any significant change in conditions. As noted previously, groundwater is expected to reach MCLs in 30 years once the source of contamination is removed (contaminated soils and drums). Although this period will be somewhat longer than the 20 years estimated under any of the treatment alternatives, it should be considered that the efficiency of the treatment alternatives is questionable.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Sarney Farm site was released to the public on May 11, 1990. The Proposed Plan identified alternative SC-4 combined with Alternative GW-1 as the preferred alternative. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the selected remedy, as it was originally identified in the Proposed Plan, were necessary.

APPENDIX A. FIGURES

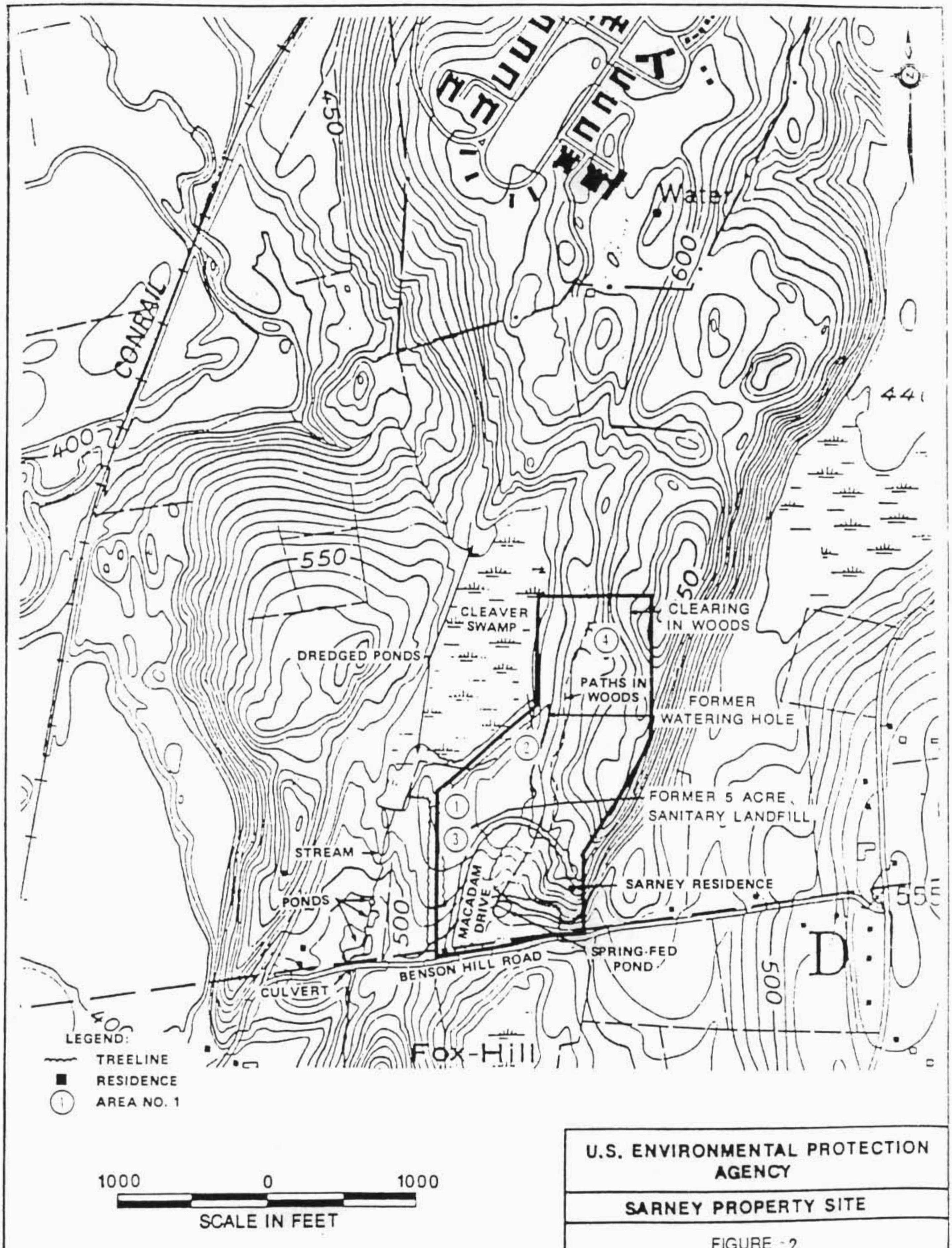


U.S. ENVIRONMENTAL PROTECTION AGENCY

SARNEY PROPERTY SITE

FIGURE 1
LOCATION MAP

EBASCO SERVICES INCORPORATED



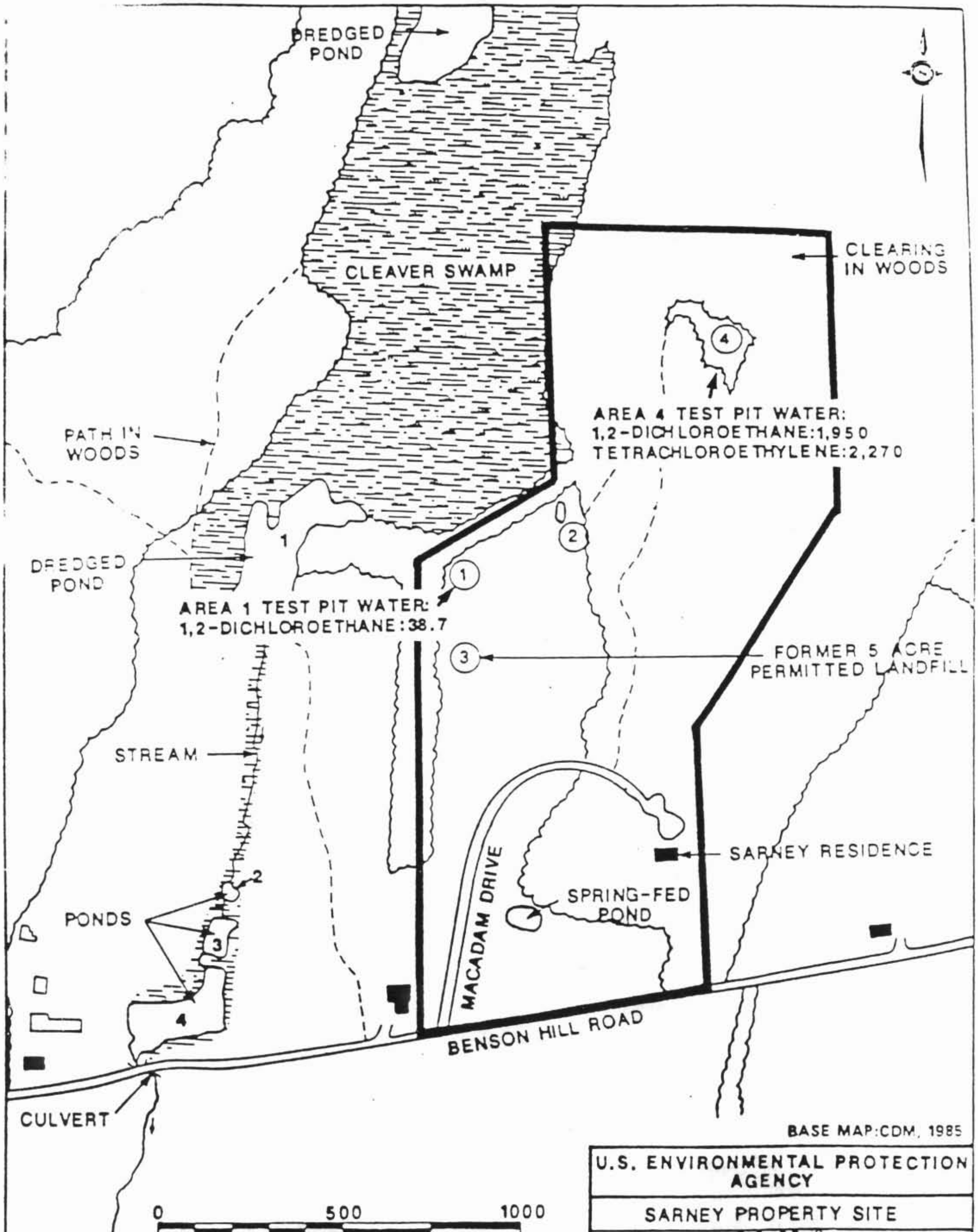
BASE MAP-USGS 1984

U.S. ENVIRONMENTAL PROTECTION AGENCY

SARNEY PROPERTY SITE

FIGURE 2
SITE PLAN

EBASCO SERVICES INCORPORATED



BASE MAP:CDM, 1985

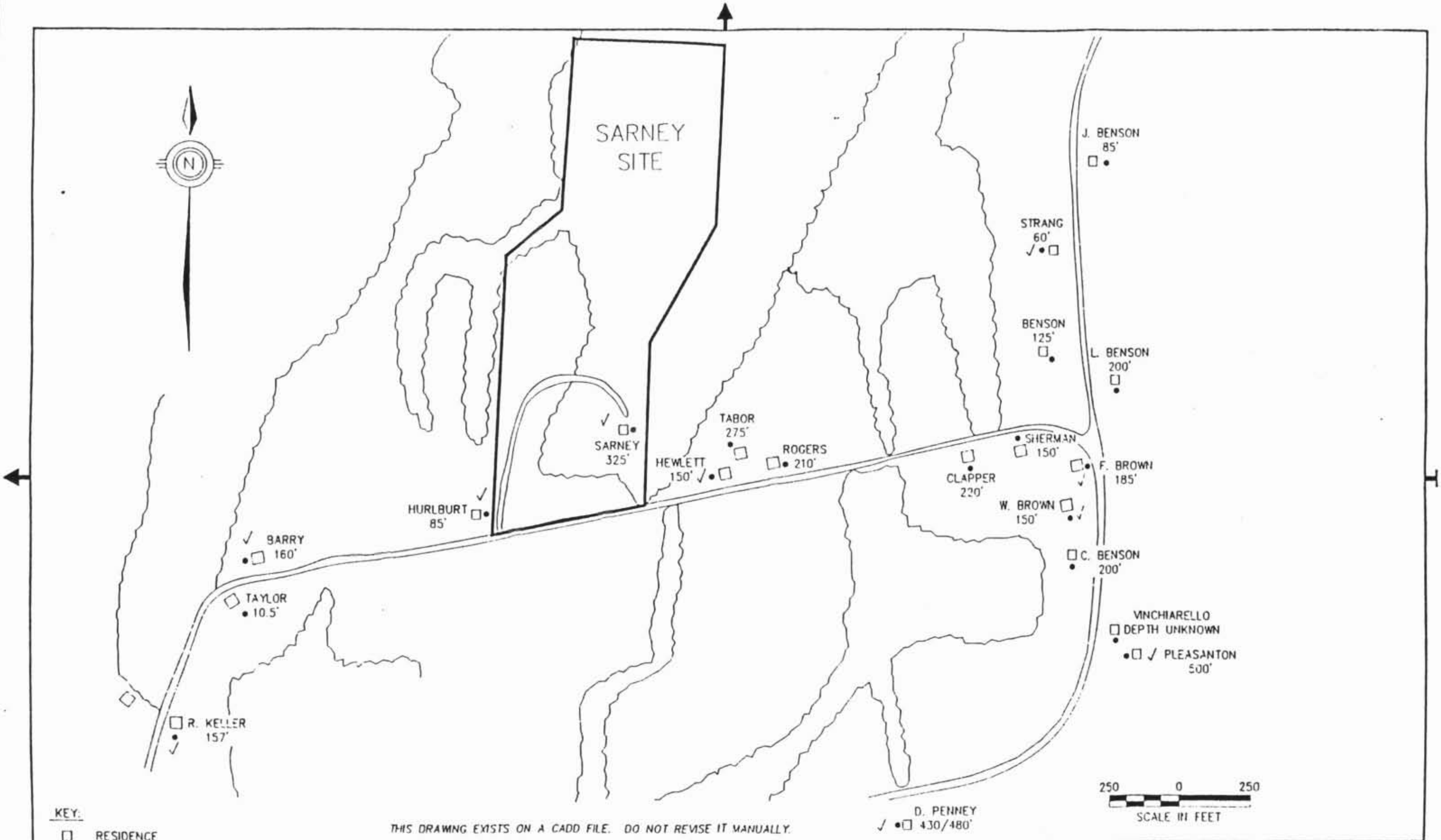
LEACHATE AND TEST PIT WATER RESULTS,ppb

U.S. ENVIRONMENTAL PROTECTION AGENCY

SARNEY PROPERTY SITE

FIGURE 3
TEST PIT WATER AND LEACHATE RESULTS FOR 1,2-DICHLOROETHANE AND TETRACHLOROETHYLENE, 1982 AND 1984

EBASCO SERVICES INCORPORATED



KEY:

□	RESIDENCE
●	WELL (DEPTH IN FEET)
✓	WELL SAMPLED

SOURCE: [illegible]

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EBASCO SERVICES INCORPORATED

DEPT ______ DR DSW

DATE ______ CH ___

SCALE AS NOTED

APPROVED

U.S. ENVIRONMENTAL PROTECTION AGENCY

SARNEY PROPERTY SITE

RESIDENTIAL WELL LOCATIONS

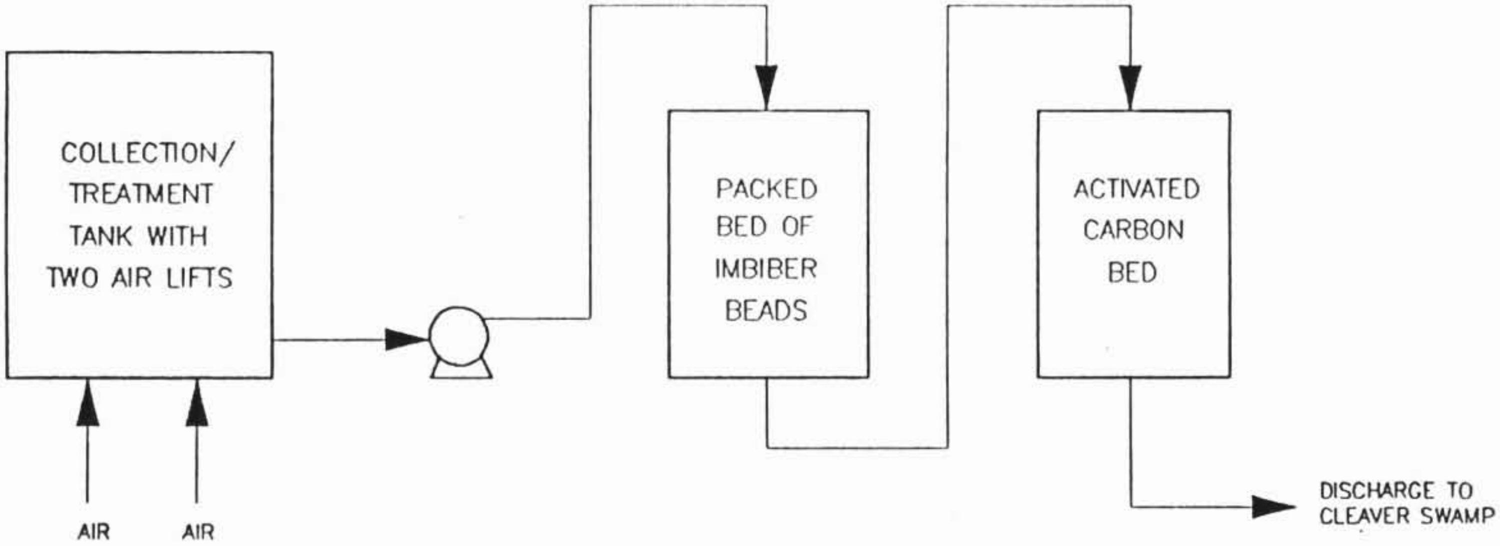
EPA 8310.008

FIGURE 4 .00

SAR-RE 21 DWG

FIGURE 5

EXISTING ON-SITE GROUNDWATER TREATMENT FACILITY



APPENDIX B. TABLES

TABLE 1

SUMMARY OF CHEMICALS DETECTED IN TEST PIT SOILS

COMPOUND	MINIMUM	MAXIMUM	ARITHMETIC MEAN	GEOMETRIC MEAN	No. OF DETECTS
** Class : SEMIVOLATILE (ppb)			No. of Samples = 23		
1,2,4-Trichlorobenzene	47.00 J	47.00 J	47.00		1
Naphthalene	5000.00	10000.00 J	7500.00		2
2-Methylnaphthalene	56.00 J	15000.00 J	5180.00		3
4-Nitrophenol	82.00 J	82.00 J	82.00		1
Phenanthrene	280.00 J	280.00 J	280.00		1
Di-n-Butylphthalate	79.00 J	2700.00	855.40		7
Butylbenzylphthalate	480.00 J	4600.00 J	2540.00		2
bis(2-Ethylhexyl)Phthalate	150.00 J	84000.00 BD	15600.00	3440.00	9
Di-n-Octyl Phthalate	55.00 J	1300.00 J	357.00		5
** Class : VOLATILE (ppb)			No. of Samples = 23		
Methylene Chloride	4.00 J	4.00 J	4.00		1
Acetone	17.00 J	17.00 J	17.00		1
Chloroform	2.00 J	2.00 J	2.00		2
1,2-Dichloroethane	6.00	6.00	6.00		1
2-Butanone	17.00 J	14000000.00 J	3340000.00		5
Trichloroethene	3.00 J	220000.00	110000.00		2
Benzene	1.00 J	1.00 J	1.00		1
4-Methyl-2-Pentanone	14.00 B	6600000.00	1370000.00		5
Toluene	2.00 J	3300000.00	723000.00		7
** Class : PESTICIDE / PCB (ppb)			No. of Samples = 23		
Aroclor - 1254	510.00	510.00	510.00		1
** Class : METALS (ppm)			No. of Samples = 23		
Aluminum	6490.00	25900.00	15200.00	13800.00	23
Antimony	4.40 J	7.60 J	6.00	5.78	2
Arsenic	1.20 J	9.00 J	3.79	3.57	23
Barium	17.10	57.80	36.40		14
Beryllium	0.61	3.90	2.05		11
Cadmium	0.54 J	63.80	4.65	1.24	18
Calcium	486.00	131000.00 J	53300.00	14100.00	23
Chromium	7.60	59.90 J	24.40	21.80	23
Cobalt	3.60	22.80 J	10.60	9.47	23
Copper	10.50 J	86.20 J	26.60	23.30	23
Iron	11300.00	38800.00	23200.00	21400.00	23
Lead	4.30 J	134.00	18.60	11.40	23
Magnesium	7320.00	88800.00 J	40900.00	30400.00	23
Manganese	239.00 J	753.00 J	460.00	441.00	23
Mercury	0.10 J	0.25 J	0.16	0.16	7
Nickel	10.00	37.00	22.90	21.20	23
Potassium	1360.00 J	3060.00	2110.00	2050.00	23
Sodium	62.40	456.00	267.00		12
Thallium	0.54 J	0.62 J	0.58	0.58	2
Vanadium	11.50 J	47.30	28.90	26.40	23
Zinc	19.10 J	85.70 J	46.80	42.60	23

TABLE 2

SUMMARY OF CHEMICALS DETECTED IN SOIL BORING SOILS

COMPOUND	MINIMUM	MAXIMUM	ARITHMETIC MEAN	GEOMETRIC MEAN	NO. OF DETECTS
** Class : SEMIVOLATILE (ppb)			No. of Samples = 21		
Naphthalene	29000.00	43000.00 D	36000.00		2
2-Methylnaphthalene	3600.00	4500.00	4050.00		2
Di-n-Butylphthalate	26000.00 J	43000.00 D	34500.00		2
bis(2-Ethylhexyl)Phthalate	60.00 J	6200.00	2153.30		6
Benzo(b)Fluoranthene @	330.00 J	640.00 J	485.00		2
** Class : VOLATILE (ppb)			No. of Samples = 23		
Methylene Chloride	4.00 J	4.00 J	4.00		1
Acetone	6.00 J	75.00	32.30		10
1,1-Dichloroethene	1.00 J	1.00 J	1.00		1
1,2-Dichloroethene (total)	15.00	15.00	15.00		1
Chloroform	1.00 J	2.00 J	1.80		5
2-Butanone	2.00 J	1100.00 JD	186.00		6
Trichloroethene	2.00 J	4.00 J	3.00		3
Benzene	4.00 J	4.00 J	4.00		2
4-Methyl-2-Pentanone	12.00 J	18000.00 J	3056.50	30.70	6
Toluene	5.00 J	2600000.00	325000.00		8
** Class : METALS (ppm)			No. of Samples = 22		
Aluminum	995.00	36500.00	11200.00	9130.00	22
Antimony	13.10 J	13.10 J	13.10	13.10	1
Arsenic	0.45 J	9.20	2.84	2.27	22
Barium	10.60	81.60	34.30		13
Beryllium	0.72	2.40	1.63	1.57	19
Cadmium	0.67	8.90 J	1.62	1.16	18
Calcium	1580.00	147000.00	80400.00	36800.00	22
Chromium	8.70	54.40 J	19.50	17.10	22
Cobalt	4.10	20.70	9.25	8.53	22
Copper	4.30 J	59.60 J	22.30		19
Iron	9700.00	37800.00	20800.00	19500.00	22
Lead	5.30 J	23.50	10.75		15
Magnesium	11700.00	86000.00	49200.00	44800.00	22
Manganese	221.00 J	1880.00 J	457.00	403.00	22
Mercury	0.09	0.30 J	0.19	0.16	2
Nickel	5.90	34.40 J	19.60	17.70	22
Potassium	724.00	13400.00	2500.00	1930.00	22
Silver	2.30 J	2.40 J	2.35		2
Sodium	421.00	446.00	429.00		3
Thallium	0.11 J	0.56 J	0.26	0.22	9
Vanadium	12.30	58.90	23.80	18.90	22
Zinc	24.00	115.00 J	49.10		15

@ Benzo(b)Fluoranthene and Benzo(k)Fluoranthene are isomers that coeluted.
The value given is the total amount for both isomers.

TABLE 3

SUMMARY OF CHEMICALS DETECTED IN WELL BORING SOILS

COMPOUND	MINIMUM		MAXIMUM		ARITHMETIC MEAN	GEOMETRIC MEAN	NO. OF DETECTS
** Class : SEMIVOLATILE (ppb)					No. of Samples = 25		
Di-n-Butylphthalate	45.00	J	45.00	J	45.00		1
** Class : VOLATILE (ppb)					No. of Samples = 23		
Methylene Chloride	6.00		53.00	J	21.20		6
Acetone	360.00	J	360.00	J	360.00		1
Chloroform	1.00	J	15.00	J	3.80		5
1,2-Dichloroethane	6.00		8.00		7.00		2
2-Butanone	5.00	J	5.00	J	5.00		1
Trichloroethene	2.00	J	2.00	J	2.00		2
Toluene	1.00	J	7.00	J	3.10		7
Chlorobenzene	2.00	J	2.00	J	2.00		2
** Class : METALS (ppm)					No. of Samples = 22		
Aluminum	5420.00		29200.00		12800.00	11700.00	22
Antimony	18.00	J	18.00	J	18.00	18.00	1
Arsenic	2.00	J	19.70		5.92	4.65	22
Barium	17.20		102.00		48.70	44.80	22
Beryllium	0.64		2.80		1.80		9
Cadmium	0.34		1.90	J	1.00	0.90	16
Calcium	6250.00		132000.00		62400.00	50100.00	22
Chromium	9.60		44.10		18.80	17.60	22
Cobalt	4.50		30.10		11.90	10.20	22
Copper	10.50	J	89.00	J	29.20	24.30	22
Iron	11300.00		43200.00		23800.00	22100.00	22
Lead	4.80		36.90		10.80		21
Magnesium	15100.00		81700.00		42900.00	38700.00	22
Manganese	319.00	J	1560.00	J	698.00	624.00	22
Mercury	0.16		2.60		0.98	0.43	3
Nickel	12.90		51.80		25.50	23.60	22
Potassium	1290.00		6200.00		2910.00	2700.00	22
Selenium	0.54	J	0.69	J	0.60	0.60	4
Sodium	82.00		393.00		212.00	190.00	19
Thallium	0.55	J	0.60	J	0.58		2
Vanadium	10.80		59.90		24.30	22.00	22
Zinc	22.50	J	113.00	J	53.20	47.80	22

11/28/89

TABLE 4

NORMAL BACKGROUND SOIL INORGANIC LEVELS (mg/l)

Compounds	General[1]	Alluvial[2]	Glacial Till[2]	Site Background[3]
Antimony	<1 - 500*	Various Soils 0.25 - 0.6	Various Soils 0.25 - 0.6	ND
Arsenic	5 - 15*	2.1 - 22	2.1 - 12	2.0
Beryllium	<1 - 7*	1 - 3	1 - 2	1.1
Cadmium	0.01 - 7	Various Soils 0.41 - 0.57	Various Soils 0.41 - 0.57	1.1
Chromium	10 - 80*	15 - 100	30 - 150	8.9 - 15.3
Cobalt	<3 - 70*	3 - 20	5 - 15	5.6 - 7.6
Copper	2 - 100	5 - 50	15 - 50	16.2 - 25.0
Lead	3 - 300**	10 - 30	10 - 30	4.3 - 6.5
Mercury	0.2 - 0.6*	0.02 - 0.15	0.02 - 0.36	ND
Nickel	4 - 30*	7 - 50	10 - 30	9.7 - 12.8
Selenium	0.1 - 2.0	0.1 - 2.0	0.2 - 0.8	ND
Vanadium	20 - 500	30 - 150	30 - 200	13.0 - 19.0
Zinc	10 - 300	20 - 108	47 - 131	23.4 - 30.0

* : Conner, J.J. and H.T. Shacklette, 1975.

** : Shacklette and Boerngen, 1984.

1 : Dragun, J., 1988.

2 : Kabata - Pendios & Pendios, 1984 for U.S. Soils.

3 : Background levels based on well boring ES-5S samples WB-02 AND WB-03.

NA : Not Available

ND : Not Detected

TABLE 5

SUMMARY OF INORGANICS DETECTED IN BACKGROUND SOIL SAMPLES

COMPOUND	MINIMUM	MAXIMUM	ARITHMETIC MEAN	GEOMETRIC MEAN	NO. OF DETECTS
** Class : METALS (ppm)			No. of Samples = 2		
Aluminum	7110.00	10300.00	8710.00		2
Arsenic	2.00 J	2.00	2.00		2
Barium	19.70	30.20	25.00		2
Cadmium	1.10 J	1.10 J	1.10		1
Calcium	91600.00	108000.00	99800.00		2
Chromium	8.90	15.30	12.10		2
Cobalt	5.60	7.60	6.60		2
Copper	16.20 J	25.00 J	20.60		2
Iron	12100.00	16900.00	14500.00		2
Lead	4.30 J	6.50 J	5.40		2
Magnesium	65100.00	74100.00	69600.00		2
Manganese	301.00	319.00	310.00		2
Nickel	9.70	12.80	11.30		2
Potassium	1430.00 J	2150.00 J	1790.00		2
Sodium	62.90	80.60	71.80		2
Vanadium	13.00	19.00	16.00		2
Zinc	23.40	30.00	26.70		2

TABLE 6.

RESULTS OF WATER SAMPLES TAKEN DURING REMOVAL ACTION (1987)

mpound	Tank 11/19/87	Tank 11/25/87	Tank 12/2/87	Tank 12/9/87	Tank 12/15/87	Tank 12/30/87	Discharge 12/30/87	Frequency	Range
l	7.8	7.8	7.7	7.4	7	NA	NA		ND-7.8
LATILES (ppb)									
ethylene chloride	93	6	12	-	-	-	-	3/7	ND-93
ichlorofluoromethane	26	-	-	-	-	-	-	1/7	ND-26
,1-dichloroethylene	-	-	4	-	-	-	-	1/7	ND-4
,1-dichloroethane	30	-	-	-	-	-	-	1/7	ND-30
rans-1,2-dichloroethylene	3	-	-	-	-	-	-	1/7	ND-3
ichlorodifluoromethane	32	-	-	-	-	-	-	1/7	ND-32
,2-dichloroethane	76	-	76	62	-	49	-	4/7	ND-76
,1,1-trichloroethane	5	-	-	-	-	-	-	1/7	ND-5
richloroethylene	9	-	-	-	-	-	-	1/7	ND-9
oluene	1200	94	81	-	-	-	-	3/7	ND-1200
otal xylenes*	32	-	-	-	-	-	-		
cetone*	220	-	-	-	-	-	-		
-hexanone*	74	69	-	-	-	-	-		
-methyl-2-hexane*	14	-	-	-	-	-	-		
-butanone*	10	-	-	-	-	-	-		
etrahydrofuran*	-	10	-	-	-	-	-		
OTAL METALS (ppb)									
ntimony	10	20	10	10	-	-	-	4/7	ND-20
rsenic	-	5	-	-	-	-	-	1/7	ND-5
admium	-	-	10	10	-	-	-	2/7	ND-10
opper	10	10	10	-	-	-	-	3/7	ND-10
ickel	40	10	-	-	-	-	-	2/7	ND-40
hallium	-	-	10	10	-	-	-	2/7	ND-20
inc	20	-	10	-	-	-	-	2/7	ND-02
otal Phenol (ppb)	36000	-	-	-	-	-	-	1/7	ND-36000

otes

Source of data: Provided by McGahren.

- = Compound was not detected

ND = Not detected

NA = Not available

* = These compounds were tentatively identified. They were not done as part of the regular analysis.

TABLE 7

RESULTS OF TEST PIT WATER, LEACHATE, AND POND WATER SAMPLES
SARNEY PROPERTY, 1980 TO 1984

Parameters	Area 1 Pit Water 1982	Area 2 Leachate Water 1982	Area 3 Pit Water 1982	Area 4 Pit Water 1982	Livestock Pond 1980	Livestock Pond 1984	NE Corner Leachate 1984	Frequency	Range
ORGANICS (ppb)									
Benzene	-	-	-	58.7	-	-	-	1/7	ND-58.7
Chloroform	2.3	-	-	187	-	-	-	2/7	ND-187
Dibromochloromethane	-	1.8	-	24.9	-	-	-	2/7	ND-24.9
1,2-dichloroethane	38.7	-	-	1950	-	-	-	2/7	ND-1950
Methylene chloride	2.3	-	1.2	18.2	NA	-	-	3/6	ND-18.2
Phenols	-	6	-	-	23	-	-	2/7	ND-23
Tetrachloroethylene	-	-	-	2270	NA	-	-	1/6	ND-2270
Trans-1,2-dichloroethylene	-	-	-	120	NA	-	-	1/6	ND-120
1,1,1-trichloroethane	-	-	-	230	-	-	-	1/7	ND-230
Trichloroethylene	1.6	-	-	84.4	-	-	-	2/7	ND-84.4
METALS (ppb)									
Cadmium	-	-	-	12	-	-	-	1/7	ND-12
Copper	10	20	10	10		-		4/7	ND-20
Iron	750	1600	3850	3610	4200	980	3200	7/7	750-4200
Lead	35	9	7	5	9	-	-	5/7	ND-35
Nickel	-	-	-	60	-	-	-	1/7	ND-60
Zinc	10	90	40	90	-	-	20	5/7	ND-90
Chloride	NA	NA	NA	19000	9200	-	9300	3/3	9200-19000
pH	7.4	6.9	7.6	6.4	7.1	NA	NA	5/5	6.4-7.6
TOC (ppm)	NA	NA	NA	NA	13	NA	NA	1/1	13

NOTES:

Source of data: Provided by McGahren, 1988.
- – Compound was not detected.
ND – Not detected
NA – Not available

TABLE 8

RESULTS OF RESIDENTIAL WELL SAMPLES
VICINITY OF SARNEY PROPERTY SITE

Compounds	Barry 7/8/86	Barry Duplicate 7/8/86	Rogers 7/8/86	Taylor 7/8/86	P.Tabor 7/9/86	B.Tabor 7/9/86	N.Benson 6/16/86	C. Benson 6/16/86	Pleasanton 6/16/86	J. Benson[d] 6/18/86	Sherman[d] 6/18/86	Strang[d] 6/18/86
<u>VOLATILES</u> (ppb)												
Acetone	6J	7J	7J	9J	3J	6J	R	R	R	R	R	R
Chloroform	-	-	-	1J	-	-	-	-	-	-	-	-
Styrene	-	-	-	-	-	-	-	-	-	-	-	8.7
<u>SEMIVOLATILES</u> (ppb)												
Bis(2-ethylhexyl) phthalate	-	3J	-	-	-	-	-	-	-	-	-	-
<u>INORGANICS</u> (ppb)												
Aluminum	-	-	-	-	-	-	-	-	-	-	-	41J
Barium	-	-	-	-	-	-	31J	63J	28J	-	22J	29J
Cadmium												
Calcium	65800	63400	81000	67700	49200	63000	88300	80000	55900	69000	90000	85700
Chromium	13	-	-	-	11	13	-	-	-	-	-	-
Copper	-	-	-	-	-	-	9.4J	23J	11J	31	22J	16J
Iron	80J	30J	485	69J	2680	1830	1300	3680	98J	26J	34J	1540
Lead	R	R	R	R	R	R	-	-	5.2	-	5.4	-
Magnesium	27200	26200	36600	27800	25800	29600	44900	38200	27000	37200	46600	42400
Manganese	-	-	113	-	16	120	22	4330	-	-	-	55
Mercury	-	-	-	-	-	-	0.3	-	-	-	-	-
Nickel	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	2970J	2630J	4210J	1490J	3950J	3530J	6040	6560	4820J	24400	4430J	5660
Sodium	2830J	2790J	5300	4090J	4000	4910	8750	7410	4090J	2160J	77200	16000
Zinc	-	R	R	R	R	R	14J	9.5J	43	12J	34	69

TABLE 8 (Cont'd)

RESULTS OF RESIDENTIAL WELL SAMPLES
VICINITY OF SARNEY PROPERTY SITE

Compounds	L.Benson[d] 6/18/86	W.Brown[d] 6/19/86	Hurlburt[d] 6/19/86	Keller[d] 6/19/86	Vinchiarello[d] 6/20/86	Clapper[d] 6/18/86	F. Brown[d] 6/18/86	Hewlett[d] 6/17/86	Hewlett[d] Duplicate 6/17/86	Sarney 8/7/85	Sarney Duplicate 8/7/85
VOLATILES (ppb)											
Acetone	-	-	-	-	-	-	-	-	-	-	5J
Chloroform	-	-	-	-	-	-	-	-	-	-	-
Styrene	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES (ppb)											
Bis(2-ethylhexyl) phthalate	-	3J	-	-	-	-	-	-	-	1J	-
INORGANICS (ppb)											
Aluminum	45J	33J	-	31J	-	-	-	21J	39J	-	-
Barium	36J	20J	-	-	13J	25J	22J	-	12J	-	-
Cadmium	-	-	-	-	-	-	-	-	-	-	20
Calcium	81300	79500	64500	75300	53000	95900	95300	65800	65100	NA	NA
Chromium	-	-	-	-	-	-	-	-	-	BL	BL
Copper	8.4J	8J	7.3J	11J	7.2J	11J	8.9J	11J	20J	24	
Iron	60J	21J	43J	38J	68J	144		2340	1700	NA	NA
Lead	-	-	-	-	-	-	-	-	-	-	-
Magnesium	39100	38500	33200	34400	22700	48400	48400	32000	31900	NA	NA
Manganese	-	-	-	-	-	17	-	21	18	NA	NA
Mercury	-	-	-	-	-	-	-	-	-	-	-
Nickel	6.5J	-	-	-	-	-	-	-	6.3J	-	-
Potassium	4660J	5310	3200J	2250J	4180J	4770J	5360	4310J	4530J	NA	NA
Silver	-	-	-	-	-	-	-	-	-	30	29
Sodium	12200	8770	2780J	26200	4160J	23000	51300	3520J	4020J	NA	NA
Zinc	12J	302	27	15J	16J	16J	17J	25	38	BL	BL

TABLE 9A
SUMMARY OF CHEMICALS DETECTED IN GROUNDWATER ROUND-I ANALYSES

	OVERBURDEN WELLS					BEDROCK WELLS				
COMPOUND	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS
** Class : SEMIVOLATILE	(ppb)		No. of Samples = 7					No. of Samples = 5		
Di-n-Butylphthalate	71.00	120.00	95.70		3					
Butylbenzylphthalate	4.00 J	9.00 J	6.50		2					
** Class : VOLATILE	(ppb)		No. of Samples = 8					No. of Samples = 5		
Chloromethane	0.70 J	0.70 J	0.70		1					
Vinyl Chloride	3.90 J	3.90 J	3.90		1	14.00 J	14.00 J	14.00		1
Chloroethane	0.40 J	0.40 J	0.40		1	0.60 J	0.60 J	0.60		1
Methylene Chloride	0.60 J	0.60 J	0.60		1					
Acetone						52.00 J	52.00 J	52.00		1
Carbon Disulfide	0.40 J	0.40 J	0.40		1	0.10 J	1.60	0.90		2
1,1-Dichloroethene	0.20 J	0.20 J	0.20		1					
1,1-Dichloroethane	2.30	2.30	2.30		1	0.60 J	1.00	0.80		2
Chloroform	1.10	1.10	1.10		1	0.40 J	0.40 J	0.40		1
1,2-Dichloroethane						16.00 J	131.00 J	60.00		3
1,1,1-Trichloroethane	0.20 J	0.50 J	0.30		3	1.20	1.20	1.20		1
Trichloroethene	0.40 J	0.60 J	0.50		2	0.40 J	1.50	1.00		2
Benzene	0.10 J	0.10 J	0.10		1	0.20 J	0.50 J	0.40	0.30	3
4-Methyl-2-Pentanone	0.50 J	4.30	2.40		2					
2-Hexanone	0.60 J	0.60 J	0.60		1					
Tetrachloroethene	0.80 J	0.80 J	0.80		1					
Toluene	71.00 JB	71.00 JB	71.00		1					
Chlorobenzene	0.30 J	0.30 J	0.30		1	0.30 J	0.30 J	0.30		1
Ethylbenzene						0.40 J	0.50 J	0.50		2
Styrene	0.10 J	0.10 J	0.10		1					
(P&M)-Xylene	0.20 J	0.20 J	0.20		1	1.20	1.60	1.40		2
O-Xylene	0.10 J	0.10 J	0.10		1	0.70 J	0.90 J	0.80		2
Trichlorofluoromethane	0.80 J	0.80 J	0.80		1	0.20 J	0.40 J	0.30		2
cis-1,2-Dichloroethene	0.60 J	0.70 J	0.70		2	0.70 J	3.10	1.90	1.60	3
N-Propylbenzene						0.20 J	0.20 J	0.20		1
1,3,5-Trimetylbenzene						0.10 J	0.20 J	0.20		2
1,2,4-Trimethylbenzene						0.10 J	0.90 J	0.50	0.40	3
1,3-Dichlorobenzene	1.00	1.00	1.00		1					
1,4-Dichlorobenzene	1.00	1.00	1.00		1					
1,2-Dichlorobenzene	0.80 J	0.80 J	0.80		1					
1,2,4-Trichlorobenzene	0.20 J	0.20 J	0.20		1					
Naphthalene	0.40 J	0.40 J	0.40		1	0.30 J	1.50	0.90		2
1,2,3-Trichlorobenzene	0.20 J	0.20 J	0.20		3	0.20 J	0.20 J	0.20		1

TABLE 9A (Contd.)

SUMMARY OF CHEMICALS DETECTED IN GROUNDWATER ROUND-I ANALYSES

	OVERBURDEN WELLS					BEDROCK WELLS				
COMPOUND	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS
** Class : TOTAL METALS	(ppb)		No. of Samples = 8					No. of Samples = 5		
Aluminum	5570.00	54900.00 J	26428.30	20274	6	200.00	2440.00	936.60	669.30	5
Arsenic	2.00 J	2.00 J	2.00		1	2.20 J	3.40 J	2.80		2
Barium	39.00	277.00 J	105.70	32	8	9.10	25.50 J	19.00	17.70	5
Calcium	78300.00	244000.00	124075.00	6496	8	16600.00	60800.00	37200.00	33727.90	5
Chromium	13.00 J	106.00	44.50	18	8					
Cobalt	5.30	46.00	18.30	8	7					
Copper	12.00	134.00 J	52.10	20	8	6.90	12.40	9.80	9.50	5
Iron	7050.00	87100.00 J	33011.30	2429	8	1040.00	27700.00	11996.00	6668.10	5
Lead	5.60	9.00 J	6.90		3	2.50 J	12.70	6.40	5.30	4
Magnesium	48900.00 J	175000.00 J	80862.50	4836	8	13000.00	34600.00	22280.00	21101.40	5
Manganese	364.00 J	4560.00	1336.40	200	8	16.50 J	236.00 J	119.40	77.80	5
Mercury	0.24	0.24	0.24		2					
Nickel	18.30	111.00	50.00	17	7	4.50	7.50	5.60	5.50	3
Potassium	2960.00	13300.00 J	6787.50	732	8	5050.00	25900.00	15074.00	12233.90	5
Sodium	1140.00	2770.00 J	2076.30	327	8	2400.00	13500.00	7554.00	5975.60	5
Vanadium	14.00	93.70	38.90	14	7	2.30	7.40	4.40	4.00	4
Zinc	57.40 J	406.00 J	165.20	67	7	18.30	21.80 J	20.20		3
** Class : DISSOLVED METALS (ppb)			No. of Samples = 4					No. of Samples = 5		
Aluminum						21.10	121.00	63.70	51.00	4
Arsenic						2.20 J	2.20 J	2.20		1
Barium	9.00	44.30	20.38		4	3.90	15.60	9.00	7.80	5
Calcium	57200.00	67500.00	61075.00		4	8150.00	59800.00	32910.00	26627.90	5
Iron						40.50	83.10 J	61.80	58.00	2
Magnesium	31200.00	35800.00	33225.00		4	11900.00	32700.00	22120.00	20625.90	5
Manganese	15.00 J	53.40	29.60		4	4.00	51.80	16.40	9.90	5
Potassium	1880.00	4040.00 J	2822.50		4	5530.00	28400.00	17068.00	13728.60	5
Sodium	1080.00 J	2000.00 J	1605.00		4	2390.00 J	14700.00 J	8162.00	6376.00	5
Vanadium	3.00	4.00	3.50		2	9.30	9.30	9.30		1
Zinc						3.00	8.00	5.60		3

TABLE 9 B

SUMMARY OF CHEMICALS DETECTED IN GROUNDWATER ROUND-II ANALYSES

	OVERBURDEN WELLS					BEDROCK WELLS				
COMPOUND	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS
** Class : SEMIVOLATILE (ppb)		No. of Samples = 6					No. of Samples = 3			
Benzoic Acid						8.00 J	8.00 J	8.00		1
Pyrene	1.00 J	1.00 J	1.00		1					
bis(2-Ethylhexyl)Phthalate	2.00 J	14.00	8.80	6.96	4	9.00 J	17.00	13.00		2
** Class : VOLATILE (ppb)		No. of Samples = 6					No. of Samples = 3			
Chloromethane						2.10 J	2.10 J	2.10		1
Vinyl Chloride						4.10 J	4.10 J	4.10		1
Chloroethane						2.03 J	2.03 J	2.03		1
Carbon Disulfide	0.26 J	0.26 J	0.26		1					
1,1-Dichloroethane	0.30 JT	0.30 JT	0.30		1	0.70 J	1.40 J	1.00		3
Chloroform	0.65 J	0.65 J	0.70		1	1.10 J	1.10 J	1.10		1
1,2-Dichloroethane	380.00 J	380.00 J	380.00		1					
2-Butanone	88.50 J	88.50 J	88.50		1					
1,1,1-Trichloroethane	0.20 J	0.54	0.40		2					
Trichloroethene	0.40 J	10.70 J	5.60		2	0.44 J	1.70 J	0.90		3
4-Methyl-2-Pentanone	29.40 J	29.40 J	29.40		1					
Toluene	130.00 J	130.00 J	130.00		1					
Dichlorodifluoromethane	0.76 J	0.76 J	0.80		1	3.80 J	3.80 J	3.80		1
Trichlorofluoromethane	0.54 J	3.03 J	1.80		2					
cis-1,2-Dichloroethene	0.55 J	0.55 J	0.60		1	1.10 J	2.60 J	1.60		3
1,4-Dichlorobenzene	2.40 J	2.40 J	2.40		1					

TABLE 9B (Cont'd.)

SUMMARY OF CHEMICALS DETECTED IN GROUNDWATER ROUND-II ANALYSES

	OVERBURDEN WELLS					BEDROCK WELLS				
COMPOUND	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS
** Class : TOTAL METALS	(ppb)		No. of Samples = 7					No. of Samples = 3		
Aluminum	2270.00	34900.00	16355.70	10515	7	1070.00	5290.00	3460.00	2833.70	3
Arsenic						5.00	6.10	5.60		2
Barium	9.20	157.00	72.90	46	7	8.70	37.50	21.20	17.90	3
Beryllium						1.70	1.70	1.70		1
Calcium	66800.00	148000.00	93771.40	89859	7	15800.00	91900.00	63300.00	49235.90	3
Chromium	15.20 J	75.90	33.80	29	7	9.50	14.10 J	11.80		2
Cobalt	22.60	23.90	23.30		2					
Copper	20.60	64.50 J	47.10	43	5					
Iron	3950.00	52100.00	24785.70	16966	7	7070.00	11300.00	9030.00	8864.90	3
Lead	3.10 J	18.10 J	9.30	8	7	3.80 J	6.60 J	5.70	5.50	3
Magnesium	37100.00	77700.00	53042.90	51431	7	19800.00	48900.00	36500.00	34057.40	3
Manganese	154.00	2030.00	819.60	564	7	78.80	188.00	142.60	133.60	3
Nickel	15.70	72.80 J	36.30	31	5					
Potassium	3490.00	10600.00	6507.10	5911	7	11700.00	28900.00	17966.70	16506.10	3
Sodium	1550.00	3360.00	2217.10	2137	7	6470.00	14800.00	9386.70	8705.50	3
Vanadium	20.00	59.50	40.40	37	4					
Zinc	47.00	189.00	118.00		2	31.10	103.00	57.90	50.30	3
** Class : DISSOLVED METALS	(ppb)		No. of Samples = 4					No. of Samples = 3		
Aluminum	104.00	160.00	132.00		2	67.00	74.00	70.00		3
Barium	35.00	64.00	49.50		2					
Calcium	50900.00	69000.00	58725.00		4	7580.00	47900.00	34393.30		3
Iron	44.00	90.00	67.00		2	960.00	1040.00	1000.00		2
Magnesium	30000.00	38200.00	33475.00		4	17100.00	23600.00	20300.00		3
Manganese	8.00	131.00	69.30		4	2.00	56.00	29.00		2
Potassium	1750.00	3020.00	2193.30		3	10300.00	29600.00	16833.30		3
Sodium	928.00	2860.00	1939.50		4	6680.00	15200.00	9623.30		3
Thallium						0.60 J	0.60 J	0.60		1
Zinc	10.00	38.00	24.00		3	5.00	7.00	6.00		2

TABLE 10

SUMMARY OF CHEMICALS DETECTED IN RESIDENTIAL WELLS

COMPOUD	MINIMUM	MAXIMUM	ARITHMETIC MEAN	GEOMETRIC MEAN	NO. OF DETECTS
** Class : SEMIVOLATILE (ppb)		No. of Samples = 11			
Diethylphthalate	4.00 J	4.00 J	4.00		1
Di-n-Butylphthalate	2.00 J	3.00 J	2.30		4
** Class : VOLATILE (ppb)		No. of Samples = 11			
Chloromethane	0.90 J	0.90 J	0.90		1
Carbon Disulfide	0.10 J	0.10 J	0.10		1
Chloroform	0.20 J	0.20 J	0.20		1
1,2-Dichloroethane	3.00 J	3.00 J	3.00		1
1,2-Dichloropropane	0.20 J	0.20 J	0.20		1
Trichloroethene	2.10	2.10	2.10		1
2-Hexanone	0.30 J	0.90 J	0.50		3
Chlorobenzene	0.10 J	0.10 J	0.10		1
cis-1,2-Dichloroethene	1.40	1.40	1.40		1
** Class : TOTAL METALS (ppb)		No. of Samples = 12			
Aluminum	22.00 J	74.00 J	48.00		2
Antimony	23.00	23.00	23.00		1
Barium	4.00	34.00 J	15.00		12
Calcium	44200.00	85100.00	66158.33		12
Chromium	3.00	10.00 J	5.75		12
Cobalt	5.00	5.00	5.00		3
Copper	4.00	72.00	24.20		5
Iron	31.00	4110.00 J	773.17		6
Lead	2.00 J	5.00 J	2.90		10
Magnesium	19400.00 J	40000.00 J	30041.67		12
Manganese	3.00	48.00 J	17.00		4
Nickel	6.00	10.00	8.22		9
Potassium	1560.00 J	5560.00 J	3820.00		12
Silver	5.00	145.00	51.67		3
Sodium	1890.00	67500.00	16127.50		12
Vanadium	4.00	6.00	4.63		8
Zinc	16.00 J	302.00 J	84.80		5

TABLE 11

RESULTS OF SURFACE WATER SAMPLES FROM THE SARNEY PROPERTY SITE
JULY 9-10, 1986

Compound	SW-01^d	SW-02	SW-03	SW-04^d	SW-05	SW-06	SW-07	SW-08	SW-09	SW-10	SW-11	SW-12	SW-13	Frequency	Range
VOA (ppb)															
Styrene	–	8.7	–	–	–	–	–	–	–	–	–	–	8.7	2/13	ND-8.7
BNA (ppb)															
phenol	–	–	–	–	–	38	–	–	–	–	–	–	–	1/13	ND-38
2 methyl phenol	–	–	12	–	–	–	–	–	–	–	–	–	–	1/13	ND-12
4 methyl phenol	–	–	–	–	–	73	–	–	–	–	–	–	–	1/13	ND-73
INORGANICS (ppb)															
Arsenic	–	–	–	–	–	45	–	–	–	–	–	–	–	1/13	ND-45
Chromium	–	–	12	–	–	105	34	12	–	–	15	–	13	6/13	ND-105
Cobalt	–	–	–	–	–	42J	–	–	–	–	–	–	–	1/13	ND-42J
Copper	22J	–	22J	–	–	248	74	30	–	–	30	31	–	7/13	ND-248
	–	–	–	–	–	–	–	–	–	–					
Lead	11E	–	19	12E	3J	564EJ	148EJ	56	11	R	R	R	R	8/8	3J-564EJ
Mercury	–	–	–	–	–	–	–	–	–	–	–	1.06	–	1/13	ND-1.06
Nickel	–	–	–	–	–	119	38	–	–	–	–	–	–	2/13	ND-119
Selenium	–	–	–	–	–	23N	–	–	–	–	–	–	–	1/13	ND-23N
Vanadium	–	–	–	–	–	228	77	26	–	–	22		21	5/13	ND-228
Zinc	R	R	142	60	51	983	285	472	65	R	R	R	R	7/7	51-983
Cyanide	–	–	–	12	–	–	19	28	–	–	–	–	–	3/13	ND-28

NOTES:

Source of data: Provided by McGahren, 1988.
– – Compound was not detected.
R – Indicates analysis was rejected
J – Value is estimated
E – Serial dilution agreement was less than 10%
N – Spike sample recovery was outside of control limits (75 to 125%)
d – These samples were done in duplicate. The mean value is presented here.
ND – Not Detected

TABLE 12

SUMMARY OF CHEMICALS DETECTED IN SURFACE WATER

COMPOUND	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS
** Class : SEMIVOLATILE (ppb)		No. of Samples = 13			
Phenol	38.00	38.00	38.00		1
Benzoic Acid	160.00 J	160.00 J	160.00		1
Pyrene	2.00 J	3.00 J	2.50		2
** Class : VOLATILE (ppb)		No. of Samples = 13			
Chloromethane	0.50 J	0.80 J	0.63		3
Vinyl Chloride	68.00 D	68.00 D	68.00		1
Chloroethane	2.40	2.40	2.40		1
Methylene Chloride	0.70 J	0.70 J	0.70		1
Acetone	1.30 J	19.00 J	8.10		6
Carbon Disulfide	0.20 J	1.00	0.42		6
1,1-Dichloroethene	4.50	4.50	4.50		1
1,2-Dichloroethane	0.20 J	4.50	1.43		7
2-Butanone	0.30 J	1.10 J	0.73		3
Trichloroethene	3.00	3.00	3.00		1
Benzene	2.80	2.80	2.80		1
Toluene	5.00 BJ	5.00 BJ	5.00		1
Chlorobenzene	3.50	3.50	3.50		1
Ethylbenzene	2.20	2.20	2.20		1
Styrene	0.40 J	0.40 J	0.40		1
(P&M)-Xylene	0.20 J	1.10	0.65		2
O-Xylene	1.00	1.00	1.00		1
Isopropylbenzene	0.10 J	0.10 J	0.10		1
N-Propylbenzene	0.20 J	0.20 J	0.20		1
1,3,5-Trimethylbenzene	0.20 J	0.20 J	0.20		1
1,2,4-Trimethylbenzene	0.20 J	0.20 J	0.20		1
1,3-Dichlorobenzene	0.10 J	0.10 J	0.10		1
1,4-Dichlorobenzene	0.10 J	0.10 J	0.10		1
N-Butylbenzene	0.10 J	0.10 J	0.10		1
1,2,4-Trichlorobenzene	0.30 J	0.30 J	0.30		1
Hexachlorobutadiene	0.60 J	0.60 J	0.60		1
1,2,3-Trichlorobenzene	0.50 J	0.50 J	0.50		1
** Class : TOTAL METALS (ppb)		No. of Samples = 5			
Aluminum	29.00 J	29.00 J	29.00		1
Antimony	28.00	28.00	28.00		2
Arsenic	52.00 J	52.00 J	52.00		1
Barium	7.00	72.00 J	21.60		5
Cadmium	7.00 J	7.00 J	7.00		1
Calcium	19300.00	102000.00	42560.00		5
Chromium	3.00 J	6.00	4.67		3
Cobalt	5.00	8.00	6.33		3
Copper	5.00	7.00	6.25		4
Iron	44.00 J	89100.00	18225.60		5
Lead	4.00 J	6.00 J	5.00		3
Magnesium	9380.00 J	29400.00 J	15730.00		5
Manganese	22.00 J	571.00	224.40		5
Nickel	6.00 J	12.00	9.50		4

TABLE 12 (Contd.)

SUMMARY OF CHEMICALS DETECTED IN SURFACE WATER

COMPOUND	MINIMUM	MAXIMUM	ARITHMATIC MEAN	GEOMETRIC MEAN	No. OF DETECTS
** Class : TOTAL METALS (ppb) (Contd.)		No. of Samples = 5			
Potassium	1560.00 J	11000.00 J	3964.00		5
Silver	6.00	6.00	6.00		2
Sodium	1880.00	3630.00	2755.00		2
Vanadium	5.00	6.00	5.50		2
Zinc	24.00 J	24.00 J	24.00		1
** Class : DISSOLVED METALS (ppb)		No. of Samples = 8			
Aluminum	22.00	66.00	35.71		7
Antimony	18.00	36.00	26.67		3
Barium	6.00	19.00	9.25		8
Calcium	14200.00	52100.00	36937.50		8
Chromium	3.00	7.00	4.14		7
Cobalt	5.00	6.00	5.50		2
Copper	3.00	5.00	4.00		2
Iron	48.00	140.00	94.00		6
Lead	2.00 J	2.00 J	2.00		1
Magnesium	6520.00	26700.00	18090.00		8
Manganese	13.00	104.00	66.88		8
Nickel	6.00	14.00	9.17		6
Potassium	1660.00 J	6800.00 J	2646.25		8
Silver	5.00 J	8.00 J	6.67		3
Sodium	840.00 J	2170.00 J	1428.50		4
Vanadium	3.00	7.00	4.29		7
Zinc	7.00	10.00	8.33		3

TABLE 13

SUMMARY OF CHEMICALS DETECTED IN SURFACE SEDIMENT SOILS

COMPOUD	MINIMUM	MAXIMUM	ARITHMETIC MEAN	GEOMETRIC MEAN	NO. OF DETECTS
** Class : SEMIVOLATILE (ppb)		No. of Samples = 13			
Di-n-Butylphthalate	95.00 J	150.00 J	118.80		4
Pyrene	68.00 J	87.00 J	79.30		3
bis(2-Ethylhexyl)Phthalate	52.00 J	52.00 J	52.00		1
** Class : VOLATILE (ppb)		No. of Samples = 14			
2-Butanone	22.00 J	22.00 J	22.00		1
** Class : METALS (ppm)		No. of Samples = 14			
Aluminum	2160.00	21900	9600.70	4020.40	14
Arsenic	0.38 J	5.00	2.60	2.20	14
Barium	18.90 J	97.10 J	41.70	26.80	14
Beryllium	0.33	0.87	0.50	0.50	10
Cadmium	1.10	1.10	1.10	1.10	1
Calcium	12100.00	89400.00	42735.70	16929.70	14
Chromium	9.40	32.70	16.00	11.30	12
Cobalt	5.30	12.70	8.30	6.40	11
Copper	8.80	176.00	34.00	19.60	14
Iron	4660.00	26000.00	13831.40	6066.90	14
Lead	4.60 J	59.60 J	19.90	12.60	14
Magnesium	3630.00	56500.00	25912.90	8494.00	14
Manganese	64.70	1140.00	307.80	171.10	14
Nickel	8.20	23.80	14.60	10.80	12
Potassium	463.00 J	3510.00 J	1228.30	597.40	14
Selenium	0.76 J	10.90 J	4.80	2.80	3
Silver	0.93 J	1.30 J	1.10	1.10	2
Vanadium	8.5	42.90 J	21.30	14.80	13
Zinc	15.60 J	74.10 J	46.10	30.90	14

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TABLE 14 A

INDICATOR CHEMICALS FOR THE SARNEY FARM SITE

	CHEMICAL	Groundwater	Soils	POND/STREAM Sediments	SWAMP Sediments	POND/STREAM Surface Water	SWAMP Surface Water
Volatiles							
	Vinyl chloride	X	-	-	-	-	X
	Carbon disulfide	X	-	-	-	X	X
	1,1-Dichloroethane	X	-	-	-	-	-
	Chloroform	X	X	-	-	-	-
	1,2-Dichloroethane	X	-	-	-	X	X
	2-Butanone	-	X	-	X	-	X
	1,1,1-Trichloroethane	X	-	-	-	-	-
	Benzene	X	X	-	-	-	-
	4-Methyl-2-pentanone	-	X	-	-	-	-
	Toluene	-	X	-	-	-	-
	Chlorobenzene	X	X	-	-	-	-
	Ethylbenzene	X	-	-	-	-	-
	Trichloroethene	X	X	-	-	-	-
	Trichlorofluoromethane	X	-	-	-	-	-
	Chloromethane	X	-	-	-	X	-
Semi-volatiles							
	Di-n-butyl phthalate	X	X	-	X	-	-
	Naphthalene	X	X	-	-	-	-
	2-Methylnaphthalene	-	X	-	-	-	-
	Bis-2(ethylhexyl)phthalate	X	X	-	-	-	-
	Butyl benzyl phthalate	-	X	-	-	-	-
	Di-n-octyl phthalate	-	X	-	-	-	-
Inorganics							
	Arsenic	X	-	-	-	-	X
	Lead	X	-	-	-	-	-
	Nickel	X	-	-	-	-	-
	Selenium	-	-	-	X	-	-
	Vanadium	X	-	-	-	-	-
	Zinc	X	-	-	-	-	-

X : Indicates that the compound was detected above site background level and has been selected as an indicator for the medium.

- : Indicates that the compound was not selected as an indicator for the medium.

Table 14B. References Doses for the Indicator Chemicals at the Sarney Farm Site

CHEMICAL	Oral Reference Dose(b) (mg/kg-day)	Source(a)	Inhalation Reference Dose(b) (mg/kg-day)	Source(a)
Noncarcinogens				
Bis-2(ethylhexyl)phthalate	2.00E-02	HEA	Not Determined	HEA
2-Butanone	5.00E-02	HEA	9.00E-02	HEA
Butyl benzyl phthalate	2.00E-01	HEA	Not Determined	HEA
Carbon Disulfide	1.00E-01	HEA	-	HEA
Chlorobenzene	3.00E-02	HEA	5.00E-03	HEA
Chloroform	1.00E-02	HEA	Not Determined	HEA
1,1-Dichloroethane	1.00E-01	HEA	1.00E-01	HEA
Diethylphthalate	8.00E-01	HEA	Not Determined	HEA
Di-n-butyl phthalate	1.00E-01	HEA	Not Determined	HEA
Di-n-octyl phthalate****	2.00E-02	HEA	Not Determined	HEA
Ethylbenzene	1.00E-01	HEA	Not Determined	HEA
2-Hexanone*	5.00E-02	HEA	2.00E-02	HEA
Lead**	1.43E-04	PMCL	Not Determined	PMCL
2-Methylnaphthalene***	4.00E-01	HEA	Not Determined	HEA
4-Methyl-2-pentanone	5.00E-02	HEA	2.00E-02	HEA
Naphthalene	4.00E-01	HEA	Not Determined	HEA
Nickel	2.00E-02	HEA	Not Determined	HEA
Total Phenolics #	6.00E-01	HEA	Not Available	HEA
Toluene	3.00E-01	HEA	1.00E+00	HEA
1,1,1-Trichloroethane	9.00E-02	HEA	3.00E+00	HEA
Tichlorofluoromethane	3.00E-01	HEA	2.00E-01	HEA
Vanadium	7.00E-03	HEA	Not Determined	HEA
Zinc	2.00E-01	HEA	Not Determined	HEA

a) Source : HEA = Health Effects Assessment document
PMCL = Proposed Maximum Contaminant Level

b) These are the maximum acceptable daily intakes via oral ingestion and inhalation given by the EPA (1989).

* : RfDs are assumed to be the same as for 4-methyl-2-pentanone on the basis of the compounds being isomers.

** : A tentative value was computed by the USEPA using the proposed National Drinking Water Standard of 5 ug/l (USEPA 1988) and a reference drinking rate of 2.0 l/day (USEPA 1986b).

*** : The oral RfD is assumed to be the same as for naphthalene on the basis of the similarity of the two compounds.

Note : For those compounds where inhalation criteria are not available, the oral criteria will be applied as the inhalation criteria in the evaluation of the potential risks.

**** : The oral RfD is assumed to be the same as for bis(2-ethylhexyl)phthalate on the basis of the similarity of the two compounds.

: The oral RfD is conservatively assumed to be the same as that for phenol.

TABLE 14C

TOXICITY CRITERIA USED FOR CARCINOGENIC INDICATOR CHEMICALS

CHEMICAL	Oral $(mg/kg\text{-}day)^{-1}$	Source(a)	Inhalation $(mg/kg\text{-}day)^{-1}$	Source(b)
Carcinogens				
Arsenic	Not Available	HEA	5.0E+01 (A)	HEA
Benzene	2.9E-02 (A)	HEA	2.9E-02 (A)	HEA
Bis-2(ethylhexyl)phthalate	1.4E-02 (B2)	HEA	Not Determined	HEA
Chloroform	6.1E-03 (B2)	HEA	8.1E-02 (B2)	HEA
1,1-Dichloroethane	9.1E-02* (B2)	HEA	Not Determined	HEA
1,2-Dichloroethane	9.1E-02 (B2)	HEA	9.1E-02 (B2)	HEA
1,2-Dichloropropane	6.8E-02* (B2)	HEA	Not Determined	HEA
Trichloroethene	1.1E-02 (B2)	HEA	1.3E-02* (B2)	HEA
Vinyl chloride	2.3E+00* (A)	HEA	2.95E-01* (A)	HEA

a) Cancer potency factor for each exposure route as defined by IRIS (EPA, 1989) unless denoted by " * ". Alphanumerics in brackets represent EPA Weight of Evidence classifications, which are defined as follows:

Group A - Human Carcinogen. Sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.

Group B1 - Probable Human Carcinogen. Limited evidence of carcinogenicity in humans from epidemiologic studies.

Group B2 - Probable Human Carcinogen. Sufficient evidence of carcinogenicity in animals, inadequate evidence of carcinogenicity in humans.

Group C - Possible Human Carcinogen. Limited evidence of carcinogenicity in animals.

b) Source : HEA = Health Effects Assessment document

Note : For those compounds where inhalation criteria are not available, the oral criteria will be used as the cancer potency factor in evaluating the potential risk posed by those compounds.

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TABLE 15A
PRESENT-USE SCENARIOS AT THE SARNEY FARM SITE

Present-Use Scenario Definitions	Circumstances of Exposure	Ages Exposed	Pathways of Exposure
1. Site Surface Soils			
a) Site and Area Residents	Recreational Use of Site / Trespassing	All Ages	Direct Contact / Ingestion / Inhalation of Suspended Soils
b) Site and Area Residents (Downwind)	Living Downwind of Contaminated Areas	All Ages	Inhalation of Volatile Organic Compounds Released from Soil
c) Farm Workers	Working on Site	Adults	Direct Contact / Ingestion / Inhalation of Suspended Soils/ Inhalation of Volatile Organic Compounds Released from Soil
2. Groundwater			
a) Site and Area Residents	Use of Groundwater from Current Residential Wells	All Ages	Ingestion / Direct Contact / Inhalation of Volatiles While Showering
3. Surface Water in Downstream Ponds, Streams and Swamp			
a) Site and Area Residents	Recreational Use by Pond Owners and Local Residents / Trespassing	All Ages	Ingestion / Direct Contact
b) Site and Area Residents (Downwind)	Living on Site or Downwind of Site	All Ages	Inhalation of Volatile Organic Compounds Released from Water
4. Sediments in Downstream Ponds, Streams and Swamp			
a) Site and Area Residents	Recreational Use by Pond Owners and Local Residents/Trespassing	All Ages	Direct Contact / Ingestion

TABLE 15B
FUTURE-USE SCENARIOS AT THE SARNEY FARM SITE

Future-Use Scenario Definitions	Circumstances of Exposure	Ages Exposed	Pathways of Exposure
1. Site Surface Soils			
a) Site and Area Residents	Living on Site	All Ages	Direct Contact / Ingestion / Inhalation of Suspended Soils
b) Site and Area Residents	Living Downwind or on Contaminated Areas	All Ages	Inhalation of Volatiles Released from Soil
c) Farm Workers	Identical to Present-Use Scenario	Identical to Present-Use Scenario	Identical to Present-Use Scenario
2. Site Subsurface Soils			
a) Construction Workers	Working on Site	Adults	Direct Contact / Ingestion / Inhalation of Suspended Soils
b) Site Residents	Living on Site	All Ages	Inhalation of Volatile Organic Compounds in Basement Air
3. Groundwater			
a) Site and Area Residents	Use of Groundwater from Bedrock Aquifer (including residential wells)	All Ages	Ingestion / Direct Contact / Inhalation of Volatiles While Showering
4. Surface Water in Downstream Ponds, Streams and Swamp			
a) Site and Area Residents	Identical to Present-Use Scenario	Identical to Present-Use Scenario	Identical to Present-Use Scenario
b) Site and Area Residents (Downwind)	Identical to Present-Use Scenario	Identical to Present-Use Scenario	Identical to Present-Use Scenario
5. Sediments in Downstream Ponds, Streams and Swamp			
a) Site and Area Residents	Identical to Present-Use Scenario	Identical to Present-Use Scenario	Identical to Present-Use Scenario

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TABLE : 16

SARNEY FARM SITE
RISK TO FARMWORKERS EXPOSED TO SOILS
PRESENT-USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Worst-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Conpound CPF*CDI	Summation of Worst-Case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Soil Ingestion	2.07E-07	Trichloroethene	1.14E-07	3.40E-02	2-Butanone	2.75E-02
Direct Contact	2.16E-07	Trichloroethene	1.19E-07	3.30E-02	2-Butanone	2.87E-02
Soil Inhalation	6.38E-09	N/A	--	1.79E-03	N/A	--
Total from all pathways	4.29E-07	Trichloroethene	2.33E-07	6.88E-02	2-Butanone	5.62E-02

PATHWAYS	Summation of Average-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Conpound CPF*CDI	Summation of Average-case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Soil Ingestion	8.22E-10	N/A	--	4.11E-05	N/A	--
Direct Contact	1.07E-10	N/A	--	5.33E-06	N/A	--
Soil Inhalation	1.40E-12	N/A	--	7.17E-08	N/A	--
Total from all pathways	9.30E-10	N/A	--	4.65E-05	N/A	--

(*) Exceeds Target Risk Level of 1.0E-05.

(**) Exceeds CDI:RfD Ratio of One.

NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

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TABLE 16
SARNEY FARM SITE
RISK TO RESIDENTS EXPOSED TO SOILS
PRESENT-USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Worst-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Worst-Case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Soil Ingestion	2.12E-07	Trichloroethene	1.16E-07	6.31E-02	2-Butanone	5.71E-02
Direct Contact	1.58E-07	N/A	--	2.28E-02	2-Butanone	1.51E-02
Soil Inhalation	2.66E-09	N/A	--	7.14E-04	N/A	--
Ground level volatile inhalation	1.32E-08	N/A	--	3.58E-03	N/A	--
Total from all pathways	3.86E-07	Trichloroethene	1.16E-07	9.02E-02	2-Butanone	7.22E-02

PATHWAYS	Summation of Average-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Average-case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Soil Ingestion	1.23E-09	N/A	--	3.04E-05	N/A	--
Direct Contact	1.10E-10	N/A	--	1.70E-06	N/A	--
Soil Inhalation	4.94E-13	N/A	--	8.76E-09	N/A	--
Ground level volatile inhalation	7.34E-11	N/A	--	1.40E-07	N/A	--
Total from all pathways	1.41E-09	N/A	--	3.22E-05	N/A	--

(*) Exceeds Target Risk Level of 1.0E-05.
(**) Exceeds CDI:RfD Ratio of One.
NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

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TABLE 1·6
SARNEY FARM SITE
RISK TO CONSTRUCTION WORKERS EXPOSED TO SOILS
FUTURE-USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Worst-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Worst-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Soil Ingestion	1.18E-07	N/A	--	3.26E-01	2-Butanone 4-Methyl-2-Pentanone	2.14E-01 1.01E-01
Direct Contact	1.23E-07	N/A	--	4.77E-01	2-Butanone 4-Methyl-2-Pentanone Toluene	3.12E-01 1.47E-01 1.23E-02
Soil Inhalation	3.63E-09	N/A	--	1.47E-02	N/A	--
Total from all pathways	2.45E-07	N/A	--	8.18E-01	2-Butanone 4-Methyl-2-Pentanone Toluene	5.26E-01 2.48E-01 1.23E-02

PATHWAYS	Summation of Average-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Average-case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Soil Ingestion	2.17E-11	N/A	--	1.01E-05	N/A	--
Direct Contact	2.81E-12	N/A	--	1.31E-06	N/A	--
Soil Inhalation	3.64E-13	N/A	--	1.73E-08	N/A	--
Total from all pathways	2.49E-11	N/A	--	1.14E-05	N/A	--

(*) Exceeds Target Risk Level of 10E-05.

(**) Exceeds CDI:RfD Ratio of One.

NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

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TABLE 16 (cont'd)
SARNEY FARM SITE
RISK TO RESIDENTS EXPOSED TO SOILS
FUTURE USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Average-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Average-Case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Soil Ingestion	3.43E-09	N/A	--	1.39E-04	N/A	--
Direct Contact	2.48E-10	N/A	--	4.10E-04	N/A	--
Soil Inhalation	1.21E-12	N/A	--	2.77E-08	N/A	--
Ground level volatile inhalation	1.88E-09	N/A	--	3.59E-06	N/A	--
Basement model volatile inhalation	1.52E-08	N/A	--	7.67E-05	N/A	--
Total from all pathways	2.08E-08	N/A	--	6.29E-04	N/A	--

(*) Exceeds Target Risk Level of 1.0E-05.

(**) Exceeds CDI:RfD Ratio of One.

NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

TABLE 16
SARNEY FARM SITE
RISK TO RESIDENTS EXPOSED TO SOILS
FUTURE-USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Worst-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Worst-Case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Soil Ingestion	2.92E-07	Trichloroethene Bis(2-Ethylhexyl) Phthalate	1.60E-07 1.31E-07	1.62E-01	2-Butanone 4-Methyl-2-Pentanone	1.08E-01 4.39E-02
Direct Contact	2.16E-07	Trichloroethene	1.19E-07	3.33E-02	2-Butanone	2.21E-02
Soil Inhalation	3.27E-09	N/A	--	5.90E-04	N/A	--
Ground level volatile inhalation	1.71E-07	N/A	--	4.64E-02	2-Butanone	3.73E-02
Basement model volatile inhalation	3.04E-03	* Trichloroethene * Chloroform * Benzene	2.52E-03 4.80E-04 3.73E-05	6.78E+02	** 2-Butanone ** 4-Methyl-2-Pentanone ** Toluene	4.36E+02 2.33E+02 7.75E+00
Total from all pathways	3.04E-03	* Trichloroethene * Chloroform * Benzene Bis(2-Ethylhexyl) Phthalate	2.52E-03 4.80E-04 3.73E-05 1.31E-07	6.78E+02	** 2-Butanone ** 4-Methyl-2-Pentanone ** Toluene	4.36E+02 2.33E+02 7.75E+00

(*) Exceeds Target Risk Level of 1.0E-05.

(**) Exceeds CDI:RfD Ratio of One.

NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

TABLE 16 (cont'd)

SARNEY FARM SITE
GROUNDWATER PATHWAY RISKS
FUTURE-USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Average-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Average-case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Groundwater Ingestion	3.42E-03	* Arsenic	3.39E-03	1.13E+00	** Lead	1.07E+00
		* Vinyl Chloride	2.56E-05		Vanadium	3.66E-02
		1,2 Dichloroethane	4.78E-06		Nickel	1.69E-02
		1,1 Dichloroethane	1.01E-06			
		Benzene	1.84E-07			
		Chloromethane	1.24E-07			
		Trichloroethene	1.22E-07			
Shower Dermal Contact	4.46E-07	Benzene	3.34E-07	3.83E-05	N/A	--
Inhalation of volatiles while showering	1.59E-05	1,2 Dichloroethane	7.51E-06	8.16E-03	N/A	--
		Vinyl Chloride	5.16E-06			
		1,1 Dichloroethane	1.59E-06			
		Benzene	2.90E-07			
		Trichloroethene	2.27E-07			
Total from all pathways	3.44E-03	* Arsenic	3.39E-03	1.14E+00	** Lead	1.07E+00
		* Vinyl Chloride	3.08E-05		Vanadium	3.66E-02
		1,2 Dichloroethane	1.23E-05		Nickel	1.69E-02
		1,1 Dichloroethane	2.60E-06			
		Benzene	8.08E-07			
		Trichloroethene	3.49E-07			
		Chloromethane	1.24E-07			

(*) Exceeds Target Risk Level of 1.0E-05.

(**) Exceeds CDI:RfD Ratio of One.

NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

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TABLE 16

SARNEY FARM SITE
GROUNDWATER PATHWAY RISKS
FUTURE-USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Worst-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Worst-Case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Groundwater Ingestion	1.03E-02	* Vinyl Chloride	1.02E-03	5.54E+00	** Lead	5.22E+00
		* Arsenic	8.88E-03		Vanadium	2.10E-01
		* 1,2 Dichloroethane	3.78E-04		Nickel	5.88E-02
		1,1 Dichloroethane	3.47E-06		Zinc	3.03E-02
		Chloromethane	8.66E-07			
		Trichloroethene	7.33E-07			
		Benzene	4.60E-07			
Shower Dermal Contact	5.81E-06	Vinyl Chloride	3.62E-06	2.14E-04	N/A	--
		1,2 Dichloroethane	1.34E-06			
		Benzene	8.35E-07			
Inhalation of volatiles while showering	4.08E-04	* Vinyl Chloride	1.03E-04	1.17E-02	N/A	--
		* 1,2 Dichloroethane	2.98E-04			
		1,1 Dichloroethane	2.73E-06			
		Trichloroethene	6.82E-07			
		Benzene	3.62E-07			
		Chloromethane	3.31E-07			
Total from all pathways	1.07E-02	* Vinyl Chloride	1.13E-03	5.55E+00	** Lead	5.22E+00
		* Arsenic	8.88E-03		Vanadium	2.10E-01
		* 1,2 Dichloroethane	6.77E-04		Nickel	5.88E-02
		1,1 Dichloroethane	6.20E-06		Zinc	3.03E-02
		Benzene	1.66E-06			
		Trichloroethene	1.42E-06			
		Chloromethane	1.20E-06			

(*) Exceeds Target Risk Level of 1.0E-05.

(**) Exceeds CDI:RfD Ratio of One.

NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

TABLE 16 (cont'd)

SARNEY FARM SITE
GROUNDWATER PATHWAY RISKS
PRESENT-USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Average-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Average-case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Groundwater Ingestion	2.56E-07	Trichloroethene	1.05E-07	3.16E-03	N/A	--
		Chloromethane	1.03E-07			
		Chloroform	4.84E-08			
Shower Dermal Contact	9.07E-10	N/A	--	3.06E-05	N/A	--
Inhalation of volatiles while showering	1.29E-06	Chloroform	1.01E-06	6.69E-03	N/A	--
		Trichloroethene	1.95E-07			
		Chloromethane	7.87E-08			
Total from all pathways	1.55E-06	Chloroform	1.06E-06	9.88E-03	N/A	--
		Trichloroethene	3.00E-07			
		Chloromethane	1.82E-07			

(*) Exceeds Target Risk Level of 1.0E-05.

(**) Exceeds CDI:RfD Ratio of One.

NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

4/13/90

TABLE 16

SARNEY FARM SITE
GROUNDWATER PATHWAY RISKS
PRESENT-USE SCENARIO

	CARCINOGENS			NONCARCINOGENS		
PATHWAYS	Summation of Worst-Case Lifetime Cancer Risk	Compounds Representing Majority of risk	Compound CPF*CDI	Summation of Worst-Case Hazard Index	Compounds Representing Majority of risk	Compound CDI:RfD Ratio
Groundwater Ingestion	1.25E-06	Trichloroethene	7.33E-07	7.16E-03	N/A	--
		Chloromethane	3.71E-07			
		Chloroform	1.49E-07			
Shower Dermal Contact	3.67E-09	N/A	--	7.45E-05	N/A	--
Inhalation of volatiles while showering	1.84E-06	Chloroform	1.01E-06	7.88E-03	N/A	--
		Trichloroethene	6.82E-07			
		Chloromethane	1.42E-07			
Total from all pathways	3.09E-06	Trichloroethene	1.42E-06	1.51E-02	N/A	--
		Chloroform	1.16E-06			
		Chloromethane	5.13E-07			

(*) Exceeds Target Risk Level of 1.0E-05.

(**) Exceeds CDI:RfD Ratio of One.

NA Not Applicable, calculated levels for each compound are two orders of magnitude below risk levels.

Table 17. List of Applicable or Relevant and Appropriate Requirements (ARARs) for the Soil and Drum Treatment Alternatives.

SOILS

Regulatory Level	Description
Federal	National Ambient Air Quality Standards for Hazardous Air Pollutants (40 CFR 52); for the operation of the soil treatment unit
	RCRA - Standards Applicable to Transport of hazardous Waste (CFR 263.11, 263.20-21 and 263.30-31); for the transport of wastes off-site
	RCRA - Standards for Owners/Operators of Permitted Hazardous Waste Facilities (CFR 264.10-264.18); for the treatment of wastes off-site
	RCRA - Preparedness and Prevention (40 CFR 264.30-264.37); for the treatment of wastes off-site
	RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50-264.56); fot the treatment of wastes off-site
	DOT Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1-172.558); for the treatment of wastes off-site
State	New York Hazardous Waste Manifest System Rules (6 NYCRR 372); for the treatment of wastes off-site
	New York Hazardous Waste Treatment Storage and Disposal Facility Permitting Requirements (6 NYCRR 370 and 373); for the treatment of wastes off-site

OTHERS ARARs COMMON TO ALL ALTERNATIVES

Regulatory Level	Description
Federal	OSHA - Safety and Health Standards (29 CFR 1926)
	OSHA - Record Keeping, Reporting and Related Regulations (29 CFR 1904)

TABLE 18

COST SENSITIVITY ANALYSIS - SOURCE CONTROL

			PRESENT WORTH			
ALT	CAPITAL COST	ANNUAL O&M COST	DISCOUNT RATE = 4%	DISCOUNT RATE = 5%	DISCOUNT RATE = 7%	DISCOUNT RATE = 10%
SC-1	$0	$15,300	$297,000	$263,500	$211,800	$160,000
SC-4	$644,000	$0	$644,000	$644,000	$644,000	$644,000
SC-5	$1,657,100	$0	$1,657,100	$1,657,100	$1,657,100	$1,657,100

Comment

The Present Worths for Alternative SC-1 includes the costs of a $10,000 review every five years for

Table 19. List of Applicable or Relevant and Appropriate Requirements (ARARs) for the Groundwater Treatment Alternatives.

GROUNDWATER

Regulatory Level	Description
Federal	National Ambient Air Quality Standards for Hazardous Air Pollutants (NAAQS) 40 CFR 52
	CWA Water Quality Criteria (WQC) for Protection of Human Health and Aquatic Life
	SDWA Maximum Contaminant Levels (MCLs)
State	6 NYCRR Groundwater Quality Regulations Part 703.5
	Drinking Water Standards (10 NYCRR Part 5)
	6 NYCRR Ambient Surface Water Quality Standards Part 701
	6 NYCRR Groundwater Treatment Quality Standards Part 703.5
	6 NYCRR NY State Pollution Elimination Discharge System Part 750
	NYS Ambient Air Quality Standards and Control Apparatus Permit Requirements (6 NYCRR Part 212)

Table 19. List of Applicable or Relevant and Appropriate Requirements (ARARs) for the Groundwater Treatment Alternatives

GROUNDWATER

Regulatory Level	Description
Federal	National Ambient Air Quality Standards for Hazardous Air Pollutants (NAAQS) 40 CFR 52
	CWA Water Quality Criteria (WQC) for Protection of Human Health and Aquatic Life
	SDWA Maximum Contaminant Levels (MCLs)
State	6 NYCRR Groundwater Quality Regulations Part 703.5
	Drinking Water Standards (10 NYCRR Part 5)
	6 NYCRR Ambient Surface Water Quality Standards Part 701
	6 NYCRR Groundwater Treatment Quality Standards Part 703.5
	6 NYCRR NY State Pollution Elimination Discharge System Part 750
	NYS Ambient Air Quality Standards and Control Apparatus Permit Requirements (6 NYCRR Part 212)

TABLE 20

COST SENSITIVITY ANALYSIS - GROUNDWATER

				PRESENT WORTH			
ALT	YEARS TO REMEDIATE	CAPITAL COST	ANNUAL O&M COST	DISCOUNT RATE = 4%	DISCOUNT RATE = 5%	DISCOUNT RATE = 7%	DISCOUNT RATE = 10%
GW-1	30	$0	$15,300	$297,000	$263,500	$211,800	$160,000
	19	$0	$15,300	$211,900	$193,400	$162,700	$128,400
	13	$0	$15,300	$159,300	$148,700	$130,200	$107,900
	7	$0	$15,300	$93,100	$89,000	$81,600	$72,000
GW-2	30	$50,000	$15,100	$342,800	$309,700	$258,800	$207,600
	19	$50,000	$15,100	$258,900	$240,700	$210,400	$176,600
	13	$50,000	$15,100	$207,100	$196,600	$178,300	$156,400
	7	$50,000	$15,100	$141,800	$137,800	$130,500	$121,000
GW-3	19	$632,900	$90,000	$1,728,900	$1,635,300	$1,479,300	$1,304,200
	13	$632,900	$90,000	$1,445,400	$1,392,900	$1,301,200	$1,190,600
	7	$632,900	$90,000	$1,086,700	$1,068,100	$1,034,000	$989,400
GW-4	19	$734,000	$136,200	$2,391,900	$2,250,300	$2,014,400	$1,749,500
	13	$734,000	$136,200	$1,963,100	$1,883,700	$1,745,000	$1,577,700
	7	$734,000	$136,200	$1,420,500	$1,392,400	$1,340,700	$1,273,200
GW-5	19	$482,900	$80,700	$1,464,700	$1,380,800	$1,241,100	$1,084,300
	13	$482,900	$80,700	$1,210,700	$1,163,700	$1,081,600	$982,500
	7	$482,900	$80,700	$889,500	$872,800	$842,200	$802,300

Comment

The Present Worths for Alternatives GW-1 and GW-2 include the costs of a $10,000 review every five years.

The remediation times for Alternatives GW-3, GW-4 and GW-5 includes one year to implement and the remaining years for operation.

Alternatives GW-1 and GW-2 are evaluated for the 7, 13 and 19 years cases, because once the source is remediated (one year to implement) the natural flushing may remediate the bedrock groundwater on-site during the remaining 6 to 18 years.

Table 21. List of Applicable or Relevant and Appropriate Requirements (ARARs) for the Selected Remedy.

SOILS

Regulatory Level	Description
Federal	National Ambient Air Quality Standards for Hazardous Air Pollutants (40 CFR 52); for the operation of the soil treatment unit
	RCRA - Standards Applicable to Transport of Hazardous Waste (CFR 263.11, 263.20-21 and 263.30-31); for the transport of wastes to an off-site treatment facility
	RCRA - Standards for Owners/Operators of Permitted Hazardous Waste Facilities (40 CFR 264.10-264.18); for the treatment of wastes off-site
	RCRA - Preparedness and Prevention (40 CFR 264.30-264.37); for the treatment of wastes off-site
	RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50-264.56); for the treatment of wastes off-site
State	New York Hazardous Waste Manifest System Rules (6 NYCRR 372); for the treatment of wastes off-site
	New York Hazardous Waste Treatment Storage and Disposal Facility Permitting Requirements (6 NYCRR 370 and 373); for the treatment of wastes off-site
	Air Emissions (6 NYCRR 200-234); for the operation of the soil treatment unit
	Freshwater Wetlands Act (6 NYCRR Part 663); for activities at the site
	DOT - Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1-172.558); for the treatment of wastes off-site
GROUNDWATER	
Federal	SDWA Maximum Contaminant Levels (MCLs)
State	Groundwater Quality Regulations (6 NYCRR Part 703)
	Drinking Water Standards (10 NYCRR Part 5)
OTHERS	
	OSHA - Safety and Health Standards (29 CFR 1926)
	OSHA - Record Keeping, Reporting and Related Regulations (29 CFR 1904)

APPENDIX C. ADMINISTRATIVE RECORD INDEX

SARNEY FARMS
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

SITE INVESTIGATION

Correspondence

p. 1 - 3	Letter to party not named from Ms. Donna Hearn, Town of Dover Planning Board, Re: Proposal for two subdivisions. Questionnaire is attached. 10/10/86.
p. 4	Letter to Mr. John McGahren, US EPA from Mr. Arthur Sarney, Re: Changing the name of the site. 8/2/89.

REMEDIAL INVESTIGATION

Sampling and Analysis Plans

p. 5	EPA Sampling Permission Form, Sarney Property, signed by David Hewlett and Shirley Hewlett. 5/31/86.
p. 6	EPA Sampling Permission Form, Sarney Property, signed by Kenneth Sherman and Nancy Sherman. 6/1/86.
p. 7	EPA Sampling Permission Form, Sarney Property, signed by James Benson. 6/1/86.
p. 8	EPA Sampling Permission Form, Sarney Property, signed by Norman Benson. 6/2/86.
p. 9	EPA Sampling Permission Form, Sarney Property, signed by Bonnie and Gordon Strang. 6/2/86.
p. 10	EPA Sampling Permission Form, Sarney Property, signed by Norman Benson. 6/2/86.
p. 11	EPA Sampling Permission Form, Sarney Property, signed by Lawrence Benson. 6/3/86.
p. 12	EPA Sampling Permission Form, Sarney Property, signed by Charles Clapper. 6/3/86.
p. 13	EPA Sampling Permission Form, Sarney Property, signed by Ellen Taylor, no date.

p. 14	EPA Sampling Permission Form, Sarney Property, signed by A.R. Pleasanton. 6/6/86.
p. 15	EPA Sampling Permission Form, Sarney Property, signed by Conrad Benson. 6/7/86.

Work Plans

p. 16 - 55	Report: Interim Report for the Sarney Property Site, prepared by CDM. 10/3/85.
p. 56 - 129	Report: Final Work Plan for the Sarney Property Site, Volume I, prepared by CDM. 3/31/86.
p. 130 - 147	Report: Final Work Plan for the Sarney Property Site, Volume II, prepared by CDM. 3/31/86.
p. 148 - 152	Statement of Work, Sarney Farm Property, Remedial Planning Activities. 9/8/88.

Remedial Investigation Reports

p. 153 - 528	Report: Engineering Investigations at Inactive Hazardous Waste Site in the State of NY, Phase II Investigations, prepared by Wehran Engineering. 6/85.
p. 529 - 905	Report: Final Remedial Investigation Report Sarney Farm Property Site, Volume I, prepared by EBASCO. 5/90.
p. 906 - 1291	Report: Final Remedial Investigation Report, Sarney Farm Property Site, Volume II, prepared by EBASCO. 5/90.

Correspondence

p. 1292	Letter to Mr. John McGahren, US EPA from Mr. David Carruth, DE Associates, Re: request under FOIA. 11/28/88.

FEASIBILITY STUDY

Supplements and Revisions to the Proposed Plan

p. 1293 - 1512 Report: Final Supplemental Feasibility Study, prepared by EBASCO. 5/1/90.

RECORD OF DECISION

Correspondence

p. 1513 - 1514 Letter to Mr. Doug Touchuk, US EPA from Ms. Jacqueline Scott, HWIC, Re: receiving proposed remedial solutions and RODs. 2/15/90.

ENFORCEMENT

Notice Letters and Responses

p. 1515 Letter to Mr. Norman Nosenchuck, US EPA from Mr. & Mrs. Arthur Sarney, Sarney Farms, Re: Operations at his farm. 11/10/83.

p. 1516 - 1517 Letter to Mr. Langdon Marsh, NYDEC, from Mr. Arthur I. Sarney, Re: Involvement with site. 12/9/83.

p. 1518 - 1521 Letter to Mr. and Mrs. Arthur Sarney, Sarney Farms from Mr. William Librizzi, US EPA, Re: Indication of the property as hazardous. 6/5/85.

p. 1522 Letter to Ms. Karen Sudy, US EPA from Ms. Margaret Tribble, Cyanamid, Re: Intent of EPA to RI/FS. 6/7/85.

p. 1523 - 1524 Letter to Ms. Karen Sudy, US EPA from Mr. Paul Brown, Dow Chemical Company, Re: Declining of EPA request to do a RI/FS. 6/21/85.

p. 1525 Letter to Mr. Robert Howe, US EPA from Mr. & Mrs. Arthur Sarney, Sarney Farms, Re: Confirmation of a telephone call. 6/29/85.

p. 1526	Letter to Ms. Karen Sudy, US EPA from Ms. Margaret Tribble, Cyanamid, Re: Denial of Cyanamid as PRP. 7/2/85.
p. 1527	Letter to Ms. Karen Sudy, US EPA from Ms. Margaret Tribble, Cyanamid, Re: List of other PRPs. 9/25/85.
p. 1528 - 1536	Letter to Mr. George J. Sella, Jr., American Cyanamid Company, from Mr. James Marshall, US EPA, Re: Indication of the company as PRP. 7/30/86.
p. 1537 - 1539	Letter to Mr. James Andrea, Sterling from Mr. James Marshall, US EPA, Re: Indication of the company as PRP. 8/29/86.
p. 1540 - 1542	Letter to Mr. P.F. Oreffice, Dow Chemical Company, from Mr. James Marshall, US EPA, Re: Indication of the company as PRP. 8/29/86.
p. 1543 - 1545	Letter to Mr. Robert Cobalt, Morton Chemical Division from Mr. James Marshall, US EPA, Re: Indication of the company as a PRP. 8/29/86.
p. 1546 - 1548	Letter to Mr. Thomas Wyman, CBS, Inc., from Mr. James Marshall, US EPA, Re: Indication of the company as a PRP. 8/29/86.
p. 1549 - 1557	Letter to Ms. Susan Shaw, US EPA from Ms. Margaret Tribble, Cyanmid, Re: Request for information. 9/4/86.
p. 1558 - 1559	Letter to Mr. Michael McCauty, Quarles and Brady from Mr. Jack Axelrod, Morton Thiokol, Inc., Re: Information concerning Morton Thiokol. 9/5/86.
p. 1560 - 1562	Letter to Mr. James Marshall, US EPA from Mr. Jack Axelrod, Morton Thiolol, Inc., Re: Information concerning Morton Thiokol, Inc. 9/11/86.
p. 1563	Letter to Mr. Paul Simon, US EPA from Ms. Nancy Bryson, Crowell and Moring, Re: Letter to Sterling. 9/24/86.
p. 1564 - 1565	Letter to Mr. James Marshall, US EPA form Mr. Paul Ware Jr., Goodwin, Procter and Hoar, Re: Request for information. 9/24/86.

p. 1566 - 1571	Letter to Ms. Susan Shaw, US EPA from Mr. Rodney Walsh Jr., Pitney Bowes, Re: Request for information. 10/1/86.
p. 1572 - 1576	Letter to Ms. Susan Shaw, US EPA from Dr. Roger Wolfe, Sterling Drug Inc., Re: Request for Information. 10/10/86.
p. 1577 - 1582	Letter to Ms. Susan Shaw, US EPA from Ms. Donna Binkowski, Dow Chemical, Re: Request for information. 10/14/86.
p. 1583 - 1587	Letter to Ms. Susan Shaw, US EPA from Mr. Arthur Vogel, Quarles and Brady, Re: Request for information from Morton-Thiokol, Inc. 10/16/86.
p. 1588 - 1596	Letter to Mr. Richard Giannattasio, Milford Barrel Company from Mr. James Marshall, US EPA, Re: Indication of him as a PRP. 12/23/86.
p. 1597 - 1599	Letter to Mr. John Giannattasio, Touchdown Waste Systems Company from Mr. James Marshall, US EPA, Re: Indication of him as a PRP. 12/23/86.
p. 1600 - 1603	Letter to Mr. James Marshall, US EPA from Mr. John Giannattasio, Re: Request for information. 1/25/87.

Correspondence

p. 1604 - 1605	Letter to Mr. David Ruff, Duchess County Department of Health from Mr. Vince Pitruzzello, US EPA, Re: Information regarding Sarney Farms. 9/19/85.
p. 1606	Letter to Mr. Charles Kurker, US EPA from Ms. Susan Shaw, US EPA, Re: PRP search. 2/12/86.
p. 1607	Letter to the Arizona Department of Transportation, Motor Vehicle Division from Ms. Susan Shaw, US EPA, Re: Search for John Giannattaio. 7/31/86.
p. 1608	Letter to the Texas Secretary of State from Ms. Susan Shaw, US EPA, Re: Information relating to the Giannattasios. 9/23/86.

p. 1609	Letter to Mr. Charles Motes Jr., Milford Department of Health from Ms. Susan Shaw, US EPA, Re: Information relating to the Giannattasios. 3/17/87.
p. 1610	Letter to Mrs. Louise Leary, Norwalk Department of Health from Ms. Susan Shaw, US EPA, Re: Information relating to the Giannattasios. 3/17/87.
p. 1611	Letter to Mrs. Edith Carruth, Stamford Department of Health from Ms. Susan Shaw, US EPA, Re: Information relating to Haul-A-Way, Inc. 4/20/87.
p. 1612 - 1616	Memo to File from Mr. Doug Zimmerman, US EPA, Re: Donahue Property Norwalk, Ct. and a related PRP to Sarney Farms. 5/19/88. A map and photos are attached.
p. 1617	Letter to Ms. Denise Rioux, Connecticut Secretary of State from Ms. Susan Shaw, US EPA, Re: Information pertaining to PRPs. 9/15/88.

NATURAL RESOURCES TRUSTEES

Correspondence

p. 1618	Letter to Mr. Leonard Corin, US Fish and Wildlife Service from Mr. Robert Hargrove, US EPA Re: To determine if there are any federal endangered/ threatened species or critical habitats present in the vicinity of the Sarney Property National Priorities List Site. 5/5/89.
p. 1619	Letter to Mr. Robert Hargrove, US EPA from Mr. Leonard Corin, US Fish and Wildlife Re: Response concerning the threatened/endangered species in the Sarney Farms area. 5/24/89.

PUBLIC PARTICIPATION

Comments and Responses

p. 1620 - 1622	Letter to Mr. and Mrs. Barry from Ms. Karen Sudy, US EPA, Re: Notification of beginning an RI/FS in their area. 5/29/86.
p. 1623 - 1625	Letter to Mr. Lawrence Benson from Ms. Karen Sudy, US EPA, Re: Notification of beginning an RI/FS in their area. 5/30/86.

Community Relations Plans

p. 1626 - 1655	Report: Final Community Relations Plan, prepared by CDM. 3/31/86.

Public Meeting Transcripts

p. 1656 - 1673	Final Public Scoping Meeting Summary, prepared by CDM. 9/23/86.

Fact Sheets and Press Releases

p. 1674	Fact Sheet for the Sarney Farm Site. 2/89
p. 1675 - 1685	Press release, "EPA Announces Proposed Cleanup Remedy For Sarney Superfund Site." 5/15/1990

Proposed Plan

p. 1686 - 1690	Superfund Proposed Plan for the Sarney Farm Superfund Site. 5/90.

Correspondence

p. 1691 - 1697 Letter to Mr Robert Murphy, CIGNA, from Mr. Paul Simon, US EPA, Re: Freedom of Information Act Request. Date illegible. Attachments:

A) 1/19/87 response from Richard Giannattasio
B) 1/20/87 certification from Richard Giannattasio
C) 9/24/86 letter to Mr. James Marshall, US EPA, from Mr. Paul F. Ware jr., Goodwin, Proctor & Hoar.

APPENDIX D. NYSDEC LETTER OF CONCURRENCE

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7010

Thomas C. Jorling
Commissioner

SEP 24 1990

Mr. Richard L. Caspe, P.E.
Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Dear Mr. Caspe:

RE: Sarney Property Site I.D. No. 314007
Dutchess County, New York

The New York State Department of Environmental Conservation (NYSDEC) has reviewed the revised draft Declaration for the Record of Decision (ROD) for the above-referenced site. The NYSDEC concurs with the selected remedies which include:

1. Alternative SC-4, Buried Drums and Contaminated Soils - Excavation and off-site treatment and disposal of 40 contaminated drums. Approximately 2365 cubic yards of soil will be excavated and treated on-site with low temperature enhanced volatilization and on-site redeposition.

2. Alternative GW-1, No Action Groundwater - This alternative includes long-term monitoring program for surface water, groundwater and residential wells and additional hydrogeological investigation including placement of additional monitoring wells, if needed, to ensure that the remedy will be protective to the human health and the environment.

Our acceptance of the groundwater remedy is based on the understanding that the additional investigation as outlined in our letter dated June 11, 1990 will be completed and the groundwater remedial alternatives will be re-evaluated. If the re-evaluation suggest that an alternative other than the No-Action groundwater alternative would be more protective to the human health and the environment, then the ROD will be reopened.

If you have any questions, please call Mr. Kamal Gupta, of my staff, at (518) 457-3976.

Sincerely,

Edward O. Sullivan
Deputy Commissioner

cc: W. McCabe, USEPA, Region II
D. Garbarini, USEPA, Region II
C. Ramos, USEPA, Region II
R. Tramontano, NYSDOH

APPENDIX E. RESPONSIVENESS SUMMARY

FINAL RESPONSIVENESS SUMMARY
SARNEY FARM PROPERTY SITE
AMENIA, DUTCHESS COUNTY, NEW YORK

The U.S. Environmental Protection Agency (EPA) held a public comment period from May 12, 1990 through June 10, 1990 for interested parties to comment on EPA's Draft Feasibility Study and Proposed Remedial Action Plan (PRAP) for remedial action at the Sarney Farm Property Superfund Site in Amenia, New York.

EPA held a public meeting on May 23, 1990 at the Amenia Town Hall, Amenia, New York to describe the remedial alternatives and to present EPA's preferred remedial alternatives to clean up the Sarney Farm Property site.

A responsiveness summary is required for the purpose of providing EPA and the public with a summary of citizens' comments and concerns about the site raised during the public comment period and EPA's responses to those concerns. All comments summarized in this document will be considered in EPA's final decision for selection of the remedial alternative for cleanup of the site. The responsiveness summary is organized into the following sections:

I. Responsiveness Summary Overview. This section briefly describes the public meeting held on May 23, 1990 and includes historical information about the Sarney Farm Property site along with the proposed remedial alternatives to clean up the site.

II. Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns regarding the Sarney Farm Property site.

III. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's Responses to Comments. This section summarizes comments submitted to EPA at the public meeting and during the public comment period and provides EPA's responses to these comments.

Attached to this responsiveness summary are three appendices: Appendix A is EPA's agenda for the public meeting; Appendix B is EPA's Proposed Plan for the Sarney Farm Property site; and Appendix C is the public meeting sign-in sheet.

I. RESPONSIVENESS SUMMARY OVERVIEW

A. PUBLIC MEETING AND SITE HISTORY

The public meeting for the Sarney Farm Property site began at 7:00 p.m. on May 23, 1990 with presentations by EPA and was followed by a question and answer session. Approximately 20 residents and local officials attended the meeting.

Doug Garbarini, Chief, Eastern New York and Caribbean Remedial Action Section; Rahul Gupta, Sarney Farm Property Remedial Project Manager; and Cecelia Echols, Region II Community Relations Coordinator, represented EPA. EPA contractor personnel were represented by Mario Verdibello, ARCS II Site Manager, and Gerry Zanzalari, ARCS II Community Relations Specialist.

Ms. Echols opened the meeting and explained that the purpose of the meeting was to discuss the results of the FS and to present EPA's preferred remedial alternative for cleanup of the Sarney Farm Property site. Members of the community were encouraged to ask questions or express concerns regarding the site which would be factored into EPA's final Record of Decision (ROD) for the Sarney Farm Property site. They were also informed that EPA would accept comments throughout the remainder of the public comment period which closes on June 10, 1990. Ms. Echols then introduced Mr. Doug Garbarini.

Mr. Garbarini provided an overview of the Superfund process and explained how a site may be placed on EPA's National Priorities List (NPL) through the Hazardous Ranking System (HRS) process. Placement on the NPL makes a site eligible for federal funding for site remediation. He explained that the initial examination of a site is called the Remedial Investigation (RI) wherein the nature and extent of site contamination is determined. Samples of soil, air, sediment, surface water, and groundwater are collected and analyzed by EPA-approved laboratories. The contaminants detected through this analysis are then evaluated regarding their potential risk to human health and the environment; and the potential routes through which flora or fauna may come into contact with these contaminants are identified. The next stage of the investigation is known as the Feasibility Study (FS). EPA develops a number of alternatives to remediate site contamination based on established criteria. Once these cleanup alternatives are developed and evaluated, EPA prepares a Proposed Remedial Action Plan (PRAP) which presents EPA's preferred remedial alternative(s) for cleanup of the site. This preferred remedial alternative is then presented to state agencies and the public for review and comment. Upon receipt of public and state agency comments, EPA evaluates the responses and factors them into its final selection for a site remedy. A responsiveness summary addressing public comments is then prepared and becomes part of the ROD. The next stage of site cleanup is known as the Remedial Design (RD) phase where the design of the remedy is detailed. This is followed by the final, the Remedial Action (RA) phase where the selected remedy is implemented and site cleanup actually occurs. Upon completion of the RA, site closure occurs, and, if necessary, continuing site monitoring may be conducted to ensure the effectiveness of the remedy. The RI/FS can encompass a time frame from 18-24 months; the RD takes 12-18 months; and the RA can take as long as 30 years if the remedy includes the pumping and treatment of contaminated groundwater. If the remedy is as simple as removing items such as drums, remediation can take as little as six months to complete. Mr. Garbarini then introduced Mr. Mario Verdibello.

Mr. Verdibello provided a brief history of the site and a description of past investigative activities conducted by EPA at the site. The site is located in the Town of Amenia, Dutchess County, New York. The site is bordered by Benson Hill Road to the south, trees and agricultural areas to the west, steeply sloping land to the east, and Cleaver Swamp to the northwest.

In February 1968, Richard and John Giannattsio (doing business as Haul-A-Way Company, Inc.) applied to the Dutchess County Health Department (DCHD) for a permit to operate a five-acre sanitary landfill on the property, which, at that time, was owned by Mr. Herbert Davidson. The DCHD issued the permit in April 1968 with the provision that no industrial waste be deposited at the site. In June 1968, Haul-A-Way Company Inc. purchased a 143-acre parcel of the property containing the landfill site.

In November 1968, dumping of industrial waste on the site was reported and a subsequent site inspection by DCHD confirmed that barrels of waste solvents were placed in, and near a trench in the northern end of a large pasture area south-southeast of Cleaver Swamp. Another site inspection revealed that barrels were also being placed in another excavated trench to the southeast of the original trench. The DCHD informed Haul-A-Way that this type of disposal was not allowed under conditions of the landfill permit and a subsequent site inspection in January 1970 revealed that illegal dumping had stopped.

In August 1970, ownership of the property was transferred to Joseph A. Frumento and Charles J. Miller and in March 1971, the land was purchased for use as a pasture by the current owners, Arthur and Joan Sarney.

DCHD obtained water samples from the site in 1980 and 1982 and, as a result, the New York State Department of Environmental Conservation (NYSDEC) added the Sarney Farm site to a statewide list of hazardous waste sites eligible for possible cleanup under a state-administered Superfund program. In 1984, the site was proposed for inclusion on EPA's National Priorities List of hazardous waste sites and received final listing status in June 1986. Placement on the NPL made the site eligible for cleanup funds under federal Superfund legislation.

In 1986, EPA contracted with Camp, Dresser and McKee (CDM) to conduct an RI at the site. Based on the results of samples taken from the site, EPA conducted a removal/treatment action at the site to remove organic contaminants. EPA installed an on-site treatment facility to wash soil and remove contaminants. This treatment system is currently operating. Due to contractual limitations, EPA transferred responsibility for completing the RI/FS at the Sarney Farm site to Ebasco Services, Inc., who completed the study in May 1990.

B. SUMMARY OF REMEDIAL ALTERNATIVES

Superfund legislation requires that each site remedy is selected to be protective of human health and the environment, cost-effective, and in accordance with statutory requirements. Permanent solutions to contamination problems are to be achieved whenever possible.

In the course of conducting the RI/FS, EPA has determined that remedial action at the Sarney Farm site should encompass both soil and groundwater cleanup alternatives. To maintain consistency with the FS report, the remedial alternatives described below will address the cleanup of groundwater separately from soil remediation.

The FS developed and evaluated alternatives for remediating soil contamination (SC) and buried drums as well as groundwater (GW) contamination at the site. A "No Further Action" alternative was also evaluated for the groundwater and soils to provide a baseline for comparison and to provide an appropriate alternative in the event that no contravention of standards nor significant health or environmental risks were found to exist at the site.

The alternatives presented below are those which were evaluated in detail following the preliminary screening of alternatives. They have been indexed to correspond with the descriptions of alternatives carried through detailed analysis in the FS report. Two alternatives described in the FS were not carried through for detailed analysis. These were: Alternative SC-2 which involves land use restriction, fencing and warning signs, and SC-3 which involves excavation/off-site incineration and disposal of drums and soil.

Alternative SC-2 was dropped from future consideration since it would not prevent the contaminants in the drums and soil from migrating into other media, e.g., groundwater and surface water, and further impacting the environment and public health. Alternative SC-3 was screened out because it uses a similar technology as alternatives SC-4 and SC-5 and would achieve the same goals, however it is almost four times the cost of SC-4 and two times the cost of SC-5.

The preferred alternative will combine what the EPA and NYSDEC believe is the most appropriate alternative for remediating the contaminated soils and drums at the site with the most appropriate alternative for the contaminated groundwater. A list of the remedial alternatives considered are presented in Tables 1 and 2, followed by a description of each alternative.

Table 1. Remedial Alternatives for Contaminated Drums and Soils (SC)

- SC-1: No Further Action
- SC-4: Off-site Treatment/disposal of Drums and On-site Soil Treatment
- SC-5: Off-site Treatment/disposal of Drums and Off-site Soil Treatment

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Table 2. Remedial Alternatives for Contaminated Groundwater (GW)

- GW-1: No Further Action
- GW-2: Carbon Adsorption Treatment System at Each Existing Contaminated Residential Well
- GW-3: Collection and Treatment of Groundwater Using an Air Stripper
- GW-4: Collection and Treatment of Groundwater Using Hydrogen Peroxide with UV Light
- GW-5: Collection of Groundwater and Treatment at Existing On-site Aeration System

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In addition to the description of the alternatives, cost and schedule information are also provided (see Table 3). The present worth costs are estimates which take into account both the capital cost and the operation and maintenance (O&M) costs for 30 years. Time to implement as used herein means time for site preparation and for actual on-site construction and start up activities. It does not include the remedial design phase which typically takes 12-18 months.

SC-1: NO FURTHER ACTION

Capital Cost:	None
Present Worth Cost:	$264,000
Time to Implement:	Immediate

In this alternative, no further remediation of soils and drums beyond the current EPA removal action would occur. Contaminated soil and drums would remain in place and continue to act as a source of groundwater contamination. A long-term monitoring program would be implemented in order to assess the migration of the contaminated groundwater. The monitoring program would include an annual inspection of the site as well as sampling and testing of the surface water and groundwater every six months for 30 years. In addition, because this alternative would result in contaminants remaining on-site, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund, requires that the site be reviewed every 5 years to assure that human health and environment are being protected by the remedial action being implemented.

SC-4: OFF-SITE TREATMENT OF DRUMS AND ON-SITE TREATMENT OF SOILS

Capital Cost:	$644,000
Present Worth Cost:	$644,000
Time to Implement:	14 months

This alternative involves excavating the drums and approximately 2,365 cubic yards (cy) of contaminated soil. The drums would then be placed in overpack containers and transported to a Resource Conservation and Recovery Act (RCRA) permitted off-site treatment and disposal facility. The facility would incinerate the drummed wastes and then dispose of the drum residues. The contaminated soil would be treated on-site using a low temperature thermal treatment unit. In the soil treatment facility, hot air is injected into the soils at a temperature of 260°C. Volatile organic compounds in the soil, e.g., toluene, are volatilized into the air stream and combusted in an after burner where they are destroyed. The off-gas from the after burner would be treated in a scrubber for particulate adsorption and gas removal. After treatment, the soil would be used to back-fill and regrade the excavated areas. Proper engineering measures would be implemented to control air emissions, fugitive dust, run-off, erosion and sedimentation.

SC-5: OFF-SITE TREATMENT OF DRUMS AND SOILS

Capital Cost:	$1,657,100
Present Worth Cost:	$1,657,100
Time to Implement:	14 months

This alternative consists of excavating the contaminated drums and soil as described in SC-4. The drums would then be placed in overpacks and transported to an off-site RCRA licensed treatment and disposal facility. For the purpose of developing a cost for this alternative, low temperature thermal treatment was chosen as the most cost-effective technology for the off-site treatment of soils. Treated soils would be disposed of by the treatment facility operator in accordance with RCRA regulations. Clean fill would be brought in to back-fill and regrade the excavated areas. Proper engineering measures would be implemented to control fugitive dust, run-off, erosion and sedimentation.

Contaminated Soil Treatment Alternatives Cost Summary

	CAPITAL COST	O&M[A] COST	PRESENT WORTH COST	TIME (MONTH)
SC-1	$ 0	$15,300	$ 264,000	0
SC-2	$ 644,000	0	644,000	14
SC-3	$1,657,100	0	1,657,100	14

[A] per year

GW-1: NO FURTHER ACTION

Capital Cost: None
Present Worth Cost: $263,500
Time to Implement: Immediate

A no further action alternative would involve conducting a long-term program to monitor the migration of contaminants in the bedrock aquifer underlying the site. The monitoring program would involve the sampling of existing monitoring wells installed on-site plus the residential wells located in the vicinity of the site every six months for 30 years. Surface water samples would also be collected and analyzed for contaminants. This information would be continually used to assess any potential future impact and to ensure protection of human health and the environment. A five year review would be performed since contaminated groundwater would be left on-site. Fact sheets would be distributed to the public, as well as town and county officials to inform them of the results of the monitoring program and to indicate whether contamination is spreading or otherwise causing a problem which must be addressed.

GW-2: CARBON ADSORPTION TREATMENT AT RESIDENTIAL WELLS

Capital Cost: $50,000
Present Worth Cost: $310,000
Time to Implement: 14 months

This alternative would involve setting up small individual carbon adsorption systems at existing residential wells as a point-of-use water treatment alternative. The water would be pumped from the individual well using the existing pump through a residential carbon adsorption system which would remove the organic contaminants. In addition, the installation of new wells in potentially affected areas would be discouraged through the release of routine site fact sheets to the town and county if the results of the monitoring program indicate that contamination is spreading or otherwise causing a problem.

GW-3: COLLECTION AND TREATMENT OF GROUNDWATER USING AN AIR STRIPPER

Capital Cost:	$632,900
Present Worth Cost:	$1,640,000
Time to Implement:	14 months

This alternative is to pump and treat the groundwater from the plume area to prevent the migration of the contaminants. The major feature of this alternative includes groundwater pumping, collection, treatment and on-site discharge to Cleaver Swamp, and a long-term monitoring program. The groundwater would be pretreated using lime and polymers to remove iron. Following pre-treatment the water would be pumped to an air stripper where the volatile organic contaminants, e.g., 1,2-DCA and vinyl chloride, would be removed.

This alternative would treat contaminated groundwater to levels required by the federal and state maximum contaminant levels (MCLs) for public drinking water supply systems and the state surface water quality standards for discharge of effluent to surface water. However, it should be noted that engineering practicability and cost effectiveness of pump and treatment is questionable in lieu of the site hydrogeological characteristics. The productive aquifer underlying the site consists of medium to coarse grained fractured limestone bedrock. The movement of contaminants in this type of geology is highly influenced by the extent and location of the fractures, something extremely difficult if not impossible to accurately determine. The estimated time frame for treatment of the groundwater is 20 years, however this number is subject to much uncertainty.

GW-4: COLLECTION AND TREATMENT OF GROUNDWATER USING HYDROGEN PEROXIDE AND UV LIGHT

Capital Cost:	$734,000
Present Worth Cost:	$2,250,000
Time to Implement:	14 months

This alternative is similar to GW-3 in that it would attempt to clean up the contaminated bedrock aquifer. The major features of this alternative include groundwater pumping, collection, treatment and on-site discharge, and a long-term monitoring program. The pumping, collection, pre-treatment and monitoring program for this alternative is the same as Alternative GW-3. In this alternative the water would be treated using chemical oxidation with hydrogen peroxide and UV light. This treatment would reduce the volatile organic contaminants, e.g., 1,2-DCA and vinyl chloride, to levels required by the federal and state MCLs for public drinking water supply and state surface water quality standards. The water would then be discharged to Cleaver Swamp. The same engineering limitations discussed under Alternative GW-3 apply to Alternative GW-4. The estimated aquifer restoration time frame for this alternative is also 20 years.

GW-5: COLLECTION OF GROUNDWATER AND TREATMENT AT EXISTING ON-SITE SYSTEM

Capital Cost: $482,900
Present Worth Cost: $1,380,000
Time to Implement: 14 months

The major features of this alternative include groundwater pumping, collection, treatment and on-site discharge, and a long-term monitoring program. The groundwater would be pumped to the existing on-site aeration system. This system would remove the volatile organic contaminants, e.g., 1,2-DCA and vinyl chloride, in the groundwater. The existing system would have to undergo some modification prior to use in this scenario. This alternative would reduce contaminated groundwater to levels required by the federal and state MCLs for public drinking water supply. The pumping, collection, discharge system and monitoring program would be the same as discussed in Alternative GW-3. The same engineering limitations discussed previously apply to Alternative GW-4. The estimated aquifer restoration timeframe for this alternative is also 20 years.

Table 4. Groundwater Treatment Alternatives Cost Summary

	CAPITAL COST	O&M[A] COST	PRESENT WORTH	TIME TO IMPLEMENT[B]
GW-1	0	15,300	263,500	3 WEEKS
GW-2	50,000	15,100	310,000	14 MONTHS
GW-3	632,900	90,000	1,640,000	14 MONTHS
GW-4	734,000	136,200	2,250,000	14 MONTHS
GW-5	482,900	80,700	1,380,000	14 MONTHS

[A] Per Year

[B] Alternatives GW-3, GW-4, and GW-5 would each require approximately 20 years of actual operation before reaching remedial action objectives, i.e., meet MCLs in groundwater; Alternatives GW-1 and GW-2 natural attenuation would result in objectives being met in approximately 30 years.

C. EVALUATION OF ALTERNATIVES

The preferred alternative combines source control alternative SC-4, Off-site Treatment/disposal of Drums and On-site Low Temperature Thermal Treatment of Soils, with GW-1, the No-action groundwater alternative. Based on current information, this combination of alternatives provides the best balance among the nine criteria that EPA uses as a means of evaluation. This section provides a glossary of the nine criteria and an analysis, with respect to these criteria, of all of the alternatives under consideration for remediation.

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. A comprehensive risk analysis is included in the RI.

Compliance with ARARs. Addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) and/or provide grounds for invoking a waiver. A complete listing of ARARs for this Site can be found in Section 3 of the FS.

Short-Term effectiveness. Involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period of the alternative.

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 and volume. Refers to the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

Implementability. Involves the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost. Includes both capital and operation and maintenance (O&M) costs. Cost comparisons are made on the basis of present worth values. Present worth values are equivalent to the amount of money which must be invested to implement a certain alternative at the start of construction to provide for both construction costs and O and M costs over a 30 year period.

Community acceptance will be based on a review of the RI/FS and Proposed Remedial Action Plan, and whether or not the community supports or opposes the preferred alternative.

State acceptance indicates whether, based on its review of the RI/FS and PRAP, the state concurs with, opposes, or has no comment on the preferred alternative.

ANALYSIS

Contaminated Drums and Soil Alternatives

Alternatives SC-4 and SC-5 provide treatment of contaminated soils and drums and are therefore considered to be protective of human health and the environment. Alternative SC-1 would leave contaminated soil and drum wastes unremediated and would therefore not be protective of human health or the environment. It would not comply with ARARs nor would it be effective in the short or long term. There would be no reduction in the mobility, toxicity, or volume of contaminated materials. There would be no implementation issues and it would involve the least expenditure of funds of the three alternatives.

Alternatives SC-4 and SC-5 present short-term risks to on-site workers, the community, and the environment since they entail excavation, containment and transport of the contaminated drum wastes as well as excavation and treatment or transport of the contaminated soil. SC-5 would result in less of a short-term risk to on-site workers, the community and the environment because the contaminated soil would be treated off-site; however, it would also create potential risks due to the off-site transport of contaminated soil. Both SC-4 and SC-5 would provide long-term permanent protection to the public health and the environment against the drum wastes and contaminated soil within a 14-month period by reducing the mobility, toxicity, and volume of the waste. Both SC-4 and SC-5 would be readily implementable. Alternative SC-5 would be more expensive to implement than SC-4. Both SC-4 and SC-5 comply with ARARs.

In summary, alternatives SC-4 and SC-5 are similar, however SC-4 is advantageous over SC-5 since there is a limited chance of off-site spillage of contaminated soil while being transported to an off-site treatment and disposal facility. In addition, alternative SC-4 provides full protection of human health and the environment at a lesser cost than SC-5.

Contaminated Groundwater Alternatives

The results of the RI show that only the wells near the sources of contamination were found to contain levels of the contaminants of concern above MCLs. If the sources of contamination were removed from the site, natural processes such as biodegradation, volatilization, dilution and flushing would attenuate the aquifer contamination, and the potential risk to residents via the groundwater and surface water would be eliminated. The slow nature of the groundwater flow on the site will serve to maximize the effectiveness of biodegradation and volatilization processes. As a result, all alternatives for groundwater treatment, including no further action, would be protective of human health and the environment assuming the sources of contamination, i.e. soil and drums, are removed. The no further action alternative would "remediate" the aquifer in approximately 30 years through natural attenuation.

Alternative GW-2 would provide the same degree of protection to the public health as no further action. Alternatives GW-3, GW-4 and GW-5 would provide an uncertain degree of aquifer remediation within 20 years. GW-3 and GW-5 present minimal short-term hazards to on-site workers during the remedial action through accidental ingestion and exposure to air emissions. Alternatives GW-3, GW-4 and GW-5 employ proven and reliable technologies for remediating contaminated groundwater. However, it should be stressed that the long-term effectiveness is questionable due to the difficulty in predicting the extent and location of fractures in the bedrock aquifer and in properly locating extraction wells in the precise areas to capture all of the contaminated groundwater. Alternatives GW-3, GW-4 and GW-5 would reduce the toxicity and volume of contaminated groundwater at the site. The point of use treatment system in Alternative GW-2 would reduce the toxicity and volume of contaminated groundwater used by individual residents. However, it would not alter the toxicity, mobility or volume of contaminants in most of the site groundwater. Alternative GW-1 would be much easier to implement than Alternatives GW-2, GW-3, GW-4 and GW-5 because the existing monitoring wells could be used and no additional equipment would be required. Alternative GW-4 would be the most expensive to implement, followed by Alternatives GW-3, GW-5, GW-2 and GW-1.

All of the alternatives for groundwater remediation are protective of human health and the environment, including the no action alternative. This is because there is no ingestion of contaminated groundwater occurring at present nor is any use of the contaminated portion of the aquifer envisioned during EPA's five year review period. To help insure that additional wells intended for potable water use are not installed in the affected area during this period, EPA would distribute fact sheets to the public, and town and county officials to periodically provide information on the condition of the aquifer. In the long run all the treatment alternatives would meet groundwater ARAR's, with the possibility of alternatives GW-3, GW-4, and GW-5 achieving this requirement in the aquifer in the shortest period of time. Therefore, none of the alternatives are designed to be effective in remediating the aquifer over the short term. There may be minor, easily mitigable construction impacts associated with alternatives GW-3, GW-4 and GW-5. There would be very gradual reduction in toxicity, and volume of contaminated groundwater under alternatives GW-1 and GW-2, largely as a result of natural dispersion and biodegradation (attenuation) of contamination. Alternatives GW-3, GW-4 and GW-5 may accelerate this reduction through their respective pump and treatment strategies for groundwater, but would not be effective in remediating the aquifer over the short term.

Mr. Verdibello then introduced Mr. Rahul Gupta.

PREFERRED ALTERNATIVE

Mr. Rahul Gupta, EPA Remedial Project Manager for the Sarney Farm site presented EPA's preferred remedial alternative.

The preferred alternative combines the source control alternative SC-4 with the no further action alternative for groundwater GW-1. The EPA believes that this combination of alternatives represents the best balance among the evaluation criteria used to evaluate remedies. Cost estimates associated with the preferred alternative are:

Capital Cost:	$644,000
Present Worth:	$907,500

Specifically, the preferred alternative will involve the following actions:

Drums located in two areas of the Site will be removed for off-site disposal to a permitted treatment and disposal facility. The drums in both areas are close to the surface. A shovel and backhoe will be used to remove the overlying soil. In some areas of the site the groundwater is very close to the surface, therefore it may be necessary to construct dewatering trenches upgradient of drum excavation areas in order to control groundwater intrusion. The soil surrounding the drums will be placed in a designated area and tested. If found to be contaminated it will be placed with the other contaminated soil and treated using on-site low temperature thermal treatment. Highly contaminated soil contiguous with the drums (if present) may be sent off-site with the drums.

Excavated soil will be transported to an on-site treatment facility, i.e., a low temperature thermal treatment system. The thermal treatment process will be designed to handle five cubic yards of soil per hour. The treated soil will then be removed and tested to ensure that the soil has achieved the health based clean-up criteria. Based on the results of the RI there are a few areas of soil that are contaminated with large concentrations of the contaminants of concern; further delineation of these areas will be conducted during the remedial design. This treatment will reduce the level of all contaminants of concern to below the clean-up criteria. The treated soil will then be used to backfill the excavated areas on site. This will eliminate the potential migration of contaminants from the contaminated drums and soils into the groundwater or surface water.

Natural attenuation of the groundwater contamination, i.e., biodegradation, dilution, dispersion, will reduce the levels of contaminants in the site aquifer and the minor potential risk to the public from contamination will be eliminated. The slow nature of the groundwater flow on the site will serve to maximize the effectiveness of natural attenuation processes. These natural occurring processes would serve to attenuate the groundwater contaminant concentration levels to acceptable levels over time. The long-term monitoring program and the required five-year review process will ensure that in the future, if there is evidence of significant changes in conditions which present a significant risk to human health or the environment, appropriate remedial action will be taken.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Residents of Dutchess County have been actively involved in environmental issues throughout the county and have been aware of local hazardous waste problems since 1980. In particular, residents have expressed interest in active and abandoned landfills and the potential hazardous waste threat to local groundwater supplies.

A Final Community Relations Plan for the Sarney Farm Property site was completed by EPA in March 1986. Concerns expressed by citizens and local officials included potential surface and groundwater contamination; potential negative effect on human health; potential adverse impact on local property values; and federal and state approach to hazardous waste cleanup.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIvED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS

Comments raised during the public comment period for the Sarney Farm Property site are summarized below and are organized into the following categories:

A. Nature and Extent of Contamination
B. Future Activities
C. Other Concerns

A. NATURE AND EXTENT OF CONTAMINATION

COMMENT: A resident inquired about how many drums were discovered at the site and the number of drums that may be ruptured.

EPA RESPONSE: Approximately forty drums were discovered and the exact number of ruptured and leaking drums is difficult to estimate.

COMMENT: A resident asked if the potential health risks from contaminants leaking from ruptured drums could increase since it will be 12-18 months before these drums are removed from the site.

EPA RESPONSE: As part of the RI/FS, EPA has determined that soils in the disposal area are very low in permeability. This means that any contaminants which may leak from a ruptured or leaking drum will not travel very far. These drums have been in place since 1970 and our studies indicate extremely low contaminant levels in site soils with the exception of soils in the immediate vicinity of the drums. Therefore, only minimal increases in soil contamination can be expected between the present time and the removal of the drums. In addition, a leachate collection and treatment system is currently in place and operating at one of the drum disposal areas on the site (Area II). This system collects any material that may leak from the drums and treats it to remove contaminants.

COMMENT: A resident asked approximately how many cubic yards of contaminated soil would be remediated.

EPA RESPONSE: EPA will excavate approximately 2,365 cubic yards of soil. This amount is based on excavation of soil in excess of that contained in the disposal trenches. As this soil is being excavated, soil sampling will continue to ensure that all contaminated soil is removed.

COMMENT: A resident asked if EPA would notify people if site-related contamination is detected in residential wells.

EPA RESPONSE: EPA will notify all residents of the results of samples collected in their respective wells.

5. **COMMENT:** A resident asked about the nature of contaminants detected at the site.

   EPA RESPONSE: The buried drums contained toluene, a paint solvent; 2-butanone, (also known as methyl ethyl ketone) which is a common industrial solvent. Vinyl chloride, an adhesive which is also used in the manufacture of polyvinyl chloride (PVC), and dichloroethane, a solvent, were detected at low levels in groundwater. In addition, naturally-occurring levels of arsenic were detected in one on-site well, and in one surface water sample.

6. **COMMENT:** A resident asked how many of the on-site wells were contaminated.

   EPA RESPONSE: Of the twelve wells drilled on the site, contaminants in excess of state maximum contaminant levels (MCLs) were detected in four of these wells. Three of the wells which exhibited contamination are bedrock wells, and one well was a shallow well.

7. **COMMENT:** A resident expressed concern that by drilling wells into the underlying bedrock, contaminants could potentially be spread into areas of previously uncontaminated groundwater.

   EPA RESPONSE: Since the wells drilled are encased in steel, it is highly unlikely for contaminants to spread to uncontaminated areas. Additionally, when wells are drilled, they are pumped to determine if the quantity of water produced by the well is sufficient to produce an adequate water sample. If a small water vein is tapped and does not provide sufficient water quantity, the well is then drilled deeper into the ground. Any contaminants that may leak into the well prior to finding a vein of sufficient quantity could potentially contaminate those veins, however, if the vein is insufficient in quantity to produce enough water for a sample, it is also insufficient in quantity to be used for a water supply. Therefore, no potential water supply veins or aquifers would be contaminated. In addition, the level of contamination detected was below the MCLs in the residential wells, as discussed earlier.

8. **COMMENT:** Concern was expressed that contamination could possibly be moving out of the underlying unconsolidated material.

   EPA RESPONSE: The studies indicate that the contaminants were detected only in specific on-site wells in the bedrock aquifer. None of the samples taken from other wells have exhibited any site-related contamination. Our conclusion is that there is very little flow of groundwater in the bedrock aquifer in the site vicinity and, if the contaminant source is removed, there is little, if any, chance of contaminant levels increasing. Additional testing will be conducted in the future to further delineate site-specific hydrogeological conditions. This information, in combination with with long-term monitoring, will ensure that the remedy remains protective of human health and the environment.

9. **COMMENT:** A resident asked if EPA investigated the possible northward movement of site-related contaminants.

   EPA RESPONSE: Surface water samples were taken from streams and ponds adjacent to the site. No significant contamination was detected in any of these samples. Also, the surface water flow is toward the south, thereby further eliminating the potential for contamination north of the site.

10. **COMMENT:** Concern was expressed that the levels of contamination detected were less than originally envisioned.

    EPA RESPONSE: The RI performed at the site was objective in nature. EPA did not have any expectations regarding the nature and extent of potential site contamination but is reporting the results of sampling just as it was analyzed. Our results indicate that the detected contamination is essentially confined to the site study areas, and that there has not been any widespread dispersal. No significant contamination has been detected by EPA or the New York State Department of Health in any nearby residential wells and removing the source should result in elimination of the majority of the problem. EPA is not considering groundwater remediation at this time, however, additional groundwater investigations will occur in the future.

11. **COMMENT:** A resident asked how EPA determines the amount of contaminants that may be present in the buried drums.

    EPA RESPONSE: EPA has determined through its investigations, that there are approximately 42 drums buried on the site. The exact number of drums and volume of contaminants in each cannot be exactly determined until the drums are actually removed from the trenches. The possibility exists that the drums may be empty which could indicate that the contents have leaked into surrounding soils. In that case, EPA would remove the drums, along with any remaining contents, and, if highly contaminated soil is present, it would be removed to an off-site facility for treatment. The remaining lower-level contamination would be treated at the site.

12. **COMMENT:** Several residents inquired when the last on-site and residential well-sampling occurred and when these wells would be sampled again.

    EPA RESPONSE: The last round of sampling took place in April 1989. The Dutchess County Health Department (DCHD) conducted residential well sampling in June 1990. Should followup sampling be required, it can be initiated by EPA within a few weeks time.

    NYSDEC RESPONSE: Approximately 10-15 wells were sampled by Dutchess County under direction of the New York State Department of Health. DCHD is currently contacting area residents to conduct additional sampling. Any residents wishing to have their well tested should contact the DCHD.

B. FUTURE ACTIVITIES

1. **COMMENT:** A resident inquired about the physical appearance of workers on the site; if heavy equipment would be used and what the site would look like when the remedial actions are complete.

   EPA RESPONSE: During the actual removal of drums, workers in protective clothing will be present on the site along with various pieces of equipment required to complete the particular task at hand. The reason for protective clothing is to ensure the safety of people actually working on the site. This protective clothing may range from fully-encapsulating suits, to normal, everyday work clothes. The site will be restored to its previously undisturbed condition. Once contamination is removed, soil will be replaced and the site will be graded and landscaped to whatever conditions existed prior to remediation.

2. **COMMENT:** A resident asked if the site would be safe for agricultural use when remediation is complete.

   EPA RESPONSE: When site remediation is complete, the site will be sufficiently clean to allow agricultural use. In addition, the only areas of concern here are the areas directly over the disposal trenches. Other portions of the site are not affected by contamination.

3. **COMMENT:** A resident inquired as to whether EPA would rely on its own resources in the case of a potential on-site accident or depend on local emergency services.

   EPA RESPONSE: Prior to undertaking any site-related activities, EPA develops a site Health and Safety Plan (HASP) which addresses most any potential site-related hazard. As part of this HASP, local emergency service providers are contacted and alerted regarding the type of activities being conducted at the site. If an emergency were to occur, EPA would depend on use of local facilities and resources. A Health and Safety Officer (HSO) is present on the site at all times when remedial activities are being conducted, and it is the responsibility of the HSO to ensure that all remedial activities are conducted within established safety guidelines.

4. **COMMENT:** A resident asked if EPA would continue to monitor nearby wetlands following the completion of remedial action.

   EPA RESPONSE: EPA plans to conduct monitoring in the adjacent wetlands as part of the ROD. It will be undertaken during the design phase.

5. **COMMENT:** Concern was expressed that residents may feel safer with the placement of carbon filters on residential water supplies since they are unsure of the schedule of residential well-testing in the future and that remedial activities may disturb contaminants and result in the potential contamination of uncontaminated water supplies.

   EPA RESPONSE: EPA has considered the installation of carbon filters; however, based on current sampling results, EPA has determined that carbon filters are not necessary to protect the potable water supply of the residents. People occasionally consider well testing and filter maintenance an inconvenience. The filters do reach a point of saturation where the filter element is no longer effective and allows contaminants to pass through. At this point, the filter element must be removed, properly disposed of, and replaced. The drinking water standards are developed based on the assumption that a person would consume two liter of water per day for 70 years. Since the level of contaminants in this case is minimal, even if a particular well was not tested for some period of time, very little, if any, risk would be incurred from drinking water from a residential well. No groundwater remediation will occur at this time. Additional groundwater investigations and studies will occur in the future.

6. **COMMENT:** A resident asked what steps are next in the remediation process.

EPA RESPONSE: Following signature of the Record of Decision by the Regional Administrator, the ROD will be made available to the public. Following this, the RD is begun. This typically takes approximately 12 to 18 months. EPA has already budgeted funding for this activity in the event the PRPs do not perform the work. Subsequently, the remedial action will be initiated.

7. **COMMENT:** A resident asked about EPA's target date to initiate drum removal.

EPA RESPONSE: The Sarney Farm site is about to enter the remedial design (RD) stage. of remediation. This process typically encompasses 12-18 months. EPA will attempt to speed up the removal of the drums to remediate the principal source of contamination, possibly by separating the drum removal portion of the project from the soil treatment portion. Utilizing this approach,the design timeframe may be reduced to 6 months. Construction could then be initiated upon solicitation and award of construction contract within 3-4 months of design completion.

COMMENT: Concern was expressed that contaminants may continue migrating through the groundwater and that EPA's preferred remedial alternative may not adequately address groundwater contamination.

RESPONSE: None of the residential wells sampled by EPA or the New York State Department of Health indicated the presence of contaminants in excess of the Federal and State standards. Based on this and other information gathered as part of the RI/FS, EPA believes that any potential future risk from the groundwater will be eliminated by the removal of the source (i.e., contaminated soil and drums), and natural attenuation processes. EPA will continue to assess groundwater conditions at the site, and will conduct a long-term monitoring program. Additional studies to be conducted in the future will further delineate the hydrogeological conditions at the site.

C. OTHER CONCERNS

1. **COMMENT:** A resident expressed concern regarding potential harmful emissions resulting from the on-site thermal treatment of contaminated soils.

EPA RESPONSE: The low-temperature thermal treatment system which EPA is selecting as the remedial alternative for treatment of contaminated soil will be equipped with highly absorbent activated carbon filters that absorb and collect any potentially hazardous emissions from treatment of the soil. These filters are then transported off the site to an EPA-approved disposal facility.

2. **COMMENT:** A resident inquired about the low temperature thermal unit EPA plans to utilize to treat contaminated soils at the Sarney site.

   EPA RESPONSE: The unit is a low-temperature heating system designed to evaporate contaminants in the soil. The system can be fueled by electricity or natural gas. Soil is placed into the unit and heated to a temperature of less than 400° F. The contaminants in the soil are essentially boiled out of the soil and the gases given off by these contaminants are then collected in activated carbon filters. These filters are changed as they become saturated and are disposed of at EPA-approved facilities.

3. **COMMENT:** A resident inquired about the on-site leachate collection system.

   EPA RESPONSE: This system actually collects and cleans any rainwater or runoff that collects in the drum disposal trench.

4. **COMMENT:** A resident asked how to obtain results of EPA tests at the site and surrounding area.

   EPA RESPONSE: EPA will provide all sampling results directly to the affected residents upon receipt of validated data from our laboratories.

5. **COMMENT:** Several residents and a local official asked if the people responsible for burying the drums would also be responsible for the financial aspects of site cleanup; if these names are public information; and the time in which a PRP must respond to EPA.

   EPA RESPONSE: Under Superfund legislation, EPA has identified and contacted several PRPs. This information is available to the public upon request. These PRPs have received copies of EPA's PRAP and will receive Notice Letters based upon EPA's choice of a final site remedy. These Notice Letters will request that the PRPs assume financial responsibility for any remedial action. If the PRPs indicate that they will commit to implement the remedy, EPA will negotiate a settlement document to memorialize that commitment by the PRPs. If the PRPs do not volunteer to perform the work, EPA has the authority to either require the PRPs to do the work, or to implement the remedy itself and then seek recovery of the cost of the remedy from the PRPs.

6. **COMMENT:** A resident asked how the site is placed and ranked on the NPL; how many Superfund sites are in the region, and the ranking of the Sarney Farm site.

   EPA RESPONSE: When a site is initially placed on the NPL, it is ranked according to the degree of risk it presents to public health and the environment. However, as more sites are added to the list, the ranking of a particular site may change. The data used to place a site in the list is usually preliminary so its ranking may not be an indication of actual risk. There are approximately 200 sites in EPA Region II on the NPL with between 80-100 in the State of New York. As of July 1989, the Sarney Farm was ranked number 668 out of 848 total sites on the NPL.

7. **COMMENT:** A local official expressed concern that, although documents received in 1985 indicate that the Sarney Farm site is the number one cleanup priority, EPA may change the priority of site remediation based on potential hazards presented by other sites across the nation.

   EPA RESPONSE: When sites are ready for remediation they are prioritized nationally according to the risks present. If the PRPs do not offer to perform the work, and if funds are not sufficient to fund all sites nationally that are ready for remediation, then, typically, funds will be disbursed to those sites which pose the greatest risk. The Sarney Farm site may be a primary local priority but may not be ranked that highly on a nationwide basis. Other Superfund sites that pose greater risks to human health and the environment would probably receive a higher priority than the Sarney Farm site.

8. **COMMENT:** A resident asked how EPA defines a PRP.

EPA RESPONSE: EPA conducts what is known as a PRP search. These searches may be conducted by the contractors and civil investigators who are employed by EPA and/or EPA staff. Site records are examined in order to determine who owned and operated the site at the time it was contaminated; anyone who may have participated in transporting hazardous materials to the site; who may have produced the materials, and the current owners of the site. Anyone who is identified as participating in any of these activities can be considered a PRP.

9. **COMMENT:** A resident asked if a listing of other NPL sites in the State of New York is available to the public.

EPA RESPONSE: Yes. This listing is available to the public. EPA will send this to the town supervisor or to individuals upon request.

10. **COMMENT:** A resident expressed concern that the RI/FS reports were not available at the Dover Plains Town Hall information repository.

EPA RESPONSE: It was EPA's intent to make the RI/FS available at both the Dover Plains and Amenia Town Hall. Unfortunately, the documents were only available at the Amenia Town Hall at the time of the meeting. Another copy of the RI/FS was sent to the Dover Plains Town Hall when it came to EPA's attention that the document had not been previously received.

11. **COMMENT:** A resident commented that people did not want to cooperate regarding residential well sampling because test results were not received by residents and there is a lack of confidence in testing procedures.

EPA RESPONSE: It is EPA's policy to provide test results to residents and EPA will do whatever is necessary to ensure accurate and timely responses to requests for test results.

12. **COMMENT:** A resident asked if EPA had completed any similar contaminant cleanup on other sites.

EPA RESPONSE: Yes. There have been approximately 200 remedial action starts nationwide. As an example of treatment of contaminated groundwater, in the Town of Vestal, New York, EPA has recently completed construction of an air stripper which treats contaminated water. This treatment is currently on-going.

13. **COMMENT:** A resident asked if a PRP is usually agreeable to paying for site remediation, and what the incentives are for a PRP to assume financial responsibility.

EPA RESPONSE: It is difficult to predict whether a particular PRP will agree to assume this responsibility. As indicated above, even if a PRP does not agree to carry out EPA's selected remedy, EPA has the authority to order the PRP to perform the work. If such an order is violated by the PRP, the PRP may be held liable for substantial penalties. In addition, if EPA performs the work itself, it can recover the costs it incurs from the PRPs. Also, PRPs occasionally feel they can perform the work at less expense than EPA. Therefore, they would assume site remediation efforts in the interest of reducing overall costs.

14. **COMMENT:** Several residents asked if funding for the cleanup could potentially not be obtained, and, if so, could the project be partially funded.

EPA RESPONSE: The remedial design will be funded upon signature of the ROD. Finding for the remedial action is uncertain at this time depending on the availability of funds and the priority of the project with respect to all other remedial actions nationally.

APPENDIX A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

AGENDA
Public Meeting
Sarney Farm Superfund Site
Amenia Town Hall
Amenia, New York

May 23, 1990
7:00 P.M.

I. Welcome & Introduction	Cecilia Echols Community Relations Coordinator U.S. EPA, Region 2
II. Overview of Superfund	Doug Garbarini Chief, Eastern New York and Caribbean Remedial Action Section U.S. EPA, Region 2
III. Site Background & History and Results of the Remedial Investigation & Feasibility Study	Mario Verdibello Site Manager EBASCO, Services, Inc. (contractor to EPA)
IV. Preferred Alternative	Rahul Gupta Remedial Project Manager Sarney Farm Superfund Site U.S. EPA, Region 2
V. Questions and Answers	
VI. Closing	

APPENDIX B

Superfund Proposed Plan

Sarney Farm Superfund Site
Amenia, New York

EPA
Region 2

May 1990

ANNOUNCEMENT OF PROPOSED PLAN

This Proposed Remedial Action Plan is issued to describe the preferred alternative for remediating the source of contamination and managing the migration of contaminants associated with the Sarney Farm Superfund Site pursuant to Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended and Section 300.430(f) of the National Contingency Plan (NCP). The preferred alternative has been developed by the U.S. Environmental Protection Agency (EPA), as the lead agency for Site activities, and the New York State Department of Environmental Conservation (NYSDEC), the support agency for the Site. The preferred alternative is based on two key documents: the Remedial Investigation (RI) report which characterizes the nature and extent of contamination, as well as the risks to public health and the environment posed by the Site; and the Feasibility Study (FS) which describes how the various remedial alternatives were developed and evaluated.

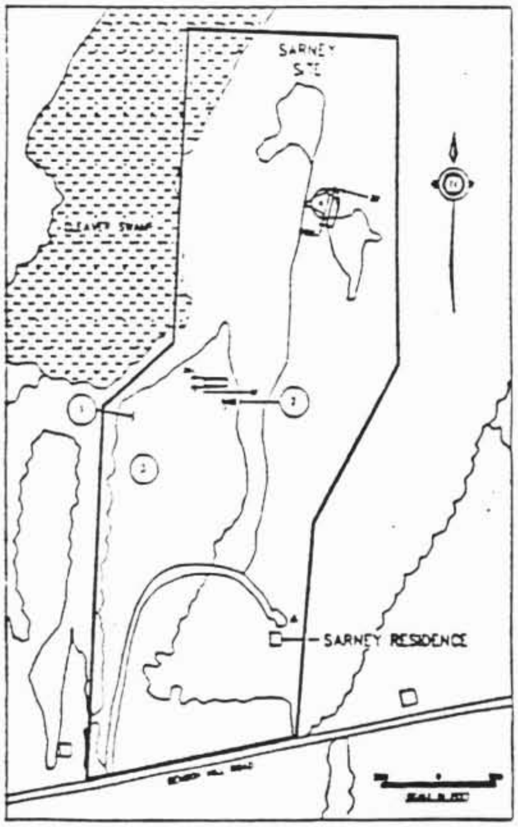

Figure 1

This Proposed Plan provides background information on the Sarney Farm Site, describes the alternatives being considered to remediate the Site, presents the rationale for selection of the preferred alternative, and outlines the public's role in helping EPA make a final decision on a remedy.

This Proposed Plan is being distributed along with the RI and FS reports, to solicit public comment regarding the most acceptable way to remediate the Sarney Farm Site. Detailed information on any of the material included in the Proposed Plan may be found in those reports. The reports have been placed in information repositories which are located in the Town Halls of Dover Plains and Amenia, New York. The precise location of the repositories are listed later in this document.

Additional documentation concerning the remedy selection is available in the administrative record for the Site. Copies of the administrative record will be available for viewing at either of the two repositories starting on May 11, 1990.

other is the trench in the woods northeast of the large pasture (Area 4).

The contamination is derived from leaking drums and wastes dumped in those trenches. The contaminants of concern in the soils and drums in those trenches are: 2-butanone, trichloroethene, 4-methyl-2-pentanone, and toluene. Samples collected near leaking drums in the trenches in Areas 2 and 4, contained high concentrations of contaminants and were analyzed as liquid phase samples (see Table 1). The contaminants can be transported by infiltration into the underlying overburden and bedrock aquifers at the Site.

Table 1. Maximum Concentration of Selected Contaminants Detected in Soil and Drum Samples (ug/l)

COMPOUND	AREA 2	AREA 4
2-BUTANONE	2,900	4,000,000
TRICHLOROETHENE	N.D.*	22,000
4-METHYL-2-PENTANONE	91,000	6,600,000
TOLUENE	61,000	3,300,000

*NOT DETECTED

Although contamination in the trenches was quite extensive, sample results for the groundwater indicated limited contamination in this medium. Analyses were performed for over 120 contaminants for samples collected from 12 on-site wells and 10 residential wells. Very few wells had detectable concentrations of contaminants. Table 2 summarizes the maximum concentrations of the contaminants of concern in the groundwater and surface water.

Table 2. Maximum Concentration of Selected Contaminants Detected in Groundwater and Surface Water Samples (ug/l)

COMPOUND	ON-SITE	NEARBY RESIDENCES	SURFACE WATERS
1,2-DICHLOROETHANE	131	3	4.5
VINYL CHLORIDE	14	N.D.*	68
ARSENIC	6.1	N.D.*	52

*NOT DETECTED

Of the 12 monitoring wells installed at the Site, only 2 contained contaminants (1,2-dichloroethane and vinyl chloride) in excess of the applicable Maximum Contaminant Levels (MCLs). With the possible exception of one well, in which the presence or absence of 1,2-dichloroethane (1,2-DCE) could not be confirmed, no contaminants were detected above the MCLs in the residential wells sampled. Previous sampling conducted by CDM in 1987 showed no contaminants present in the residential wells. In view of these findings 1,2-dichloroethane was not selected as an indicator chemical for residential well groundwater. The risk assessment concluded that based on the residential well sampling results there was no unacceptable risk to residents currently utilizing these sources as a drinking water supply. EPA has promulgated an acceptable risk range of 10^{-4} to 10^{-6} which translates to an individual having a 1 in 10,000 to a 1 in 1,000,000 increased chance of developing cancer as result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the Site.

Of all the exposure pathways considered, including both current and future use scenarios, two presented a risk which was not within EPA's acceptable risk range. One was for the scenario under which future construction of residential structures was to occur on-site in the contaminated Areas 2 and 4, and assumed that future residents inhaled the volatile contaminants trichloroethene, 2-butanone, 4-methyl-2-pentanone, and toluene from these soils. The probable worst-case cancer risk was from trichloroethene inhalation and was calculated to be 2.52×10^{-3}. Under the second scenario, future use of groundwater directly below areas 2 and 4, the calculated potential excess cancer risk posed by the worst case exposure was 1.07×10^{-2}. More than 99% of the risk was associated with ingestion of groundwater containing arsenic, vinyl chloride and 1,2-dichloroethane.

Exposure to vinyl chloride and arsenic via accidental ingestion of the surface water and dermal contact with surface water was determined to be a minor risk due to a single detection of vinyl chloride at one sample location. In addition, the risk posed by vinyl chloride is just below the target level risk, and the single detected level of arsenic (52 ug/l) is barely above the Safe Drinking Water Act MCL of 50 ug/l. Probable worst-case cancer risk associated with arsenic and vinyl chloride were determined to be 4.4×10^{-4} and 2.9×10^{-5}, respectively.

This alternative involves excavating the drums in Areas 2 and 4 and approximately 2365 cubic yards (cy) of contaminated soil. The drums would then be placed in [illegible] containers and transported to a Resource Conservation and Recovery Act (RCRA) permitted off-site treatment and disposal facility. The facility would incinerate the drummed wastes and then dispose of the drum residues. The contaminated soil would be treated on-site using a low temperature thermal treatment unit. In the soil treatment facility, hot air is injected into the soils at a temperature of 260°C. Volatile organic compounds in the soil (i.e. toluene) are volatized into the air stream and combusted in an after burner where they are destroyed. The off-gas from the after burner would be treated in a scrubber for particulate adsorption and gas removal. After treatment the soil would be used to back fill and regrade the excavated areas. Proper engineering measures would be implemented to control air emissions, fugitive dust, run-off, erosion and sedimentation.

SC-5 OFF-SITE TREATMENT OF DRUMS AND SOILS

Capital Cost: $1,657,100
Present Worth Costs: $1,657,100
Time to Implement: 14 months

This alternative consists of excavating the contaminated drums and soil as described in SC-4. The drums would then be placed in overpacks and transported to an off-site RCRA licensed treatment and disposal facility. For the purpose of developing a cost for this alternative, low temperature thermal treatment was chosen as the most cost-effective technology for the off-site treatment of soils. Treated soils would be disposed of by the treatment facility operator in accordance with RCRA regulations. Clean fill would be brought in to back fill and regrade the excavated areas. Proper engineering measures would be implemented to control fugitive dust, run-off, erosion and sedimentation.

Table 5. Contaminated Soil Treatment Alternatives Cost Summary

	CAPITAL COST	O&M^ COST	PRESENT WORTH COST	TIME (MONTH)
SC-1	$ 0	15,300	264,000	0
SC-4	644,000	0	644,000	14
SC-5	1,657,100	0	1,657,100	14

^PER YEAR

GW-1 NO FURTHER ACTION

Capital Cost: none
Present Worth Cost: $263,500
Time to Implement: Immediate

A no further action alternative would involve conducting a long-term program to monitor the migration of contaminants in the bedrock aquifer underlying the Site. The monitoring program would involve the sampling of existing monitoring wells installed on-site plus the residential wells located in the vicinity of the Site every six months for 30 years. Surface water samples would also be collected and analyzed for contaminants. This information would be continually used to assess any potential future impact and to ensure protection of human health and the environment. A five year review would be performed since contaminated groundwater would be left on-site. Fact sheets would be distributed to the public, Town and County to inform them of the results of the monitoring program and to indicate whether contamination is spreading or otherwise causing a problem which must be addressed.

GW-2 CARBON ADSORPTION TREATMENT AT RESIDENTIAL WELLS

Capital Cost: $50,000
Present Worth Costs: $310,000
Time To Implement: 14 months

This alternative would involve setting up small individual carbon adsorption systems at existing residential wells as a point-of-use water treatment alternative. The water would be pumped from the individual well using the existing pump through a residential carbon adsorption system which would remove the organic contaminants. In addition, the installation of new wells in potentially affected areas would be discouraged through the release of routine site fact sheets to the Town and County if the results of the monitoring program indicate that contamination is spreading or otherwise causing a problem.

GW-3 COLLECTION AND TREATMENT OF GROUNDWATER USING AN AIR STRIPPER

Capital Cost: $632,900
Present Worth Costs: $1,640,000
Time to Implement: 14 months

This alternative is to pump and treat the groundwater with the no-action groundwater alternative GW-1. Based on current information, this combination of alternatives provides the best balance among the nine criteria that EPA uses as a means of evaluation. This section provides a glossary of the nine criteria and an analysis, with respect to these criteria, of all of the alternatives under consideration for remediation.

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. A comprehensive risk analysis is included in the RI.

Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) and/or provide grounds for invoking a waiver. A complete listing of ARARs for this Site can be found in section 3 of the FS.

Short-term effectiveness involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period of the alternative.

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, and volume refers to the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

Implementability involves the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost includes both capital and O and M costs. Cost comparisons are made on the basis of present worth values. Present worth values are equivalent to the amount of money which must be invested to implement a certain alternative at the start of construction to provide for both construction costs and O and M costs over a 30 year period.

Community Acceptance will be based on a review of the RI/FS and Proposed Plan, and whether or not the community supports or opposes the preferred alternative.

State acceptance indicates whether, based on its review of the RI/FS and PRAP, the state concurs with, opposes, or has no comment on the preferred alternative.

ANALYSIS

Contaminated Drums and Soil Alternatives

Alternatives SC-4 and SC-5 provide treatment of contaminated soils and drums and are therefore considered to be protective of human health and the environment. Alternative SC-1 would leave contaminated soil and drum wastes unremediated and would therefore not be protective of human health or the environment. It would not comply with ARAR's nor would it be effective in the short term or long term. There would be no reduction in the mobility, toxicity, or volume of contaminated materials. There would be no implementation issues and it would involve the least expenditure of funds of the three alternatives.

Alternatives SC-4 and SC-5 present short term risks to on-site workers, the community, and the environment since they entail excavation, containment and transport of the contaminated drum wastes as well as excavation and treatment or transport of the contaminated soil. SC-5 would result in less of a short-term risk to on-site workers, the community and the environment because the contaminated soil would be treated off-site; however, it would also create potential risks due to the off-site transport of contaminated soil. Both SC-4 and SC-5 would provide long-term permanent protection to the public health and the environment against the drum wastes and contaminated soil within a 14-month period by reducing the mobility, toxicity and volume of the waste. Both SC-4 and SC-5 would be readily implementable. Alternative SC-5 would be more expensive to implement than SC-4. Both SC-4 and SC-5 comply with ARARs.

In summary, alternatives SC-4 and SC-5 are similar, however SC-4 is advantageous over SC-5 since there is a limited chance of off-site spillage of contaminated the surface. A shovel and a backhoe will be used to remove the overlying soil. In some areas of the Site the groundwater is very close to the surface, therefore it may be necessary to construct dewatering trenches upgradient of drum excavation areas in order to control groundwater intrusion. The soil surrounding the drums will be placed in a designated area and tested. If found to be contaminated it will be placed with the other contaminated soil and treated using on-site low temperature thermal treatment. Highly contaminated soil contiguous with the drums (if present) may be sent off-site with the drums.

Excavated soil will be transported to an on-site treatment facility i.e., a low temperature thermal treatment system. The thermal treatment process will be designed to handle 5 cubic yards of soil per hour. The treated soil will then be removed and tested to ensure that the soil has achieved the health based clean-up criteria. Based on the results of the RI there are a few areas of soil that are contaminated with large concentrations of the contaminants of concern; further delineation of these areas will be conducted during the remedial design. This treatment will reduce the level of all contaminants of concern to below the clean-up criteria. The treated soil will then be used to backfill the excavated areas on site. This will eliminate the potential migration of contaminants from the contaminated drums and soils into the groundwater or surface water.

Natural attenuation of the groundwater contamination (e.g. biodegradation, dilution, dispersion) will reduce the levels of contaminants in the Site aquifer and the minor potential risk to the public from contamination will be eliminated. The slow nature of the groundwater flow on the site will serve to maximize the effectiveness of natural attenuation processes. These natural occurring processes would serve to attenuate the groundwater contaminant concentration levels to acceptable levels over time. The long term monitoring program and the required five year review process will ensure that in the future, if there is evidence of significant changes in conditions which present a significant risk to human health or the environment, then appropriate remedial action will be taken.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the remedy selected for each Superfund site meet the needs of the local community, in addition to being an effective solution to the problem. To this end, this Proposed Plan is being distributed to the public during the 30 day public comment period. The Proposed Plan, RI/FS reports, and others documents which are part of the administrative record file for the site are available for public review at the following repositories:

Dover Plains Town Hall
Dover Plains, New York
Telephone: (914) 832-6111
Business hours: Monday to Friday
8:30 a.m. - 4:00 p.m.

Amenia Town Hall
Amenia, New York
Telephone: (914) 373-8118
Business hours: Monday to Friday
9:30 a.m. - 4:00 p.m.

Written and verbal comments on the Proposed Plan and the RI/FS reports will be welcomed through June 10, 1990. The comments and EPA's responses to those comments will be documented in a Responsiveness Summary. The Responsiveness Summary will be appended to the subsequent Record of Decision (ROD) which formally documents the selected remedy for the Site.

All written comments should be addressed to:

Rahul Gupta
Remedial Project Manager
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
26 Federal Plaza, Room 29-100
New York, New York 10278

EPA has identified the preferred alternative described here based on the information available at this time. The final decision on the remedy to be implemented will be documented in the ROD only after consideration of all comments received and any new information presented. The public, therefore, is encouraged to review and comment on all of the alternatives described in this Proposed Plan and in the FS report.

A public meeting will be held at the Amenia Town Hall, Amenia, New York on May 23, 1990 at 7:00 p.m., to present both the details of the RI and FS reports and the Proposed Remedy.

APPENDIX C

UNITED STATES PROTECTION AGENCY
REGION II
PUBLIC AVAILABILITY SESSION
FOR
SARNEY FARM SUPERFUND SITE
AMENIA, NEW YORK

MAY 23, 1990
ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
James A Fisher Jr	Po'k Journal		[illegible]	[illegible]	Po'k Journal	
Dale C. Jones	Main St.	Sharon CT.	06069 -	364-5800	WKZE Radio	
	Benson Hill Rd.	Dover Plains	12522	877 9275		
Joan Sarney	Benson Hill Rd	Dover Plains	12522	877 9275		
[illegible]		Dover Plains	12522	877-3210	Town of Dover	
Edward Brennan	Poplar Hill Road	Wassaic	12592	877-3151	Self	
Larry Murphy	Old Rt. 22	Wassaic	12592	373-9929	Self.	
James Lister	50 Wolf Rd.	Albany	12233	457-3976	NYSDEC	
Joseph McEnroe	North Rd.	~~Albany~~ [illegible]	12501	373-8408	town Board	
Robert E. Cook	Midway	Amenia	12501	373-9085	" "	
Peter Bowe	Whitlock court	"	"	373-9418	" "	
Aaron Betz	~~[illegible]~~ PO Box H	~~Millbrook~~ Amenia		373-8200 ~~[illegible]~~	Harlem Valley Times	
J H Kelley	Benson Hill Rd	Dover Plains	12522	877-3134		
R C Rogers	N Town Hill 195	Wassaic	12592	677-5472	Dunn geoscience	✓
Arlene Dubois	[illegible] Rd	Amenia	12501	373-9088	Town Board	–
Deloss D. Luther II	P.O. A306 Furnace Bank Rd	WASSAIC	12592	(914) 373-8045	Self + Fire District	Yes

UNITED STATES PROTECTI AGENCY
REGION II
PUBLIC AVAILABILITY SESSION
FOR
SARNEY FARM SUPERFUND SITE
AMENIA, NEW YORK

MAY 23, 1990
ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Evelyn Chiarito	151 Craig Rd	Dover Pl	[illegible]	[illegible]	CAC [illegible] advisory Bd	✓
David Reagan	Benson Rd	Wassaic, NY	12592	914 373 9620	Amenia CAC	✓

ROD 9009 SARNEY FARM - FSF

Private Landfill where industrial waste was dumped

CONTAMINATION -

VOC's IN SOIL 2365 CY
VOC's in GW

Soil

toluene 3.3 ppm
2 butenone 14 PPM HEALTH BASED LEVELS
4 methyl 2 pentenone 6.6 ppm NOT SPECIFIED
TCE 0.2 ppm IN ROD
phthalates
napthalene

Selected Remedy PW = $1.66M

EXCAVATE DRUMS W/OFFSITE DISPOSAL
EXCAVATE SOIL, IMPLEMENT LTTT w/ ONSITE DISPOSAL