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Superfund Record of Decision:

Vestal Water Supply 1-1, NY

50272-101

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Vestal Water Supply 1-1 site is located in Vestal, Broom County, New York. The site is on the south bank of the Susquehanna River, and lies east of Choconut Creek. The site lies within the floodplain of the Susquehanna River, and contains several wetland areas. Well No. 1-1 is one of three production wells that provide drinking water to several water districts in the Vestal area. A State Road Industrial Park thought to be a source of contamination is located 1,500 feet southeast of the Vestal Well No. 1-1. Chlorinated solvents were first detected in Well No. 1-1 in 1978, after a chemical spill at a plant in nearby Endicott led to the testing of wells in the vicinity for specific synthetic compounds. Subsequently, contaminated ground water was pumped from this well and discharged offsite to the Susquehanna River. Further investigations determined that the chlorinated solvents present in Well No. 1-1 could not be attributed to the chemical spill at the IBM plant. A 1986 Record of Decision (ROD) documented the selection of ground water treatment using air stripping to remove VOCs, addressed Well 1-1 contamination, and required additional studies of four potential source areas in the State Road Industrial Park. This ROD addresses contaminated soil in the four source areas and is a final remedy. This ROD also addresses a contingency remedy for potable

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Vestal Water Supply 1-1, NY
Second Remedial Action - Final
Contaminated Medium: soil
Key Contaminants: VOCs (PCE, TCE), other organics (PAHs), metals (chromiun, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 56
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

water, if needed. The primary contaminants of concern affecting the soil are VOCs including TCE and PCE; other organics including PAHs; and metals including chromium and lead.

The selected remedial action for this site includes treating the soil by in-situ vacuum extraction to remove VOCs in two of the four source areas within the State Road Industrial Park, followed by carbon absorption to control air emissions; disposing of the residual carbon offsite; and ground water monitoring. This ROD provides a contingency remedy for ground water treatment using precipitation and filtration to remove heavy metals in addition to the current treatment, as necessary. The estimated present worth cost for this remedial action is $1,700,000. There are no annual O&M costs associated with this selected remedial action. The estimated present worth cost for the contingency remedy is $17,900,000, which includes an estimated annual O&M cost of $925,000.

PERFORMANCE STANDARDS OR GOALS: Chemical-specific cleanup goals for soil in the two source areas include TCE 140 ug/kg, 1,1,1-TCA 170 ug/kg, and 1,2-DCE 188 ug/kg (for Area 2 only).

ROD FACT SHEET

SITE

Name:	Vestal Well No. 1-1
Location/State:	Vestal, Broome County, N.Y.
EPA Region:	II
HRS Score (date):	Range: 37.69-39.65
NPL Rank (date):	441 (9/83)

ROD

Date Signed: September 27, 1990

Selected Remedy- in situ removal of VOCs from soil through induced volatilization, collection, and removal via carbon adsorption. No action for groundwater contamination, with contingency remedy for metals removal at Well 1-1 via chemical precipitation and clarification, should future monitoring indicate the need for it.

Capital Cost:	$1,700,000 ($5,400,000 with contingency rem.)
O and M:	$0 ($925,000 with contingency remedy)
Present Worth:	$1,700,000 ($19,600,000 with contingngcy rem.)

LEAD

Remedial, EPA

Primary contact:	Edward G. Als- (212) 264-0522
Secondary Contact:	Douglas Garbarini- (212) 264-0109

WASTE

Type and media:

Soil - *VOCs: 1,1,1-Trichloroethane, Trichloroethylene, Tetrachloroethylene, and trans-1,2-Dichloroethylene
*Semi-VOCs: Napthalene, 2-Methylnapthalene, Phenanthrene, and bis(2-ethylhexyl)phthalate
*Inorganics: Chromium, Copper, and Lead

Groundwater - *VOCs: 1,1,1-Trichloroethane, Trichloroethylene, 1,1-dichloroethane, trans-1,2-dichloroethylene
*Semi-VOCs: Trace
*Inorganics: Chromium, Copper, Lead, and Mercury

Origin: Alleged poor housekeeping practices of Vestal Asphalt and Chenango Industries in the Stage Road Industrial Park

DECLARATION FOR THE RECORD OF DECISION

VESTAL WATER SUPPLY WELL NO. 1-1

SITE NAME AND LOCATION

Vestal Water Supply Well No. 1-1
Vestal, Broome County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Vestal Water Supply Well No. 1-1 site, 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 applicable, the National Contingency Plan. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record.

The State of New York concurs on 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 (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

A remedy for groundwater contamination was previously selected and documented in the June 27, 1986 ROD for this site. That remedy included returning Well 1-1 to service as a potable water supply through the construction and operation of a water treatment facility. The facility has been constructed and will return Well 1-1 to distribution to Water District 1 in the near future. Monitoring results indicate that the treated water meets all applicable standards.

The earlier ROD also recommended that a second site investigation be undertaken to determine the location of potential source areas and to evaluate the need for remedial action. The 2nd investigation has documented the existence and nature of additional contamination at this site.

This ROD contains the remedy selected for the releases or threats of release documented by the 2nd investigation. The major components of the selected remedy include:

* In situ vacuum extraction of volatile organic contamination from soil in source areas 2 and 4 within the Stage Road Industrial Park, followed by carbon adsorption, with subsequent treatment and disposal of contaminated carbon at a permitted off-site facility

* Monitoring program to evaluate the progress of the vacuum extraction remedy

* Monitoring program to periodically assess inorganic contaminants in the aquifer upgradient of Well 1-1 (the decision to implement a monitoring program for organic contamination was contained in EPA's June 27, 1986 ROD)

* A contingency remedy involving treatment of inorganic contaminants to be implemented, if necessary, in the future

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 technologies to the maximum extent practicable.

Since this remedy will result in hazardous substances remaining for an indefinite time at the site above health-based levels, a review will be conducted no later than five years after commencement of the remedial action to ensure that this remedy, as well as the water treatment remedy implemented pursuant to the first ROD, continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator

Date 9/27/90

Decision Summary

VESTAL WATER SUPPLY WELL NO. 1-1

VESTAL, BROOME COUNTY, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK

TABLE OF CONTENTS

SITE NAME, LOCATION, AND DESCRIPTION

The Town of Vestal is located in Broome County, New York about five miles southwest of the city of Binghamton, on the south bank of the Susquehanna River (figure 1). Drinking water for most of the western part of the Town of Vestal is supplied by Water District No. 1, which is comprised of wells 1-1, 1-2, and 1-3. Well 1-1 was taken out of service in 1978 because it was found to be contaminated with volatile organic chemicals (VOCs). Well 1-1 has subsequently become the focus of Federal Superfund activity, which has included a preliminary assessment and subsequent ranking of the well as a National Priorities List (NPL) site, followed by two separate investigations into the nature and extent of the contamination affecting the site. This Record of Decision (ROD) is specifically for the second remedial investigation and feasibility study (RI/FS), which primarily focused on the possible sources of the contamination affecting Well 1-1.

The study area for this Superfund site includes all that area located to the south of the Susquehanna River, to the east of Choconut Creek, to the north of Vestal Parkway, and to the west of NY State Route 26 (figure 2). The area is generally flat, contains several small wetland areas, and lies within the floodplain of the Susquehanna River. Well 1-1 is located on Pumphouse Road, a short distance west of North Main Street, and is the easternmost well in Water District No. 1. The Stage Road Industrial Park, which is the location of the four potential source areas investigated in the second RI/FS, is located a short distance east of North Main Street, approximately 1500 feet from Well 1-1.

After being taken out of service in 1978, Well 1-1 was continuously pumped to waste into the Susquehanna River in order to hydraulically "capture" and discharge the plume of contaminated groundwater before the contaminants could reach the remainder of the wellfield. This strategy was possible since Well 1-1 was located hydraulically downgradient of the groundwater contamination and between the contamination and the remaining Water District No. 1 wells (figure 3). The ROD for the first RI/FS called for construction and operation of an air stripping facility at Well 1-1 in order to return Well 1-1 to service as a potable water supply. This decision also allowed Well 1-1 to continue capturing the plume of contaminants, thereby preventing their downgradient migration to the other Water District No. 1 supply wells. The ROD also determined that a second RI/FS should be performed to determine, if possible, the source(s) of the contamination affecting Well 1-1.

At the present time, the air stripping facility at Well 1-1 has been constructed and has recently completed start-up testing, while continuing to discharge to the Susquehanna River. Well 1-2 became physically impaired in 1988, and as a result now provides a limited yield of potable water as a reserve supply. Well 1-3 is presently Water District One's primary water supply. Additional reserve capacity, if needed, can be obtained on a limited basis through an interconnection with other supply wells in the area. The treated water from Well 1-1 will become available for public distribution in the near future.

The second RI/FS commenced in November, 1988, and focused on four potential source areas in the Stage Road Industrial Park (figure 4). These four areas are:

Area 1- the part of the Vestal Asphalt property adjacent to Route 17

Area 2- the truck parking area between Stage Road and the Erie Lackawanna railroad tracks

Area 3- the area between the north side of the Chenango Industries building and an existing drainage ditch

Area 4- the area between the south side of the Chenango Industries building and the Erie Lackawanna railroad tracks.

These four areas were suspected of being areas where organic contaminants were present in the soils and entering the water table, based primarily on the concentrations of VOCs in groundwater found in the first RI, as well as on the concentrations of VOCs in soil gas found during the initial stages of the second RI.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

A chemical spill at the IBM plant in Endicott, New York in 1978 led to a testing program for all drinking water wells in the vicinity for organic compounds. As a result of this testing, chlorinated solvents were discovered in Well 1-1, and the well was taken out of service and pumped to the Susquehanna River. Subsequent investigation has since determined that the presence of chlorinated solvents in Well 1-1 is not related to the spill at the IBM plant.

The New York State Department of Environmental Conservation (NYSDEC) commenced the first RI/FS at the site in April, 1985 pursuant to a cooperative agreement with EPA. This investigation focused primarily on the contamination of groundwater by VOC's in the Vestal 1-1 study area. This investigation indicated that the VOC contamination was apparently originating in the Stage Road Industrial Park area, located immediately east of North Main Street and south of Route 17 in Vestal, N.Y. The second RI/FS recently completed by EPA has confirmed the Stage Road Industrial

Park as the source of VOC contamination. The physical evidence collected during the second RI, moreover, indicates that releases of VOCs have taken place in at least two of the four potential source areas.

Special Notice letters were sent to Vestal Asphalt Inc. and Chenango Industries, Inc. in May and June, 1988, respectively. These letters are intended to provide official notification from EPA to individuals or corporations of their status as potentially responsible parties (PRP) for a release of contamination and for the cleanup deemed necessary by EPA. The basis for this notification was that potential source area 1 was partially within the Vestal Asphalt property, potential source areas 3 and 4 were located on the Chenango property, and potential source area 2 was partially within a truck parking area owned by the New York State Department of Transportation (NYSDOT) and predominantly used by Vestal Asphalt Inc. Neither Chenango Industries Inc. nor Vestal Asphalt Inc. indicated a willingness to negotiate a settlement to provide for their implementation of the remedy for operable unit one at that time. After the issuance of these Special Notice letters, the second RI/FS has subsequently determined that only potential source areas 2 and 4 warrant remediation.

An additional Notice letter, including demand for payment, was sent on June 6, 1990 to the NYSDOT as owner of the truck parking area (source area 2). Demands for payment of costs incurred by EPA had previously been issued to both Chenango Industries Inc. and Vestal Asphalt Inc. on September 14, 1989. Chenango Industries Inc. met with EPA on the matter of EPA's demand for payment; however, no settlements have been reached at the present time with any PRPs regarding payment of EPA's incurred costs at the Vestal 1-1 site.

Special Notice was recently given to the three PRPs mentioned above in a letter dated July 26, 1990 in order to determine the PRPs' intent to negotiate the performance of the selected remedy contained in this ROD.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

A Community Relations Plan was developed for this site by EPA which designated the Vestal Public Library and the Vestal Town Hall as public information repositories. All public information concerning the site, including the site Administrative Record file, is presently located at the repositories.

Notice of the availability of EPA's Proposed Plan for the second RI/FS was placed in the Binghamton Press on Friday, May 18, 1990 (figure 5), and an EPA press release was issued on Monday, May 21, 1990. A public meeting was held on May 31, 1990, to solicit public comment on the second RI/FS and Proposed Plan. The public comment period, normally 30 days from the notice of availability of the Proposed Plan, was extended at the request of the Town of Vestal and of Chenango Industries, a PRP conducting business in the Stage Road Industrial Park. The new closing date for the comment period was designated as July 12, 1990.

Earlier, in 1986, a similar public meeting had been held to invite public comment on the first RI/FS.

The most recent public meeting was attended primarily by Town and State officials and the news media. The primary concern at that meeting was the present worth cost of one of the potable water treatment alternatives (GW-5), which was proposed at the time of the meeting as a possible potable water contingency remedy. This alternative has not been incorporated into the selected remedy.

<u>SCOPE AND ROLE OF OPERABLE UNIT</u>

EPA issued a ROD on June 27, 1986 that selected air stripping technology as the remedy which would enable Well 1-1 to be returned to service as a potable water source (Appendix 3). The ROD also indicated the need for a second RI/FS to evaluate suspected source areas of contamination in the Industrial Park. Therefore, the Vestal 1-1 Superfund site was segmented into two remedial efforts, or operable units, which enabled the remediation of Well 1-1 to proceed through the design and construction of an air stripping facility (first operable unit), while a concurrent investigation sought to determine the specific sources of the localized groundwater contamination affecting Well 1-1 (second operable unit), and to identify any additional site contaminants which could potentially affect Well 1-1 which were not compatible with the air stripping treatment technology.

The construction of the first operable unit air stripping facility was completed in January, 1990, and is presently undergoing startup testing. EPA anticipates the return of Well 1-1 to service in September, 1990.

Fieldwork for the second operable unit RI/FS was initiated by EPA in November, 1988, after significant delays were encountered obtaining access to property in the Industrial Park. The fieldwork was concentrated in four areas of the Industrial Park which were considered potential source areas of contamination based on existing groundwater and soil gas data.

The fieldwork for the second RI included: geophysical and soil vapor surveys (to assist in optimum placement of boreholes); the installation of 4 groundwater monitoring wells; the drilling of 36 boreholes (figure 6); and the sampling of both the soil from the boreholes and the groundwater from the entire network of groundwater monitoring wells that now exists as a result of the first and second RI's.

This operable unit addresses the sources of the contamination which have affected the Vestal Well 1-1 water supply. The contamination which EPA believes warrants remediation, based in large measure on the public health risk assessment performed for this site, is the volatile organic contamination of the soils in source areas 2 and 4.

This operable unit was also intended to provide a confirmatory examination of the contamination of groundwater in the study area. This confirmatory examination determined, among other things, that heavy metal contamination in the study area, although presently not posing a health risk at Well 1-1, nevertheless merited consideration during the feasibility study phase of this operable unit. This contamination is further discussed below.

__SUMMARY OF SITE CHARACTERISTICS__

As a result of EPA's second RI/FS at this site, the extent and nature of contamination has been characterized in sufficient detail to analyze remedial alternatives. The following is a summary of this characterization.

Subsurface soil samples were collected and analysed from each of the four potential source areas for volatile organic, semivolatile organic, and inorganic contamination. A risk assessment was then conducted to determine the degree of risk posed by the measured levels of contamination to human, floral and faunal receptors via reasonable exposure pathways.

Analytical results of soil sampling indicated significant VOC contamination in suspected source areas 2 and 4 (figures 7 and 8). Source areas 1 and 3 also showed some evidence of VOC contamination, although the measured concentrations and frequency of occurrence indicate that areas 1 and 3 are only slightly contaminated. Areas 2 and 4 had the highest levels of VOC's, with maximum concentrations (in the low % range, by weight) of 1,1,1-trichloroethane, trichloroethylene, trans-1,2-dichloroethylene and tetrachloroethylene found in borehole SB-219, with lesser concentrations in surrounding boreholes. Xylene, toluene, and benzene were also found in their highest concentrations in area 2.

Semi-volatile compounds were found in significant concentrations throughout the four potential source areas (figures 9 and 10). Napthalene, 2-methylnapthalene, phenanthrene, and bis(2-ethylhexyl)phthalate were found in their highest concentrations (low % range, by weight) in areas 1 and 4 (boreholes 115 and 409, respectively).

To determine whether the presence of a particular hazardous inorganic element in the soil constituted "significant contamination", the RI/FS considered representative background concentrations of these elements for the geographic area containing the Superfund site. Inorganic elements are naturally found in soils in varying amounts. Several inorganic elements, such as chromium, copper and lead, were found at this site in significant amounts in areas 2 and 4 (figures 11 and 12). The highest concentration of chromium was 1,130 mg/kg in borehole SB-206 (area 2); the highest concentration of copper was 487 mg/kg and was found in borehole SB-422 (area 4); and the highest concentration of lead was 91 mg/kg and was found in SB-206. It should also be noted that since SB-206 was located on the perimeter of area 2, further sampling should be conducted (during the design phase of this operable unit) to define the full extent of chromium-contaminated soils in area 2. Background concentration ranges for the above elements in the upstate New York area are 30-100 mg/kg, 15-20 mg/kg, and 15-30 mg/kg, respectively.

Analytical results for several of the groundwater monitoring wells in the study area indicated low level contamination by heavy metals, including copper, chromium, lead, and mercury, in excess of Federal and State groundwater and drinking water standards (figure 13). The maximum total concentrations (both suspended and dissolved) reported for these metals were: copper-1.58 mg/l, chromium-.15 mg/l, lead-.191 mg/l, and mercury-.204 mg/l. The results from the groundwater monitoring wells also confirmed the VOC contamination which was documented during the first RI.

In summary, the analytical results of the second RI indicate that soils in all four source areas contain volatile and semi-volatile organic contamination, while concentrations of several heavy metals exceed background levels in source areas 2 and 4.

SUMMARY OF SITE RISKS

The risk assessment (RA) for this operable unit primarily addresses the potential impacts to human health associated with soil exposure from the Vestal Well 1-1 site in the absence of remedial actions. The risks associated with the use of Well 1-1 as a potable water supply without treatment were evaluated during the first operable unit. This assessment constitutes an evaluation of the no-action alternative and deals primarily with soil contamination in the four identified source areas (Areas 1-4). This RA has been conducted using conservative assumptions according to the general guidelines outlined by EPA. The purpose of using these assumptions is to explore the potential for adverse health effects.

For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} to 10^{-6} using information on the relationship between dose and response. The 10^{-6} risk level is used as the point of departure for determining remediation goals for alternatives when regulatory standards or requirements are not available or are not sufficiently protective. For systemic toxicants, acceptable exposure levels generally represent concentration levels to which the human population, including sensitive subgroups, may be exposed without adverse effect.

Selection of Contaminants of Concern

Contaminants which have inherent toxic/carcinogenic effects that are likely to pose the greatest concern with respect to the protection of public health and the environment were selected as contaminants of concern. The chemicals selected as contaminants of concern and their concentrations in the soil at the Vestal Well 1-1 site are presented in table 1.

Exposure Assessment

In this assessment, both current and potential future exposure pathways are considered. Current activity patterns at the site are examined to identify current exposure potential to residents and workers from the site as it presently exists. In developing future exposure pathways, it is assumed that no further remedial actions will be undertaken. It is further assumed that a commercial or light industrial building, such as those currently present at the Industrial Park, may be constructed on the source areas and that exposure to contaminants in soils may occur during the construction. This latter scenario was assessed.

To quantitatively assess the potential risks to human health associated with the exposure scenarios considered in this assessment, estimates of chronic daily intakes (CDIs) are developed. CDIs are expressed as the amount of a substance taken into the body per unit body weight per unit time, or mg/kg/day. A CDI is averaged over a lifetime for carcinogens and over the exposure period for noncarcinogens. An average case and a reasonable maximum case are considered. The average case is based on average (but conservative) conditions of exposure and the average exposure point concentrations. The reasonable maximum case is based on upper-bound conditions of exposure and the reasonable maximum exposure point concentration, and as such represents the extreme upper limit of potential exposure.

Workers excavating soils may be exposed to contaminants in the soil through three possible routes; namely, dermal absorption, incidental ingestion of soils, and inhalation of volatile chemicals from excavated soil. The exposures from each of these routes are calculated separately and are then summed to give the total potential exposure. The dermal absorption and ingestion scenarios represented the greatest risk. The assumptions for assessing these routes of exposure are presented below:

* future on-site construction workers would work in a pit such as an excavated building foundation for a 6-week period, 5 days per week, and that the worker would be involved in a manual task which would result in dermal contact with soil.

* future on-site construction workers would be involved in manual tasks which would result in soil contact with the hands and incidental ingestion of soils following eating or smoking.

* future on-site construction workers would be exposed to volatile organics via inhalation over 30 work days for 8 hours a day, for one year. It was also assumed that workers would engage in light to moderate activities during which each worker would inhale 7 m^3 and 20 m^3 of air (per day) for the average and reasonable maximum exposure scenarios. It is further assumed that the chemicals inhaled are 100 percent bioavailable in the lungs.

Toxicity Assessment

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group 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 provide an upper bound estimate of the excess lifetime cancer risk associated with exposure 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 actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Noncarcinogenic risks were assessed using a hazard index (HI) computed from expected daily intake levels (subchronic and chronic) and reference doses, or RfDs (representing acceptable intakes). Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ). This is the ratio of the estimated intake (derived from the contaminant concentration in a given medium) to the contaminant's RfD. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the HI can be generated. The hazard index is useful as a reference point for gauging the potential effects of environmental exposures to complex mixtures. In general, hazard indices which are less than one are not likely to be associated with any health risk, and are therefore less likely to be of concern than hazard indices greater than one. In accordance with EPA's guidelines for evaluating the potential toxicity of complex mixtures, it was assumed that the toxic effects of the site related chemicals would be additive. Thus, lifetime excess cancer risk and the CDI:RfD ratios were summed to indicate the potential risks associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Under current EPA guidelines, the likelihood of carcinogenic and noncarcinogenic effects due to exposure to site chemicals are considered separately.

The summary of health effects criteria for chemicals of potential concern at the Vestal site is presented in table 2.

Risk Characterization

The risk characterization quantifies present and/or potential future threats to human health that result from exposure to the contaminants of concern at the four areas. The site-specific risk values are estimated by incorporating information from the toxicity and exposure assessments. The combined excess lifetime cancer risks from potential soil exposure to construction workers (via dermal absorption, incidental ingestion, and inhalation of volatiles) range from 10^{-4} to 10^{-6} for the four source areas. Hazard indices for the noncarcinogenic exposure of construction workers (via dermal absorption, incidental ingestion and inhalation of volatiles) exceeded one only for the reasonable maximum cases in areas 2 and 4. In addition, exposure to groundwater contaminated with hazardous organic compounds immediately below source areas 2 and 4, and exposure to inorganic elements in groundwater at a variety of locations in the study area also resulted in cancer risks approximating 10^{-4} and hazard indices of greater than one. Table 3 summarizes carcinogenic and noncarcinogenic risks for the site.

It is unlikely that the soil and groundwater contamination has adversely affected any plant life in the study area, particularly wetlands, due to the considerable depths at which the higher concentrations of volatile and semi-volatile organics, and heavy metals have been detected (below root levels). The study area is considered by EPA to have limited ecological significance (both flora and fauna).

For more specific information concerning public health risks, please see the volume entitled Public Health Evaluation for the Vestal Well 1-1 Site located at both Town Hall and the Public Library.

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. Several chemicals, in particular 1,1-DCE, 1,1-DCA, PCBs, and 1,1,2,2-PCA, contribute to excess lifetime cancer risks greater than 10^{-6} under the specific conditions of exposure addressed in the RA, although they were detected infrequently and at low concentrations. In particular, 1,1-DCE was detected in only one boring in Area 2 at depths of 4 to 6 feet and 14 to 16 feet. However, the conservative models used assume the contaminant is present at the mean concentration throughout the volume of soils in Area 2. Environmental chemistry analysis error can stem from several sources including the errors inherent in the analytical methods, chain of custody problems, and characteristics of the matrix being sampled. Environmental parameter measurements primarily contribute to uncertainty because little verified information is available.

In the Vestal RA there are uncertainties regarding the estimates of how often, if at all, an individual would come in contact with the chemicals of concern and the period of time over which such exposure would occur. In particular, this applies to the future construction exposures. There is also significant uncertainty in the models used to estimate exposure point concentrations.

Toxicological data error (potentially occurring in extrapolating both from animals to humans and from high to low doses) is also a large source of potential error in this risk assessment. There is also a great deal of uncertainty in assessing the toxicity of a mixture of chemicals. In this assessment, the effects of exposure to each of the contaminants present in the environmental media have initially been considered separately.

In summary, the calculated risks to public health from this Superfund site based on average, but conservative, exposure assumptions primarily involve exposure to organic chemicals in hypothetically excavated soils from areas 2, 3, and 4 [N.B.-It should be noted that the risk from hypothetically excavated soils in area 3 is based on a single contaminant, 1,1-dichloroethylene, whose computed risk is tempered by the low frequency of its observation and the uncertainty associated with the very low levels at which it was detected]; exposure to groundwater contaminated with hazardous organic compounds immediately below source areas 2 and 4, and exposure to inorganic elements in groundwater at a variety of locations in the study area. Also, based on the transport modelling of all contaminant species of concern, EPA has determined that VOCs in areas 2 and 4 will continue to enter the aquifer in amounts which not only will cause contravention of applicable groundwater standards, but will also perpetuate the need for water treatment at Well 1-1 for a period of time estimated to be at least 20 years.

DESCRIPTION OF ALTERNATIVES

Given the risk summary presented above and after consideration of all relevant site factors which could impact on the eventual selection of a site remedy, the following remedial response objectives were formulated:

1) Ensure protection of groundwater from the continued release of VOC contamination from soil;

2) Ensure protection of Vestal Well 1-1 water quality from any groundwater contamination not addressed in the first operable unit; and

3) Ensure protection of human health, presumably that of site workers who are exposed to contaminated soils through excavation.

Alternatives were then formulated to meet these remedial response objectives, using various technologies and approaches. The alternatives which were formulated were therefore intended to remediate the source and to address the possible need for additional treatment of potable water at Well 1-1, given the updated contaminant profile provided by the second RI.

The alternatives were also formulated so as not to interfere with or otherwise affect the plume containment objective contained in the first operable unit ROD, which is being accomplished by the continuous pumping of Well 1-1. Plume containment was intended to prevent the VOC contaminant plume from reaching the remainder [illegible] istrict 1 water supply wells.

[illegible] accomplish protection of groundwater from the continued release of VOC's from the source areas, EPA determined that certain cleanup levels of soil contaminants should be specified, below which adverse impacts to the aquifer would not be expected to occur from contamination leaching from the soil into the aquifer. EPA further determined that "adverse impacts to the aquifer" would occur if any applicable or relevant and appropriate requirements (ARARs) for groundwater protection would be exceeded in the aquifer due to the leaching of contaminants from soil (within a mixing zone). EPA determined that such adverse impacts to the aquifer will result from the continued leaching of VOCs from areas 2 and 4. Alternatives for source remediation were then developed and evaluated based, among other things, on their ability to attain the soil cleanup levels for VOCs developed by EPA for areas 2 and 4. These soil cleanup levels, which will also significantly reduce the hypothetical risk from human exposure to excavated soils, are as follows:

INDICATOR CHEMICAL	ACTION LEVEL
Trichlorethylene	140 ug/kg
1,1,1-Trichloroethane	170 ug/kg
1,2-Dichloroethylene	188 ug/kg (for area 2 only)

The remedial action objectives for the second operable unit did not include aquifer restoration, other than that which would be accomplished through the continuous pumping of Well 1-1, since EPA determined during the formulation of the first operable unit FS that the hydrogeology of the study area would not be amenable to an appreciably faster aquifer restoration through selective placement of extraction wells into the plume of contamination. The selection of the first operable unit remedy, as described in the first operable unit ROD, was based in part on this determination. Remedial action objectives also did not include remediation of heavy metals or semivolatiles in soils at the Industrial Park, since the detected concentrations do not pose an unacceptable public health risk under present or future land use scenarios.

A "no action" alternative was also evaluated in the FS as required by regulation, in order 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. The preliminary screening step typically removes several alternatives from further consideration based on the general criteria of effectiveness, implementability, and cost. The remaining alternatives which are listed and described below have retained their pre-screening alphanumerical designations in order to correspond with the descriptions of alternatives contained in the FS report.

Provided below is a description, including cost and schedule information, for each alternative that was evaluated in detail. The present worth costs are estimates which take into account both the capital cost and the operation and maintenance (O and M) costs for 30 years. The time to implement reflects an estimate of the time needed to physically construct, or implement, the remedy. In addition, all remedies, except no action, require a design phase which typically takes 12-18 months to complete.

Source Remediation (SC)

- o **SC-1**: No Action
- o **SC-2**: Off-Site Incineration
- o **SC-3**: Low Temperature Thermal Extraction
- o **SC-4**: Soil Tilling
- o **SC-5**: In-Situ Vapor Extraction

SC-1: No Action

Capital Cost: $0
Present Worth Cost: $331,000
Time To Implement: Immediate

In this alternative, no remedial action would be taken which would address contaminated soils. A monitoring program for soils and groundwater would be conducted once a year for a maximum of thirty years with a site review conducted at least every five years as required by regulation.

SC-2: Off-Site Treatment (Incineration)

Capital Cost: $49,400,000
Present Worth Cost: $49,400,000
Time To Implement: 3 months

Under this alternative, soils contaminated above selected cleanup levels, as well as a certain amount of "buffer" soils (those relatively clean soils which underlie the contaminated soils), would be excavated and transported to an offsite hazardous waste treatment facility. The methods of offsite treatment of VOCs required to meet RCRA land disposal requirements may vary; however, offsite incineration has been chosen as part of this alternative for the purpose of developing cost and schedule information. Clean fill would be used to backfill the site excavation. The estimated volume of soils from areas 2 and 4 to be excavated and treated offsite is 25,220 cubic yards (cy).

SC-3: Low Temperature Thermal Extraction

Capital Cost: $8,400,000
Present Worth Cost: $8,400,000
Time To Implement: 6 months

Under this alternative, the same volume of soils as in alternative **SC-2** would be excavated from areas 2 and 4. These soils would be treated onsite using low temperature thermal extraction technology to remove volatile hazardous contaminants in the soil until selected cleanup levels are attained. The gaseous and particulate contaminants removed from the soil would be passed through a baghouse, followed by a condensor, and finally an afterburner. Afterburner emissions would be monitored to insure compliance with all applicable State and Federal air regulations. The aqueous fraction from the condensor would be treated via carbon adsorption, and the spent carbon as well as the organic fraction from the condensor would be disposed of at an offsite hazardous waste treatment facility. The treated soil would be used as backfill in the excavated areas, once it was determined that the soils no longer contained hazardous waste.

SC-4: Soil Tilling

Capital Cost: $3,300,000
Present Worth Cost: $3,300,000
Time to Implement: 8 months

Under this alternative, the same volume of soils as in Alternative **SC-2** would be excavated from areas 2 and 4. The excavated soils would then be placed in a 1.5 foot thick layer on a concrete pad with curbing. The soil would then be mechanically "tilled" or agitated periodically. Tilling would continue intermittently over a period of time causing a gradual volatilization of VOCs to the atmosphere. Monitoring would be performed to indicate when selected action levels were attained. No controls on air emissions are envisioned under this alternative; moreover, preliminary calculations indicate that, due to the slow rate of volatilization expected, no contravention of NYS standards would occur if this alternative were implemented. The treated soil would be used as backfill in the excavated areas, once it was determined that the soils no longer contained hazardous waste.

Rainwater collected on the curbed pad would be allowed to evaporate. The curbing would be designed for a 100 year, 24 hour storm event.

SC-5: In Situ Vapor Extraction

Capital Cost: $1,700,000
Present Worth Cost: $1,700,000
Time to Implement [illegible]

Under this alternative, vapor extraction wells would be located in areas 2 and 4. Subsurface vapor monitoring equipment would also be installed in both areas. The extraction wells would be manifolded together and attached to vacuum pumps in order to pump subsurface soil gases contaminated with VOCs through a carbon adsorption unit prior to discharge to the atmosphere. Pumping and treating subsurface soil gases would continue until the monitoring equipment indicates that the selected soil cleanup levels have been attained. Soil sampling and analysis would then be conducted to confirm that soil cleanup levels had been achieved. Contaminated activated carbon would be disposed of at an offsite hazardous waste facility.

Bench scale and possibly pilot tests would be required to develop the appropriate design parameters for this alternative.

Potable Water Treatment (GW)

GW-1: No Action
GW-2: Precipitation + Filtration
GW-5: Filtration + Ion Exchange

GW-1: No Action

Capital Cost: $20,000
Present Worth Cost: $20,000
Time to Implement: Immediate

Under this alternative, groundwater would be monitored periodically for inorganics in the Vestal Water District 1 study area. Existing groundwater monitoring wells, as well as two additional wells that would be installed in the northeast part of the study area, would be utilized for this monitoring.

The monitoring for inorganics under this alternative would be included in the monitoring plan that has recently been developed for the first operable unit remedy (Appendix 4). This plan also includes a monitoring schedule for the organic compounds of concern.

GW-2: Precipitation + Filtration

Capital Cost: $3,700,000
Present Worth Cost: $17,900,000
Time To Implement: 8 months

Under this alternative, the monitoring plan as described under GW-1 would be implemented. In addition, the dissolved inorganic constituents of the groundwater at Well 1-1 would be treated via the addition of the chemicals trimercapto-s-triazine and lime to form a precipitate of metal compounds. The precipitate could then be removed, along with any other particulate matter, via settling and filtration. Sludge bottoms and periodic filter backwash would then be dewatered in a filter press and the filtrate recycled back to the beginning of the treatment system. The filtered solids would be disposed of offsite at a hazardous waste handling facility.

Treatability studies would be needed to determine appropriate design parameters for this alternative.

This alternative would require 8 months to construct. Its design life would be 30 years.

GW-5: Filtration + Ion Exchange

Capital Cost: $4,000,000
Present Worth Cost: $70,000,000
Time To Implement: 8 months

Under this alternative, the monitoring plan described under **GW-1** would be implemented. In addition, any particulate matter in the influent water from Well 1-1 would be removed via filtration and the dissolved inorganics would then be treated via ion exchange technology. This technology would need to employ a mercury-specific ion exchange resin, as well as a more generic ion exchange resin for the removal of other metals in the influent water. The resins would then be periodically regenerated for reuse.

The filtered particulate matter and spent ion exchange regeneration solutions would be disposed of at an offsite hazardous waste facility.

Treatability studies would be needed to develop appropriate design parameters for this alternative.

This alternative would require 8 months to construct. Its design life would be 30 years.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

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 of the Vestal Water Supply Well No. 1-1.

Glossary of Evaluation Criteria

o 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 Public Health Evaluation.

o 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 2 of the FS.

o 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.

o 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.

o Reduction of toxicity, mobility, and volume refers to the anticipated performance of the treatment technologies, with respect to these parameters.

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

o 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.

o 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.

o Community acceptance indicates whether, based on a review of public comments received on the RI/FS report and on the Proposed Plan, the public concurs with, opposes or has no comment on the preferred alternative.

Analysis

I. Source Remediation

The source remediation alternatives were developed to address the contamination found in soils in the Stage Road Industrial Park which was felt to present significant risk or otherwise pose an unacceptable impact to public health or the environment. The remedial response objectives for which the source remediation alternatives were formulated are:

-Ensure protection of groundwater from the continued release of VOC contamination from soil; and

-Ensure protection of human health, presumably that of site workers who are exposed to contaminated soils through excavation.

o Overall Protection of Human Health and the Environment

EPA believes that source alternatives **SC-2** through **SC-5** would be sufficiently protective of human health and the environment. However, this protection varies in that alternatives **SC-2**, **SC-3** and **SC-5** provide similar protection through the removal of VOC's from the site, while **SC-4** provides somewhat less protection by gradual on-site venting of VOC's to the atmosphere. **SC-1** (No Action) provides limited protection in that, given no changes in future uses of the Industrial Park which would involve water withdrawals for potable water use or significant amounts of soil excavation in contaminated areas, public health could be sufficiently protected by the remedial actions implemented under operable unit one. Under the no action alternative, however, the aquifer would continue to be degraded for an indefinite period of time from volatile organic contaminants leaching from the soils in areas 2 and 4. This prolonged degradation of the aquifer could conceivably extend beyond the design life of the operable unit one air stripping facility, thereby requiring treatment at Well 1-1 far into the future. Conversely, treatment of the soils could significantly reduce the time which the air stripper would be required to operate.

o Compliance With ARARs

Possible ARARs for remediation of the source at this site include appropriate and relevant portions of the Resource Conservation and Recovery Act (RCRA) and its implementing regulations, and State and Federal air quality laws and regulations.

Compliance with RCRA ARARs influenced the development of alternatives **SC-2**, **SC-3**, and **SC-4**, since these alternatives would involve excavation and subsequent placement of RCRA hazardous wastes.

RCRA Subtitle C requirements are considered applicable for off-site treatment and disposal alternative **SC-2**. Moreover, conformance with RCRA closure and Land Disposal Restriction (LDR) requirements for alternative **SC-2** would ultimately be the responsibility of the RCRA hazardous waste treatment and disposal facility.

Under alternatives **SC-3** and **SC-4**, the soil would no longer be deemed to contain hazardous wastes after it is treated to below health-based levels and the treatment standards required by LDRs. The treated soil would be subjected to the Toxicity Characteristic Leaching Procedure (TCLP) to determine whether it still contains any listed RCRA hazardous wastes above the treatment standards required by the LDRs. All soil emerging from the treatment that fails the TCLP test would be retreated so as to meet these standards. All soil would be treated so that it does not contain RCRA hazardous wastes above the health-based levels determined by the risk assessment. Because the soil would no longer contain any listed RCRA hazardous wastes above health-based levels, and because it would meet the LDR treatment standards (TCLP concentrations) it would not be subject to regulation under Subtitle C of RCRA and may be used to backfill the excavated areas on-site.

Alternative SC-5 is not subject to RCRA land disposal restrictions or closure requirements since no excavation and subsequent placement of hazardous wastes would occur under this alternative.

In addition, alternatives SC-2, SC-3 and SC-5 would also conform to RCRA Section 3003 (40 CFR 262 and 263, 40 CFR 170 to 179) regulating the offsite transportation and management of hazardous waste.

It is presently anticipated that all the alternatives would meet Federal and State air quality ARARs.

o <u>Short-term Effectiveness</u>

Alternative SC-1 poses the least short-term risks due to implementation of the remedy (potential for no action), while SC-4 poses the greatest short-term risk due to inhalation of VOCs from the soil tilling operation. SC-2, SC-3 and SC-5 are similar in their short-term risks and intermediate between the other two alternatives in this regard.

o <u>Long-term Effectiveness And Permanence</u>

Alternatives SC-2 through SC-5 all provide permanent protection and would therefore be effective over the long term. Implementation of alternative SC-1 would not only pose a long-term hypothetical risk of worker exposure to excavated contaminated soils, but would also prolong the time necessary for aquifer cleanup, since contaminated soils left in place would continue to contribute to aquifer contamination. In terms of the other source remediation alternatives, SC-5 would require treatability testing to determine the length of time necessary to reach selected action levels. Excavation and treatment alternatives SC-2, SC-3 and SC-4 would all be effective within relatively short periods of time. SC-2 would achieve effective and permanent cleanup in the shortest period of time.

o <u>Reduction Of Toxicity, Mobility, And Volume</u>

Alternatives SC-2, SC-3, and SC-5 would all be effective in reducing the toxicity, mobility, and volume of site contaminants. SC-2 achieves thermal destruction of the VOCs present in the soil, while SC-3 and SC-5 result in volatilization of VOCs and subsequent capture by air pollution control devices. SC-4 would result in the transfer of VOCs to the atmosphere. However, the rate of this transfer is gradual enough so that no adverse impacts or contravention of applicable standards is anticipated. SC-1 would not affect the toxicity, mobility, and volume of contaminants other than through normal flushing of soil via precipitation events.

o Implementability

All of the source control alternatives are considered technically and administratively implementable. However, alternatives SC-2, SC-3 and SC-4, which involve on-site excavation would require extensive coordination with and may adversely affect the activities of some tenants of the Industrial Park.

o Cost (table 4)

SC-1, or the no action alternative, would obviously be the least expensive to implement. SC-5 would be the least expensive of the alternatives for which remedial action would take place. SC-4 is twice the cost of SC-5, while SC-3 is more than twice the cost of SC-4. SC-2 is the most expensive source control alternative, and is approximately six times the cost of SC-3.

o State Acceptance

The State of New York concurs with the selected remedy (see State letter of concurrence-Appendix 5).

o Community Acceptance

EPA believes that the selected remedy has the support of the affected community, based on the comments received during the public comment period, including those comments received during the public meeting held on May 31, 1990. EPA also believes that the selected remedy is acceptable in principle to Chenango Industries, based on the company's recent correspondence with EPA. Other potentially responsible parties have not given similar indication as of the date of this ROD.

II. Potable Water Treatment

The GW-1, GW-2, and GW-5 alternatives are designed to address the impact of inorganic groundwater contamination, which has been detected hydraulically upgradient of Well 1-1, on Well 1-1. The historic source of these inorganic contaminants may have been the Stage Road Industrial Park, where elevated levels of chromium and copper have been found in the soils, albeit in amounts which do not present unacceptable present or future public health risks. The source of the mercury detected in certain monitoring wells during the second operable unit RI is presently unknown.

The remedial response objective for which the potable water treatment alternatives were formulated to meet is:

-Ensure protection of Vestal Well 1-1 water quality from any groundwater contamination not addressed in the first operable unit.

Aquifer restoration, other than the restoration provided for by the continuous pumping at Well 1-1, was not included as a remedial response objective for groundwater, since EPA determined during the 1st operable unit that the hydrogeology in the study area would not be amenable to an appreciably faster aquifer restoration through selective placement of extraction wells into the plume of contamination.

o Overall Protection Of Human Health And The Environment

All of the alternatives, including no action, are currently equal in their protectiveness of human health and the environment, since Well 1-1 has never shown contamination with inorganics above health-based levels. However, no action under **GW-1** involves a level of uncertainty regarding long-term protectiveness, since inorganic contamination in the vicinity of Well 1-1 may someday be detected at the Well. Therefore, the inclusion of a groundwater monitoring program for inorganics under this alternative would serve to mitigate this uncertainty.

o Compliance With ARARs

All of the alternatives would meet ARARs for potable water i.e., Part 5 of the NYS Sanitary Code, as measured in the effluent from the Well 1-1 treatment facility. However, alternative **GW-1** would no longer meet ARARs in the effluent of Well 1-1 if the Well becomes significantly contaminated in the future with the inorganics of concern.

Compliance with groundwater ARARs for organic contamination at any point within the aquifer i.e., not necessarily at Well 1-1, was addressed during the first operable unit Record of Decision, which indicated that 20 or more years would be needed to meet these requirements within the aquifer given continuous pumping at Well 1-1, as required under the first operable unit ROD.

Compliance with groundwater ARARs for inorganic contamination at any point within the aquifer was not previously addressed in the first operable unit Record of Decision. Moreover, the ability to meet these ARARs at all points throughout the area of attainment, or plume, cannot be specifically determined at this time.

However, EPA believes it is reasonable to assume that inorganic contaminants will also meet ARARs within the aquifer in 20 years, given continuous pumping at Well 1-1.

Alternatives **GW-2** and **GW-5** would also conform to RCRA Section 3003 (40 CFR 262 and 263, 40 CFR 170 to 179) regulating the offsite transportation and management of hazardous waste.

o <u>Short-term Effectiveness</u>

Alternatives **GW-2** and **GW-5** may have minor short term construction impacts associated with their implementation, including possible disruption of service to the operation of Well 1-1. However, these impacts should be mitigable through the observance of proper health and safety protocols and the formulation of an acceptable remedial action workplan.

o <u>Long-term Effectiveness And Permanence</u>

Both **GW-2** and **GW-5** would be effective and permanent in the long term. **GW-1**'s long term effectiveness is uncertain, since inorganic contamination in the vicinity of Well 1-1 may someday be detected at the Well; however, the monitoring plan associated with **GW-1** should provide ample assurance of the effectiveness of the remedy.

o <u>Reduction Of Toxicity, Mobility, And Volume</u>

None of the alternatives would reduce the toxicity, mobility or volume of inorganic contaminants until such time as the contaminants reached Well 1-1. Present site information cannot confirm whether inorganic contamination of Well 1-1 will ever occur.

o <u>Implementability</u>

EPA believes that all of the potable water treatment alternatives would be implementable; however, **GW-1** would be the easiest and least expensive to implement, since a groundwater monitoring program is already in place. Implementation of **GW-5** would be less space intensive than **GW-2** i.e., room needed for additional treatment units, although EPA presently believes that both alternatives can be implemented in this regard. The implementation of **GW-2** and **GW-5** would require coordination with the design engineer of the air stripping facility and the Town of Vestal, in order to ensure system and operational compatability.

o <u>Cost</u> (table 4)

The cost associated with alternative **GW-5** is greater than three times the cost of **GW-2** in terms of present worth costs. O and M makes up a significant portion of the present worth costs of alternatives **GW-2** and **GW-5**, due chiefly to the cost of waste residuals disposal associated with the respective treatment processes. There are minimal costs associated with GW-1.

o State Acceptance

The State of New York concurs with the selected remedy (see State letter of concurrence-Appendix 5).

o Community Acceptance

EPA believes that the selected remedy has the support of the affected community, based on the comments received during the public comment period, including those comments received during the public meeting held on May 31, 1990. EPA also believes that the remedy is acceptable in principle to Chenango Industries, a potentially responsible party, based on the company's recent correspondence with EPA. Other potentially responsible parties have not given similar indication as of the date of this ROD.

SELECTED REMEDY

The selected remedy for the Vestal Well 1-1 combines the source remediation alternative **SC-5** with the potable water treatment alternative **GW-1**. As explained below, EPA believes that a contingency remedy for potable water treatment should also be specified at this time.

The EPA believes that this combination of alternatives represents the best balance among the criteria used to evaluate remedies. Cost estimates associated with the selected remedy are:

Capital Cost: $1,700,000
Present Worth Cost: $1,700,000

In addition, EPA has made provision for a contingency remedy (GW-2) as part of the potable water portion of the selected remedy, in the event that Well 1-1 becomes contaminated with inorganic contaminants in the future. Cost estimates associated with the contingency remedy are:

Capital Cost: $3,700,000
Present Worth Cost: $17,900,000

See table 5 for a more complete breakdown of costs associated with the selected remedy.

Specifically, the selected remedy will involve the following actions:

Source Remediation

The source remediation alternative SC-5 (figure 14-shown just for area 4) will be implemented in source areas 2 and 4 and is intended to provide in situ removal of all VOCs present, as indicated by attainment of the following action levels for indicator chemicals:

INDICATOR CHEMICAL	ACTION LEVEL
Trichlorethylene	140 ug/kg
1,1,1-Trichloroethane	170 ug/kg
1,2-Dichloroethylene	188 ug/kg (for area 2 only)

These action levels represent the average concentration of an indicator chemical in the soil within a given source area which would theoretically produce a concentration in groundwater at the property boundary of the Industrial Park equal to applicable potable water standards.

First, additional boreholes will be drilled to further define the extent of the VOC soil contamination in areas 2 and 4. These additional samples will be analyzed for both inorganic and organic hazardous compounds of concern. Areas 2 and 4 should be more accurately defined using the results of these samples. Should this additional sampling indicate any unexpected concentrations or types of contamination not amenable to the SC-5 source remediation, then EPA will determine whether the unexpected contamination requires remediation and what administrative steps are required to effect the remediation.

Second, a bench and/or pilot scale treatability study will be needed to ascertain design parameters for the full scale implementation of this alternative. Some of the parameters to be determined are: optimum number and spacing of extraction wells; depth of extraction and monitoring wells; capacities of vacuum pump(s) and carbon adsorption treatment system(s) needed for full scale implementation, etc. These tests will also serve to help estimate the amount of time required to meet the selected action levels. Next, a remedial design will be prepared, followed by implementation of the remedial action.

Conceptually, the implementation of SC-5 will consist of soil gas extraction wells installed in the unsaturated zone above the water table. It is assumed that approximately fourteen wells will be needed in area 4 and approximately four wells in area 2, based on a radius of influence of 25 feet per well. Depth of the wells is assumed to be 20 feet. Five gas monitoring wells (estimated four in area 4 and one in area 2) will also be needed to monitor subsurface soil gas conditions. The extraction wells will be constructed of 2 inch PVC pipe designed with a vacuum seal near the surface and an extraction zone corresponding to the profile of the subsurface contamination. The monitoring wells will also be constructed of 2 inch PVC pipe and will be placed in accordance with the treatability study design to monitor the contaminant concentrations in soil gas. A method and schedule of securing additional soil borings will also be developed for the purpose of determining the progress of the selected remedy toward achieving the selected action levels in the soil.

The extraction wells will be connected to a common header which will be attached to the vacuum pump(s). The vacuum pump(s) will extract the contaminated vapors from the soil and relay the contaminated air through activated carbon canisters, and afterwards discharge the clean soil gas to the atmosphere. It is assumed that two vacuum pumps will be used, one for each contaminated area. Spent activated carbon will then be disposed of at a RCRA hazardous waste facility.

The actual details of the design of the soil remediation portion of the selected remedy may vary from the conceptual details given above; however, the use of vacuum extraction technology will remain the basis for the remedial design.

A public information program will be included in the revised community relations plan for remedial action. This information program will inform the public and the users of the Stage Road Industrial Park about the expected impacts of this remedial action on the Park.

The selected soil action levels to be achieved in areas 2 and 4 are based on meeting applicable requirements for groundwater contaminants at the Stage Road Industrial Park border, which EPA considers to be the potential location of the closest theoretical groundwater receptor. As such, these action levels provide a margin of safety for potable water withdrawals from Well 1-1, which is approximately 1000 feet northwest of the Industrial Park border. This margin of safety is in addition to the protectiveness provided by the operation of the Well 1-1 air stripping facility.

Moreover, in the event that the selected action levels can not be achieved within the period of time estimated in the treatability study, EPA believes that the protectiveness of this remedy at Well 1-1 will not be compromised, i.e., the remedy will reduce the volume of contaminants in areas 2 and 4 to levels that do not threaten the water supply at Well 1-1. The vacuum extraction system will be operated until the selected action levels are met or until the system is no longer effective in removing volatile organic contamination, whichever comes first.

The risks associated with the average and reasonable maximum case exposures to volatile organics from excavated soils in area 4, which were determined to be marginally acceptable when compared to EPA's acceptable risk range, will be further mitigated by the implementation of the **SC-5** alternative.

EPA also believes that the existing land use in the area of groundwater attainment, or plume i.e., industrial/light commercial, as well as the present availability of the Town's water supply to the area, together provide substantial safeguards against groundwater withdrawals from the presently contaminated area of groundwater attainment (other than Well 1-1) for potable water purposes.

Potable Water Treatment

The potable water treatment selected remedy **GW-1** (no action) will involve installation of two additional groundwater monitoring wells, and the periodic review of the groundwater data collected under the monitoring program for the first operable unit to determine whether any changes in inorganic groundwater contamination have taken place in the Vestal Well 1-1 study area. EPA believes that no further remedial action is necessary at the present time.

Contingency Remedy

Groundwater will be monitored once every six months at selected monitoring wells in order to measure any changes in the inorganic groundwater contamination. If the groundwater monitoring program indicates that any inorganic contaminant of concern is increasing above baseline levels in close proximity to Well 1-1, then a contingency remedy for potable water treatment i.e., **GW-2**, will proceed to the design stage. For the purpose of this paragraph, the inorganic contaminants of concern will be mercury, chromium, and lead.

The criteria of "increasing" and "close proximity", as used in the preceding paragraph, will be defined as follows:

> "increasing"-an upward trend in total concentration above the present baseline concentration presently established for a monitoring well of any inorganic contaminant of concern over two consecutive monitoring periods. For a monitoring well where baselines were not established during the second RI, the init[illegible]ected remedy's monitoring program will serve to establish this baseline.
>
> "close proximity"-wells 1-24, 1-29, and 1-29a.

Actual implementation (construction) of the contingency remedy would then be initiated should any of the inorganics of concern be detected and confirmed at Well 1-1, unless institutional constraints are present at that time which prevent implementation from taking place.

The above approach has been developed by EPA because of the uncertainties involved in predicting the likelihood of significant concentrations of inorganic contamination reaching Well 1-1 and the relatively low cost of design as compared to the overall cost of contingency remedy implementation. In addition, the above strategy will result in faster implementation of the contingency remedy, should it ever be required.

Monitoring well baseline concentrations and Well 1-1 detection concentrations needed to initiate design and construction of the contingency remedy, respectively, are as follows:

DESIGN PHASE

Monitoring Well	Inorganic Contaminant Total(Suspended+Dissolved)	Baseline Concentration
1-24	Chromium	76 ug/l
	Mercury	20 ug/l
	Lead	28 ug/l
1-29	Chromium	TBD*
	Mercury	2 ug/l
	Lead	27 ug/l
1-29a	Chromium	TBD
	Mercury	2 ug/l
	Lead	78 ug/l

* To Be Determined

CONSTRUCTION PHASE

Well	Inorganic Contaminant	Detection Level
Well 1-1	Chromium	10 ug/l
	Mercury	0.2 ug/l
	Lead	5 ug/l

A second purpose of the groundwater monitoring of inorganics will be to delineate, if possible, any patterns of inorganic contamination in the grou[illegible] suspected source areas could be identified and, if necessary, remediated in the future.

The monitoring plan will utilize strategic well points presently in existence for the purposes outlined above. Additionally, two wells will be installed in the northeast part of the study area to monitor the possible migration of some of the contamination from the Industrial Park toward the Susquehanna River outside the capture zone of Well 1-1. Results of the monitoring of the northeast part of the study area will be reviewed periodically to determine whether any groundwater contamination appears to be reaching the Susquehanna River.

The potable water treatment portion of the selected alternative will also be subject to the 5-year review provisions of Section 121(c) of CERCLA. Moreover, these provisions will be implemented through the monitoring program developed for operable unit one.

Compliance with groundwater ARARs for inorganic contamination as measured within the aquifer was not previously addressed in the first operable unit Record of Decision. Moreover, the ability to meet these ARARs at all points throughout the area of attainment, or plume, cannot be specifically determined at this time. However, EPA believes it is reasonable to assume that inorganic contaminants will meet ARARs within the aquifer in approximately 20 years, which is also EPA's present estimate for meeting organic ARARs in the area of attainment. This estimate assumes that Well 1-1 is continuously pumped for that period of time. Under the 5-year review provisions of CERCLA, EPA will review the inorganic data collected pursuant to the above-described monitoring plan in order to, besides the other reasons mentioned, determine the progression of the area of attainment toward meeting all ARARs (both inorganic and organic) within the 20 year estimated period. Should EPA determine at any time that meeting ARARs within the area of attainment is not likely within the estimated time period, then EPA will re-evaluate the time needed to meet ARARs and the remedial action objectives. If necessary, EPA will then require that additional remedial action be implemented.

EPA believes that the selected remedy for potable water treatment, including the provision for a contingency remedy at this time, ensures that the Vestal Well 1-1 water supply, which now meets all applicable potable water standards through the recent addition of the air stripping facility, will continue to meet all potable water standards in the future. Inclusion of a monitoring program ensures that a contingency remedy for potable water treatment of inorganics will be available in a timely manner should it ever be needed.

* * * * * *

The source remediation and potable water treatment elements of this selected remedy fulfill the source investigation requirements of and are consistent with the 1986 Record of Decision for the first operable unit.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve protection of human health and the environment. In addition, section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that, when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element.

Protection of Human Health and the Environment

Both parts of the selected remedy protect human health and the environment. The source remedy will reduce the concentrations of VOC's in the soils in area 2 and 4 such that the underlying aquifer will eventually no longer be adversely impacted by leaching of VOC's into the groundwater. It may also eventually eliminate the need for treatment of VOC's at Well 1-1 by reduction of the source of this contamination. In addition, the reduction of VOC's will also reduce the hypothetical risk of human exposure to any soils excavated from areas 2 and 4.

The potable water treatment remedy, although it specifies no action at this time, includes a contingency remedy for treatment of inorganic (heavy metals) contamination should EPA determine that a need exists for such a remedy. This remedy is therefore structured to provide further assurance that Well 1-1 will provide potable water meeting all applicable regulatory standards to Water District 1 on a long-term basis.

Compliance With Applicable or Appropriate and Relevant Standards

The selected remedy including the contingency remedy is expected to comply with all applicable or appropriate and relevant state and federal requirements. Some of the requirements which will be accounted for in the design of the source remedy are those of 6 NYCRR parts 212 and 231 for new source emission rates in non-attainment areas and for emission rate standards, respectively. In addition, all RCRA and U.S. Department of Transportation regulations governing the offsite transportation and disposal of hazardous wastes will be observed. Federal OSHA standards will also be complied with during construction.

State potable water standards i.e., 10 NYCRR part 5, will not be contravened at Well 1-1 during its use as a potable water supply. In the event that inorganic contamination of Well 1-1 occurs in the future, the potable water treatment contingency remedy selected at that time would ensure that these standards continue to be met at Well 1-1, although the Well might briefly be out of service (less than one year) while the contingency remedy is being constructed.

Other state and federal criteria which will be considered during the design of the remedy include Executive Order 11988 on Floodplain Management.

Cost Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its costs (present worth= $1,700,000).

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable and Preference for Treatment as a Principal Element

The use of in situ vapor extraction/carbon adsorption technology to separate the contaminants of concern from the site soil matrix and to subsequently dispose of the contaminants at an approved RCRA facility satisfies the statutory preference of CERCLA for utilizing permanent solutions and alternative treatment technologies to the maximum extent practicable. This part of the selected remedy will also permanently and significantly reduce the toxicity, mobility and volume of hazardous wastes in the soils at the site.

The selection of **GW-1** (no action) for potable water treatment meets the objectives of the second operable unit dealing with the Well 1-1 potable water supply through the specification of a procedure for contingency remedy **GW-2** selection and implementation. EPA believes that the addition of this remedy to the remedy previously chosen for the first operable unit i.e., air stripping facility, represents a permanent solution to the present and potential contamination of Well 1-1. The potable water contingency remedy would also provide treatment of inorganic contamination as the principal element of the remedy, should such treatment ever be required.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Vestal Well 1-1 Superfund site was released to the public in May 1990. The Proposed Plan identified Alternatives **SC-5** and **GW-1** (with provision for either GW-2 or GW-5 as the contingency remedy) to remediate the source and address additional potable water treatment, respectively. EPA reviewed all comments submitted during the public comment period. Upon review of these comments, EPA determined that, based upon public comment concerning the high cost of potable water alternative **GW-5**, that potable water alternative **GW-2** would be selected as the contingency remedy. No other significant changes to the selected remedy, as it was originally identified in the Proposed Plan, were necessary.

APPENDIX 1

TABLE 1

AVERAGE AND PLAUSIBLE MAXIMUM SOIL CONCENTRATIONS FOR EXPOSURE MODELING
VESTAL WELL 1-1 SITE

CHEMICAL	AREA 1		AREA 2		AREA 3		AREA 4	
	Average Case (a) (mg/kg)	Plausible Maximum Case (b) (mg/kg)	Average Case (a) (mg/kg)	Plausible Maximum Case (b) (mg/kg)	Average Case (a) (mg/kg)	Plausible Maximum Case (b) (mg/kg)	Average Case (a) (mg/kg)	Plausible Maximum Case (b) (mg/kg)
Acetone	*	*	*	*	0.195	7.08	1.382	12.852
Benzene	0.003	0.003	0.003 c	0.003	*	*	*	*
2-Butanone	0.034	0.034	0.026 e	0.026 e	0.01	0.012	*	*
Chloroform	*	*	0.007 e	0.007 e	*	*	*	*
1,1-Dichloroethane	*	*	0.009 c	0.009	0.004 c	0.004	0.12	0.186
1,1-Dichloroethylene	*	*	0.003 c	0.003 c	0.003 e	0.003 e	0.005 c	0.005
trans-1,2-Dichloroethylene	0.003	0.003	0.118	0.312	0.004 c	0.013 d	*	*
Ethylbenzene	0.005	0.022	0.087	0.159	*	*	*	*
1,1,2,2-Tetrachloroethane	*	*	0.04 c	0.04 d	*	*	*	*
Tetrachloroethylene	*	*	0.067	0.298	*	*	0.002 e	0.002 e
Toluene	0.005	0.01	0.052	0.33	*	*	*	*
1,1,1-Trichloroethane	*	*	0.075	0.425	0.002 e	0.002 e	0.158	0.216
Trichloroethylene		*	0.171	5.045	*	*	0.134	0.864
Xylene	0.007	0.054 e	0.197	2.038	*	*	*	*
Bis(2-ethylhexyl)phthalate		*	0.4	0.73	0.39	1.1	0.21	3.782
Di-n-butylphthalate		*	0.065 c	0.065	*	*	*	*
Noncarcinogenic PAHs	3.9	95.8	3.4	5.16	0.32 e	0.32 e	0.2	0.23 e
Carcinogenoc PAHs	1.1	5.5	0.8 c	1.5 d	0.05 e	0.05 e	*	*
PCBs	*	*	0.15	0.378	*	*	0.05	0.55 e
Chromium	24	24	47	47	9.2	14.2	20	20
Copper	*	*	23	23	7.7	7.7	46	46

* Chemical not detected in this area.

(a) Geometric mean with one half the detection limit for non-detects unless otherwise noted.

(b) Geometric mean of detected values only, unless otherwise noted.

(c) Geometric mean of detected values only.

(d) Geometric mean with non-detects.

(e) Only detected value

TABLE 2

SUMMARY OF HEALTH EFFECTS CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN
VESTAL WELL 1-1 SITE

CHEMICAL	ORAL CRITERIA: Reference Dose (RfD) (mg/kg/d)	Safety Factor (a)	Source (b)	EPA/CAG Cancer Potency Factor (mg/kg/d)-1	Weight of Evidence (c)	INHALATION CRITERIA: Reference Dose (RfD) (mg/kg/d)	Safety Factor (a)	Source (b)	EPA/CAG Cancer Potency Factor (mg/kg/d)-1	Weight of Evidence (c)
BENZENE	*	--	IRIS	2.90E-02	A	-- (d)	--	--	2.90E-02	A
1,1-DICHLOROETHANE	1.00E-01	1.00E+03	HEA	9.10E-02	C	1.00E-01	1.00E+03	HEA	--	B2
1,1-DICHLOROETHYLENE	9.00E-03	1.00E+03	IRIS	6.00E-01	C	--	--	--	1.20E+00	C
TRANS-1,2-DICHLOROETHYLENE	2.00E-02	1.00E+03	IRIS	--	--	--	--	--	--	
ETHYL BENZENE	1.00E-01	1.00E+03	IRIS	--	--	--	--	--	--	
TETRACHLOROETHYLENE	1.00E-02	1.00E+03	IRIS	5.10E-02	B2	--	--	--	3.30E-03	B2
TOULENE	3.00E-01	1.00E+02	IRIS	--	--	1.00E+00	1.00E+03	HEA	--	--
1,1,1-TRICHLOROETHANE	9.00E-02	1.00E+03	IRIS	--	--	3.00E-01	1.00E+03	HEA	--	--
TRICHLOROETHYLENE	7.35E-03 *	1.00E+03	HA	1.10E-02	B2	--	--	--	4.60E-03	B2
XYLENES	2.00E+00	1.00E+02	IRIS	--	--	4.00E-01	1.00E+03	HEA	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	2.00E-02	1.00E+03	IRIS	1.40E-02	B2	--	--		--	B2
CARCINOGENIC PAHs (e)	--	--	--	1.15E+01	B2	--	--		6.10E+00 *	B2
NONCARCINOGENIC PAHs (f)	4.00E-01	1.00E+02	HEA	--	--	--	--		--	
ACETONE	1.00E-01	1.00E+03	IRIS	--	--	--	--	--	--	--
2-BUTANONE	5.00E-02	1.00E+03	IRIS	--	--	9.00E-02	1.00E+03	HEA	--	--
DI-N-BUTYLPHTHALATE	1.00E-01	1.00E+03	IRIS	--	--	--	--	--	--	
1,1,2,2-TETRACHLOROETHANE	--	--	--	2.00E-02	C	--	--	--	2.00E-01	C
ANTIMONY	4.00E-04	1.00E+03	IRIS	--	--	--	--	--	--	
ARSENIC	1.00E-03 *	1.00E+00	HEA	1.75E+00	A	--	--	--	5.00E+01	A
BARIUM	5.00E-02	1.00E+02	IRIS	--	--	1.00E-04	1.00E-03	HEA	--	
BERYLLIUM	5.00E-03	1.00E+02	IRIS	--	--	--	--	--	8.40E+00	B2
CHROMIUM (g)	5.00E-03	5.00E+02	IRIS	--	--	--	--	--	4.10E+01	A
COPPER (h)	3.70E-02	--	HEA	--	--	--	--	--	--	
LEAD (i)				--	B2	--	--	--	--	B2
MANGANESE	2.00E-01	1.00E+02	HEA	--	--	3.00E-04	1.00E+02	HEA	--	--
MERCURY	3.00E-04	1.00E+03	HEA	--	--	--	--	--	--	--
NICKEL	2.00E-02	3.00E+02	IRIS	--	--	--	--	--	--	
SELENIUM	3.00E-03	1.50E+01	HEA	--	--	1.00E-03	1.00E+01	HEA	--	
THALLIUM	7.00E-05	3.00E+03	HEA	--	--	--	--	--	--	
VANADIUM	7.00E-03	1.00E+02	HEA	--	--	--	--	--	--	--
ZINC	2.00E-01	1.00E+01	HEA	--	--		--		--	
[illegible]	--	--	--	7.70E+00 *	B2	--	--		--	

(a) Safety factors used to develop reference doses consist of multiples of 10, each factor representing a specific area of uncertainty inherent in the data available. The standard uncertainty factors include:
- A ten-fold factor to account for the variation in sensitivity among the members of the human population,
- A ten-fold factor to account for the uncetainty in extrapolating animal data to the case of humans,
- A ten-fold factor to account for the uncertainty in extrapolating from less than chronic No Observed Adverse Effects Levels (NOAELs) to chronic NOAELs; and
- A ten-fold factor to account for the uncertainty in extrapolating from Lowest Observed Adverse Effect Levels (LOAELs) to NOAELs

(b) Sources of Reference Doses IRIS = chemical files of the Integrated Risk Information System (May 1, 1989), HEA = Health Effects Assessments, HA = Health Advisory.

(c) Weight of evidence classification scheme for carcinogens:
- A -- Human Carcinogen, sufficient evidence from human epidemiological studies.
- B1 -- Probable Human Carcinogen, limited evidence from epidemiological studies and adequate evidence from animal studies.
- B2 -- Probable Human Carcinogen, inadequate evidence from epidemiological studies and adequate evidence from animal studies.
- C -- Possible Human Carcinogen, limited evidence in animals in the absence of human studies.
- D -- Not Classified as to human carcinogenicity; and
- E -- Evidence of Noncarcinogenicity.

(d) -- Indicates that no criteria have been established in IRIS, HEA, or HA for this chemical via this route of exposure

(e) Based on the toxicity of benzo(a)pyrene. CPAHs detected at the Vestal site are benzo(a)pyrene, benzo(a)anthracene, and chrysene

(f) Based on the toxicity of naphthalene. NCPAHs detcted at the Vestal site are naphthalene, phenanthrene, fluoranthene, pyrene, anthracene, fluorene, 2-methylnaphthalene.

(g) Criteria are for CrVI.

(h) This dose is equivalent to the reported drinking water standard of 1.3 mg/liter, assuming a 70 kg person ingests 2 liters of water per day. The Drinking Water Criteria Document concluded that toxicity data were inadequate for calculation of an RfD for copper.

(i) Lead is evaluated by the biokinetic uptake model. See text.

* Review pending.

TABLE 3

RISK ASSESSMENT SUMMARY
VESTAL WELL 1-1 SITE

EXPOSURE PATHWAY	TOTAL EXCESS UPPER BOUND LIFETIME CANCER RISK: AVERAGE CASE (a)	TOTAL EXCESS UPPER BOUND LIFETIME CANCER RISK: PLAUSIBLE MAXIMUM CASE (b)	HAZARD INDEX: AVERAGE CASE (a)	HAZARD INDEX: PLAUSIBLE MAXIMUM CASE (b)	CHEMICALS CONTRIBUTING TO THE RISK (c)
Potential exposure to construction workers via soil contact (dermal absorption and ingestion) and inhalation of volatiles.					
Area 1	1E-06	2E-05	1E-02 (<1)	5E-02 (<1)	Carcinogenic PAHs
Area 2	1E-04	4E-04	9E-02 (<1)	1E+00 (>1) (d)	1,1-DCE, PCE, TCE, 1,1,2,2-PCA, cPAHs
Area 3	1E-04	3E-04	1E-02 (<1)	4E-02 (<1)	1,1-DCE
Area 4	2E-04	5E-04	3E-01 (<1)	1E+00 (>1)	1,1-DCE, TCE, 1,1-DCA
Potential exposure to construction workers via inhalation of contaminated dust.					
Area 1	2E-16	3E-15	1E-15 (<1)	6E-15 (<1)	---
Area 2	2E-16	3E-12	3E-15 (<1)	7E-14 (<1)	---
Area 3	1E-17	3E-17	4E-16 (<1)	1E-15 (<1)	---
Area 4	3E-19	9E-19	5E-15 (<1)	2E-14 (<1)	---
Leaching of contaminants to groundwater with exposure directly below the source area.					
Area 1	4E-08	2E-06	1E-02 (<1)	4E-01 (<1)	Carcinogenic PAHs
Area 2	4E-06	2E-04	3E-02 (<1)	4E+00 (>1)	Chloroform, 1,1-DCA, 1,1-DCE, 1,1,2,2-PCA, PCE, TCE, PCB
Area 3	1E-06	2E-05	5E-02 (<1)	5E-01 (<1)	1,1-DCA, 1,1-DCE
Area 4	8E-06	4E-04	4E-01 (<1)	7E+01 (>1)	1,1-DCA, 1,1-DCE, TCE, PCB, Acetone
Leaching of contaminants to groundwater with exposure at the well field.					
Area 1	4E-10	2E-08	1E-04 (<1)	4E-03 (<1)	---
Area 2	4E-08	2E-06 (d)	3E-04 (<1)	4E-02 (<1)	---
Area 3	1E-08	2E-07	5E-04 (<1)	5E-03 (<1)	---
Area 4	8E-08	4E-06	4E-03 (<1)	7E-01 (<1)	1,1-DCA, Carcinogenic PAHs
Potential exposures and risks from ingestion of groundwater at concentrations detected in monitoring wells.					
Total Concentrations	1E-04	8E-04	7.4 (>1)	140 (>1)	Arsenic, antimony, barium, beryllium, chromium, manganese, mercury, nickel, thallium, vanadium, zinc
Dissolved Concentrations	8E-05	4E-04	6.2 (>1)	78 (>1)	Arsenic, antimony, manganese, mercury, nickel, thallium

(a) Average case risks are based on average (but conservative) conditions of exposure and the geometric mean soil concentration.

(b) Plausible maximum case risks are based on upper-bound conditions of exposure and the geometric mean concentration of detected values where, except for inorganics in groundwater, maximum detected value is used.

(c) Chemicals resulting in an excess lifetime cancer risk of greater than 1E-06 or a CDI:RfD ratio greater than one.

(d) An excess lifetime cancer risk of greater than 1E-06 or a CDI:RfD ratio greater than one is due only to the summation of two or more chemicals (i.e., no individual chemical results in an exceedance).

--- = Not relevant.

NOTE: 1,1-DCE = 1,1-Dichloroethylene; 1,1,2,2-PCA = 1,1,2,2-Tetrachloroethane; 1,1-DCA = 1,1-Dichloroethane.

TABLE 4

COST ESTIMATE SUMMARY
TREATMENT ALTERNATIVES
VESTAL FEASIBILITY STUDY

ALTERNATIVE	CAPITAL COST	ANNUAL O&M	5-YEAR REVIEW	TOTAL PRESENT WORTH 5% DISCOUNT PRICE ($)
<u>SOIL CONTAMINATION</u>				
SC-1- LIMITED ACTION	0	19,700	10,000	331,000
SC-2 - OFF-SITE INCINERATION	49,400,000	0	0	49,400,000
SC-4 - LOW TEMPERATURE THERMAL EXTRACTION	8,384,000	0	0	8,384,000
SC-5 - SOIL TILLING	3,229,000	0	0	3,299,000
SC-5 - IN-SITU VAPOR EXTRACTION	1,642,000	0	0	1,642,000
<u>GROUNDWATER CONTAMINATION</u>				
GW-1 NO ACTION	20,000	0	0	20,000
GW-2 FILTRATION, PRECIPITATION	3,675,000	924,500	0	17,912,000
GW-5 FILTRATION PLUS ION EXCHANGE	4,008,000	4,290,300	0	70,078,000

NOTE: All capital costs are fully loaded with contingency and design factors.

CAPITAL AND OPERATING COST SUMMARY

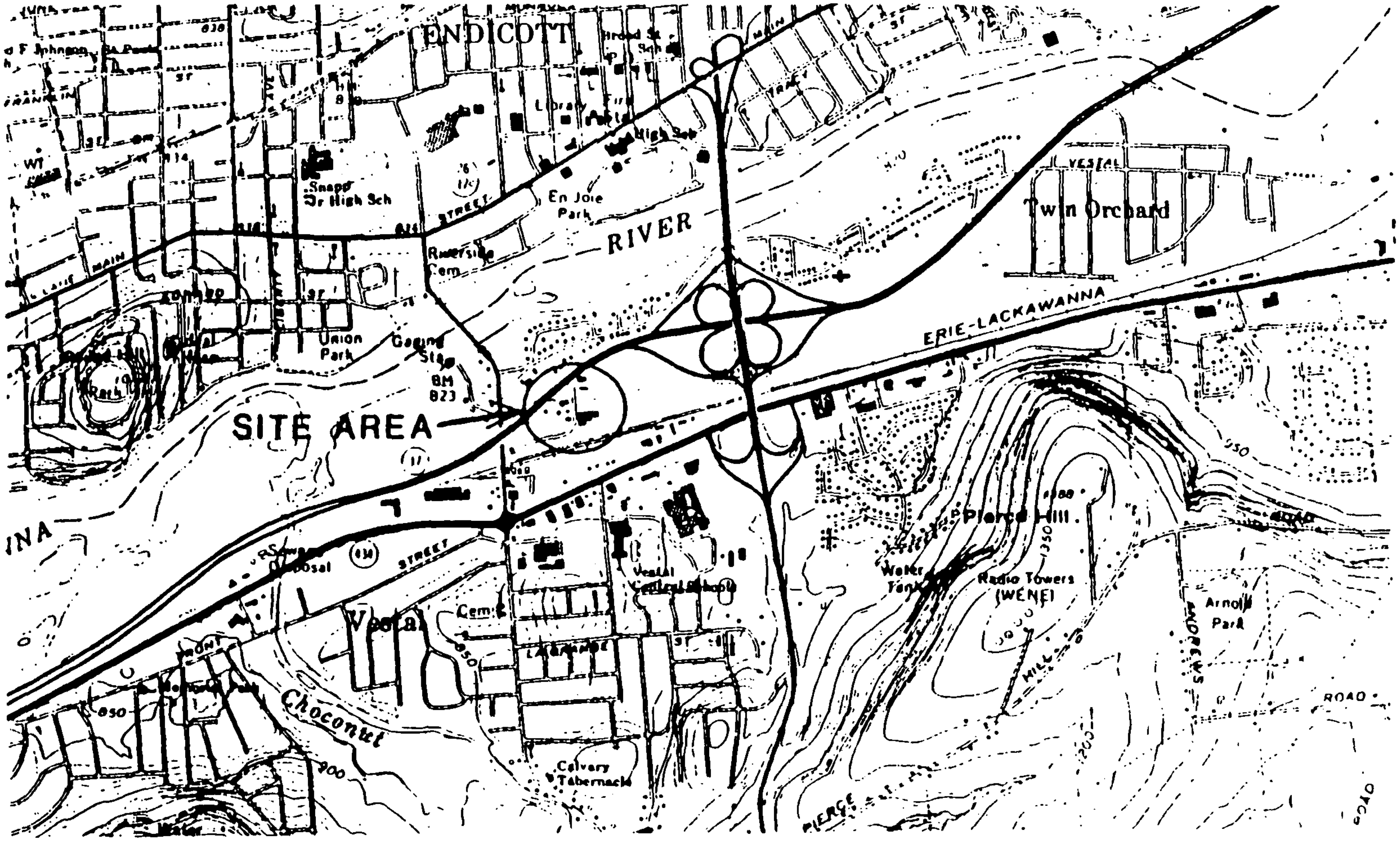
ALTERNATIVE SC-5 - IN-SITU VAPOR EXTRACTION

VESTAL WELL 1-1 FEASIBILITY STUDY

Item	Qty	Unit	Unit Cost Sub.	Unit Cost Mat.	Unit Cost Labor	Unit Cost Equip.	Total Cost Sub.	Total Cost Mat.	Total Cost Labor	Total Cost Equip.	Total Direct Cost	Comments
INSTRUCTION												
1) Public Education Program		LS	18000.00				18000				18000	
SITE PREPARATION												
2) Area 2 Fence	400	LF	10.00				4000				4000	
3) Area 4 Fence	900	LF	10.00				9000				9000	
4) Equipment Mob/Demob.		LS			2500.00	3000.00			2500	3000	5500	
5) Decontamination Facilities		LS			1500.00	2000.00			1500	2000	3500	
IN-SITU VAPOR EXTRACTION												
6) Area 2 Extraction Wells	80	LF	100.00				8000				8000	4 @ 20'
7) Area 1 Extraction Wells	280	LF	100.00				28000				28000	14 @ 20'
8) Vacuum Pump	2			5000.00	600.00			5000	1200		6200	
9) In - Situ Treatment	8	MO			20000.00	5000.00			160000	40000	200000	
10) Carbon Treatment		LS	200000.00				200000				200000	
11) Mobile Laboratory		LS	100000.00				100000				100000	
RESIDUAL HANDLING/SITE CLOSURE												
12) Carbon Disposal		LS	60000.00				60000				60000	
							427000	5000	165200	45000	642200	
Burden @ 13% of Labor Cost									21476		21476	
Labor @ 15% of Labor Cost									21780		24780	
Material @ 5% of Material Cost								250			250	
Subcontract @ 10% of Sub. Cost							42700				42700	
Total Direct Cost							469700	5250	211456	45000	731406	
Indirects @ 75% of Total Direct Labor Cost									158592		158592	
Profit @ 10% Total Direct Cost											73141	
											963139	
Health & Safety Monitoring @ 10%											96314	
Total Field Cost											1059452	
Contingency @ 20% of Total Field Cost											211890	
Engineering @ 15% of Total Field Cost											158918	
Permitting & Legal @ 5% of Total Field Cost											52973	
Construction Management @ 15% of Total Field Cost											158918	
TOTAL COST THIS PAGE											1642151	

TABLE 5

APPENDIX 2



U.S. GEOLOGICAL SURVEY 7.5 MINUTE SERIES (TOPOGRAPHIC) ENDICOTT QUADRANGLE

N

SCALE 1 24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE BROOME COUNTY, VESTAL, NY
General Site Location
EBASCO SERVICES INCORPORATED

FIGURE 1

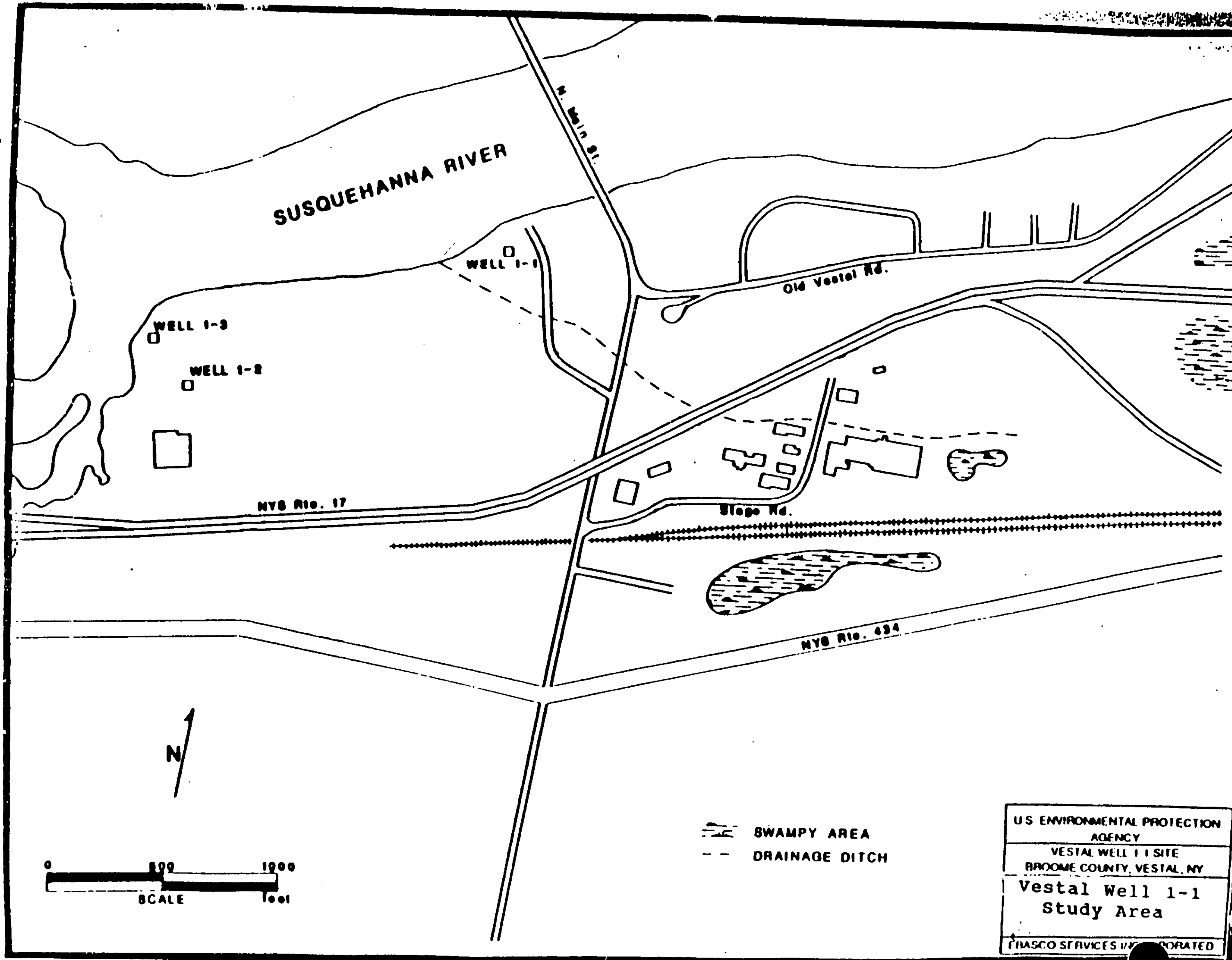

SUSQUEHANNA RIVER
N. Main St.
WELL 1-1
WELL 1-3
WELL 1-2
Old Vestal Rd.
NYS Rte. 17
Stage Rd.
NYS Rte. 434
N
0
500
1000
SCALE
feet
SWAMPY AREA
DRAINAGE DITCH
U S ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Vestal Well 1-1
Study Area
EBASCO SERVICES

FIGURE 2

FIGURE 3

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

SITE: Vestal Water Supply Well 1-1, Vestal, Broome County, New York

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing the analysis of cost effectiveness of remedial alternatives for this site:

- Well Field Contamination Investigation (R.J. Martin)
- Vestal Water Supply Well 1-1 Focused Feasibility Study
- Vestal Water Supply Well 1-1 Remedial Investigation/ Feasibility Study
- Staff Summaries, Letters and Recommendations
- Responsiveness Summary

DESCRIPTION OF SELECTED REMEDY

This Record of Decision calls for the following actions:

- Construction of a packed column air stripping system on well 1-1 in order to return the well to full service as Vestal Water District 1's primary water supply. This cost effective alternative will have the following positive impacts:

  1) restoration of District 1 water supply capacity to the level that existed prior to loss of well 1-1;

  2) provision of a water supply to the district that exceeds applicable or relevant and appropriate standards, thereby providing a very high level of public health protection;

  3) hydraulic containment of the plume of contaminants via pumping well 1-1, thereby protecting other District 1 water supply wells; and

  4) cessation of untreated discharge from well 1-1 to the Susquehanna River.

- Initiation of a supplemental Remedial Investigation and Feasibility Study to further investigate the extent of soil contamination in suspected source areas and to evaluate possible source control measures.

DECLARATIONS

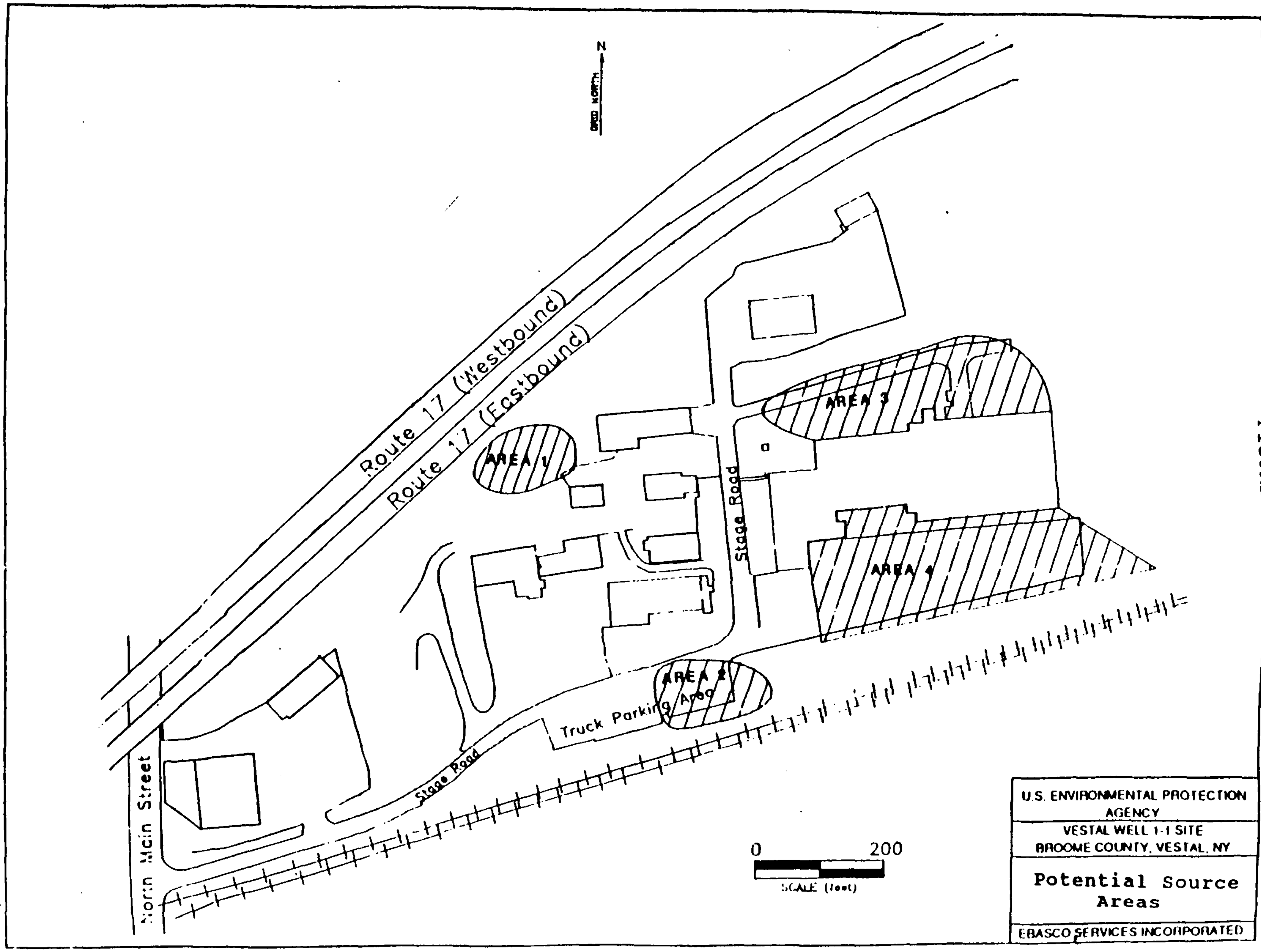
Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the national Contingency Plan (40 CFR Part 300), I have determined that the construction of an air stripping system to treat Vestal water supply well 1-1 and its subsequent use as the Town's primary water supply is a cost-effective remedy and provides adequate protection of public health, welfare and the environment. Furthermore, I have determined that it is necessary to undertake a supplemental Remedial Investigation and Feasibility Study to investigate the extent of soil contamination in suspected source areas and to evaluate possible source control measures. A determination regarding future source control actions will be made upon completion of this work.

The State of New York has been consulted and agrees with the approved remedy. In addition, the action will require future operation, maintenance, and monitoring activities to ensure the continued effectiveness of the remedy. These activities are presently considered eligible for Trust Fund monies for a period of one year; however, pending CERCLA legislation may affect this eligibility and/or the period of eligibility.

Funding of this remedial action will occur at the time of CERCLA reauthorization; moreover, I have determined that the action being taken will be appropriate when balanced against the future availability of Trust Fund monies for use at other sites.

JUNE 27, 1986
Date

Christopher J. Daggett
Regional Administrator



Route 17 (Westbound)
Route 17 (Eastbound)
GRID NORTH
N
AREA 1
AREA 2
AREA 3
AREA 4
Stage Road
Stage Road
Truck Parking Area
North Main Street
0
200
SCALE (feet)
U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Potential Source Areas
EBASCO SERVICES INCORPORATED

FIGURE 4

FIGURE 5

AFFIDAVIT OF PUBLICATION

State of New York
Town of Vestal ss.:
County of Broome

Phyllis Johnson, being duly sworn, deposes and says that she is the Principal Clerk of the Binghamton Press Company, Inc., publisher of the following newspaper printed and published in the Town of Vestal, New York and of general circulation in the County of Broome, State of New York: Press & Sun-Bulletin.

A notice, of which the annexed is a printed copy, was published on the following dates: May 18, 1990

Sworn to before me this 18th day of May, 19 9[illegible]

[illegible]
Notary Public
[illegible]SON
[illegible] York
[illegible] 31, 19__

THE UNITED STATES
ENVIRONMENTAL
PROTECTION AGENCY
Invites
PUBLIC COMMENT ON THE PROPOSED REMEDIATION OF THE VESTAL WELL NO. 1-1 (2ND OPERABLE UNIT - SOURCE REMEDIATION)
Located Near
NORTH MAIN STREET in
VESTAL, N.Y.

The U.S. Environmental Protection Agency (EPA) as lead agency for the Vestal Well 1-1 Superfund site will hold a **Public Meeting** to discuss the Remedial Investigation/Feasibility Study Report (RI/FS) and the Proposed Plan for the site. The N.Y.S. Department of Environmental Conservation (NYSDEC) as support agency will also be in attendance. The meeting will be held on May 31, 1990 at 7:30 p.m. in the Board Room of Vestal Town Hall, Vestal Parkway, Vestal, N.Y.

EPA evaluated the following remedial options for the Vestal Well 1-1 site:

SOURCE REMEDIATION

- SC-1: No Action
- SC-2: Off-Site Incineration
- SC-3: Low Temperature Thermal Extraction
- SC-4: Soil Tilling
- SC-5: In-Situ Vapor Extraction

POTABLE WATER TREATMENT

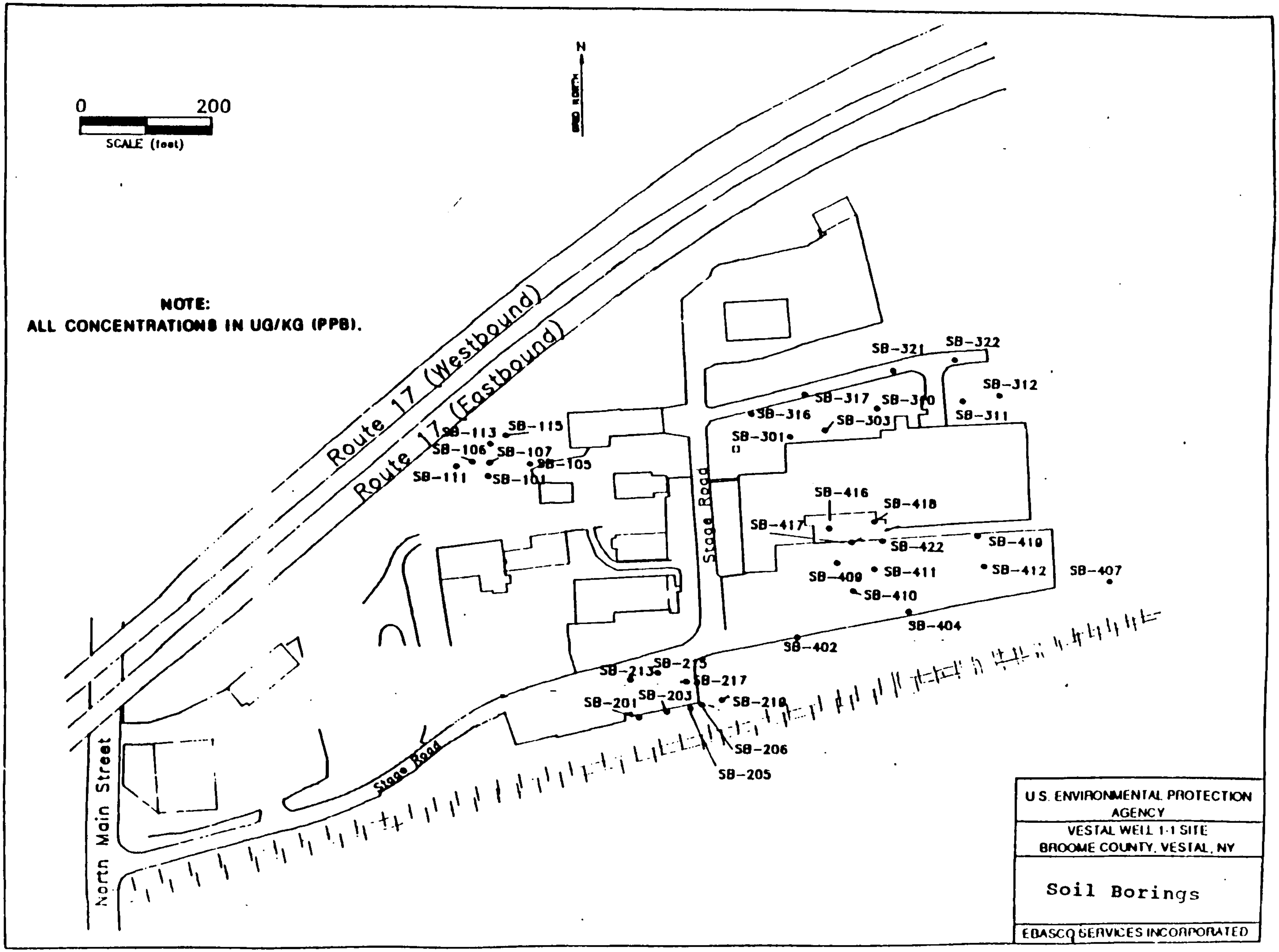
- GW-1: No Action
- GW-2: Precipitation + Filtration
- GW-5: Filtration + Ion Exchange

The no action alternative for both remedial categories was evaluated as required by the National Oil and Hazardous Substances Pollution Contingency Plan.

Based on available information, the proposed option at this time is to combine the **source remediation** alternative which involves in-situ vapor extraction with the no action **potable water treatment** alternative, which includes contingency planning. EPA and NYSDEC welcome the public's comment on **all** alternatives identified above. EPA will choose the final remedy after the public comment period ends and consultation with NYSDEC is concluded. EPA may select an option other than the proposed alternative after consideration of all comments is concluded.

Complete documentation of the project findings is presented in the RI/FS Report and in the Proposed Plan. These documents are available at either the Vestal Public Library or the Vestal Town Hall. The public may comment in person at the public meeting and/or may submit written comments through June 17, 1990 to:

Edward G. Als
Remedial Project Manager
Emergency and Remedial Response Division
U.S. Environmental Protection Agency



0
200
SCALE (feet)
N
NOTE:
ALL CONCENTRATIONS IN UG/KG (PPB).
Route 17 (Westbound)
Route 17 (Eastbound)
Stage Road
North Main Street
SB-113
SB-115
SB-106
SB-107
SB-105
SB-111
SB-101
SB-321
SB-322
SB-312
SB-317
SB-310
SB-311
SB-316
SB-303
SB-301
SB-416
SB-418
SB-417
SB-422
SB-419
SB-409
SB-411
SB-412
SB-407
SB-410
SB-404
SB-402
SB-213
SB-215
SB-217
SB-201
SB-203
SB-219
SB-206
SB-205
U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Soil Borings
EBASCO SERVICES INCORPORATED

FIGURE 6

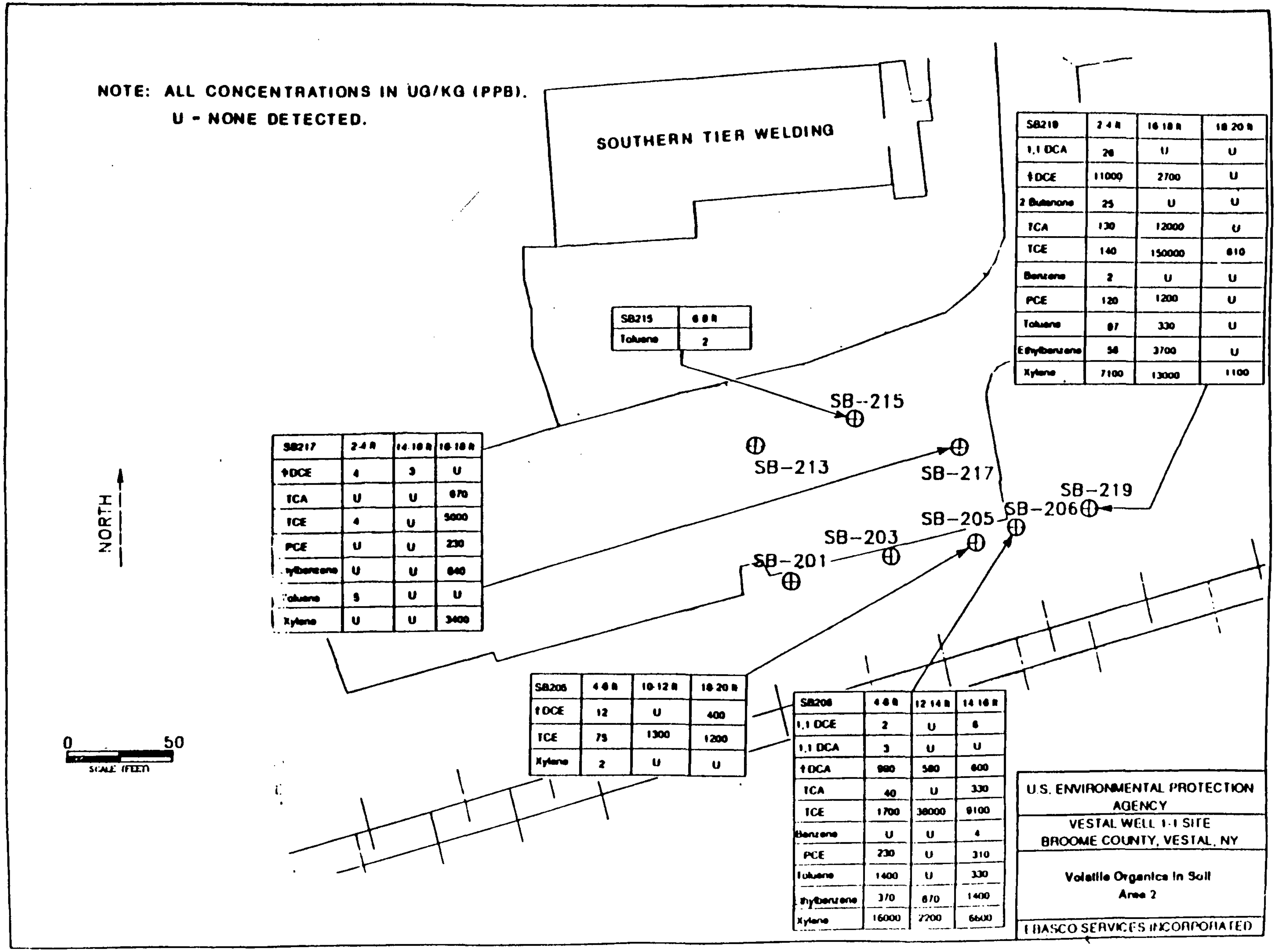


FIGURE 7

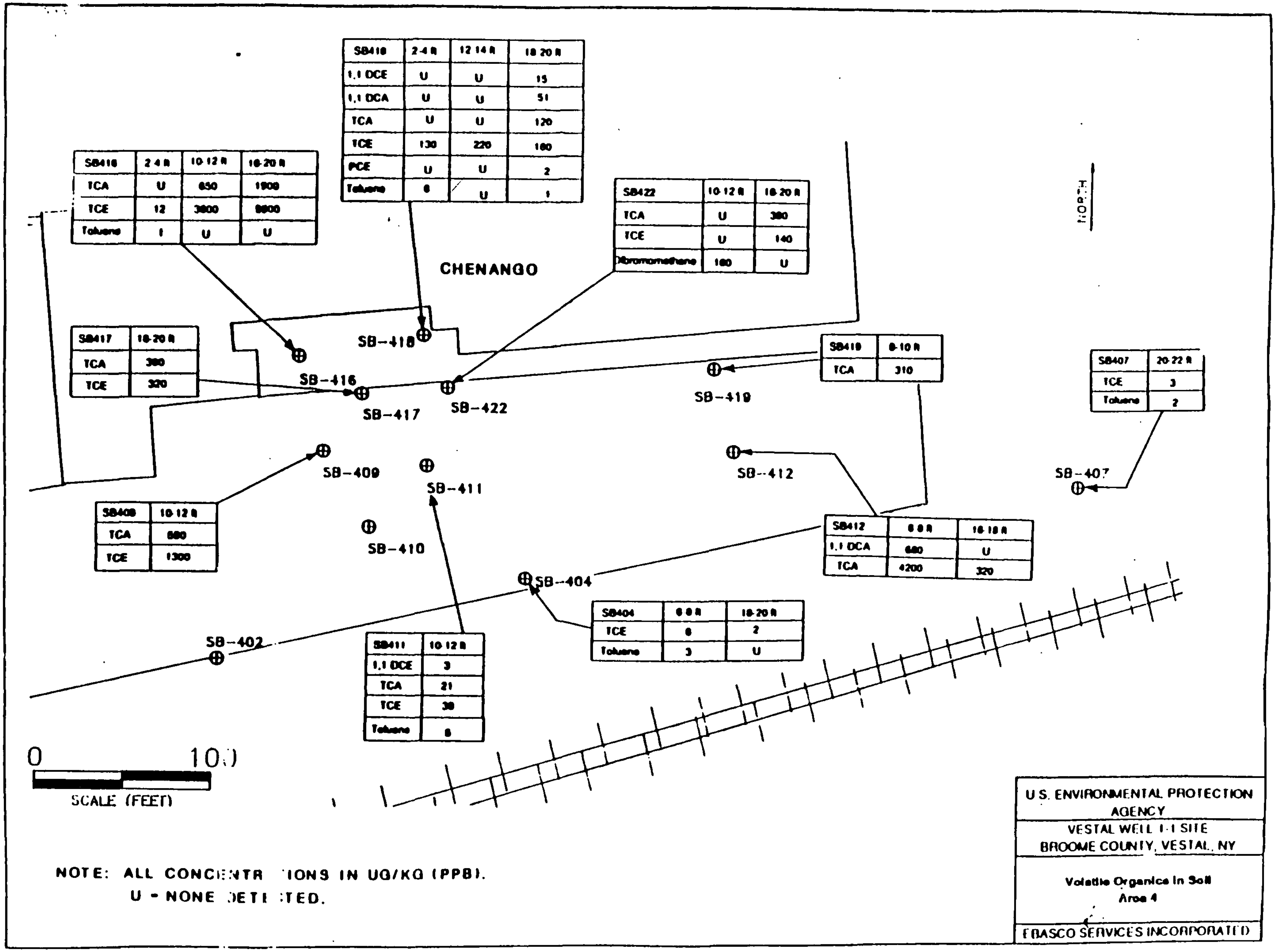
SB215	6-8 ft
Toluene	2

SB219	2-4 ft	16-18 ft	18-20 ft
1,1 DCA	28	U	U
↑DCE	11000	2700	U
2 Butanone	25	U	U
TCA	130	12000	U
TCE	140	150000	810
Benzene	2	U	U
PCE	120	1200	U
Toluene	87	330	U
Ethylbenzene	58	3700	U
Xylene	7100	13000	1100

SB217	2-4 ft	14-16 ft	16-18 ft
↑DCE	4	3	U
TCA	U	U	670
TCE	4	U	5000
PCE	U	U	230
Ethylbenzene	U	U	840
Toluene	5	U	U
Xylene	U	U	3400

SB206	4-6 ft	10-12 ft	18-20 ft
↑DCE	12	U	400
TCE	75	1300	1200
Xylene	2	U	U

SB208	4-6 ft	12-14 ft	14-16 ft
1,1 DCE	2	U	6
1,1 DCA	3	U	U
↑DCA	980	580	600
TCA	40	U	330
TCE	1700	38000	9100
Benzene	U	U	4
PCE	230	U	310
Toluene	1400	U	330
Ethylbenzene	370	670	1400
Xylene	16000	2200	6600



SB416	2-4 ft	10-12 ft	18-20 ft
TCA	U	650	1900
TCE	12	3800	9800
Toluene	1	U	U

SB418	2-4 ft	12-14 ft	18-20 ft
1,1 DCE	U	U	15
1,1 DCA	U	U	51
TCA	U	U	120
TCE	130	220	180
PCE	U	U	2
Toluene	6	U	1

SB422	10-12 ft	18-20 ft
TCA	U	380
TCE	U	140
Dibromomethane	180	U

SB417	18-20 ft
TCA	380
TCE	320

SB419	8-10 ft
TCA	310

SB407	20-22 ft
TCE	3
Toluene	2

SB409	10-12 ft
TCA	880
TCE	1300

SB412	6-8 ft	16-18 ft
1,1 DCA	680	U
TCA	4200	320

SB404	6-8 ft	18-20 ft
TCE	6	2
Toluene	3	U

SB411	10-12 ft
1,1 DCE	3
TCA	21
TCE	39
Toluene	6

NOTE: ALL CONCENTRATIONS IN UG/KG (PPB).
U - NONE DETECTED.

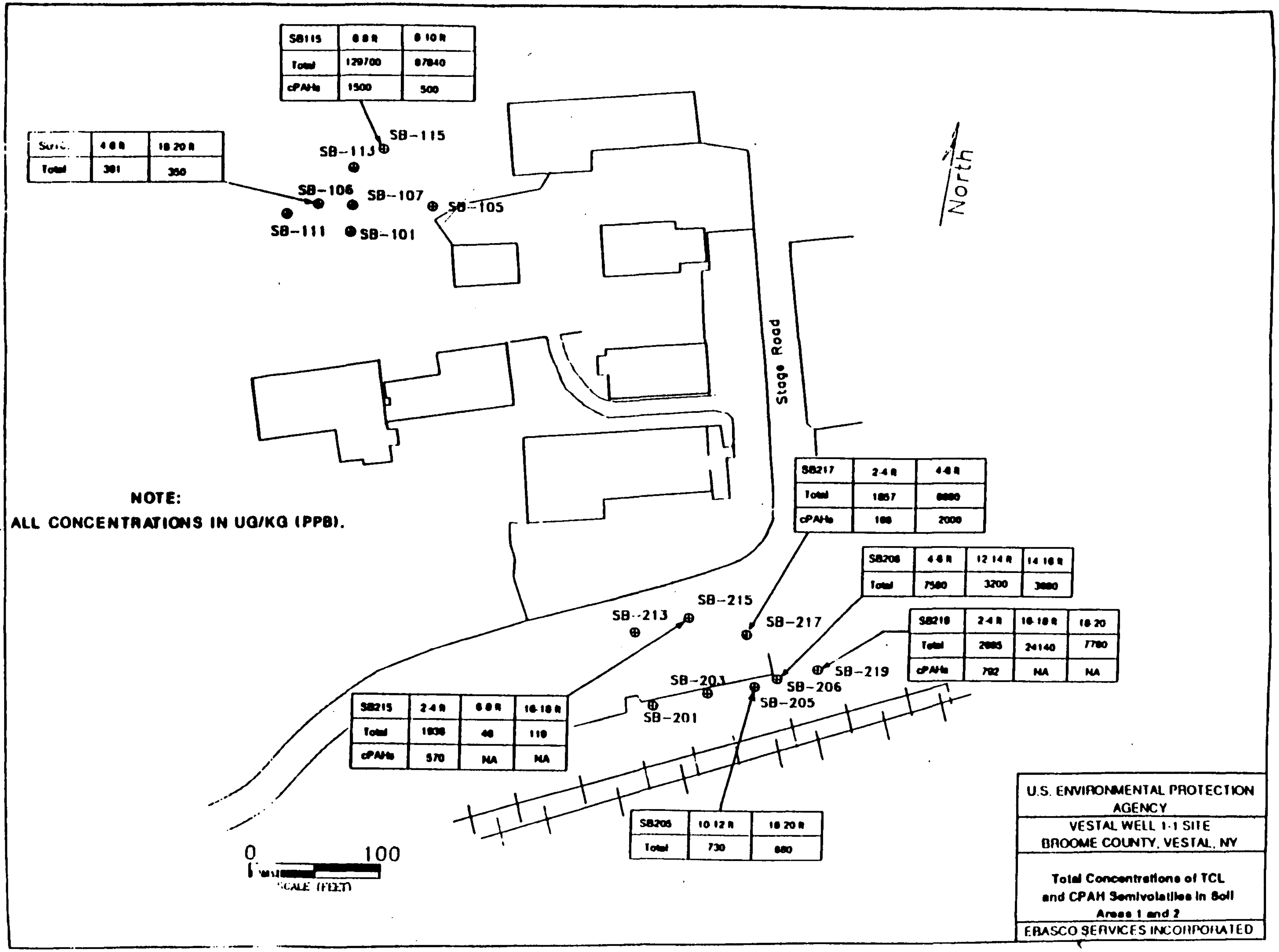
U.S. ENVIRONMENTAL PROTECTION AGENCY

VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY

Volatile Organics in Soil
Area 4

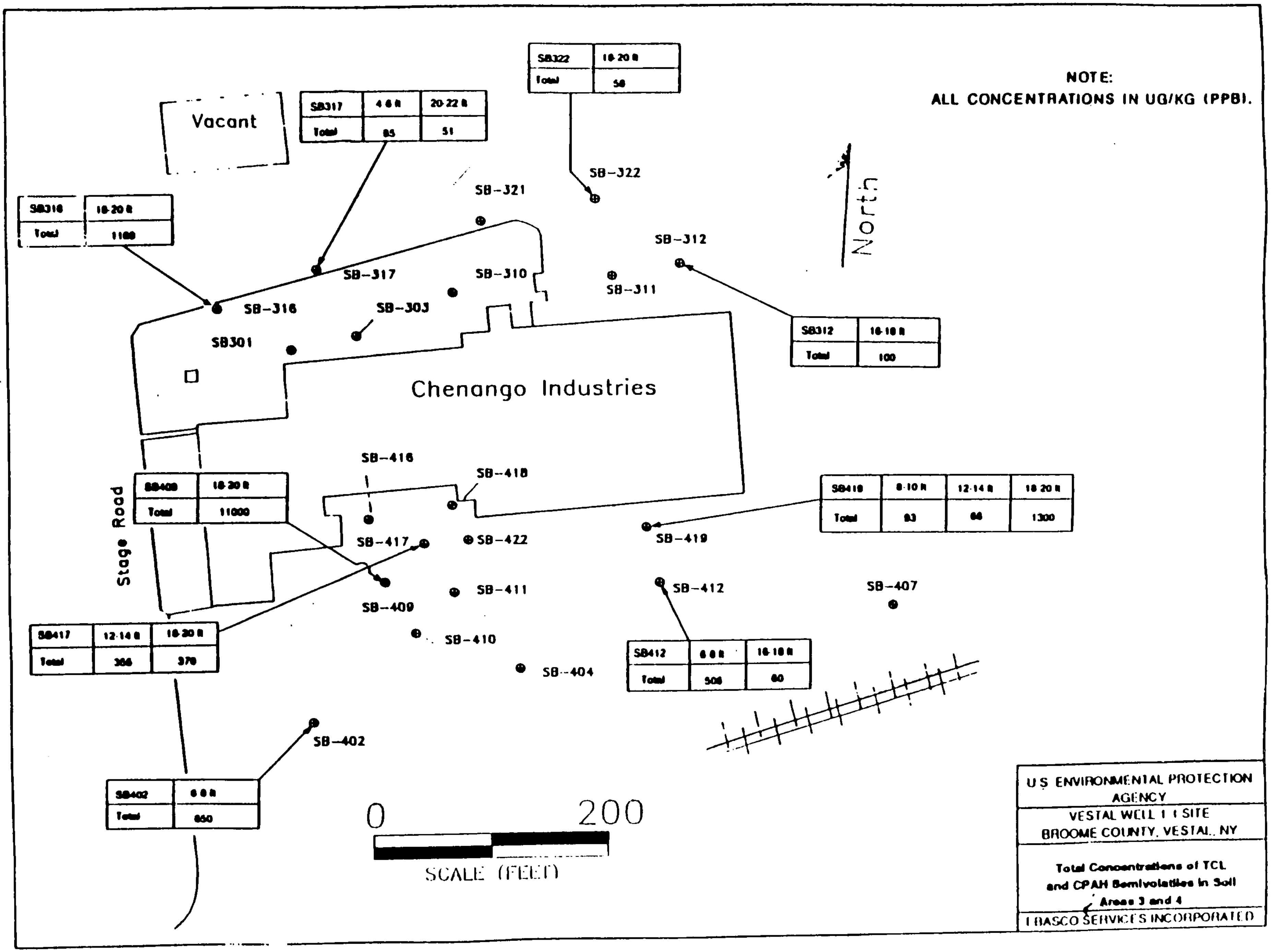
EBASCO SERVICES INCORPORATED

FIGURE 8



SB115 | 6 8 ft | 8 10 ft
Total | 129700 | 87840
cPAHs | 1500 | 500
SB-115
SB-113
SB-106
SB-107
SB-105
SB-111
SB-101
Total | 301 | 350
4 6 ft | 18 20 ft
North
Stage Road
NOTE:
ALL CONCENTRATIONS IN UG/KG (PPB).
SB217 | 2-4 ft | 4-6 ft
Total | 1857 | 8880
cPAHs | 186 | 2000
SB206 | 4 6 ft | 12 14 ft | 14 16 ft
Total | 7580 | 3200 | 3880
SB219 | 2-4 ft | 16-18 ft | 18 20
Total | 2885 | 24140 | 7780
cPAHs | 792 | NA | NA
SB-213
SB-215
SB-217
SB-219
SB-203
SB-206
SB-205
SB-201
SB215 | 2-4 ft | 6 8 ft | 16-18 ft
Total | 1936 | 46 | 110
cPAHs | 570 | NA | NA
SB205 | 10 12 ft | 18 20 ft
Total | 730 | 880
0
100
SCALE (FEET)
U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Total Concentrations of TCL and CPAH Semivolatiles in Soil
Areas 1 and 2
EBASCO SERVICES INCORPORATED

FIGURE 9



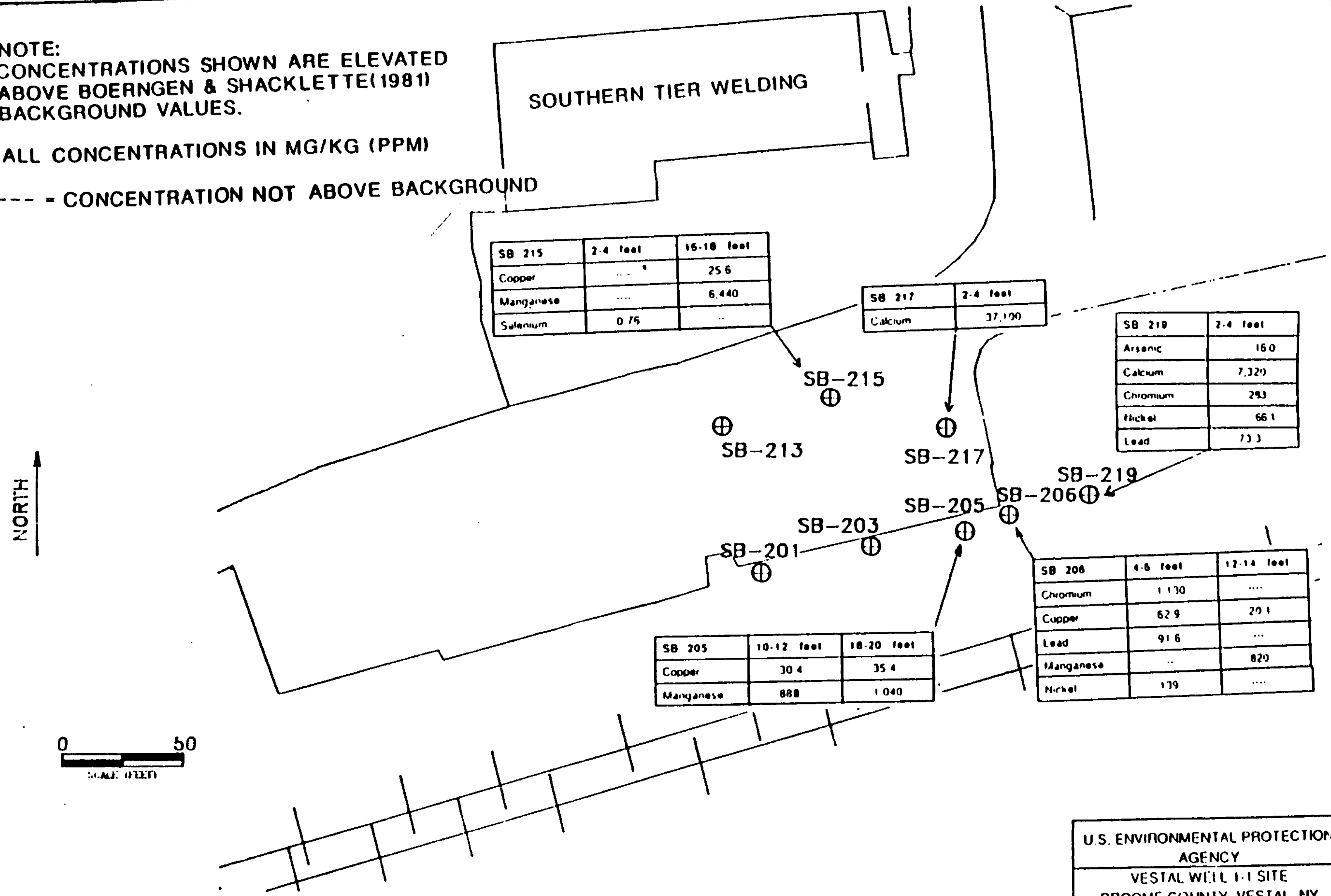
NOTE:
ALL CONCENTRATIONS IN UG/KG (PPB).
North
Vacant
Chenango Industries
Stage Road
SB317 | 4-6 ft | 20-22 ft
Total | 85 | 51
SB322 | 18-20 ft
Total | 58
SB318 | 18-20 ft
Total | 1100
SB312 | 16-18 ft
Total | 100
SB409 | 18-20 ft
Total | 11000
SB419 | 8-10 ft | 12-14 ft | 18-20 ft
Total | 93 | 66 | 1300
SB417 | 12-14 ft | 18-20 ft
Total | 366 | 370
SB412 | 6-8 ft | 16-18 ft
Total | 506 | 60
SB402 | 6-8 ft
Total | 850
SB-321
SB-322
SB-312
SB-317
SB-310
SB-311
SB-316
SB-303
SB301
SB-416
SB-418
SB-417
SB-422
SB-419
SB-409
SB-411
SB-412
SB-407
SB-410
SB-404
SB-402
0
200
SCALE (FEET)
U S ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Total Concentrations of TCL and CPAH Semivolatiles in Soil
Areas 3 and 4
EBASCO SERVICES INCORPORATED

FIGURE 10

NOTE:
CONCENTRATIONS SHOWN ARE ELEVATED ABOVE BOERNGEN & SHACKLETTE(1981) BACKGROUND VALUES.

ALL CONCENTRATIONS IN MG/KG (PPM)

--- = CONCENTRATION NOT ABOVE BACKGROUND



SB 215	2-4 feet	16-18 feet
Copper	---	25 6
Manganese	----	6,440
Selenium	0 76	--

SB 217	2-4 feet
Calcium	37,190

SB 219	2-4 feet
Arsenic	16 0
Calcium	7,320
Chromium	293
Nickel	66 1
Lead	73 3

SB 205	10-12 feet	18-20 feet
Copper	30 4	35 4
Manganese	888	1 040

SB 206	4-6 feet	12-14 feet
Chromium	1 130	----
Copper	62 9	20 1
Lead	91 6	---
Manganese	--	820
Nickel	139	----

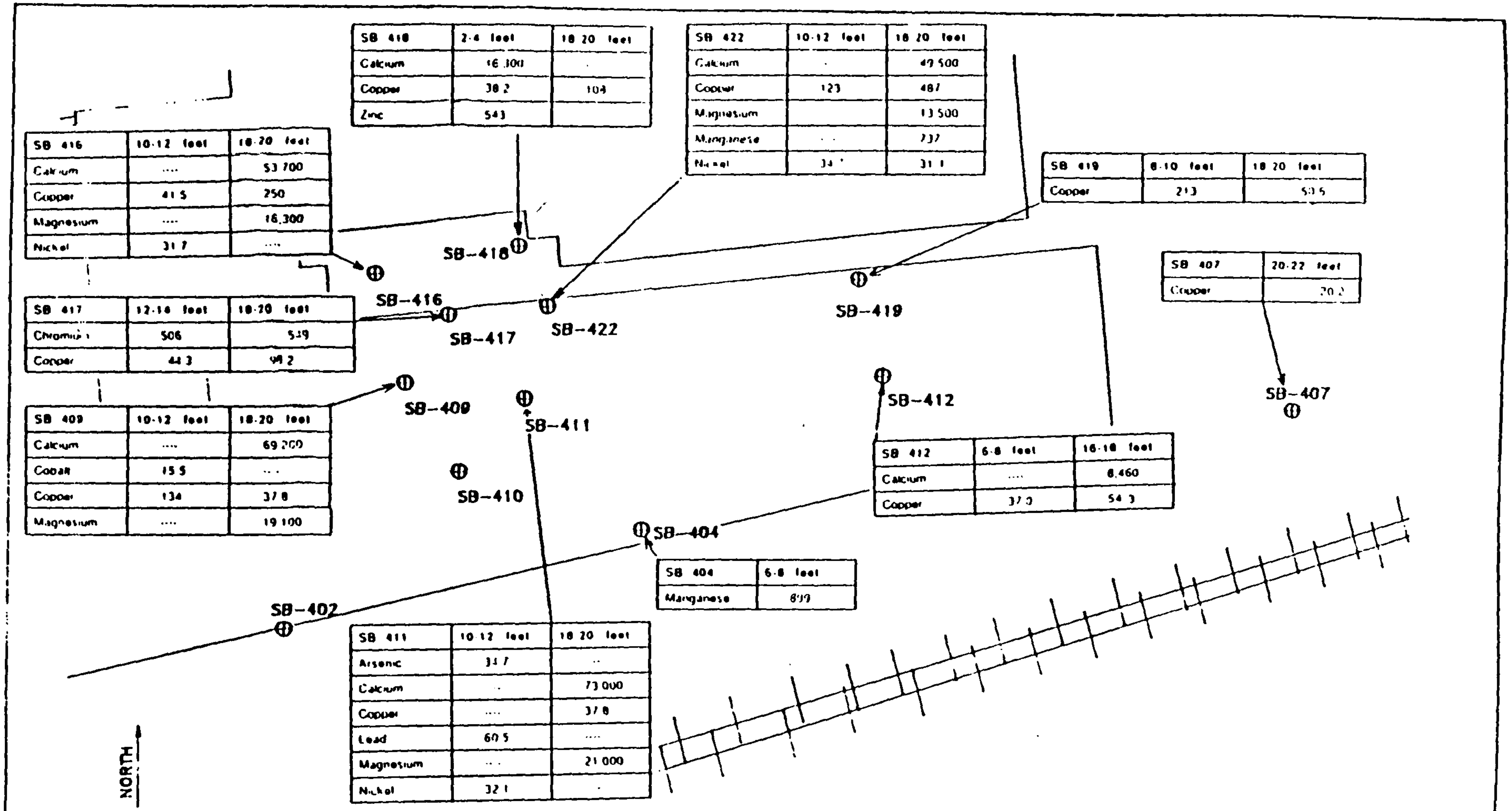
U.S. ENVIRONMENTAL PROTECTION AGENCY

VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY

Inorganic Concentrations In Soil Above Background
Area 2

EBASCO SERVICES INCORPORATED

FIGURE 11



SB 416	10-12 feet	18-20 feet
Calcium	....	53 700
Copper	41 5	250
Magnesium	....	16,300
Nickel	31 7	....

SB 418	2-4 feet	18 20 feet
Calcium	16 300	.
Copper	38 2	104
Zinc	543	

SB 422	10-12 feet	18 20 feet
Calcium	.	49 500
Copper	123	487
Magnesium		13 500
Manganese	. .	737
Nickel	34 '	31 1

SB 419	8-10 feet	18 20 feet
Copper	213	53 5

SB 407	20-22 feet
Copper	20 2

SB 417	12-14 feet	18-20 feet
Chromium	506	539
Copper	44 3	99 2

SB 409	10-12 feet	18-20 feet
Calcium	....	69 200
Cobalt	15 5	...
Copper	134	37 8
Magnesium	....	19 100

SB 412	6-8 feet	16-18 feet
Calcium	....	8,460
Copper	37 0	54 3

SB 404	6-8 feet
Manganese	899

SB 411	10 12 feet	18 20 feet
Arsenic	33 7	..
Calcium	..	73 000
Copper	....	37 8
Lead	60 5	....
Magnesium	...	21 000
Nickel	32 1	.

NOTE:
CONCENTRATIONS SHOWN ARE ELEVATED ABOVE BOERNGEN & SHACKLETTE(1981) BACKGROUND VALUES.

0 100
SCALE (FEET)

ALL CONCENTRATIONS IN MG/KG (PPM)

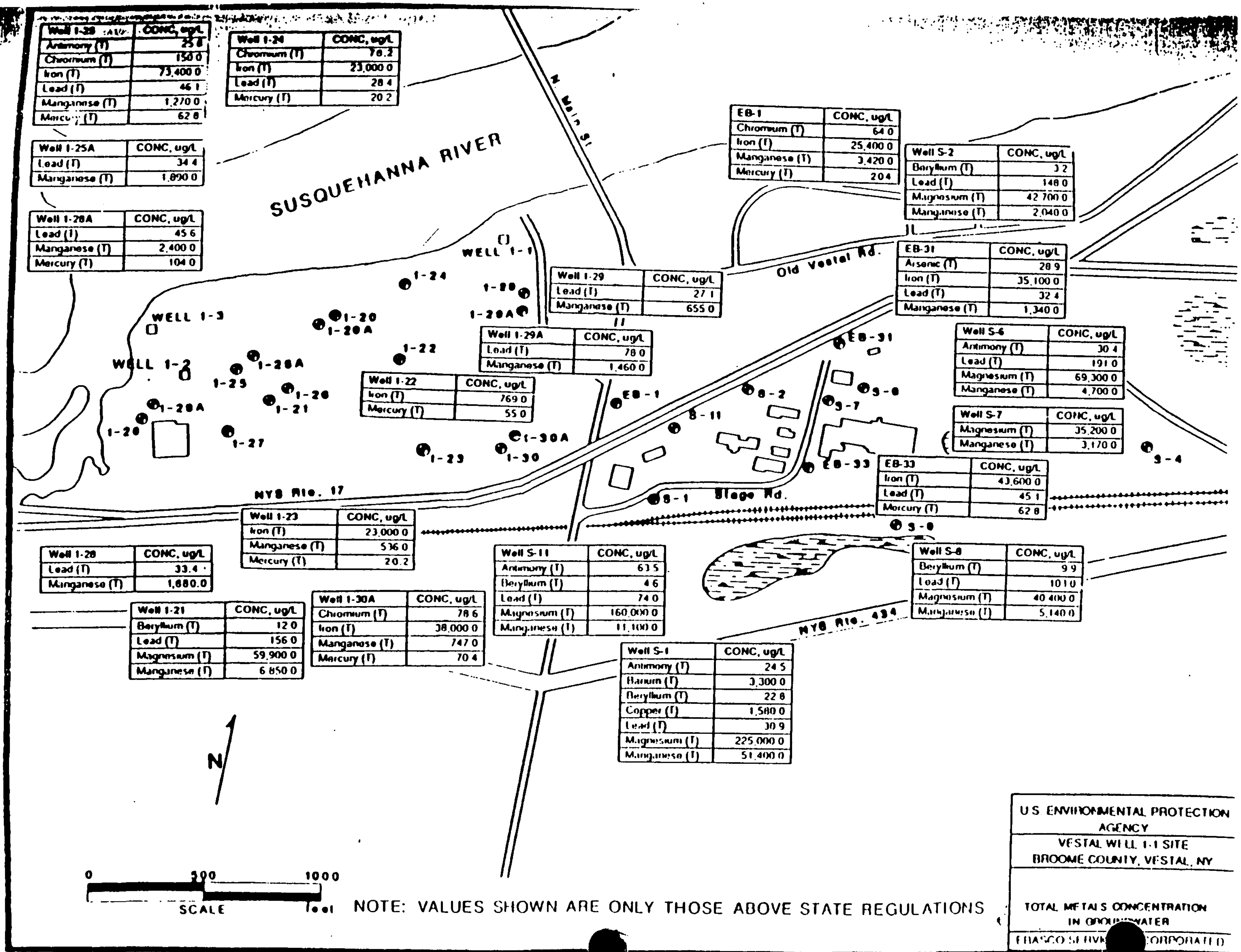
--- = CONCENTRATION NOT ABOVE BACKGROUND

U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY

Inorganic Concentrations in Soil Above Background
Area 4

EBASCO SERVICES INCORPORATED

FIGURE 12



Well 1-2[illegible]	CONC, ug/L
Antimony (T)	25.8
Chromium (T)	150.0
Iron (T)	73,400.0
Lead (T)	46.1
Manganese (T)	1,270.0
Mercury (T)	62.8

Well 1-24	CONC, ug/L
Chromium (T)	76.2
Iron (T)	23,000.0
Lead (T)	28.4
Mercury (T)	20.2

Well 1-25A	CONC, ug/L
Lead (T)	34.4
Manganese (T)	1,890.0

Well 1-28A	CONC, ug/L
Lead (T)	45.6
Manganese (T)	2,400.0
Mercury (T)	104.0

EB-1	CONC, ug/L
Chromium (T)	64.0
Iron (T)	25,400.0
Manganese (T)	3,420.0
Mercury (T)	20.4

Well S-2	CONC, ug/L
Beryllium (T)	3.2
Lead (T)	148.0
Magnesium (T)	42,700.0
Manganese (T)	2,040.0

Well 1-29	CONC, ug/L
Lead (T)	27.1
Manganese (T)	655.0

EB-31	CONC, ug/L
Arsenic (T)	28.9
Iron (T)	35,100.0
Lead (T)	32.4
Manganese (T)	1,340.0

Well 1-29A	CONC, ug/L
Lead (T)	78.0
Manganese (T)	1,460.0

Well S-6	CONC, ug/L
Antimony (T)	30.4
Lead (T)	191.0
Magnesium (T)	69,300.0
Manganese (T)	4,700.0

Well 1-22	CONC, ug/L
Iron (T)	769.0
Mercury (T)	55.0

Well S-7	CONC, ug/L
Magnesium (T)	35,200.0
Manganese (T)	3,170.0

EB-33	CONC, ug/L
Iron (T)	43,600.0
Lead (T)	45.1
Mercury (T)	62.8

Well 1-23	CONC, ug/L
Iron (T)	23,000.0
Manganese (T)	536.0
Mercury (T)	20.2

Well 1-28	CONC, ug/L
Lead (T)	33.4
Manganese (T)	1,880.0

Well S-11	CONC, ug/L
Antimony (T)	63.5
Beryllium (T)	4.6
Lead (T)	74.0
Magnesium (T)	160,000.0
Manganese (T)	11,100.0

Well S-8	CONC, ug/L
Beryllium (T)	9.9
Lead (T)	101.0
Magnesium (T)	40,400.0
Manganese (T)	5,140.0

Well 1-21	CONC, ug/L
Beryllium (T)	12.0
Lead (T)	156.0
Magnesium (T)	59,900.0
Manganese (T)	6,850.0

Well 1-30A	CONC, ug/L
Chromium (T)	78.6
Iron (T)	38,000.0
Manganese (T)	747.0
Mercury (T)	70.4

Well S-1	CONC, ug/L
Antimony (T)	24.5
Barium (T)	3,300.0
Beryllium (T)	22.8
Copper (T)	1,580.0
Lead (T)	30.9
Magnesium (T)	225,000.0
Manganese (T)	51,400.0

NOTE: VALUES SHOWN ARE ONLY THOSE ABOVE STATE REGULATIONS

U.S. ENVIRONMENTAL PROTECTION AGENCY

VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY

TOTAL METALS CONCENTRATION IN GROUNDWATER

EBASCO SERVI[illegible] CORPORATED

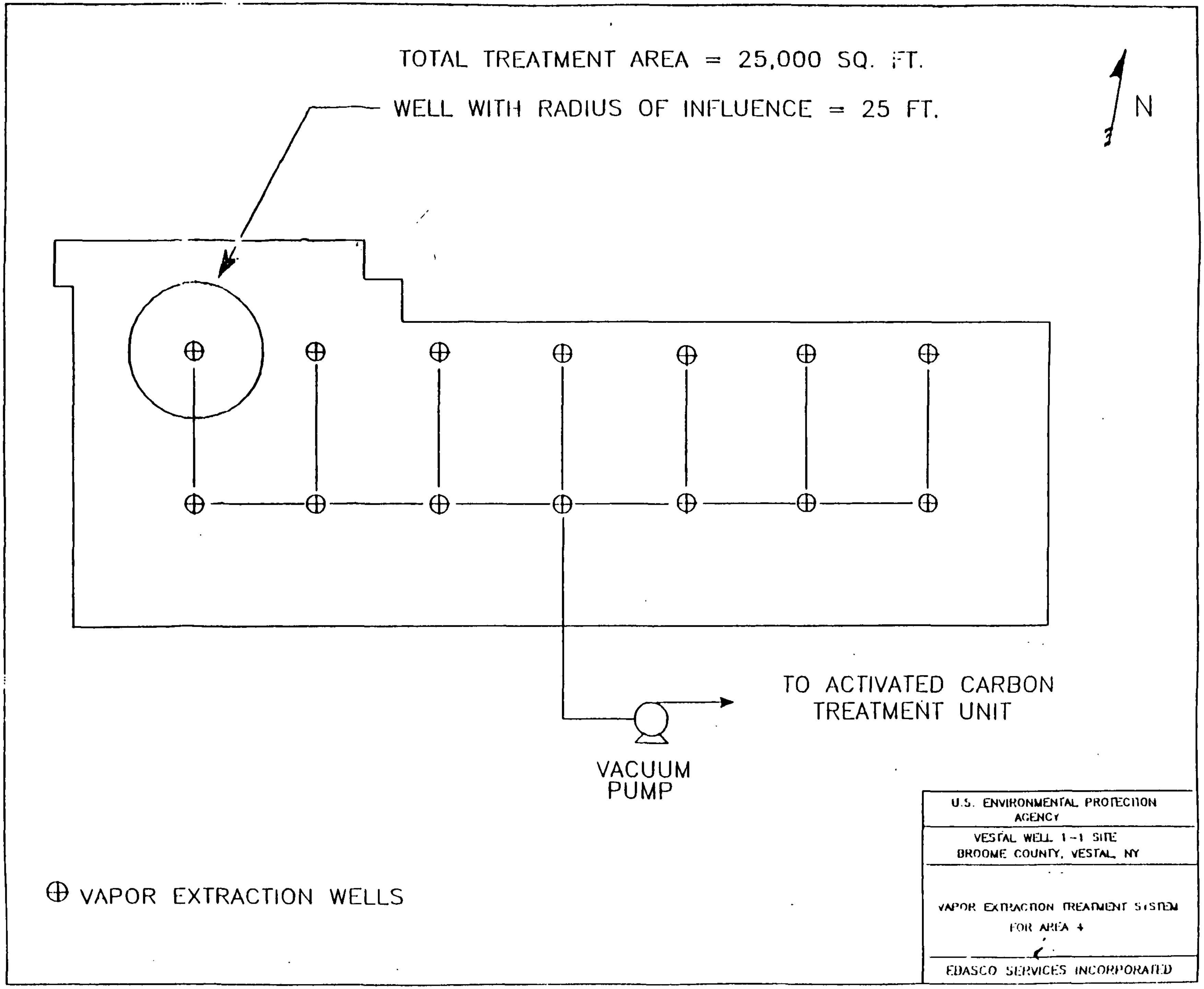

TOTAL TREATMENT AREA = 25,000 SQ. FT.
WELL WITH RADIUS OF INFLUENCE = 25 FT.
N
TO ACTIVATED CARBON TREATMENT UNIT
VACUUM PUMP
⊕ VAPOR EXTRACTION WELLS
U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
VAPOR EXTRACTION TREATMENT SYSTEM FOR AREA 4
EDASCO SERVICES INCORPORATED

FIGURE 14

APPENDIX 3

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

SITE: Vestal Water Supply Well 1-1, Vestal, Broome County, New York

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing the analysis of cost effectiveness of remedial alternatives for this site:

- Well Field Contamination Investigation (R.J. Martin)
- Vestal Water Supply Well 1-1 Focused Feasibility Study
- Vestal Water Supply Well 1-1 Remedial Investigation/ Feasibility Study
- Staff Summaries, Letters and Recommendations
- Responsiveness Summary

DESCRIPTION OF SELECTED REMEDY

This Record of Decision calls for the following actions:

- Construction of a packed column air stripping system on well 1-1 in order to return the well to full service as Vestal Water District 1's primary water supply. This cost effective alternative will have the following positive impacts:

  1) restoration of District 1 water supply capacity to the level that existed prior to loss of well 1-1;

  2) provision of a water supply to the district that exceeds applicable or relevant and appropriate standards, thereby providing a very high level of public health protection;

  3) hydraulic containment of the plume of contaminants via pumping well 1-1, thereby protecting other District 1 water supply wells; and

  4) cessation of untreated discharge from well 1-1 to the Susquehanna River.

- Initiation of a supplemental Remedial Investigation and Feasibility Study to further investigate the extent of soil contamination in suspected source areas and to evaluate possible source control measures.

Attachment 4

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the national Contingency Plan (40 CFR Part 300), I have determined that the construction of an air stripping system to treat Vestal water supply well 1-1 and its subsequent use as the Town's primary water supply is a cost-effective remedy and provides adequate protection of public health, welfare and the environment. Furthermore, I have determined that it is necessary to undertake a supplemental Remedial Investigation and Feasibility Study to investigate the extent of soil contamination in suspected source areas and to evaluate possible source control measures. A determination regarding future source control actions will be made upon completion of this work.

The State of New York has been consulted and agrees with the approved remedy. In addition, the action will require future operation, maintenance, and monitoring activities to ensure the continued effectiveness of the remedy. These activities are presently considered eligible for Trust Fund monies for a period of one year; however, pending CERCLA legislation may affect this eligibility and/or the period of eligibility.

Funding of this remedial action will occur at the time of CERCLA reauthorization; moreover, I have determined that the action being taken will be appropriate when balanced against the future availability of Trust Fund monies for use at other sites.

June 27, 1986
Date

Christopher J. Daggett
Regional Administrator

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION VESTAL WATER SUPPLY WELL 1-1

SITE LOCATION AND DESCRIPTION

The study area for this Remedial Investigation/Feasibility Study (RI/FS) covers 225 acres (.4 square miles) in the Town of Vestal, New York (figure 1). Vestal water supply well 1-1 is located on the south bank of the Susquehanna River about 400 feet west of the Endicott-Vestal Route 26 Bridge. Other significant features of the area include an industrial park immediately to the southeast of the well, and several marsh areas and drainage ditches encompassing and interlacing the industrial park (figure 2).

Well 1-1 is one of three production wells in Water District 1 that are intended to provide drinking water to several water districts in the Vestal area. Well 1-1 presently is being pumped to waste into the Susquehanna River in accordance with a SPDES permit, while well 1-2 usually provides enough water to satisfy the District 1 service area. Well 1-3, which produces a relatively low quality (corrosive) yield, is used as reserve capacity in periods of maximum demand.

The aquifer underlying the study area is extremely permeable, resulting in high production capacities as well as rapid contaminant migration. There also exists many variations in the subsurface geology in this area, giving rise to a highly complex groundwater hydrology. The direction of groundwater flow is generally from east to west (figure 3).

SITE HISTORY

In 1954, well 1-1 was constructed with a capacity of 1.4 MGD as a back-up well to supplement the Vestal water supply which was provided at that time by the Town of Endicott across the Susquehanna River. A few years later, Water District 1 became an independent water supplier for the Town of Vestal, utilizing wells 1-1, 1-2 and 1-3 with a combined capacity of 4.6 MGD.

A chemical spill at the IBM plant in Endicott in 1978 led to a testing program for all drinking wells in the vicinity for synthetic organic compounds. As a result of this testing, significant concentrations of chlorinated solvents were discovered in well 1-1, and the well pumpage was diverted to the Susquehanna River where it presently continues to discharge under a SPDES permit. Subsequent investigation has since indicated that the presence of chlorinated solvents in well 1-1 is not related to the spill at the IBM plant.

In December, 1982, the site was placed on the National Priorities List (NPL) in combination with Vestal Water Supply Well 4-2, which was a similarly contaminated well a few miles away in another water district; however, these two sites were later separately listed due to the recognition that the sites were most likely contaminated by different sources existing in the immediate area of each well. Just prior to the listing of well 1-1 on the NPL, the Town of Vestal contracted with R.J. Martin to conduct an investigation of the contamination of well 1-1. His conclusions in part tended to implicate the area around the southeast corner of Stage Road as a suspected source. This is an area which borders the industrial park along Stage Road.

A Focused Feasibility Study (FFS) was conducted by New York State Department of Environmental Conservation consultants in order to determine the need for an initial remedial measure. The FFS recommended the construction of a large capacity water main between Water Districts 1 and 5 in order to improve the reliability of the District 1 supply. EPA rejected this recommendation on July 9, 1985, because the Agency believed that a sufficient capacity of good quality water still existed for the service area, and that there was no short-term threat of losing this capacity.

At the present time, well 1-2 is the primary water supply and well 1-3 is used as a backup to provide extra capacity during peak demand periods (figure 4).

CURRENT SITE STATUS

During the RI, 27 wells were sampled, including well 1-1 and 26 groundwater monitoring wells (figure 3). In addition, five surface water samples, 17 soil samples, four sediment samples, and three sewer water samples were collected. All samples were analyzed for priority pollutant volatile organics, and a complete priority scan was conducted on samples taken from wells 1-1, S-2, and S-4. Nineteen of 57 samples contained priority pollutant volatile organics.

Seven new monitoring wells (S-1, S-2, S-4, S-6, S-7, S-8 and S-11) were installed east of Main Street to provide additional hydrogeologic groundwater quality data for the purpose of locating the source or sources of groundwater contamination. Wells S-1, S-2, S-6, S-7, S-8 and S-11 were sited to further define the contaminant plume near suspected source areas. Well S-4 was located upgradient of any known contamination and was used to determine background levels. After purging, monitoring wells were sampled for priority pollutant volatile organics. Wells 1-1, S-2 and S-4 were also sampled for all EPA priority pollutants.

Soil samples were collected at 5-foot intervals from boreholes B-1 through B-7 and analyzed for priority pollutant volatile organics to determine if any soil contamination existed upgradient of the suspected source areas. Additional soil samples were obtained from depths of 3 feet or 5 feet in power auger holes drilled in the Chenango Industries drainage ditch area and at the tank truck parking area as part of the source area identification study.

The RI confirmed the presence of eight volatile organic compounds in the groundwater southeast and east of well 1-1. Based on the measured concentrations and known health effects, the primary contaminants are the chlorinated solvents trichloroethylene; 1,1,1-trichloroethane; trans-1,2-dichloroethylene; and 1,1-dichloroethane. Historical values for these compounds in well 1-1 are given in table 1. The concentration of total volatile organics (TVO) in well 1-1 was 241 ppb in April 1985. The highest recorded concentration of TVO in the groundwater plume was 12,840 ppb in monitoring well 1-33 located approximately 1,500 feet southeast of well 1-1 (figure 5). Computer modeling of the data and areal mapping of contaminants indicate that two pockets of chlorinated solvents are the major sources of contamination currently affecting well 1-1 (figure 6). Subsequent use of a solute transport model showed that the plume will continue to migrate slowly toward well 1-1, provided that well 1-1 continues to be pumped to waste, with no impact to wells 1-2 and 1-3.

No identifiable wastes contributing to the well 1-1 contaminant plume were present at the surface, either at the well site or in the upgradient suspected source areas. There is no indication of lagoons in historical aerial photographs, and the RI revealed no surface indications of buried waste pits, lagoons or drums. In addition, no "hot spots" were found at the surface, indicating that the contaminants are confined to the groundwater and possibly in unsaturated soils at depths greater than 5 feet. However, some deep soil contamination found in at least two areas of borehole investigation have led to the decision to perform a supplemental RI/FS study to evaluate the extent of this contamination and possible source control measures. This supplemental work will be the subject of a future Record of Decision.

1,1-dichloroethane, trans 1,2-dichloroethylene, and 1,1,1-trichloroethane all have produced similar damaging toxic effects on the livers, kidneys and central nervous systems of laboratory animals, usually as acute effects. Acute human toxicity has also been observed in the workplace after high exposure to 1-1 dichloroethane and trans 1,2,-dichloroethylene. There is very little weight of evidence from animal studies to suggest through extrapolation that any of these compounds produce carcinogenic effects in humans.

Trichloroethylene also has been shown to affect the same target organs in laboratory animals and humans in the workplace as do the other three chlorinated compounds of concern. In addition, there is some evidence from animal studies to suggest the possibility that trichloroethylene is a potential human carcinogen. Most of the exposures to contaminants associated with the plume of contamination have been or will be at low levels. Since carcinogenic effects are often related to low level exposures, trichloroethylene is therefore considered the major contaminant of concern.

Exposure to these contaminants is almost non-existent at the present time, since well 1-1 has been taken out of service and the pumpage to waste discharges from a pipe beneath the surface of the Susquehanna River. Possible exposure routes and receptors could change, however, with implementation of various remedial alternatives. These potential exposures have been analyzed in the risk assessment performed for this site and will be discussed in the alternatives evaluation.

ENFORCEMENT

No negotiations with potentially responsible parties (PRP) have been conducted up to the present time. Information request letters were sent out in May, 1986, to two companies in the Stage Road industrial park; namely, Chenango Industries and Neil Guiles Asphalt Company. The latter presently leases its property from O'Brian Oil and Supply, who will also be receiving an information request in the near future.

Enforcement efforts have been hampered by the lack of obvious sources of contamination. The RI/FS has succeeded in determining the two most likely locations where contamination entered the groundwater; therefore, enforcement activity is now expected to increase as a result. The supplemental RI/FS which will further investigate suspected source areas will be designed to facilitate this enforcement effort.

The Town of Vestal has also initiated a claim against Chenango Industries pursuant to Section 112 of CERCLA for loss of well 1-1.

ALTERNATIVES EVALUATION

The public health and environmental objectives of the RI/FS were as follows:

- Contain the plume of contamination to mitigate further contamination of public water supplies;
- Provide a safe, reliable water supply to the Town of Vestal; and
- Ensure that the quality and best use of the Susquehanna River are not impaired.

The objective of the proposed supplemental source control RI/FS will be to determine which, if any, source control measures would be feasible and cost effective.

Initial Screening of Alternatives

General remedial technologies that were initially considered in the feasibility study were a variety of contaminant source controls, groundwater decontamination methods and alternative drinking water supplies (table 2). Since a supplemental source control RI/FS will be performed in the near future, source control technologies were eliminated from further consideration at the present time.

Feasible remedial technologies were further developed into an array of ten alternatives (table 3) which were then subjected to a preliminary screening based on environmental, public health and cost criteria. All of the alternatives were considered to meet or exceed applicable or relevant and appropriate standards as measured at the water supply well. An off-site disposal alternative will be developed as part of the supplemental RI/FS, since source control technology might involve off-site disposal of contaminated soils.

The preliminary screening of alternatives resulted in the elimination of six alternatives. Installation of extraction (interceptor) wells was eliminated based on technical problems in modeling the complex subsurface hydrogeology, with no guarantee that extraction wells in combination with well 1-1 would effect aquifer clean-up significantly faster than the continuation of pumping well 1-1 alone. At the present time, it is estimated that continued pumping of well 1-1 will cleanse the aquifer in 20+ years. Also, there would be significantly higher costs to implement an extraction well alternative, with minimal benefits gained through its implementation.

Provision of a supplemental water supply from either Johnson City or Binghamton was eliminated because they would be an order of magnitude higher in cost with no additional environmental benefits.

Installation of a new water supply well was eliminated due to the uncertainty in siting a new well. There is no guarantee that it would not encounter similar problems to those of wells 1-1 and 1-3.

The use of granular activated carbon to remove volatile organics from well 1-1, either alone or in conjunction with a packed column air stripper, was removed from further consideration because of higher costs and greater difficulty of operation and maintenance. At the present time, the environmental benefits of air stripping with activated carbon over air stripping alone are questionable; however, if the detailed design phase of this project indicates a possibility of unreliable performance of the packed column air stripper in achieving design standards, then the use of activated carbon with air stripping will be re-examined at that time. At a minimum, the packed column air stripper will be designed with the capability of future addition of an activated carbon system should the Town of Vestal eventually decide to implement additional treatment.

Detailed Analysis of Alternatives

The initial screening, therefore, refined the list of remedial alternatives to the following:

- No action;
- Air stripping of well 1-1 as a primary water supply;
- Air stripping of well 1-1 as a secondary water supply; and
- Provision of supplemental water supply from District 5.

A detailed analysis of these alternatives was then performed, consistent with 40 CFR Part 300.68(i). The detailed analysis of each alternative included refinement and specification of alternatives in detail, with emphasis on use of established technology; detailed cost estimation, including operation and maintenance costs, and distribution of costs over time; evaluation in terms of engineering implementation, reliability, and constructability; assessment of the extent to which the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of, public health; and an analysis of any adverse environmental impacts.

Applicable or relevant and appropriate standards for this site include this Agency's Maximum Contaminant Levels (MCLs), which have been proposed pursuant to the Safe Drinking Water Act, and New York State's groundwater quality standards established pursuant to the Clean Water Act. The applicable proposed MCLs are for trichloroethylene (5 ug/l) and 1,1,1-trichloroethane (200 ug/l). The applicable State standard is for trichloroethylene (10 ug/l).

Complete costs associated with the alternatives are presented in table 4. A summary of the alternatives evaluation follows.

No Action

The no action alternative is the continuation of the present situation, which involves pumping well 1-1 to waste into the Susquehanna River and using well 1-2 as the primary District 1 water supply, with well 1-3 acting as reserve capacity.

This alternative has been proven to be technically feasible and effective since it has already been implemented and has been reliable over six years in terms of controlling the migration of the contaminant plume. Operation and maintenance (O&M) is straightforward and approximates the normal operation of a water supply well. This alternative also provides a source of drinking water, i.e. well 1-2, whose water quality exceeds applicable or relevant and appropriate standards. However, the long-term reliability of using well 1-2 with 1-3 as reserve capacity is questionable because of the limited options available in the event of mechanical failure or future contamination of well 1-2. Also, this alternative includes the continued discharge to the Susquehanna River of low levels of volatile organic chemicals (VOCs) which, although not expected to create a significant adverse environmental impact, is nevertheless a negative feature of this alternative.

The present worth costs of the no action alternative are the least of the four alternatives, although the costs of all four alternatives are very similar and are not expected to play a significant role in selection of a remedial alternative.

<u>Air Stripping as Primary Water Supply</u>

This alternative involves the installation of an air stripping column approximately 40 feet in height (figure 7) near well 1-1, combined with retrofitting of the well's pump for the desired flow rate and discharge pressure. To provide stripping air to the column, a blower would be installed with the column. A wet well and new effluent pump would be provided to pump the treated water into the water supply distribution system. The present discharge of well 1-1 into the Susquehanna River would therefore be eliminated. Preliminary design calculations were based on maximum expected influent VOC concentrations of approximately twice the maximum levels of contaminants found in the last three years. To provide flexibility in the unlikely event that VOC levels should rise above design levels, the column would be designed so that either the column height could be increased or activated carbon technology could be added as secondary treatment.

The technical feasibility and effectiveness of a properly designed packed column air stripper is well documented for volatile organic contaminants. O&M is not complicated, and actual construction would be relatively easy and rapid. Since well 1-1 would continue to be pumped as it is under the no action alternative, the plume of contamination would still be effectively controlled. The effluent from the stripper would provide capacity for the average daily demand of District 1, with well 1-2 used as reserve capacity. The air stripper will be designed to achieve an effluent limit which will approximate the level associated with a 10^{-6} increase in cancer due to chronic trichloroethylene exposure. The system will also be capable of achieving an effluent limit of less than 1 ug/l for trichloroethylene, which is considered the detection limit. Therefore, this alternative will exceed applicable or appropriate and relevant standards, providing a very high level of public health protection with no significant increase in cost. The long-term reliability of District 1's water supply will also be returned to the level that existed prior to contamination of well 1-1.

Emissions from the air stripper will consist of extremely low levels of chlorinated hydrocarbons which will pose no chronic or sub-chronic health threats to downfield receptors. Any potential impacts to the biota of the Susquehanna River will also be eliminated.

The present worth costs of this alternative are slightly greater than the no action alternative, but less than the other alternatives that survived preliminary screening.

<u>Air Stripping as Secondary Water Supply</u>

This alternative involves the same air stripping technology, design criteria and operation and maintenance as the previously discussed alternative. It would differ primarily in that well 1-1 would supplement well 1-2 as reserve capacity and would function as a primary water supply only in the event of a shutdown of well 1-2. At times when well 1-1 was being pumped to the distribution system, it would first be treated by the packed tower aeration system. At other times, well 1-1 would be pumped to the Susquehanna River without treatment.

The technical feasibility and effectiveness of this alternative do not vary from the previous one. The reliability of the system in exceeding applicable or appropriate and relevant standards is slightly greater, since the treated water from well 1-1 would only be used occasionally, and at those times it would be blended with uncontaminated water from well 1-2. However, reliability of air stripping technology is high enough so that this advantage is considered minor.

Periodic untreated discharge of well 1-1 into the Susquehanna River might have minimal adverse environmental impacts. Emissions from the air stripper would be similar to those associated with the previous alternative, but on an intermittent basis.

This alternative is greater in present worth costs than the operation of well 1-1 as a primary water supply due to the additional power costs associated with periodic pumping to waste of well 1-1.

Supplemental Water Supply From District 5

Under this alternative, well 5-1 would be retrofitted with a pumping capacity of 1 MGD, and Districts 1 and 5 would be interconnected with an additional transmission pipe to make one district. Wells 1-2 and 5-1 would then act as backup to each other with each having the capacity (1 MGD) to supply the current peak demand of both districts. A new 10-inch diameter transmission pipe would be installed between Districts 1 and 5 (figure 8) to supplement the existing connection. The new pipe would be sized to carry approximately 500 gpm, while the existing pipe carries approximately 200 gpm. The exact pipeline route would be determined during the design phase in addition to a more detailed evaluation of the pressure differentials and water usage. Well 1-1 would continue to be pumped to waste into the Susquehanna River.

The technical feasibility and effectiveness of this alternative is virtually guaranteed. O&M would be straightforward and would approximate the normal operation of a water supply well. In addition, it would provide a high degree of long-term reliability for District 1's water needs. However, this reliability is contingent upon well 5-1, presently untreated, continuing to produce high quality water. This alternative would also take somewhat longer to implement than the air stripping alternatives, and would involve temporary construction impacts along the pipeline route, which would mostly traverse previously disturbed rights-of-ways. Untreated discharge of well 1-1 into the Susquehanna River would continue under this alternative, which would not be expected to create a significant adverse environmental impact.

This is the most expensive of the four alternatives in terms of total present worth.

RECOMMENDED ALTERNATIVE

The appropriate extent of remedy shall be determined by EPA's selection of a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of public health and welfare and the environment. This will normally require selection of a remedy that attains or exceeds applicable or relevant and appropriate federal and state public health and environmental requirements that have been identified for the site.

Each of the alternatives selected for detailed evaluation is considered an appropriate extent of remedy within the above definition. Based on meetings with New York State, its consultants, the Town of Vestal and the public on the RI/FS, it is recommended that air stripping of well 1-1 with subsequent distribution of the treated water as District 1's primary water supply be selected as the remedial action for this project. Detailed capital cost estimates for the recommended alternative are given in table 5.

This alternative is only slightly higher in cost than the lowest cost alternative i.e. no action, yet provides greater reliability and flexibility for the District 1 water supply by means of the restoration of District 1's water supply to full capacity, discontinues the present untreated discharge of well 1-1 to the Susquehanna River, and has a wide measure of Town and public support.

COMMUNITY RELATIONS

Community perception of the Vestal well 1-1 contamination problem has been an important factor in placing this site on the Superfund National Priorities List. Chlorinated solvents were discovered in water from well 1-1 in April 1980. In response to several groundwater contamination problems in Vestal, the Purity of Waters Committee was set up. Numerous public meetings were held to discuss the issue and a large measure of public concern was expressed. Considerable local press regarding the issue contributed to public awareness. Since the NPL listing in December 1982, public concern has subsided, and the townspeople have been generally satisfied that appropriate action is being taken and that no contaminated water is being consumed. However, there is still concern regarding the potential spread of contamination. In order to avoid additional public concern, the Vestal Town Board adopted a 1 ug/l cleanup criterion for any single VOC prior to putting well 1-1 back on/line. The selected alternative will be capable of achieving that criterion.

Specific concerns that were raised during the public comment period, including comments made at the public meeting held on June 10, 1986, at Town Hall in Vestal (figure 9), are answered in the Responsiveness Summary.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

At the present time, there are no federal environmental laws other than the Safe Drinking Water Act which are applicable to implementing the selected remedial action at this site.

Trichloroethylene has been chosen by EPA for evaluation and possible future regulation pursuant to the Clean Air Act's National Emission Standards for Hazardous Air Pollutants (NESHAP). However, such regulation will likely not be promulgated for 1-2 years. At the present time, EPA believes that the risk assessment performed for the operation of the packed column air stripper has sufficiently demonstrated the extremely low risk associated with the predicted level of air emissions on likely receptor areas, using worst case assumptions throughout the analysis.

FUTURE ACTIONS

A second operable unit consisting of source control remedial measures may be implemented following the supplemental RI/FS and issuance of a subsequent EPA Record of Decision. Source control measures may be a cost-effective means of expediting the treatment of the contaminated groundwater.

OPERATION AND MAINTENANCE

Preliminary cost estimates for the O&M of the packed column air stripper are given in table 6.

A detailed description and schedule of O&M procedures, including such activities as instrument readings, influent/effluent sampling, equipment inspections, and maintenance of a spare parts inventory will be developed as part of the design phase of the project.

Once CERCLA trust fund eligibility for O&M costs expires, O&M costs will then be borne by either the Town of Vestal or the State of New York or both.

SCHEDULE

Record of Decision 6/30/86

Initiate Negotiations with PRP's 7/86

Negotiations Successful*	Negotiations Unsuccessful**	
Sign Administrative Order on Consent	Amend Cooperative Agreement	9/86
	Select Contractor	12/86
Design	Approve Contract and Initiate Design	8/87
	Initiate Construction	12/87
Construction	Complete Construction	6/88

*Subsequent activity dates are subject to length of negotiations.
**Assumes State lead on design and the availability of funds in September, 1986.

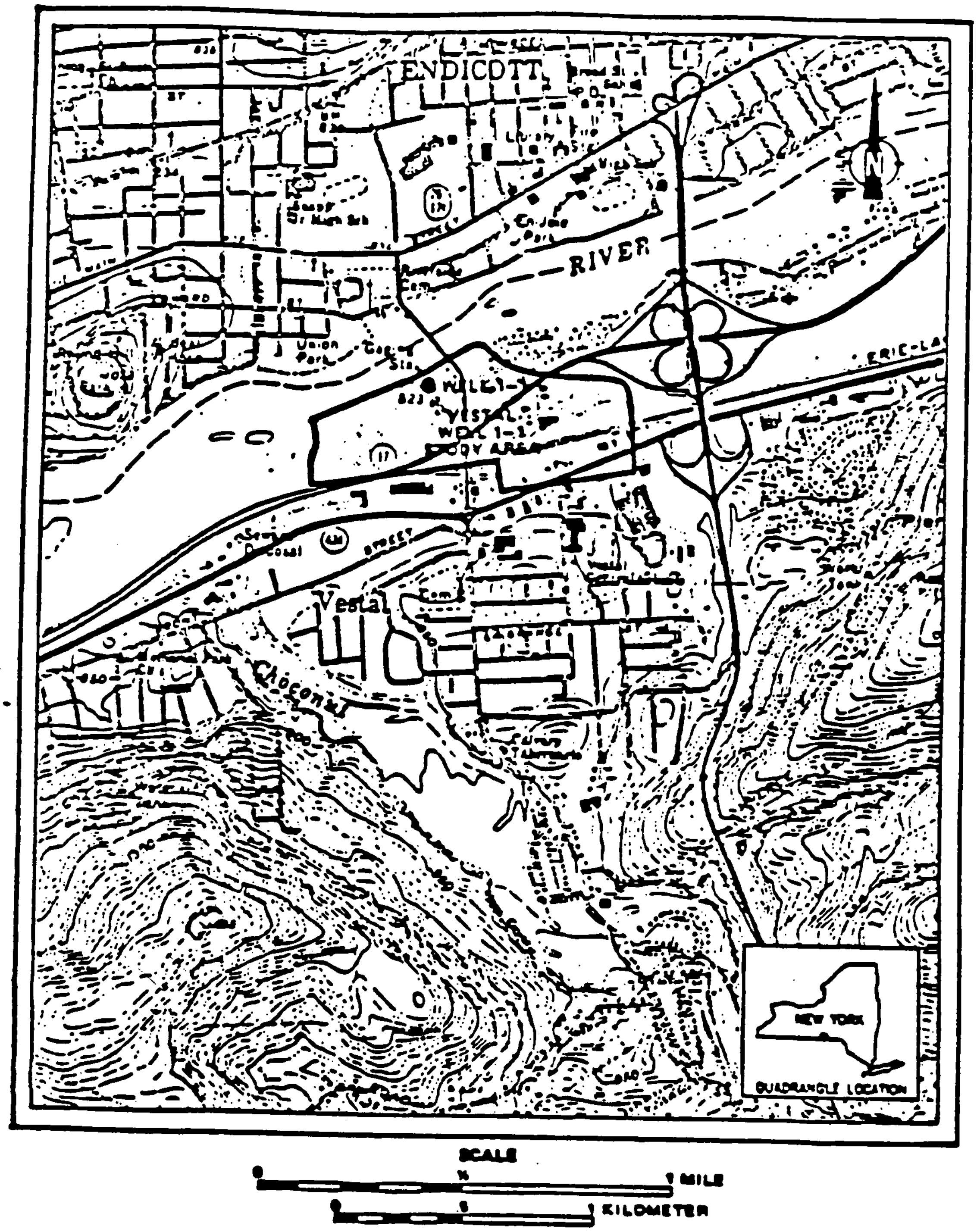


Figure 1 WELL 1–1 SITE STUDY AREA

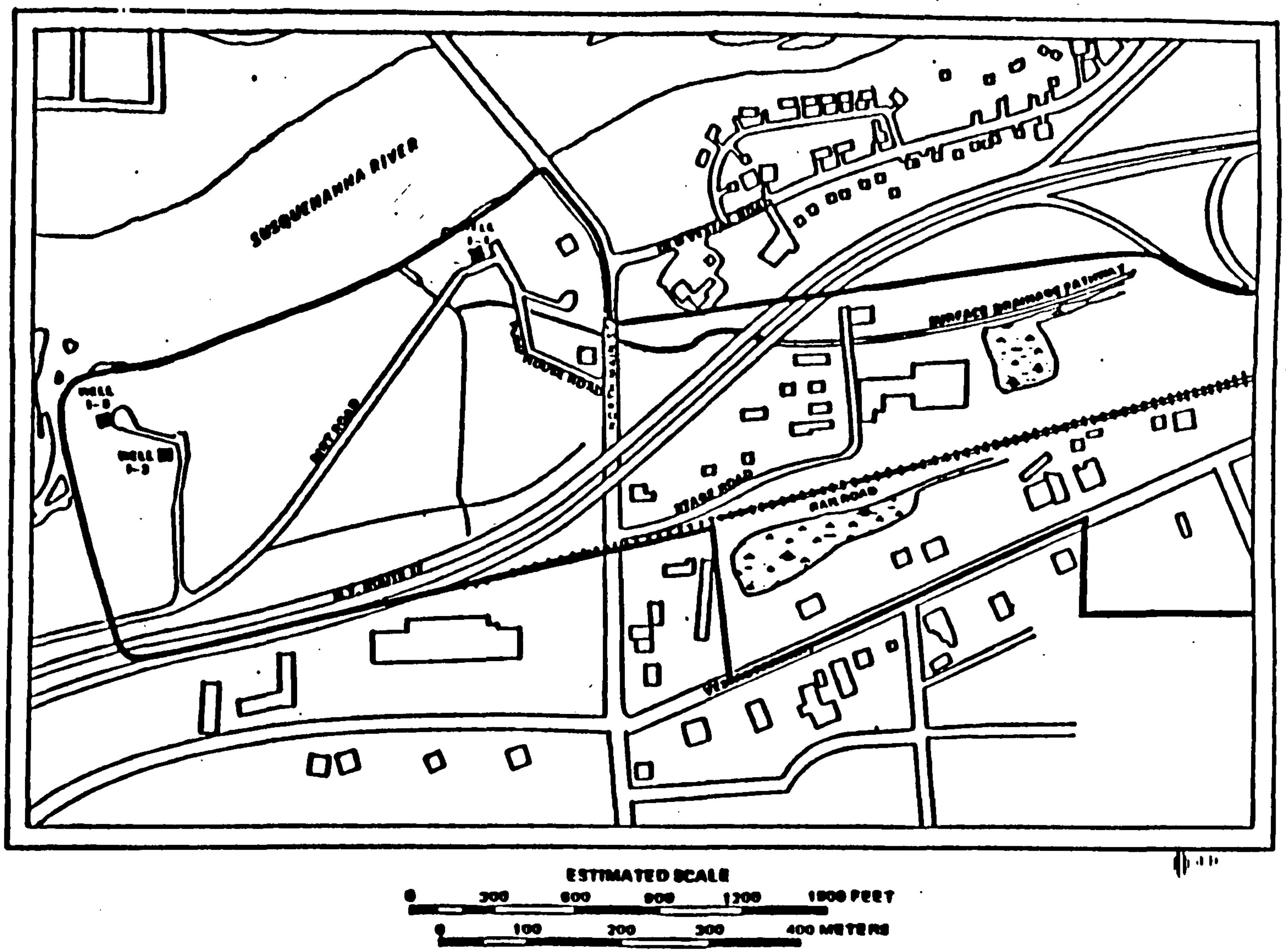


Figure 2 VESTAL WELL 1–1 STUDY AREA AND ENVIRONS

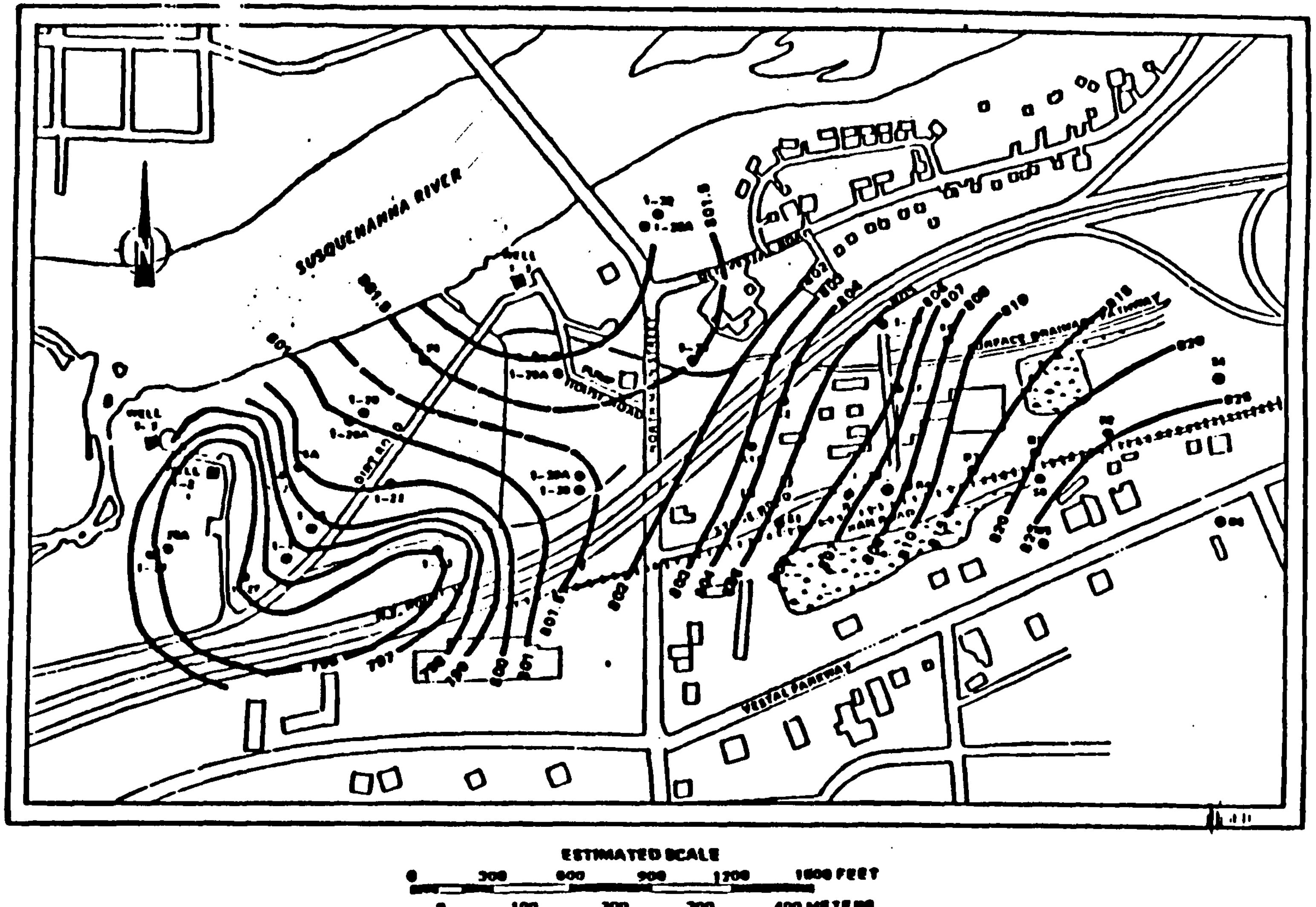


Figure 3 WATER TABLE CONTOUR MAP, APRIL 1985

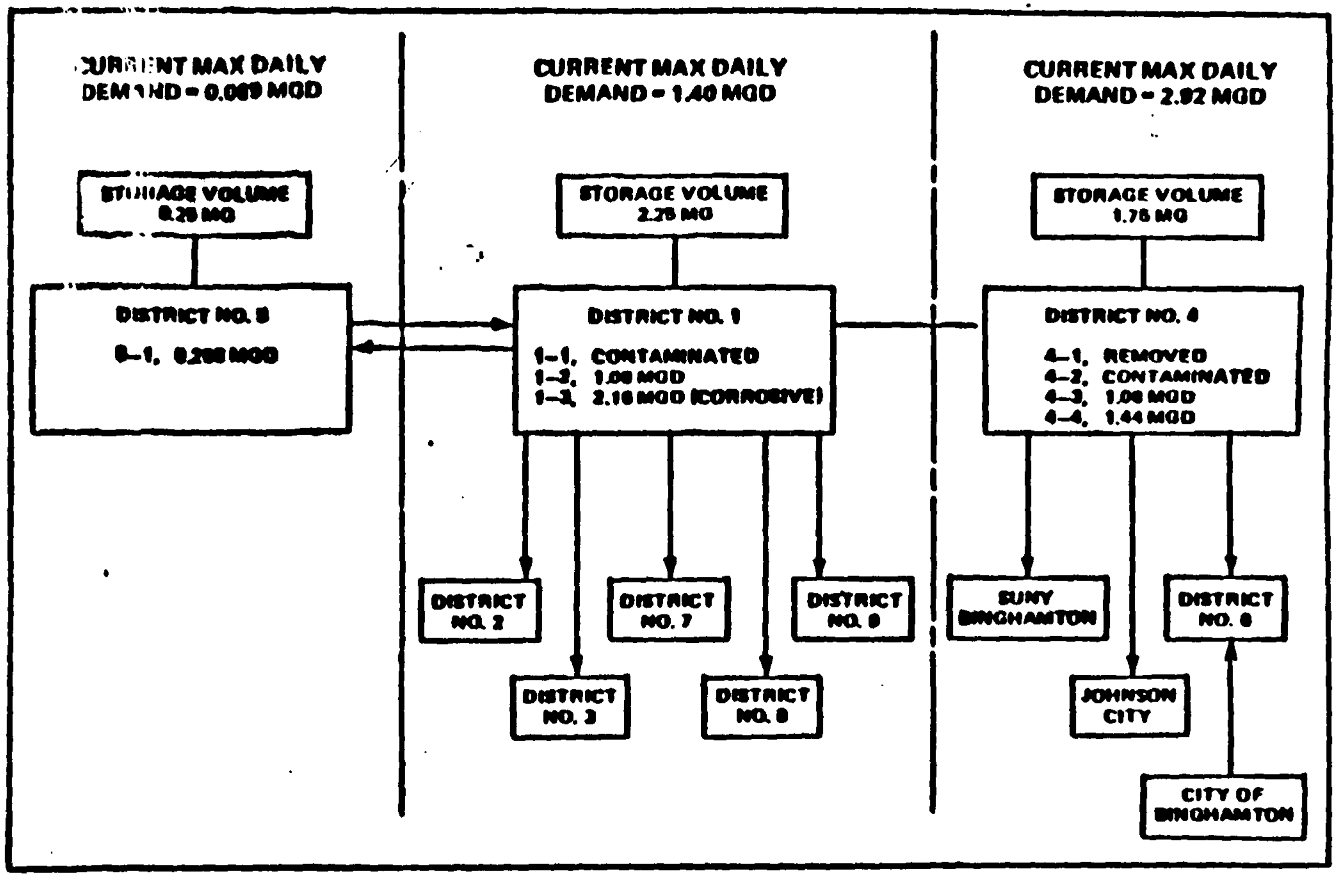


Figure TOWN OF VESTAL WATER DISTRICT INTERCONNECTIONS

Table 4

WELL 1-1 HISTORICAL VOC LEVELS

ug/l

Date	1,1,1-Trichloro-ethane	TCE	1,1,-Dichloro-ethane	1,2-Trans-Dichloro-ethylene
06-16-80	1,400/1,500	130/390	—	—
06-27-80	1,600	470	—	—
07-02-80	13	5	—	—
02-18-81	420	150	—	—
09-18-81	44	22	—	—
10-22-81	260	86	81	—
11-04-81	188	108	—	—
01-13-82	135	94	—	—
02-15-82	198	168	—	—
04-13-82	68	67	—	—
05-10-82	—	—	—	—
05-11-82	145	93	—	—
06-15-82	156	11	—	—
05-24-83	145	75	—	—
08-13-84	280	170	150	—
09-09-84	140	69	—	—
Remedial Investigation 04-24-85	47	60	71	58

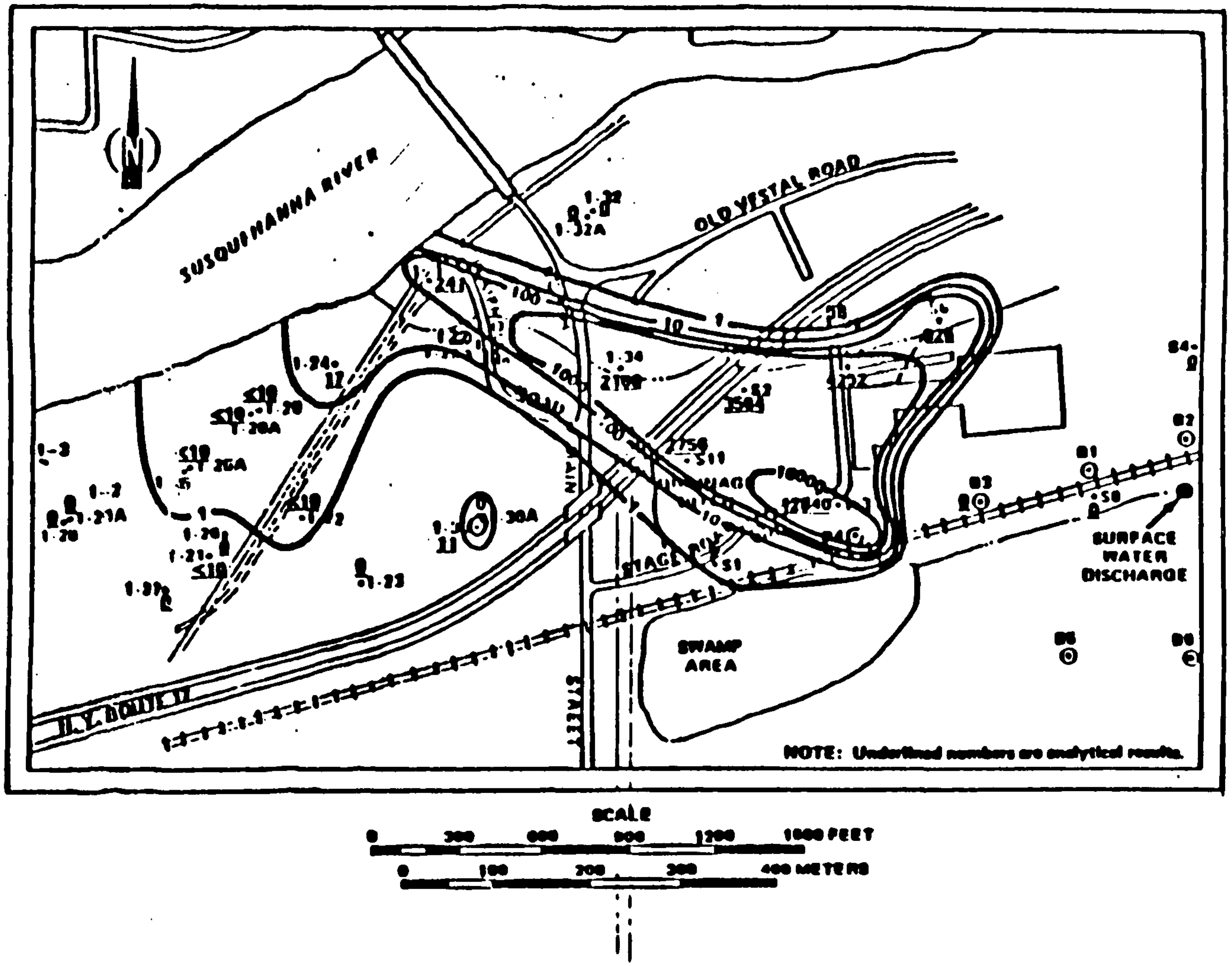


Figure 5 AREAL EXTENT OF GROUNDWATER CONTAMINATION – TOTAL VOLATILE ORGANICS (ppb)

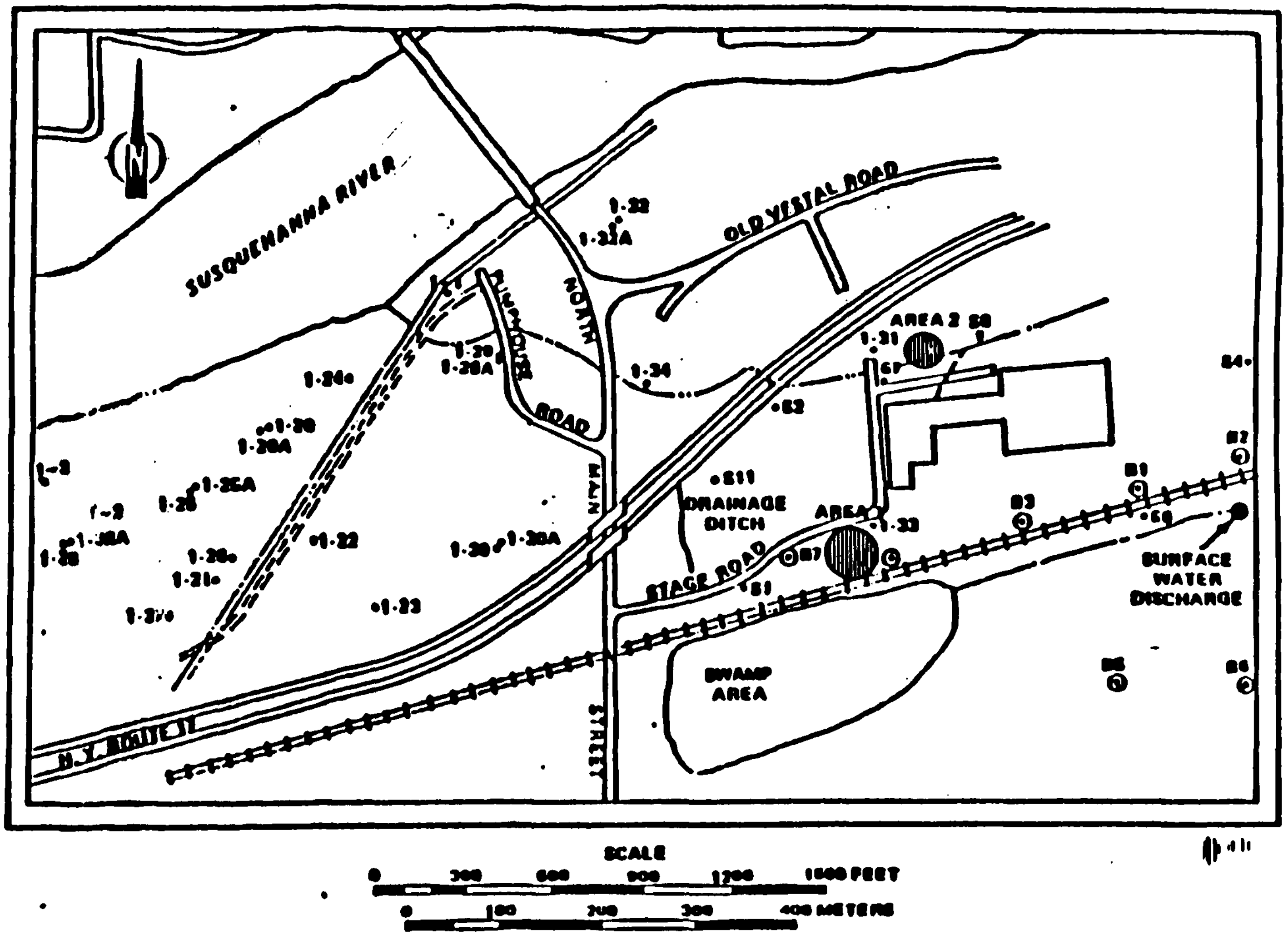


Figure 6 LOCATIONS OF SURFACE DISCHARGES APPARENTLY RESULTING IN GROUNDWATER CONTAMINATION

Table
2
GENERAL RESPONSE ACTIONS AND
ASSOCIATED REMEDIAL TECHNOLOGIES

<u>Contaminant Source Control Methods</u>

- Install groundwater cut-off walls
- Source elimination

<u>Groundwater Decontamination Methods</u>

- Install an interceptor well
- Continue to pump Well 1-1 to waste (No action)
- Treat Well 1-1
- Treat the source

<u>Alternative Drinking Water Supplies</u>

- Treat Well 1-3
- Water supply from District No. 5
- Water supply from Johnson City
- Water supply from Binghamton
- Install a new water supply well in Water District No. 1

Table
3
WATER DISTRICT NO. 1 OPERATING CHARACTERISTICS

Alternative	Water Supply Sources in Operation					
	Well 1-1 to Waste	Well 1-1 to Distribution	Well 1-2 to Distribution	Well 1-3 to Distribution	Extraction Well to Waste	Supplemental Water Supply
No Action	X		X	Y		
Air Stripping Well 1-1*	X	Y	X			
Air Stripping Well 1-1**		X	Y			
GAC Adsorption Well 1-1	X	Y	X			
Combined Air Stripping/GAC Adsorption Well 1-1	X	Y	X			
Air Stripping Extraction Well and Well 1-1	X	Y	X		X	
Water Supply from District No. 5	X		X			Y
Water Supply from Johnson City	X		X			Y
Water Supply from Binghamton	X		X			Y
New Water Supply Well	X		X			Y

Key: X = At full capacity.
Y = As supplemental supply.

*Using Well 1-2 as the primary supply and Well 1-1 as supplement.
**Using Well 1-1 as the primary supply and Well 1-2 as supplement.

Table
4
ESTIMATED COSTS FOR REMEDIAL ALTERNATIVES

Alternative	Capital Cost ($)	O & M Costs ($/yr)	Present Worth* of O & M Costs ($)	Total Present Worth ($)
No Action	0	160,500	1,513,000	1,513,000
Air Stripping Well 1-1**	389,400	158,200	1,491,300	1,880,700
Air Stripping Well 1-1†	389,400	119,750	1,128,900	1,518,300
Water Supply from District No. 5	426,300	155,600	1,466,800	1,893,100

*Present worth based on 30 years at 10% (P/A = 9.4269).
**Using Well 1-2 as the primary supply and Well 1-1 as supplement.
†Using Well 1-1 as the primary supply and Well 1-2 as supplement.

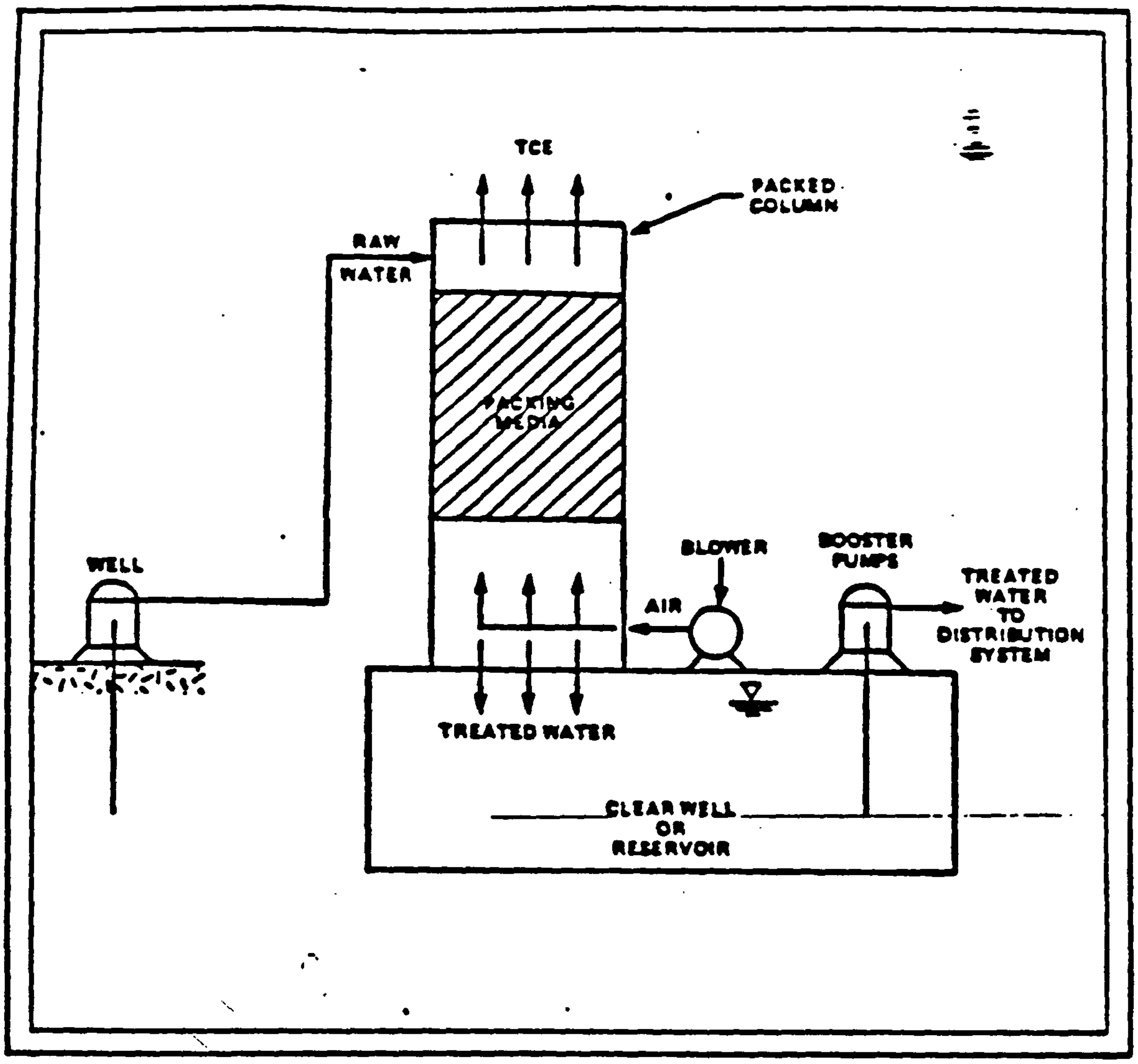


Figure 7 SCHEMATIC OF PACKED COLUMN AERATION PROCESS

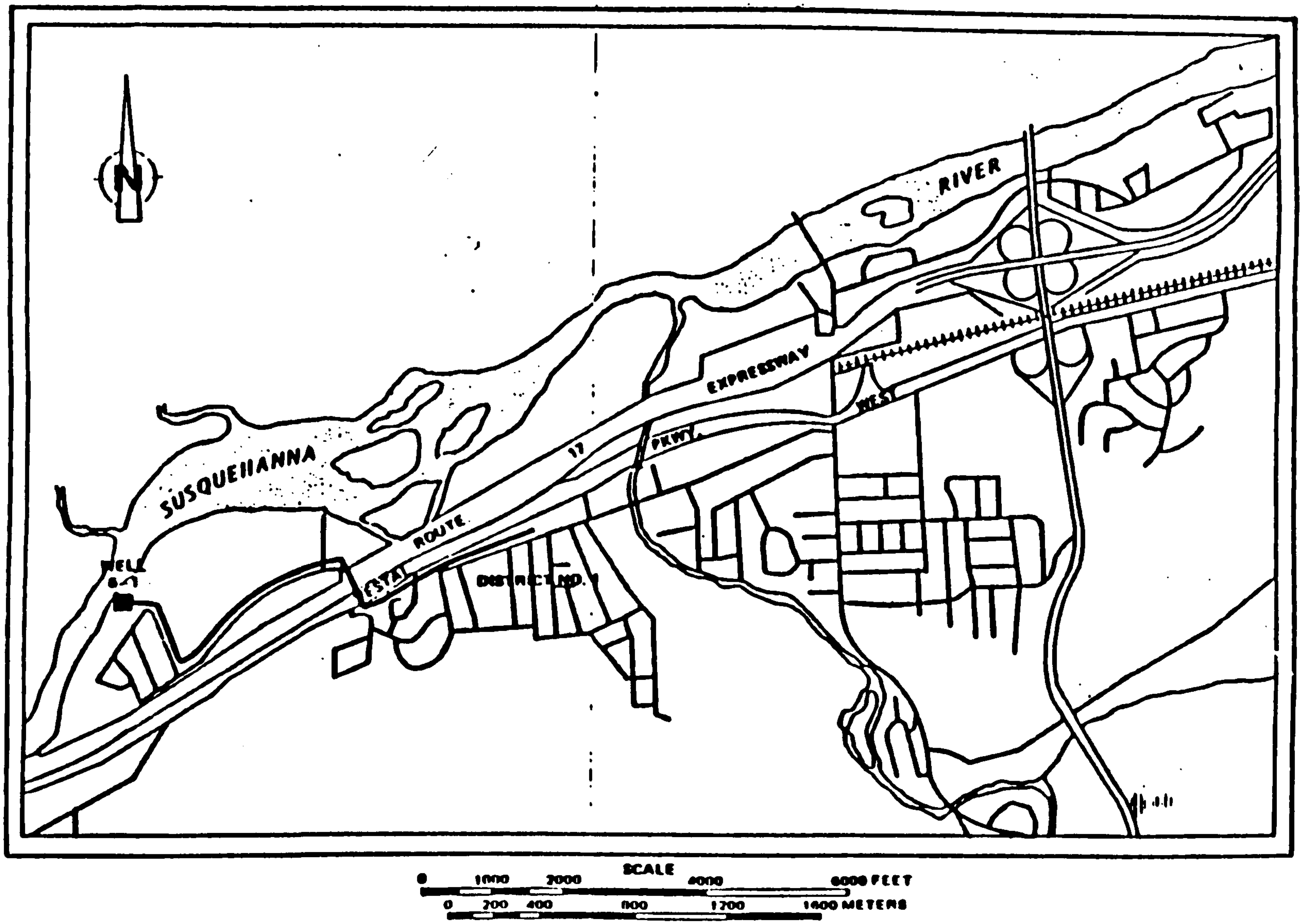


Figure 8 PROPOSED WATER SUPPLY TRANSMISSION MAIN FROM WELL 6–1 TO DISTRICT NO. 1

Table 6
ESTIMATED CAPITAL COST OF AIR STRIPPING WELL 1-1

Building Construction and Materials	$135,500
Equipment (Packed Column, Blowers, Pumps, Controls, etc.)	103,400
Instrumentation and Electrical	49,500
Subtotal	288,400
Engineering and Contingency @ 35%	101,000
Total	$389,400

Figure 9

PUBLIC MEETING

7:00 PM—June 10, 1986

TOWN HALL

Vestal Parkway West—Vestal, N.Y.

The New York State Department of Environmental Conservation (DEC) will be holding a public meeting to explain and discuss the remedial investigation and feasibility study (RI/FS) that was carried out to determine the source and extent of contamination that was identified in one of the town of Vestal's water supply wells. In 1980 volatile organic chemicals, primary trichloroethane (TCA), dichloroethylene (DCE), dichloroethane (DCA) and trichloroethylene (TCE) all common degreasers, were found in the town's water supply well 1-1 located between the end of pump house road and the Susquehana River, a little west of North Main Street. The well was taken out of service and not used to avoid introducing contaminants into the town's drinking water supply.

During the remedial investigation, Ecology & Environment, Inc., an engineering firm under contract to DEC, installed seven monitoring wells, seven soil borings, and collected samples of air, surface water, groundwater and soils for chemical analysis. It was found that contamination was primarily limited to groundwater in an area to the northwest of Stage Road. It was determined that the contamination was not migrating toward the town's two other municipal supply wells located to the west of well 1-1. Currently, the possibility of public contact with the contaminants is very limited. The town will, however, continue to monitor the water supply wells closely to insure that they remain uncontaminated.

In addition to the field investigation, a Feasibility Study was conducted to evaluate various remedial plans for containing the plume and ensuring a safe, adequate supply of drinking water for the Town of Vestal. Several plans capable of achieving these objectives were developed and are presented in a report entitled, "Remedial Investigation Report, Risk Assessment, and Feasibility Study for Water Supply Well 1-1 Site, Vestal, New York". The report is available for review in the Vestal Public Library and the Vestal Town Clerk's office.

During the next month these alternatives will be evaluated and one will be selected as the recommended alternative. You are encouraged to attend the public meeting, read the report and provide any input that may help to select the best alternative.

If you have any questions or need additional information please call Jeffrey Brandow P.E. at 518/457-5677 or call 1-800-342-9296 and leave a recorded message and we will get back to you.

Table
6
ESTIMATED O & M COSTS OF AIR STRIPPING WELL 1-1

Power*	$ 143,300**	$ 104,850†
Sampling	2,500	2,500
Labor	1,000	1,000
Maintenance Materials	11,400	11,400
	$ 158,200/yr	$ 119,750/yr
Present Worth††	$ 1,491,300	$1,128,900

*For blowers, heating, ventilation, lighting, and incremental costs for pumping water to top of column.
**Based on Well 1-1 as the supplemental supply (from Table 3-1).
†Based on Well 1-1 as the primary supply (from Table 3-1).
††Based on 30 years @ 10% (P/A = 9.4269).

APPENDIX 4

VESTAL WELL 1-1
VESTAL, NEW YORK

Monitoring Plan

Rev. 2, July 12, 1990
Morlando Construction Enterprises, Inc.
Joe Guarnieri, Project Manager

Table of Contents

Purpose of Monitoring Plan

The purpose of this monitoring plan for the Vestal Well 1-1 located at Pumphouse Road is to provide the Town of Vestal with sampling and analysis requirements of the untreated and treated water from it in order that a confirmation of potable quality according to the guidelines set forth in the New York State Sanitary Code, Part 5 can be made. It also outlines a program for ongoing collection of data from several existing monitoring wells about the site to provide a basis for determining changes in the contaminated groundwater plume over time.

The treatment objective for this facility is to reduce the level of each volatile organic contaminants to 1-2 PPB and the total organics to between 10 and 20 PPB in the finished water.

If at any time this objective is not met, modifications to the treatment system may be required as determined by the Bureau of Public Water Supply Protection of the New York State Department of Health.

Site Description - (see Fig. 1)

Well 1-1, a municipal water supply well, is contaminated with volatile organic compounds - primarily trichloroethylene (TCE) and 1,1,1-trichlorethane. Water samples are collected from Well 1-1 every 30 days by the Town of Vestal. Well samples taken in 1988 show the following contaminant concentrations;

73 PPB	Trichloroethene
7 PPB	1,1 Dichloroethene
63 PPB	1,1 Dichloroethane
190 PPB	1,1,1 Trichloroethane
75 PPB	trans-1,2-Dichloroethene

Rev. 2

These levels exceed NYSDEC TEC groundwater standards and Town of Vestal organic compound "non-detection" goals.

Drinking water for most of the western part of the Town of Vestal is supplied by District 1, which draws water from wells 1-1, 1-2, and 1-3. At present, Well 1-3 is the water source, Well 1-2 is used to supplement supply in periods of peak demand, and Well 1-1 is being pumped to waste in the Susquehanna River.

Well 1-2 now yields 500-700 gpms but pumps an appreciable amount of sand. Therefore, Well 1-2 is used as an emergency source only.

The three wells are on one aquifer, which is partly contaminated. The pumping of Well 1-1 to waste affects the contaminant plume that could otherwise contaminate Well 1-2 and 1-3.

Because Well 1-2 has a limited capacity, and the water in Well 1-3 is highly corrosive, it is important that contamination in the aquifer is contained and that Well 1-1 be reinstated to meet future peak demands in Water District 1 and other interconnected districts.

Monitoring Well Location - (see Fig. 2)

Ten monitoring wells are located east of Main Street to provide hydrogeologic groundwater quality data for the purpose of locating the source or sources of groundwater contamination. Of these Wells S-1, S-2, S-6, S-7, S-8, S-11, EB-1,EB-31, and EB-33 are cited to define the contaminant plume near suspected source areas.

Sixteen monitoring wells are located west of Main Street to be used for gathering hydrogeologic groundwater quality data. Among these are wells 1-22, 1-24, 1-29, and 1-29(a).

The total depths for the wells of interest are as follows:

S-1	25 FT
S-2	32 FT
S-6	41 FT
S-7	32 FT
S-8	25 FT
S-11	40 FT
EB-1	33 FT
EB-31	53 FT
EB-33	35 FT
1-22	132 FT
1-24	129 FT
1-29	119 FT
1-29(a)	64 FT

Groundwater Sampling Frequency

Groundwater should be sampled from each of the nine monitoring wells of interest east of Main Street once a year. The volatile contaminants of concern which constitute the basis of design of the Air Stripping Tower are: Rev. 2

- Trichloroethylene
- 1,1,1-Trichloroethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,2-Dichloroethylene Rev. 2
- Chloroform

Laboratory analysis protocols are to be in accordance with EPA methods 502.1 Volatile Halocarbons and 503.1 Volatile Aromatics.

Also, groundwater should be sampled once every six months for both dissolved and total concentrations of the following inorganics: Chromium, copper, lead, zinc, nickel and mercury at the following well locations; 1-22; 1-24; 1-29; 1-29(a); and EB-1 (see figure 2)

WATER SAMPLING FREQUENCY AT WELL 1-1

The following water sampling frequency should be implemented at Well 1-1 to insure reliability of the Air Stripping Technology.

Location	Frequency	Subject Analysis	
Well 1-1	once every three months**	volat. & inorganics*	Rev. 2
Clearwell	once per day-first week	volat.	
Clearwell	once per week-next month	volat.	
Clearwell	every 30 days	volat.	
Clearwell	once first week	See Note 3	
Clearwell	once next month	See Note 3	
Clearwell	once 90 days there after	See Note 3	

* Inorganics include chromium, copper, lead, zinc, nickel, and mercury. Volatiles are those included per EPA method 502.1 and 503.1 analyses. Rev.

** Noted frequency to be followed for at least the initial three years; thereafter determination of a different frequency may be made. Rev.

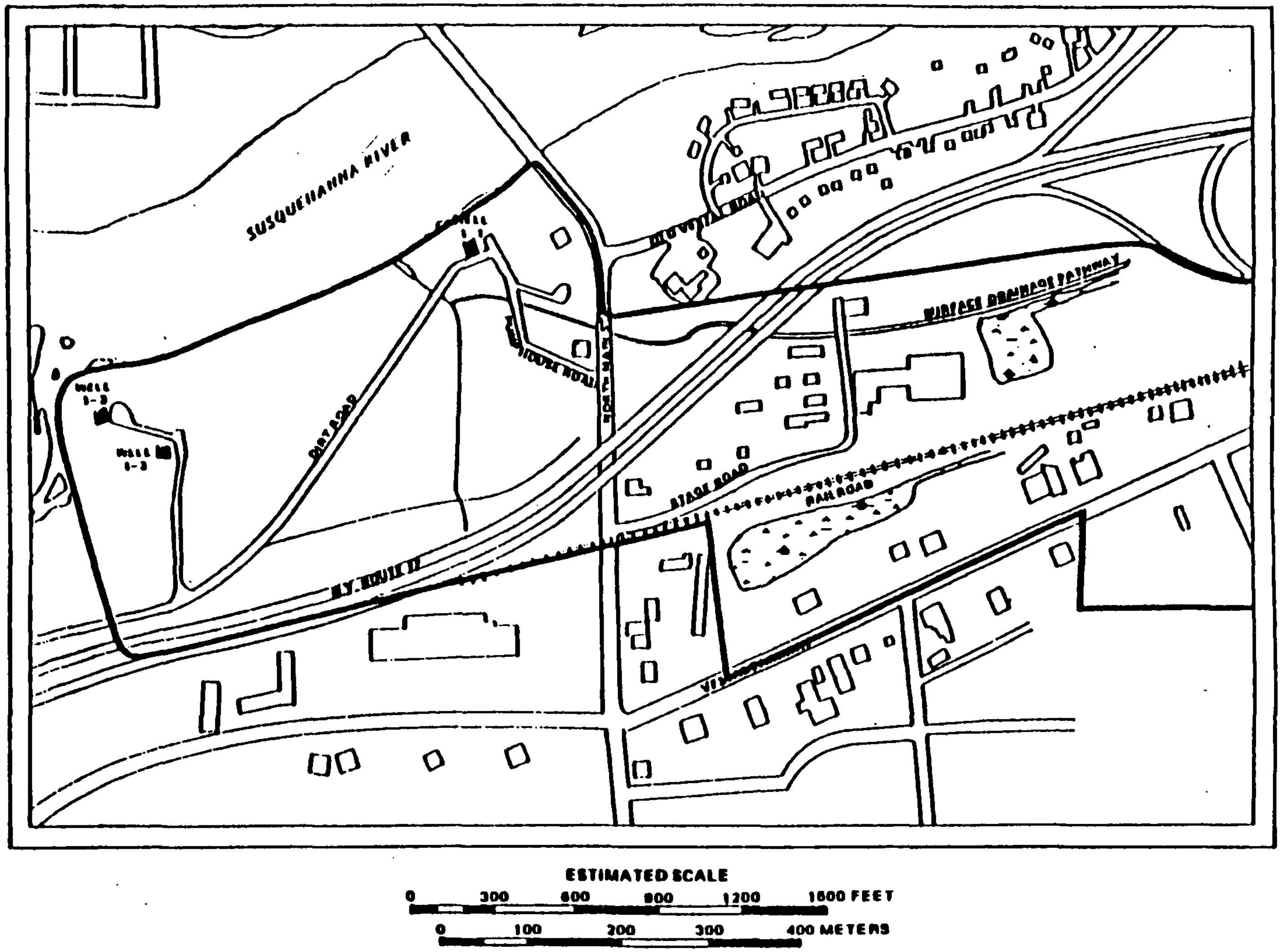
Note 1: Sampling of both raw and treated water shall be taken and analysis shall be conducted by a New York State approved lab in conformance with EPA method 502.1 Volatile Halocarbons and 503.1 Volatile Aromatics. Microbiological testing of raw and finished water samples are to be conducted monthly to determine if any biological growth is occurring within the tower. The results are to be submitted to the Broome County Health Department.

Note 2: The first physical sample of the clearwell commenced 2/19/90.

The first physical sample of Well 1-1 commenced 2/20/90

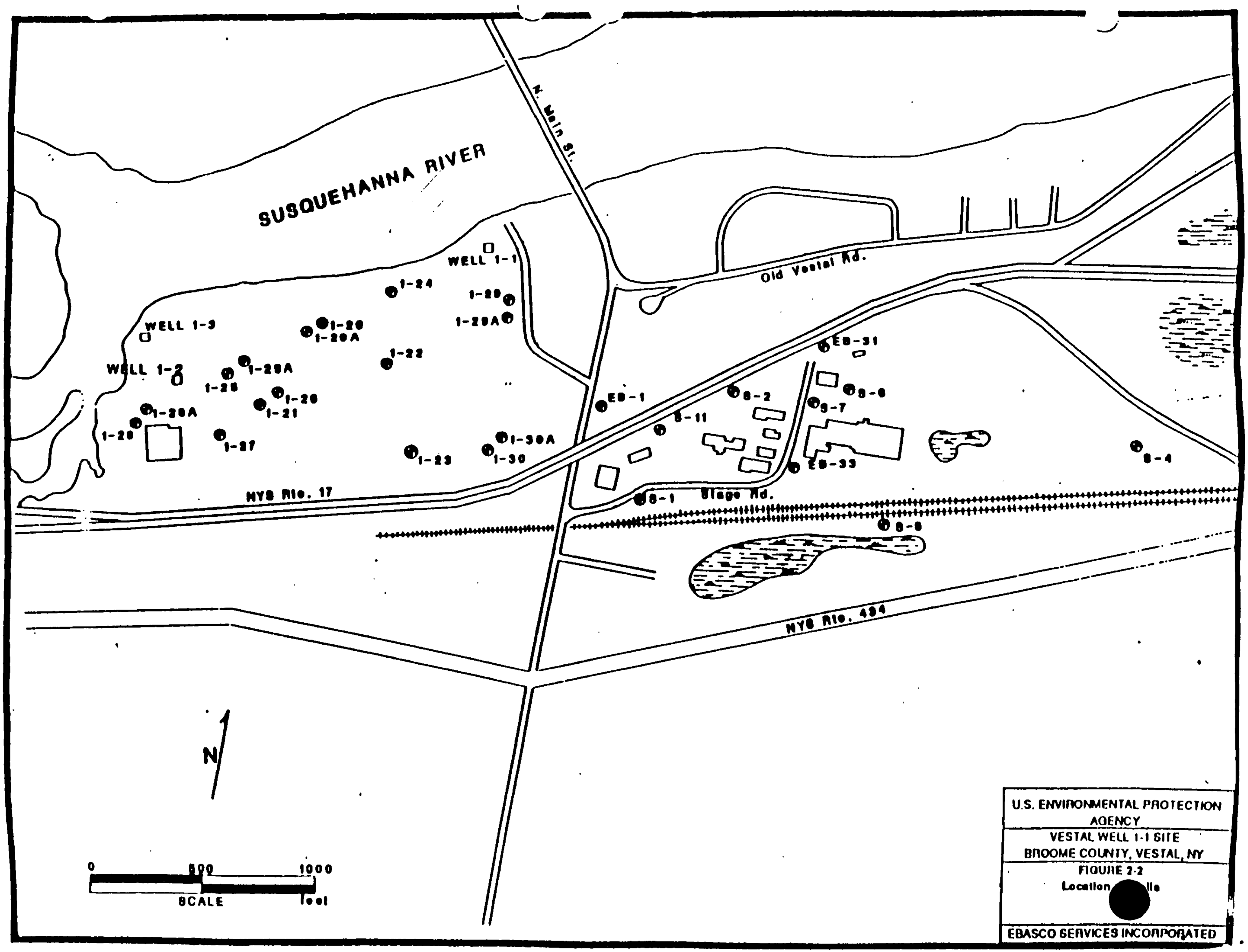
Note 3: Required analysis is per the full range of contaminants described in the New York State Sanitary Code, Subpart 5-1 of January 19, 1990.

Figure #1



VESTAL WELL 1–1 STUDY AREA AND ENVIRONS

Figure #2


SUSQUEHANNA RIVER
N. Main St.
Old Vestal Rd.
WELL 1-1
WELL 1-3
WELL 1-2
1-24
1-29
1-29A
1-28
1-28A
1-22
1-25A
1-25
1-26
1-21
1-20A
1-20
1-27
1-23
1-30A
1-30
NYS Rte. 17
EB-1
EB-31
S-2
S-6
S-7
S-11
EB-33
S-4
S-1
Stage Rd.
S-8
NYS Rte. 434
N
0
500
1000
SCALE
feet
U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
FIGURE 2-2
Location lls
EBASCO SERVICES INCORPORATED

APPENDIX 5

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

Thomas C. Jorling
Commissioner

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

SEP 2 4 1990

Dear Mr. Caspe:

Re: Vestal Water Supply Well 1-1, O.U. 2 Site - ID. No. 704009A
Vestal, Broome County, New York

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

1. In-situ vacuum extraction of volatile organic contamination from soil in source areas 2 and 4 within the Stage Road Industrial Park, followed by carbon adsorption, with subsequent treatment and disposal of contaminated carbon at a permitted off-site facility.

2. Monitoring program to evaluate the progress of the vacuum extraction remedy.

3. Monitoring program to periodically assess inorganic contaminants in the aquifer upgradient of Well 1-1 (the decision to implement a monitoring program for organic contamination was contained in EPA's June 27, 1986 ROD).

4. A contingency remedy involving treatment of inorganic contaminants to be implemented, if necessary, in the future.

As our staffs had agreed upon on September 11, 1990, the soil cleanup levels for both area 2 and area 4 will be: trichloroethylene, 140 µg/kg; 1,1,1 trichloroethane, 170 µg/kg; and 1,2 dichloroethylene, 188 µg/kg.

If you have any questions, please contact Mr. James Lister, of my staff, at (518) 457-3976.

Sincerely,

Edward O. Sullivan
Deputy Commissioner

cc: R. Tramontano, NYSDOH
D. Garbarini, USEPA, Region II
E. Als, USEPA, Region II

APPENDIX 6

RESPONSIVENESS SUMMARY

VESTAL WATER SUPPLY WELL NO. 1-1
Vestal, Broome County, N.Y.

The U.S. Environmental Protection Agency (EPA) originally scheduled a public comment period from May 18, 1990 through June 16, 1990 for interested parties to comment on EPA's final Remedial Investigation/Feasibility Study (RI/FS) and Proposed Plan for the Vestal Well No. 1-1 site. However, EPA honored requests from the Town of Vestal and Chenango Industries to extend the comment period through July 12, 1990.

EPA held a public meeting on May 31, 1990 at the Vestal Town Hall, located at 605 Vestal Parkway West, Vestal, N.Y. to describe the remedial alternatives and present EPA's Proposed Plan for cleaning up the Vestal Well No. 1-1 site.

A transcript of the meeting is part of the Administrative Record for the site and documents those questions addressed at the public meeting. Other comments received during the comment period, as well as those not addressed during the public meeting, are summarized and responded to in the responsiveness summary. All comments were considered prior to the selection of the remedy for the Vestal Well No. 1-1 site.

The comments have been summarized and organized into three major categories: **Proposed Plan; Remedial Investigation/Feasibility Study;** and **Public Health Evaluation.**

Proposed Plan

Comment: How will the financial obligation, including both capital and operation and maintenance costs, be achieved for the potable water remedy selected (particularly the contingency remedy)? What funding guarantees are there for a project of this magnitude? What impact will there be on the Town of Vestal should it be given responsibility for operation and maintenance?

Response: The contingency remedy selected as part of the potable water selected remedy is GW-2. The cost of the contingency remedy, in particular the operation and maintenance costs of the precipitation and clarification technology, is relatively expensive.

Capital costs for contingency remedy implementation would be funded by EPA (90%) and the State of N.Y. (10%), unless these costs are paid by a potentially responsible party. This funding is in the same proportion as for the selected soils remedy.

Assurance of the operation and maintenance of the remedy (after initial testing and start-up was complete) would be the responsibility of the State; however, should EPA determine that the remedy assists in restoring groundwater quality to a level that assures protection of public health, then the continued operation of the remedy for up to 10 years (or achievement of health-based levels in the aquifer, whichever comes first) could be considered remedy implementation, and therefore funded accordingly (90%-10%). This determination would be made by EPA at the time of contingency remedy construction. Potential impacts on the Town would depend on the agreement reached between the Town and New York State.

The amount of EPA funding for the contingency remedy, in the absence of an agreement with a potentially responsible party, would be based on determination of the remedial implementation period. The EPA cost share for capital costs associated with the contingency remedy is committed to by this Record of Decision, subject to the availability of federal funds at the time of contingency remedy design, and again at the time of contingency remedy construction.

The State's obligation to fund the contingency remedy, including the yet to be determined State cost share for long term operation and maintenance, would be contractually guaranteed by the execution of a Superfund State Contract. Such a contract presently exists for this site, but would have to be amended at a future date to include the contingency remedy, if the remedy becomes necessary. If the State elects not to fund its portion of the contingency remedy, whether through State or local contribution, then construction of the remedy would not proceed.

Comment: Exploration for a new water supply well should also be considered at this time as a possible alternative.

Response: In certain limited instances, EPA, pursuant to its responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") can assist in the arrangement of alternate water supply provisions. However, for long-term remedial actions e.g., Vestal 1-1, EPA's response actions are usually directed toward protection of public health and the environment through prevention/remediation of the uncontrolled release or spread of contamination into the environment, which may include ground and surface waters used for potable water purposes. EPA believes as a policy matter that planning, development and management of potable water supplies are generally the responsibility of state and local governments, and are outside the scope of Superfund long-term remedial goals.

An alternate water supply to replace Well 1-1 has not been considered a necessary response to the release of hazardous substances at this site. EPA's appropriate response, initiated at the time of the first operable unit, has been to ensure containment and continuous pumping of the plume of contamination, as well as to provide treatment of water from Well 1-1 to attain applicable water quality requirements. During the first operable unit FS, EPA considered two discharge receptors for treated water from Well 1-1; namely, the Susquehanna River, or potable water distribution. EPA's analysis of alternatives concluded that it was cost-effective and protective of public health and the environment to treat the pumpage to potable water standards so that Well 1-1 could be restored to service as a potable water supply.

In summary, EPA believes that the State of New York and, by extension, the Town of Vestal must generally plan, develop, and manage the Town's potable water resources. On the other hand, water resources affected by the release of hazardous substances at this site (most notably Well 1-1) are within the scope of EPA remedial goals.

Comment: The action levels which trigger the potable water contingency remedy should be set at Well 1-1, not some intermediate monitoring well.

Response: The selected remedy under this Record of Decision documents the criteria for implementation of contingency remedy GW-2 at Well 1-1. There are two basic criteria; namely, the exceedance of selected baseline levels of inorganics at any of 3 monitoring wells designated under the selected remedy for this purpose, and the exceedance of potable water supply criteria for inorganics at Well 1-1. The first criterion is intended to assist EPA's decision to initiate the contingency remedy selection process and subsequent design, and the second criterion is intended to trigger EPA's decision to construct the designed remedy. For additional details, including a description of selected baseline levels of inorganics, please see the SELECTED REMEDY portion of the Record of Decision.

In this way, EPA believes that the amount of time required to make the contingency remedy operational would be considerably shortened using the conservative criteria specified in the ROD, and the corresponding impact on the water resources of the Town of Vestal would be lessened.

Comment: If a need for treatment of inorganics arises in the future, the contingency remedy should be flexible enough to consider more than the two options presently considered under the contingency remedy.

Response: The contingency remedy, if required, will be alternative GW-2, as described in the SELECTED REMEDY portion of the Record of Decision. However, new technologies may be considered in the future should circumstances warrant their consideration.

Comment: The selection of in situ vapor extraction for source remediation is not necessarily supported by the FS, specifically the assumptions concerning the size of the mixing zone (for the soil to groundwater model). The selected source remedy for Area 4 should be no action, while the selected source remedy for area 2 should be either no action or capping.

Response: There are numerous assumptions inherent in all groundwater models; however, EPA believes that the current model provides a reasonable scenario for predicting fate and transport of contaminants from the vadose zone to a groundwater receptor.

Remedial Investigation/Feasibility Study

Comment: The Feasibility Study calculated overly conservative soil cleanup levels by limiting consideration of dilution effects, as well as by using an unjustified assumption concerning the amount of annual water infiltration from precipitation. The FS alternatives analysis is biased as a result.

Response: The calculations of soil cleanup levels in the Feasibility Study represented one of the recommended methodologies of developing soil cleanup levels based on theoretical groundwater exposures. In order to confirm the soil cleanup levels for this Record of Decision, EPA has employed additional modelling techniques which use similar and additional conservative assumptions. EPA believes these conservative assumptions are justifiable, particularly when employed in matters potentially affecting public health.

Comment: Source remediation efforts in Area 2 must begin prior to, or contemporaneously with, any remediation efforts in Area 4, since cleanup of Area 4 alone could not achieve EPA's objective of protecting groundwater and surface water from the continued release of contaminants from soils.

Response: It is EPA's intention to proceed with design and implementation of the soil remediation remedy in areas 2 and 4 concurrently. Moreover, the remediation of area 2 prior to area 4 is not believed to be a necessary sequence of remediation in order to achieve EPA's objectives.

Comment: The partial containment option was inappropriately screened from further consideration from the FS. This technology had been screened out of the FS based on the possibility of groundwater table fluctuations solubilizing groundwater contaminants, a hypothesis which was not supported by any of the site data.

Response: During the remedial investigation no site data was collected to specifically test the above hypothesis, so that a lack of supporting information is not unusual. The fluctuating water table hypothesis, while not fully supported by the site data, nevertheless remains a valid consideration.

Moreover, EPA believes that containment technology was appropriately screened out, based on its lack of effectiveness compared to other, more promising treatment technologies. EPA's consideration of effectiveness included the degree to which the various technologies reduced the toxicity, mobility, or volume of contaminants in two relatively small, discrete areas of contaminated soil. Capping would not reduce the toxicity or volume of contaminants, and there is a level of uncertainty as to reduction of mobility. Given the other treatment technologies that were considered effective and implementable at this site, EPA believed screening out the capping option would meet the intent of the National Contingency Plan, and also be consistent with the statutory bias under CERCLA for permanent remedies employing treatment as a principal element.

Comment: The discussion of the no action alternative fails to account for the remedial activity being conducted as part of Operable Unit 1.

Response: The no action alternative discussion in the FS does not specifically mention the operable unit one remediation i.e., air stripping facility at Well 1-1. However, EPA has conducted its decision-making at this site fully aware of the consequences of the first operable unit operation. In fact, EPA's Proposed Plan specifically mentioned the protection afforded by the remedial action implemented under operable unit one in the event of a no action Record of Decision for operable unit two. The Proposed Plan went on to indicate that one serious ramification of no action would be the prolonged degradation of the aquifer conceivably extending beyond the design life of the operable unit one facility, thereby requiring treatment at Well 1-1 far into the future.

Comment: The evaluation of in situ vapor extraction arbitrarily assumes that the exhaust gas from the vacuum pumps will require treatment prior to release, while such treatment is not being required at the air stripping facility installed at Well 1-1, nor is it being required in the soil tilling alternative.

Response: The only assumption that EPA made at the point of remedy proposal and subsequent selection in this regard is that all Federal and State applicable or relevant and appropriate requirements will be met (as stated in EPA's Proposed Plan). For costing purposes, the FS made further assumptions concerning the likelihood of air emission controls being required, based on the type of remedial technology being considered. These assumptions in no way represent a determination by EPA as to the need for such controls. A final determination of the need for air emission controls will be made during design.

Comment: The RI and FS data both support the conclusion that the groundwater contamination attributable to Area 4 has had little or no impact on Well 1-1. However, the RI report states that the groundwater contamination attributable to area 4 is at least partly responsible for the contamination at Well 1-1.

Response: The above two sentiments are not necessarily exclusive of each other. It is likely that the contribution of contaminants to Well 1-1 from area 2 is greater than the contribution from area 4. However, the magnitude of the difference in impacts to Well 1-1 is difficult to assess accurately. Moreover, soil cleanup levels were based on their contaminant contribution to the aquifer as measured at the boundary of the Stage Road Industrial Park, not at Well 1-1.

Comment: Given the sizes of Areas 1 through 4, the level of effort expended by Ebasco to select borehole locations was far greater than necessary. Surface soil sampling alone could have been effective in borehole location selection.

Response: The purpose of the geophysical survey, as outlined on page 2-1 of the RI report, was to locate the leach field north of the Chenango building and to locate buried storage tanks or other large metal objects on nearby properties. This information would therefore be useful in determining whether there were active sources of contamination, or just contaminated soils. This information could also have some bearing on where boreholes could be placed i.e., avoidance of underground containments. The surface soil samples assist in delineating areas whose surficial soils show evidence of contamination. Together, the two sets of information are important to preliminarily identify the nature and extent of subsurface contamination.

Comment: The RI report does not explain the methodology by which the surface soil sampling data was used to select boring locations, and does not provide a rationale for selecting soil boring samples for lab analysis.

Response: The explanation regarding the method by which the surface soil sampling data was used to select boring locations and the rationale for the selection of soil boring samples for lab analysis are presented in Sections 2.2 and 2.3 of the RI report (pages 2-2 to 2-6). Additional details were provided in the Field Operations Plan, which was part of the site workplan prepared in April, 1988.

Generally, boring locations were selected based on high screening results. However, alternate locations were selected if accessibility was a problem. A total of 36 boreholes were drilled using this approach. Samples collected from these borings were screened using a field gas chromatograph in order to minimize the number of samples sent for lab analysis. In general, borings with high VOC readings were selected. Additional samples were selected in Area 4 in order to cover the whole area. A total of 62 samples, including blanks and duplicates, from 24 borings were selected for lab analysis.

Comment: Only three new wells and two public water supply wells appear to be properly installed in the study area for the site.

Response: The wells installed by Ecology and Environment, inc. during the first operable unit i.e., S-1 through S-8, were constructed in accordance with EPA quality assurance protocols appropriate for this site, including the proper grade of stainless steel well casing and screens. These 8 wells, as well as the 3 additional wells installed by EPA during the second operable unit, are all considered by EPA to be first class groundwater monitoring wells. In addition, the three potable water wells in the area, 1-1, 1-2, and 1-3 were properly installed, although well 1-2 has experienced recent difficulties in achieving an effective yield. Although the wells associated with the R.J. Martin investigation ("1" series) were constructed of polyvinyl chloride (PVC), EPA believes that those wells which were not obstructed or otherwise defunct would provide acceptable data in order to confirm the moderate-to-high levels of organic compounds documented during the first operable unit RI.

Comment: An inconsistency regarding access to wells exists between the text on page 2-9 of the RI report and the data on table 2-1, concerning obstruction of the wells.

Response: The "inconsistency" noted was that, if certain wells (1-26 and 1-30) were obstructed, then how could water level measurements be reported for these wells. It is possible that a well which is damaged enough to preclude sample collection may still be amenable to water level measurements, which was the case for these two wells. Access to S-6, moreover, was initially denied, but the well was able to be sampled at a later date.

Comment: Since one of the two monitoring wells upgradient of Chenango Industries was obstructed, EPA should have replaced it, instead of using 1985 data from this well.

Response: The intent of the second operable unit was to delineate sources of site contamination, and to confirm the existing profile of groundwater contamination, including identification of any contaminants in the groundwater that might be incompatible with the first operable unit selected remedy. As such, the decision was made not to replace Well S-4 since, based on the earlier sampling, this well was outside the plume of contamination in an upgradient direction.

Comment: It appears that a mathematical error was made in the conversion of cm/min to ft/day and the values reported in Table 3-1 of the RI report should range from 16 to 35 feet/day.

Response: The comment is correct. There was a mathematical error in this conversion factor. Corrected values for Table 3-1 should read as follows:

AREA	SOIL BORINGS	DEPTH (ft)	HYDRAULIC CONDUCTIVITY (ft/day)
1	SB-107	12-14	30.7
2	SB-205	12-14	16.5
	SB-213	10-12	26.0
3	SB-310	14-16	23.6
	SB-316	16-18	28.3
	SB-322	16-18	35.4
4	SB-404	14-16	25.0
	SB-410	12-14	26.0
	SB-412	16-18	30.7
	SB-417	12-14	26.0

Comment: In Table 4-4 of the RI report, the total xylene concentrations at SB-115 (6-8 feet) is noted as 350U. Wasn't the detection level 5 (ppb)?

Response: The comment is correct. The total xylene concentration was 350 ppb.

Comment: Was the pesticide found in SB-206 at 4-6 feet dieldrin or 4,4'-DDE (text, figures and tables appear inconsistent)?

Response: The pesticide found was 4,4'-DDE, and not dieldrin as indicated in the text.

Comment: Were there four or six exceedances of nickel above background concentrations in Area 4 (text and figures appear inconsistent)?

Response: There were actually five exceedances of nickel above background concentrations in Area 4; however, the five exceedances were located within four boreholes. These exceedances were only marginally above the upper end of the background range. Figure 4-16 should also be corrected to add nickel (32.5 ppm) at borehole SB-409 (10-12').

Comment: On page 72 of the RI report, the compound trichloroethylene appears to be confused with trichloroethane in the comparison between the water quality of Wells EB-31 and S-7.

Response: The comment is correct. The sentence should be revised to read "did not contain any TCA which is the primary constituent of Well S-7".

Comment: On page 6-4, the RI report states that the maximum concentration of PCB's below source areas 2 and 4 exceeds the N.Y. State standard. However, there is no N.Y. State standard for PCBs in soil.

Response: The concentrations of PCBs, as well as the standards, referred to on page 6-4 are for groundwater.

Public Health Evaluation

Comment: The health-based cleanup levels for groundwater were calculated on the basis of a 10^{-6} risk level, instead of considering other values within the NCP risk range of 10^{-4} to 10^{-6}.

Response: Under the NCP, the 10^{-6} risk level is the point of departure for determining remediation goals when applicable or relevant and appropriate requirements do not exist or are not sufficiently protective. Therefore, it is entirely appropriate for the PHE to calculate theoretical groundwater cleanup levels based on the 10^{-6} risk level for EPA consideration. Further, EPA determined that effective management of the risks posed by contaminated groundwater at this site, as well as other site considerations, did not warrant groundwater remedial action at the present time, other than the groundwater remedial action being currently provided through implementation of the first operable unit.

Comment: The Superfund risk assessment guidance manual specifies the use of a residential exposure duration factor of 30 years adult exposure as the 90th percentile upper limit of the average time spent at one residence. The Public Health Evaluation's use of a nine year exposure duration and the assessment of the period from age 0-30 are not consistent with this guidance.

Response: The use of a nine year exposure duration from ages 0-9 was used for non-carcinogenic risk, and is an appropriate way to develop worst-case hazard indices. The use of a 30 year exposure duration averaged over a 75 year life span was used for carcinogenic risk. Both methods are consistent with the Risk Assessment Guidance for Superfund Human Health Evaluation Manual.

APPENDIX 7