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

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

bcc: E. Sullivan (2)
M. O'Toole (2)
C. Goddard
C. Branagh, RHWRE, Region 7
M. Chen/J. Lister/File

JBL/bsd
a:vestal.918

J. Lutz

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 is now treating Well 1-1 water prior to its distribution to Water District 1. 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 Date
Regional Administrator

Decision Summary

VESTAL WATER SUPPLY WELL NO. 1-1

VESTAL, BROOME COUNTY, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK

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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 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 is undergoing 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. This situation will change after the completion of start-up testing of the treatment facility at Well 1-1, at which time the treated water from this well will become available for public distribution.

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 parties considered potentially responsible for a release of contamination and for 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 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. At that time, Chenango Industries Inc. had met with EPA on the matter of 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 again to the three potentially responsible parties (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 potentially responsible party 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 conceivably could be selected as a future contingency remedy should EPA determine that it is needed.

SCOPE AND ROLE OF OPERABLE UNIT

EPA issued a Record of Decision (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 USEPA. The purpose of using these assumptions is to explore the potential for adverse health effects.

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.

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:

1. dermal absorption through direct contact with soil on the hands and arms;

2. incidental ingestion of soil as the worker eats, drinks, or smokes following contact with soil; and

3. inhalation of volatile chemicals from the 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 are presented below.

Dermal Exposure

The exposure assumptions used in determining the dermal contact exposure are present in table 2. It was assumed that a future on-site construction worker 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.

Incidental Ingestion

The exposure assumptions used in determining the incidental ingestion CDI are presented in table 3. The duration of exposure was assumed to be the same as given above for dermal absorption: 6 weeks, 5 days per week. It was assumed that a worker would be involved in a manual task which would result in soil contact with the hands and incidental ingestion of soils following eating or smoking.

Inhalation Exposure

In determining the inhalation exposure CDI, it was assumed that a future on-site construction worker potentially 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 he would inhale 7 m^3 and 20 m^3 of air (per day) for the average and reasonable maximum exposure scenarios. For the purpose of this analysis, 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.

EPA has implemented action under Superfund associated with total cancer risks ranging from 10^{-4} to 10^{-6} (i.e., the probability of one excess cancer is one in 10,000 or 1,000,000, respectively, under the conditions of exposure).

Noncarcinogenic risks were assessed using a hazard index (HI) computed from expected daily intake levels (subchronic and chronic) and 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. The conclusion should not be categorically drawn, however, that all hazard indices less than one are "acceptable" or that hazard indices of greater than one are "unacceptable."

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 are presented in table 4.

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. Table 5 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, including quantitative evaluation of the degree of risk associated with various exposure pathways, 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 PHE, 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 PHE 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 volatile organic chemicals 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 of the District 1 water supply wells.

In order to 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 (see **SELECTED REMEDY**), 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 standards 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 VOC's 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 VOC's developed by EPA for areas 2 and 4. These soil cleanup levels will also significantly reduce the hypothetical risk from human exposure to excavated soils.

The remedial action objectives for operable unit two 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)

- **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

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: 6 months

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 or 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 6)**. 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 Short-term Effectiveness

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 VOC's 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 Long-term Effectiveness And Permanence

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 Reduction Of Toxicity, Mobility, And Volume

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 6)

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 4).

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 willingness to negotiate performance of the selected remedy. 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 Short-term Effectiveness

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 Long-term Effectiveness And Permanence

Both **GW-2** and **GW-5** would be effective and permanent in the long term. However, **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 Reduction Of Toxicity, Mobility, And Volume

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 Implementability

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 Cost (table 6)

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 4).

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 willingness to negotiate performance of the selected remedy. 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

See table 7 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	
	AREA 2 7,850 sq. ft.	AREA 4 21,000 sq. ft.
Trichlorethylene	**400** ug/kg	**140** ug/kg
1,1,1-Trichloroethane	**484** ug/kg	**170** ug/kg
1,2-Dichloroethylene	**188** ug/kg	N/A

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. **The action levels were calculated using an EPA model which differed from that described in Appendix A of the FS. During the preliminary design of the SC-5 selected remedy, the results of this model will be calibrated and tested using existing and additional sampling data, as needed. Model inputs will subsequently be refined during this effort until EPA believes the model is sufficiently representative of contaminant transport at the site. The above action levels will then be confirmed. However, should these action levels require future modification based on model calibration and testing, and the modified action levels are significantly different than the present action levels, EPA will issue a notice that explains the significant difference, supplement the administrative record file to include any supporting information and, if necessary, propose an amendment to the ROD if the difference fundamentally alters the basic features of the selected remedy with respect to cost, performance, or scope.**

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. The treatability study design will also include a method and schedule of securing additional soil borings 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 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 discarded at a RCRA hazardous waste facility.

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 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. Therefore, 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. Additionally, should EPA determine at any time that achieving the selected action levels within area 2 or 4 is not likely to occur within the period of time estimated in the treatability study, then EPA will re-evaluate both the time needed to meet the selected action levels, as well as the remedial action objectives. If necessary, EPA will then require that additional remedial action be implemented.

The risk associated with the average case exposure to volatile organics from excavated soils in area 4, which was 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. However, since the reasonable maximum exposure case for the excavated soils exposure pathway resulted in risks greater than 10^{-4} for source areas 2, 3, and 4, EPA believes it is prudent to conduct 5 year reviews of the source remedial action selected in this Record of Decision.

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 additional 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 operable unit one 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 initial results of the selected 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. Examples of such constraints are: unavailability of federal or other funds, unwillingness of the State to accept O and M responsibility, etc.

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	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 groundwater so that 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

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	0.23	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

ASSUMPTIONS USED TO ESTIMATE DERMAL CONTACT EXPOSURE
VESTAL WELL 1-1 SITE

PARAMETER	VALUE	
	AVERAGE CASE	PLAUSIBLE MAXIMUM CASE
Contact rate, mg/d (a)	990	2970
Frequency of exposure, days/year	30	30
Duration of exposure, years	1	1
Dermal absorption factors, %		
Volatiles (b)	10	10
Phthalates (c)	0.3	3
PCBs (c)	7	7
PAHs (c)	0.9	2
Inorganics (d)	0	0
Body weight, Kg (e)	70	70
Averaging period, years		
Carcinogens (e)	75	75
Noncarcinogens	30/365 = 0.08	30/365 = 0.08

(a) Schaum (1984) and EPA (1988).
(b) Assumed value based on analogy to other chemicals and chemical-physical properties.
(c) Poiger and Schlatter (1980) analogy to PCDDs/PCDFs.
(d) Skog and Wahlberg (1964).
(e) EPA 1988.

TABLE 3

ASSUMPTIONS USED TO ESTIMATE INCIDENTAL INGESTION EXPOSURE
VESTAL WELL 1-1 SITE

PARAMETER	VALUE	
	AVERAGE CASE	PLAUSIBLE MAXIMUM CASE
Ingestion rate, mg/d (a)	50	100
Oral absorption factors, %		
PAHs/PCBs (b)	15	50
All others	100	100
Frequency of exposure, days/year	30	30
Duration of exposure, years	1	1
Body weight, Kg (c)	70	70
Averaging period, years		
Carcinogens (c)	75	75
Noncarcinogens	30/365	30/365

(a) LaGoy (1987).
(b) Poiger and Schlatter (1980) and Umbreit et al. (1986).
(c) EPA (1988).

TABLE 4

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

CHEMICAL	ORAL CRITERIA					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)	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
TOLUENE	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	HLA	--	--
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	--	--	--	--	--	--	--
	--	--	--	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:
- o A ten-fold factor to account for the variation in sensitivity among the members of the human population.
- o A ten-fold factor to account for the uncetainty in extrapolating animal data to the case of humans;
- o 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
- o 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), HLA = 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 5

RISK ASSESSMENT SUMMARY
VESTAL WELL 1-1 SITE

EXPOSURE PATHWAY	TOTAL EXCESS UPPER BOUND LIFETIME CANCER RISK		HAZARD INDEX		CHEMICALS CONTRIBUTING TO THE RISK (c)
	AVERAGE CASE (a)	PLAUSIBLE MAXIMUM CASE (b)	AVERAGE CASE (a)	PLAUSIBLE MAXIMUM CASE (b)	
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.

COST ESTIMATE SUMMARY
TREATMENT ALTERNATIVES
VESTAL FEASIBILITY STUDY

ALTERNATIVE	CAPITAL COST	ANNUAL O&M	5-YEAR REVIEW	TOTAL PRESENT WORTH 5% DISCOUNT PRICE ($)
SOIL CONTAMINATION				
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
GROUNDWATER CONTAMINATION				
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.

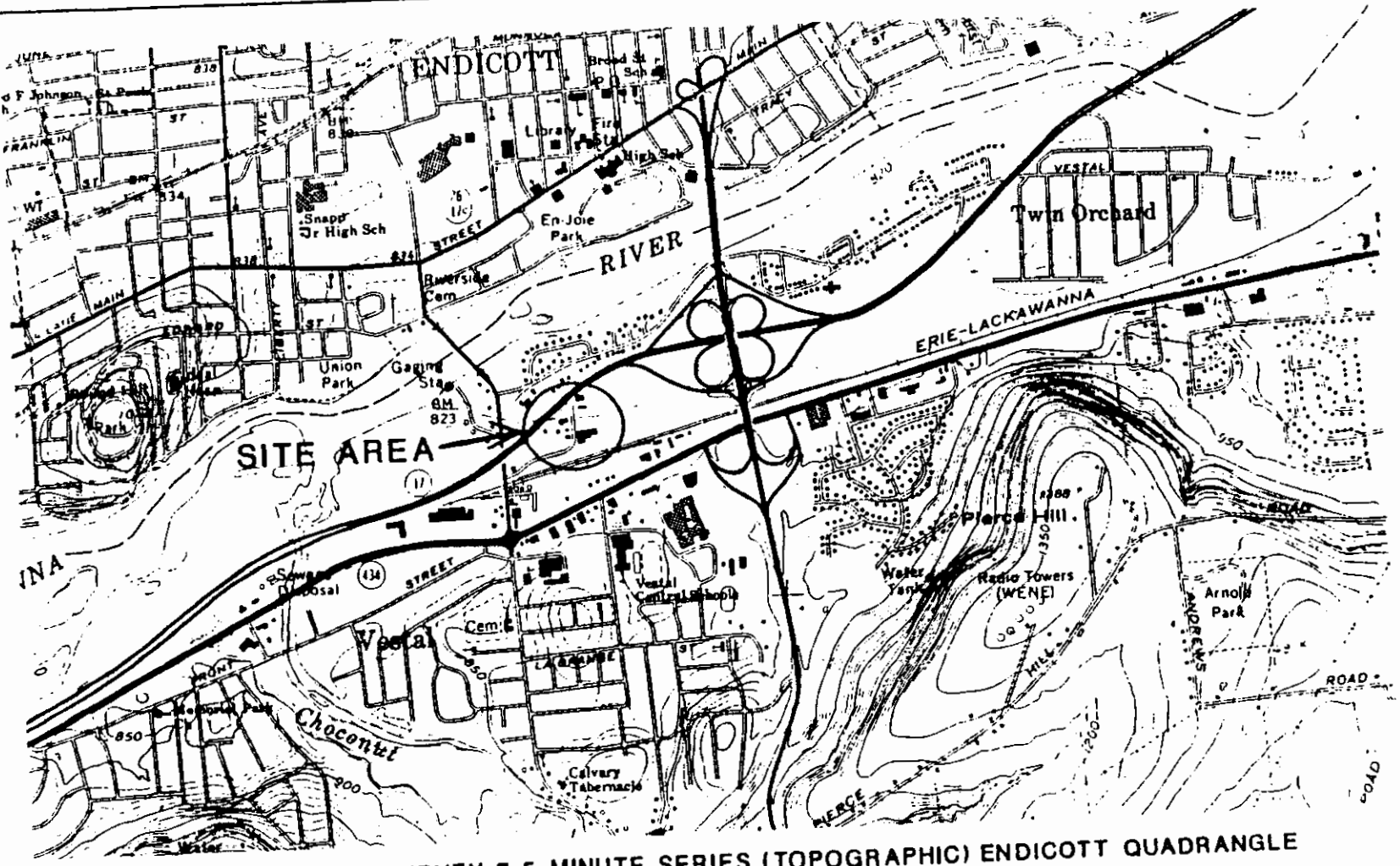
TABLE 6

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									24780		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 7

APPENDIX 2



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

N

SCALE 1:24000

1 MILE 0

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER 0

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

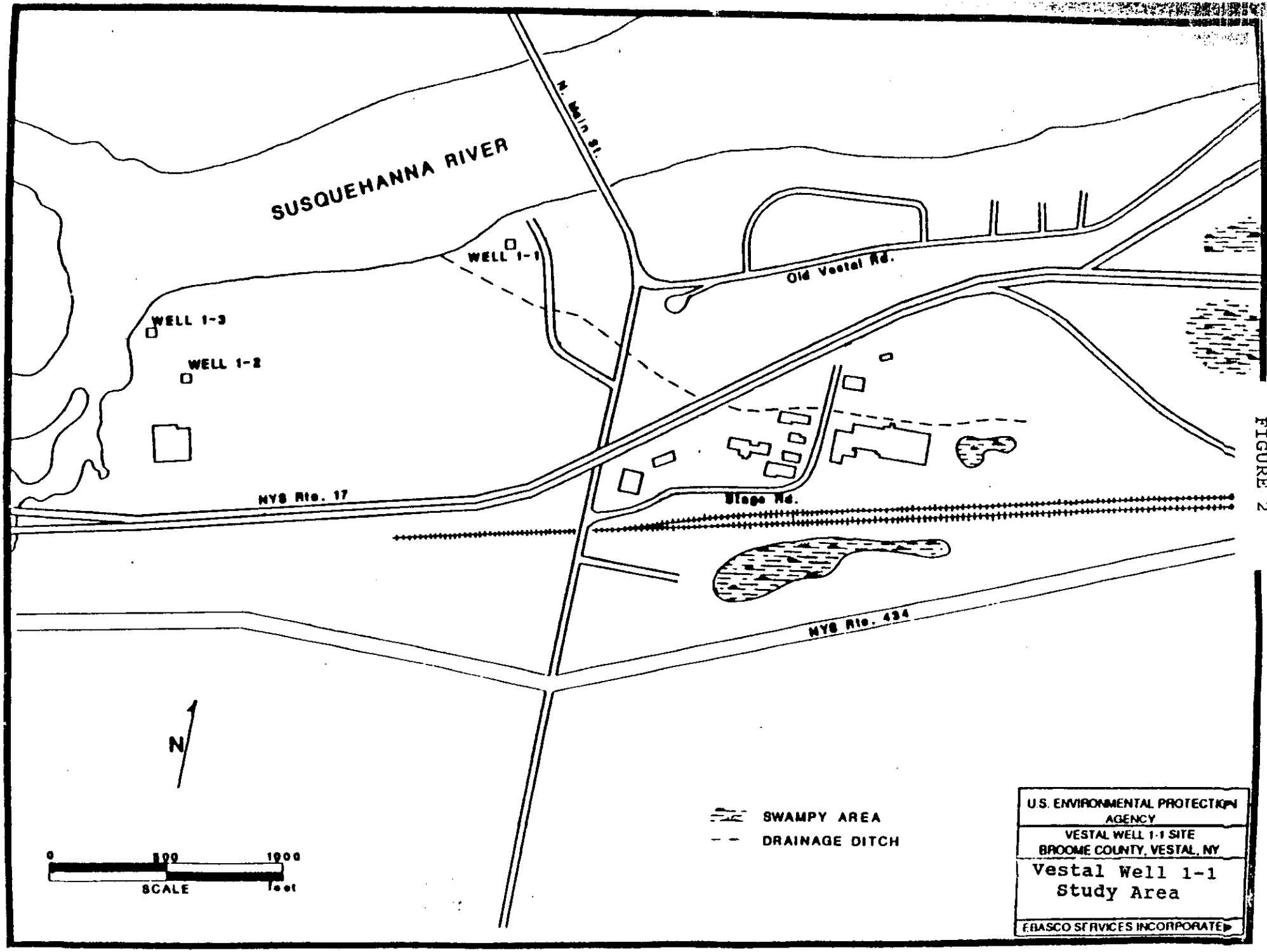

SUSQUEHANNA RIVER
N. Main St.
WELL 1-1
WELL 1-3
WELL 1-2
Old Vestal Rd.
NYS Rte. 17
Stage Rd.
NYS Rte. 434
N
0
500
1000
SCALE
Feet
SWAMPY AREA
DRAINAGE DITCH
U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Vestal Well 1-1
Study Area
EBASCO SERVICES INCORPORATED

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

FIGURE 4

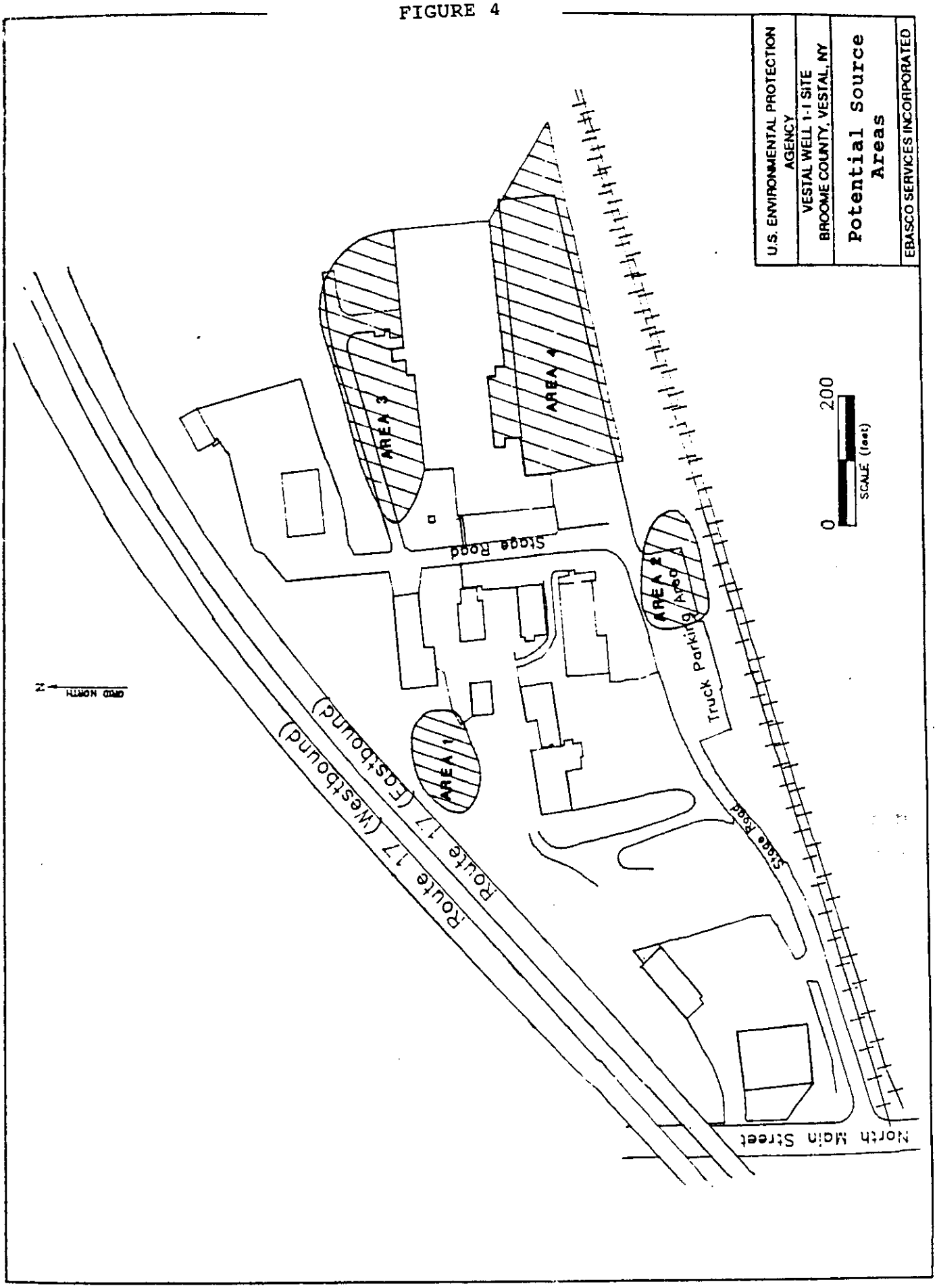

U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Potential Source Areas
EBASCO SERVICES INCORPORATED
AREA 1
AREA 2
AREA 3
AREA 4
Stage Road
Truck Parking Area
Route 17 (Westbound)
Route 17 (Eastbound)
North Main Street
0
200
SCALE (feet)
GRID NORTH
N

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 90

Notary Public
[illegible] ISON
Notary Public, State of New York
[illegible] County
My Commission Expires May 31, 19[illegible]

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

FIGURE 6

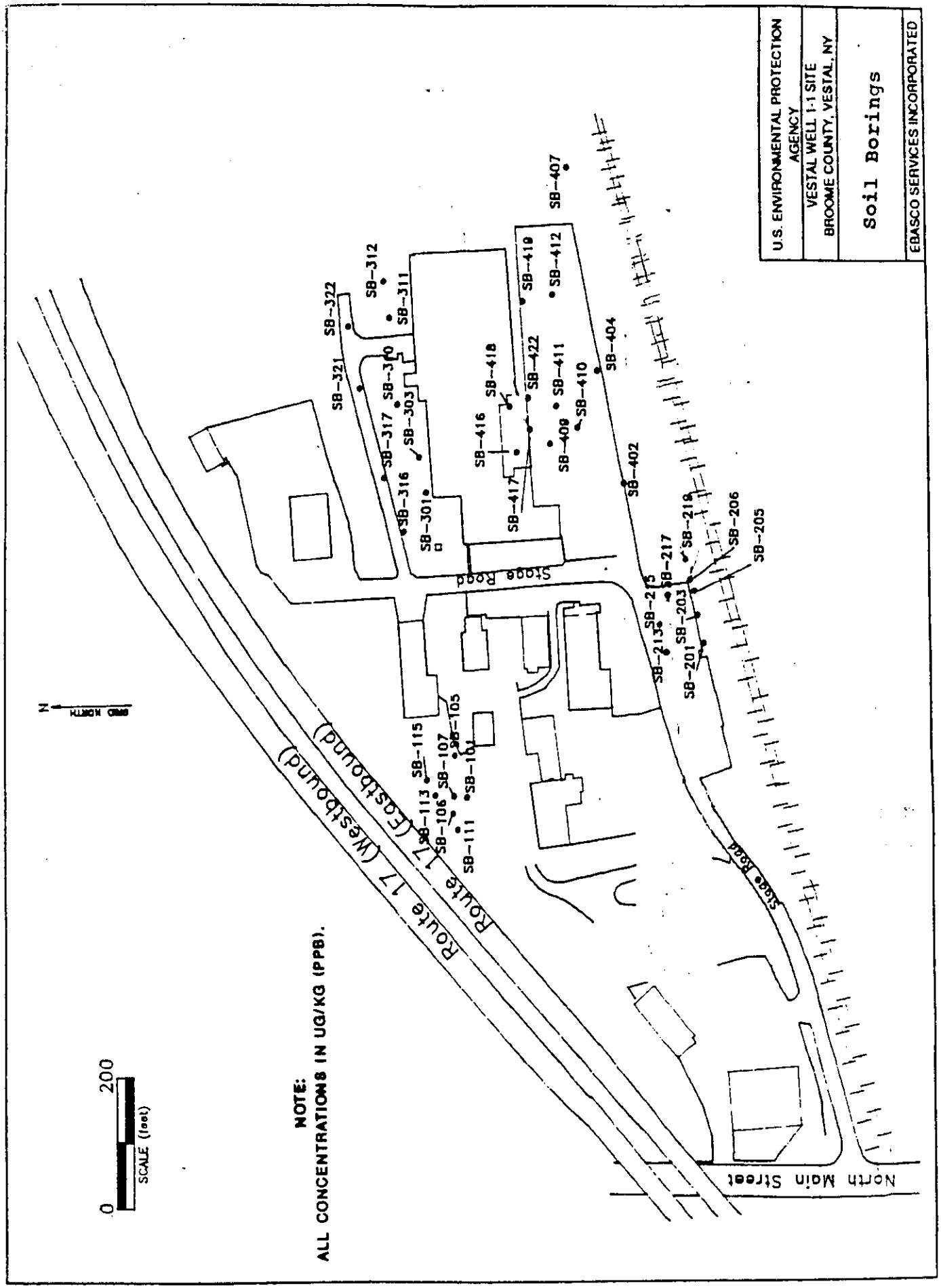

U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Soil Borings
EBASCO SERVICES INCORPORATED
NOTE:
ALL CONCENTRATIONS IN UG/KG (PPB).
0
200
SCALE (feet)
GRID NORTH
N
Route 17 (Eastbound)
Route 17 (Westbound)
Stage Road
North Main Street
SB-322
SB-312
SB-311
SB-321
SB-320
SB-317
SB-303
SB-316
SB-301
SB-419
SB-412
SB-407
SB-418
SB-422
SB-411
SB-416
SB-417
SB-409
SB-410
SB-404
SB-402
SB-218
SB-217
SB-215
SB-213
SB-203
SB-201
SB-206
SB-205
SB-115
SB-107
SB-105
SB-113
SB-106
SB-111
SB-101

FIGURE 7

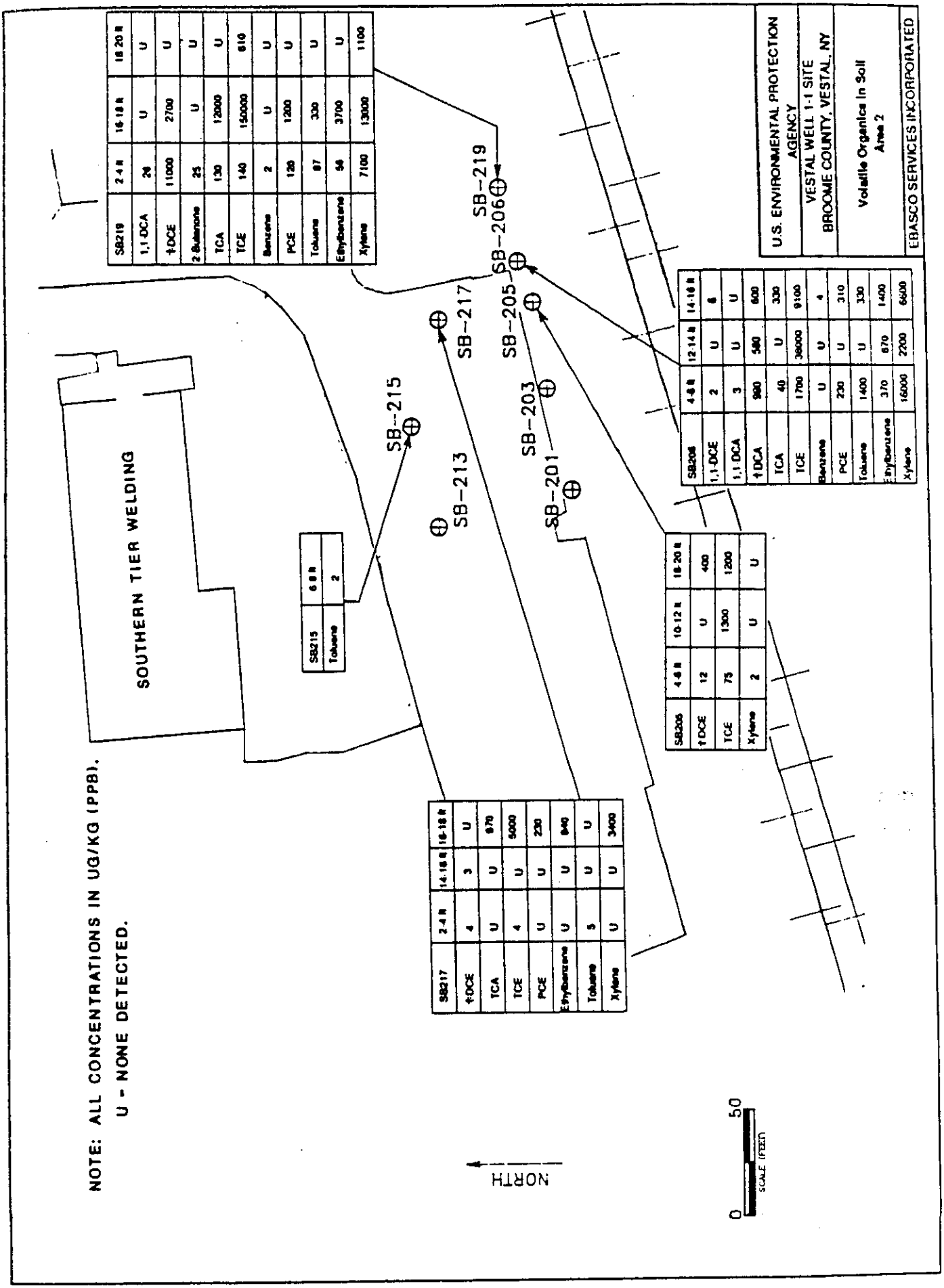

U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Volatile Organics in Soil
Area 2
EBASCO SERVICES INCORPORATED
SOUTHERN TIER WELDING
SB-201
SB-203
SB-205
SB-206
SB-213
SB-215
SB-217
SB-219
NOTE: ALL CONCENTRATIONS IN UG/KG (PPB).
U - NONE DETECTED.
NORTH
0
50
SCALE (FEET)

FIGURE 8

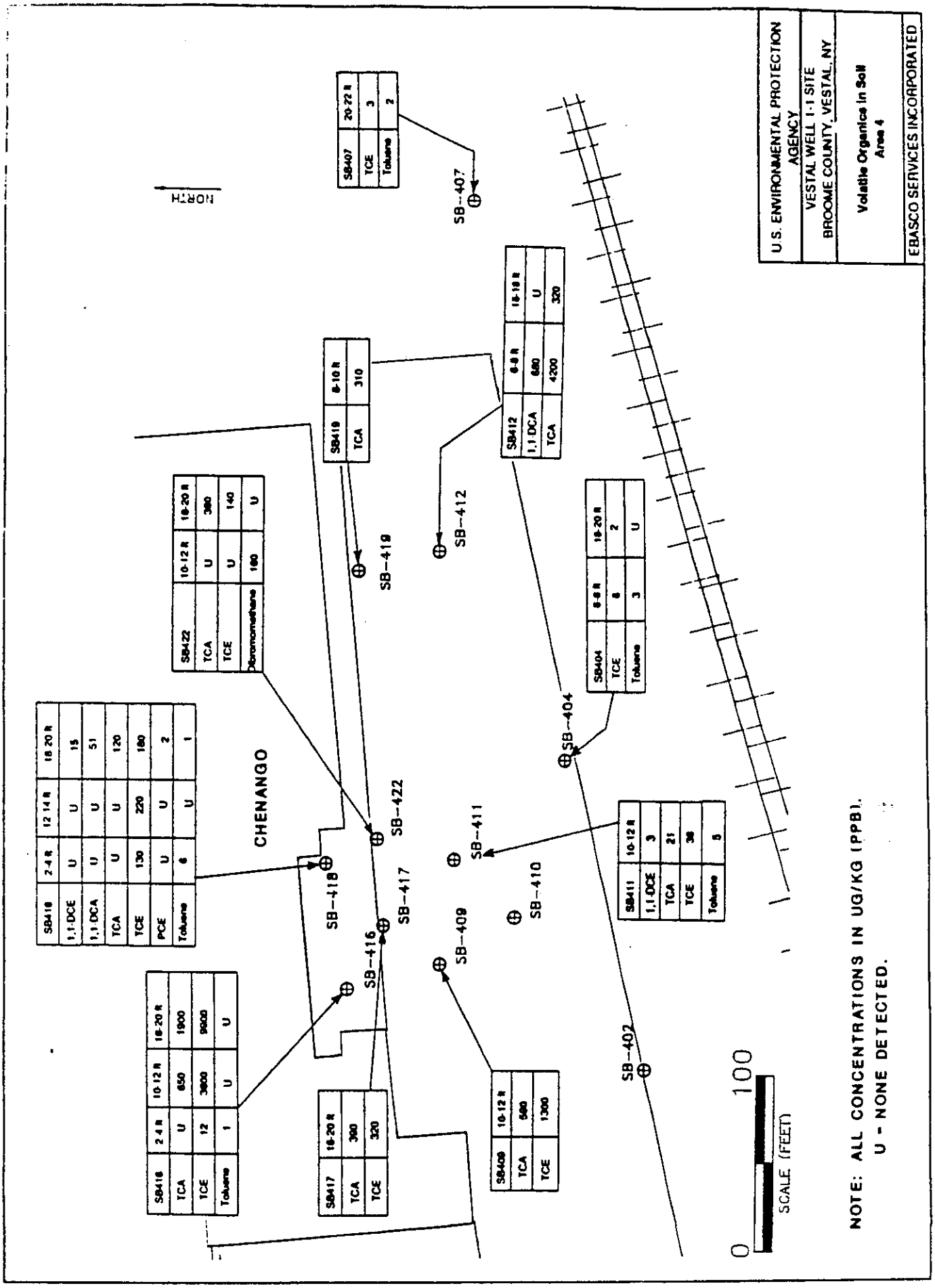

U.S. ENVIRONMENTAL PROTECTION AGENCY
VESTAL WELL 1-1 SITE
BROOME COUNTY, VESTAL, NY
Volatile Organics in Soil
Area 4
EBASCO SERVICES INCORPORATED
NORTH
CHENANGO
SB-402
SB-404
SB-407
SB-409
SB-410
SB-411
SB-412
SB-416
SB-417
SB-418
SB-419
SB-422
SB418 | 2-4 ft | 12-14 ft | 18-20 ft
1,1-DCE | U | U | 15
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
Chloromethane | 180 | U
SB419 | 8-10 ft
TCA | 310
SB412 | 6-8 ft | 18-19 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 | 38
Toluene | 5
SB418 | 2-4 ft | 10-12 ft | 18-20 ft
TCA | U | 650 | 1900
TCE | 12 | 3600 | 9800
Toluene | 1 | U | U
SB417 | 18-20 ft
TCA | 360
TCE | 320
SB409 | 10-12 ft
TCA | 680
TCE | 1300
SB407 | 20-22 ft
TCE | 3
Toluene | 2
0
100
SCALE (FEET)
NOTE: ALL CONCENTRATIONS IN UG/KG (PPB).
U - NONE DETECTED.

FIGURE 9

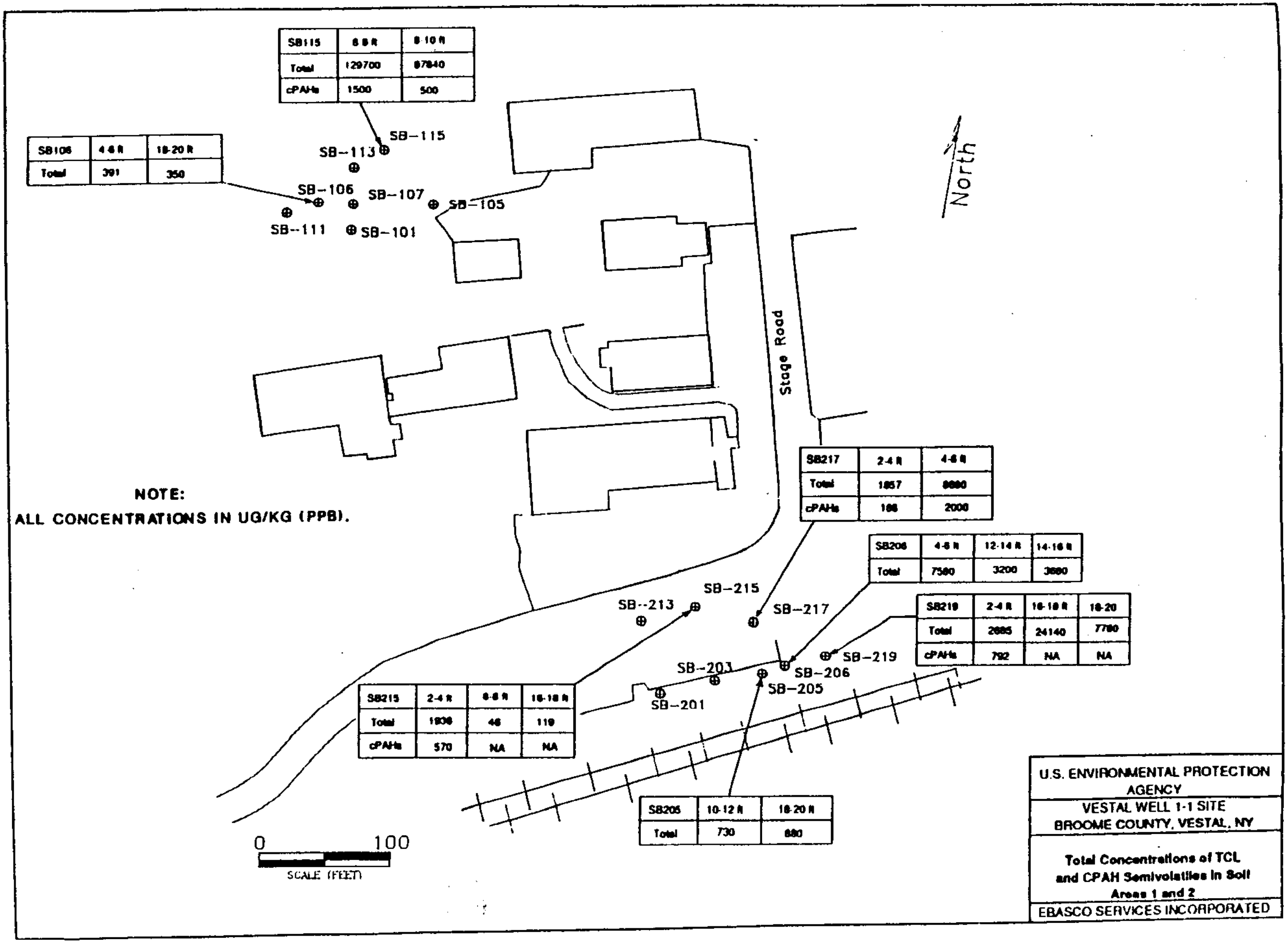
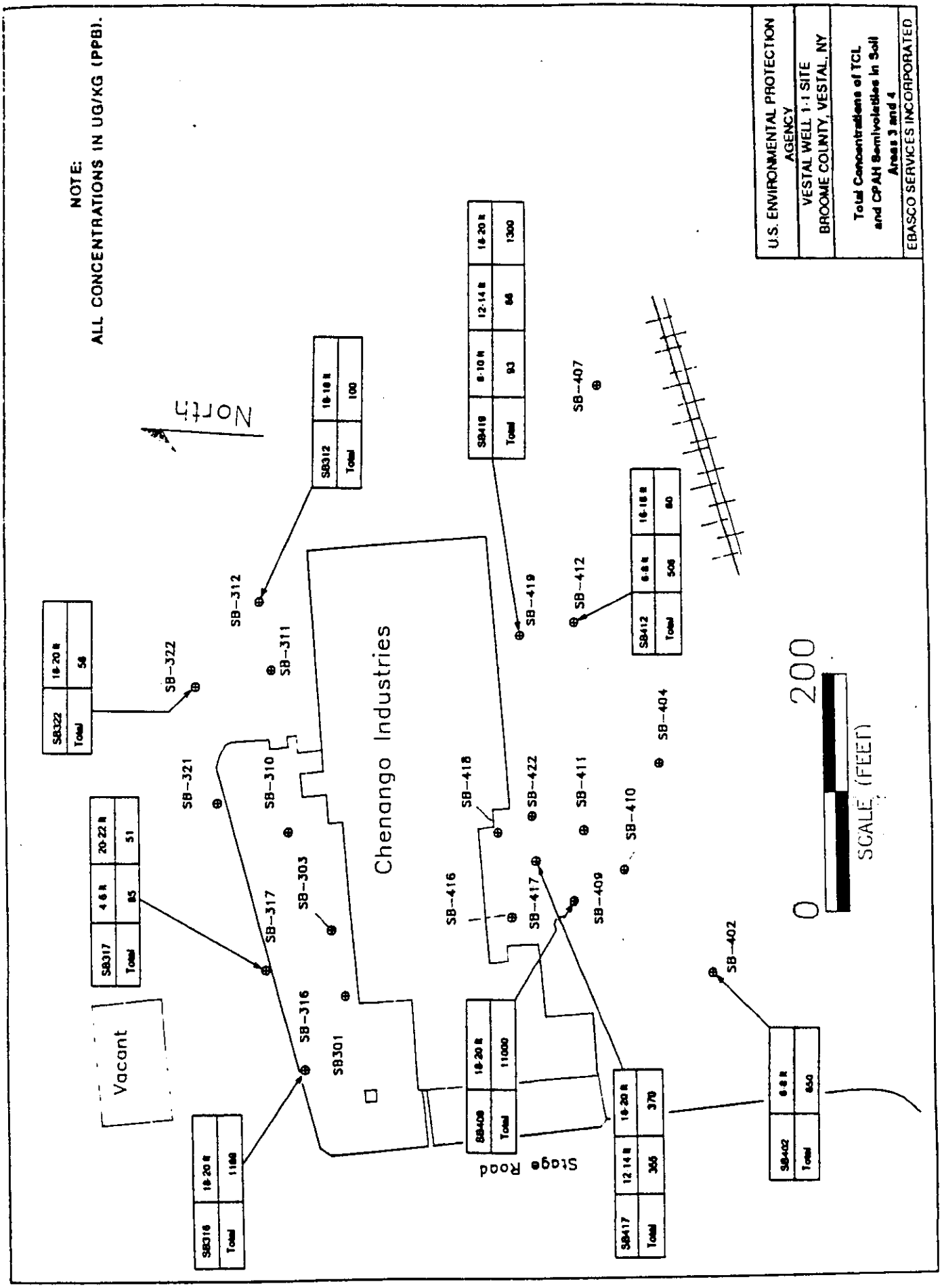

SB115 | 6-8 ft | 8-10 ft
Total | 129700 | 87840
cPAHs | 1500 | 500
SB106 | 4-6 ft | 18-20 ft
Total | 391 | 350
SB-115
SB-113
SB-106
SB-107
SB-105
SB-111
SB-101
North
Stage Road
NOTE:
ALL CONCENTRATIONS IN UG/KG (PPB).
SB217 | 2-4 ft | 4-6 ft
Total | 1857 | 9880
cPAHs | 188 | 2000
SB206 | 4-6 ft | 12-14 ft | 14-16 ft
Total | 7580 | 3200 | 3880
SB219 | 2-4 ft | 16-18 ft | 18-20
Total | 2685 | 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 | 119
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

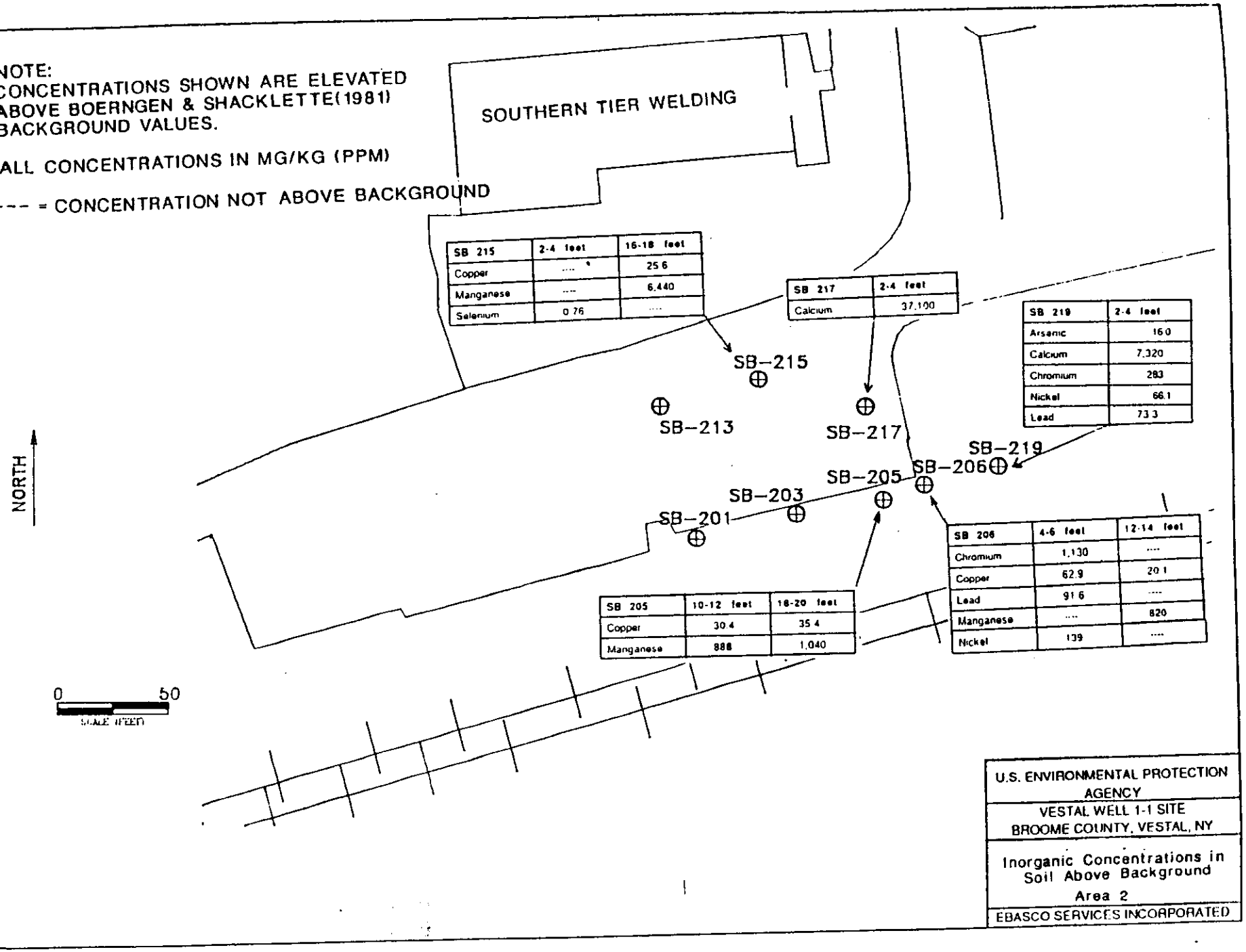
FIGURE 10


NOTE:
ALL CONCENTRATIONS IN UG/KG (PPB).
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
North
Chenango Industries
Vacant
Stage Road
SB301
SB-303
SB-310
SB-311
SB-312
SB-316
SB-317
SB-321
SB-322
SB-402
SB-404
SB-407
SB-409
SB-410
SB-411
SB-412
SB-416
SB-417
SB-418
SB-419
SB-422
SB316 | 18-20 ft | 1100 | Total
SB317 | 4-6 ft | 85 | 20-22 ft | 51 | Total
SB322 | 18-20 ft | 56 | Total
SB312 | 18-18 ft | 100 | Total
SB408 | 18-20 ft | 11000 | Total
SB417 | 12-14 ft | 365 | 18-20 ft | 370 | Total
SB419 | 8-10 ft | 93 | 12-14 ft | 86 | 18-20 ft | 1300 | Total
SB412 | 6-8 ft | 500 | 16-18 ft | 80 | Total
SB402 | 6-8 ft | 850 | Total
0
200
SCALE (FEET)

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	37,100

SB 219	2-4 feet
Arsenic	16.0
Calcium	7,320
Chromium	283
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	....

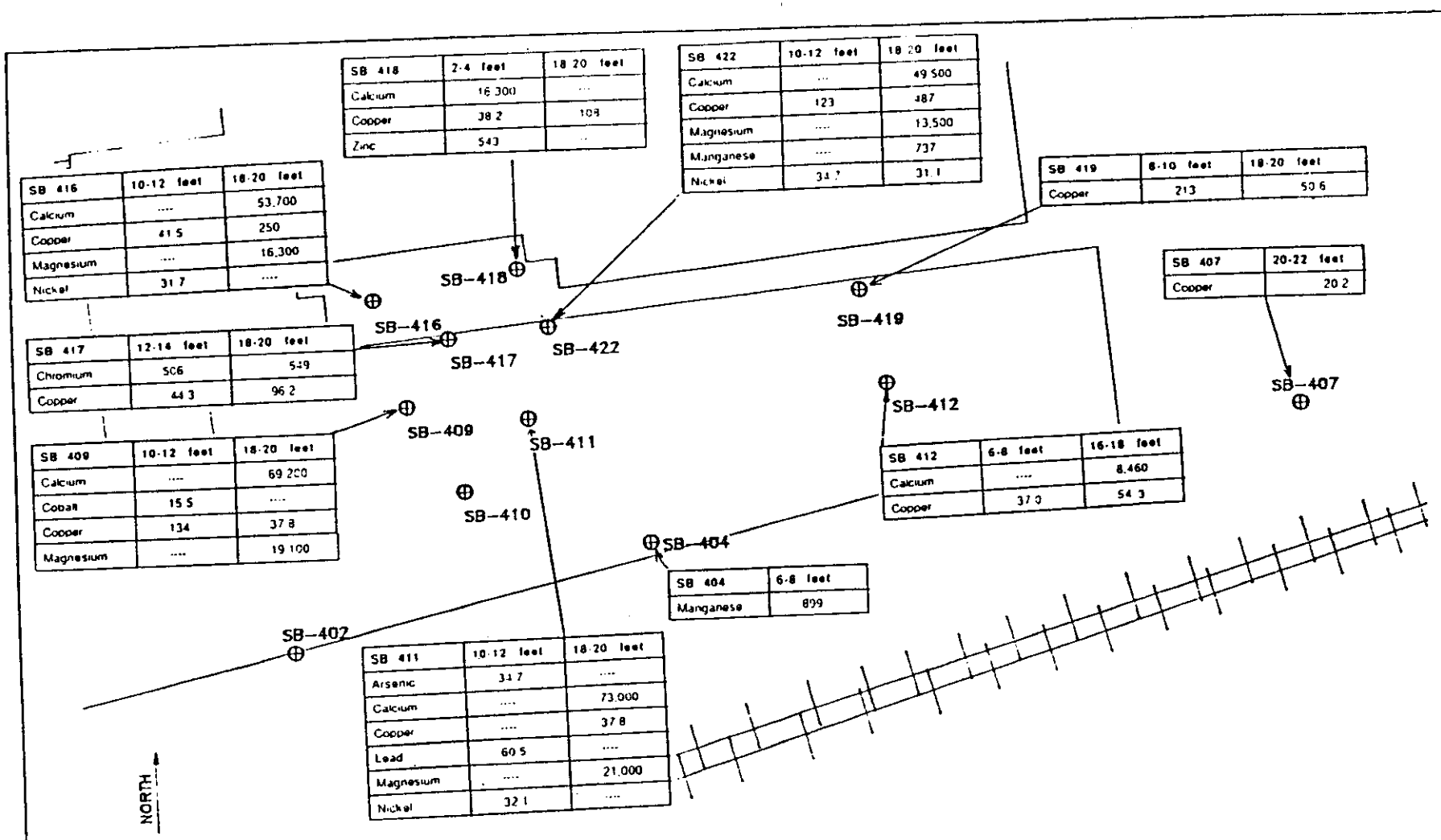
U.S. ENVIRONMENTAL PROTECTION AGENCY

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

Inorganic Concentrations in Soil Above Background
Area 2

EBASCO SERVICES INCORPORATED

FIGURE 11



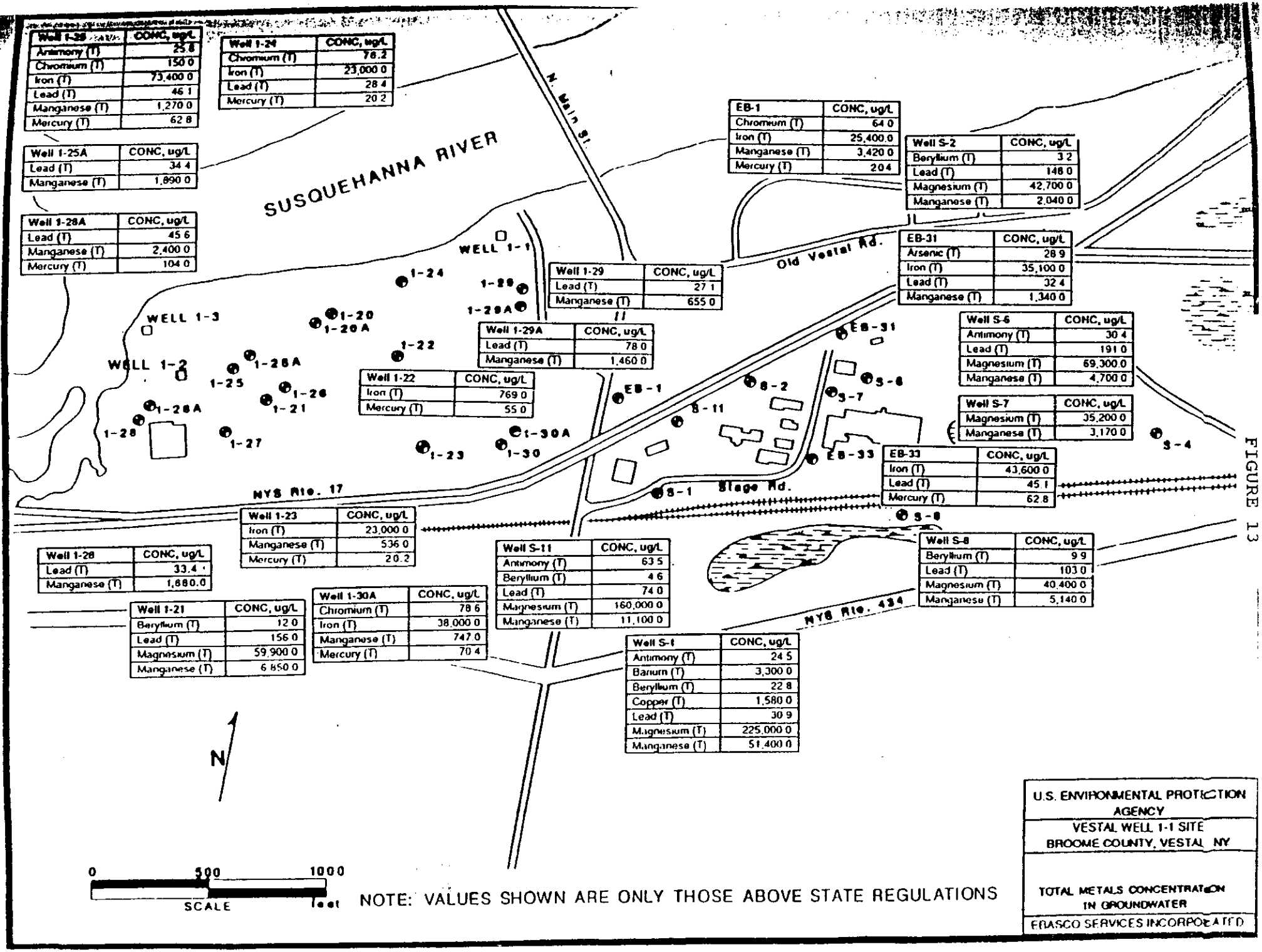
NOTE:
CONCENTRATIONS SHOWN ARE ELEVATED ABOVE BOERNGEN & SHACKLETTE(1981) BACKGROUND VALUES.

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
ENSCO SERVICES INCORPORATED

FIGURE 17



Well 1-25	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)	78.2
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

Well 1-29	CONC, ug/L
Lead (T)	27 1
Manganese (T)	655 0

Well 1-29A	CONC, ug/L
Lead (T)	78 0
Manganese (T)	1,460 0

Well 1-22	CONC, ug/L
Iron (T)	769 0
Mercury (T)	55 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

EB-31	CONC, ug/L
Arsenic (T)	28 9
Iron (T)	35,100 0
Lead (T)	32 4
Manganese (T)	1,340 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 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 1-26	CONC, ug/L
Lead (T)	33 4
Manganese (T)	1,880 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

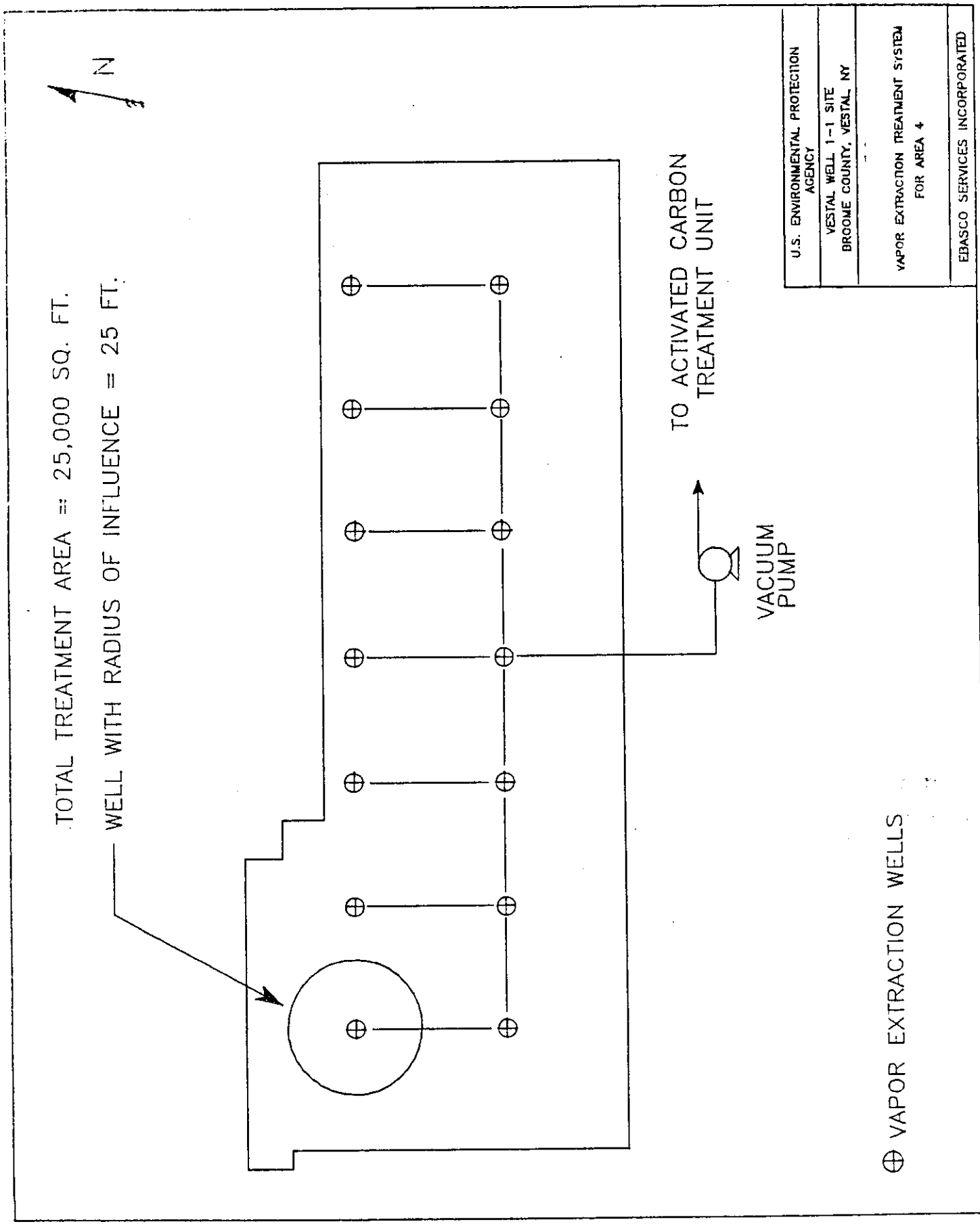
Well S-11	CONC, ug/L
Antimony (T)	63 5
Beryllium (T)	4 6
Lead (T)	74 0
Magnesium (T)	160,000 0
Manganese (T)	11,100 0

Well S-8	CONC, ug/L
Beryllium (T)	9 9
Lead (T)	103 0
Magnesium (T)	40,400 0
Manganese (T)	5,140 0

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

FIGURE 13

FIGURE 14


N
TOTAL TREATMENT AREA = 25,000 SQ. FT.
WELL WITH RADIUS OF INFLUENCE = 25 FT.
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
EBASCO SERVICES INCORPORATED