DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: **Ciba/Hercules Main Plant Site***
Facility Address: **Lower Warren Street, Town of Queensbury, NY**
Facility EPA ID #: **NYD002069748**

*The Ciba/Hercules Main Plant Site designation (the Site) includes the Main Plant Site, and the off-site Pretreatment Plant. General Site location is shown on **Figure 1**.

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

__X__ If yes - check here and continue with #2 below.

_____ If no - re-evaluate existing data, or

_____ if data are not available, skip to #8 and enter"IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

_**X**__ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

_____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): **Referenced documents**: Evaluation of Off-Site Bedrock Hydrogeology Volume I & II January 1989, Groundwater RFI Report for Main Plant (approved 9/30/93), Groundwater Investigation Report - Area West of Main Plant Site, December 2000 (approved January18, 2002), Groundwater Investigation Report - Area Southeast of Pretreatment Plant SWMU, June 2000 (approved January 18, 2002), Corrective Measure Study for On-Site Soils and Groundwater, August 1994, Additional groundwater monitoring data have been and continue to be collected and submitted on a semi-annual schedule for the spring and fall of each year.

For groundwater evaluation purposes, including determination of: groundwater contaminant concentrations, off-site migration potential, and appropriate corrective measures, the Site has been broken down into several main areas. Each has been evaluated in separate studies. The various areas of the Site are shown on **Figure 2**.

Site Characterization By Area:

North Lagoon Area: RCRA Corrective Action Management Unit (CAMU)

Groundwater investigations support the conclusion that the CAMU, which comprises the Former North Lagoon and the adjacent North and South Waste Piles, serves as a significant source of groundwater contamination at this Site. Total dissolved chromium, total cyanide and total VOCs, indicator contaminants for the CAMU, have been detected at elevated concentrations expressed in parts per billion in the groundwater in the immediate area of the CAMU and in monitoring wells further downgradient of this area. Groundwater contamination by the CAMU source appears to be focused in the overburden and the uppermost water-bearing zones in the underlying bedrock, known as Horizons A and B. Groundwater contamination found in monitoring wells located further downgradient from the CAMU area, when compared to the constituents and concentrations found in the CAMU area soils/wastes and groundwater, indicate that some of the constituents most likely originate at the CAMU area. Soil/waste constituents and concentrations in the area of these more distant monitoring wells further supports this determination. Using the maximum concentration data generated during the remedial investigation, the following concentrations in parts per billion by water-bearing zone and indicator contaminants (that are representative of general contaminant distribution) demonstrate the magnitude of the groundwater contamination detected in the vicinity and downgradient of the CAMU.

Footnotes:

[1]"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

Contaminant	Overburden	Horizon A	Horizon B	Applicable GPC
Chromium	20,000 ug/l	500 ug/l	100 ug/l	50 ug/l
Total Cyanide	50,000 ug/l	5,000 ug/l	100 ug/l	100 ug/l
Total VOCs	10 ug/l	1,000 ug/l	10,000 ug/l	5 ug/l each VOC (typical)

Unlike inorganic contamination, elevated VOC concentrations were not detected in the immediate vicinity of the south waste pile, with the exception of a localized hot spot at soil sampling location WP-3 (located approximately 150 feet east of the eastern edge of the north lagoon). Groundwater monitoring data suggests that the south waste pile contributes VOC contamination directly to the bedrock water-bearing zones. This bedrock VOC contamination could be attributed to a combination of circumstances existing at the south waste pile: i.e., (1) the VOC contamination in the waste pile seems more concentrated near its bottom and the potential exists for dense non-aqueous phase liquids (DNAPLs) to have penetrated into the bedrock and serve as continuing sources for groundwater contamination; (2) that approximately three-quarters of the bottom rests on or very near Horizon A, the first bedrock water-bearing zone, which also was demonstrated to communicate hydraulicly with the underlying bedrock zone, Horizon B; and (3) the possible diversion of most overburden groundwater to the periphery of the open impoundment and south waste pile by the open impoundment's lined northern section which was constructed down to bedrock. South of the CAMU the overburden water-bearing zone potentially receives some inorganic constituent contribution from the south waste pile.

The remedial investigation discovered a natural clay layer, of varying thickness, directly overlying bedrock under most of the site, except in a few localized areas and where excavated for such construction activities as building of the surface impoundments. This clay layer lies below the overburden water-bearing zone and serves as an aquitard that limits vertical migration of contamination from the overburden into the bedrock aquifers except where excavated or punctured.

A deep bedrock water-bearing zone, Horizon C, was found to be contaminated with indicator contaminants (principally chromium). Tests have demonstrated limited natural vertical movement between this horizon and the one above. However, it appears that contamination from the upper water-bearing zone migrated down into Horizon C, along some of the deep bedrock production wells that were formerly present at the site. Decommissioning and sealing of these wells several years ago appears to have effectively eliminated this migration pathway into the deep bedrock zone.

Area South of Railroad Property

Soil/waste material testing indicates that a large part of the area south of the railroad property exhibits a hazardous waste characteristic and demonstrates the potential to leach inorganic contaminants to the groundwater. Groundwater monitoring carried-out as part of the RFI for the area south of the railroad property (Figure 2) provided the following generalized maximum concentration data for the indicator parameters:

Contaminant	Overburden	Horizon A	Horizon B	Applicable GPC
Chromium	20,000 ug/l	3,000 ug/l	1,000 ug/l	50 ug/l
Total Cyanide	20,000 ug/l	5,000 ug/l	1,000 ug/l	100 ug/l
Total VOCs	20,000 ug/l	200 ug/l	10,000 ug/l	5 ug/l each VOC (typical)

Analysis of groundwater monitoring data and corresponding soil/waste contamination profiles suggest that the incineration area and properties in the vicinity of Buildings 8, 45, and 56 slab foundations can be considered the primary contributing sources to overburden groundwater contamination in the area south of the railroad property. This becomes evident by examining chromium, cyanide, and VOC groundwater concentration contours for those locations. However, upon close examination it appears that the CAMU located to the north may also contribute contaminants, particularly cyanide to the overburden wells and VOCs to the bedrock monitoring wells, in both cases in wells located in the southwestern portion of the Site.

Cyanide contamination in the overburden water-bearing zone in the vicinity of Building's 8 and 45 slab foundations (east-central portion of the Area South of the Railroad Property) may extend into the Area North of the Railroad Property. Here elevated soil/waste cyanide concentrations were detected at borings RB-17 (213 mg/kg) and RB-15 (136 mg/kg). The data suggest that this overburden water-bearing zone is being contaminated by cyanide in the soil/waste material north of the railroad property, and to a lesser degree, by cyanide contamination in the vicinity of the Building's 8 and 45 slab foundations.

Organic contamination in the overburden water-bearing zone south of the railroad property appears to be primarily caused by VOCs found in soils/waste material located in the vicinity of the incineration area and Building 45 and 56 slab foundations. The highest VOC concentrations in this area were detected at the latter slab foundation. Groundwater monitoring has also detected the SVOC aniline as high as 2,500 parts per million south of the Building 45 slab foundation. This finding corresponds with the elevated aniline level (7.4 mg/kg) detected in soil at that location in boring IS-22.

Overburden VOC levels remain elevated within the overburden flow zone under the incineration area. This area contains soil/waste material where VOCs were most frequently detected, but only at an average concentration under one part per million. Since the CAMU to the north appears to be an unlikely source for the overburden VOC contamination in the incineration area, this area is considered the primary VOC contamination source.

Groundwater data indicate that VOCs are present largely within in the Horizon B bedrock water-bearing zone at the southwestern part of the site. However, given the presence of the clay layer situated above the bedrock in this area it is unlikely that the incineration area soil/wastes are major contributors to contamination observed in this zone.

Area North of Railroad Property

Groundwater monitoring within this Area was limited to one overburden well located approximately in the middle of the area, and a small number of bedrock wells monitoring the B and C bedrock zones just north of the railroad tracks. Relatively low levels of VOCs and heavy metals have been detected in the monitoring wells. Also, overburden groundwater monitoring wells just south of the railroad property and adjacent to this area have detected only low levels of these constituents. However, this northern area SWMU does contribute significant cyanide contamination to the overburden water-bearing zone, which then has an impact on overburden groundwater quality in the area south of the railroad property.

Area West of the Main Plan Site

Elevated concentrations of cyanide in overburden Monitoring Well MW-OB9, located along the western property boundary, prompted additional investigations of the area off-site to the west. The results of these additional studies are contained in “Groundwater Investigation Report - Area West of Main Plant Site, December, 2000. The conclusions of this Report were that the area where cyanide concentrations exceed groundwater standards (up to 400ppb) was confined to the area immediately west of the property line. Low levels of chromium were found to be co-located with detections of cyanide, however all chromium data were below groundwater standards in all of the off-site wells.

Pretreatment Plant (PTP) and Area Southeast of the PTP

Initial groundwater sampling from three monitoring wells placed around the perimeter of the site indicated that the groundwater was impacted by site operations. An extensive list of parameters was sampled for, however, the only contaminant detected at concentrations exceeding the groundwater protection standards was cyanide. During the RFI, temporary groundwater sampling points were placed along the southern and western perimeters of the site. Sampling from these points, along with the several piezometers and monitoring wells, provided much better definition of the groundwater chemistry beneath and immediately downgradient of the site. Initial cyanide concentrations ranged from slightly over the groundwater standard of 100 parts per billion at the perimeter and immediately downgradient of the site to a range of several hundred to over 5000 parts per billion within the central portion of the Pretreatment Plant area. Concentrations vary considerably both spatially and temporally.

As additional data were collected, cyanide concentrations in one well (MW-OB21) southeast of the PTP increased to levels several times groundwater standards.

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

X	If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).
_____	If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.
_____	If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Historical/pre-remedial groundwater quality data are summarized in reports previously referenced and have been described above. A multi-component Groundwater Extraction System (GWES) has been installed at the Site to mitigate further migration of contaminated groundwater. Preliminary performance evaluations for the GWES for the Overburden and Bedrock A and B Horizons are contained within September 6, 2002 Memorandum from Brown and Caldwell. A description of current conditions related to plume stabiliztion and the current operation of the GWES at the Site follows:

Area West of the Main Plan Site

Investigations of the off-site area west of the Site have indicate that the groundwater is contaminated with relatively low levels of cyanide and chromium. See **Figure 3 and Figure 4** for most recent cyanide and chromium groundwater data. Chromium is currently found in off-site well points at levels below the groundwater standard of 50 ppb. Cyanide exceeds the groundwater standard in well located immediately west of the property line, and is found at lower concentrations further west. The source of the overburden groundwater contamination is thought to be the CAMU area, which is located upgradient. Remedial activities in the CAMU area included a west side cutoff wall, with a steel piling hydraulic barrier driven to the underlying bedrock and through the glaciolacustrine clay (where present). This barrier has the effect of cutting off contaminated groundwater flow to the south and southwest. Isolation of the CAMU source is expected to effect a gradual decrease in constituent concentrations over time in downgradient wells.

Impacted soils were also removed from an area west of the Site where overburden groundwater contamination has been observed, however these soils are not thought to be a significant source of the groundwater contamination. This is supported by the fact that the highest concentrations were detected in well points that are located upgradient of the contaminated soil deposit.

Overburden groundwater in this area that is nearest the Site boundary, may be under the influence of and be intercepted by the french drain system. This interpretation is based on the clay surface elevation as determined by numerous borings in the area. Groundwater that is beyond the capture of the french drain likely discharges to the Hudson River along thin saturated zones above the clay unit surface.

As a result, it is reasonable to conclude that the overburden groundwater plume is stabilized and it is expected to diminish over time. Continued groundwater monitoring in off-site wells will be used to verify the effectiveness performance of this remedial system .

Pretreatment Plant (PTP) and Area Southeast of the PTP

Based on the concentrations of cyanide found to be exeeding groundwater standards downgradient from the PTP, an additional study was performed to evaluate the groundwater conditions further downgradient and determine the ultimate groundwater discharge point(s). **Figure 5** presents the cyanide concentration data for both surface water and groundwater, from "The Groundwater Investigation Report - Area Southeast of Pretreatment Plant SWMU, June 2000". The report concluded that groundwater discharges to a low lying area still within the Site boundaries. Cyanide concentrations in groundwater near the point of discharge and in surface water originating at and flowing to the east and ultimately off- Site, were at levels approximately one tenth of the groundwater standard.

Main Plant Site Proper

Deep bedrock - C Horizon

The deep bedrock water-bearing zone, Horizon C, historically was found to be contaminated with Site constituents (principally cyanide and chromium). Aquifer tests demonstrated limited natural vertical movement between this horizon and those above. However, it appears that contamination from the upper water-bearing zones was allowed to migrate down into Horizon C, along deep bedrock production wells present at the site. Decommissioning and sealing of these wells was completed several years ago and subsequent groundwater quality sampling reflected an almost immediate decline. Available data continue to indicate that sealing the production wells has effectively eliminated this pathway into the deep bedrock zone. Contamination levels continue to decrease, thus supporting that the Horizon C groundwater plume has stabilized. Hydrogeologic studies have concluded that the groundwater in this zone discharges into the active cement quarry that lies immediately south of the Hudson River. The quarry is the only known discharge point for groundwater in this zone. Since the sources have been removed and there have been no detections of chromium or cyanide in quarry samples, that can be attributed to the contamination in Horizon C, this plume is considered to have stabilized.

Overburden Zone

Corrective measures implementation for the overburden zone has been completed along the entire southern boundary of the Site were it abuts the Hudson River, through the installation and operation of the GWES. For this zone, the GWES includes a downgradient french drain that is keyed into an underlying glaciolacustrine clay layer. **Figure 6** shows the location of the french drain and accociated sumps and manholes. In a few locations where the clay layer was absent the french drain trench bottom was sealed with clayey soils. The french drain has been operating nearly continuously since its installation in the late fall of 2000. The primary data set required to evaluate the performance of the GWES in the overburden is the water elevation in the french drain sumps and manholes. Capture of Site groundwater is indicated if these data demonstrate that the elevation of groundwater in the french drain is at or below the top of the lacustrine clay unit, which forms the base of the zone. Only preliminary water elevation data are available at this time from the french drain manholes and sumps. However, the pumps in drain sumps A and C are cycling as designed and their respective discharges are within the design range. These data provide a reasonable basis to conclude that those portions of the french drain that flow to sumps A and C are functioning as designed, i.e., the water level is being maintained below the top of clay. Sump B is

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

surcharged with significant additional clean waters from upgradient of the site that were not planned for in the french drain design. As a result, this pump is currently running at capacity and not cycling on and off. Consideration of all available information indicates that the portion of the french drain which feeds Sump B is also functioning as designed and is intercepting groundwater along these portions of the Site. Groundwater capture along over 90% of the french drain length is supported by preliminary data. As more monitoring data become available, any necessary optimization of the french drain operation will be made. Options to mitigate the upgradient water surcharge issue are currently being evaluated with the responsible upgradient parties. Thus, this problem is a temporary one. In the unlikely event that significant amount of groundwater is bypassing the french drain under its current operation, this groundwater would discharge to the immediately downgradient Hudson River and there would be no further expansion of the overburden groundwater plume.

Shallow Bedrock - A Horizon

A shallow bedrock zone (A Horizon) groundwater extraction system of 14 groundwater recovery wells is installed and operational along the southern property boundary at the Hudson River. While extraction rates and pump cycling are not yet fully optimized, preliminary data from observation well pairs along the extraction well line indicate that flow reversal has been achieved in the upper bedrock zone and the plume is being captured along the downgradient Site perimeter. **See Figure 6** for A Horizon Extraction Wells, piezometric contours, and preliminary extent of capture area. In a few areas, namely the areas of extraction wells EW-A1/EW-A2 and EW-A10, the preliminary data indicate that a reverse hydraulic gradient on the southern side of the extraction wells (i.e., indicating flow back toward the Site) resulting from the operation of the GWES exists, but is not as well developed as desired. Based on an evaluation of pumping rates from the extraction wells in these areas, and from observation of remaining available drawdown in these wells, some slight increases in pumping rates will be made during system optimization. This will enhance the gradient reversal in these areas and thus further increase confidence in the systems performance.

Middle Bedrock - B Horizon

A middle zone (B Horizon) bedrock groundwater extraction system of 6 groundwater recovery wells has been installed and is operational along the southern property boundary at the Hudson River. While extraction rates and pump cycling are not yet fully optimized, preliminary data from observation well pairs along the extraction well line indicate that flow reversal has been achieved in the Horizon B bedrock zone and the plume is being captured along the downgradient Site perimeter. **See Figure 7** for B Horizon Extraction Wells, piezometric contours, and preliminary extent of capture area. An evaluation of the pumping rates from the extraction wells and current drawdowns indicate that in a few areas the reverse hydraulic gradient developed on the southern side of the extraction wells can be further enhanced by small increases in extraction rates at a few of the wells (e.g., EW-B1, EW-B3, and EW-B4). These system enhancements are planned as part of system optimization and will further increase the level of confidence that complete groundwater capture is being achieved. Additional pumping rate adjustments may be reqired in the future to maintain adequate capture. These will be made on an as needed basis.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

X	If yes - continue after identifying potentially affected surface water bodies.
_____	If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.
_____	If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): See documents referenced previously.

Prior to installation and operation of the GWES, the overburden groundwater discharged to the Hudson River along the Site through a saturated zone on top of the confining glaciolacustrine clay layer. In some areas within the Site boundaries where this clay layer is absent, the overburden groundwater recharges the underlying upper bedrock flow zones (Horizons A and B). The operation of the french drain now effectively eliminates shallow groundwater discharge to the Hudson River within the Site boundaries.

West of the Main Plant Site, minor levels of Site contaminants still exist within a thin and intermittently saturated flow zone along the top of clay. Contaminated groundwater immediately west of the site is expected to be captured by the french drain system. Further to the west, groundwater containing low levels of Site constituents likely discharges and will continue to discharge to the Hudson River. Groundwater in the Area Southeast of the Pretreatment Plant is contaminated with Site constituents at levels above the groundwater standard. Groundwater from this area discharges to small surface water drainage ways which eventually flow to the Hudson River. Maximum constituent concentrations in the groundwater at the point of discharge and in immediately affected surface waters are below groundwater standards.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

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X If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s): See documents referenced previously.

The only known and continuing discharge of contaminated groundwater into the Hudson River is in the area west of the Site. The maximum cyanide concentration, found at wells off-site to the west and immediately upgradient of the Hudson River is at Well Point WP-0-50. At this location, cyanide has been found in concentrations up to 240 ppb vs. a groundwater standard of 100 ppb. This constituent's concentration is well below "10 times the groundwater standard", and is not expected to have a significant effect on surface water. Also, WP-0-50 is located only 50 feet west of the west end of the french drain, and the groundwater in the vicinity of this well point is expected to be drawn toward the drain. At well point WP-0-50, chromium is found at concentrations up to 23 ppb, which is below the groundwater standard of 50 ppb. Groundwater concentrations of cyanide and chromium are found, but at even lower levels in the well points located further to the west. At the present time, data are insufficient to determine if there are any trends in the chemical concentrations. Required groundwater monitoring will provide additional data on any concentrations changes or trends. There are no other known conditions which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at the current concentrations.

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

_____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____ If unknown - skip to 8 and enter "IN" status code.

Rationale and
Reference(s):_____
_____
_____
_____
_____
_____
_____
_____

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these

areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

X	If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."
_____	If no - enter "NO" status code in #8.
_____	If unknown - enter "IN" status code in #8.

Rationale and Reference(s): See documents referenced previously.

Monitoring of the site groundwater quality and piezometric data will continue under the facility's Part 373 Post-Closure Permit, as necessary to provide acceptable evaluations of water quality trends and verification that the components of the GWES are functioning as required. For the Main Plant Site Area, water level measurements taken from the manholes and sumps along the french drain will be used to demonstrate that the water elevations in the drain are maintained below the top of clay, and that the drain is thus capturing all of the Site overburden groundwater at the downgradient perimeter. Bedrock observation wells and well pairs along the downgradient site boundary will be used to verify that adequate groundwater flow reversal and capture is maintained within both the Horizon A and Horizon B bedrock zones.

Horizon A observation wells: AW-A7, AW-A8, AW-A9, AW-A10, AW-A11, AW-A12, AW-A13, AW-A14, MW- 25S, MW-27S.

Horizon B observation wells: AW-B9, AW-B10, AW-B11, AW-B12, AW-B13, AW-B14, AW-B15, AW-B16, AW-B17, MW-25D, MW-27D.

The approved water level and chemical monitoring program for the Site includes many additional wells not used directly for determination of "groundwater migration under control". These wells will provide necessary data for monitoring changes and trends in Site groundwater chemistry.

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

__X__ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Ciba/Hercules facility , EPA ID # NYD002069748, located at Lower Warren Street, Town of Queensbury, Warren County, New York. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

_____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

_____ IN - More information is needed to make a determination.

Completed by (signature) Gary D Casper Date 9/25/02
(print) Gary D. Casper
(title) Senior Engineering Geologist

Supervisor (signature) E L Dassatti Date 9/27/02
(print) Edwin Dassatti
(title) Director - Bureau of Solid Waste and Corrective Action
(EPA Region or State) New York State

Locations where References may be found:

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625 Broadway - 9th Floor
Albany, New York 12233

Contact telephone and e-mail numbers

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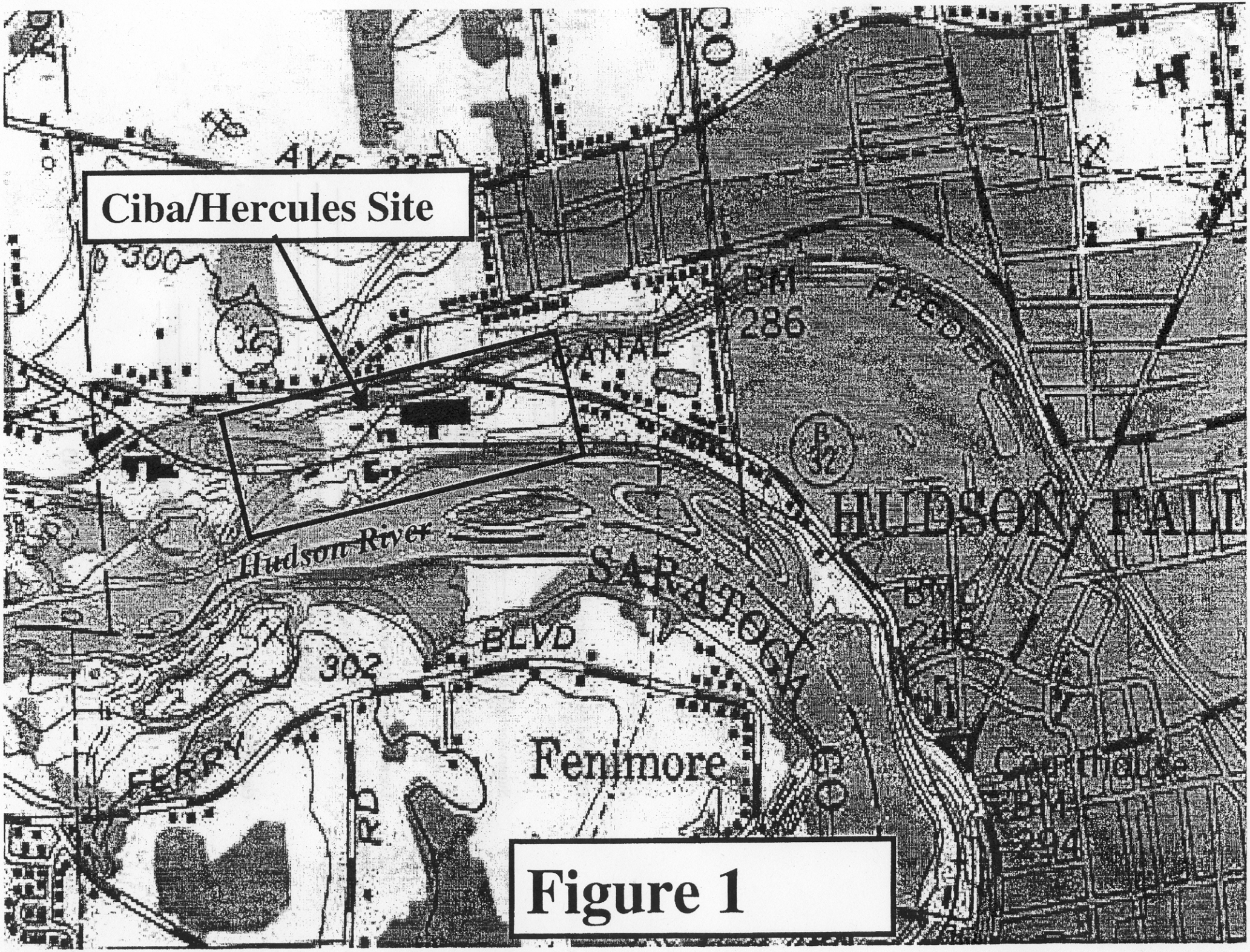
Ciba/Hercules Site
Hudson River
CANAL
BLVD
SARATOGA
Fenimore
FERRY
RD
HUDSON FALL
Courthouse
BM
286
BM
246
BM
294
300
302
32

Figure 1

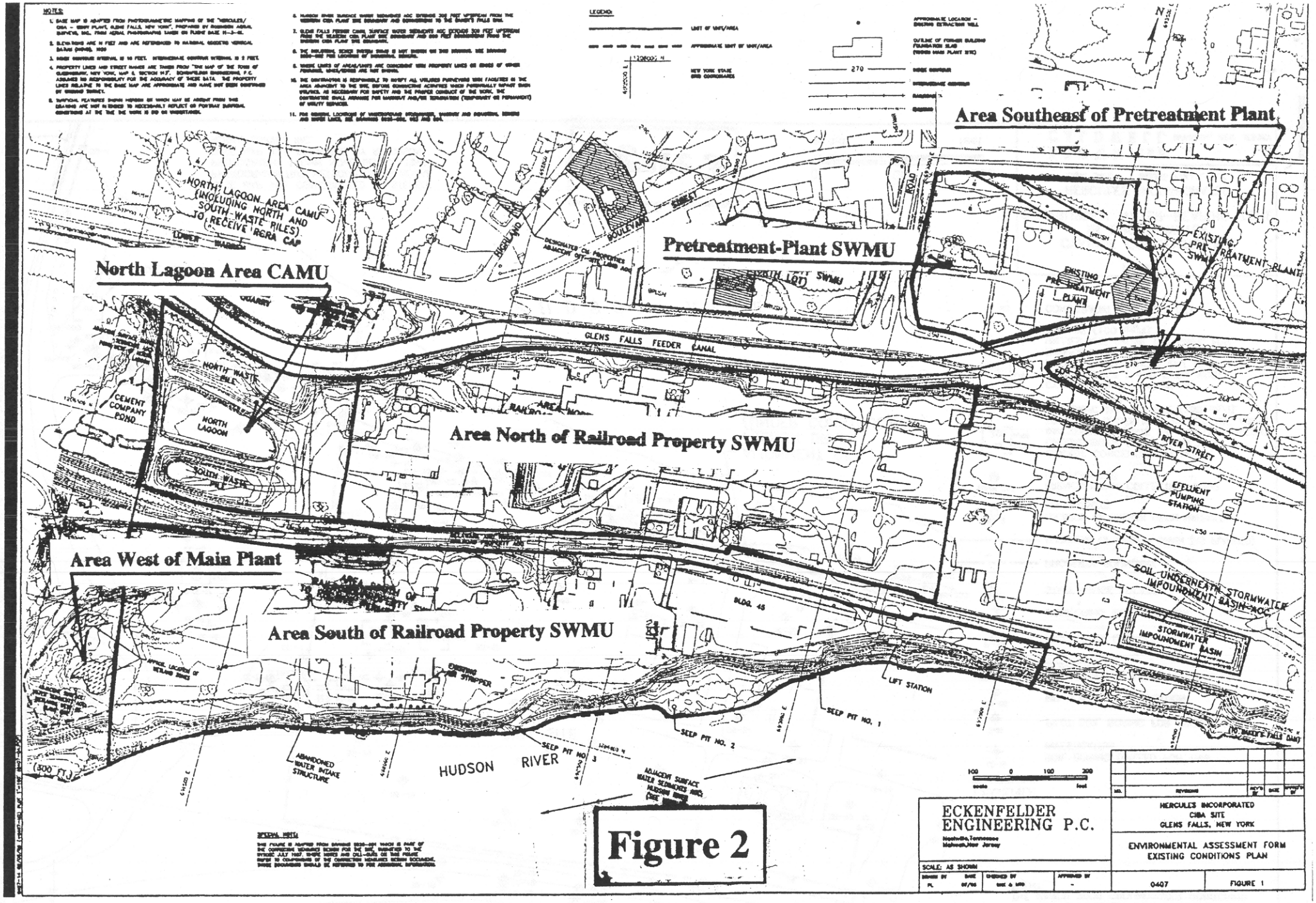
Area Southeast of Pretreatment Plant
North Lagoon Area CAMU
Pretreatment-Plant SWMU
Area North of Railroad Property SWMU
Area West of Main Plant
Area South of Railroad Property SWMU
NORTH LAGOON AREA CAMU (INCLUDING NORTH AND SOUTH WASTE PILES) TO RECEIVE RCRA CAP
GLENS FALLS FEEDER CANAL
NORTH WASTE PILE
SOUTH WASTE PILE
NORTH LAGOON
CEMENT COMPANY POND
EXISTING PRE-TREATMENT PLANT
EFFLUENT PUMPING STATION
RIVER STREET
SOIL UNDERNEATH STORMWATER IMPOUNDMENT BASIN AOC
STORMWATER IMPOUNDMENT BASIN
BLDG. 45
LIFT STATION
SEEP PIT NO. 1
SEEP PIT NO. 2
SEEP PIT NO. 3
ABANDONED WATER INTAKE STRUCTURE
HUDSON RIVER
(TO BAKER'S FALLS DAM)
LEGEND:
NOTES:
ECKENFELDER ENGINEERING P.C.
Nashville, Tennessee
Mahwah, New Jersey
HERCULES INCORPORATED
CIBA SITE
GLENS FALLS, NEW YORK
ENVIRONMENTAL ASSESSMENT FORM
EXISTING CONDITIONS PLAN
SCALE: AS SHOWN
0407
FIGURE 1

Figure 2

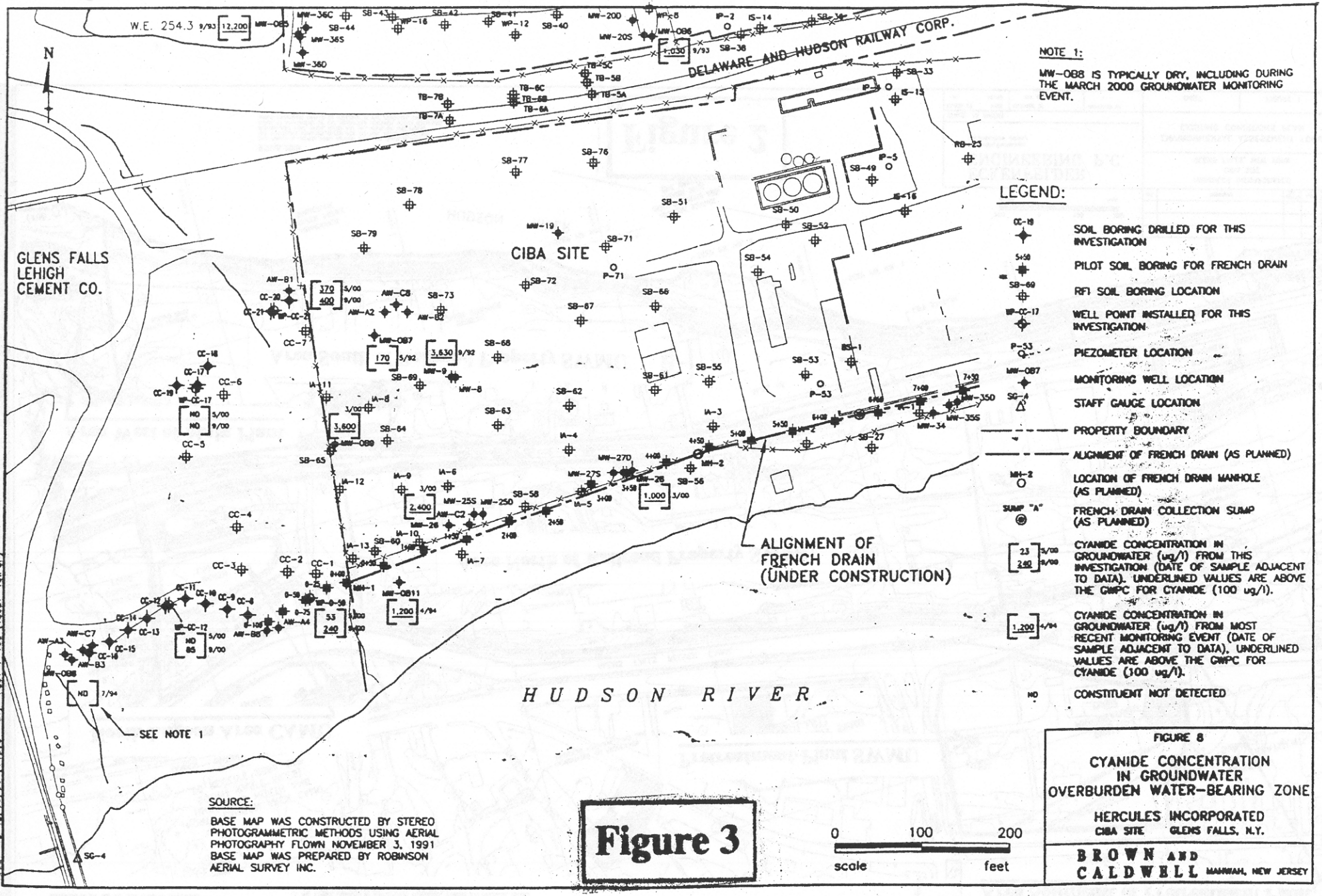

Figure 3

FIGURE 8

CYANIDE CONCENTRATION IN GROUNDWATER OVERBURDEN WATER-BEARING ZONE

HERCULES INCORPORATED
CIBA SITE GLENS FALLS, N.Y.

BROWN AND CALDWELL MAHWAH, NEW JERSEY

18927-12 12/06/00 (+18927-M1) PLOT 1=100 (18927=10.PCP)

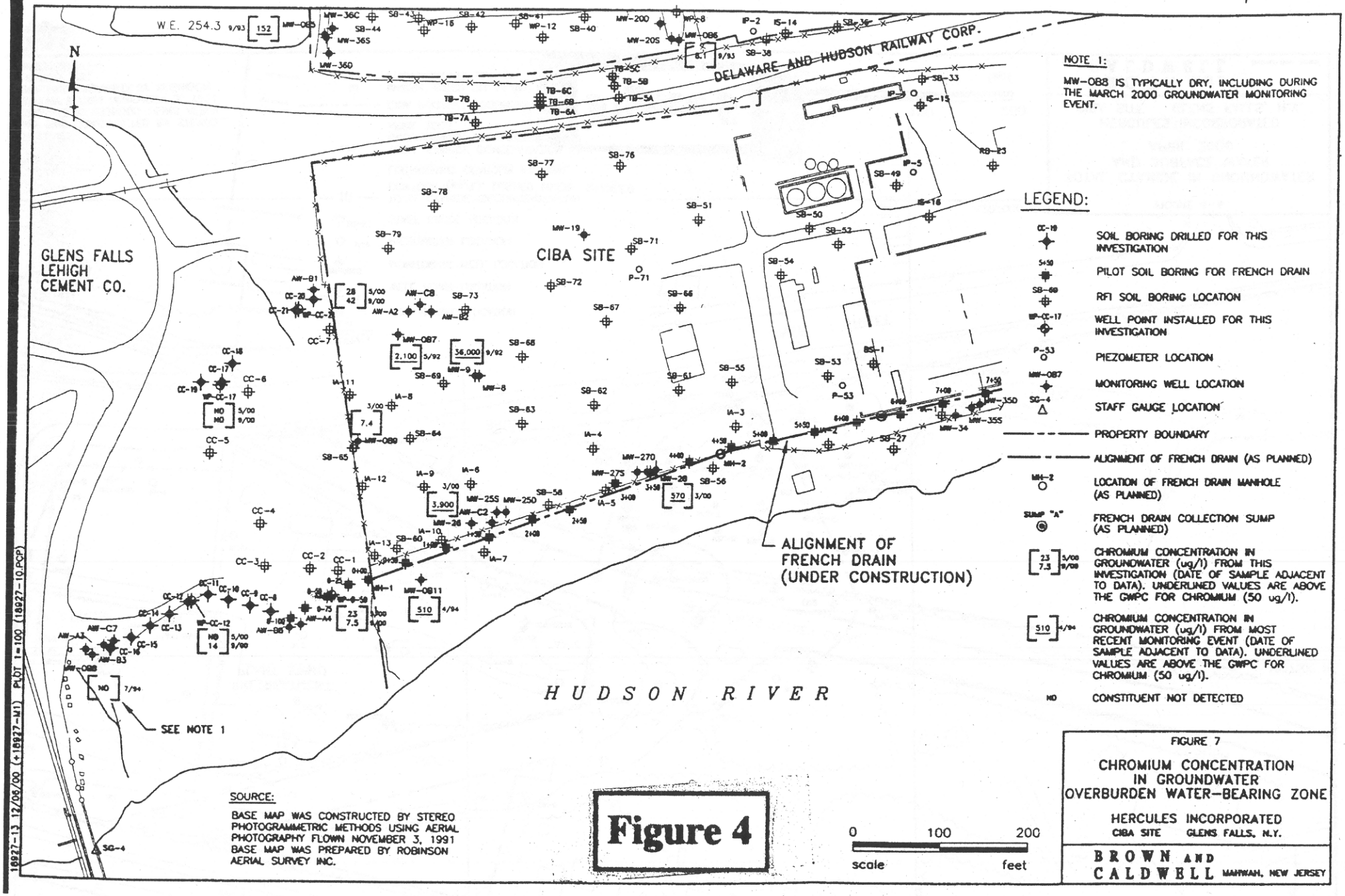

Figure 4

FIGURE 7

CHROMIUM CONCENTRATION IN GROUNDWATER OVERBURDEN WATER-BEARING ZONE

HERCULES INCORPORATED
CIBA SITE GLENS FALLS, N.Y.

BROWN AND CALDWELL MAHWAH, NEW JERSEY

18927-13 12/06/00 (+18927-M1) PLOT 1=100 (18927-10.PCP)

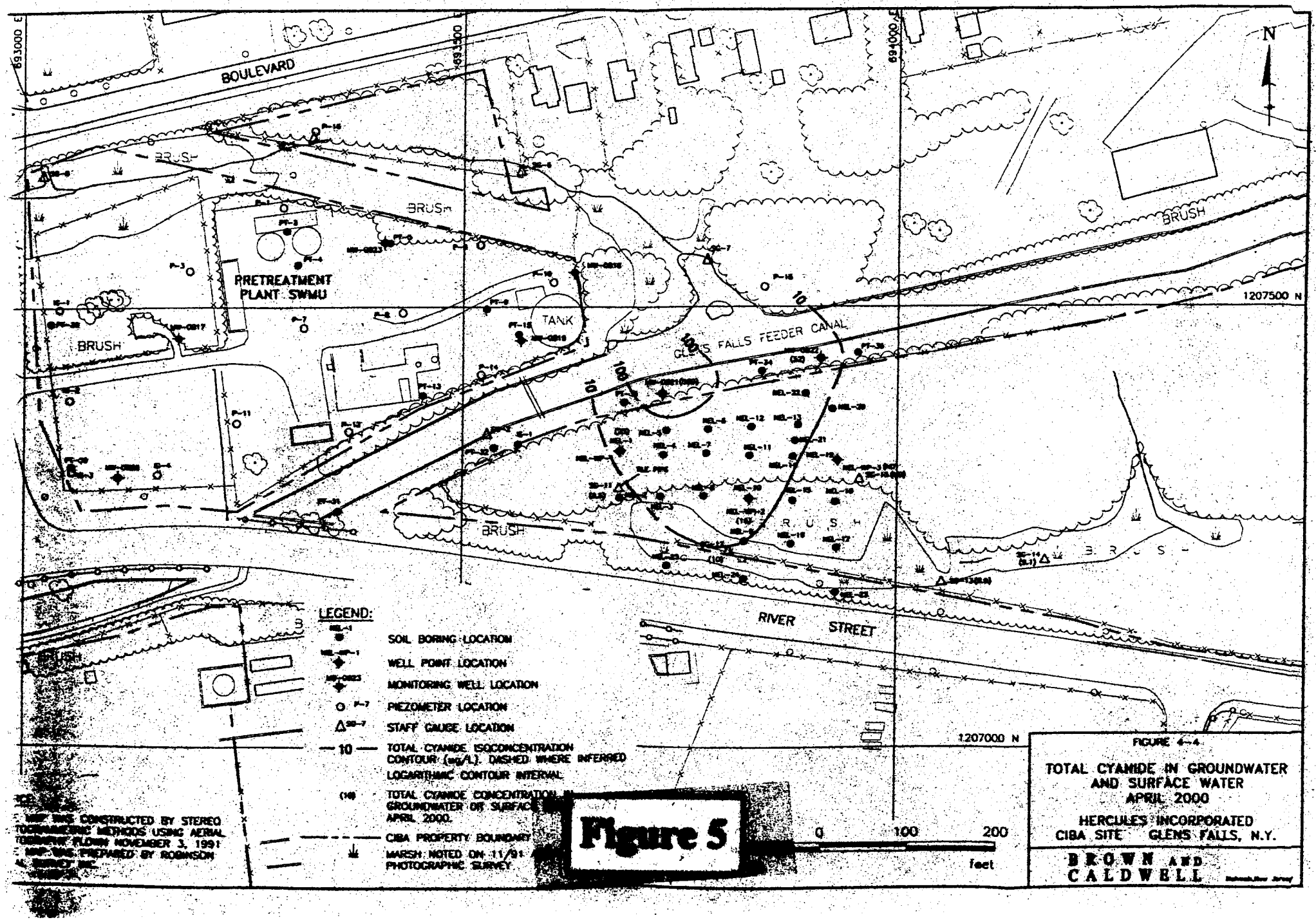

Figure 5

FIGURE 4-4

TOTAL CYANIDE IN GROUNDWATER AND SURFACE WATER APRIL 2000

HERCULES INCORPORATED
CIBA SITE GLENS FALLS, N.Y.

BROWN AND CALDWELL

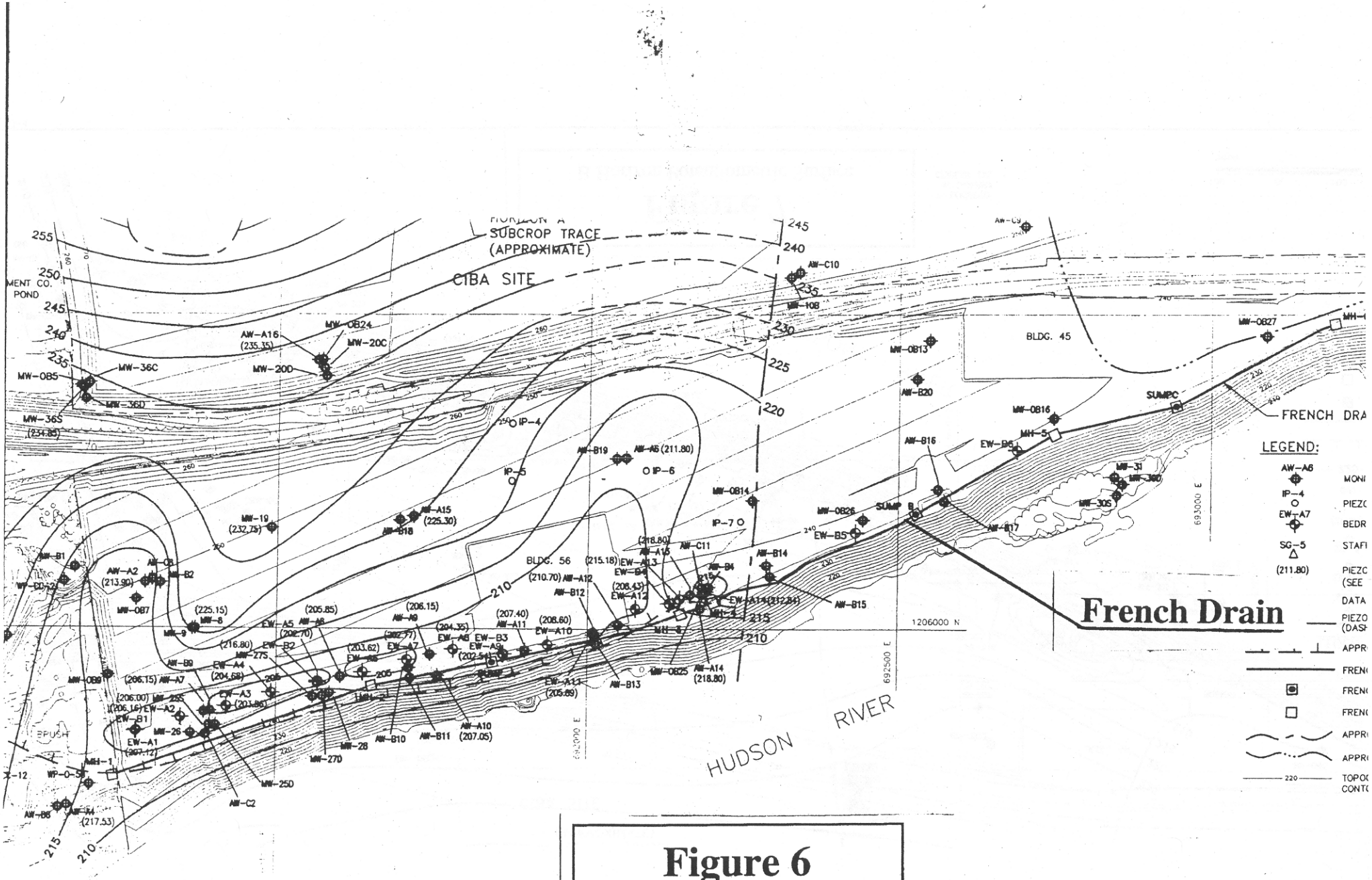

Figure 6

French Drain Alignment and
A Horizon Potentiometric Surface

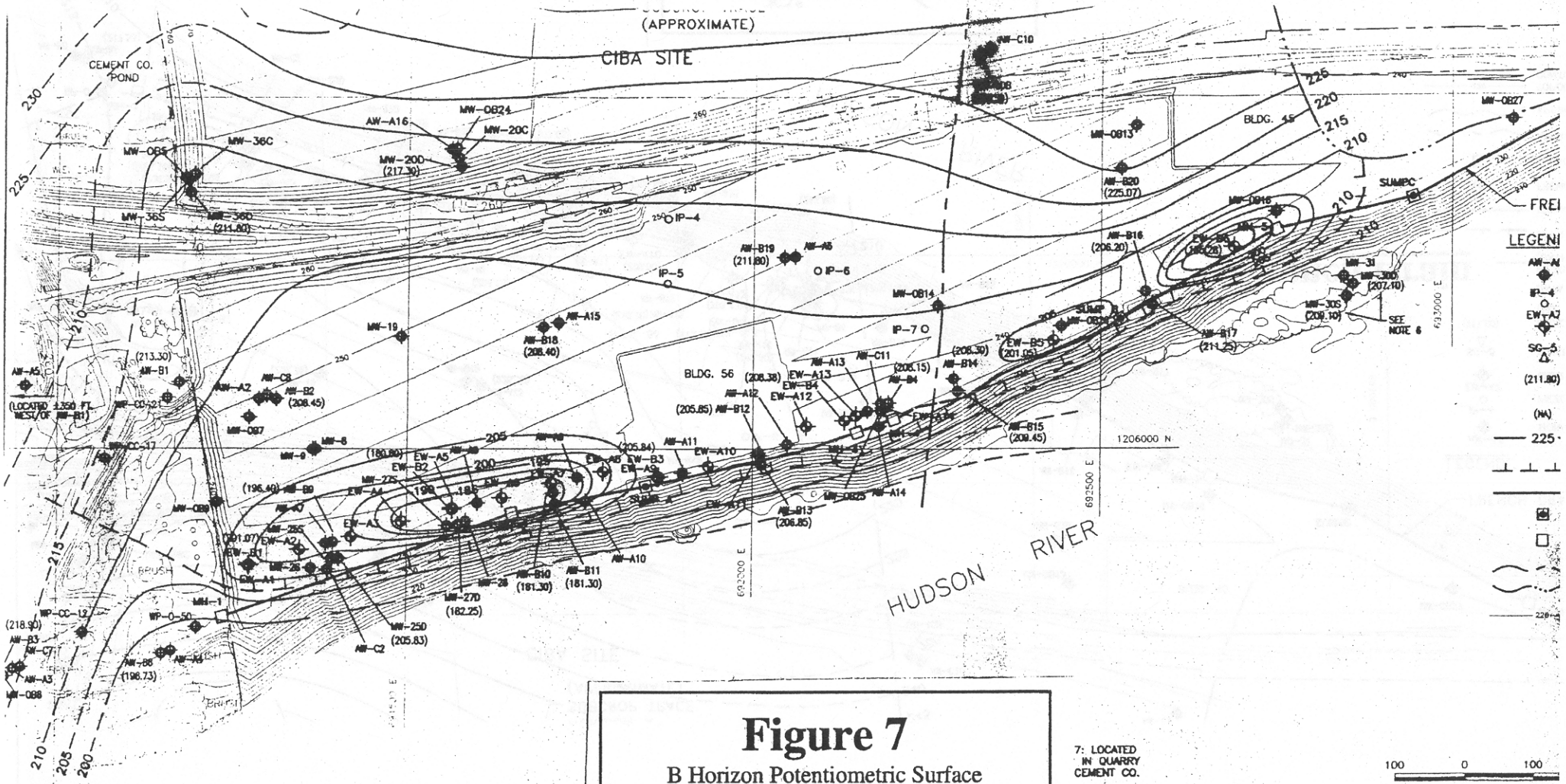

Figure 7

B Horizon Potentiometric Surface