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EXPRESS MAIL

Caroline Kwan, Project Manager
New York/Caribbean Superfund Branch 2
U.S. EPA Region II
290 Broadway, 20th Floor
New York, New York 10007-1866

Re: **Comments on "Feasibility Study" and "Proposed Plan for Remediation", Tutu Well Site, St. Thomas, Virgin Islands**

Dear Ms. Kwan:

Enclosed are three copies of the comments prepared by my office on the above referenced documents. These comments are provided on behalf of my client, L'Henri, Inc. These comments are being transmitted to counsel for the members of the group of Potentially Responsible Parties. Please feel free to contact my office, if you have any questions concerning this matter.

Sincerely,

Nancy D'Anna, Esq.

ND/aw

COMMENTS ON FEASIBILITY STUDY AND PROPOSED PLAN FOR REMEDIATION TUTU WELL SITE, ST. THOMAS, UNITED STATES VIRGIN ISLANDS SUBMITTED ON BEHALF OF L'HENRI, INC.

I. General Comments

Upon review of the administrative record maintained for Tutu Well Site, St. Thomas, United States Virgin Islands, it is apparent, that International Technology Corporation, ("IT") on behalf of L'Henri, Inc. has previously submitted comments on the Report of the Remedial Investigation, (attached as Exhibit 1), the Draft Feasibility Study (attached as Exhibit 2) and the Comments of the United States Environmental Protection Agency on the Report prepared by IT of the Soil Remediation conducted at the O'Henry Dry Cleaners, (attached as Exhibit 3). There are basic conclusions reached in the forgoing documents which appear to be inconsistent with the data generated from the sampling at the Tutu Well Site. On behalf of L'Henri, Inc., IT has previously submitted comments on these inconsistencies. As set forth in more detail below, we again reiterate those comments previously submitted.

A. <u>The conclusion that L'Henri is the primary source of contamination of chlorinated compounds in the southern portion of the aquifer is not supported by the data concerning groundwater flow, or an accurate interpretation of the VOC plume</u>.

As stated previously, in the comments submitted by IT on behalf of L'Henri, Inc. the most appropriate depiction of the deep groundwater elevation contour map for the area down gradient from the O'Henry dry cleaning store is contained in the map drawn for data collected on May 10, 1994. This map is most appropriate because it contains data from the Steele, Harvey, Eglin II, and

Eglin III wells. As demonstrated on the May 10, 1994 map, deep groundwater, and consequently contaminants, would flow southwest, beneath the O'Henry dry cleaning store. The flow path from the O'Henry dry cleaning store does not pass through the location of the Steele or LaPlace wells. Shallow groundwater flow is generally southwesterly in the vicinity of O'Henry. **See, Exhibit 1, general comment 1 and attached depictions of the deep and shallow groundwater flow maps), Exhibit 2 Comment on Section 2.1.1.3.**

The presentation of the TCE, PCE, AND 1,2 DCE in the deep groundwater is not consistent with the appropriate deep groundwater flow map as presented in the Report of the Remedial Investigation. A more consistent depiction of the plumes was submitted by IT with the comments on the Report of the Remedial Investigation. **See, Exhibit 1, comment 2 and attached maps.**

In addition, as stated in the Feasibility Study and Proposed Action Plan, 1,2 DCE is present in the southern portion of the aquifer at the level of 100 ppb. 1,2 DCE contamination is not present in the soil at the O'Henry Dry Cleaning Store at significant levels.

B. <u>The significance of the Esso Tutu Service Station as a source of contamination in the southern portion of the aquifer is ignored.</u>

The accurate depiction of groundwater flow lines demonstrates that the majority of the contamination which is present in the southern portion of the aquifer could not originate at the O'Henry Dry Cleaners, assuming that groundwater flow direction has not significantly changed with time. Additional evidence for this

position is found in examination of the presence of MTBE contamination in the aquifer. MTBE is a gasoline additive, and is not used in any form in the dry cleaning process. MTBE is found in the deep groundwater south of the Tutu Texaco Station, past the Esso Tutu Service Station, to the Delegarde well.

Further, it is without question, that the former operator of the Esso Tutu Service Station emptied the holding tank which contained waste oil, heavily contaminated with chlorinated hydrocarbons by pumping the tank into the toilet, which emptied directly into the sanitary sewer. In spite of this evidence of improper disposal and the obvious potential that the sanitary sewer remains as a potential source of chlorinated contamination, this potential source has not been investigated. **See, Soil Tech, 1990; Exhibit 1, comment 5.** Moreover, chlorinated hydrocarbon contamination has been detected in the sanitary sewer and soil at the Esso Tutu Service Station.

Further, there is a PCE hot spot located in the area identified as the "northern plume". This area, and its potential source has been ignored. In addition, if the accurate direction of groundwater is considered, it is impossible for a direct flow path to extend from the Harvey Supply Well to the Smith Supply Well. **See, Exhibit 1, comment 1, and attached maps.**

C. <u>The actual evidence obtained during the remediation of the soil at the O'Henry Dry Cleaning Store demonstrates that DNAPL contamination is not present in the soil.</u>

The Report on the Remedial Investigation stated that the concentration of PCE in the soil was not high enough to conclude

the PCE was present in a separate phase in the soil. This conclusion is supported by the actual data collected during the soil remediation conducted by L'Henri, Inc. at the O'Henry store. The actual soil data collected demonstrates that chlorinated contamination is not present at a depth below six feet at O'Henry. Further, the presence of DNAPL at the site has been assumed based upon the presence of PCE in OHMW4, a well which is located side gradient, and not down gradient from O'Henry, and the historical use of PCE at the dry cleaning store. **See, exhibit 2, comments Section 2.2.2.1.**

II. Soil Remediation at the O'Henry Dry Cleaners.

The soil remediation alternatives provided in the proposed action plan do not take into consideration that remediation has already occurred at O'Henry with EPA approval and oversite. Further, the cleanup standards provided by EPA have been incorrectly calculated. Site modeling utilized by EPA does not take into account all site specific data available. However, without conceding that said modeling is appropriate, utilizing the method of calculation provided by EPA, with appropriate site specific data, the cleanup standard to be used at the O'Henry site would be 534 mg/kg for soil above 1.6 feet and 713 mg/kg for soil below 1.6 feet, not 31 ppb. **See, Exhibit 4.**

III. Groundwater Remediation at the Tutu Well Site.

Initially, we note, that prior to Hurricane Marilyn, the Virgin Islands had experienced a drought with lasted in excess of two years. During this period, most of the groundwater elevation data was collected. During and following Hurricane Marilyn,

rainfall has increased dramatically. In St. Croix, IT has observed that groundwater elevation increased a much as ten feet, in one aquifer after the hurricane. Consequently, it is possible that the location of the groundwater contamination plumes have shifted.

Further, there is no basis in the administrative record to assume that clean up to groundwater standards through the decommissioning of existing wells, installation of groundwater recovery wells will be cost effective or will result in restoration of the groundwater to drinking water standards. The pumping of groundwater in the Tutu valley has operated to stabilize the plume and to prevent the downward migration of the plumes in the prior years. Utilization of existing wells may be more effective than the method proposed by EPA. Moreover, there has been no consideration of the time period required to restore the aquifer through the efforts of pumping and treating the groundwater, as compared to natural attenuation. The additional technical comments concerning the groundwater treatment system were contained in the comments submitted by IT to the draft Feasibility Study and are reiterated herein. Said comments are attached as Exhibit 3 for your convenience.

EXHIBIT 1

Comments
Final Remedial Investigation (RI) Report
Tutu Wells Site, Tutu, St. Thomas
Report Prepared by Geraghty and Miller (April 1995)
Comments by IT Corporation for L'Henri Inc. (June 7 1995).

GENERAL COMMENTS

1. Deep groundwater flow in the area around and hydrogeologically downgradient of the O'Henry Dry Cleaners is inconsistent between the two groundwater flow maps presented.

   The deep groundwater elevation contour maps presented in the RI are inconsistent with each other for the area around and hydrogeologically downgradient of O'Henry Dry Cleaners. The May 10, 1994 groundwater flow map is the most appropriate because the map includes data from wells Steele, Harvey, Eglin II and Eglin III (wells that are in the immediate vicinity of the O'Henry facility) which are not included on the May 23-24, 1994 map. Groundwater data from these wells indicates a groundwater "high" extending from Eglin I to Steele which approximately coincides with the topographic high (this is missing on the May 23-24 map). From the Eglin well area, groundwater and consequently contaminants would move to the southwest (beneath the O'Henry Dry Cleaners), south (toward the Steele well) and southeast (toward the LaPlace well). Data from the Geraghty and Miller pump test at Eglin indicate a preferential flow path southeast from Eglin (interpreted as fracture flow). In addition, shallow groundwater flow supports a local southwesterly flow direction in the immediate vicinity of O'Henry (in general shallow and deep groundwater flow would be expected to be similar).

2. Presentation of individual chemical compound plumes (specifically chlorinated solvents) are not consistent with groundwater flow maps in the area around and hydrogeologically downgradient of the O'Henry Dry Cleaners.

   This is the first time individual compound plume maps have been presented for Tetrachloroethene (PCE), trichloroethene (TCE), 1,2-Dichloroethene (1,2-DCE), vinyl chloride and methyl tert butyl ether (MTBE) therefore this is the first opportunity to comment on them.

   The presentation of PCE, TCE and 1,2-DCE in shallow groundwater (figures 5-25, 5-27 and 5-29 respectively) are not consistent with groundwater flow maps for the shallow groundwater (figures 4-12 and 4-13) as presented in the RI. To develop more defensible plume maps for these compounds, flow lines were drawn on figures 4-12 and 4-13 (attached). Then flow lines were transferred to the plume maps and the plumes redrawn to take into account the flow directions (attached). These redrawn maps indicate that the PCE, TCE and 1,2-DCE plumes in the shallow groundwater are located further to the west than shown in the RI and are elongated to the south rather than to the southeast (as shown in the RI).

   The presentation of PCE, TCE and 1,2-DCE in deep groundwater (figures 5-26, 5-28 and 5-30 respectively) are not consistent with the appropriate deep groundwater flow map (see

comment 1 above) for the deep groundwater (figure 4-14) as presented in the RI (figure 4-14). To develop more defensible plume maps for these compounds, flow lines were drawn on figure 4-14 (attached). Then flow lines were transferred to the plume maps and the plumes redrawn to take into account the flow directions (attached). The redrawn plume maps (which include a 5 ppb line for TCE) indicate similar patterns for the PCE, TCE and 1,2-DCE plumes, showing a wider plume in the area extending from the Eglin well to the LaPlace well as reflective of the divergent groundwater flow. Further it should be noted that no groundwater elevation data is available south of MW-22D therefore the plume is conjectural downgradient of that location.

In addition, the outermost contours presented for individual compounds in the RI should be revised to reflect the EPA MCLs. This is valid since the data is not generally constrained by non detect values (presumably 10 ppb was used as the outermost contour to reflect the detection level for these compounds).

3. Inappropriate interpretation of VOC plumes in groundwater

The RI states that there are two plumes of VOCs. This is misleading and is an inappropriate interpretation. It appears from the text that a "plume" is defined as an area with greater than 10 ppb total VOCs. However, there is no technical basis for this definition. A more valid interpretation should be based on the individual VOC compounds. Further, there is no technical basis presented for using 10 ppb (apparently an arbitrary number) as the limit of the contamination for total VOCs or for the individual compounds. The contaminant maps for PCE are the most appropriate to discuss the extent of contamination in the Tutu area. The contaminant maps for PCE (figures 5-25 and 5-26) indicate three areas with PCE greater than 100 ppb in the shallow groundwater (referred to herein as the northern, central and southern hot spots), but a more diffuse plume in the deep groundwater. This pattern appears similar for other individual chlorinated VOCs.

There is no discussion in the RI of the central PCE hot spot, except to refer to it as a subset of the "northern plume". This is a significant area and warrants discussion.

In the text discussing the "southern chlorinated VOC plume", a statement is made that the "100 ppb contour extends from the Harvey Supply Well to the Smith Supply Well". This infers a flow path between the two wells which is clearly impossible when considering the flow maps.

4. Misinterpretation of the significance of Esso as a source of potential contamination

Criteria for evaluating whether a property represented a source of impact to groundwater are presented on page 5-33 of the Final RI. These criteria are as follows:

- "If impact to soil at a property was established based on the NYS TAGM values, and similar constituents were found in the groundwater at or downgradient of the property at higher concentrations than upgradient, the property was considered to represent a source of impact to groundwater.

- If organic compounds were detected in groundwater at concentrations in excess of 1 percent of their aqueous solubility at a property, these detections were viewed as an indication of the possible presence of nonaqueous phase liquids (NAPLS) in the unsaturated or saturated zone. The property was therefore considered to represent a source of impact to groundwater."

Showing the groundwater flow lines on the contaminant plume maps indicates that the majority of the VOCs in the southern portion of the aquifer did not originate from the O'Henry Dry Cleaners. Additional evidence for this position is provided in the analysis of MTBE, a gasoline additive. MTBE has contaminated the deep aquifer in an area extending south from the Texaco station, past the Esso station to the Delegarde Well. Note that MTBE is found at low concentrations in wells near the O'Henry facility. Since MTBE is a compound which moves quickly with the groundwater, it can be considered as a tracer for any chemicals emanating from the gas stations. Therefore, MTBE can be used to trace the general direction of groundwater flow (and therefore direction of chemical movement) from Esso to the south. Since MTBE did not originate at the O'Henry Dry Cleaners and MTBE is found in drinking water supply wells Eglin I, Eglin III, Harvey, Steele, LaPlace, Smith and Delegarde, downgradient of the Esso facility, the Esso station MUST be considered a source to impact to groundwater all the way to the Delegarde well.

5. <u>Inappropriate and inadequate evaluation of the sanitary sewer system as a source of contamination.</u>

The RI inadequately addresses historical sources to the sanitary sewer as a potential source of contamination to the subsurface. For example, the report ignores the fact that the waste oil holding tank (used to dispose of VOCs) was emptied directly into the toilet (therefore directly entering the sanitary sewer system) at the Esso station (Soil Tech, 1990).

Chlorinated VOCs detected in the storm sewer at the Esso station is attributed in the RI to infiltrating groundwater because Blasland, Bouck and Lee (Esso's consultant) "observed groundwater infiltrating into the sewer" when the sample was collected. Further, the assertion that the storm water sewer occurs within the water table in this area is based on one reading from one location therefore this assertion is an assumption, not a conclusion as presented in the RI report.

The discussion in the RI of the sanitary sewer results infers that O'Henry is a current source of VOCs to the sanitary system because "the highest concentrations of chlorinated VOCs were found in the sanitary sewer samples from O'Henry". This is misleading for several reasons:

- The "samples" at the sewer near O'Henry are actually one sample and its duplicate.

- The text implies that the water in the sanitary sewer is from O'Henry. In reality, water enters the sewer from a variety of sources, including the Tom Cat laundry. As has been pointed out to Geraghty and Miller on several occasions, at the time when the sample was collected from the sewer, water was flowing into the sewer

from the north side (from the Tom Cat laundry). The Tom Cat Laundry uses water from the Eglin supply wells in its machines without prior treatment therefore the water entering the sewer (and therefore sampled by ADL) is effectively Eglin well water.

6. Misinterpretation of O'Henry Dry Cleaners as one of the main source areas for the southern plume.

The RI claims that O'Henry Dry Cleaners is "the main" and "the principal source of the southern chlorinated plume". The basis for this statement is that "In the southern chlorinated plume, relatively high chlorinated VOC concentrations have been detected in the vicinity of and downgradient of O'Henry". Further, the RI claims that "This conclusion is confirmed by the high concentrations of PCE in soil from this area". These claims are not supported by the data for the following reasons:

- Since "Relatively high concentrations" is not defined it is not known what is meant by this.

- Chlorinated VOCs detected in groundwater in the vicinity of O'Henry may have originated at any source upgradient. The presence of elevated VOCs does not logically lead to the conclusion that the property is a source.

- Consideration of the groundwater flow maps together with contaminant concentration maps indicate that it is unlikely that contaminants entering the groundwater at O'Henry have contaminated the Steele, LaPlace, Smith , Mathias and Delegarde wells.

- Data recently obtained during the soil removal action at the O'Henry Dry Cleaners confirm that no DNAPL is present in the soils (Soil Remediation Report, IT, May 1995). Further, during the soil removal action, soil samples were collected from a boring placed where previously the highest levels of PCE detected in soils were found. The soil samples indicated that no PCE is present in soils below 10 feet. Note that the unsaturated zone extends to approximately 20 feet at this location.

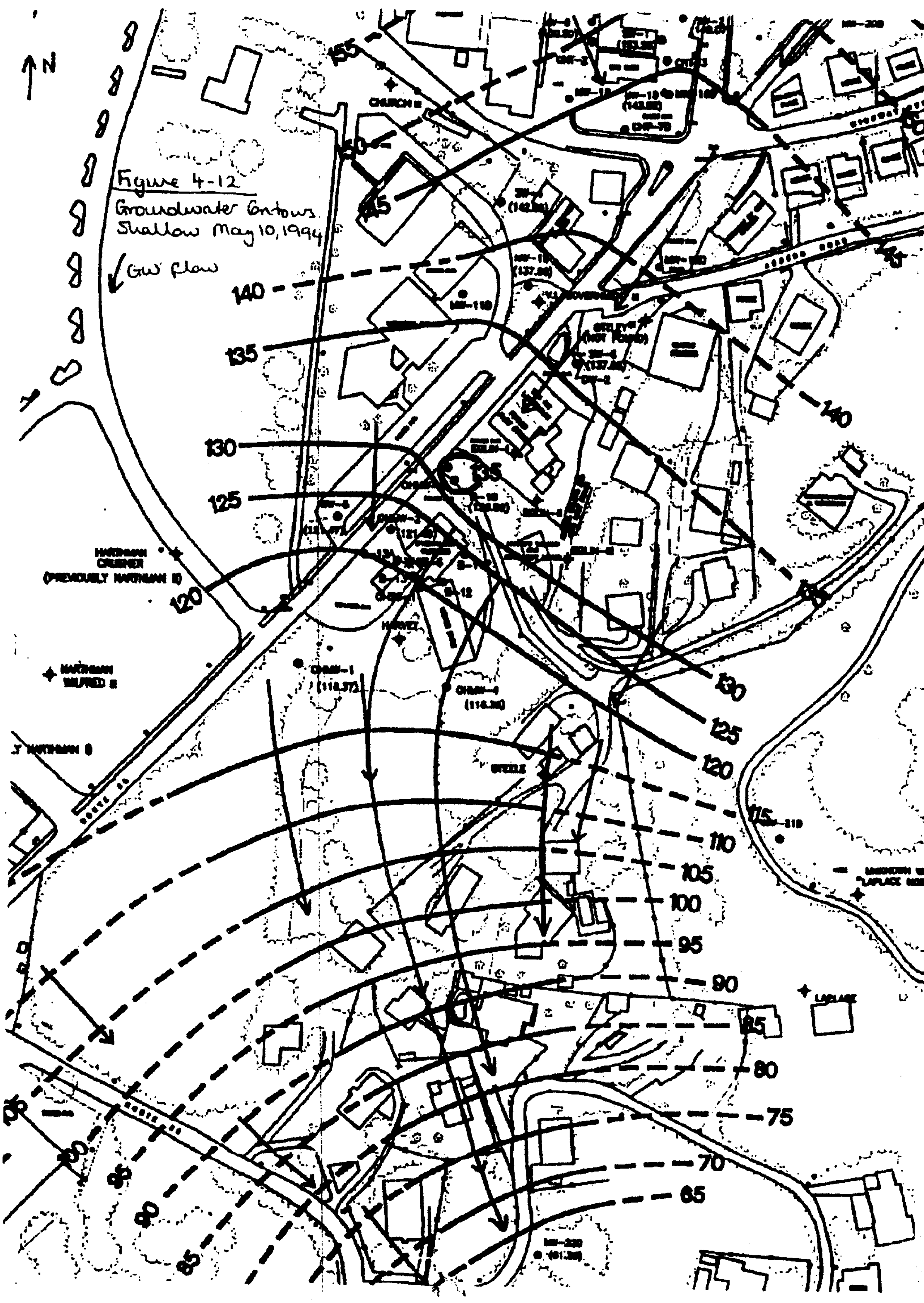
7. Comments Concerning DNAPL evaluation.

The Final RI discussion of the likely presence of DNAPL indicates a high probability of a DNAPL release at the O'Henry Dry Cleaners based on the historical use of PCE as a dry cleaning solvent using the criteria set forth in EPA 1992b. This is inappropriate use of this EPA publication where the goal is to provide guidance for site characterization. The Final RI states that the concentrations of PCE in soils found at O'Henry are not high enough to conclude that PCE is present as a separate phase in soils. Data recently obtained during the soil removal action at the O'Henry Dry Cleaners confirm that no DNAPL is present in the soils. (Soil Remediation Report, IT April 1995).

Evidence used in the Final RI to indicate that DNAPL is present in the groundwater beneath the O'Henry Dry Cleaners is that concentrations of PCE in groundwater samples

from two sampling rounds (between 1987 and 1991) were at levels which exceeded 1 percent of the solubility. This may indicate that free-phase existed before 1991. However, concentrations of PCE in groundwater samples collected from the Harvey supply well since 1991 have been much lower, indicating no free-phase since 1991. Therefore there is no evidence to conclude that PCE is present as a separate phase in groundwater beneath the O'Henry Dry Cleaners.

If it is assumed that the criteria provided in the Final RI for determining the high probability of DNAPL in groundwater is correct, then historical data provided for the Tillet supply well indicate that this area should also be identified as an area suspected to contain DNAPL in the saturated zone.


N
Figure 4-12
Groundwater Contours
Shallow May 10, 1994
GW flow
155
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
CHURCH
HARTMAN
CRUSHER
(PREVIOUSLY HARTMAN II)
HARTMAN
WILFRED II
HARVEY
CHMW-1
(118.37)
CHMW-4
UNKNOWN WELL
"LAPLACE NORTH" II
LAPLACE

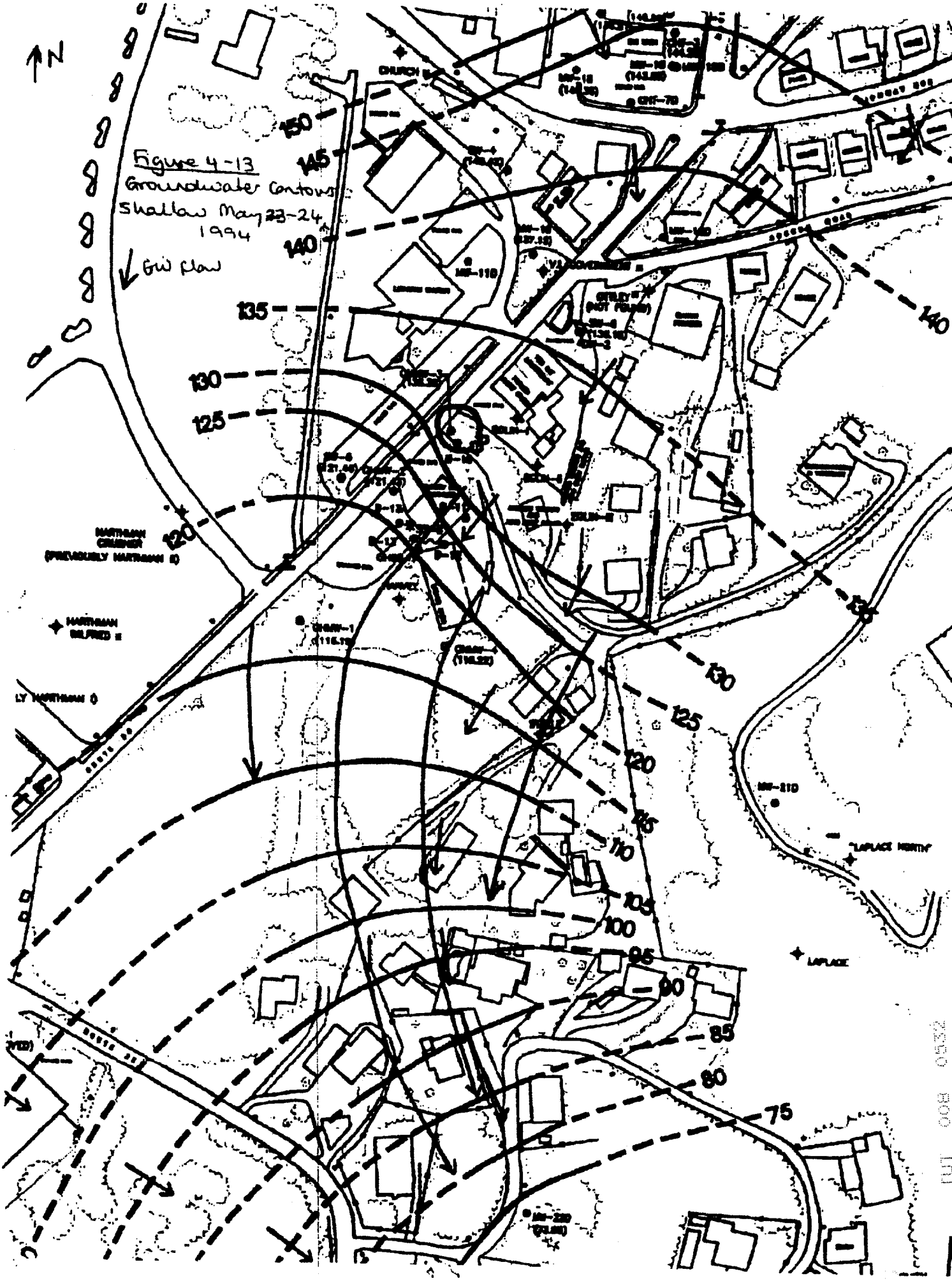

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Figure 4-13
Groundwater Contours
Shallow May 23-24
1994
GW flow
150
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
MW-110
MW-210
LAPLACE NORTH
LAPLACE

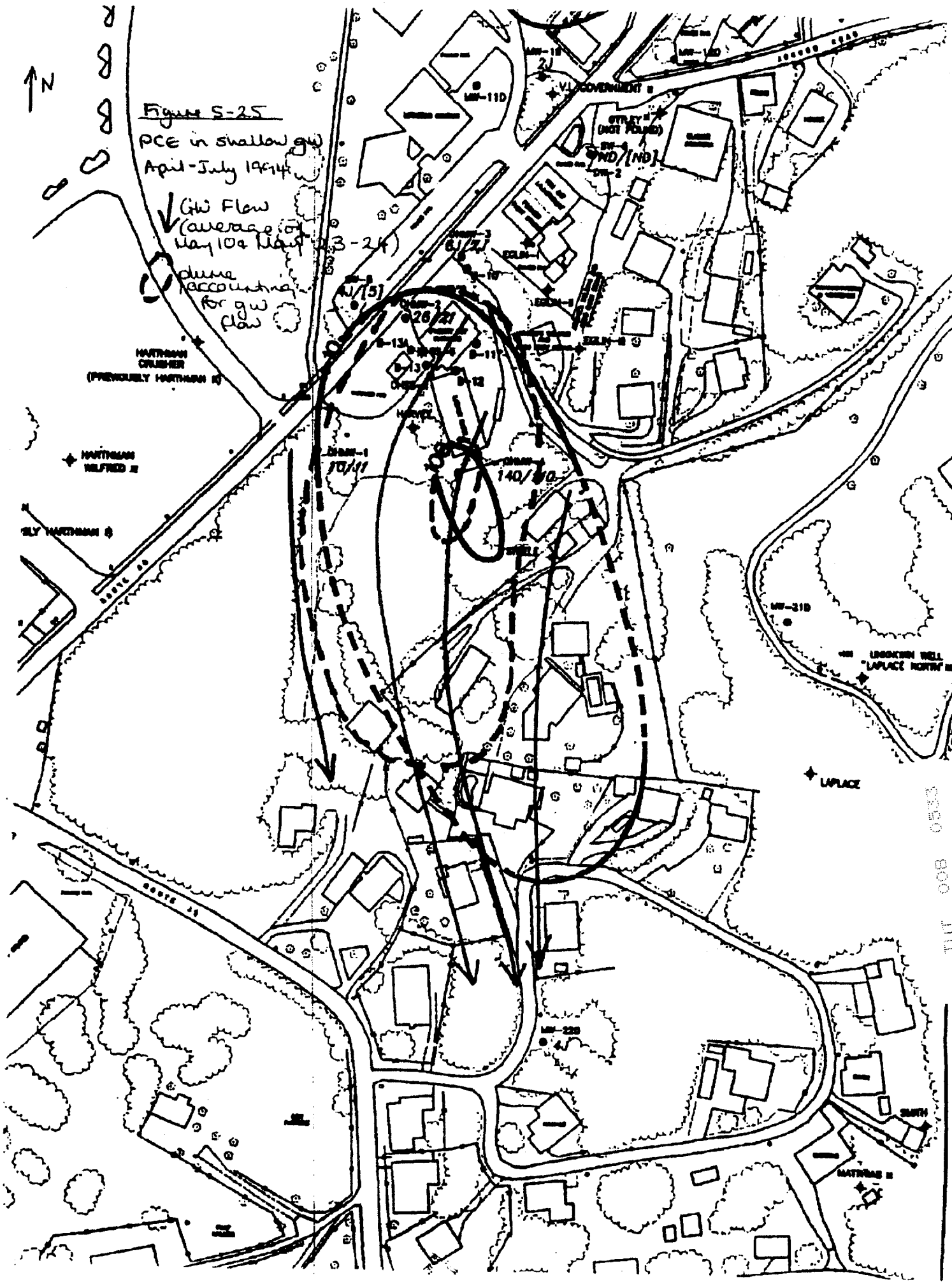
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Figure 5-25
PCE in shallow gw
April - July 1994
GW Flow
(average of
May 10 & May 23-24)
plume
accounting
for gw
flow
HARTMANN
CRUSHER
(PREVIOUSLY HARTMANN II)
HARTMANN
MILFRED II
HARTMANN II
MW-11D
MW-21D
LAPLACE
LAPLACE NORTH
SMITH
MATHIAS II

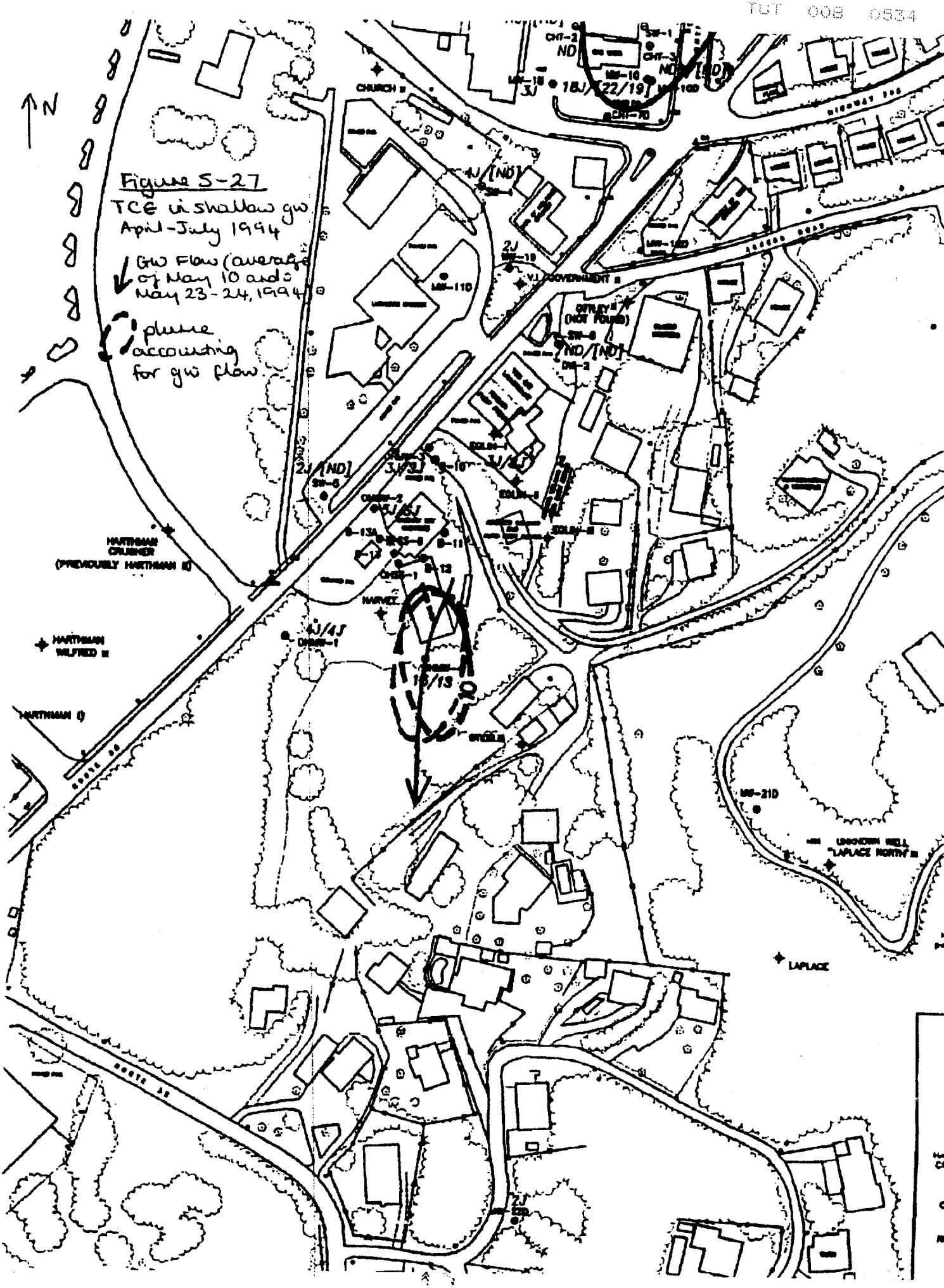
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Figure 5-27
TCE in shallow gw
April-July 1994
GW Flow (average of May 10 and May 23-24, 1994)
plume accounting for gw flow
CHURCH
MW-110
MW-210
HARTMAN CRUSHER (PREVIOUSLY HARTMAN II)
HARTMAN WILFRED
HARTMAN I
LAPLACE
LAPLACE NORTH
ROUTE 90

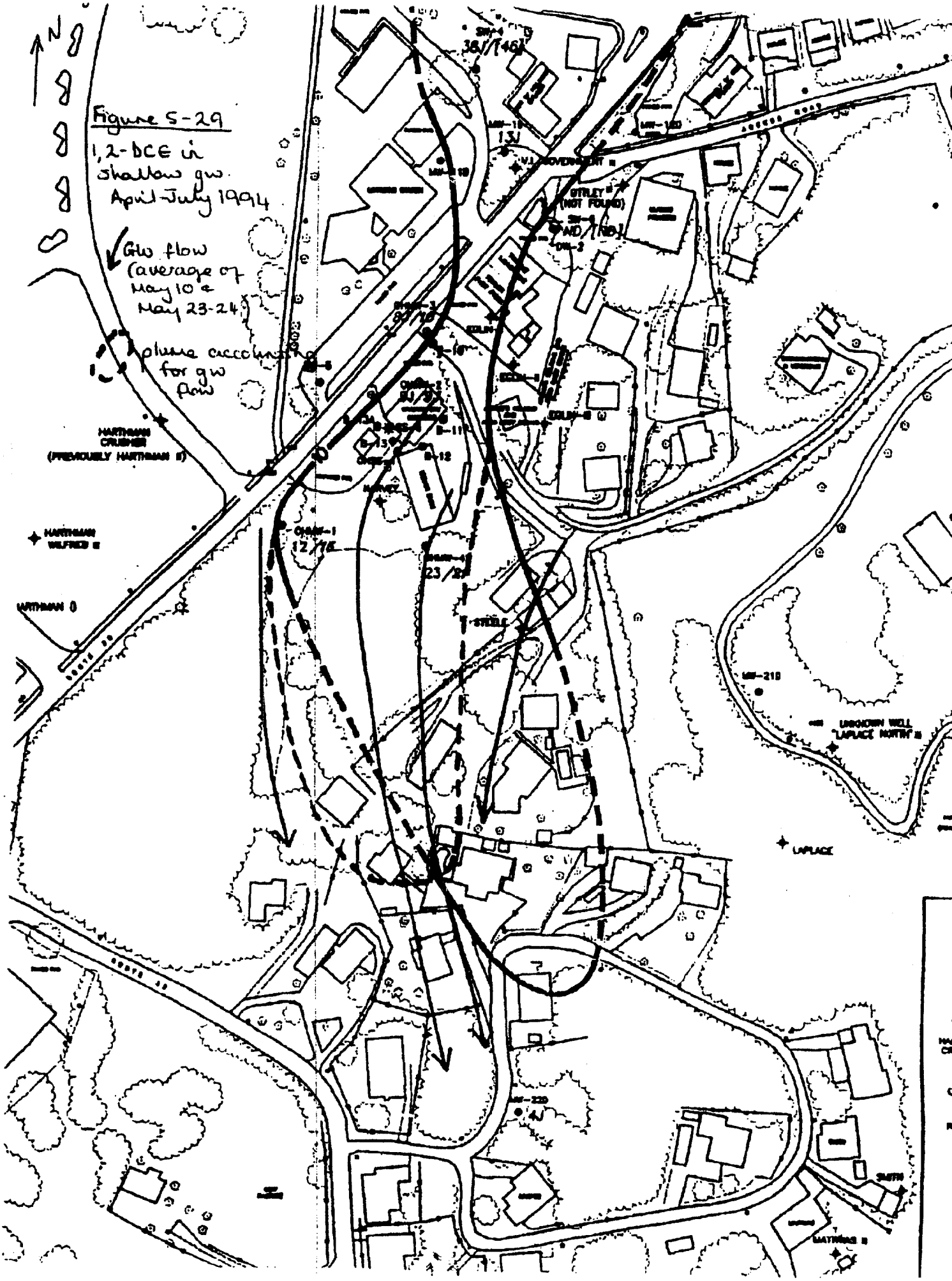
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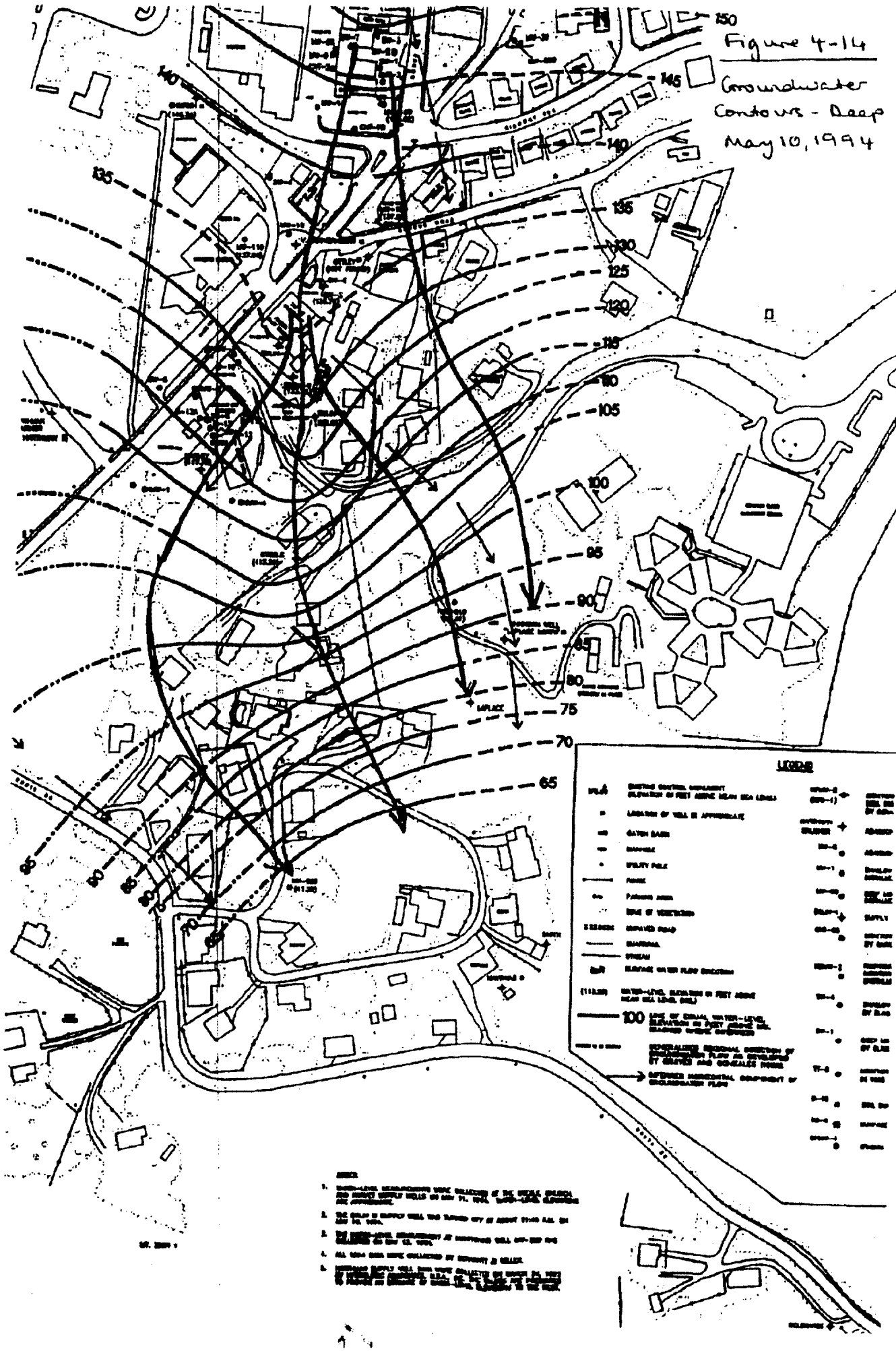
Figure 5-29
1,2-DCE in shallow gw.
April-July 1994
GW flow (average of May 10 & May 23-24)
plume accounting for gw flow
HARTMAN CRUSHER (PREVIOUSLY HARTMAN II)
HARTMAN WILFRED II
HARTMAN O
LAPLACE
UNKNOWN WELL "LAPLACE NORTH" II
HARTMAN II

TUT 008 0536

Figure 4-14

Groundwater Contours - Deep May 10, 1994



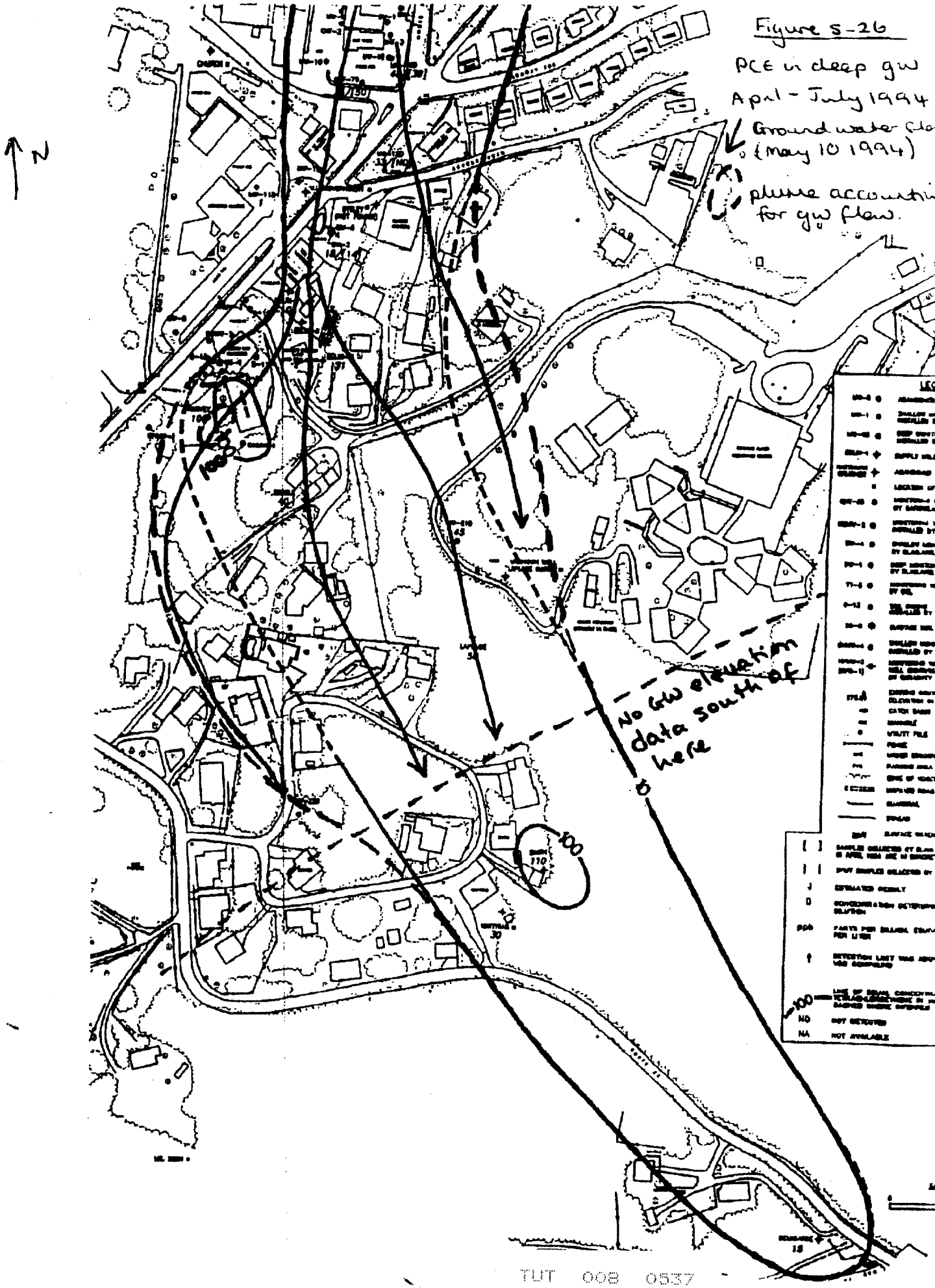


Figure 5-26
PCE in deep gw
April - July 1994
Ground water
(May 10 1994)
plume accounting
for gw flow.
No GW elevation
data south of
here
N

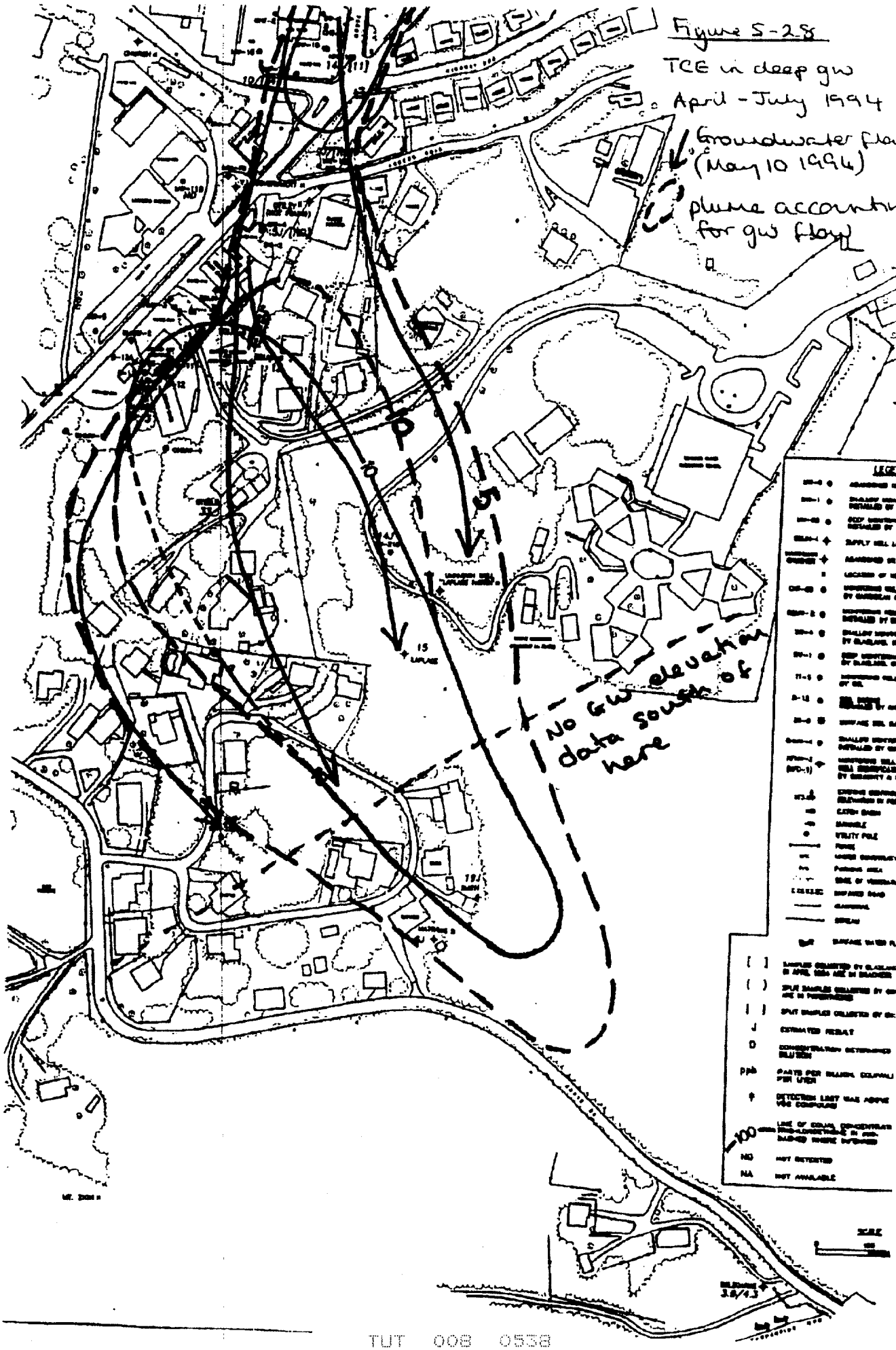


Figure 5-28
TCE in deep gw
April - July 1994
Groundwater flo
(May 10 1994)
plume accounts
for gw flow
No GW elevation
data south of
here
N

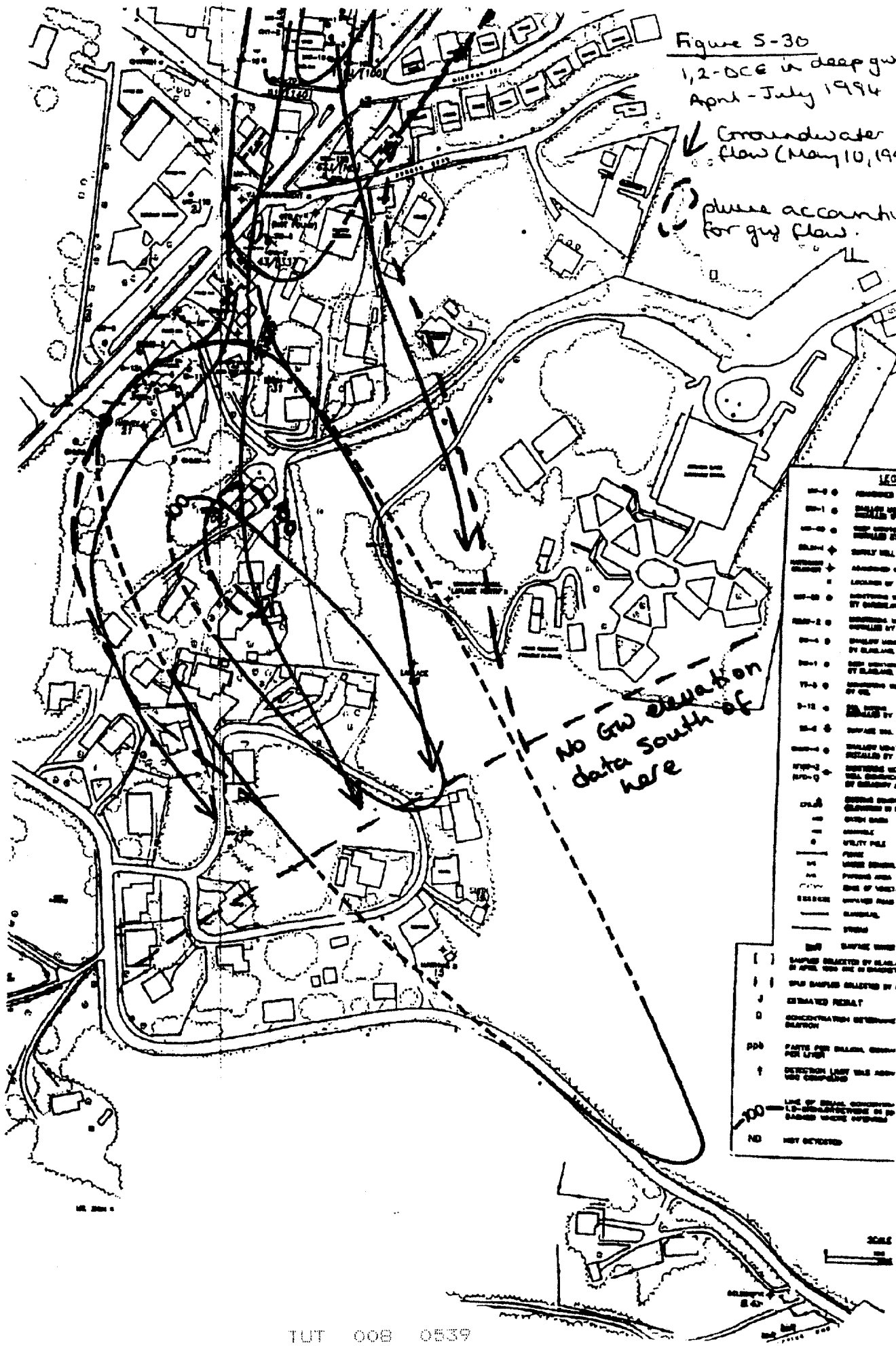

N
Figure 5-30
1,2-DCE in deep gw
April - July 1994
Groundwater
flow (May 10, 19
plume accounti
for gw flow.
No GW elevation
data south of
here

EXHIBIT 2

Comments on Geraghty and Miller, Inc. 1995, Draft Feasibility Study Tutu Wells Site, St Thomas, U.S. Virgin Islands

Section 2.1.1.3. Groundwater flow direction is still not sufficiently well understood in the deep bedrock aquifer in the southern portion of the Tutu "site" ie south of the Esso station. No measured groundwater elevations were used between the locations SW-6, MW-21D, MW-22D and west of these wells, an area of 1,000 ft x 1,500 feet. Groundwater contours representing deep bedrock groundwater flow beneath the following properties should be dashed: O'Henry laundry, Liquor Barn, and Archies Welding. The map included in Graves and Gonzales 1988, used as justification for the "generalized regional flow" presented by Geraghty and Miller, indicates a lower level of detail (contours are shown at no less than ten foot intervals) than included on figure 2-4 (contours are shown at five foot intervals). It is not appropriate to use the 5 foot contour intervals. In addition, the Graves and Gonzales map uses "dashed" (indicating approximately located) and "queried" (indicating uncertain) contours over much of the area and particularly the area to the south and southeast of the O'Henry laundry. Further, the text included in Graves and Gonzales 1988 states "Several wells were being pumped, or had just terminated, when the water levels were measured ...These water levels reflect a pumping or recovery condition; therefore, static water-level conditions throughout the Turpentine Run basin at the time of measurement cannot be assumed". Because the flow map presented by Geraghty and Miller (figure 2-4) shows a non-unique solution, the positioning of the recovery wells RW-2, RW-3 and RW-5 may be inappropriate. Also, please explain why data from MW-22D is included on both the shallow and deep flow maps.

Section 2.2.2.1. First Paragraph. Since there is no such compound as "Total chlorinated VOC", the shape of each individual VOC compound plume should be discussed. The edges of the plumes should be defined as the drinking water standard (DWS) for each individual compound (where a DWS exists). What is meant by "The southern plume originates near the O'Henry Dry Cleaners"? Regardless of the current location of chlorinated VOCs in the groundwater, the origin of these chlorinated VOCs in groundwater south of the O'Henry property is unknown.

Third Paragraph. According to the shallow bedrock groundwater flow map presented in figure 2-3, monitoring well OHMW-04 is located sidegradient to the O'Henry Dry Cleaners not downgradient as stated in the text.

Section 3.4.2. The practicality of a centralized groundwater treatment system and use of POET systems on domestic and commercial wells is questionable. The use of a centralized groundwater treatment system will require piping from one end of the Tutu area to the other with associated problems due to the hilly nature of the site. This brings up questions of access, liability if pipes leak or are damaged, and maintenance. Likewise, future liability

is a potential issue if monitoring indicates that contaminants are present in the effluent water of a permitted domestic or commercial wells. These issues should be very carefully considered before including a centralized groundwater treatment system and POET systems on domestic and commercial wells as part of the site remedy.

Section 4.4. Since the FS apparently chooses two alternatives (SWRAs 4 and 7) which is the SWRA advocated?

Section 4.5. The following activities are recommended to be included in the pre-design activities (and costs):

Pre-design work plan and reports of work performed.

Placement of additional deep bedrock monitoring wells in the area identified in the comment on section 2.1.1.3 above and additional groundwater level monitoring including wells not currently included on the flow maps to determine whether the assumed groundwater flow south of the Esso station is correct.

Groundwater modeling should be conducted to explore the limits of contaminant movement and to demonstrate that the proposed groundwater extraction well scenario will effectively capture the plume. Because of the uncertainty in flow direction in the area south of the Esso station it is recommended that a sensitivity analysis be performed assuming a southwesterly flow direction to the Kentucky Fried Chicken property and a southeasterly flow direction thereafter to test the recovery well scenario if Geraghty and Miller are incorrect in their interpretation of flow direction.

Figure 4-7. Areas marked as suspected to contain DNAPL do not appear to be consistent with the contaminant plumes drawn. For the area drawn near the O'Henry Dry Cleaners, the DNAPL plume extends outside the 10 ppb "total VOCs" contour. Please explain the rationale for the extent of the suspected DNAPL areas shown.

The locations of recovery wells should take into account the presence of individual compounds of concern (not just the "total VOC plume"). By considering just the "total VOCs" the recovery wells may not be appropriately located. Individual compound maps should be presented and an analysis as to the appropriateness of the recovery well network to recover the individual compounds of concern should be addressed.

Why does the map list only selected data for selected wells. Explain the rationale for only presenting certain data. In addition, it appears that not all of the available data has been used to construct the "total VOC" plume, for example data for MW-15 has not been incorporated. Please explain.

Comments on Cost Estimates Provided. Note that a detailed review was performed of the cost estimate for SWRA 4 (Table 4.9) because this was the (assumed) preferred alternative. Comments on this cost estimate are also applicable to other SWRA cost estimates.

The following are comments on the Groundwater Treatment Capital Cost:

The unit cost for Deed Restrictions seems low.

Explain what is included in Site Preparation/Mobilization. How many locations are included? (ie does it include site prep for the treatment system location, piping locations and recovery well locations?)

Clarify how many wells are included in Well Abandonment. How will the wells be abandoned. Does the cost include work plan and reporting requirements?

Does Site Acquisition mean purchase or lease? Is it for the site for the groundwater treatment system only or does it include piping locations and recovery well locations? If land is to be purchased, what will be final disposition after the end of the remediation. Also does the O&M costing include any taxes to be paid.

A detailed breakdown of the Groundwater Extraction System costs should be provided. Does this also include the trenching and filling for underground piping installation for piping to the centralized treatment system? If so, how will leak detection be accomplished?

What is included in Pre-Treatment? A scale inhibitor and metals treatment should be included. In addition, a bench-scale test will be required to estimate the chemical dosage so that adequate pre-treatment is performed.

Does the cost for the Low Profile Air Stripper include installation? The cost provided seems low for two air strippers in series.

Does the Liquid Phase Carbon Treatment System include one or two beds?

How many Process Pumps are included and are these Process Pumps and Piping and Discharge Pumps and Piping just for the treatment system? State how many pumps and the length of piping.

What is the assumed size of the Aboveground Storage Tank? Does the unit cost include shipping and installation?

Make sure that the cost for the Treatment Building includes cost for a foundation.

//

Is Electric for just the central treatment system or for the recovery well sites also?

Each of the POET systems may need individual design. For example they may need individual design for electrical work and housing.

The following are comments on the Soil Treatment Capital Cost:

The cost of Excavation/Disposal, Site Restoration and Excavated Soil Sample Analysis is much too low. Will individual Corrective Action Plans be prepared? Does the cost include preparation of reports? How will the soils be disposed? It would be much more practical to build soil venting piles or to perform other on-site treatment of excavated soils. How many samples will be collected per site? What analyses will be performed? Does the cost include data validation? This cost item should be broken down on an individual site basis.

Why is the cost for the SVE system at the Curriculum Center so much higher than the other sites? Detail should be provided for each site such as size of the vacuum blowers, number of extraction wells, piping details, treatment of condensate, and installation cost.

Does Engineering include detailed design, material balance, drawings, and preparation of specifications and bid packages?

Does Construction Supervision include installation of the systems? Does it include a Health and Safety Officer at the site during construction?

The following are comments on the Operations and Maintenance Cost:

Where is the cost included for an Operations and Maintenance Plan?

O&M cost should be included for the domestic and commercial wells set up with POET systems. This should include scheduled maintenance, sampling, and reporting.

How many and which wells are included in Groundwater Monitoring (ie recovery wells, monitoring wells, domestic and commercial wells)? Does the unit cost include semi-annual reports? Does the cost include Quality Control samples and data validation?

The Electricity will supply approximately 30 Hp. Is this just for the treatment system or does it include recovery wells also?

Does the cost for carbon replacement include the disposal of spent carbon?

Does Treatment System Monitoring include both air and water sampling (influent

and effluent)? What will they be analyzed for? Does the cost include Quality Control samples and data validation? Does the cost include reports?

Does Administration include data reporting or is it just project management?

Does Equipment Replacement include installation cost?

In addition the following observations are made concerning the cost buildup:

Pre-design activities as described in Section 4.5 have not been included in the cost estimates. For example SVE pilot test, bioventing pilot test if appropriate, air stripper pilot test, and metals removal pilot test should be included in the cost. This appears to significantly underestimate the final cost of remediation.

Cost does not appear to include: preparation of plans, O&M manuals and reports; start up costs; licenses, permits and legal fees; insurance and bonds.

Shipping and travel may be underestimated.

Demobilation and decommissioning of recovery wells, SVE systems and the groundwater treatment plant should be included. In addition, closure and post-closure activities should be included in the cost.

Cost should be included for air emissions evaluation and permit application.

EXHIBIT 3

TECHNICAL REVIEW COMMENTS
SOIL REMEDIATION REPORT FOR
O'HENRY LAUNDRY, TUTU, ST. THOMAS

Reference: Letter to Nancy D'Anna, Esq., from Carole Peterson received July 27, 1995.

General Comments:

Comment 1: **The limits of the excavation were determined from field gas chromatograph results and using a provisional soil cleanup level of 200 ug/kg, based on preliminary vadose zone leaching modeling. The final EPA cleanup goals for the O'Henry property, based on revisions to the model, are 375 ug/kg PCE in the 0-1.6 feet depth interval, and 31 ug/kg PCE at depths greater than 1.6 ft, which will result in levels of PCE in groundwater below the MCL of 5 ug/l. These cleanup goals are developed from unsaturated zone calculations that take into account infiltration of precipitation, PCE adsorption-desorption from site soils, anaerobic biodegradation of PCE and mixing of contaminated leachate with groundwater in the underlying aquifer. Based on the final EPA calculations, additional soils remediation is needed to address potential sources of groundwater contamination.**

Response: Cleanup standards calculated by the EPA assume soil contamination occurs at the soil cleanup standard concentration for the entire soil column. Site modeling performed by the EPA and reported in specific comment No. 15 does not take into account all site specific data available. Further, IT cannot verify the results of EPA modeling presented for the O'Henry site because site specific input parameters, input/output files, and spreadsheet calculations have not been presented. However, using the leachate to groundwater dilution factor of 0.04 assumed for the O'Henry site by the EPA (CDM, 1995), and back-calculating from the groundwater MCL for PCE of 5 ppb, the equivalent concentration of PCE in leachate entering groundwater would be 125 ppb. This value is higher than the soil cleanup standard of 31 ppb presented by the EPA which would suggest that the soil cleanup standard must be greater than 125 ppb.

Based upon analytical results of the confirmatory soil samples collected during soil remediation activities and physical conditions at the site, soils left in place at the O'Henry Laundry site represent two distinct PCE soil concentration profiles.

Profile 1: Soils left in place at the excavation base overlain by clean backfill material brought from offsite. Analytical results indicated that soils used as backfill material from ground surface to a depth of 8.25 feet within the excavation area were clean soils with PCE concentrations below detection limits. Soils underlying the backfill

material at the excavation base, at a depth of 8.25 ft and deeper, were found to contain PCE at a maximum concentration of 170 ppb. The soil boring ITSB-01 defines the limits of the contamination at 10 feet below grade (i.e., nondetect at 10 feet).

Profile 2: Soils beneath the concrete area on the northern excavation wall. Soils collected from the northern excavation wall, beneath the paved concrete slab were found to contain PCE with maximum concentrations of 38 ppb, 560 ppb, and 1100 ppb at depth intervals of 2 to 3 ft, 3.75 to 4 ft, and 5.33 to 5.88 ft, respectively. No depth limit has been defined for the contamination under the paved concrete area; however, the depth of the base of contamination was assumed to be the same as for Profile 1 (see response to Specific Comment No. 14).

Table 1 shows the two vertical distribution profiles of PCE soil concentrations. Using the above PCE concentration soil profiles and site specific soil parameters obtained during the soil remediation activities (IT, 1995), groundwater impact due to the mobilization and migration of PCE in the vadose zone was estimated using the computer program VLEACH Version 2.0 (Ravi, et al., 1993). VLEACH is a one-dimensional vadose zone model that predicts contaminant behavior within the vadose zone using a finite difference method. The modelling assumptions were the same as those described in the Workplan (IT, 1994) with the exceptions as described below.

These values were obtained during the March 1995 soil remediation activities (IT, 1995) :

- The soil type at O'Henry is predominantly sandy silt with clay soil.
- Dry bulk density = 1.53 g/mL
- Volumetric water content = 0.3

Other revised input parameters included:

- Hydraulic gradient =0.073 ft/ft (EPA Final Report, Estimation of Soil Cleanup Concentrations Required to Protect Groundwater as a Source of Drinking Water, Tutu Wells Site,USVI, 1995)

- Organic Carbon Partition Coefficient (K_{oc})=364 ml/g (EPA,1995)

- Soil organic carbon fraction (f_{oc})= 0.006 (EPA, 1995). (The more conservative of the two site specific values determined by IT and the EPA, see also the response to Specific Comment 10.)

Model data files (LHENRI for Profile 1 and LHENRI2 for Profile 2) are attached. The *VLEACH* model provides information on the amount of PCE released to the groundwater in terms of grams per year at every time step. PCE concentrations in groundwater due to the impact of leachate were estimated using VLEACH/mass loading estimates and a one-cell mixing model for the aquifer directly below the contaminated vadose zone. The mixing model assumes complete mixing in the water column.

PCE concentrations in groundwater $[M]_{GW}^{PCE}$ was calculated using:

$$[M]_{GW}^{PCE} = \frac{[M]_{Leachate}^{PCE}/year}{Volume\ of\ water\ flowing\ through\ unit\ width\ per\ year}$$

Where water volume = n x t x L x W

- n = porosity = 0.4
- t = aquifer thickness = 10 ft
- L = flow velocity using a hydraulic conductivity of 1.5 ft/day and hydraulic gradient of 0.073
- W = A unit cross-sectional width

Water volume = 0.4 x 10 ft x 42.37 ft/year x 1 ft
= 169.5 ft^3/year
= 4796 liters/year.

The incremental increase in PCE concentrations in groundwater for the O'Henry site using the two PCE concentration soil profiles are shown in Figures 1 and 2 respectively. Table 2 summarizes the highest groundwater PCE concentrations and the time at which the peak impact occurs beneath the site. Figures 1 and 2 show that with the current PCE soil concentration profiles, groundwater beneath the O'Henry site will not be impacted above EPA action limits. The site specific modeling will be incorporated into a new chapter titled, "Evaluation of Impact to Groundwater of Soils Left in Place."

Comment 2: **Concentrations of PCE reported in confirmatory laboratory analyses of samples were in many cases significantly higher than the field GC results, especially from the deeper samples and excavation wall samples. Usually, laboratory analyses of VOCs yield lower concentrations than do field results, due to compound volatilization during shipping and handling. The higher laboratory PCE results for many samples call into question the reliability of the field GC results to accurately determine whether residual PCE concentrations are below the provisional (or any) cleanup level.**

Response:

A comparison of the PCE results from samples collected and analyzed by the field GC and in the laboratory by IT and split samples analyzed by the EPA are included on Table 4. An examination of this table indicates that the field GC analyses yielded the highest concentrations in 10 samples, the IT laboratory analysis yielded the highest concentrations in 8 samples and the EPA laboratory yielded the highest concentrations in 2 samples. The field GC result was only lower than the IT laboratory result for four samples where an EPA laboratory split sample result was not available (EXS05, EXS26, EXS27, and EXS35). Of these samples, there was only one sample (EXS27) where the IT laboratory results was more than double the field GC result (195 µg/kg from field GC and 850 µg/kg from IT laboratory). For this sample, a duplicate analysis was performed. The result (570 µg/kg) is intermediate of the field GC and IT laboratory results.

For the samples for which EPA split samples are available and where the IT (or EPA) laboratory results are higher than the field GC, four samples have laboratory results which are more than double the field GC results (EXS30, EXS31, EXS33, and EXS34). In three of these samples, the IT laboratory has the highest concentration and in one case the EPA has the highest concentration.

There are only three samples where the field GC analysis was below the preliminary cleanup standard and where the confirmation sampling analysis was above the preliminary cleanup standard (EXS27, EXS30, and EXS31). These three samples are located beneath the concrete slab on the northern wall of the excavation.

In addition, the following should be noted.

- Quality control measures were taken during field analysis to support the validity of the test method. Appropriate instrument calibrations were performed and check standards were continuously analyzed throughout the field analysis to verify correct instrument performance. Accuracy and precision data (i.e., MS/MSD samples and surrogate spikes) indicate no problem with data generated by the field GC.

- Interpretation of soil VOC data is often fraught with difficulties due to inherent problems with the sampling and analytical process. Losses of VOCs have been reported due to volatilization caused by sample disruption during field or laboratory subsampling, as well as leakage and/or transformation during preanalytical handling. VOCs may become physically entrapped in the microstructure of soils and can be difficult to desorb and remove during extraction. In addition, ancillary soil properties (e.g., water content, organic carbon content, temperature) can affect spatial variability and soil VOC behavior.

VOC concentrations vary in soils both in space and time. Therefore, variability in measurement of VOCs can be large as a result of natural variability. Focus should be on the comprehensive data sets rather than on discrete values and on the laboratory confirmation samples rather than the field GC.

The confirmation samples indicate that soils have been removed to below the preliminary cleanup standard with the exception of an area of soil beneath the concrete slab. A new subsection will be added to Chapter 3.0 titled, "Evaluation of Field Screening and Laboratory Analytical Results," which will compare the results as described above.

Comment 3: **High concentrations of PCE in the southeastern part of the excavation pit and the southern pit wall near the Liquor Barn (e.g., EXS12, EXS27, EXS30, and EXS31) indicate that not all soils containing PCE above 200 ug/kg were removed. It therefore appears that additional PCE-contaminated soils exist beneath the O'Henry building.**

Response: We agree that field GC and confirmation samples indicate that soil with concentrations above the provisional cleanup level of 200 µg/kg are left in place beneath the concrete paving at the northern end of the excavation. This will be incorporated in the first paragraph of the conclusions section.

Specific Comments

Comment 1: **Section 1.1.2, page 1-2 and 1-3. The provisional level of 200 ug/kg has been revised to 31 ug/kg for soils more than 1.6 feet below ground surface, based on EPA's final vadose zone modeling results. This information should be incorporated into the text.**

Response: The information as requested will be added to the text in Section 1.0; however, please see response to General Comment No. 1.

Comment 2: **Section 2.1, page 2-1. The maximum concentration of PCE previously reported in subsurface soils was 180,000 ug/kg in sample e-02-02 from a depth of 1.5-2.5 ft (Figure 5-11 of the Draft Final Remedial Investigation Report), not the 59,000 ug/kg in boring SS1 as reported here.**

Response: We agree; however, it should be noted that the soil boring SS1 was targeted to the same location as e02-02. Therefore, data from SS1 is more recent than e02-02. The text will be revised accordingly.

Comment 3: **Section 2.1, page 2-1. The sample depths of the two undisturbed soil samples that were submitted for geotechnical analyses should be listed. According to Appendix A, apparently only one of these**

samples underwent analysis. The text here and on page 3-3 should clarify the depth interval sampled and that only sample LH01 and its duplicate were analyzed.

Response: We agree; two samples (i.e., one sample LH01 and its duplicate LH02) were collected; however, only one sample, LH01 from a depth interval of 5 to 6.5 feet, was analyzed for geotechnical parameters. The text will be revised accordingly.

Comment 4: **<u>Section 2.2, page 2-1.</u> Here and elsewhere, the text should indicate that the cleanup level of 200 ug/kg was an <u>assumed</u> cleanup level and was used provisionally.**

Response: We agree. The text will be revised accordingly.

Comment 5: **<u>Section 2.6, page 2-6.</u> The text indicates that a PID was not available during installation of boring ITSB-01. Presumably the PID had arrived by the time of the soil excavation work, yet no organic vapor readings are presented in any section of the report. If PID readings are available they should be discussed in the text because they would aid in identifying contaminated soil zones within and adjacent to the excavated area.**

Response: Table 3 summarizes PID readings taken during soil remediation activities. PID readings will be included in the report.

Comment 6: **<u>Section 3.1, page 3-1, second paragraph.</u> PCE concentrations of up to 2,845 ug/kg were found at a depth of 3-4 ft at location EXS12. Table 3-1 indicates this is an estimated concentration since the value exceeded the instrument calibration range. The text should be revised to discuss how large this estimated result could potentially be.**

Response: The reported value from sample EXS12 is reported as an estimated concentration. A sample aliquot of 0.5 g was used for analysis; the analytical results exceeded the calibration linear range. Due to problems obtaining additional supplies, the sample was not reextracted and reanalyzed with a smaller aliquot. A smaller sample aliquot would have allowed the analytical result to be within linear range; thus a more accurate value would be reported. The reported result is most likely slightly higher than the actual concentration. This will be added to the text.

Comment 7: **<u>Section 3.1, page 3-1, third paragraph.</u> Soil samples collected from the excavation wall adjacent to the concrete slab exceeded the provisional PCE cleanup level of 200 ug/kg. Given that the EPA has established an even lower soil PCE cleanup goal to be protective of groundwater, the report should discuss the potential for the**

residual contaminants at these sample sites (and others exceeding the cleanup goals) to serve as ongoing sources of groundwater contamination.

Response: See response to General Comment No. 1.

Comment 8: **Table 3.2. Please include a brief discussion of the data qualifiers used in this table, particularly the "D" qualifier, in the associated text on page 3-2.**

Response: Explanation of data qualifiers will be added to the text.

Comment 9: **Section 3.2, page 3-2. Based on Tables 3-1 and 3-2 and the associated figures, almost half of the samples that underwent both CLP and field GC analysis show higher PCE concentrations in the CLP results than the GC results. See General Comment 2. The text on page 3-2 should discuss why this is the case, and how this finding may affect interpretation of all of the field GC results.**

Response: See response to General Comment No. 2.

Comment 10: **Section 3.3, page 3-3. The organic carbon content is reported as 0.015 (1.5 %) in a sample collected from a depth of 5 - 6.5 ft. This value is almost three times higher than the value reported from the O'Henry property from two EPA samples collected from the top two feet (average TOC = 0.6 %), and much higher than the organic carbon values of 0.0002 (0.02%) to 0.001 (0.1%) used by IT in the VLEACH modeling. The report should discuss the representativeness of this value relative to other site-reported or assumed TOC values, and its implications for PCE movement through the soils. The ASTM method (D2974-87) used by IT is a combustion/incineration method that will also count inorganic carbon (e.g., carbonate and bicarbonate), unless it is deliberately removed during the sample preparation stage. (The Lloyd Kahn method, "Determination of Total Organic Carbon in Sediment", 1988, which is often used by EPA, includes an acid treatment step during sample preparation to remove inorganic carbon.) Given the presence of carbonate rocks in the area, eroded carbonate material is probably present in many Tutu soils. This could account for the higher values reported in the subsurface by IT versus the surface soil values reported by EPA.**

Response: Section 3.3, page 3-3 on geotechnical testing incorrectly reports the results of ASTM D-2974 as fraction of organic carbon. The actual parameter measured by ASTM D-2974 is the fractional organic material contained in the sample. As reported in Appendix A of the document, the two analyses performed by ASTM D-2974 produced fractional organic material results of 0.015 and 0.013. The fraction of organic

material can be related to the fraction of organic carbon by dividing by 1.724 (Dragun, J. 1988). Following this approach, and using the average fraction of organic material (0.014), yields a fractional organic carbon content of 0.008 or 0.8 percent. The model VLEACH uses "organic carbon fraction" as an input parameter which is why the ASTM method was applied by IT.

The percentage of organic carbon calculated by IT is, therefore, comparable with the percentage of total organic carbon as presented by the EPA. The fraction organic carbon value used by IT in calculation of the PCE cleanup standard using VLEACH (IT, 1994) was lower than the values determined from laboratory tests. The effect of using a higher fraction organic content in the previous modeling would have resulted in a higher cleanup standard. This will be added to the text.

Comment 11: **<u>Section 5.0, page 5-1, first sentence.</u> Based on the residual PCE contamination greater than 200 ug/kg detected in soils in the excavation pit southeastern wall, this sentence should be revised to indicate that not all of the source of potential groundwater contamination at the O'Henry site has been removed.**

Response: See response to General Comment No. 3.

Comment 12: **<u>Section 5.0, page 5-1, second bullet.</u> The argument that the average PCE concentration is soils is nearly equal to the provisional cleanup level, when the reported PCE concentrations are as much as five times greater than the provisional level, is not valid. The text must be revised.**

Response: We agree. See response to General Comment No. 1.

Comment 13: **<u>Section 5.0, page 5-1, second bullet, final sentence.</u> The report states that, due to the distance to the water table (approximately 16 feet), PCE concentrations much greater than 200 ug/kg would be needed to result in detectable concentrations of PCE in groundwater. Based on EPA's soil leaching modeling, this statement is not true. Attached is a new soil profile constructed for the O'Henry property using the maximum residual contamination remaining at each depth in soils, post-excavation, <u>as reported in the IT soil removal report</u>. The site-wide values for infiltration, Kd and biodegradation were used. The corresponding contaminant breakthrough curve indicates that leaching of these soils will result in concentrations of PCE in groundwater of approximately 30 ug/l in the future, well above the drinking water standard of 5 ug/l.**

The EPA model assumes a low organic carbon content in the deeper soil horizon, but allows for anaerobic biodegradation of PCE throughout the soil column. The modeling indicated that almost no

compound attenuation occurs in the deeper zone, due to the low organic carbon content and biodegradation rate loss terms used. Furthermore, PCE volatilization is predicted to be a very minor attenuation process at depths below about 1 meter due to the presence of anaerobic breakdown products found in soils below this depth. Therefore, PCE will migrate in leachate relatively unattenuated to the water table, regardless of the distance of the source from groundwater. The text should remove this statement.

Response: Please see response to General Comment No. 1.

Comment 14: **<u>Section 5.0, page 5-2.</u> The text states that PCE concentrations were below detectable levels beneath 10 ft in boring ITSB-01. The report should indicate, however, that this boring may not be indicative of concentrations in surrounding soils. Based on sampling results shown in Figures 2-4 and 2-7, the higher PCE concentrations exist in nearby soils.**

Response: Based on an evaluation of the spatial PCE concentrations from field GC and laboratory confirmation sampling shown in Figures 2-3 through 2-7 of the report, the depth profile for PCE concentrations in boring ITSB-01 appears representative of the depth profile of PCE concentration in soil in the excavation area. PCE which may have entered soil and migrated from the unpaved area back under the concrete will have the following characteristics:

- It is unlikely to have migrated more than a few feet horizontally.
- It will not volatilize as fast because it is effectively "capped."
- It will not migrate vertically downward in the dissolved phase as fast because there is a reduced driving force (i.e., lower infiltration).

Given the above characteristics and visual observations which indicate no residual free phase in soil and no vertical pathway for preferred contaminant migration (soils are uniform) the contaminant profile in boring ITSB-01 may not be indicative of concentrations in soils beneath the paved area in terms of actual concentrations; however, it likely accurately reflects the "general profile" where the maximum concentration of PCE in soil is between 5 and 10 feet below grade and there is non-detect below 10 feet. This will be added to the text.

Comment 15: **<u>Section 5.0, page 5-2, first paragraph, last sentence.</u> The report states that excavation of soils to a depth of 8 ft has removed all PCE-contaminated soil. Given the sampling results provided in the report, this is a false and misleading sentence which must be revised.**

Response: See response to General Comment No. 3.

Comment 16: **Section 5.0, page 5-2. The report recommends that no further in situ remediation be performed at the site. However, the revised EPA soil action levels for PCE indicate that the concentrations of PCE remaining in soils in the vicinity of the excavation will be ongoing sources of PCE contamination of groundwater above MCLs. Based on the site findings and EPA's soil action levels, some form of additional soil remedial action is required. The use of soil vapor extraction (SVE) and angled extraction wells, for example, could be effective in removing residual PCE beneath the adjacent building.**

Response: See response to General Comment No. 1.

References

CDM Federal Programs Corporation, 1995, *Final Report Estimation of Soil Cleanup Concentrations Required to Protect Groundwater as a Source of Drinking Water, Tutu Wells Site, U.S. Virgin Islands.*

Dragun, J., 1988, *The Soil Chemistry of Hazardous Materials*, Hazardous Materials Control Research Institute.

IT Corporation, 1994, *Work Plan for Evaluation and Interim Remediation of Soils O'Henry Laundry, Tutu, St. Thomas, U.S. Virgin Islands.*

IT Corporation, 1995, *Soil Remediation Report, O'Henry Laundry, Tutu, St. Thomas, U.S. Virgin Islands.*

Table 1

Concentration Profiles Used in the Model
O'Henry Laundry, St. Thomas, U.S. Virgin Islands

Concentration Profile No.	Depth Interval (ft)	PCE Concentration (ppb)
1	0 - 8.25 8.25 - 10	0 170
2	0 - 3 3 - 5 5 - 10	38 560 1100

Table 2

Highest Groundwater PCE Concentrations
O'Henry Laundry
St. Thomas, U.S. Virgin Islands

	Concentration Profile No. (Refer Table 1)	Highest Groundwater PCE Concentration (µg/L)	Time for Peak Impact (Years)
Beneath Excavated Area	1	0.026	76
Beneath Paved Concrete Area	2	0.44	90

Table 3

Summary of Organic Vapor Readings
O'Henry Laundry
St. Thomas, U.S. Virgin Islands

Sample No.	PID Reading (ppm)
EXS06	2
EXS07	0.1
EXS08	22
EXS09	34
EXS10	0.2
EXS11	0.25
EXS12	0.5
EXS13	1.8
EXS14	1.8
EXS15	0.1
EXS16	0.3
EXS17	0.5
EXS18	1.0
EXS19	0
EXS20	0
EXS21	0.5
EXS22	1.0
ESX23	2.0
EXS24	1.0
EXS25	4.0
EXS26	1.5
EXS27	1.5
EXS28	11.0
EXS29	3.0
EXS30	3.0
EXS31	7.5
EXS32	1.0
EXS33	4.0
EXS34	2.0
EXS35	0.5

Table 4

A Comparison of PCE Results (µg/kg)

Sample Number	Field GC	IT Laboratory	EPA Laboratory
ITSB-01-05.0	**237.69**[a]	120	
ITSB-01-10.0	**12.38**	2 J	
ITSB-01-14.5	4.33/4.98	11 U	
EXS01	**214.40**	140 D	
EXS02	**197.26**	120	
EXS03	**181.34**	**54**	
EXS04	**324.09**	100 D	
EXS05	**83.95**	**100**	
EXS23	275.38	**290 D**	100 J
EXS24	**57.80**	21	2 J
EXS25	173.90	190	**210 J**
EXS26	220.33	**300 D**	
EXS27	195.14	**850 D**/570 D	
EXS28	**242.71**	210 D	220 J
EXS29	**171.46**	150 D	
EXS30	155.45	**1100**	**480 J**
EXS31	169.41	560 D	**630 J**
EXS32	**63.61**	38	34 J
EXS33	15.17	**31**	30 J
EXS34	74.60	**170**	30 J
EXS35	109.65	**160**	

[a]Highlighting indicates which analytical method yielded the highest concentration for each sample.

FIGURE 1

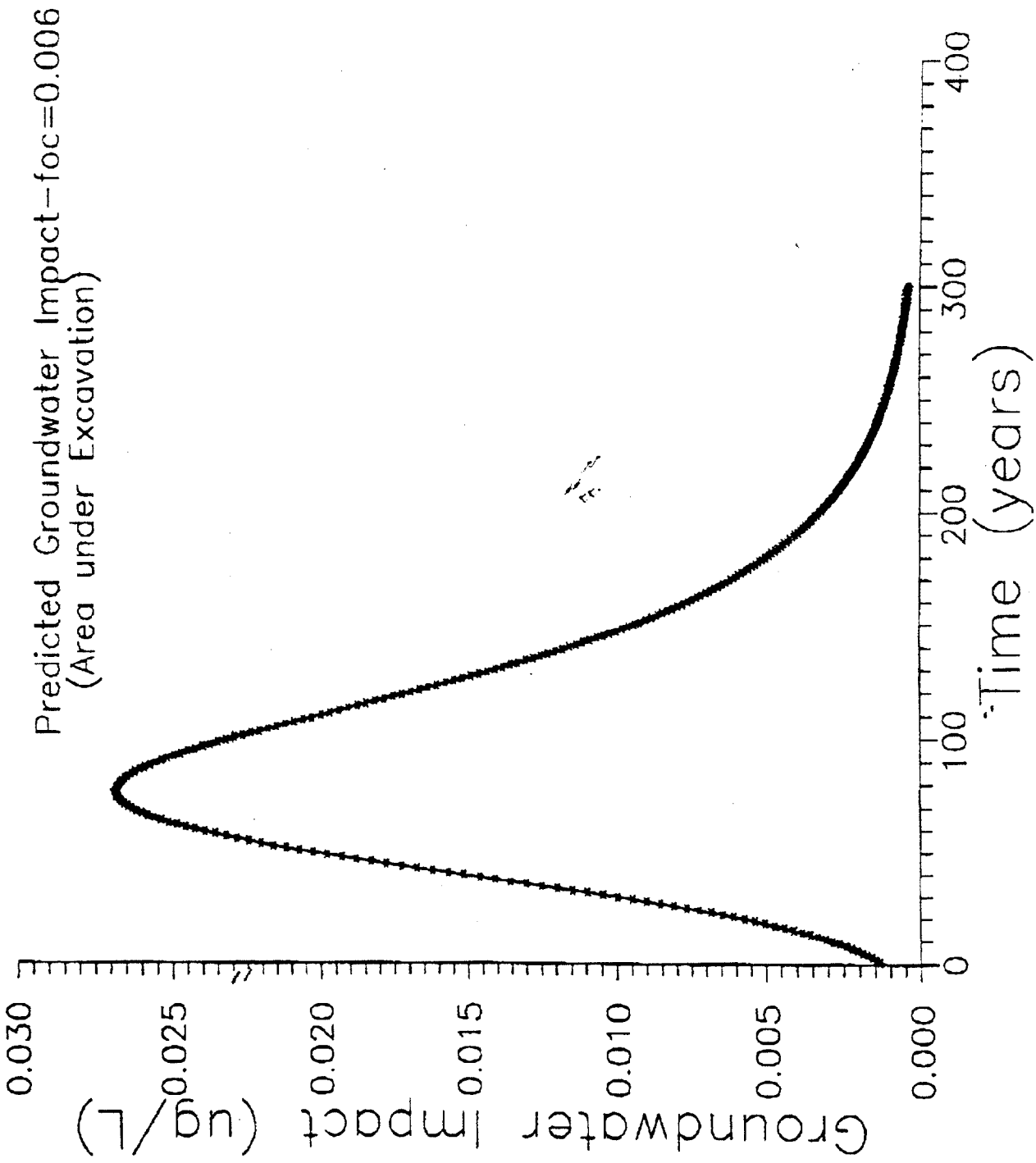

Predicted Groundwater Impact-foc=0.006
(Area under Excavation)
Groundwater Impact (ug/L)
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
100
200
300
400
Time (years)

FIGURE 2

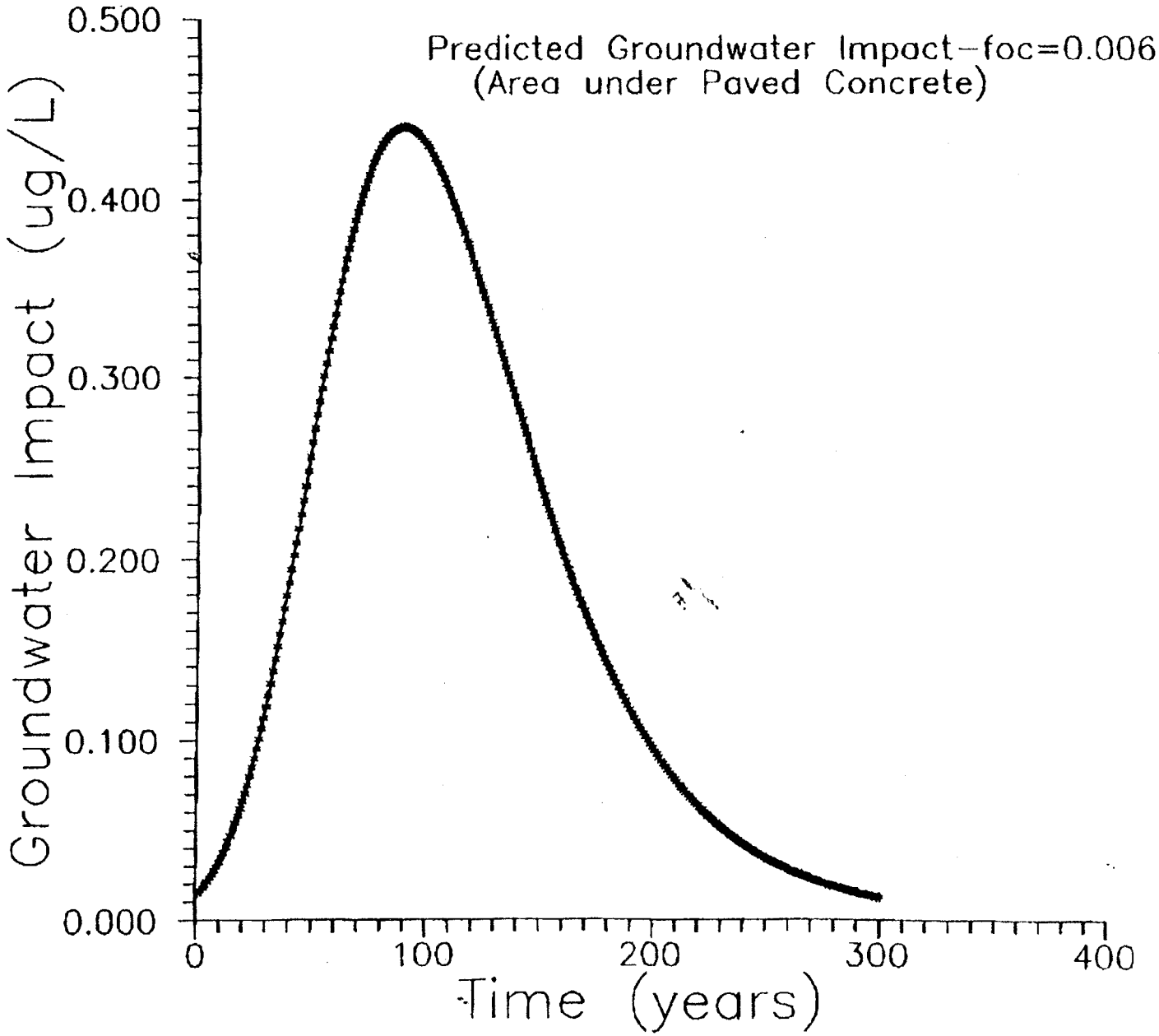

Predicted Groundwater Impact-foc=0.006
(Area under Paved Concrete)
Groundwater Impact (ug/L)
0.500
0.400
0.300
0.200
0.100
0.000
0
100
200
300
400
Time (years)

EXHIBIT 4

INTERNATIONAL TECHNOLOGY CORPORATION

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December 19, 1995

Ms. Caroline Kwan
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Transmittal of Comments and Concerns Related to Calculated Site Specific Soil Cleanup Standard for the O'Henry Dry Cleaners, Tutu, St. Thomas, U.S. Virgin Islands

Dear Ms. Kwan:

This letter presents comments and concerns relating to the site specific soil cleanup standard presented by the EPA as applicable to the O'Henry Dry Cleaners, Tutu, St. Thomas. The site specific standard is presented in *CDM Federal, July 1995, Final Report, Estimation of Soil Cleanup Concentrations Required to Protect Groundwater as a Source of Drinking Water*. This standard was referred to as the applicable standard by the EPA in the CDM Federal, 1995, document but is also presented in the EPA Technical Review Comments on *IT, 1995 Soil Remediation Report for the O'Henry Dry Cleaners, Tutu, St. Thomas*, presented in a letter to Nancy D'Anna, Esq. from Carole Peterson received July 27, 1995, and in *Geraghty and Miller Inc., 1995, Final Feasibility Study for the Tutu Wells site, Tutu, St. Thomas.* Materials in the form of calculation sheets and a spreadsheet were supplied by the EPA on October 6, 1995, in response to a FOIA request filed by Nancy D'Anna, Esq. IT Corporation (IT) at the request of L'Henri Inc., has reviewed this computer spreadsheet in addition to the above referenced documents and has the following comments and concerns with the Soil Cleanup Concentration presented by the EPA for the O'Henry Dry Cleaners site:

Development of the site specific soil cleanup levels for the Tutu Wells site by CDM Federal was based on an EPA, December, 1994, Technical Background Document for Soil Screening Guidance (Review Draft). Formulae used for the estimation of the mixing zone depths and derivation of the dilution factor in the supplied spreadsheet were cited from the EPA document, however, the EPA document used is a draft review copy that is marked "Do Not Cite or Quote." Since this method is in review draft stage which has not undergone full EPA and public review and comment, we question the use of the method as applied through the spreadsheet by CDM Federal. IT has previously used the one-dimensional, finite difference model VLEACH to

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calculate the appropriate site specific soil cleanup standard (*IT, 1994, Work Plan for Evaluation and Interim Remediation of Soils, O'Henry Laundry, Tutu, St. Thomas, U.S.V.I.*) and as pointed out in Section 3.4 of *IT, 1995, Soil Remediation Report O'Henry Laundry, Tutu, St. Thomas, U.S.V.I. (Revision 1)*, use of the site specific Foc in the model would lead to a higher soil cleanup standard than that presented in the Work Plan (IT, 1994). The model VLEACH is listed among those appropriate to be used for site specific soil cleanup standard determination in *EPA, December, 1994 Technical Background Document for Soil Screening Guidance (Review Draft)*. Understanding that the VLEACH model is conservative in that it does not consider chemical or biological degradation, it is reasonable to expect that use of the VLEACH model would result in lower soil cleanup standards than the CDM Federal spreadsheet model using the same site specific parameters. IT believes that use of VLEACH is appropriate for calculating the site specific soil cleanup standards for this site.

Notwithstanding the above, assuming that the method applied by CDM Federal is appropriate for the calculation of site specific soil cleanup standards, following is a listing of assumptions which should be amended as indicated for the O'Henry site:

- A composite soil profile generated by CDM Federal for the O'Henry Dry Cleaners simulating the soils present beneath the contaminated zone is not representative of actual soils present at the site. The generated profile indicates that the site contains clayey sands (SC) and silty sands (SM) and clayey silts at depth intervals of 0 to 2.1 ft, 2.1 to 10.96 ft, and 10.96 to 22 ft respectively. However, visual classification of soils during soil remediation activities for the excavation area and soil boring ITSB-01 indicated that soils are uniform and predominantly sandy silt with clay (ML) from the ground surface to a depth of 8.25 ft. An andesitic unweathered bedrock underlies the silty soils. Because the soil type simulated for the O'Henry Dry Cleaners was not representative of site soil conditions, model soil parameters including the assumed water content (which was taken to be the effective porosity), total porosity, soil layer thickness, and soil mass (dry bulk density) were not accurate parameters for the site. Site specific soil parameters obtained during soil remediation activities are as follows:

  - Volumetric water content = 0.3
  - Dry bulk density = 1.53 g/cc
  - Total porosity = 0.4.

- A contaminant source length of 50 ft was used by CDM Federal for the O'Henry site. This parameter is used in the calculation of the dilution factor. A resulting dilution factor of 0.04 was subsequently used for the calculations of the target soil leachate concentration of <132 $\mu g/L$ for the acceptable groundwater MCL of <5 $\mu g/L$. During soil remediation activities conducted in March 1995 at the O'Henry site, field observations indicated that a contaminant source length parallel to the groundwater flow for the site is approximately 25 feet (Note: 25 ft is used conservatively, the actual source length is probably less than 20 feet). Using the source length of 25 feet results in a dilution factor of 0.02. In

addition, a lower source length results in a lower leachate flux rate of 5.025 ft^3/yr instead of the flux rate of 10.05 ft^3/yr used by CDM Federal in the soil leaching model.

- The allowable contaminant concentration in soil was calculated by CDM Federal using an foc value of 0.006 in soils above 1.6 feet and an assumed foc value of 0.0002. CDM Federal cover letter to the EPA which accompanies the CDM Federal, July 1995, report acknowledges that the model results are very sensitive to the input value for organic carbon content of the soils and states "This represents a significant uncertainty in the model results. CDM Federal **recommends that the soil cleanup goals calculated here be recalculated if additional site-specific data becomes available and revised if necessary at that time.**" The foc obtained by IT for soils at a depth of 5-6 feet at the O'Henry site indicate that foc is 0.008. Therefore, it is appropriate that the soil cleanup concentration be recalculated.

Using the Soil Screening framework as described on page 2-22 of EPA, December 1994, the simple site specific soil screening level (SSL) is backcalculated from acceptable groundwater concentrations. First the acceptable groundwater concentration is multiplied by the dilution factor to obtain the target leachate concentration. The partition equation is then used to calculate the equilibrium soil concentration corresponding to this soil leachate concentration. Using this simple methodology (ignoring chemical degradation) and using the site specific parameters as described above for PCE at the O'Henry site yields the following:

- Allowable groundwater concentration is 4.9 mg/l (i.e., <5mg/l), the site-specific dilution factor is 1/0.02, therefore the allowable leachate concentration is 245 mg/l

- Kd is calculated to be 2.18 (foc assumed to be 0.006) for soils above 1.6 feet and 2.91 (foc assumed to be 0.008) for soils below 1.6 feet, therefore the allowable soil concentration is calculated to be 534 mg/kg for soils above 1.6 feet and 713 mg/kg for soil below 1.6 feet. (Note that recalculated values through the CDM Federal spreadsheet accounting for biodegradation should result in higher allowable soil concentrations than those presented here).

The site specific soil cleanup standards for the O'Henry site were calculated by CDM Federal based on the assumption that soil remediation activities had not been performed. Soil remediation was conducted in March, 1995 for the O'Henry site. Soil left in place is represented by two distinct profiles; soil left in place at the excavation base overlain by clean backfill material and soil beneath the concrete area on the northern excavation wall. IT has presented an evaluation of impact to groundwater of the soils left in place in the revised Soil Remediation Report (IT, August, 1995) using the VLEACH model. This evaluation indicates soil left at the site will not impact groundwater to greater than the MCL for PCE.

IT, therefore, requests that EPA review the method currently used to calculate the site specific soil cleanup standards for the O'Henry site and revise these standards based on the comments presented here.

If you have any questions regarding these comments, please contact L'Henri Inc., Counsel Nancy D'Anna, Esq. at (809) 776-6533 or me at (423) 690-3211. Additionally, please note the change of area code for east Tennessee.

Sincerely,

Belinda Price

Belinda K. Price, R.P.G.
Project Manager

cc: Andrew Praschak Esq., EPA
Leonard Reed, DPNR
Nancy D'Anna Esq.
Jack McBurney, *de maximis, inc.*

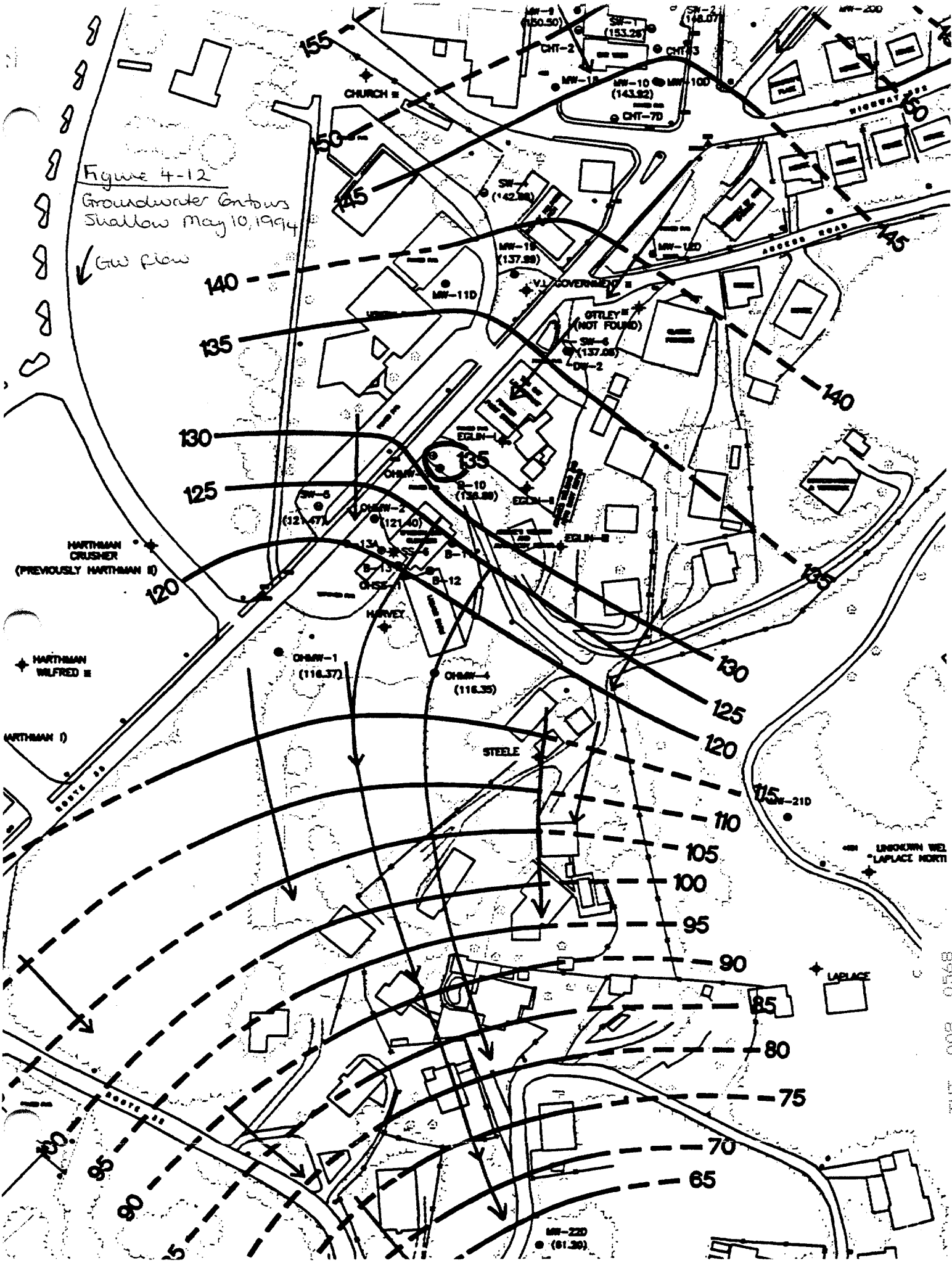


Figure 4-12
Groundwater Contours
Shallow May 10, 1994
GW flow
CHURCH
V.I. GOVERNMENT
OTTLEY (NOT FOUND)
HARTHMAN CRUSHER (PREVIOUSLY HARTHMAN II)
HARTHMAN WILFRED
HARTHMAN I
HARVEY
STEELE
LAPLACE
UNKNOWN WEL LAPLACE NORTH
MW-21D
MW-22D
155
150
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65

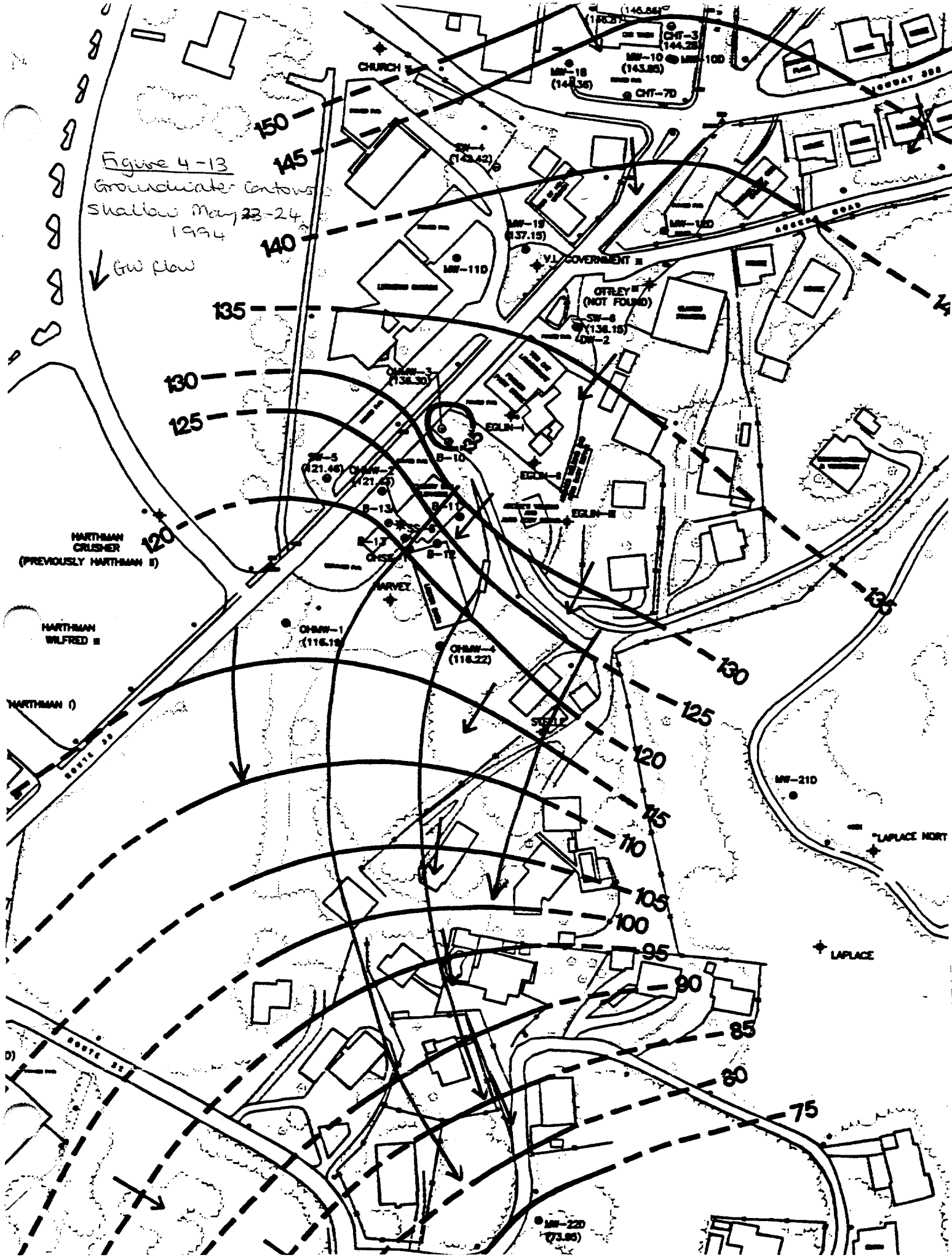
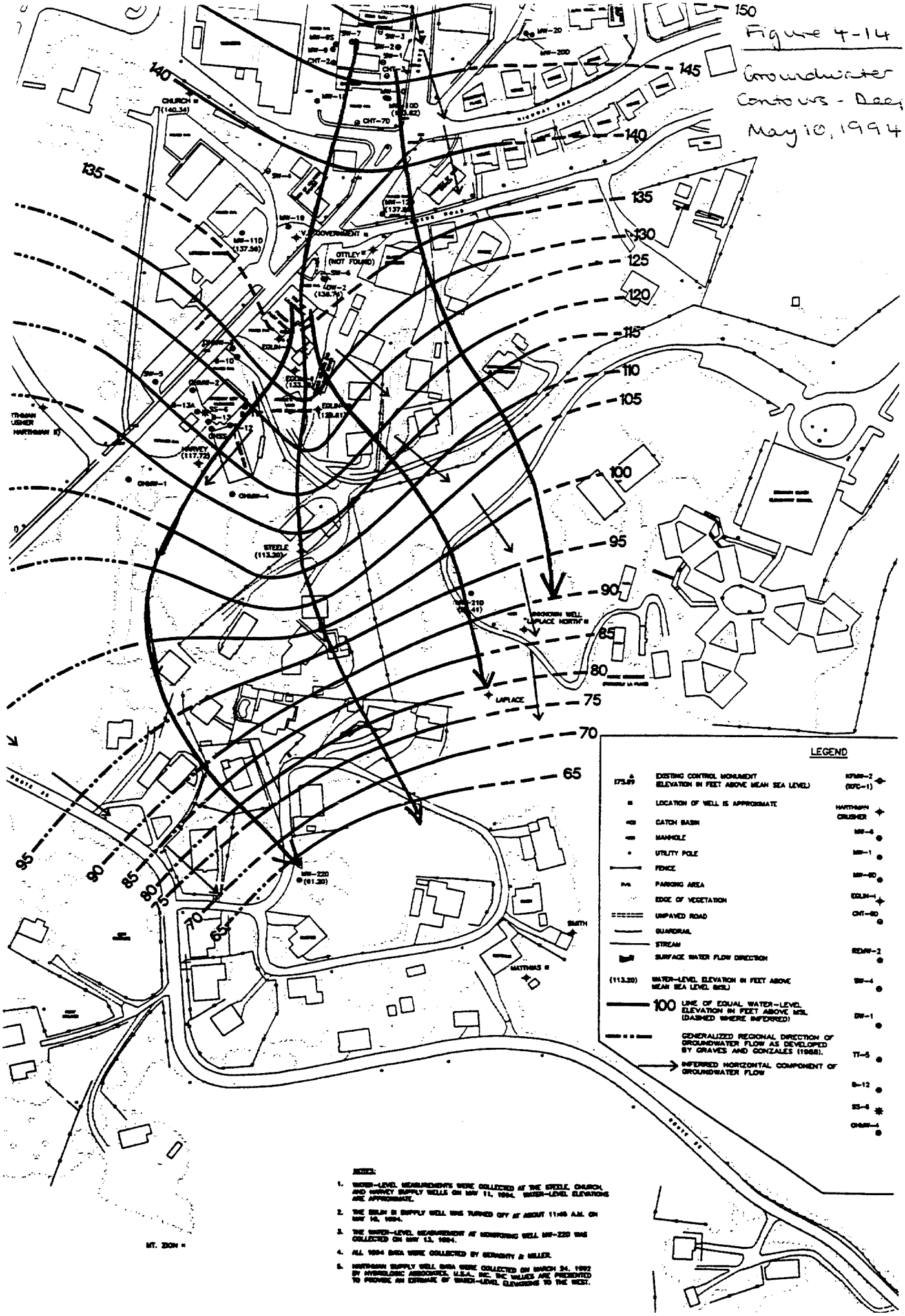


Figure 4-13
Groundwater Contours
Shallow May 23-24
1994
GW flow
CHURCH
MW-18
(146.36)
CHT-3
(144.28)
MW-10
(143.89)
MW-100
CHT-7D
SW-4
(143.42)
MW-19
(137.15)
MW-11D
MW-12D
V.I. GOVERNMENT
OTTLEY
(NOT FOUND)
SW-6
(136.15)
OMW-2
OMW-3
(136.30)
EGLIN-I
EGLIN-II
EGLIN-III
B-10
B-11
B-12
B-13
B-17
SW-5
(121.44)
OMW-2
(121.47)
HARTHMAN
CRUSHER
(PREVIOUSLY HARTHMAN II)
HARVEY
HARTHMAN
WILFRED III
HARTHMAN I)
OMW-1
(116.19)
OMW-4
(116.22)
STOCKP
MW-21D
LAPLACE HORT
LAPLACE
MW-22D
(73.86)
150
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75

Figure 4-14

Groundwater Contours - Deep

May 10, 1994



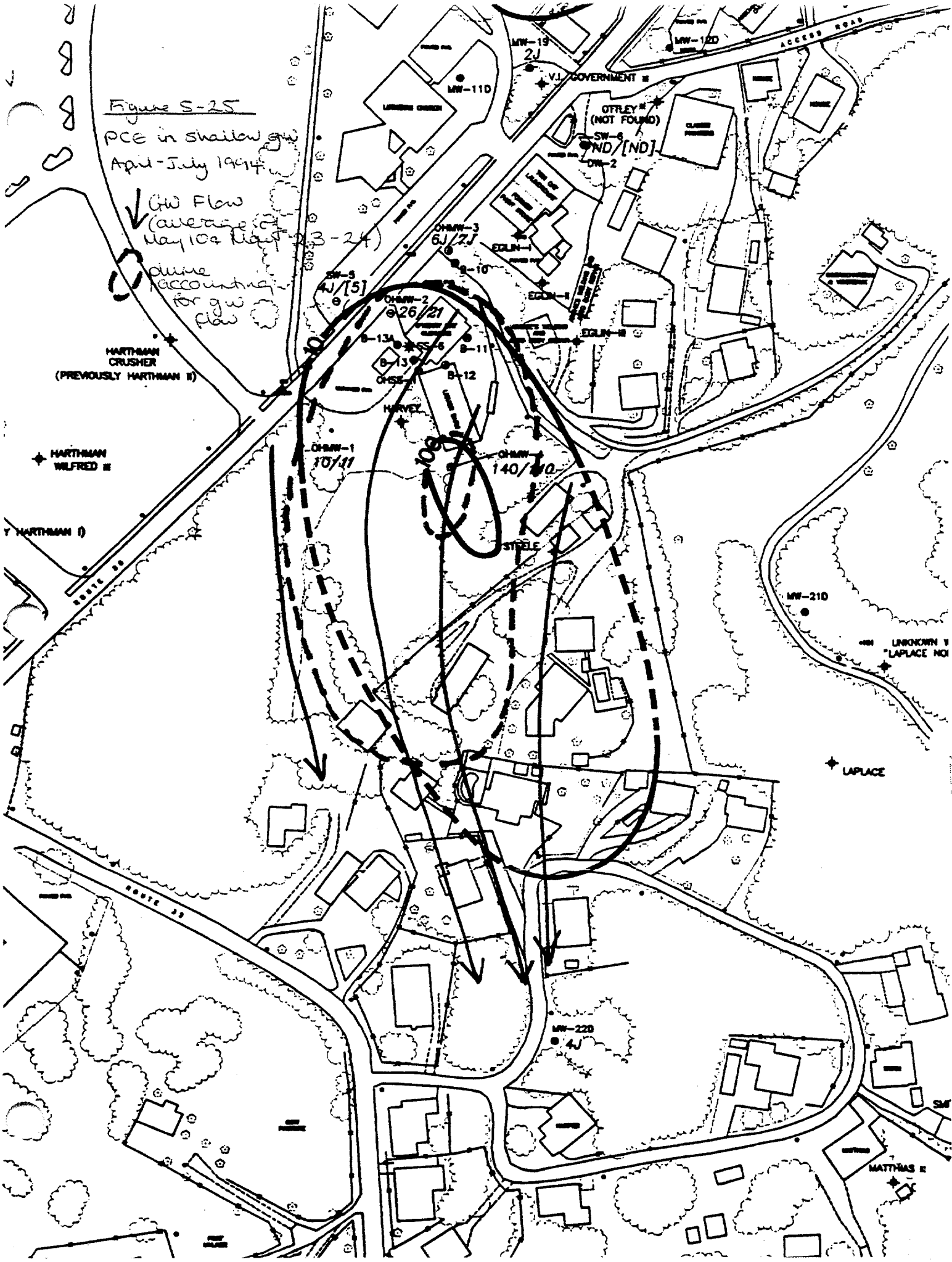


Figure 5-25
PCE in shallow gw
April - July 1994
GW Flow
(average of
May 10 & Nov 23-24)
plume
accounting
for gw
flow
MW-19
2J
MW-11D
MW-12D
ACCESS ROAD
V.I. GOVERNMENT II
OTFLEY II
(NOT FOUND)
SW-6
ND/[ND]
DW-2
OHMW-3
6J/2J
EGLIN-I
B-10
EGLIN-II
SW-5
4J/[5]
OHMW-2
26/21
B-13A
SS-6
B-11
EGLIN-III
B-13
B-12
OHSE-1
HARVEY
HARTHMAN
CRUSHER
(PREVIOUSLY HARTHMAN II)
HARTHMAN
WILFRED III
Y HARTHMAN I)
OHMW-1
10/11
OHMW-
140/10
STEELE
MW-21D
UNKNOWN V
"LAPLACE NOI
LAPLACE
MW-22D
4J
MATTHIAS II
ROUTE 22
ROUTE 22

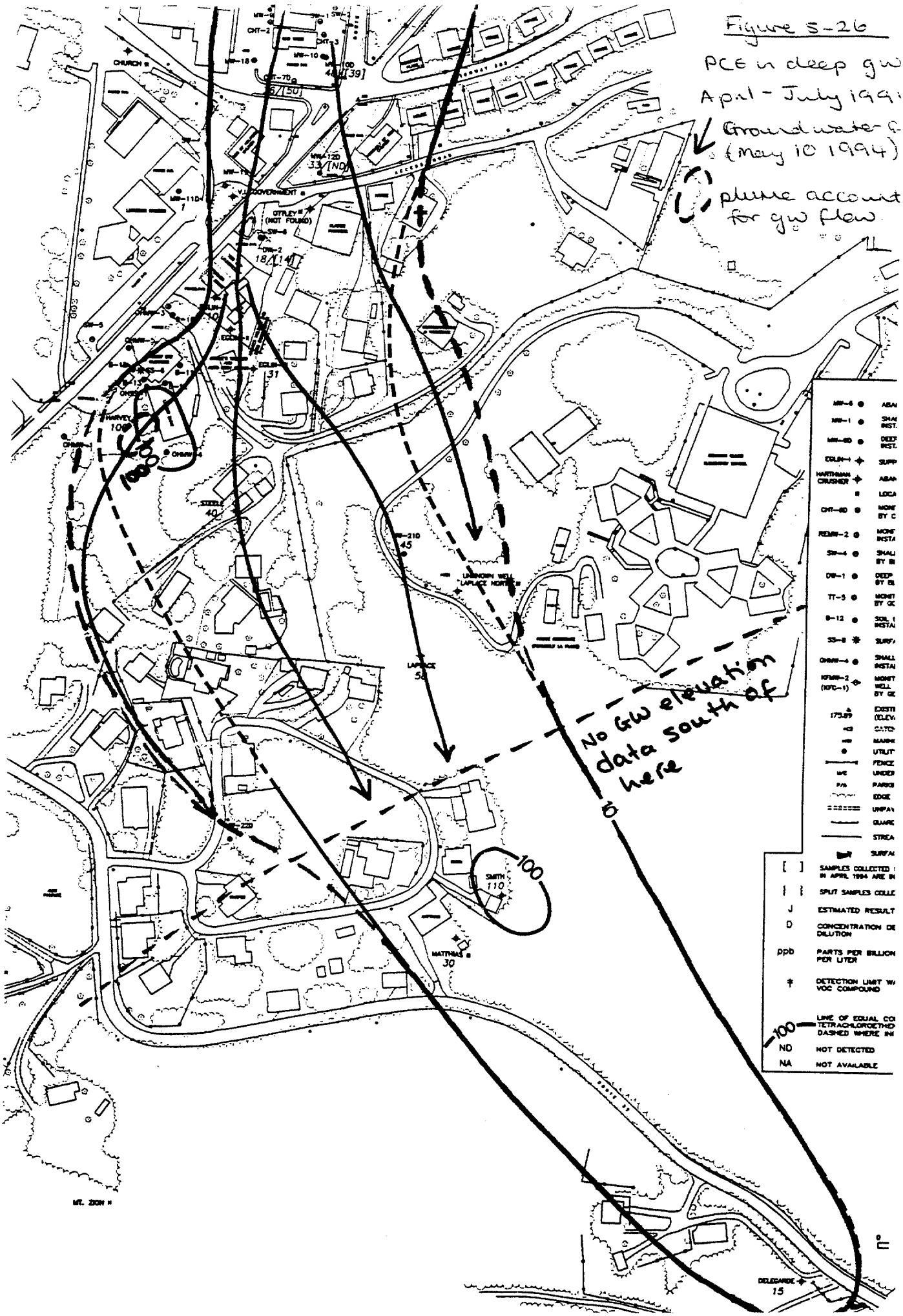


Figure 5-26
PCE in deep gw
April - July 199
Groundwater
(May 10 1994)
plume account
for gw flow
No GW elevation
data south of
here
10
100
CHURCH
V.I. GOVERNMENT
STYRLEY
(NOT FOUND)
HARVEY
100
SUSSEX
40
LAPLACE
50
SMITH
110
MATTHIAS
30
DELEGARDE
15
MR. ZION
[ ] SAMPLES COLLECTED
IN APRIL 1994 ARE IN
J ESTIMATED RESULT
D CONCENTRATION DE
DILUTION
ppb PARTS PER BILLION
PER LITER
DETECTION LIMIT W
VOC COMPOUND
100 LINE OF EQUAL CO
TETRACHLOROETHE
DASHED WHERE IN
ND NOT DETECTED
NA NOT AVAILABLE

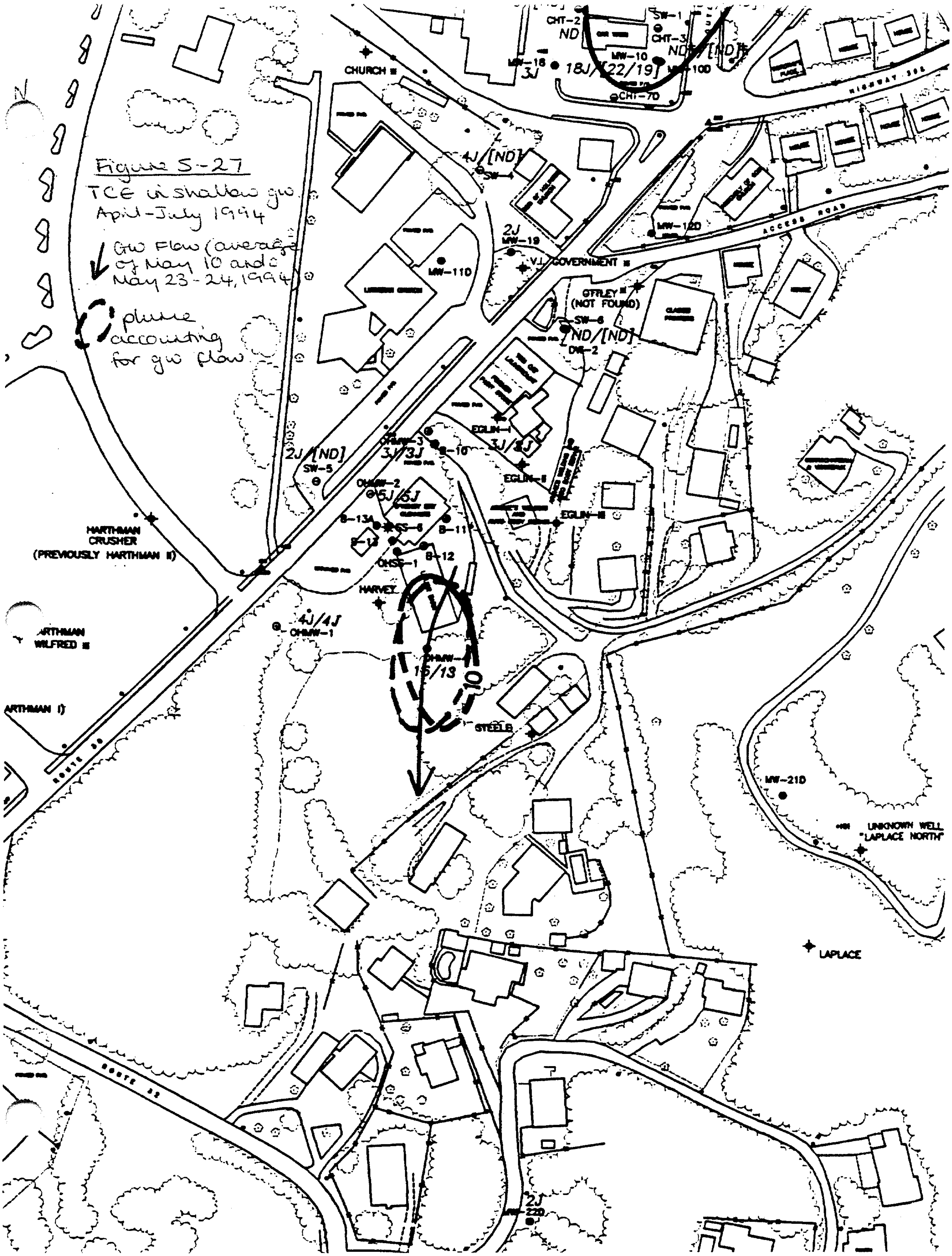


Figure 5-27
TCE in shallow gw
April-July 1994
Gw Flow (average of May 10 and May 23-24, 1994)
plume accounting for gw flow
N
CHT-2
ND
SW-1
CHT-3
ND
[ND]
MW-18
3J
18J/[22/19]
MW-10
MW-10D
CHT-7D
CHURCH
HIGHWAY 30L
4J/[ND]
SW-4
2J
MW-19
MW-12D
ACCESS ROAD
MW-11D
V.J. GOVERNMENT
OTTLEY
(NOT FOUND)
SW-6
ND/[ND]
DW-2
EGLIN-I
3J/3J
OHMW-3
3J/3J
B-10
2J/[ND]
SW-5
EGLIN-II
EGLIN-III
OHMW-2
5J/5J
B-13A
B-13
B-11
OHSS-1
B-12
HARTHMAN
CRUSHER
(PREVIOUSLY HARTHMAN II)
HARVEY
4J/4J
OHMW-1
HARTHMAN
WILFRED
OHMW-
15/13
10
STEELE
HARTHMAN I
ROUTE 30
MW-21D
UNKNOWN WELL
"LAPLACE NORTH"
LAPLACE
ROUTE 32
2J
MW-22D

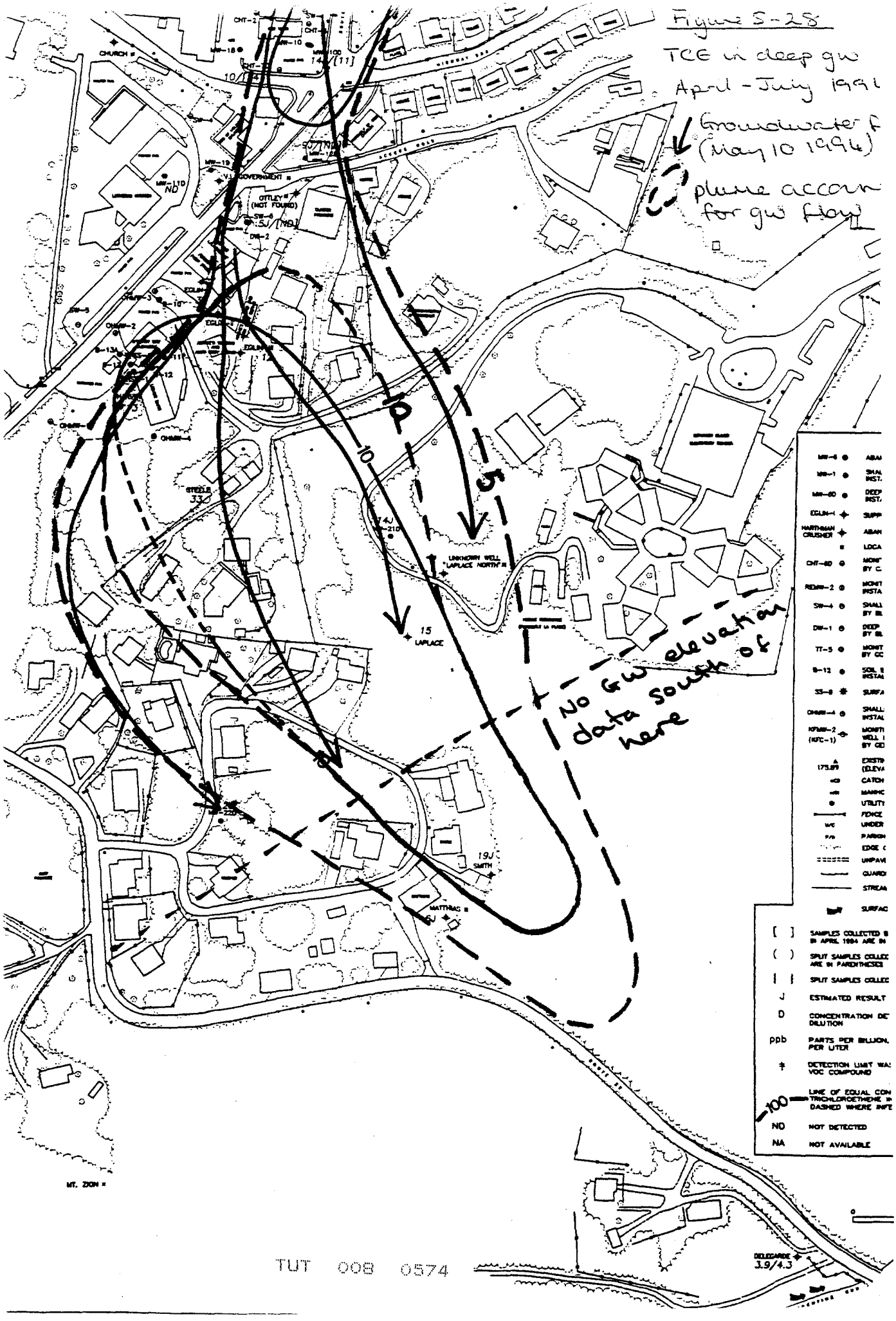


Figure S-28
TCE in deep gw
April - July 1991
Groundwater f
(May 10 1994)
plume accoun
for gw flow
No GW elevation
data south of
here
10
5
15
LAPLACE
UNKNOWN WELL
LAPLACE NORTH
STEELE
33J
19J
SMITH
MATTHIAS
MT. ZION
DELECARDE
3.9/4.3
SAMPLES COLLECTED
IN APRIL 1994 ARE IN
SPLIT SAMPLES COLLEC
ARE IN PARENTHESES
ESTIMATED RESULT
CONCENTRATION DE
DILUTION
PARTS PER BILLION,
PER LITER
DETECTION LIMIT WA
VOC COMPOUND
LINE OF EQUAL CON
TRICHLOROETHENE
DASHED WHERE INFE
NOT DETECTED
NOT AVAILABLE

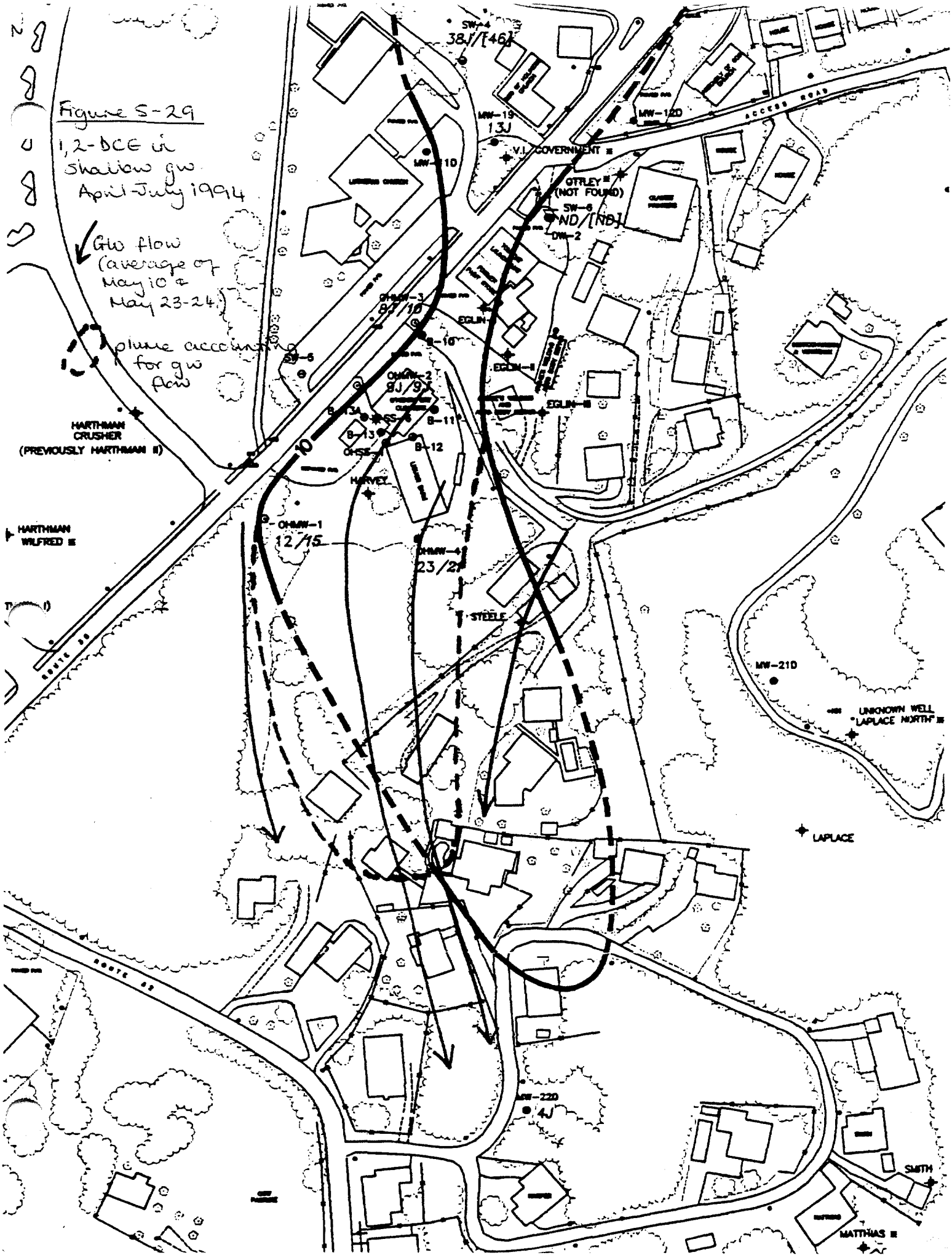


Figure 5-29
1,2-DCE in shallow gw April-July 1994
GW flow (average of May 10 & May 23-24)
plume according for gw flow
SW-4
38J/[46]
MW-19
13J
MW-120
ACCESS ROAD
V.I. GOVERNMENT
MW-110
OTRLEY
(NOT FOUND)
SW-6
ND/[ND]
DW-2
OHMW-3
8J/10
EGLIN
B-10
SW-5
OHMW-2
9J/9
EGLIN-II
EGLIN-III
B-13A
SS
B-11
B-13
B-12
OHSE-1
HARVEY
HARTHMAN CRUSHER
(PREVIOUSLY HARTHMAN II)
HARTHMAN WILFRED
OHMW-1
12/15
OHMW-4
23/27
STEELE
MW-210
UNKNOWN WELL "LAPLACE NORTH"
LAPLACE
MW-220
4J
SMITH
MATTHIAS
ROUTE 90

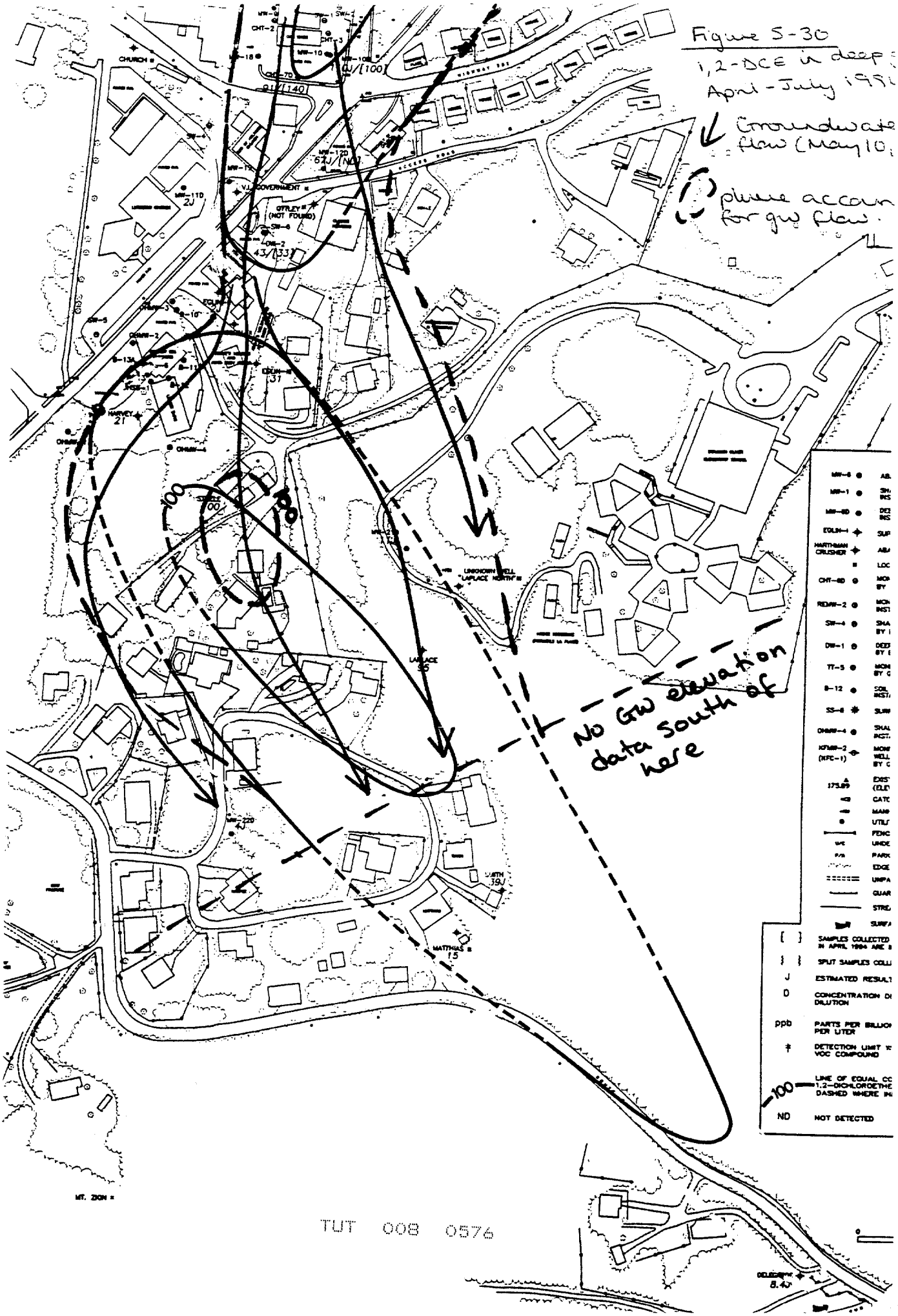


Figure 5-30
1,2-DCE in deep
Apr-July 199
Groundwate
flow (May 10,
plume accoun
for gw flow.
No GW elevation
data south of
here
100
ppb
PARTS PER BILLIO
PER LITER
ND
NOT DETECTED
MT. ZION