United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-87/042
September 1987

EPA

Superfund Record of Decision:

Suffern Well Field, NY

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Suffern Village Well Field, Suffern, Rockland County, New York

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for the Suffern site developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, November 20, 1985.

STATEMENT OF BASIS

This decision is based upon the administrative record for the Suffern Village Well Field site. A copy of the record is available for review at the information repository for the site and at the regional office. The following documents, which are part of the administrative record, were primarily relied upon in making this decision:

- Remedial Investigation Report, Suffern Well Field, prepared by ERM-NORTHEAST, July 1987
- Feasibility Study Report, Suffern Well Field, prepared by ERM-NORTHEAST, August 1987
- The attached Decision Summary for the Suffern Well Field site
- The attached Responsiveness Summary for the site, which incorporates public comments received
- Staff summaries and recommendations

DESCRIPTION OF THE SELECTED REMEDY

Of the various alternative remedies considered, a no action alternative has been selected for this site. Due to the presence of only moderate levels of contaminants and predicted low levels in the future, this is deemed to be an appropriate choice. Applicable or relevant and appropriate requirements (ARARs) at the point of groundwater withdrawal and use are not now and are not predicted to be exceeded. Further, no long-term negative impacts on soil or surface water are anticipated.

Nevertheless, in order to confirm the adequacy of this alternative selection, an extensive monitoring and reevaluation program is included. This monitoring program will serve as an early warning of unanticipated contaminant levels, which is a prudent precaution in consideration of uncertainties in aquifer behavior prediction.

DECLARATIONS

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. The statutory preference for treatment need not be satisfied because treatment was found to be unnecessary for meeting ARARs. Drinking water standards are currently being met and have been met in the recent past, without treatment.

Although contaminants will exist at concentrations exceeding standards in certain locations in the aquifer for several years, predicted natural attenuation will reduce these concentrations to allowable limits in approximately 2 years. Access to the aquifer should be restricted until such time as ARARs are met therein.

The State of New York has been consulted and agrees with the approved remedy (see attached letter).

Start-up of the monitoring program which is eligible for Superfund monies for a period of up to one year, includes aquifer model verification and all associated sampling and analysis required for said verification. The action will require future operation and maintenance activities to ensure the effectiveness of the monitoring program. All such activities are the responsibility of New York State.

I have also determined that the action being taken will be appropriate when balanced against the future availability of Trust Fund monies for use at other sites.

September 25, 1987
Date

Christopher J. Daggett
Regional Administrator

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA/ROD/R02-87/042	2.
3. RECIPIENT'S ACCESSION NO.	
4. TITLE AND SUBTITLE SUPERFUND RECORD OF DECISION Suffern Village Well Field, NY First Remedial Action - Final	5. REPORT DATE September 25, 1987 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. TYPE OF REPORT AND PERIOD COVERED Final ROD Report 14. SPONSORING AGENCY CODE 800/00
15. SUPPLEMENTARY NOTES	

16. ABSTRACT

The Suffern Village Well Field site is located in Rockland County, New York. The Village of Suffern operates four production wells that provide water to approximately 12,000 people. In September 1978 monitoring activities detected 1,1,1-trichloroethane (TCEA), a common industrial chemical compound, and trace VOCs in the municipal water distribution system. In December 1978, wells 1,2 and 4 with TCEA levels of 90-114 ppb were shut down. Municipal water supply requirements were met by well 3. A subsequent survey identified the Tempcon Corporation, a small local oil burner reconditioning business, as the source of TCEA. In January 1979, Tempcon ceased using a seepage disposal pit and TCEA-based cleaning products. By March 1979, removal of waste material and excavation and devolatilization of contaminated soils were completed. A spray aeration treatment system was then implemented to remove TCEA from the municipal water supply. Monitoring results indicate TCEA levels in the four wells below the New York State Department of Environmental Conservation (NYSDEC) guideline of 50 ppb.

A no action remedy with ground water monitoring to assure the presence of TCEA at concentrations below the NYSDOH action level is the selected remedial action. The estimated present worth cost for this ground water monitoring is $311,000.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Suffern Village Well Field, NY First Remedial Action - Final Contaminated Media: gw Key contaminants: TCEA, VOCs		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)* None	21. NO. OF PAGES 47
	20. SECURITY CLASS *(This page)* None	22. PRICE

INSTRUCTIONS

1. **REPORT NUMBER**
   Insert the EPA report number as it appears on the cover of the publication.

2. **LEAVE BLANK**

3. **RECIPIENTS ACCESSION NUMBER**
   Reserved for use by each report recipient.

4. **TITLE AND SUBTITLE**
   Title should indicate clearly and briefly the subject coverage of the report, and be displayed prominently. Set subtitle, if used, in smaller type or otherwise subordinate it to main title. When a report is prepared in more than one volume, repeat the primary title, add volume number and include subtitle for the specific title.

5. **REPORT DATE**
   Each report shall carry a date indicating at least month and year. Indicate the basis on which it was selected *(e.g., date of issue, date of approval, date of preparation, etc.)*.

6. **PERFORMING ORGANIZATION CODE**
   Leave blank.

7. **AUTHOR(S)**
   Give name(s) in conventional order *(John R. Doe, J. Robert Doe, etc.)*. List author's affiliation if it differs from the performing organization.

8. **PERFORMING ORGANIZATION REPORT NUMBER**
   Insert if performing organization wishes to assign this number.

9. **PERFORMING ORGANIZATION NAME AND ADDRESS**
   Give name, street, city, state, and ZIP code. List no more than two levels of an organizational hirearchy.

10. **PROGRAM ELEMENT NUMBER**
    Use the program element number under which the report was prepared. Subordinate numbers may be included in parentheses.

11. **CONTRACT/GRANT NUMBER**
    Insert contract or grant number under which report was prepared.

12. **SPONSORING AGENCY NAME AND ADDRESS**
    Include ZIP code.

13. **TYPE OF REPORT AND PERIOD COVERED**
    Indicate interim final, etc., and if applicable, dates covered.

14. **SPONSORING AGENCY CODE**
    Insert appropriate code.

15. **SUPPLEMENTARY NOTES**
    Enter information not included elsewhere but useful, such as: Prepared in cooperation with, Translation of, Presented at conference of, To be published in, Supersedes, Supplements, etc.

16. **ABSTRACT**
    Include a brief *(200 words or less)* factual summary of the most significant information contained in the report. If the report contains a significant bibliography or literature survey, mention it here.

17. **KEY WORDS AND DOCUMENT ANALYSIS**
    (a) DESCRIPTORS - Select from the Thesaurus of Engineering and Scientific Terms the proper authorized terms that identify the major concept of the research and are sufficiently specific and precise to be used as index entries for cataloging.

    (b) IDENTIFIERS AND OPEN-ENDED TERMS - Use identifiers for project names, code names, equipment designators, etc. Use open-ended terms written in descriptor form for those subjects for which no descriptor exists.

    (c) COSATI FIELD GROUP - Field and group assignments are to be taken from the 1965 COSATI Subject Category List. Since the majority of documents are multidisciplinary in nature, the Primary Field/Group assignment(s) will be specific discipline, area of human endeavor, or type of physical object. The application(s) will be cross-referenced with secondary Field/Group assignments that will follow the primary posting(s).

18. **DISTRIBUTION STATEMENT**
    Denote releasability to the public or limitation for reasons other than security for example "Release Unlimited." Cite any availability to the public, with address and price.

19. & 20. **SECURITY CLASSIFICATION**
    DO NOT submit classified reports to the National Technical Information service.

21. **NUMBER OF PAGES**
    Insert the total number of pages, including this one and unnumbered pages, but exclude distribution list, if any.

22. **PRICE**
    Insert the price set by the National Technical Information Service or the Government Printing Office, if known.

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
SUFFERN VILLAGE WELL FIELD
NEW YORK

United States Environmental Protection Agency
Region II
New York

TABLE OF CONTENTS

		PAGE
I.	SITE LOCATION AND DESCRIPTION	1
II.	SITE HISTORY	1
III.	ENFORCEMENT	5
IV.	COMMUNITY RELATIONS	5
V.	ALTERNATIVES EVALUATION	6
	A - Description	7
	B - Public Health Evaluation	9
	C - Evaluation of Alternatives in Comparison to Specific Criteria	10
VI.	SELECTED REMEDY	18
	A - Description	18
	B - Statutory Determination	19

ATTACHMENTS

A. NYSDEC Letter of Concurrence

B. Responsiveness Summary

FIGURES

FIGURE	TITLE	PAGE
1-1	General Vicinity Map	20
1-2	Locations of Wells	21
2-1	Average Monthly TCEA Concentrations Suffern Wells	22
2-2	Location of Tempcon Test Pits	23
2-3	Location of E-Site Test Pits	24
2-4	TCEA Concentration Map Samples of October 1986	25
2-5	TCEA Concentration Map Samples of December 1986	26
5-1	Alt.1-TCEA Concentration in Production Wells vs Time	27
5-2	Alt.1-TCEA Concentration in Aquifer - Dec. 1987	28
5-3	Alt.1-TCEA Concentration in Aquifer - Dec. 1991	29
5-4	Alt.1-TCEA Concentration in Aquifer - Dec. 1996	30
5-5	Alt.4-TCEA Concentration in Aquifer - Dec. 1989	31
5-6	Alt.6-TCEA Concentration in Aquifer - Dec. 1992	32

TABLES

TABLE	TITLE	PAGE
2-1	Water Quality Data - October 1986	33
2-2	Water Quality Data - December 1986	34
5-1	Alternative No. 1 No-Action Projected Contaminant Concentration vs ARARs	35
5-2	Summary of the Evaluation of Alternatives	36

I. SITE LOCATION AND DESCRIPTION

The Suffern Village Well Field site is located in the north eastern portion of the Village of Suffern, New York. The well field is approximately 0.25 miles north of the New York-New Jersey border in Rockland County and covers an area of approximately 30 acres in the Ramapo River valley. The study area lies on the relatively flat alluvial floor of the Ramapo River Valley approximately 2,500 feet north of the confluence of the Ramapo and Mahwah Rivers. Topographic relief is in the order of 660 feet; the uplands are at elevation 930 feet (ASL) and the 100 year flood plain is at elevation 270 feet (ASL). Slopes as steep as 40% are found along the valley walls. The New York State Thruway, U.S. Route 17, New York State Route 59, and a Conrail right-of-way all pass through the study area (Figure 1-1).

The Ramapo River is categorized by the NYSDEC as a "Class A Water". It is therefore best utilized for potable water supply or as a supply of water for food processing operations.

The portion of the study area south of the Thruway has been characterized as one of three major flood areas within the Ramapo Valley in Rockland County.

The Village of Suffern operates four production wells that provide water at an average rate of approximately 1.8 million gallons per day (MGD), to a population of approximately 12,000 people. The well field consists of four gravel-packed, production wells completed in the valley-fill, glacial outwash sediments of the Ramapo River Valley (Figure 1-2). Recharge to the wells is derived principally from induced infiltration of water from the Ramapo River. Other sources include infiltration of run-off from upland areas, direct precipitation onto the valley floor and underflow along the valley.

II. SITE HISTORY

Volatile organic contamination of the Village of Suffern Well Field was detected in tap water collected from the municipal distribution system in September, 1978. Subsequent monitoring activities by the Village, the Rockland County Health Department (RCHD) and the New York State Department of Environmental Conservation confirmed that ground water at the Suffern Well Field had become contaminated with 1,1,1-trichloroethane (TCEA), a common industrial chemical compound with several uses. Only traces of other VOCs were identified during these activities, none in

concentrations approaching those of the TCEA, and in all cases below NYSDOH guidelines. Wells 1, 2, and 4 with TCEA levels of 90 to 114 parts per billion (ppb) were shut down in December of 1978; the Village water supply requirements were provided by Well #3, which had TCEA levels well below the NYSDOH guideline of 50 ppb.

Several actions were implemented as a result of these findings. These included a survey of local commercial establishments in order to identify the source of the TCEA which culminated in the discovery that the Tempcon Corporation, a small oil burner reconditioning business, had used TCEA prior to the discovery of the TCEA ground water contamination. No other TCEA users were identified. In January of 1979, Tempcon ceased using a seepage disposal pit as well as TCEA-based cleaning products. Subsequently, under the guidance of the RCHD, remedial measures including the removal of waste materials from its disposal pit and the excavation and devolatilization of contaminated soils, were completed in March, 1979. The contaminant levels in the ground water were not immediately affected.

The Village then constructed a spray aeration treatment system later that year to remove the TCEA from the municipal supply. Based on the prevailing contaminated condition of the site, it was placed on the National Priorities List in October, 1984. Monitoring results have shown that TCEA levels are within the NYSDOH guideline of 50 ppb; therefore the treatment system has not been needed since the beginning of 1985. RCDH (May 10, 1985) advised the Village that wells #1 and #4 could be utilized without aeration.

Since May, 1985, when well #3 was taken out of service for redevelopment, the TCEA concentrations in all four wells have remained below the NYSDOH guideline with only occasional excursions. Well #3 went back in service in late 1985 and TCEA levels have remained below 15 ppb. At present, TCEA levels are still consistently higher in Well #4 but the ranges of values are significantly lower than in previous years. Currently, the highest values recorded as of February, 1987 are in the 25-30 ppb range.

The contamination history of the Suffern Well Field is unusual in that only one contaminant has been persistent although trace levels of other organic chemical species have been periodically detected. Since the cessation of subsurface disposal activities and the treatment of contaminated soils

at Tempcon, the water quality of the Suffern wells has gradually improved over several years, such that current concentrations of TCEA are below the NYSDOH "action guidelines."

In summary, previous investigative efforts have recognized the TCEA contamination problem to be the probable result of the discontinued disposal practices at the Tempcon Corporation. The complex nature of the site hydrogeology had prevented the thorough understanding of the behavior of TCEA within the glacial aquifer thereby resulting in the belief that there might be other sources of TCEA. Equally importantly, there existed a concern that even though the suspected source had been remediated, slugs of contaminants may have been released into the subsurface thereby causing the well field to be continually under the threat of periodic contamination above the NYSDOH guidelines.

The trend in TCEA concentrations from November 1978 to February 1987 is shown on Figure 2-1. For a detailed discussion, refer to the Remedial Investigation Report, July 1987, Section 5.2.2.1.

A remedial investigation of the well field was undertaken in April, 1986, in order to identify all sources of contamination within the well field and adjacent areas.

The scope of the field work included a soil sampling program and a water sampling program. The former included testing for VOCs in soils at twelve deep test boring locations and characterizing soils in test pits at Tempcon and the E-well site. The location of the borings are shown on Figures 2-2 and 2-3.

For the water sampling program, a total of 24 wells were installed in individual well, two-well and three-well cluster configurations. Locations are shown on Figure 1-2, and the details of the installation are described in the Remedial Investigation Report.

Subsequent to initial sampling, two comprehensive rounds of water samples were taken in October and December, 1986. TCEA and associated impurities and/or degradation by-products have been detected in several of the wells installed throughout the study area. Tables 2-1 and 2-2 present the analyti-

an approximation of contamination as shown on the attached TCEA isoconcentration maps on Figures 2-4 and 2-5. Concentrations of associated impurities have likewise been measured or estimated.

The distribution of TCEA-related contamination within the aquifer is such that supply wells still yield ground water with TCEA in quantities ranging from one to 30 ug/L. The nearby Spring Valley Water Company production well #100, located due east of Tempcon also contains TCEA in similar concentrations.

The highest observed concentrations of TCEA and other VOCs is located at the "E-well location"; values of TCEA ranged from 30 ug/L to 1500 ug/L. A second area to the south, the "I-well location", contained elevated concentrations of TCEA ranging from 30 to 75 ug/L.

No data has indicated that metals, other inorganics semi-volatiles, and other VOCs, could affect human health or the environment and they were not considered indicators.

No ambient air, surface soil, sediment or surface water pathways of significant release are indicated by the results of the RI. The only pathway of concern considered in depth has been via ground water migration from Tempcon and the E-site as well as from a former gas works facility.

As a result of a risk assessment, it is believed that the long-term exposure to the toxic constituents identified during the RI pose only a negligible health hazard. A detailed presentation of this risk assessment is included in the Remedial Investigation report, dated August 1987, which is part of the Administrative Record.

Coal tar related waste materials appear to be present in unknown quantities near the well field. These apparently derived from a former gas works plant located near the well field. This facility operated from 1902-1935. At the very low concentration levels detected in either the soils and/or ground water, the detected PAHs are considered to be only a very minor concern from a human health and environmental standpoint.

A solute transport model (Suffern Aquifer Model) has been developed that utilizes all available information in the study area, and is capable of predictive simulations of contaminant concentration profiles as a function of time. Future sampling/analyses are reqired to confirm the validity of the model.

III. ENFORCEMENT

At the time of the initial detection of the contaminant TCEA, the Rockland County Health Department investigation indicated that the Tempcon Corporation was the potential source. Remedial measures, including excavation and disposal of a concrete seepage pit into which wastes had reportedly been deposited and the treatment of contaminated soils, were performed. Nevertheless, elevated TCEA levels persisted.

By letter of February 22, 1985, Tempcon was advised that EPA intended to perform an RI/FS at the site; also, that Tempcon might be a responsible party and subject to liabilities. Tempcon responded on March 5, 1985 indicating no knowledge of data or investigations leading to the EPA action. Based upon this response, EPA determined that there was little likelyhood of Tempcon participation in the study. EPA therefore signed a cooperative agreement with New York State on March 29, 1985 to undertake the RI/FS.

Although no remedial action is contemplated at this time, an extensive monitoring program will be implemented to ensure protection of public health and to verify the results of the model. Should the model prove deficient thereby indicating contamination which might jeopardize public health, a second operable unit may be initiated to remediate the problem. EPA maintains its right to initiate enforcement action against Tempcon for recovery of all relevant costs, including the cost of the RI/FS and any subsequent actions taken to protect public health.

IV. COMMUNITY RELATIONS

The first known public attention was focused on the site in August 1978 when some residents living in Rockland County began to complain about the taste of their water. After the Rockland County Board of Health tested several community water supplies and found TCEA in the Suffern wells, the village installed an aeration system.

When news of the contamination first became public, local residents besieged the mayor's office with questions and complaints. These complaints ended after a local newspaper article, dated December 14, 1978, reported that the contamination level in the Suffern water supply had been decreased to a safe level.

In March 1980, when the aeration system was shut down after a heavy rain storm and the community was advised to boil its drinking water, local newspapers carried the story. Also, after further testing, the mayor announced that the water was safe to drink again, and this was covered in the media.

No other community involvement with the site has been documented. There are no known citizen groups in the area.

Although no public meetings have been held (prior to our August 19, 1987 meeting) for the purpose of discussing the Suffern Village Well Field site, the issue has been raised at several town council meetings. Also, at a Village meeting on July 14, 1986, DEC presented the program and objectives of the RI/FS that was about to be initiated.

Community awareness at the site can be characterized as moderate. It is important to note, however, that this level of interest will become much greater if there is an increase in the ground water contamination.

Specific concerns that were raised during the public comment period, including comments made at the public meeting held on August 19, 1987 at the Suffern Town Hall, are answered in the attached Responsiveness Summary. A transcript of the hearing is included in the Administrative Record which is available for review at the information repository and at the regional office.

V. ALTERNATIVES EVALUATION

The remedial alternatives for the Suffern Well Field site were developed and evaluated using the Comprehensive Environmental, Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR §300.68, and the "Guidance on Feasibility Studies Under CERCLA", as guidance.

According to Section 121 of CERCLA, the recommended remedial alternative must protect human health and the environment, should be cost-effective, and should utilize permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. The proposed remedy must also attain applicable or relevant and appropriate federal and state public health and environmental requirements (ARARs) that have been identified for the site. The ARARs are indicated on Table 5-1.

A three step process was developed and used to facilitate the selection of a preferred remedial alternative. The following is a summary of that process:

1. Selection of remedial technologies and general alternatives.

2. Further development and screening of remedial alternatives.

3. Detailed evaluation of the final alternatives.

Complete details of these analyses are presented in the Feasibility Study Report, dated August, 1987; the results of Step 3, are presented herein. Note that the decision is based on nine alternatives initially screened. The remaining five alternatives are presented in accordance with the numbering system utilized in the Feasibility Study (Table 5-3).

A - Description

Alternative No. 1 - No Action

No active remedial measures would occur; no ground water pumping, diversion, treatment or other activity would be contemplated. Management and use of the Ramapo River Valley aquifer would continue in its present manner, including major withdrawals by the Spring Valley Water Company and Suffern Village. Monitoring of the ground water is the only activity included.

Alternative No. 2 - Treat Suffern Water Supply,Using The Existing Spray Aeration System

This system would be relied on to meet public health standards. Rehabilitation of the spray aeration system is required to provide treatment capacity up to the maximum system demand, and to achieve long term, highly reliable treatment for the expected period of aquifer contamination. Monitoring of water quality is included.

Alternative No. 3 - Treat Suffern Water Supply, Using a Packed Tower Aeration (PTA) System

Removal of the volatile organic compounds would be accomplished via packed tower aeration. The salient features are:

a) Ground water withdrawal rates in accordance with existing requirements.

b) Treatment of flows from all Suffern wells with capacity to treat two wells simultaneously.

c) Continuous treatment as long as it takes for restoration of the aquifer.

d) Long term standby capability, if required.

e) Minimal required monitoring of system performance.

Alternative No. 4 - Plume Containment, by Extraction at Point(s) of Maximum Contamination; Treat w/PTA and Discharge to River

This remedial action comprises two major components:

a) Ground water pumping

b) Treating contaminated ground water for discharge into the Ramapo River. This depends on ground water modeling for optimum scheme for aquifer restoration and ground water plume containment. Objective is to remediate the aquifer as soon as practicable.

Alternative No. 6 - Divert Plume with Suffern Wells No.3 and No.4 ; Treat w/PTA and Pump to Suffern Distribution System

This alternative would essentially divert the contaminant plume using an existing production well (or wells). The program depends on a model prediction of plume migration and characteristics. Spring Valley Well #100 or Suffern production wells, or a combination thereof, would pump at maximum rate to maintain an inward gradient throughout the plume. A PTA system for the Suffern Wells would remove VOCs to comply with ARARs, and then the treated water would be pumped to the Suffern distribution system.

B - Public Health Evaluation

The ground water transport-dispersion model was used to estimate concentrations of TCEA in ground water over time at identified points of interest. Estimates of the concentrations of related "dichloro" compounds, based on TCEA levels were then derived for the affected water. Concentrations of those compounds with evidence of animal carcinogenicity were expressed in terms of lifetime equivalent concentrations. Exposure routes and the degree of exposure via each route were estimated. Risks were then calculated for the level of carcinogen(s) in the affected water in the absence of any remedial activity, and for each of the remedial alternatives. Non-carcinogenic hazards were also examined.

Alternative No. 1 - No Action

Under Alternative No. 1 the 70-year equivalent concentration of TCEA in the Suffern well water was calculated to be 0.29 ug/L. At present there is inadequate evidence to rank TCEA as a possible human carcinogen. The 70-year equivalent concentrations in Suffern public water supply were estimated to be 0.006 ug/L for 1,2-dichlorethane and 0.064 ug/L for 1,1-dichloroethylene. The excess lifetime cancer risk associated with the model predicted concentrations of 1,1-dichloroethylene was estimated to be 7×10^{-6}. That is, there is a 5% probability that more than 7 cases of cancer would develop out of a population of 1 million people so exposed, and a 95% probability that there would be less than 7 cases out of 1 million. The excess lifetime cancer risk associated with 1,2-dichloroethane was estimated to be 3×10^{-8}.

Non-carcinogenic risks were estimated to be negligible.

The risks associated with each remedial alternative were also calculated; the total excess lifetime cancer risks are tabulated below. Other risks were estimated to be negligible.

ALTERNATIVE	ESTIMATED LIFETIME CANCER RISK
No. 1	7×10^{-6}
No. 2	7×10^{-6}
No. 3	6×10^{-6}
No. 4	5×10^{-6}
No. 6	5×10^{-6}

C - Evaluation of Alternatives in Comparison to Specific Criteria

The specific criteria to be evaluated include regulatory requirements (e.g. ARARs), performance, reliability, implementability, effectiveness, environmental impacts, institutional concerns and cost. These criteria were derived from the "Guidance on Feasibility Studies Under CERCLA", 1985, and the factors in SARA Section 121(b)(1), A-G. The following analysis summarizes the above from the Feasibility Study.

Alternative No. 1 - No-Action

Low levels of contaminants are predicted as shown on Table 5-1. As noted there, no ARARs are predicted to be exceeded at the existing points of withdrawal of ground water, i.e., at the production wells. Therefore, the no action alternative appears to satisfy the requirements of SARA concerning cleanup standards. Only natural processes would act to permanently reduce the toxicity and/or mobility of contaminants. The predicted results of these natural processes are shown on Figure 5-1 which presents the decline in TCEA concentration at the production wells as a function of time. The anticipated TCEA concentration profiles in the well field as a function of time are shown on Figures 5-2, 3, and 4 for the future years 1, 5, and 10, respectively, beyond the sampling results of December 1986.

Restricting access to the aquifer is recommended because of the predicted presence of contamination which may exceed ARARs at some locations. This situation is predicted to continue for approximately 4 years. The inclusion of monitoring and re-evaluation activities in this alternative satisfies regulatory concerns; however, as an institutional issue, it is recommended that the State, County or local government use their respective authorities to restrict access to the aquifer until ARARs are met in the aquifer.

The components and analyses proposed under the no action alternative are considered to be straight forward, accurate and highly reliable in determining conditions at the locations of the sampling. However, the historically fluctuating concentrations, the difficulties in

predicting aquifer behavior, and the size of the study area all indicate that the monitoring system cannot guarantee that no contaminants could arrive at a production well without warning. The continuation of aquifer evaluation using the model in conjunction with an extensive monitoring program helps lessen that concern. The scope of this program incorporates a total of 37 wells into a monitoring network. For the first two years of monitoring, four quarterly rounds will be taken at each of these wells. In subsequent years, it is anticipated that quarterly sampling at a reduced number of wells and with fewer analytical parameters would be performed. Results of the first two years of monitoring will be utilized to verify, or modify, the aquifer performance model.

This program is sufficiently comprehensive to track the existing TCEA plume, provide water quality results vs time and space for comparison to model predictions, and act as an early warning system for the Suffern and Spring Valley well fields.

No long-term adverse impacts on air, soil or surface water are anticipated from this alternative. The ground water quality will improve and reach a point within 10 to 15 years where no impact will be definable.

A present worth evaluation of the estimated costs for Alternative No. 1 is presented in Table 5-2. As can be seen from the table, this no action alternative may have significant costs; the present worth amounts to $311,000.

Alternative No. 2 - Treat Suffern Public Water Supply With the Existing Spray Aeration System

The rehabilitated spray aeration system would not be as effective as packed tower aeration for removing volatile organic compounds. Low concentrations of TCEA (zero to about 10 ug/L) are predicted by the model to be present in the Suffern public supply wells after December 31, 1988. If the existing spray aeration system is only 60% effective for VOC removal, then it would be expected to achieve effluent quality conforming to the most stringent ARARs.

No significant health hazards are posed by the release of VOCs from the ground water into the surrounding air.

The contaminant characteristics of the aquifer as a function of time will be similar to Alternative No. 1. Therefore, it will be necessary to restrict access to the aquifer because contaminant levels may exceed ARARs at some locations. This situation is predicted to continue for approximately 4 years.

Alternative No. 2 is not required to be implemented in order to meet ARARs at the well head at any future time, based on the modeling discussed previously. Combined with a program of strict aquifer use, spray aeration has the potential of reducing the levels of VOCs to a level which approaches NYSDEC guidance values. The reduction in the exposures to carcinogenic volatile organic compounds would not be as significant as could be expected with packed tower aeration technology, but is comparable considering the low threat presented by the contaminants found in the water supply.

The contaminant characteristics in the aquifer are entirely analagous to those described under Alternative No. 1, no action.

Although the rehabilitated system will not be normally operated in a recycle flow mode, this capability will be available as an emergency treatment option. If higher levels of VOCs are detected in the supply wells than predicted by the Suffern Aquifer Model, then the Suffern Water Department will have some flexibility to raise the removal rate of VOCs, albeit at a lower system flow rate.

The rehabilitated system is anticipated to be easily installed and operated in the area occupied by the existing spray aeration system. The time to establish normal operation is expected to be about six months. With the exception of the no action alternative, the time to initiate ground water treatment is the shortest for Alternative No. 2.

No long-term adverse impacts on soil or surface water are anticipated from this alternative. Groundwater quality will improve and reach a point within 10 to 15 years where no impact will be definable.

Operation of the rehabilitated spray aeration system at 2,650 gpm could be expected to initially cause an emission of the order of 0.1 lb/hr of volatile organic vapors into the air; this would decrease with time. The rate of emission of VOCs from the spray aeration system is expected to be lower than the Acceptable Ambient Levels (AALs) of the contaminants of concern (1,1,1-TCEA and its degradation by-products), and would not represent a significant adverse impact on air quality.

Capital costs and operation and maintenance costs to complete Alternative No. 2 are presented in Table 5-2; total present worth amounts to $1,260,000.

Alternative No. 3 - Treat Suffern Public Water Supply with Packed Tower Aeration

The technologies proposed in this alternative conform to the preferences of CERCLA for remedial actions that use treatment to permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances. Utilization of packed tower aeration to remove VOCs from ground water is a permanent solution in that the technology significantly reduces the potential exposure to and toxicity of the VOCs. The low inhalation hazard caused by the emission of VOCs from the treated ground water is considered less significant than the hazards posed by ingesting contaminated ground water or the dermal contact route of exposure.

Alternative No. 3 is not required in order to meet ARARs at the well head at any future time, based on the modeling and assumptions discussed previously. It does have the potential of reducing the levels of VOCs to the most stringent NYS guidance values.

There is a high degree of confidence that effective performance will be attained treating the Suffern water supply, as has been done at other similar sites. The physical characteristics of the contaminants of concern in the ground water are suitable to separation by air stripping.

The packed tower aeration systems can be designed for flexibility, durability and ease of operation. Two packed towers are provided for parallel independent operation. Maintenance can therefore be performed on each system. Also, if the influent concentration exceeds the "worst case" design basis, the system can be realigned to treat a reduced flow rate with a series packed tower operation (rather than parallel).

The packed towers are dependent on the effectiveness of the existing manganese removal treatment system; at high manganese levels, fouling of the tower packing materials may occur.

The packed tower aeration system is anticipated to be easily installed in the area occupied by the current spray aeration system. The time required for pilot plant testing (if required), and the subsequent design, installation, and startup of the field facility is anticipated to be about eighteen months.

The contaminant characteristics of the aquifer as a function of time will be similar to Alternative No. 1. Therefore, it will be necessary to restrict access to the aquifer because contaminant levels may exceed ARARs at some locations. This situation is predicted to continue for approximately 4 years.

During the time when the new packed tower aeration facility is being constructed, the Water Department will be unable to use its aeration system in the event of heightened contamination. The Suffern Public Water Supply System is currently interconnected, at four locations, with the Spring Valley Water Company. The latter has indicated that they are capable of providing water to Suffern on an emergency basis. Determining the length of time that Spring Valley could provide water to Suffern would require additional study. Since the Suffern Water Department does not currently use the existing spray aeration facility to continuously treat the public water supply, the temporary loss of this facility would not be expected to pose a greater threat to public health than currently exists. Thus, though it is a concern that the existing spray aeration system would be out of service during implementation, it is not an overriding negative factor.

No long-term adverse impacts on air, soil or surface water are anticipated from this alternative. The ground water quality will improve and reach a point within 10 to 15 years where no impact will be definable.

Operation of two packed towers at the maximum design capacity would cause the emission of less than 1.0 lb/hr of volatile organic vapors into the air. The Acceptable Ambient Levels (AALs) from the "New York State Air Guide-1: Guidelines for the Control of Toxic Air Contaminants" (NYSDEC, Division of Air Resources, July 1986 printing) were compared to the estimated air concentrations for the contaminants of concern. Since none of the VOCs released will exceed its AAL at any receptor in the area, no air emission control should be necessary.

The present worth of capital costs and operations and maintenance (O&M) is $1,392,000. Since it was assumed, based on aquifer modeling results, that Alternative No. 3 would require 15 years to complete, the present worth costs of operations and maintenance are more than twice the magnitude of the capital costs. The costs to replace capital equipment is relatively small in comparison to the initial capital costs and periodic O&M costs.

Alternative No. 4 - Plume Containment by Extraction at the Point of Maximum Contamination; Packed Tower Aeration, and Discharge to the Ramapo River.

This alternative would be expected to achieve effluent quality conforming to the most stringent standards. Packed tower aeration of the contamination ground water would constitute a permanent removal of VOCs from the aquifer. The toxicity and volume of VOCs would be reduced in the aquifer. The stripped compounds should not cause public health risks in the atmosphere. Mobility of compounds within the aquifer would be sharply reduced by the recovery of contaminated ground water.

Alternative No.4 is not required to be implemented in order to meet ARARs at the well head at any time in the future.

For Alternative No. 4, the estimated time required to reduce or remove contamination to below ARARs in the aquifer is estimated at one year from inception of operation.

Since ground water would be extracted at points of maximum concentration, the most complete and rapid remediation of aquifer contamination would be attained.

As discussed for Alternative 3, system effectiveness can be expected to be maintained as long as significant fouling of tower packing does not occur. For a system operational time of one year it is not expected that packing change will be required.

Since well water characteristics at the proposed recovery well locations are not known, it is recommended that the pilot study be conducted for at least four weeks before design is initiated. The pilot study will determine if pretreatment of raw well water is required to remove iron and/or manganese prior to aeration. The time from start of testing to beginning of operations is anticipated to be about eighteen months.

Several institutional factors would need to be considered in the implementation of this alternative. First, an entity to operate the ground water treatment system and oversee compliance with NPDES discharge permit standards would need to be designated or created. Second, real property or temporary construction rights would have to be obtained for the land required to install wells and construct the treatment systems. Furthermore, land would need to be acquired or a right-of-way obtained to permit the installation of discharge piping to the Ramapo River on both the west and east sides of the river. Any potential conflicts of this alternative with existing aquifer management would require resolution. On the plus side, little or no aquifer restriction would be required due to the short cleanup time.

No long-term adverse impacts on soil or surface water are anticipated from this alternative. Ground water quality will improve and will essentially meet ARARs approximately one year after commencement of extraction operations. Emission of VOCs into the atmosphere will be similar to Alternative No. 3, of the order of 0.1 lb/hr, and as such would not represent a significant adverse impact on air quality.

The present worth of capital costs and operation and maintenance (O&M) to complete Alternative No. 4 is $817,000. This is a point of departure alternative since it accomplishes site cleanup in the shortest time frame. Costs to conduct this remedial action are relatively low; the alternative is completed in one year and high costs to operate finished water booster pumps are avoided since the water is treated and gravity fed to the Ramapo River.

The total costs for this alternative are considerably lowered by making the assumption that after one year, much of the high cost equipment will be in good working order, and have a significant resale value as used equipment.

Alternative No. 6 - Plume Diversion by Suffern Well Nos. 3 and 4; Treatment by Packed Tower Aeration and Discharge to Suffern System

The remedial technology for use in Alternative No. 6 was designed to produce an effluent quality conforming to the most stringent standards. The degree of reduction in mobility, toxicity, and volume afforded by Alternative No. 6 is equivalent to that for Alternative 4.

Alternative No.6 is not required to be implemented in order to meet ARARs at the well head at any time in the future.

The estimated time required to reduce or remove contamination to below ARARs in the aquifer is estimated to be four years. Figure 5-6 presents the TCEA concentration profile at the end of 4 years of operation; the peak value is 2 ppb, corresponding to a DCE value of .04. This time period is longer than that of Alternative No. 4, for which a one year project duration is estimated, but shorter than that of Alternative No. 3, for which a fifteen-year project life is forecast. Because ground water would be pumped from the projected outer edge of the plume, a less complete remediation of overall aquifer contamination would be achieved in this alternative.

The packed towers are dependent on the effectiveness of the existing manganese removal system; at high manganese levels, fouling of the tower packing may occur.

Since well water characteristics at the proposed recovery well locations are not known, it is recommended that at least a four week pilot study be conducted before design is initiated. The pilot study will determine if pretreatment of raw well water is required to remove iron and/or manganese prior to aeration. The time from start of testing to beginning of operations is anticipated to be about eighteen months.

Some disruption of existing systems would ensue during stripper packed tower aeration system tie-in. Disruptions to the distribution system can be minimized by accumulating sufficient water in elevated storage to meet the expected demand during tie-in. Because two packed towers would be installed, a portion of the water demand could be treated by one unit while the other unit was being installed and connected into the system.

Restricting access to the aquifer is required because of the predicted presence of contamination which may exceed ARARs at some location. This situation is predicted to continue for approximately 2 years.

No long-term adverse impacts on soil or surface water are anticipated from this alternative. Ground water quality will improve and will essentially meet ARARs

approximately two years after commencement of treatment operations. Emission of VOCs into the atmosphere will be of the order of 0.1 lb/hr, and would not represent a significant adverse impact on air quality.

The total present worth of capital costs and operations and maintenance costs (O&M) is $840,000. The capital costs to implement Alternative No. 6 are the same as those required for Alternative No. 3. However, the annual O&M costs for Alternative No. 6 are slightly higher than for Alternative No. 3 because the energy requirements to operate the blower required for Alternative No. 6 are higher.

The present worth costs for Alternative No. 6 are less than those of Alternative No. 3 since the period of performance is only 4 years for Alternative No. 6 while it is 15 years for Alternative No. 3. The present worth costs for Alternative No. 6 are greater than those of Alternative No. 1 (the no action alternative) and Alternative No. 4.

VI. SELECTED REMEDY

A - Description

The no action alternative would provide for no active remedial measures. No ground water pumping, diversion, treatment or other activity is contemplated. Management and use of the Ramapo River Valley aquifer will continue in its present manner, including major withdrawals by the Spring Valley Water Co. and Suffern Village. Monitoring of the ground water is the only activity included.

In as much as no ARARs are predicted to be exceeded at the existing ground water removal locations, the requirements of CERCLA cleanup standards are intrinsically met without further action.

With respect to the goal of management of migration, no active effort is directed to this objective. Only natural processes would act to permanently reduce the toxicity and/or mobility of contaminants. Toxic, mobile contaminants will remain in some locations in the aquifer for five years. Accordingly, there is the need to reasonably include restricting access to the aquifer because of the predicted presence of contamination which may exceed ARAR standards at some locations. This situation is predicted to continue until approximately model year 4. Therefore, it is recommended that the State, County and local governments exercise their respective authorities to restrict access to the

aquifer until ARARs are met in the aquifer. The inclusion of monitoring and re-evaluation activities in this alternative does help satisfy regulatory concerns. The scope of this program incorporates a total of 37 wells into a monitoring network. For the first two years of monitoring, four quarterly rounds will be taken at each of these wells. In subsequent years, it is anticipated that quarterly sampling at a reduced number of wells and with fewer analytical parameters would be performed. Results of the first two years of monitoring will be utilized to verify, or modify the aquifer performance model.

This program is sufficiently comprehensive to track the existing TCEA plume, provide water quality results vs time and space for comparison to model predictions and act as an early warning system for the Suffern and Spring Valley well fields.

The source for the contaminants of concern presumably originated prior to 1978 from the operations of Tempcon Corporation. Shortly thereafter the activities causing the problem were discontinued. Contamination has spread beyond the initial "point source"; therefore, no attempt at source control is feasible.

B - Statutory Determinations

As described herein, and with the assumption that model predictions of contaminant concentration and time profile prove to be valid, no action is required to be protective of human health and the environment.

The ARARs that have been considered are presented in Table 5-1. For a detailed review of ARARs, refer to the Feasibility Study, Section 1.3. No waivers of other Federal and State laws have been invoked.

By reference to Table 5-2, Summary of the Evaluation of Alternatives, it can be seen that this alternative has the lowest present worth; in consideration of the noneconomic criteria as well, it obviously is the most cost-effective solution.

Further, with respect to other alternatives embodying the preference for treatment, the absence of threat to human health and the environment has led to the conclusion that treatment is unnecessary. Also, in consideration of utilization of financial resources, treatment is not desirable or practicable.

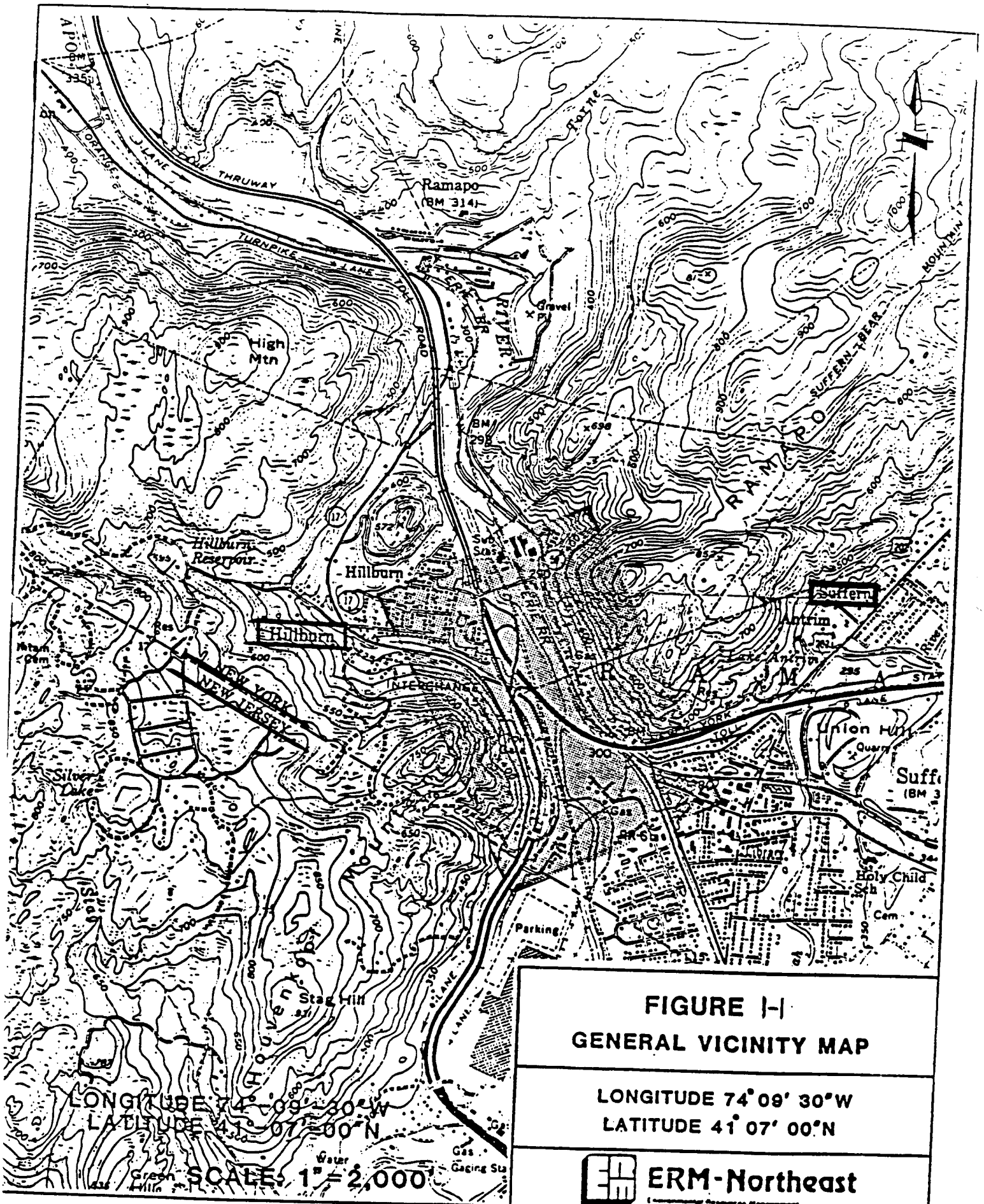


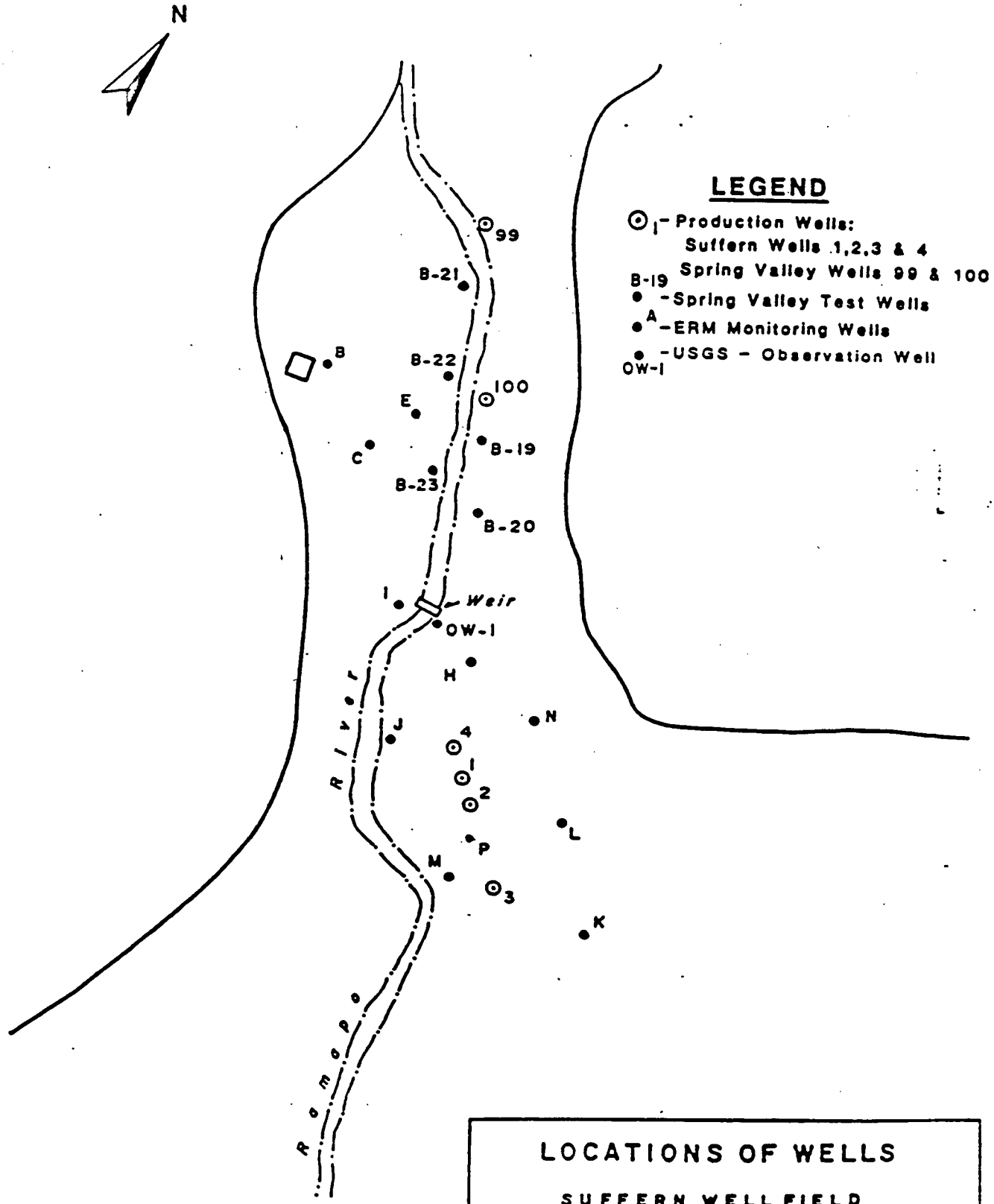
FIGURE I-1

GENERAL VICINITY MAP

LONGITUDE 74° 09' 30"W

LATITUDE 41° 07' 00"N

ERM-Northeast



LOCATIONS OF WELLS

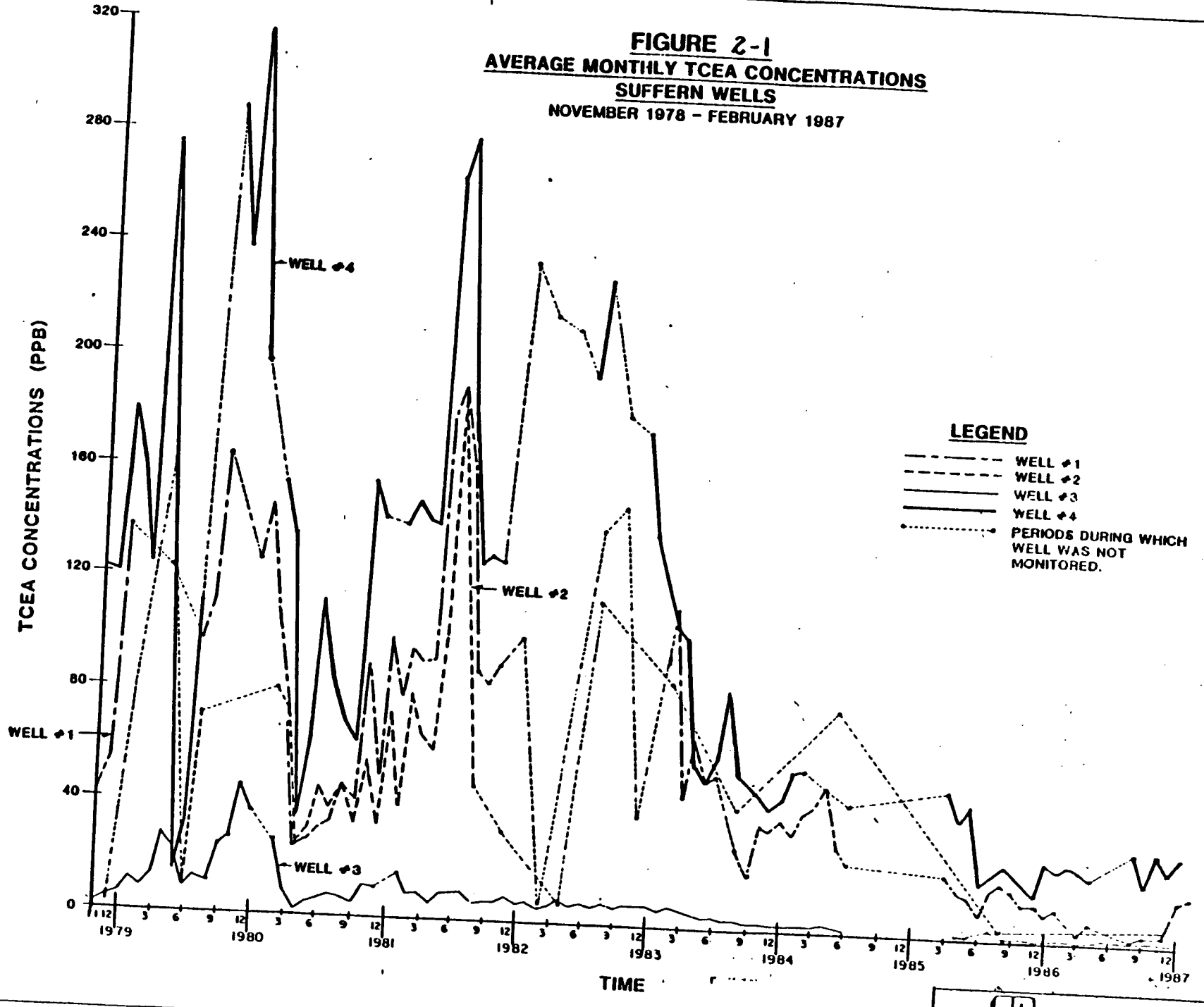
SUFFERN WELL FIELD

ROCKLAND CTY, NY

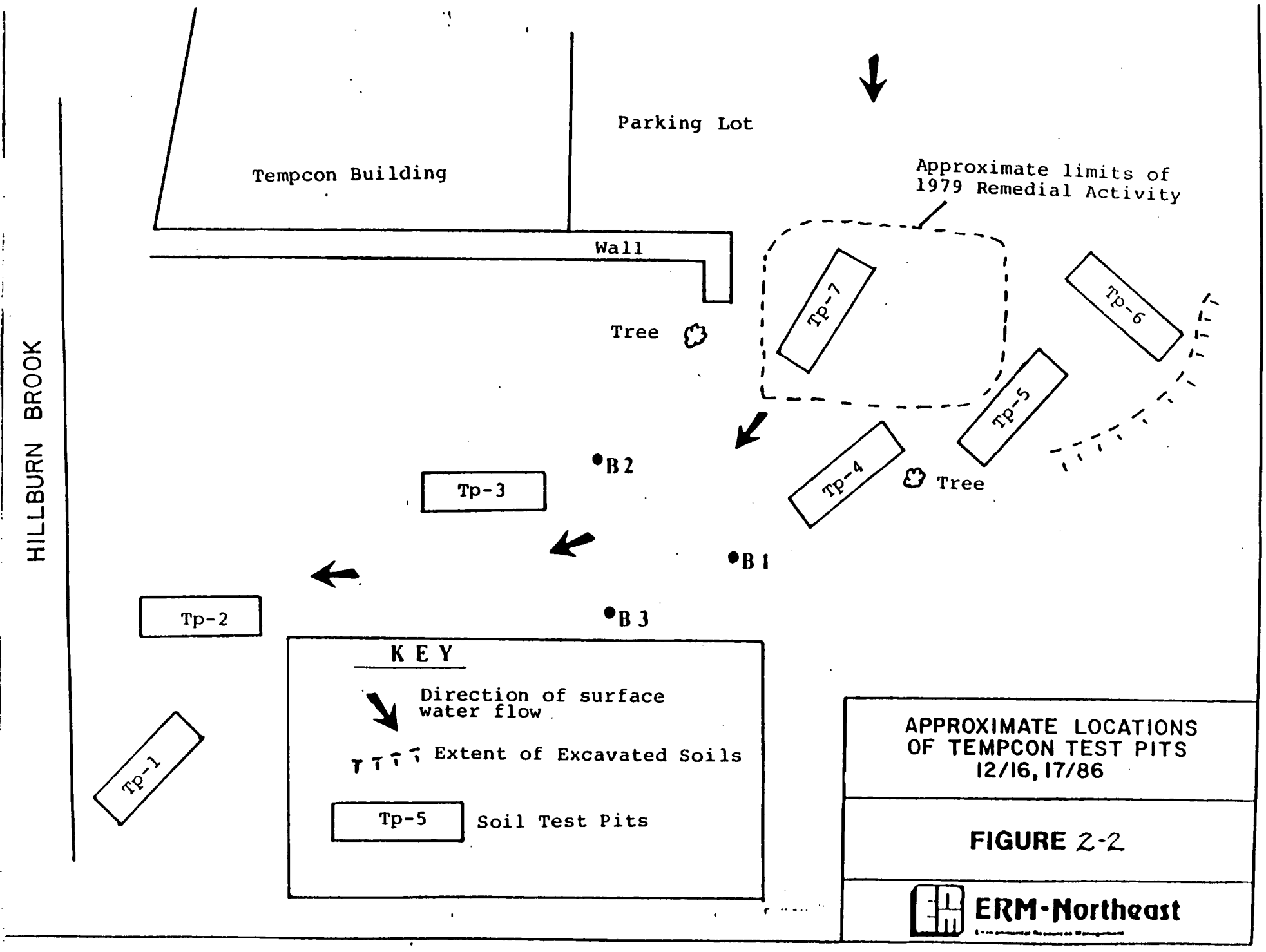
Prepared by ERM-Northeast

Figure 1-2

FIGURE 2-1
AVERAGE MONTHLY TCEA CONCENTRATIONS
SUFFERN WELLS
NOVEMBER 1978 - FEBRUARY 1987



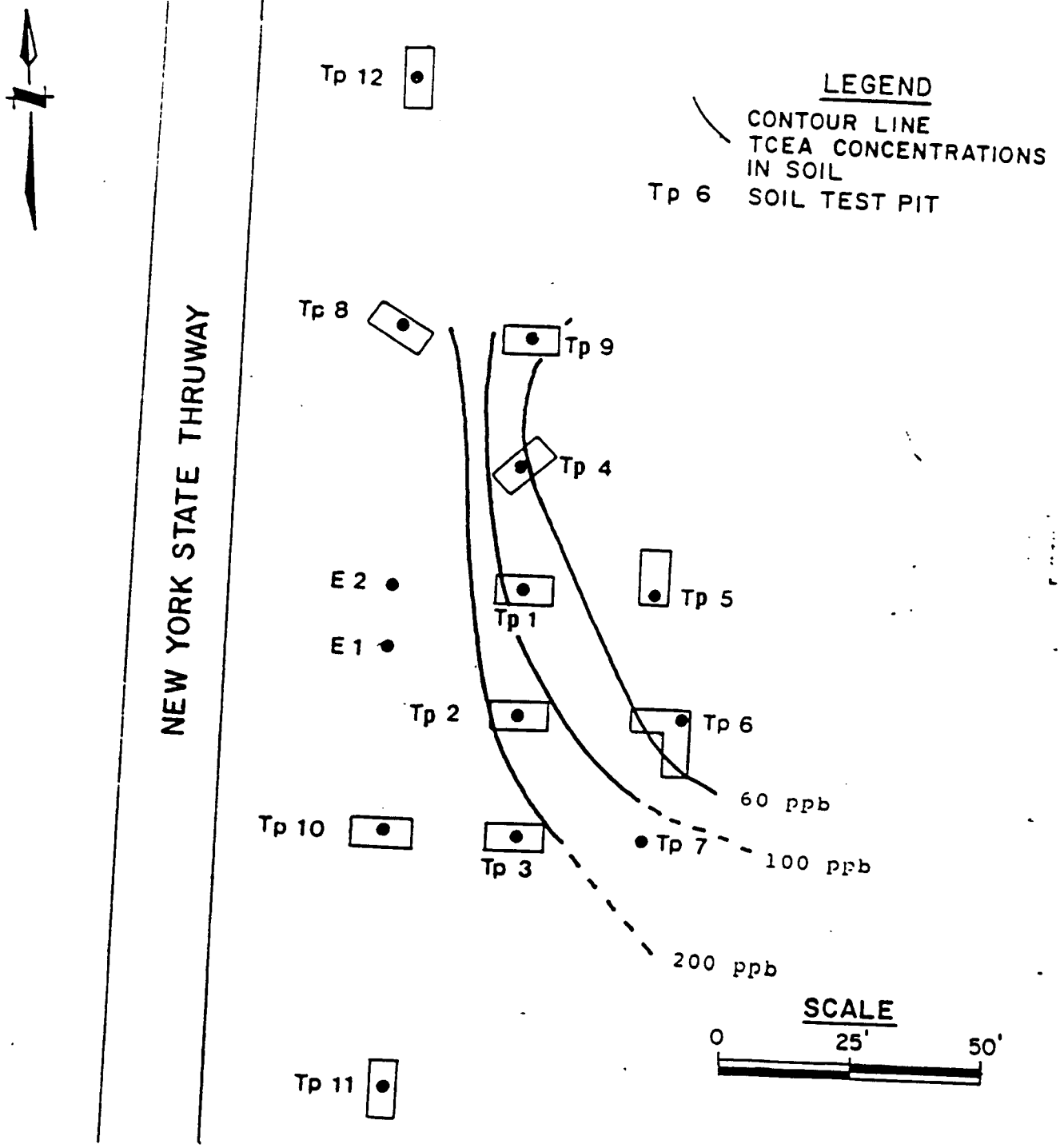
ERM-Northeast



APPROXIMATE LOCATIONS OF TEMPCON TEST PITS 12/16, 17/86

FIGURE 2-2

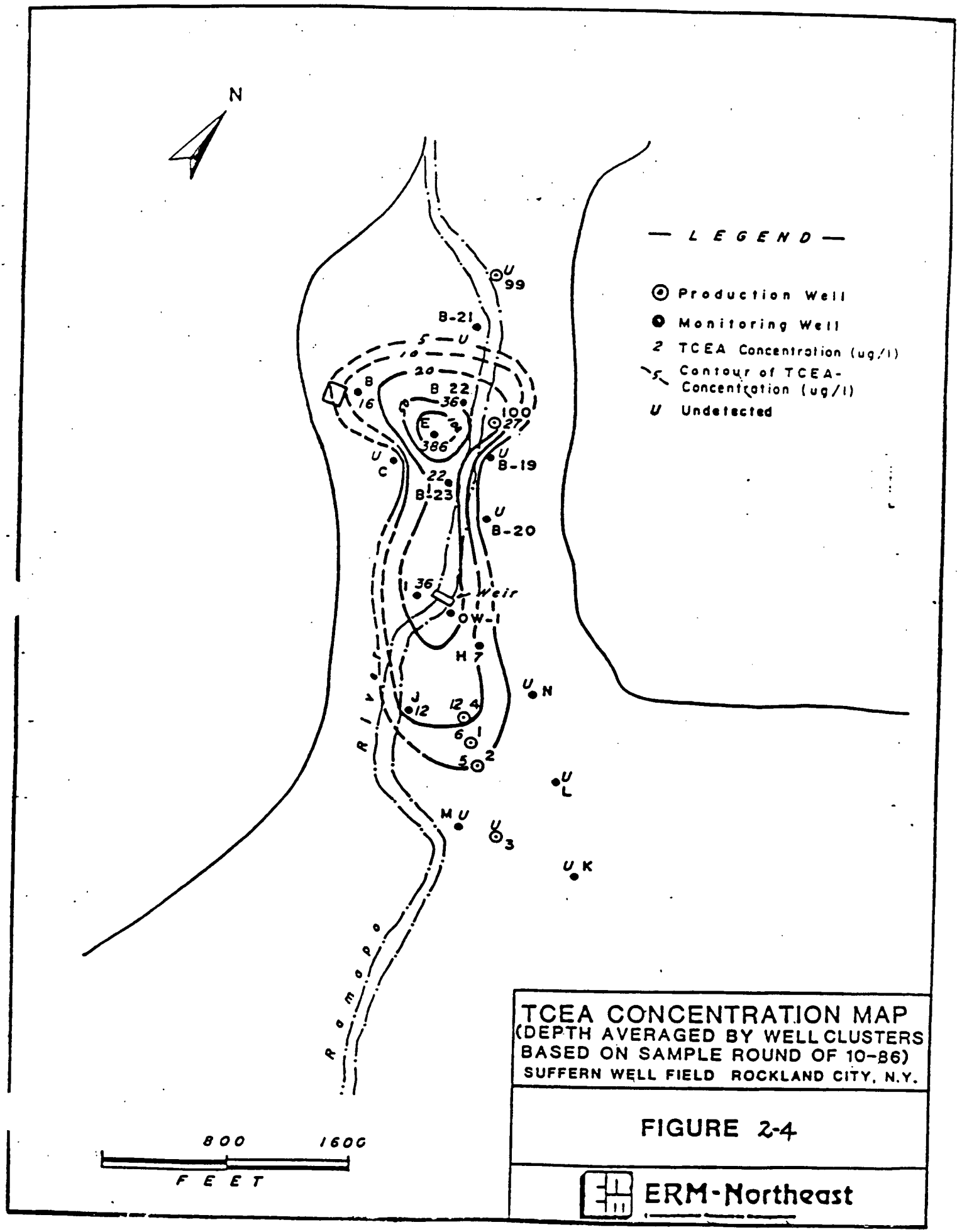
ERM-Northeast



TEST PIT LOCATIONS - E - SITE
VILLAGE OF SUFFERN
NEW YORK 12/15-16-17/86

FIGURE 2-3

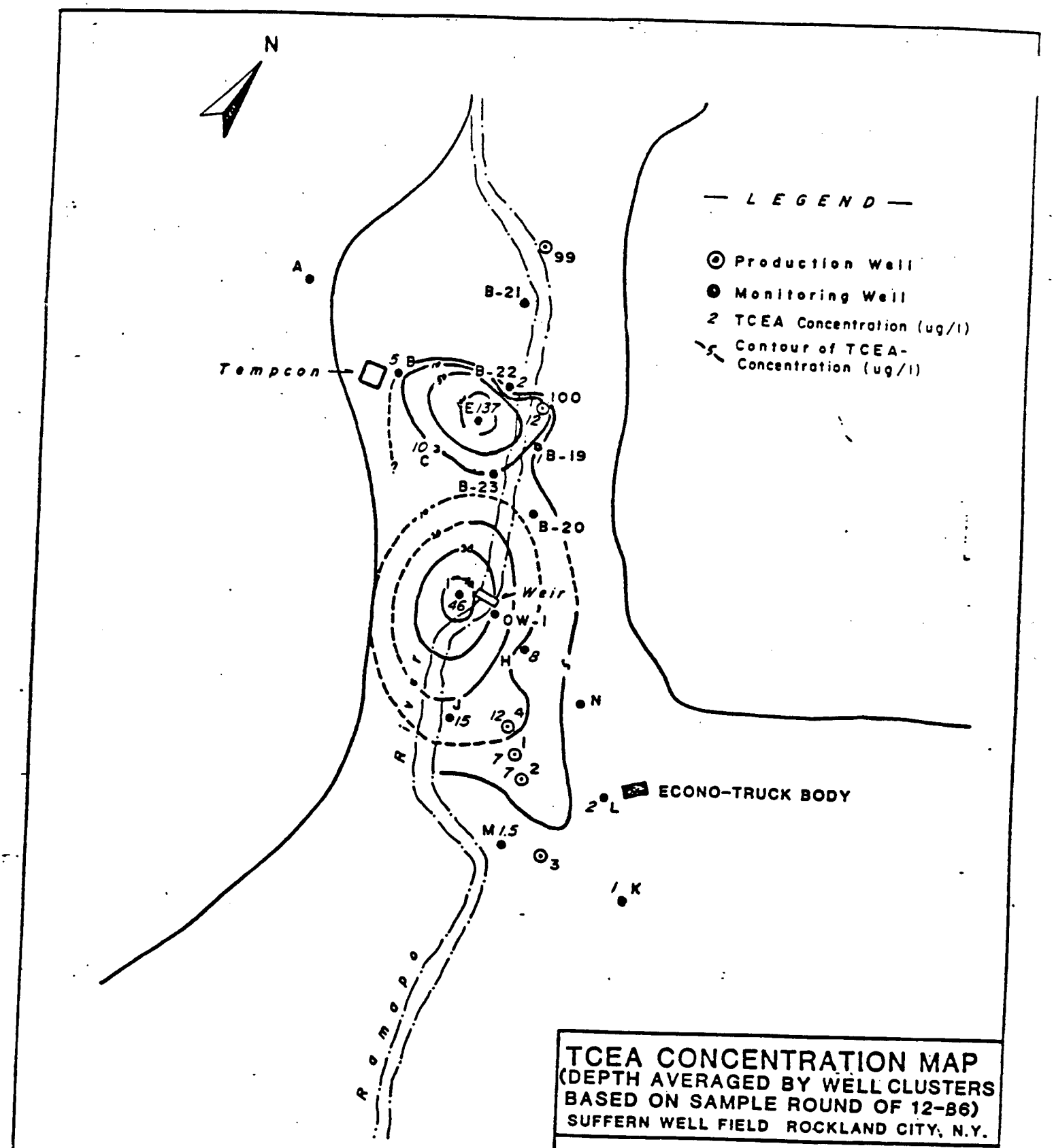
ERM-Northeast



TCEA CONCENTRATION MAP
(DEPTH AVERAGED BY WELL CLUSTERS BASED ON SAMPLE ROUND OF 10-86)
SUFFERN WELL FIELD ROCKLAND CITY, N.Y.

FIGURE 2-4

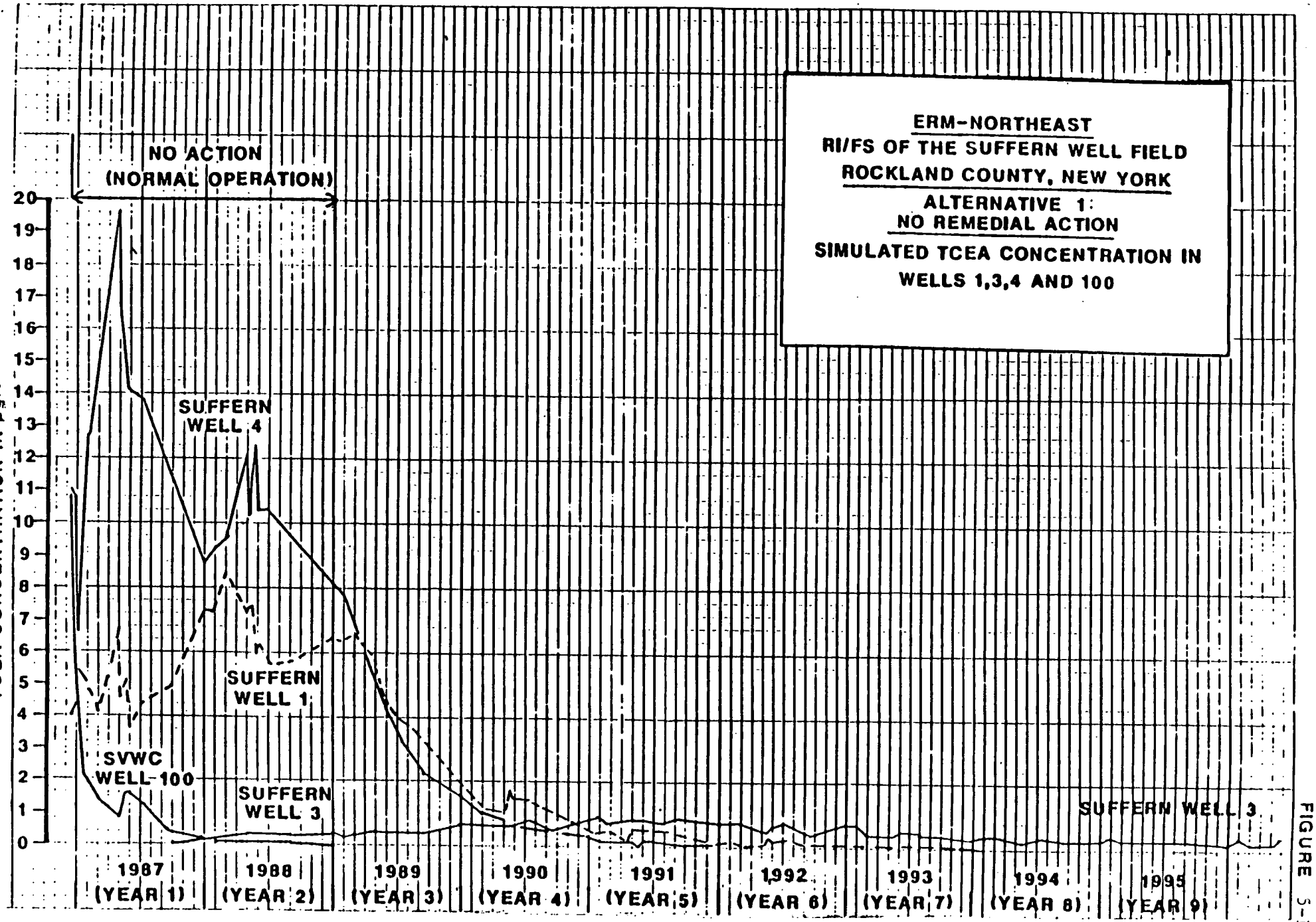
ERM-Northeast



TCEA CONCENTRATION MAP
(DEPTH AVERAGED BY WELL CLUSTERS BASED ON SAMPLE ROUND OF 12-86)
SUFFERN WELL FIELD ROCKLAND CITY, N.Y.

FIGURE 2-5

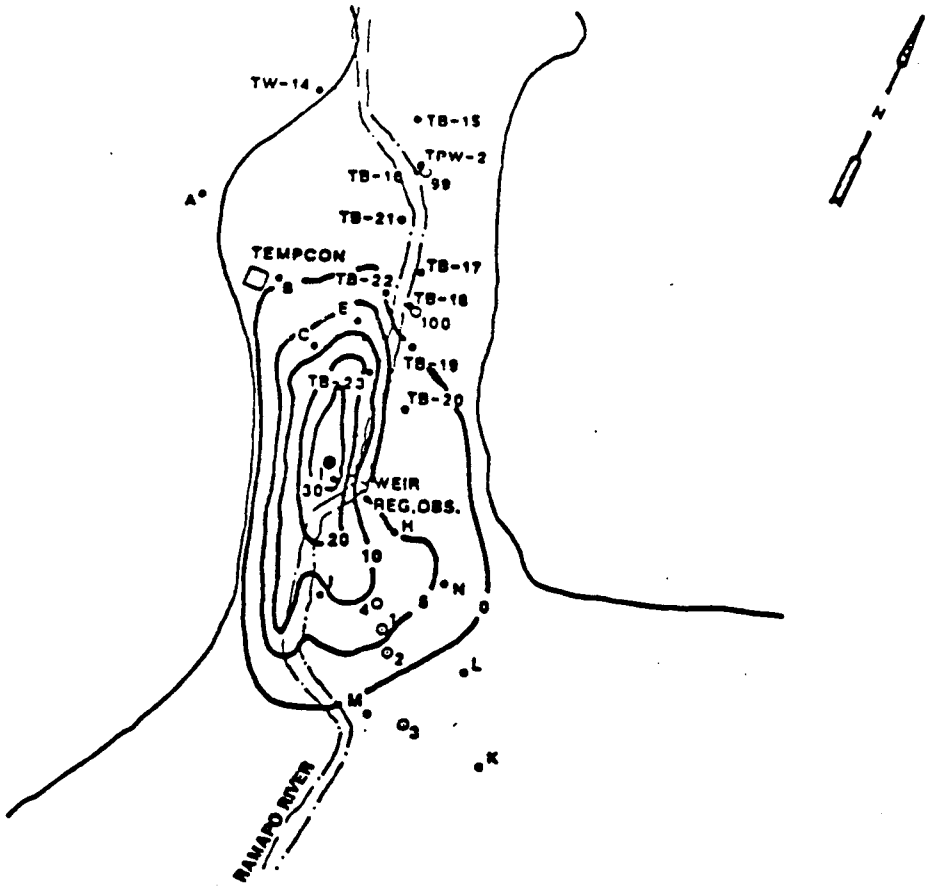
ERM-Northeast



LEGGETTE, BRASHEARS & GRAHAM, INC.

FIGURE 5-1

FIGURE 5-2



LEGEND

- AQUIFER BOUNDARY
- SURFACE WATER
- WEIR
- PRODUCTION WELL
- OBSERVATION WELL
- MODEL BOUNDARY
- 8 ISOPLETH OF EQUAL TCEA CONCENTRATION IN µG/L

● PEAK CONCENTRATION = 39 µG/L

NOTES: ALTERNATIVE #1 IS NO-ACTION
ALL SUPPLY WELLS OPERATE AS NORMAL

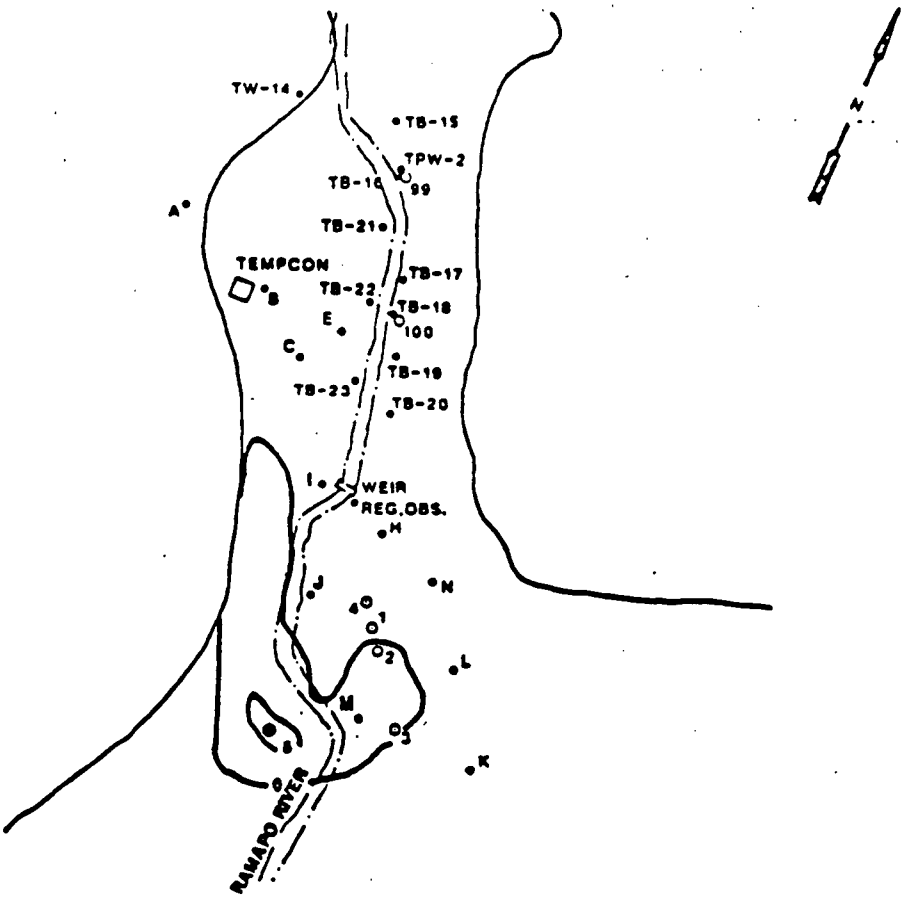
ERM-NORTHEAST
RI/FS OF THE SUFFERN WELL FIELD
ROCKLAND COUNTY, NEW YORK

LEGGETTE, BRASHEARS & GRAHAM, INC.
72 DANBURY ROAD
WILTON, CONNECTICUT 06897

0 800 1600
SCALE IN FEET

ALTERNATIVE 1
SIMULATED TCEA CONCENTRATION
AT THE END OF YEAR 1
12/31/87

FIGURE 5-3



LEGEND

- AQUIFER BOUNDARY
- SURFACE WATER
- WEIR
- PRODUCTION WELL
- OBSERVATION WELL
- MODEL BOUNDARY
- 8 ISOPLETH OF EQUAL TCEA CONCENTRATION IN µG/L

● PEAK CONCENTRATION =8 µG/L

NOTES: ALTERNATIVE #1 IS NO-ACTION
ALL SUPPLY WELLS OPERATE AS NORMAL

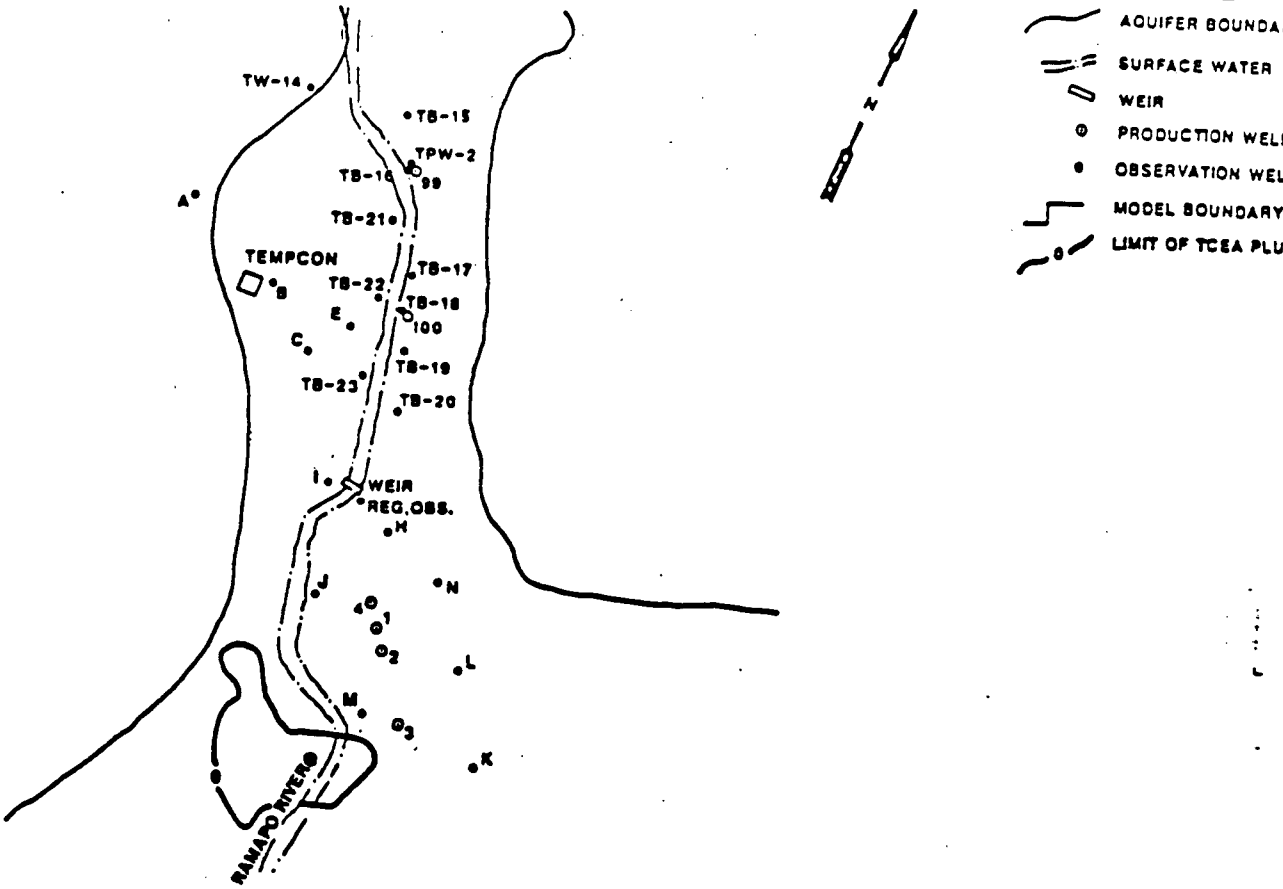
ERM-NORTHEAST
RI/FS OF THE SUFFERN WELL FIELD
ROCKLAND COUNTY, NEW YORK

LEGGETTE, BRASHEARS & GRAHAM, INC.
72 DANBURY ROAD
WILTON, CONNECTICUT 06897

0 800 1600
SCALE IN FEET

ALTERNATIVE 1
SIMULATED TCEA CONCENTRATION
AT THE END OF YEAR 5
12/31/01

FIGURE 5-4



● PEAK CONCENTRATION =2 µG/L

NOTES: ALTERNATIVE #1 IS NO-ACTION
ALL SUPPLY WELLS OPERATE AS NORMAL

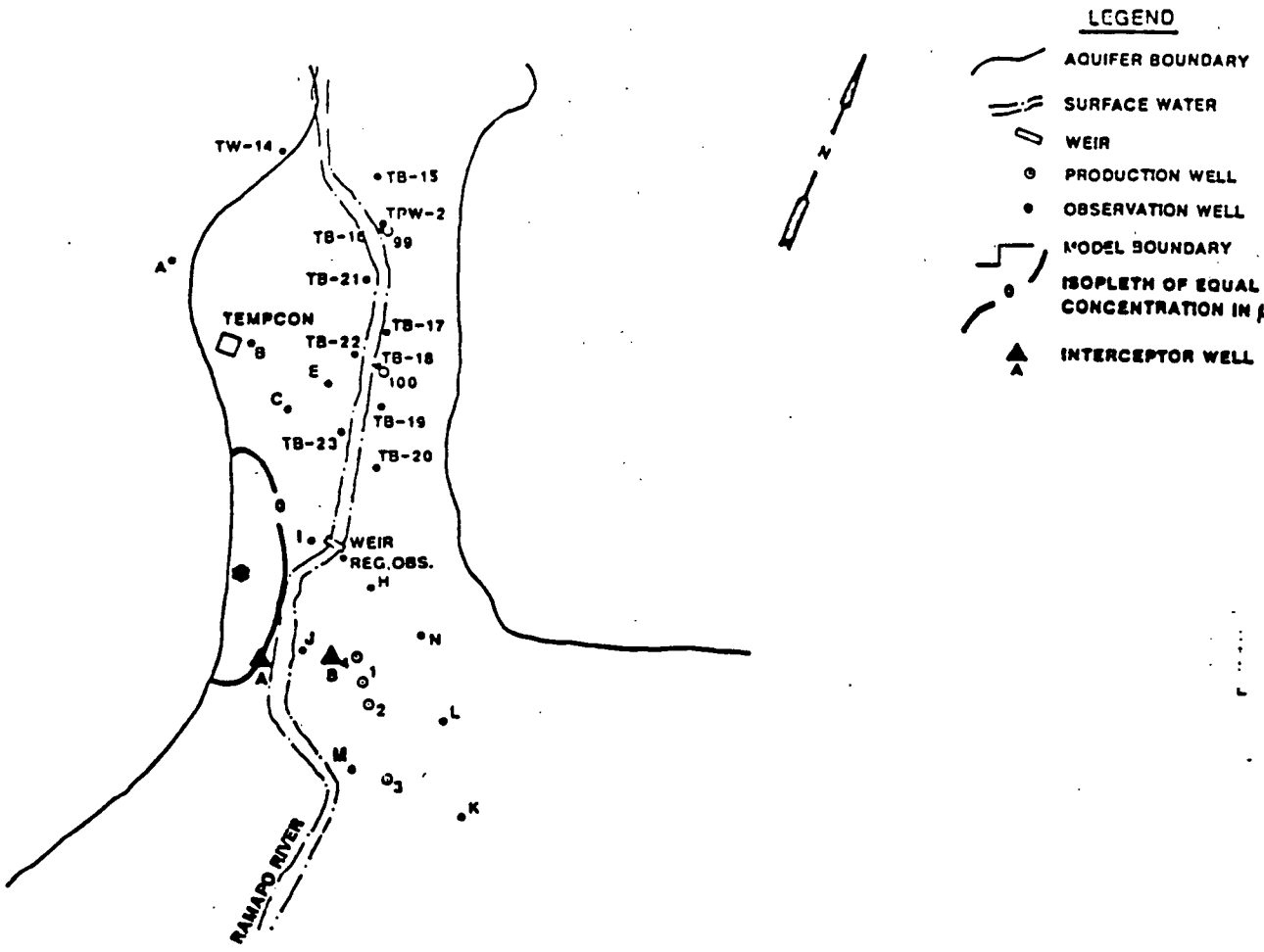
ERM-NORTHEAST
RI/FS OF THE SUFFERN WELL FIELD
ROCKLAND COUNTY, NEW YORK

LEGGETTE, BRASHEARS & GRAHAM, INC.
72 DANBURY ROAD
WILTON, CONNECTICUT 06897

0 800 1600
SCALE IN FEET

ALTERNATIVE 1
SIMULATED TCEA CONCENTRATION
AT THE END OF YEAR 10
12/31/86

FIGURE 5-5



● PEAK CONCENTRATION =3 µG/L

NOTES: ALTERNATIVE 4, PLUME CONTAINMENT
INTERCEPTOR WELLS PUMPING CONTINUOUSLY
WELL A: 1400 GPM
WELL B: 1000 GPM

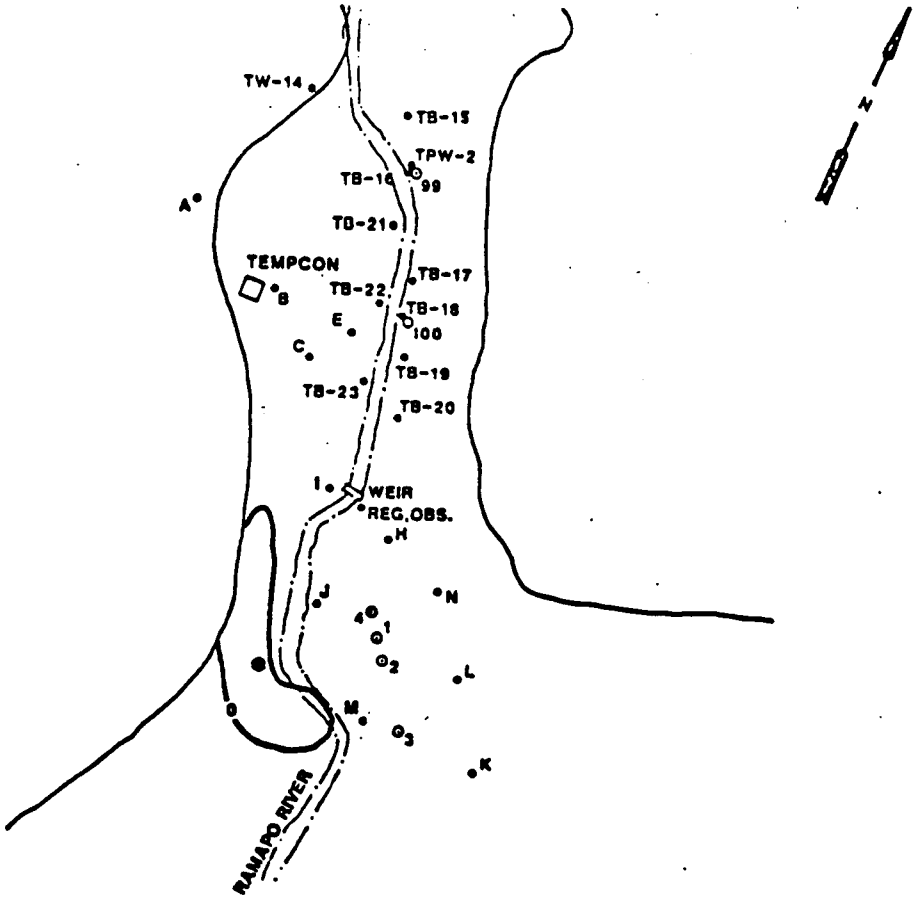
ERM-NORTHEAST
RI/FS OF THE SUFFERN WELL FIELD
ROCKLAND COUNTY, NEW YORK

LEGGETTE, BRASHEARS & GRAHAM, INC.
72 DANBURY ROAD
WILTON, CONNECTICUT 06897

0 800 1600
SCALE IN FEET

ALTERNATIVE 4
SIMULATED TCEA CONCENTRATION
AT THE END OF YEAR 3
12/31/89

FIGURE 5-6



LEGEND

- AQUIFER BOUNDARY
- SURFACE WATER
- WEIR
- PRODUCTION WELL
- OBSERVATION WELL
- MODEL BOUNDARY
- LIMIT OF TCEA PLUME

● PEAK CONCENTRATION =2 µG/L

NOTE: ALTERNATIVE 6: PLUME DIVERSION, WELL 3 & 4 PUMPING RATES INCREASED AFTER YEAR 2

ERM-NORTHEAST
RI/FS OF THE SUFFERN WELL FIELD
ROCKLAND COUNTY, NEW YORK

LEGGETTE, BRASHEARS & GRAHAM, INC.
72 DANBURY ROAD
WILTON, CONNECTICUT 06897

0 800 1600
SCALE IN FEET

ALTERNATIVE 6
SIMULATED TCEA CONCENTRATION
AT THE END OF YEAR 6
12/31/92

TABLE 2-1

WATER QUALITY DATA - OCTOBER 1986

SAMPLE POINT	1,1,1 TCEA	1,1 DCEA	1,2 DCEA	1,1 DCE	TOLUENE	BENZENE	ANTIMONY	CHROMIUM	COPPER	LEAD	SILVER	ZINC
A-1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
B-1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
B-2	47	23	U	U	U	BMRL	N/A	N/A	N/A	N/A	N/A	N/A
B-3	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
B-22	36	25	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
B-20	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
B-19	U	U	U	U	5	U	N/A	N/A	N/A	N/A	N/A	N/A
B-21	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
B-23	22	6	U	U	U	9	N/A	N/A	N/A	N/A	N/A	N/A
C-1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
C-2	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
E-1	13	5	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
E-2	766	140	7	86	U	U	N/A	N/A	N/A	N/A	N/A	N/A
L-1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
L-1 9/25/86	8	U	U	U	5	U	N/A	.05	N/A	N/A	N/A	N/A
M-1	U	U	U	U	U	U	27	30	111	26	U	82
M-2	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
N-1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
N-2	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
PROD WELL #1	6	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
PROD WELL #2	5	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
PROD WELL #3	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
PROD WELL #4	12	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
PROD WELL #4 9/25/86	U	U	U	U	BMRL	U	U	U	29	21	49	U
H-1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
H-2	13	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
I-1	53	8	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
I-2	37	2	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
I-3	19	BMRL	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
J-1	19	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
J-2	17	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
J-3	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
K-1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
RR #1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
RR #2	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
HB #1	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
SWC #99	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
SWC #100	27	6	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
TRIP BLANK 10/3/86	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A
TRIP BLANK 10/6/86	U	U	U	U	U	U	N/A	N/A	N/A	N/A	N/A	N/A

NOTE: ALL VALUES EXPRESSED AS UG/L .

METALS RESULTS FROM 9/25/86 PRIORITY POLLUTANT SCAN

BMRL: BELOW MINIMUM REPORTING LEVELS
U: UNDETECTED
N/A: NOT ANALYZED

TABLE 2-2

WATER QUALITY DATA - DECEMBER 1986

SAMPLE POINT	TCEA	1,1-DCEA	1,2 DCEA	TCE	1,1 DCE	TRANS 1,2-DCE	BENZENE	ETHYL BENZENE	TOLUENE	TRICHLOROFLUOROMETHANE
A-1										
B-1										
B-1	4	1								
B-3	6	3								
C-1	1									
C-2		1					36	17	129	1
E-1	35	9								
E-2	238	96	5	3	1					
B-19	1				53	7				
B-20										
B-21										
B-22	2	30					5		4	
B-23	3	9					3		9	
SV-99										
SV-100	12	2								
I-1	75	12			5					
I-2	47	6								
I-3	16	2			1					
J-1	11	<1			1					
J-2	19	2			1					
J-3										
H-1										
H-2	8	1			1					
N-1										
N-2										
L-1	2									
K-1	1									
M-1	1									
M-2	2									
SUFFERN #1	7									
SUFFERN #2	7									
SUFFERN #3	1									
SUFFERN #4	12	1		<1						
REG. WELL	<1									
FIELD BLANK 3:30										4
FIELD BLANK 9:30										10
TRIP BLANK 3:30										7
TRIP BLANK 9:30										

NOTE:
BLANK SPACE = NOT DETECTED
ALL CONCENTRATIONS IN ug/l

TABLE 5-1

ALTERNATIVE NO. 1 - NO-ACTION

APPROXIMATE CONCENTRATIONS OF CONTAMINANTS AT EACH SUFFERN PRODUCTION WELL VERSUS ARAR STANDARDS

CONTAMINANT OF CONCERN	RANGE OF Approximated CONCENTRATIONS IN YEAR 1 THROUGH YEAR 10 (ug/l)	ARAR DRINKING WATER STANDARD (ug/l)	MORE STRINGENT NYSDEC TOG GUIDELINE (ug/l)
1,1,1 Trichloroethane (TCEA)	19.6 - 0.1	200	50
1,1 Dichloroethane (1,1 DCEA)	9.8 - 0.005[2]	—	50
1,2 Dichloroethane (1,2 DCEA)	0.4 - 0.00[3]	5	0.8
1,1 Dichloroethylene (1,1 DCE)	4.3 - 0.02[4]	7	0.07

NOTES:

1. The "range of approximated concentrations" represents the widest range which may occur in any of the production wells. The range was prepared by the procedure discussed in the text, using the ratios presented in Notes 2 through 6 below.

2. Based on a ratio of 0.50 to 1.0 for 1,1, DCEA to 1,1,1 TCEA - RI data, December 1986, MW B-3 and MW E-2.

3. Based on a ratio of 0.02 to 1.0 for 1,2 DCEA to 1,1,TCEA. Based on December 1986 RI data at MW E-2.

4. Based on a ratio of 0.22 to 1.0 for 1,1 DCE to 1,1,1 TCEA. Based on December 1986 RI data at MW E-2.

5. Based on a ratio 0.013 to 1.0 of TCE to 1,1,1 TCEA. Based on December 1986 RI data at MW E-2.

TABLE 5-2

SUMMARY OF THE EVALUATION OF ALTERNATIVES

ALTERNATIVE	Regulatory Criteria: Ability To Meet ARARs	Regulatory Criteria: Ability To Meet TCCs	Regulatory Criteria: SARA (Other Than ARARs)	Technical Criteria: Performance: Effectiveness	Technical Criteria: Performance: Time to Achieve TCCs (2)	Technical Criteria: Reliability	Technical Criteria: Implementability	Institutional Criteria	Public Health Evaluation (Estimated Lifetime Cancer Risk)	Environmental Criteria (Soil, Ground Water, Surface Water, Air, Noise, Traffic And Socio-Economic)	Cost Criteria
Alternative No. 1: No Action	YES	NO	Doesn't reduce volume, toxicity, or mobility	Not Applicable	15 years	+	+	Achievable, if sampling entity established	7.0 EIP -06	TCCs are not achieved in ground water.	Present Worth: $ 311,000
Alternative No. 2: Treat Suffern Public Water Supply With The Existing Spray Aeration System	YES	NO	(1) reduces volume and toxicity	neutral	15 yrs	+	+	Must be acceptable to Suffern Water Department	7.0 EIP -06	TCCs are not achieved in ground water. Potential negative air quality impact.	Capital Costs: $ 165,000; O & M Costs: $ 144,000; Present Worth: $1,200,000
Alternative No. 3: Treat Suffern Public Water Supply With Packed Tower Aeration	YES	YES	reduces volume and toxicity	+	15 yrs	+	+	Must be acceptable to Suffern Water Department	6.0 EIP -06	TCCs are not achieved in ground water.	Capital Costs: $ 416,000; O & M Costs: $ 128,000; Present Worth: $1,342,000
Alternative No. 4: Plume Containment By Extraction At The Point Of Maximum Contamination; Treat with Packed Tower Aeration and Discharge To The Ramapo River	YES	YES	reduces volume; toxicity and mobility	+	1 year	+	-	Discharge Permit to Ramapo River, real property rights, and right of way to the Ramapo River are required.	5.0 EIP -06	No Adverse Impacts	Capital Costs: $ 761,000; O & M Costs: $ 163,000; Salvage Value: ($ 107,000); Present Worth: $ 871,000
Alternative No. 6: Divert Plume With Suffern Supply Wells No. 3 and No. 4; Treat with Packed Tower Aeration	YES	YES	reduces volume; toxicity and mobility	+	4 years	neutral	-	Suffern Water Department would have to allow control of wells for remedial purposes	5.0 EIP -06	No Adverse Impacts	Capital Costs: $ 406,000; O & M Costs: $ 137,000; Present Worth: $ 840,000

Notes: (1) At highest effectiveness, i.e. with recycle, the removal efficiency may approach that necessary for TCCs Guidance Values.

(2) Levels or concentrations of organic compounds entering the distribution system already achieve ARARs (Drinking Water Standards) as shown in first column under Regulatory Criteria.

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-4011

Thomas C. Jorling
Commissioner

Mr. Stephen D. Luftig
Director
Office of Emergency and Remedial Response
U. S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10278

SEP 16 1987

Dear Mr. Luftig:

Re: Suffern Village Well Field Site
Suffern (V), Rockland County
Remedial Investigation/Feasibility Study

The New York State Department of Environmental Conservation (NYSDEC) has recently completed a Remedial Investigation/Feasibility Study (RI/FS) at the Suffern Village Well Field site, Village of Suffern, Rockland County, New York.

This RI/FS work recommended that the "No Action" remedial alternative be implemented at this site. The RI/FS work also recommended that comprehensive sampling and model verification programs be undertaken to confirm the conclusions of the study. This Department endorses these technical recommendations.

The draft declaration for the Record of Decision (ROD) on the Suffern Well Field RI/FS indicates that the model verification and sampling programs are operation and maintenance (O & M) activities, which are the responsibilities of the State of New York. The draft declaration further states that the first year of these O & M activities is considered start-up, which is eligible for Federal Superfund monies. We do not agree that these programs should be responsibilities of New York State. Instead, the U.S. Environmental Protection Agency (USEPA) should be responsible for the model verification program, until the model is verified, and also be responsible for the sampling program. At the conclusion of these programs, the data base will be evaluated to determine if further action is required. If further action is not required (that is, the "No Action" alternative is implemented), the State of New York will be responsible for future monitoring activities.

If you have any questions or comments regarding this matter, please contact Mr. Robert Foltin or Mr. William Eberle, of my staff, at (518) 457-1708.

Sincerely,

Norman H. Nosenchuck, P.E. NOT
Director
Division of Solid and Hazardous Waste

cc: G. Pavlou, USEPA Region II
W. McCabe, USEPA Region II
R. Kaplan, USEPA Region II

ATTACHMENT B

SUFFERN VILLAGE WELL FIELD

SUFFERN, ROCKLAND COUNTY, NEW YORK

RESPONSIVENESS SUMMARY

Major comments raised during the public meeting held on August 19, 1987 at the Suffern Village Hall are summarized briefly below. A complete transcript of this meeting is part of the administrative record and is available therein. The public comment period extended from August 10th until September 9th, and written comments are also addressed in this summary.

The NYSDEC chaired subject meeting, and presented a brief history of the site, and the no-action alternative as the preferred solution. ERM personnel reviewed the objectives and conclusions of the Remedial Investigation and Feasibility Study, the Risk Assessment, and the alternative solutions that were considered.

A question and answer period follows:

1 - Question: Relative to Alternative 1, explanation for scope and cost was requested.

Answer: It was indicated that the costs were for a sampling/analysis program and for model confirmation work.

Further, it was explained preliminarily that for the first year EPA would bear 90% of the cost, and DEC would assume the balance; beyond this period the State would bear all costs.

2 - Question: Who has responsibility for the overview/supervision of the monitoring program?

Answer: EPA advised that after the first "year start-up period", that the State was responsible for the continuance of the program. DEC indicated that it would handle same, or perhaps enter into an agreement with Suffern. Implementation mechanism is still being studied.

3 - Question: What happens if in the future other contaminants are found or other standards promulgated?

Answer: Either EPA or the State would reenter the picture to investigate and remediate as necessary, either as a continuation of the current scope of study and remediation, or as a second phase (separate operable unit).

New standards would require revisions during the design phase of a project. For those projects in which remedial action is underway or completed, a reanalysis of the contamination with respect to its impact on public health and the environment would be undertaken and further corrective measures, as necessary, would be implemented.

4 - Question: As a part of Question #3, concern was expressed that the financial burden would fall on the community for new regulations after a site "has been cleaned up".

Answer: EPA's Federal Water Quality Criteria as set forth in the Clean Water Act are the same figures (for the most part) that the State has developed in its guidelines, and these are consistant with currently deemed to be acceptable risk levels; more stringent standards merely reduce the risks further.

5 - Comment: The Rockland County Health Department noted that NYS Health Department is considering lowering the guideline maximum organic contaminant level from 50 ppb to 5 ppb, justifying the concern of Suffern Village.

The State Health Department entered the following statement into the record:

"The Rockland County Department of Health in a number of environmental programs acts as a local agent for the New York State Department of Health and uses as a guide, the New York State Sanitary Code, and various rules and regulations and environmental guidelines.

At this point the New York State Department of Health has not adopted any standards for the maximum contaminant levels for 1,1,1, trichloroethane. They have, however, recommended in the past that no amount of contaminant be present in the drinking water above 50 ppb.

Recently, the State Commissioner of Health has adopted a general policy that the public should be subject only to the lowest amounts possible of any contaminant possible in the water supply.

In keeping with the State Health Commissioner's general policy it is recommended that the Village of Suffern take measures to reactivate their aeration system so the lowest values practical can be obtained in the Village water."

The DEC & EPA emphasized that in the presence of a contaminant concentration exceeding standards, or if the monitoring program did not confirm model predictions and excessive contaminant concentrations could occur in drinking water, a remediation program would be initiated.

6 - Questions: Would no-action result in concentrations (presumably TCEA) less than 5 ppb?

Answer: Yes, in approximately 4 years, beyond 12/86, the model predicts less than 5 ppb in the production wells.

7 - Statement: The Ramapo River Committee emphasized the importance of maintaining the quality of the aquifer which has the potential for supplying the needs of 50,000 people from the Spring Valley and Suffern fields.

Further, the necessity to secure the area, including preventing dumping in the area, appropriate fencing , etc, was emphasized. Also, the public should be made fully aware of the necessity to protect this resource.

Rockland County Health Department noted their activities with Rockland and Spring Valley to minimize vandalism, etc.

Ramapo River Committee noted the proposal of a new landfill north of the present Town of Ramapo landfill where the geology is similar to the Suffern Site, and therefore another potential threat to the subject aquifer. The public was urged to become familiar with the site to oppose the proposed action.

In a written communication, the Mayor of Suffern Village has inquired as to the capability of the model developed for this project to predict the effect of leachate from the Ramapo Landfill site (approximately two miles north of the Suffern well field) on the Suffern drinking water properties. This question is beyond the scope of the present study, and has been referred to Leggette, Brashears & Graham, Inc., and their response will be communicated to the Mayor.