PB93-963806

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-92/168
March 1992

EPA

Superfund Record of Decision:

Robintech Inc./National Pipe, NY

NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R02-92/168	2.	3. Recipient's Accession No.

4. Title and Subtitle
SUPERFUND RECORD OF DECISION
Robintech Inc./National Pipe, NY
First Remedial Action - Final

5. Report Date
03/31/92

6.

7. Author(s)

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U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered
800/000

14.

15. Supplementary Notes
PB93-963806

16. Abstract (Limit: 200 words)

The 12.7-acre Robintech Inc./National Pipe Company site is a light industrial facility located in the Town of Vestal, Broome County, New York. The facility is situated in a regionally important industrial center adjacent to Binghamton, NY, where an estimated 5,500 people live within 1 mile of the site. Two distinct aquifers, which underlie the facility, provide 250,000 gallons of water per day for 10 onsite production wells to meet requirements for cooling water in the pipe production process. There are no private drinking water wells in the vicinity of the site. All residents are supplied with drinking water by the Vestal well fields. In 1966, Robinson Technical Products, later renamed Robintech Inc., constructed the main building that currently exists onsite. The first floor of the building was used to manufacture aircraft engine mounts and automobile accelerator cables; the second floor housed the assembly area for electronic cable. In 1970, the first floor activities were replaced with polyvinyl chloride (PVC) pipe extrusion operations. Since that time, several successive site owners have continued PVC pipe production at the site. During site operations, cooling waters from the PVC operations were discharged to an onsite settling tank to reduce particulate matter before entering the storm sewer. In 1984,

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Robintech Inc./National Pipe, NY
First Remedial Action - Final
Contaminated Media: gw
Key Contaminants: VOCs (DCE, TCA, TCE, vinyl chloride)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 68
	20. Security Class (This Page) None	22. Price

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

Abstract (Continued)

a routine state permit discharge compliance sample found organic constituents not included in the permit. Further investigation resulted in the conclusion that ground water contamination beneath the site originated from reinjection of wastewater into the PW-2 production well. This ROD is the first of two operable units planned for the site and addresses remediation of the contaminated ground water. A future ROD will address suspected lead contamination of onsite soil as OU2. The primary contaminants of concern affecting the ground water are VOCs, including 1,1-DCE,1,2-DCE, 1,1,1-TCA, TCE, and vinyl chloride.

The remedial action for this site includes extracting contaminated ground water by pumping from the bedrock and overburden aquifers; treating the VOC-contaminated ground water by air stripping, followed by discharge of the treated water to the permitted effluent discharge point or, depending on plant requirements, use of the treated water in the plant process; implementing a semi-annual monitoring program for 10 wells and the effluent discharge to track the migration and concentration of contaminants of concern; and institutional controls to restrict ground water usage. This alternative includes an ARAR waiver contingency measure that may be invoked if the continued monitoring and adjustments to the treatment system indicate that portions of the aquifer cannot be restored to beneficial usage. The estimated present worth cost for this action is $2,255,877, which includes an annual O&M cost of $242,286 for 15 to 30 years.

PERFORMANCE STANDARDS OR GOALS: The selected remedy will achieve chemical-specific ARARs based on SDWA MCLs and state equivalents for the site, including TCE 5 ug/l; 1,1-DCE 5 ug/l;1,2-DCE 5 ug/l; 1,1,1-TCA 5 ug/l; and vinyl chloride 2 ug/l. Air emissions from the stripping treatment operations will comply with state requirements for air resources.

ROD FACT SHEET

SITE

Name:	Robintech
Location/State:	Vestal, Broome Co., New York
EPA Region:	II
HRS Score (date):	30.76 (6/86)
NPL Rank (date):	Not Applicable

ROD

Date Signed: March 31, 1992

Selected Remedy

Groundwater: Pump and treat (air stripping) of groundwater with goal of achieving ARARs. Treated groundwater to be discharged to SPDES outfall.

Capital Cost:	$ 291,564
O & M:	$ 242,286
Present Worth:	$ 2,255,877

LEAD

Enforcement, PRP Lead
Primary Contact (phone): Mark Granger (212-264-9588)
Secondary Contact (phone): Melvin Hauptman (212-264-7681)

WASTE

Type: Groundwater - VOCs.

Medium: Groundwater.

Origin: Pollution allegedly originates from a.) overflow of process waste water settling tank, and b.) possible reinjection of waste water at PW-2.

DECLARATION FOR RECORD OF DECISION

SITE NAME AND LOCATION

Robintech Inc./National Pipe Co. Site, Vestal, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Robintech Inc./National Pipe Co. Site ("Site") in Vestal, New York, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document summarizes the factual and legal basis for selecting the remedy for this Site.

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy. A letter of concurrence from NYSDEC is appended to this document.

The information supporting this remedial action decision is contained in the Administrative Record for this Site, the index of which is also appended to this document.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected by this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The remedial alternative presented in this document is the first of two operable units for the site. It focuses on groundwater contamination.

The major components of the selected remedy include the following:

- Contaminated groundwater will be pumped from bedrock and overburden extraction wells in accordance with an extraction scheme that will be further refined during remedial design. The pumping will continue until maximum contaminant levels (MCLs) are achieved in the aquifer, which is estimated to take 15 to 30 years.

- An air stripping treatment system will be installed to remove VOCs from the pumped groundwater.

- The treated water from the Robintech Site could be used in the plant process or pumped directly to the SPDES permitted effluent discharge point.

- A long-term system monitoring program which includes the collection and semi-annual analysis of ten wells and the SPDES effluent discharge will be implemented in order to track the migration and concentrations of the contaminants of concern.

- Institutional controls in the form of deed restrictions will be recommended to the appropriate authorities (on- and off-site restrictions) in order to prevent the extraction of groundwater for potable purposes.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy satisfies the statutory preference for remedies that employ treatment that reduce the toxicity, mobility, or volume of contamination as their principal element for the groundwater.

Because this alternative will result in contaminants remaining on-site above health based limits until the contaminant levels in the aquifer are reduced below MCLs, CERCLA requires that this action be reviewed at least once every five years after commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator, Region II
U.S. Environmental Protection Agency

3/31/92
Date

DECISION SUMMARY

ROBINTECH INC./NATIONAL PIPE CO. SITE

VESTAL, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK

<u>TABLE OF CONTENTS</u>

ATTACHMENTS

I. Site Location and Description

The Robintech Inc./National Pipe Co. Site ("Site") is located at 3421 Old Vestal Road in the Town of Vestal, Broome County, New York (see Figure 1). Vestal, with a population of 27,238 (U.S. Census, 1980), is located within a regionally important industrial center adjacent to Binghamton, N.Y. in the Susquehanna River basin. An estimated 5,350 people live within a one mile radius of the Site.

The Site occupies 12.7 acres, and is bordered by Commerce Road and several warehouses and light industrial buildings to the east; Old Vestal Road and several residences to the south; an amusement facility (known as the Skate Estate), and fuel storage tanks (Mobil Tank Farm) to the west; and by Conrail railroad tracks and Parkway Vending Inc. to the north. The Site is located approximately half-way down the westerly face of a hill that slopes gently toward the Susquehanna River. Consistent with this, EPA field observations and examination of topographic contours indicate that the superficial (overland) flow of surface water across the Site is to the west, controlled by a series of conduits and drainage ditches which direct the flow to the river, located approximately a half mile to the north and west.

The area has two distinct aquifers which are sources of water supply. The upper aquifer is comprised of the overburden material above bedrock. This material consists mainly of gray and brown till which becomes harder with depth. In addition, fill material associated with extensive grading on-site for storage and parking space ranges from 0-6 feet. Groundwater was encountered within the upper aquifer unit 6-20 feet below the ground surface. The lower aquifer is shale bedrock with a weathered zone 7-10 feet thick. The primary permeability of this material is low but the secondary permeability is much higher. Fractures along the horizontal bedding planes and vertical joints in the shale allow for groundwater flow. Groundwater was encountered in this zone 10-60 feet below the ground surface.

Groundwater flow in the study area is primarily toward the west, with minor components trending to the northwest and southwest, and is recharged from rainfall. There are no private drinking water wells in the vicinity of the Site. All residents are supplied with drinking water by the Vestal well fields. One of these well fields is located downgradient of the Site near the river. Several investigations in the area have indicated that groundwater contamination from the Site is not impacting this area.

The area where the Site is located is not known to contain any ecologically significant habitat, wetlands, agricultural land, or historic or landmark sites which are impacted by the Site.

II. Site History and Enforcement Activities

In 1966, Robinson Technical Products constructed the main building that currently exists at the Site. The first floor of the building was used for the manufacture of aircraft engine mounts and automobile accelerator control cables. The second floor was used for the assembly of electronic cable. In 1970, Robinson Technical Products was renamed Robintech, and first floor production activities were replaced with PVC pipe extrusion operations. Between 1966 and 1979 the present pipe staging area was paved in four successive stages to the north. The warehouse was constructed in 1974 (see Figure 2).

The Site was bought by Buffton Corporation, the current owner, in 1982, and has been occupied by its subsidiaries National Pipe Company and Electro-Mech Incorporated. Electro-Mech continued the assembly of electronic cable on the second floor. National Pipe continued the PVC pipe extrusion operations. According to Buffton, in 1991 the assets of National Pipe Co. were sold to LCP National Plastics, Inc. ("LCP"), a subsidiary of Hanlon Group, Inc. Electro-Mech and LCP are currently operating at the Site.

Production wells currently provide water to the plant to meet a 250,000 gal/day requirement for cooling water for the PVC pipe manufacturing operation. Ten wells were drilled on-site between 1983 and 1984, numbered PW-1 through PW-10. One well (PW-7) was abandoned and grouted to the surface with cement due to poor yield. Production well PW-10 was screened within the overburden aquifer but has been removed from operation, also due to low yield. The eight remaining wells derive water from fractures in the shale bedrock aquifer. These wells discharge into a distribution tank located near the rear of the production facility and are simultaneously activated and deactivated automatically in response to plant demand. Water from the distribution tank is used as both contact and non-contact cooling water in the pipe production process. After this, the water is pumped to a process wastewater settling tank to reduce particulate content, and then discharged at the permitted effluent discharge point.

An NYSDEC effluent sample collected at the Site in 1984 to verify discharge permit compliance found certain organic constituents above standards that were not covered under the existing permit. Further investigation resulted in the conclusion that the source of contamination was coming from the groundwater beneath the Site. The Robintech Site was placed on the EPA National Priorities List (NPL) in 1986. An Administrative Order on Consent (AOC) under Sections 104 and 122 of CERCLA, 42 U.S.C. §§9604, 9622 for the performance of a Remedial Investigation and Feasibility Study (RI/FS) was issued by EPA in 1987 to General Indicator Group, Inc. (a successor of Robintech), Buffton, Buffton Electronics (now named Electro-Mech, Inc.), and National

Pipe Company. General Indicator Group, Inc. subsequently changed its name to CompuDyne, Inc. McLaren/Hart, retained by Buffton, implemented the EPA approved RI/FS work plan. The RI Report was approved by EPA in October, 1991. The revised FS Report was submitted to EPA in December, 1991. All of the above parties have been identified as Potentially Responsible Parties (PRPs) pursuant to CERCLA.

III. Highlights of Community Participation

The RI and FS Reports and the Proposed Plan for the Robintech Inc./National Pipe Co. Site were released to the public for comment on February 21, 1992. These documents were made available to the public in both the Administrative Record and information repositories maintained at the EPA Docket Room in the Region II New York City office and at the Town of Vestal Public Library located at 320 Vestal Parkway East, Vestal, New York. The notices of availability for these documents were published in the Binghamton Press & Sun Bulletin on February 21, 1992. A public comment period was held from February 21 through March 21, 1992. A public meeting was held on March 18, 1992 at the Vestal Town Hall in Vestal, New York. At this meeting, representatives from EPA presented the findings of the RI/FS and answered questions from the public about the Site and the remedial alternatives under consideration. Response to the comments received during this period is included in the Responsiveness Summary, which is appended to this ROD.

IV. Scope and Role of Operable Unit or Response Action Within Site Strategy

EPA has separated the response actions at the Site into two distinct operable units (OUs). These operable units include: a.) groundwater contaminated with volatile organics above Federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs) (OU-1); and b.) soils potentially contaminated with lead in excess of EPA's Interim Guidance on Soil Lead Cleanup Levels at Superfund Sites (OU-2). The remedial action described in this ROD will address only contaminated groundwater. Potential lead contamination will be addressed in a future ROD.

The ultimate goal of the EPA Superfund approach to groundwater remediation as stated in the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300 (NCP) is to return usable groundwater to their beneficial uses within a time frame that is reasonable. The goal of this remedial action is to halt the spread of the groundwater contaminant plume and return usable groundwater to beneficial uses within a time frame that is reasonable. However, EPA recognizes that the selected remedy may not achieve this goal because of the technical difficulties associated with restoring contaminated aquifers to groundwater cleanup levels. The result of this remedial action will be monitored carefully to determine the feasibility of achieving this final goal. This remedial action will permit the further collection of data on the aquifer without delaying initial remediation measures.

EPA's Superfund Program uses EPA's Groundwater Protection Strategy as guidance when determining the appropriate remediation for contaminated groundwater at CERCLA sites. The Groundwater Protection Strategy establishes different degrees of protection for groundwater based on their vulnerability, use, and value. For the aquifer at the Robintech Site, which is classified by EPA as a Class II aquifer, the final remediation goals will be Federal Safe Drinking Water Act MCLs and New York State Department of Health MCLs. Class II aquifers include current and potential sources of drinking water as well as groundwater potentially available for drinking water, agriculture, or other beneficial use.

V. Summary of Site Characteristics

A. Site Geology and Hydrology

The majority of unconsolidated materials encountered on-site comprise two glacial till units deposited directly above the bedrock surface. The deeper, older till unit is medium to light gray in color and contains abundant rock fragments from the underlying gray shale. This unit has a documented on-site thickness ranging from 0-29 feet. The shallower, younger till unit identified on-site is brown in color and contains reddish-brown sandstone and siltstone fragments. The brown till ranges from 0 to 21 feet in thickness. Soil borings completed just northwest of the Site also intersect a thin medium to dark brown lacustrine clay unit.

Surficial soils that were suspected of being disturbed or reworked during construction activities were classified as fill. Typically, these materials were encountered to a maximum depth of 6 feet below ground surface, if encountered. The composition of the fill is similar to other surficial soils encountered on-site. According to a representative of National Pipe, the source of some of the fill material may be from excavations associated with construction activities for Old Vestal Road.

A weathered bedrock zone, between 7 and 10 feet thick, was encountered on-site between overlying unconsolidated materials and competent bedrock. Bedrock underlying the Site is composed primarily of medium to dark gray shale, interbedded with siltstone and occasional lenses of sandstone. Rock cores collected from on-site locations indicate that the upper surface of the bedrock is highly fractured and severely weathered in areas. Fractures intersected during rock coring are predominantly horizontal and partially clay-filled. Vertical jointing within the rocks is well developed with a prominent orientation of north-south. Less developed joints generally trend northeast-southwest and northwest-southeast. This extensively developed system of joints is the main conduit for groundwater movement within these rocks due to the near absence of primary porosity in the shale.

Groundwater was encountered in the glacial till at depths ranging from approximately 6 to 20 feet below the ground surface. The average depth to water encountered was 12 feet below grade. The overburden aquifer is heterogeneous in nature, and the occurrence of groundwater appears to be non-uniform. At several areas (MW-4, MW-5, and MW-6 locations), the saturated zone extends only a few feet, and the overburden aquifer is essentially non-existent. At such areas the till is extremely dense, and consequently unable to store or transmit significant volumes of groundwater. The dense portions of the till appear to result in discontinuous zones of saturation.

The water level measurements in the overburden wells were used to construct groundwater elevation contour maps in an effort to evaluate the direction of groundwater flow in the overburden. The contour maps generated during the Remedial Investigation indicate a predominant groundwater flow direction toward the west. Minor flow components to the northwest and southwest are also possible. The direction of groundwater flow is consistent with the general slope of the topography in the western and northern directions, toward the Susquehanna River.

The occurrence of groundwater in the bedrock aquifer is controlled primarily by the distribution, magnitude and interconnection of fractures in the shale bedrock. Sandstone beds are limited in the bedrock underlying the Site, and therefore the presence of groundwater under primary porosity conditions is believed to be minimal. Water levels measured in bedrock monitoring and production wells during static conditions varied between approximately 10 and 60 feet below the ground surface. The average depth to water measured in the bedrock wells was approximately 34 feet below grade.

At several areas (MW-4, MW-5, and MW-6) the bedrock surface is severely weathered and fractured. Intermediate wells installed to screen the weathered bedrock zone in these areas were discovered to be in hydraulic connection with the deeper bedrock wells as evidenced by the drawdown observed in MW-4, MW-5, and MW-6 during a pumping test of PW-2. In addition, the water levels measured in the intermediate and bedrock monitoring wells at the MW-4 and MW-5 nests were essentially the same.

Piezometric surface contour maps generated during the Remedial Investigation for the bedrock aquifer indicate a predominant hydraulic gradient in the north-northwest direction toward the

Susquehanna River, the major discharge area in the watershed. The contour maps also display westerly and southerly groundwater flow components within the southern one-third section of the Site, indicating an apparent groundwater divide trending in the east-west direction in this portion of the Site.

B. Nature and Extent of the Contamination

The groundwater quality of the aquifer underlying and downgradient of the Site was assessed during water quality sampling conducted by McLaren/Hart for Buffton in 1989. Tables 1 through 3 present the results of the analyses of groundwater samples from this RI sampling.

The following halogenated alkane/alkene compounds are hazardous substances pursuant to CERCLA and are also the principal contaminants detected during the RI groundwater monitoring program.

- Trichloroethene (TCE)
- 1,1-Dichloroethene (1,1-DCE)
- 1,2-Dichloroethene (1,2-DCE)
- Vinyl Chloride
- 1,1,1-Trichloroethane (1,1,1-TCA)
- Acetone

1,1,1-Trichloroethane was the principal volatile organic contaminant (VOC) detected in the groundwater underlying the Site in both aquifers. The concentrations detected in the overburden ranged from an estimate of 5 ppb to 1,100 ppb. Concentrations of 1,1,1-TCA detected in bedrock production wells ranged from 5 ppb to 8,800 ppb. Figures 3 and 4 display the 1,1,1-TCA distribution based on McLaren/Hart groundwater sampling data. The overflow of the process wastewater settling tank and reinjection of process wastewater into PW-2 represent the most probable pathway for the majority of contaminants to have entered the groundwater.

Several VOCs were detected in the overburden at lower levels, but above MCLs, in the northern portion of the "Paved Pipe Staging" area. In addition, TCE was detected ranging from 12-54 ppb in both aquifers along Commerce Road at the "Northeastern Site Boundary" area. The MCL for TCE is 5 ppb.

Elevated metal concentrations were detected in unfiltered groundwater samples collected from several RI monitoring wells. Existing or proposed MCLs were exceeded for barium, cadmium, lead, and chromium, in unfiltered groundwater samples. Metal concentrations in the on-site filtered groundwater samples do not exceed MCLs.

The majority of VOC contamination detected in the PW-2 area was not detected in downgradient monitoring well locations. Significantly lower contaminant levels in these wells indicate that: a.) constant pumping of the production wells may be curtailing the spread of groundwater contamination or b.) a plume exists somewhere between the PW-2 area and the downgradient well locations.

For metals in on-site and downgradient soil and sediment, lead is the apparent contaminant of concern, although the data that this is based upon is currently undergoing further review by EPA. Soil and sediment samples analyzed by McLaren-Hart have shown lead levels exceeding the EPA interim cleanup level of 500-1000 ppm in most samples collected down to a depth of 10 feet (concentrations ranged from 10 to 56,000 ppm). EPA conducted confirmatory split sampling at several sampling locations at the time these samples were collected. The EPA split samples failed to confirm the elevated lead concentrations (concentrations ranged from 12-61 ppm). In addition, a comprehensive soil and sediment investigation was conducted by EPA, prior to the 1988 McLaren-Hart investigation. Lead levels in soil and sediments from this investigation ranged from 1 to 143 ppm. Because of the elevated concentrations of lead indicated by the McLaren-Hart data, EPA's Emergency Response Team (ERT) sampled the suspected heavily contaminated soil and sediment in order to assess the potential need for immediate action in February 1992. Results of this sampling effort (over 100 samples were taken from varying horizons) revealed no detections of lead within or above the 500-1000 ppm range on-site or downgradient. The results of this sampling effort, along with additional sampling to be conducted, will be used in determining the necessity of remediating lead in soils as part of the previously noted second operable unit (OU-2) for soils contamination.

VI. Summary of Site Risks

EPA conducted a Risk Assessment of the "no-action" alternative to evaluate the potential risks to human health and the environment associated with the Site in its current state. All the contaminants identified above detection limits in the sampling of environmental media at the Site were selected as contaminants of concern. The contaminants of concern and their indices of toxicity are listed in Table 4.

EPA's Risk Assessment identified several potential exposure pathways by which the public may be exposed to contaminant releases from the Robintech Site under a current land-use scenario. In addition, the potential future risks associated with the use of contaminated groundwater were evaluated. The actual and potential pathways and populations potentially affected are shown in Table 5.

The potential exposure routes identified in the Risk Assessment include ingestion, inhalation, and dermal contact exposure to organic compounds and metals from contaminated groundwater beneath the Site as a source of potable water.

The potentially exposed populations in all cases were the residents (adults and children) of neighborhoods near the Site, workers within the study area, and trespassers.

The Risk Assessment evaluated the maximum and average contaminant concentrations detected in the environmental media at the Robintech Site. Table 6 presents the range, maximum, and average concentration of all groundwater contaminants of concern.

Under current EPA guidelines, the likelihood of carcinogenic (cancer causing) and non-carcinogenic effects due to exposure to Site chemicals are considered separately. It was assumed that the toxic effects of the Site-related chemicals would be additive. Thus, carcinogenic and non-carcinogenic risks associated with exposures to individuals were summed to indicate the potential risks associated with mixtures of potential carcinogens and non-carcinogens, respectively.

Non-carcinogenic risks were assessed using a Hazard Index ("HI") approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference Doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of milligram per kilogram per day (mg/kg-day), are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared with the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds across all media that impacts a common receptor. An HI greater than 1 indicates that the potential exists for non-carcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. A compound specific list of RfDs for the Site is included in Table 4.

The HIs for the potential ground water exposures at the Robintech Site are presented in Table 7. The HI calculated for a resident exposed to maximum organic contaminant levels exceeds one. The cumulative HIs are 33.0 for children and 14.0 for adults. The main contributors to non-carcinogenic risks are 1,1,1-TCA, TCE, chromium, and 2-butanone.

Potential carcinogenic risks were evaluated using the cancer slope factors developed by the EPA for the compounds of concern. Cancer slope factors (SFs) have been developed by EPA's Carcinogen Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes the underestimation of the risk highly unlikely. For known or suspected carcinogens, EPA considers excess upper bound individual lifetime cancer risks of between 10^{-4} to 10^{-6} to be acceptable with 10^{-6} being the point of departure. The 10^{-4} to 10^{-6} range indicates that an individual has not greater than a one in ten thousand to one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year period under specific exposure conditions at the Site. A compound specific list of SFs for the Site is included in Table 4.

The cancer risk levels for ground water exposures are presented in Table 8. The cumulative upper bound risk for adult residents using contaminated ground water is 4.8×10^{-3} for the overburden aquifer and 5.5×10^{-3} for the bedrock aquifer. Both values are greater than EPA's acceptable cancer risk range. Vinyl chloride and 1,1-DCE are the main contributors to carcinogenic risk.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry analysis uncertainty can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the Risk Assessment provides upper bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

Actual or threatened releases of hazardous substances from the Robintech Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VII. Description of Alternatives

The Superfund law requires that any remedy selected for a Site must be protective of human health and the environment, cost-effective, and in accordance with statutory requirements. Permanent solutions to contamination are to be achieved wherever possible, and there is a bias for treating wastes and applying innovative technologies. The remedial alternatives considered for the Site are summarized below. They are numbered to correspond with their presentation in the FS report.

The time to implement refers only to the actual construction time and does not include the time needed to design the remedy and negotiate with the potentially responsible parties.

Alternatives for the Contaminated Groundwater

A common element in each groundwater remediation alternative, with the exception of the "No Action" alternative (described later) is long-term groundwater monitoring to evaluate the alternative's effectiveness. Monitoring will be conducted semi-annually for the duration of the alternative, and will include sampling ten wells along with the treated groundwater effluent discharge for VOCs and metals. Further detail on this proposed long-term groundwater monitoring program can be found in the FS Report on page 3-6. In addition, in accordance with Section 121 of CERCLA, EPA must review any remedial action that leaves hazardous substances above health based levels at a site once every five years to assure that the remedy selected remains protective of human health and the environment. It is anticipated that all groundwater alternatives presented in this document will require a five year review.

The remedial action objectives for the contaminated groundwater are a.) to restore the aquifer as a potential source of drinking water by reducing contaminant levels to the New York State and Federal MCLs, and b.) to reduce or eliminate the potential for off-site migration of contaminants. Bedrock and overburden extraction wells located in the areas of concern will be pumped at rates that will allow for coordinating an expeditious groundwater remediation. The exact number, depth, and location of extraction wells will be further refined during remedial design (RD). A monitoring well cluster (one overburden, one bedrock) will be installed during remedial design midway between the PW-2 area and MW-5 (located on the Skate Estate property) to assist in determining pumping rates as well as to further assess groundwater quality between these areas (see Figure 2). The pre-design phase pumping rate estimate is: 20 gallons per minute (gpm) for PW-2 with a total rate of 5 gpm for associated overburden extraction wells; 10 gpm for the Northeastern Site Boundary bedrock well with a total rate of 5 gpm for associated overburden extraction wells; and a total of 5 gpm for overburden extraction wells in the Paved Pipe Staging area. Estimated pumping rates may be revised in response to data generated during remedial design pump tests.

Based on current estimates (Appendix A of the FS), the aquifer in the vicinity of PW-2 could be remediated in 15 years, in the Paved Pipe Staging area in 2 years, and in the vicinity of the Northeastern Site Boundary in 6 years. These estimates can be revised as data is collected during the remedial action. The "30-Year Present Worth" figures presented include costs for monitoring beyond the estimated time to remediate.

For all alternatives, institutional controls such as deed restrictions, will be recommended to appropriate authorities in order to restrict any other groundwater withdrawals.

For treatment alternatives, the treated water from areas of concern may either be discharged separately at the permitted discharge outfall or used as plant process water. This approach permits the design option for continued operation of groundwater treatment independent of the plant operations. Groundwater from production wells in non-contaminated areas may continue to be used for industrial purposes without treatment.

Recent studies have indicated that pumping technologies may contain uncertainties in achieving the ppb concentrations required under ARARs over a reasonable period of time. For this reason, the following groundwater extraction alternatives may include contingency measures, whereby the groundwater extraction system's performance will be monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points;

c) pulsed pumping to allow for aquifer equilibration and to allow adsorbed contaminants to partition into groundwater; and

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial uses in a reasonable time frame, all or some of the following measures involving long-term management may occur, for an indefinite period of time, as a modification of the existing system:

a) engineering controls such as physical barriers, source control measures, or long-term gradient control provided by low level pumping, as containment measures;

b) chemical-specific ARARs may be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction;

c) future institutional controls, in the form of local zoning ordinances, may be recommended to be implemented and maintained to restrict access to those portions of the aquifer which remain above remediation goals;

d) continued monitoring of specified wells; and

e) periodic reevaluation of remedial technologies for groundwater restoration.

The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at intervals of no less often than every five years.

Alternative GW-1: No Action

CERCLA requires that the "No Action" alternative be considered at every site to provide a baseline of comparison among alternatives. This alternative assumes no additional activity takes place beyond the current activities at the Site. All wells that are currently pumping are assumed to continue pumping at their current rates. In accordance with Section 121 of CERCLA, remedial actions that leave hazardous substances at a site are to be reviewed at least once every five years to assure that the remedial action is protective of human health and the environment. The No Action alternative would have to be reviewed by EPA at least once every five years.

Cost	Capital Cost:	$0
	Annual O&M:	$0
	30-Year Present Worth:	$0

Time to Implement None

Alternative GW-2: Groundwater Extraction/Discharge/ Institutional Controls/Monitoring

This alternative assumes continued plant operations at the present rate of water use. Overburden extraction wells will be manifolded into the bedrock well system and together they will be pumped into the plant's storage tank. The water will continue to be used as process cooling water in the plant. The process water will continue to be discharged without treatment at the existing permitted discharge point.

A long-term monitoring plan will be implemented as previously described in "Alternatives for Contaminated Groundwater" with the addition of sampling the influent water to the plant.

Cost	Capital Cost:	$133,622
	Annual O&M:	$ 65,929
	30-Year Present Worth:	$921,331

Time to Implement 6 months

Alternative GW-3A: GW Extraction/Air Stripping/ Discharge/ Combined Flow/Institutional Controls/Monitoring

The groundwater extraction scheme and treated water discharge for this alternative are identical to that previously described in "Alternatives for Contaminated Groundwater."

Contaminated groundwater will be pumped from areas of concern to an air stripper. Treated groundwater may either be used in the plant process or discharged separately. Approximately 95 to 99 percent of the VOCs would be removed by air stripping.* Air stripping is a proven technology, has been widely used in the removal of VOCs from groundwater, and is commercially available.

A long-term monitoring plan will be implemented as previously described in "Alternatives for Contaminated Groundwater."

Cost	Capital Cost:	$ 291,564
	Annual O&M:	$ 242,286
	30-Year Present Worth:	$2,255,877

Time to Implement 2 years

(*) Regarding potential air emissions: The application of air emission controls will be determined during remedial design in accordance with New York State Regulation Part 212.

Alternative GW-4B: GW Extraction/Air Stripping/ Carbon Adsorption/Discharge/Separate Flow/ Institutional Controls/Monitoring

The groundwater extraction scheme and treated water discharge for this alternative are identical to that previously described in "Alternatives for Contaminated Groundwater."

For this remedial alternative, liquid phase and vapor phase carbon adsorption units follow the air stripper. Groundwater from the PW-2 area will be pumped through the stripper, then to a two-stage (in series) liquid phase carbon adsorber for the removal of any remaining VOCs. The groundwater from the Northeastern Site Boundary area and Paved Pipe Staging area enters the treatment process after the air stripper but before the carbon adsorption unit. The rationale for this approach is that the only contaminant of concern in the Northeastern Site Boundary is TCE. Also, TCE is at a lower concentration in the Northeastern Site Boundary area and the pumping rate estimate is lower (15 gpm) than that of the PW-2 area (25 gpm). The low level of TCE in the Northeastern Site Boundary, combined with the 1,1,1-TCA and 1,1-DCA from the Paved Pipe Staging area (5 gpm), can effectively be removed through carbon adsorption alone. Spent carbon would be shipped off-site for disposal or regeneration.

A long-term monitoring plan will be implemented as previously described in "Alternatives for Contaminated Groundwater."

Costs	Capital Cost:	$ 376,732
	Annual O&M:	$ 235,500
	30-Year Present Worth:	$2,430,127

Time to Implement 2 years

Alternative GW-6B: GW Extraction/ UV/Chemical Oxidation/Carbon Adsorption/Discharge/Institutional Controls/Monitoring

The groundwater extraction scheme and treated water discharge for this alternative are identical to that described in "Alternatives for Contaminated Groundwater."

This remedial alternative is similar to Alternative GW-4B except that a free radical chemical oxidation process rather than the air stripping process would be used to remove VOCs from the groundwater. A hydrogen peroxide-ultraviolet light (H_2O_2-UV) oxidation system would treat the groundwater. This oxidation system employs a combination of H_2O_2 and UV light to chemically oxidize the VOCs in the process stream. The 25 gpm flow rate from the PW-2 area contains the majority of VOCs and is pumped through the UV system. The Northeastern Site Boundary and Paved Pipe Staging area influent is added prior to carbon adsorption. The treated groundwater from the PW-2 area would have VOC concentrations below permitted discharge limits for all contaminants except 1,1,1-TCA. The carbon adsorbers will treat the effluent of the UV system for this compound and for VOCs from the Northeastern Site Boundary and Paved Pipe Staging areas.

A long-term monitoring plan will be implemented as previously described in "Alternatives for Contaminated Groundwater."

Cost	Capital Cost:	$ 494,904
	Annual O&M:	$ 210,300
	30-Year Present Worth:	$2,494,342

Time to Implement 2 years

VIII. Summary of Comparative Analysis of Alternatives

EPA has developed nine criteria (OSWER Directive 9355.3-01), codified in the NCP §300.430(e) and (f), to evaluate potential alternatives to ensure all important considerations are factored into remedy selection. This analysis is comprised of an individual assessment of the alternatives against each criterion and a comparative analysis designed to determine the relative performance of the alternatives and identify major trade-offs, that is, relative advantages and disadvantages, among them.

The nine evaluation criteria against which the alternatives are evaluated are as follows:

Threshold Criteria - The first two criteria must be satisfied in order for an alternative to be eligible for selection.

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection

and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with Applicable, or Relevant and Appropriate Requirements (ARARs)** addresses whether or not a remedial alternative would meet all of the applicable or relevant and appropriate requirements (ARARs) of other federal and state environmental statutes and/or satisfy the criteria for invoking a waiver as set forth in Section 121(a) of CERCLA.

Primary Balancing Criteria - The next five "balancing criteria" are to be used to weigh trade-offs among the different hazardous waste management strategies.

3. **Long-term Effectiveness and Permanence** focuses on any residual risk remaining at the Site after the completion of the remedial action. This analysis includes consideration of the degree of threat posed by the hazardous substances remaining at the Site and the adequacy of any controls (for example, engineering and institutional) used to manage the hazardous substances remaining at the Site. It also considers how effective and permanent the remedy is in the long term.

4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** is the anticipated performance of the treatment technologies a particular remedy may achieve.

5. **Short-term Effectiveness** addresses the effects of the alternative during the construction and implementation phase until the remedial response objectives are met. It also considers the time required to implement the remedy.

6. **Implementability** addresses the technical and administrative feasibility of implementing an alternative including the availability of various services and materials required during its implementation.

7. **Cost** includes estimated capital, and operation and maintenance costs, both translated to a present-worth basis. The detailed analysis evaluates and compares the cost of the respective alternatives, but draws no conclusions as to the cost-effectiveness of the alternatives. Cost-effectiveness is determined in the remedy selection phase, when cost is considered along with the other balancing criteria.

Modifying Criteria - The final two criteria are regarded as "modifying criteria", and are to be taken into account after the above criteria have been evaluated. They are generally to be focused upon after public comment is received.

8. **State Acceptance** reflects the statutory requirement to provide for substantial and meaningful State involvement.

9. **Community Acceptance** refers to the community's comments on the remedial alternatives under consideration, along with the Proposed Plan. Comments received during the public comment period, and the EPA's responses to those comments, are summarized in the Responsiveness Summary which is a part of this ROD.

The following is a summary of the comparison of each alternative's strengths and weaknesses with respect to the nine evaluation criteria.

1. Overall Protection of Human Health and the Environment: Alternatives GW-3A, GW-4B, and GW-6B would provide permanent overall protection of human health and the environment through extraction and treatment of contaminated groundwater. Such alternatives will provide the greatest overall protection of human health and the environment. While Alternative GW-2 is considered viable, its ability to provide reliable protection and continuous remediation over time is questionable as it is dependent on the continued operation of the plant and there is no treatment of contaminated groundwater involved. Deed restrictions to prevent the withdrawal of contaminated groundwater for potable purposes would be recommended for implementation for all alternatives.

The "No-Action" alternative is not protective of human health and the environment; therefore, it was eliminated from further consideration and will not be discussed further.

2. Compliance with ARARs: Since the groundwater underlying the Site is a potential future potable water supply source, Federal and State MCLs (whichever is more stringent) are ARARs. Both Federal and State MCLs are relevant and appropriate for the cleanup of the aquifer. Alternatives GW-3A, GW-4B, and GW-6B are designed to meet these ARARs. The ability of Alternative GW-2 to meet ARAR's over time is questionable as it is dependent on dilution of the contaminated groundwater and on the continued operation of the plant and pipe production.

Any off-site discharge of treated water for these alternatives will comply with the NYSDEC State Pollutant Discharge Elimination System (SPDES) permit.

3. Long-Term Effectiveness: Alternatives GW-3A, GW-4B, and GW-6B would provide long-term effectiveness by virtue of the extended groundwater extraction plan, the attainment of MCLs, and a resulting minimal risk from contaminant residuals. There would be no long-term threat to the environment or human health as the aquifer will be remediated to drinking water standards. The long-term effectiveness of Alternative GW-2, though viable at present, is questionable in the long term as it is dependent on dilution of the contaminated groundwater and on the continued operation of the plant and pipe production.

4. Reduction of Toxicity, Mobility or Volume: Alternatives GW-3A, GW-4B, and GW-6B, with an identical groundwater pumping scheme, would reduce the toxicity, mobility and volume permanently through extraction and treatment of contaminated groundwater. Alternative GW-4B would produce a cleaner effluent than GW-3A by approximately 5-10%. The reduction of VOC content for Alternative GW-6B, the alternative involving innovative technology, should be comparable to the reduction of VOCs for Alternative GW-4B, but this would need to be confirmed during remedial design. It should be noted that GW-6B would not generate air emissions. Alternative GW-2 may tend to reduce mobility but will not address the reduction of toxicity and volume criteria as there is no treatment system currently in place, or planned, for this alternative.

5. Short-Term Effectiveness: No short term impacts on human health and the environment are anticipated with construction associated with any of the alternatives as no contaminated media will be disturbed. Monitoring will help to prevent potential future exposure during the remedial period for all the alternatives.

6. Implementability: All of the alternatives involve the use of commercially available products and accessible technology. Also, as mentioned previously, the extraction plan and pumping rates are identical for all of the alternatives. Alternative GW-2 is the easiest to implement as it involves only well installation, followed by Alternative GW-3A, which is the simplest treatment alternative. The added treatment and piping, in addition to the residuals handling and disposal associated with carbon adsorption, make Alternatives GW-4B and GW-6B more difficult and time consuming to implement. Alternative GW-6B, an innovative technology, has had limited application and may achieve the VOC treatment necessary for this Site. A treatability study would have to be performed during RD for this alternative. This, along with the technology involved, makes it more difficult to implement than Alternatives GW-3A and GW-4B.

7. Cost: Alternative GW-2 has the lowest capital and O&M costs, resulting in a present worth of $921,331 because it does not involve the installation of a separate groundwater treatment system. Alternative GW-3A has the next higher cost with a present worth of $2,255,877. Alternative GW-4B adds further treatment to that outlined in GW-3A for a present worth of $2,430,127. Alternative GW-6B, the innovative treatment alternative carries a present worth of $2,494,342.

8. State Acceptance: A concurrence letter from New York State is attached to this Record of Decision at Appendix C.

9. Community Acceptance: In general, the community was supportive of the remedy. All comments that were received from the public comment period are addressed in the attached Responsiveness Summary (Appendix D).

IX. Description of the Selected Remedy

Based on the results of the RI/FS reports, as well as a detailed evaluation of all comments submitted by interested parties during the public comment period, and the rest of the administrative record for the Site, EPA has selected Alternative GW-3A as the selected alternative for addressing the groundwater contamination problem at the Robintech Inc./National Pipe Co. Site. Specifically, the selected alternative will involve the following:

- Contaminated groundwater will be pumped from bedrock and overburden extraction wells in accordance with an extraction scheme that will be further refined during remedial design. Remedial design determinations will include pumping rates and the exact location and depth of extraction wells. The pumping will continue until MCLs are achieved in the aquifer, notwithstanding the previously noted contingency measures. After the groundwater treatment system is in place it is estimated that groundwater in the aquifer will meet the remediation goals in 15 to 30 years.

- An air stripping treatment system will be installed to remove VOCs from the pumped groundwater. The application of air emission controls on the stripper will be determined during remedial design in accordance with New York State Regulation Part 212.

- The treated water from the Robintech Site could be used in the plant process or pumped directly to the SPDES permitted effluent discharge point, depending on plant process requirements.

- A long-term system monitoring program which includes the collection and semi-annual analysis of ten wells and the SPDES effluent discharge will be implemented in order to track the migration and concentrations of the contaminants of concern.

- Institutional controls in the form of deed restrictions will be recommended to the appropriate authorities (on- and off-site restrictions) in order to prevent the extraction of groundwater for potable purposes.

o The site conditions will be evaluated at least once every five years to determine if a modification to the selected alternative is necessary.

The ultimate goal of the EPA Superfund Program's approach to groundwater remediation as stated in the NCP is to return usable groundwater to its beneficial use within a reasonable time frame. Therefore, for the aquifers underlying the Robintech Site, which are classified as Class II aquifers, the final remediation goal will be the MCLs.

The preferred alternative is believed to provide the best balance of trade-offs among the alternatives with respect to the evaluation criteria. Based on the information available at this time, EPA believes the preferred alternative will be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent technologies to the maximum extent practicable. The preferred alternative also meets the statutory preference for the use of a remedy that involves treatment as a principal element.

Alternative GW-3A, with a network of bedrock and overburden extraction wells, is as capable of a comparable level of contamination removal from the aquifer as the other treatment alternatives and of reducing contaminant concentration levels in the most heavily contaminated portions of the aquifer. Besides being the most cost effective and simplest of all treatment options, Alternative GW-3A is the easiest treatment alternative to implement. This alternative does not require the handling and disposal of hazardous residuals as would Alternative GW-4B, and uses a reliable and proven technology that would not require prior testing, unlike Alternative GW-6A. In addition, this alternative provides for the control of potential contaminant migration and is ultimately expected to reduce contamination to MCLs thereby restoring the aquifer.

This alternative also includes contingency measures, as necessary, outlined under "Alternatives for the Contaminated Groundwater" in the Description of Alternatives section of this ROD (Section VII), whereby the groundwater extraction and treatment system's performance will be monitored on a regular basis and adjusted as warranted by the performance data collected during operation. If it is determined, in spite of any contingency measures that may be taken, that portions of the aquifer cannot be restored to its beneficial use, ARARs may be waived based on the impractic-ability, from an engineering perspective, of achieving further contaminant reduction. The decision to invoke a contingency measure may be made during periodic review of the remedy, which will occur at intervals of no less often than every five years.

X. Statutory Determinations

EPA's primary responsibility at Superfund sites is to select remedial actions that are protective of human health and the environment. CERCLA also requires that the selected remedial action for the Site comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws, unless a waiver is granted. The selected remedy must also be cost effective and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. The statute also contains a preference for remedies that include treatment as a principal element. The following sections discuss how the selected remedy for contaminated groundwater at the Site meets these statutory requirements.

1. Protection of Human Health and the Environment

In order to meet the remedial objectives outlined in the previous section, the risk associated with exposure to the contaminated groundwater must fall within the acceptable risk range for carcinogens. Attainment of MCLs and proposed MCLs is also necessary to ensure that the remedy is protective. The selected remedy protects human health and the environment by reducing levels of contaminants in the groundwater through extraction and treatment as well as through the recommendation of deed restrictions. Alternative GW-3A will provide overall protection by reducing the toxicity, mobility, and volume of contamination permanently, through treatment of the contaminated water to meet federal and state MCLs.

2. Compliance with Applicable or Relevant and Appropriate Requirements of Environmental Laws

All ARARs would be met by the selected remedy.

Chemical Specific ARARs -- The selected remedy would achieve compliance with chemical specific ARARs related to the groundwater at the Site. The relevant and appropriate requirements include the MCLs promulgated pursuant to the Safe Drinking Water Act as well as State law. The contaminants of concern identified for the Site have MCLs. Values for MCLs, proposed MCLs and New York State Department of Health MCLs are listed in Tables 9 and 10.

Air emission controls will be implemented to comply with the applicable portions of 6NYCRR Chapter 3 - Air Resources.

3. Cost-Effectiveness

According to the dictates of 40 CFR §300.430(f)(1)(ii)(D) of the NCP, cost effectiveness is determined by evaluating three of the five balancing criteria noted in §300.430(f)(1)(i)(B) to determine overall effectiveness: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. A remedy shall be cost effective if its costs are proportional to its overall effectiveness. The selected remedy meets these criteria and provides for overall effectiveness in proportion to its cost and in mitigating the principal risk posed by contaminated groundwater. The estimated cost for the selected remedy has a capital cost of $291,564, annual O&M of $242,286, and 30-year present worth of $2,255,877.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy for the groundwater satisfies this criterion by the use of a groundwater extraction system to remove contaminated groundwater from the aquifer.

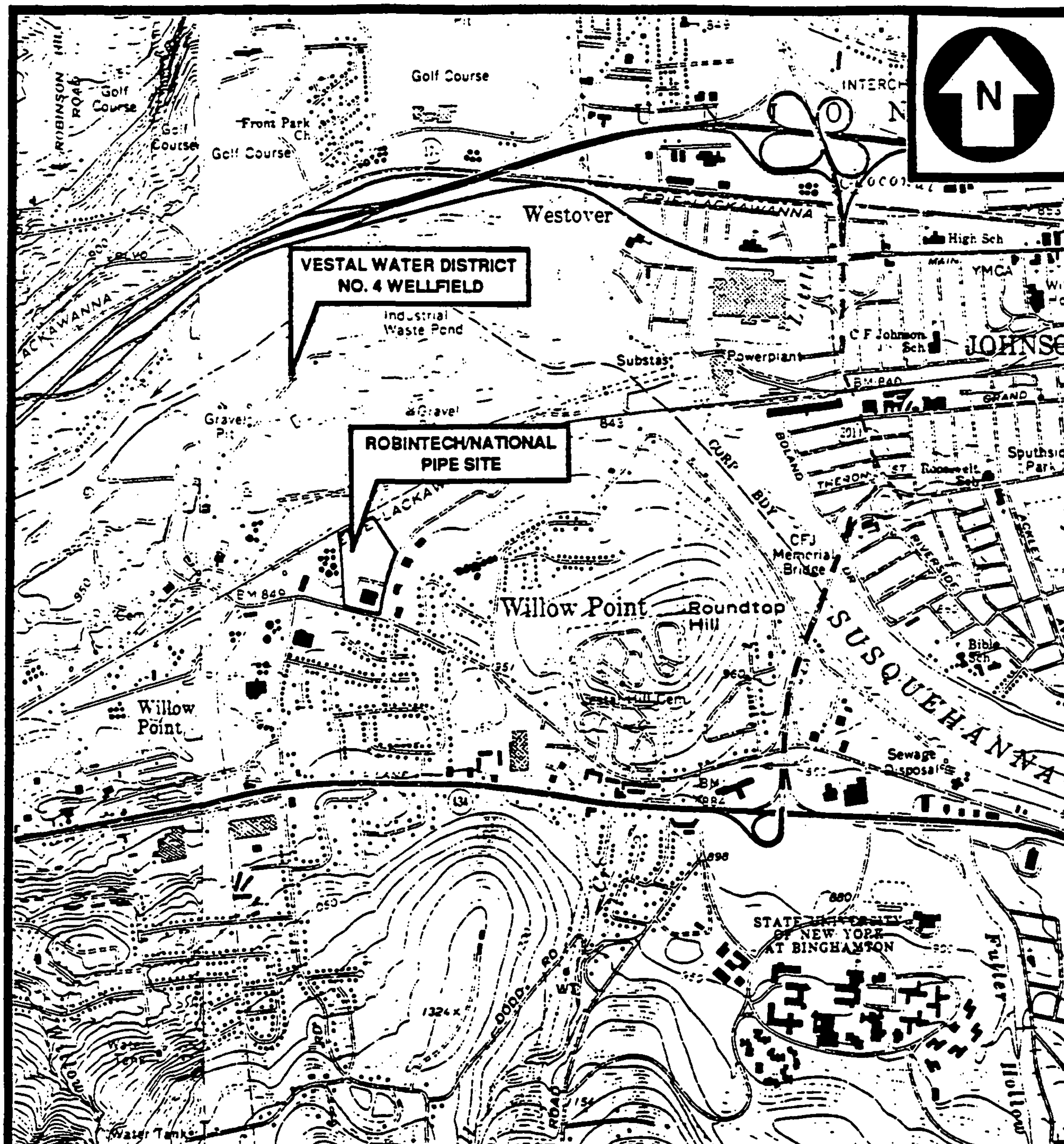
5. Preference for Treatment as a Principal Element

The selected remedy satisfies the statutory preference for remedies employing treatment that permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances. The selected remedy satisfies this criterion by the use of an air stripping system to treat contaminated groundwater in addition to the installation and operation of groundwater extraction wells.

XI. Documentation of Significant Changes

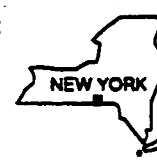
The Proposed Plan for the Robintech Inc./National Pipe Co. Site was released for public comment on February 21, 1992. The Proposed Plan identified Alternative GW-3A, with a network of bedrock and overburden extraction wells and treatment with discharge at the permitted effluent discharge point, as the preferred alternative for the groundwater contamination. Therefore, there have been no changes from the time of the Proposed Plan until the signing of the ROD.

APPENDIX A - FIGURES



BASE MAP IS A PORTION OF THE FOLLOWING 7.5' U.S.G.S. QUADRANGLE(S):
ENDICOTT, N.Y., 1969

0 1000 2000 3000 feet



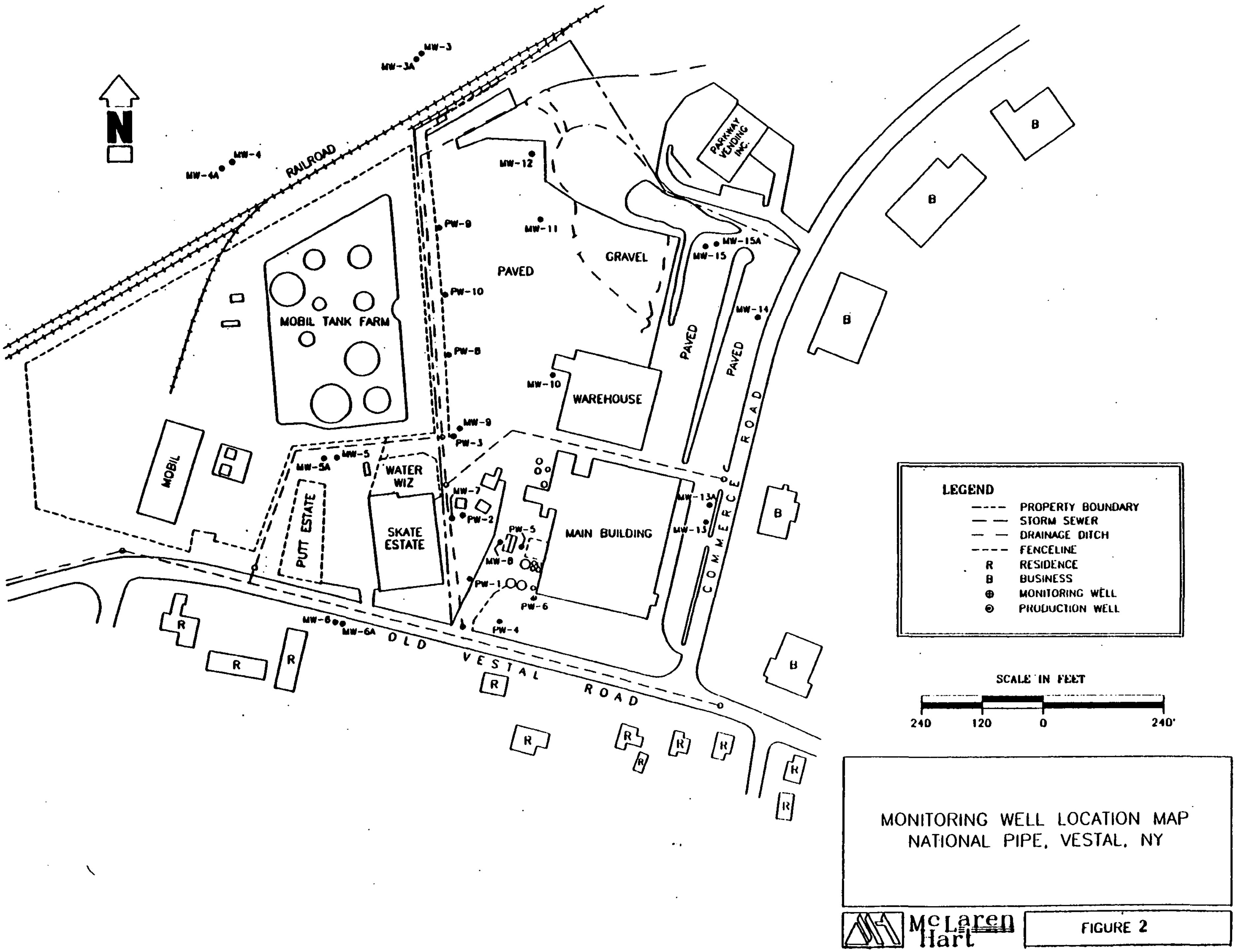
QUADRANGLE LOCATION

SITE LOCATION MAP

LOCATION OF THE ROBINTECH INC./NATIONAL PIPE COMPANY
VESTAL, N.Y.

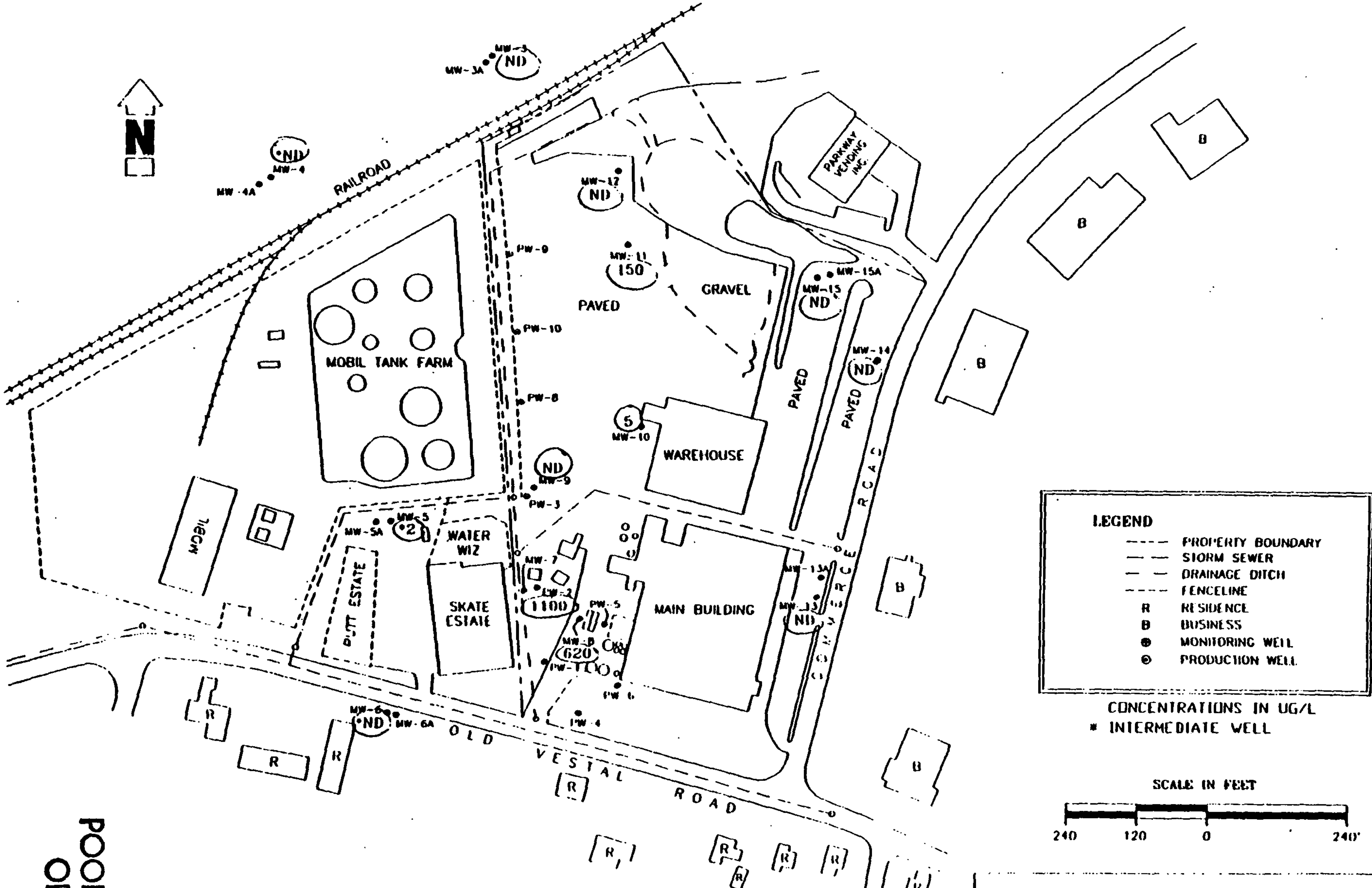
ALLIANCE
Technologies Corporation

FIGURE 1



MONITORING WELL LOCATION MAP
NATIONAL PIPE, VESTAL, NY

FIGURE 2

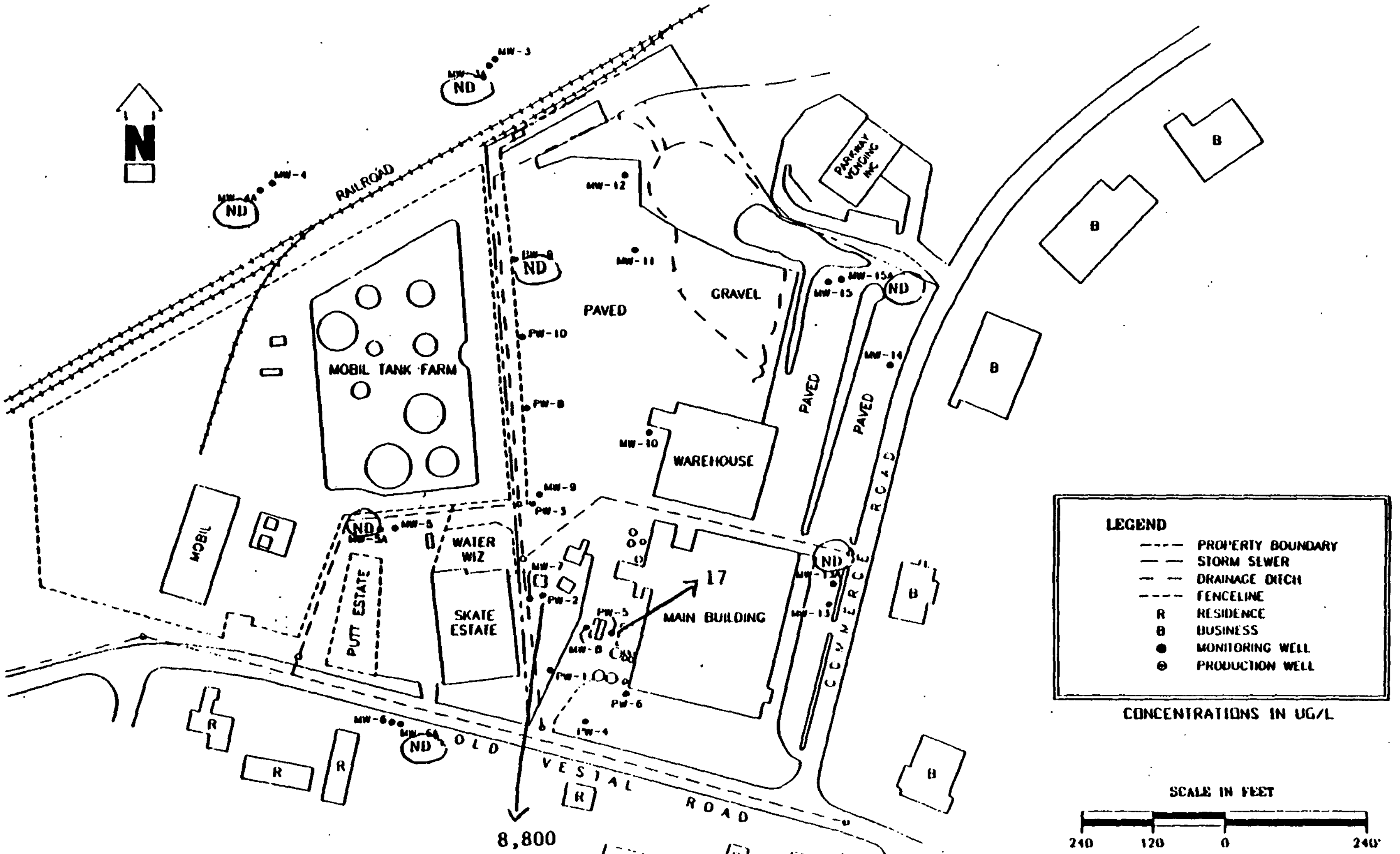


1,1,1-TCA CONCENTRATION DISTRIBUTION IN OVERBURDEN AND INTERMEDIATE MONITORING WELLS -- 1989
NATIONAL PIPE, VESTAL, NY

McLaren

Figure

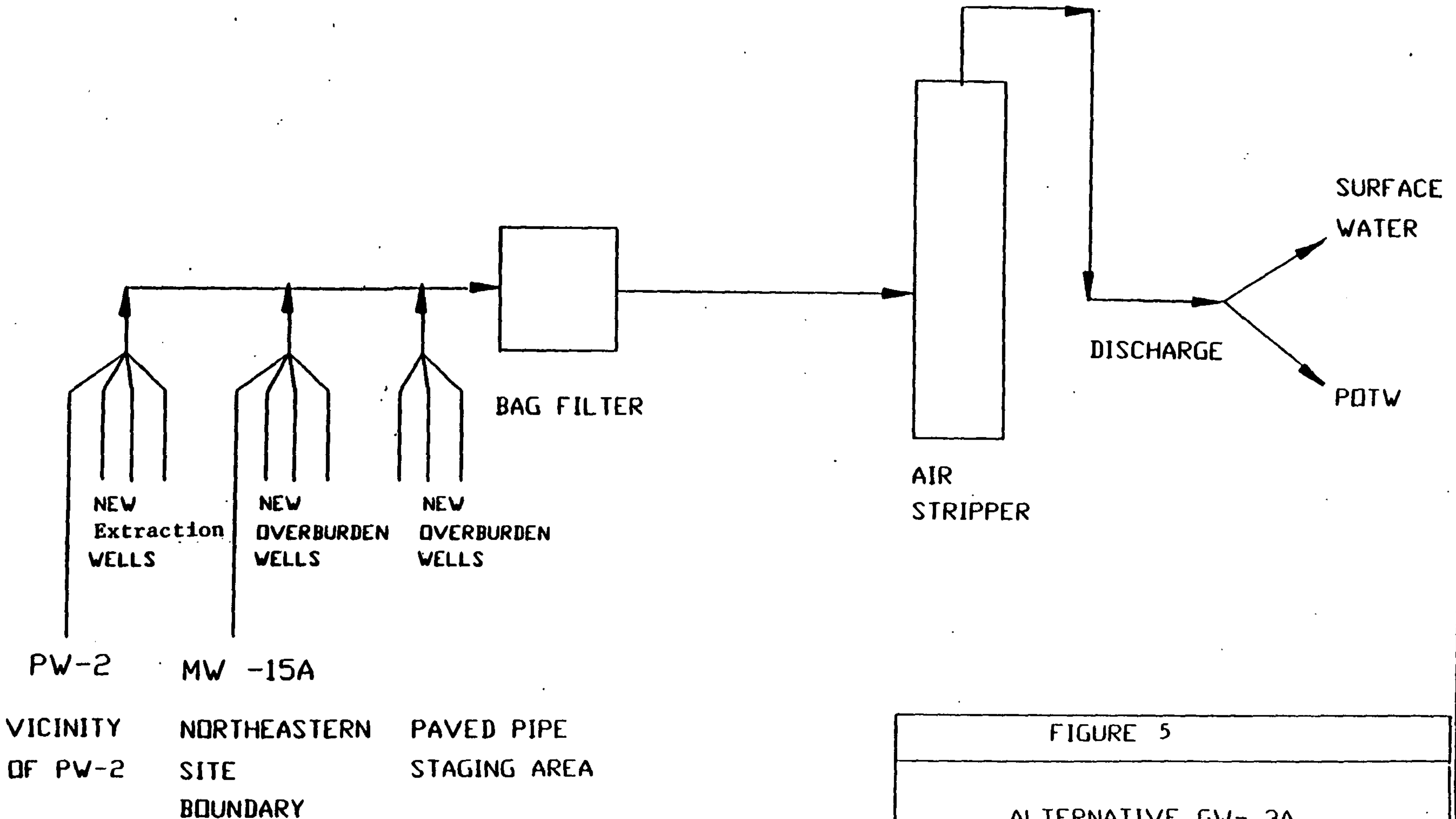
POOR QUALITY ORIGINAL



1,1,1-TCA CONCENTRATION DISTRIBUTION
IN BEDROCK
WELLS - 1989
NATIONAL PIPE, VESTAL, NY

McLaren

POOR QUALITY ORIGINAL



* MONITORING INCLUDED IN ALTERNATIVE

FIGURE 5

ALTERNATIVE GW- 3A

McLAREN/HART
ENVIRONMENTAL
ENGINEERING CORP.

APPENDIX B - TABLES

TABLE 1
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
AND AVAILABLE NEW YORK STDs AND FEDERAL MCLs, ORGANIC PARAMETERS
NATIONAL PIPE, VESTAL, NEW YORK

SAMPLE NUMBER	MW-3	MW-3A	MW-4	MW-4D	MW-4A	MW-5	MW-5D	MW-5A	MW-6	MW-6A	MW-7	NY STD	FED MCL
DATE	10-24-89	10-25-89	10-24-89	10-24-89	10-25-89	2-1-89	2-1-89	2-1-89	2-2-89	2-1-89	1-26-89	(ug/l)	(ug/l)
VOLATILE ORGANICS (ug/l)													
Acetone	–	–	–	–	–	–	–	2200E	–	–	–	NS	NS
Benzene	–	–	–	–	–	9	8	10	–	–	2Q	5	5
Chloroethane	–	–	–	–	–	–	–	–	–	–	23	5	NS
Chloroform	–	–	–	–	–	–	–	–	–	–	1Q	100	NS
1,1-Dichloroethane	–	–	–	–	–	3Q	3Q	3Q	–	–	95	5	NS
1,1-Dichloroethene	–	–	–	–	–	–	–	–	–	–	52	5	7
1,2-Dichloroethane	–	–	–	–	–	–	–	–	–	–	3Q	5	5
1,2-Dichloroethene (total)	–	–	–	–	–	–	–	–	–	–	230E	Z	X
Tetrachloroethene	–	–	–	–	–	–	–	–	–	–	17	5	NS
Toluene	–	2Q	–	–	2Q	–	–	–	–	–	–	5	NS
1,1,1-Trichloroethane	–	–	–	–	–	2Q	2Q	–	–	–	1100E	5	200
Trichloroethene	–	–	–	–	–	–	–	–	–	–	1000E	5	5
Vinyl Chloride	–	–	–	–	–	–	–	–	–	–	17	2	2
Total VOC's	–	2Q	–	–	2Q	14Q	13Q	2213Q	–	–	2540Q	NS	NS
TICs Number	0	1	1	1	1	2	2	5	0	0	1	NS	NS
Concentration	–	15	14	16	6	86	84	460	–	–	80	NS	NS
SEMIVOLATILE ORGANICS (ug/l)													
Semivolatile Organics	–	–	–	–	–	–	–	–	–	–	–	NS	NS
TICs Number	0	0	0	0	0	0	1	0	1	0	1	NS	NS
Concentration	–	–	–	–	–	–	100	–	90	–	77	NS	NS

TICs Tentatively identified compounds (listed in Appendix J)
D Duplicate (MW-4, MW-5, MW-15A listed as MW-20, MW-1, MW-16 respectively on the chain of custody)
Q Estimated semi-quantitative value because concentration is below contract required quantitation limit
J Value is a semi-quantitative estimate based on QA/QC review
R Data failed to meet QA/QC requirements
X Standard is 70 ug/l for cis-1,2 dichloroethene, and 100 ug/l for trans-1,2 dichloroethene
Z Standard is 5 ug/l for cis-1,2 dichloroethene and 5 ug/l for trans-1,2 dichloroethene
– Not Detected
NS Not Specified
NA Not Analyzed
MCL Maximum Contaminant Level, EPA
STD NY State standard for groundwater (Class GA)
E Analyte quantified from dilution (from 5 to 25 fold); refer to Appendix

TABLE 1 (continued)
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
AND AVAILABLE NEW YORK STDs AND FEDERAL MCLs, ORGANIC PARAMETERS
NATIONAL PIPE, VESTAL, NEW YORK

SAMPLE NUMBER	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-13A	MW-14	MW-15	MW-15A	MW-15AD	NY STD	FED MCL
DATE	10-25-89	1-27-89	2-3-89	1-27-89	1-31-89	1-26-89	2-3-89	1-25-89	1-25-89	2-2-89	2-2-89	(ug/l)	(ug/l)
VOLATILE ORGANICS (ug/l)													
Acetone	–	–	–	–	–	–	–	–	–	–	–	NS	NS
Benzene	23	–	–	–	–	–	–	–	–	–	–	5	5
Chloroethane	43	–	–	–	–	–	–	–	–	–	–	5	NS
Chloroform	–	–	–	–	–	–	–	–	–	–	–	100	NS
1,1-Dichloroethane	370E	–	–	23	–	–	–	–	–	–	–	5	NS
1,1-Dichloroethene	110	–	–	–	–	–	–	–	–	–	–	5	7
1,2-Dichloroethane	–	–	–	–	–	–	–	–	–	–	–	5	5
1,2-Dichloroethene (total)	400E	–	–	–	–	–	–	–	–	–	–	Z	X
Tetrachloroethene	–	–	–	–	–	–	–	–	–	–	–	5	NS
Toluene	–	–	–	–	–	–	–	–	–	–	–	5	NS
1,1,1-Trichloroethane	620E	–	5Q	150	–	–	–	–	–	–	–	5	200
Trichloroethene	460E	–	–	–	–	–	–	54	31	14	12	5	5
Vinyl Chloride	36	–	–	–	–	–	–	–	–	–	–	2	2
Total VOC's	1913	–	5Q	173	–	–	–	54	31	14	12	NS	NS
TICs Number	1	2	0	1	0	1	0	0	0	0	0	NS	NS
Concentration	100	51	–	11	–	12	–	–	–	–	–	NS	NS
SEMIVOLATILE ORGANICS (ug/l)													
Semivolatile Organics	–	–	–	–	–	–	–	–	–	–	–	NS	NS
TICs Number	1	0	0	0	0	1	0	0	0	0	1	NS	NS
Concentration	150	–	–	–	–	61	–	–	–	–	12	NS	NS

TICs Tentatively identified compounds (listed in Appendix J)
D Duplicate (MW-4, MW-5, MW-15A listed as MW-20, MW-1, MW-16 respectively on the chain of custody)
Q Estimated semi-quantitative value because concentration is below contract required quantitation limit
J Value is a semi-quantitative estimate based on QA/QC review
R Data failed to meet QA/QC requirements
X Standard is 70 ug/l for cis-1,2 dichloroethene, and 100 ug/l for trans-1,2 dichloroethene
Z Standard is 5 ug/l for cis-1,2 dichloroethene and 5 ug/l for trans-1,2 dichloroethene
– Not Detected
NS Not Specified
NA Not Analyzed
MCL Maximum Contaminant Level, EPA
STD NY State standard for groundwater (Class GA)
E Analyte quantified from dilution (from 5 to 25 fold); refer to Appendix

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS AND AVAILABLE NEW YORK STDs AND FEDERAL MCLs, METALS AND CYANIDE NATIONAL PIPE, VESTAL, NEW YORK

SAMPLE NUMBER	MW-3	MW-3F	MW-3A	MW-3AF	MW-4	MW-4F	MW-4D	MW-4DF	MW-4A	MW-4AF	MW-5	MW-5F	MW-5D	MW-5DF	MW-5A	MW-5AF	NY STD	FED MCL
DATE	10-24-89	10-24-89	10-25-89	10-25-89	10-24-89	10-24-89	10-24-89	10-24-89	10-25-89	10-25-89	2-1-89	2-1-89	2-1-89	2-1-89	2-1-89	2-1-89	(ug/l)	(ug/l)
METALS (ug/l)																		
Aluminum	15400	-	370	-	4610	-	3900	-	1150	-	-	-	486	-	188Q	-	NS	NS
Antimony	4.7J	4.7J	4.7J	4.7J	4.7J	4.7J	4.7J	4.7J	4.7J	4.7J	-	-	-	-	-	-	NS	NS
Arsenic	-	-	8.8Q	8.9J	36.7	20J	R	-	14J	8.7Q	-	-	-	-	-	-	50	50
Barium	-	48Q	121Q	121Q	145Q	-	72.2Q	72.2Q	72.2Q	96.4Q	713	541	553	481	219	410	1000	1000
Beryllium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Cadmium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.0	-	10	5
Calcium	93000	103000	12500	11000	49000	52000	48000	50000	21000J	28400J	168000	108000	164000	146000	50300	78800	NS	NS
Chromium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	100
Cobalt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Copper	37.5	-	-	-	-	-	-	-	17.4Q	17.4Q	-	-	-	-	-	-	1000	NS
Iron	27300	290	663	-	7920	-	6630	-	1860	-	3750	850	2980	790	820	630	300	NS
Lead	-	-	-	-	-	-	-	-	-	-	2.44Q	-	2.88Q	-	5.5	-	50	50
Magnesium	17300	13000	7470	7580	8900	8530	8730	8420	5090J	6320J	27200	26100	22900	20000	13000	15700	NS	NS
Manganese	1870	1460	-	-	424	315	401	329	99	97	900	820	1020	940	100	430	300	NS
Mercury	-	-	-	-	-	-	-	-	.07J	-	-	-	-	-	-	-	2	2
Nickel	-	15.8J	-	-	14.2Q	23Q	100J	-	22Q	-	22.0Q	-	-	-	-	-	NS	NS
Potassium	1140Q	194Q	39400	35900	542Q	44Q	692Q	94Q	2440Q	2490Q	3180Q	2340Q	2660Q	2290Q	18800	10100	NS	NS
Selenium	R	R	R	R	R	R	R	R	R	R	-	-	-	-	-	-	10	50
Silver	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50
Sodium	5790	5600	57200	51800	5740	5370	5670	5720	14800J	19000J	13000	11800	9900	12200	51200	35000	NS	NS
Thallium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Vanadium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Zinc	61	50	23	-	13Q	44	15Q	19Q	38	-	-	-	-	-	57	5.0Q	5000	NS
CYANIDE (ug/l)	-	-	-	-	-	-	-	-	-	-	-	NA	-	NA	-	NA	200	NS

NA: Parameter not analyzed
-: Not detected
D: Duplicate (MW-4, MW-5, MW-15A listed as MW-20, MW-1, MW-16 respectively on the chain of custody)
Q: Estimated semi-quantitative value because concentration is below contract required quantitation limit
J: Value is a semi-quantitative estimate based on QA/QC review

R: Rejected
MCL: Maximum Contaminant Level, EPA
STD: NY State standard for groundwater (Class GA)
F: Sample was filtered in the field

TABLE 2 (continued)
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
AND AVAILABLE NEW YORK STDs AND FEDERAL MCLs, METALS AND CYANIDE
NATIONAL PIPE, VESTAL, NEW YORK

SAMPLE NUMBER	MW-6	MW-6F	MW-6A	MW-6AF	MW-7	MW-7F	MW-8	MW-8F	MW-9	MW-9F	MW-10	MW-10F	MW-11	MW-11F	MW-12	MW-12F	NY STD	FED MCL
DATE	2-2-89	2-2-89	2-1-89	2-1-89	1-26-89	1-26-89	10-25-89	10-25-89	1-27-89	1-27-89	2-3-89	2-3-89	1-27-89	1-27-89	1-31-89	1-31-89	(ug/l)	(ug/l)
METALS (ug/l)																		
Aluminum	3370	-	170Q	-	14900	-	52500	230	1850	1030	28100	-	880	-	2850	-	NS	NS
Antimony	-	-	-	-	-	-	4.7J	4.7J	-	-	-	-	-	-	-	-	NS	NS
Arsenic	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-	-	50	50
Barium	600	52Q	1360	1270	300	-	169Q	121Q	266	266	1050	171Q	248	145Q	180Q	93.6Q	1000	1000
Beryllium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Cadmium	-	-	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	10	5
Calcium	171000	13000	53700	48500	187000	182000	-	132000	97700	87800	175000	106000	168000	107000	207000	187000	NS	NS
Chromium	-	-	-	-	-	-	-	-	-	-	8.8	-	-	-	-	-	50	100
Cobalt	-	-	-	-	-	-	-	-	-	-	40Q	-	-	-	-	-	NS	NS
Copper	-	-	-	-	133	-	175	-	-	-	320	-	31	-	89	-	1000	NS
Iron	3220	20.5	420	-	31700	-	101000	159	2780	1630	60800	-	24500	110	7060	56	300	NS
Lead	3.84Q	-	-	-	-	-	-	-	1.69Q	-	23.5	-	29.2	-	8.80	-	50	50
Magnesium	21000	2960	8620	8620	41000	33100	29300	15700	20700	22400	27500	17500	17500	11300	51200	50900	NS	NS
Manganese	540	-	80	60	5420	5060	5070	1770	880	850	7480	530	3200	750	1960	1500	300	NS
Mercury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Nickel	-	-	-	-	82	-	121	-	-	-	-	-	-	-	-	-	NS	NS
Potassium	14600	14200	1260Q	1290Q	2780Q	2290Q	3140Q	492Q	4020Q	3760Q	3280Q	1380Q	1980Q	1270Q	3580Q	3140Q	NS	NS
Selenium	-	-	-	-	-	-	R	R	-	-	-	-	-	-	-	-	10	50
Silver	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50
Sodium	51900	68800	63500	58400	76500	76500	58200	58200	67700	67000	7590	13800	98400	95900	27100	27600	NS	NS
Thallium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Vanadium	-	-	-	-	-	-	24Q	31.3Q	-	-	-	-	-	-	-	-	NS	NS
Zinc	22	-	-	-	140	6.0Q	276	34	4.1Q	84	135	32	55	63	11Q	39	5000	NS
CYANIDE (ug/l)	-	NA	-	NA	-	NA	-	-	-	NA	-	NA	-	NA	-	NA	200	NS

NA: Parameter not analyzed
-: Not detected
D: Duplicate (MW-4, MW-5, MW-15A listed as MW-20, MW-1, MW-16 respectively on the chain of custody)
Q: Estimated semi-quantitative value because concentration is below contract required quantitation limit
J: Value is a semi-quantitative estimate based on QA/QC review

R: Rejected
MCL: Maximum Contaminant Level, EPA
STD: NY State standard for groundwater (Class GA)
F: Sample was filtered in the field

TABLE 2 (continued)

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

AND AVAILABLE NEW YORK STDs AND FEDERAL MCLs, METALS AND CYANIDE

NATIONAL PIPE, VESTAL, NEW YORK

SAMPLE NO.	MW-13	MW-13F	MW-13A	MW-13AF	MW-14	MW-14F	MW-15	MW-15F	MW-15A	MW-15AF	MW-15AD	MW-15ADF	FB-1	FB-1F	FB-1025	FB-1025F	NY STD	FED MCL
DATE	1-26-89	1-26-89	2-3-89	2-3-89	1-25-89	1-25-89	1-25-89	1-25-89	2-2-89	2-2-89	2-2-89	2-2-89	1-31-89	1-31-89	10-25-89	10-25-89	(ug/l)	(ug/l)
METALS (ug/l)																		
Aluminum	15100	-	-	-	7150	-	1250	-	281	-	-	-	-	-	-	-	NS	NS
Antimony	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.71	4.71	NS	NS
Arsenic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50
Barium	162Q	-	195Q	195Q	145Q	76Q	180Q	-	240	220	150Q	124Q	-	-	72.2Q		1000	1000
Beryllium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Cadmium	-	-	-	-	-	-	-	-	5.0	-	5.0	-	-	-	-	-	10	5
Calcium	87800	118000	52900	51800	54100	50600	74600	60100	69700	63900	61700	57300	-	-	-	10Q	NS	NS
Chromium	-	-	-	-	40	-	770	14	30	-	-	-	-	-	-	-	50	100
Cobalt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Copper	71	-	-	-	23Q	49	53	-	-	-	-	-	-	27	14Q	-	1000	NS
Iron	27600	-	750	-	14900	303	26000	120	608	-	492	-	-	-	-	-	300	NS
Lead	2.50Q	-	-	-	10	1.47Q	-	-	-	-	5.39	-	-	-	-	-	50	50
Magnesium	22700	16500	9380	8770	9100	7250	14800	10300	11100	9840	9840	9680	-	-	-	-	NS	NS
Manganese	1270	460	170	12Q	1540	40	1250	110	390	360	400	350	-	-	-	-	300	NS
Mercury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Nickel	42	-	-	-	230	82	100	20Q	-	-	-	-	-	-	-	-	NS	NS
Potassium	3760Q	2110Q	1170Q	1130Q	1400Q	826Q	1850Q	1270Q	1460Q	1090Q	970Q	970Q	-	-	-	-	NS	NS
Selenium	-	-	-	1.60	-	-	-	-	-	-	-	-	-	-	R	R	10	50
Silver	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50
Sodium	17600	17900	19400	19800	17400	17600	99100	92300	11100	8050	9900	8510	-	-	698Q	720Q	NS	NS
Thallium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Vanadium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NS	NS
Zinc	230	270	-	22	50	210	80	180	-	-	-	-	-	40	-	69	5000	NS
CYANIDE (ug/l)	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	-	200	NS

NA: Parameter not analyzed

-: Not detected

D: Duplicate (MW-4, MW-5, MW-15A listed as MW-20, MW-1, MW-16 respectively on the chain of custody)

Q: Estimated semi-quantitative value because concentration is below contract required quantitation limit

J: Value is a semi-quantitative estimate based on QA/QC review

R: Rejected

MCL: Maximum Contaminant Level, EPA

STD: NY State standard for groundwater (Class GA)

F: Sample was filtered in the field

TABLE 3
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
AND AVAILABLE NEW YORK STDs AND FEDERAL MCLs, ADDITIONAL PARAMETERS
NATIONAL PIPE , VESTAL, NEW YORK

SAMPLE NUMBER	MW-3	MW-3A	MW-4	MW-4A	MW-4D	MW-5	MW-5D	MW-5A	MW-6	MW-6A	MW-7	MW-8	NY STD	FED MCL
DATE	10-24-89	10-25-89	10-24-89	10-25-89	10-24-89	2-1-89	2-1-89	2-1-89	2-2-89	2-1-89	1-26-89	10-25-89	(ug/l)	(ug/l)
FIELD PARAMETERS														
Temperature (degrees C)	13	11	12	12	12	14	14	14	11	11	10	14	NS	NS
pH	6.7	7.3	7.5	5.6	7.5	6.8	6.8	7.9	11.4	7.6	6.8	6.8	NS	NS
Conductivity (umhos/cm)	NM	NM	NM	NM	NM	1010	NM	610	540	560	1735	NM	NS	NS
ADDITIONAL PARAMETERS (mg/l)													mg/l	mg/l
Bicarbonate as HCO3	-	100.7	-	2.72	R	432	362	268	30	221	522	-	NS	NS
Chloride	44	29	6	8	6	30.4	30	34	34.7	46	103	179	250	NS
Dissolved Organic Carbon	69	40	45	32	56	8	3	9	4	2	138	94	NS	NS
Hardness	303	62	159	73.4	156	497	502	203	214	188	694	433	NS	NS
Nitrate, as N	0.02	0.02	0.09	0.09	0.11	0.03	0.03	0.05	0.07	0.06	0.24	0.02	45	45
Sulfate	47	2	25	19	25	10	8	17	29	17	33	30	250	NS
Sulfide	R	R	R	R	R	1.08	1.31	1.70	2.19	1.72	1.45	R	NS	NS
Total Dissolved Solids	378	270	182	162	204	483	478	353	170	315	725	658	NS	NS
Total Organic Carbon	R	R	R	R	R	10	5	49	8	4	141	R	NS	NS

D Duplicate (MW-4, MW-5, MW-15A listed as MW-20, MW-1, MW-16 respectively on the chain of custody)
Q Estimated semi-quantitative value because concentration is below contract required quantitation limit
J Value is a semi-quantitative estimate based on QA/QC review
R Data failed to meet QA/QC requirements
\- Not Detected
NM Not Measured
NS Not Specified
NA Not Analyzed
MCL Maximum Contaminant Level, EPA
STD NY State standard for groundwater (Class GA)

TABLE 3 (continued)
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
AND AVAILABLE NEW YORK STDs AND FEDERAL MCLs, ADDITIONAL PARAMETERS
NATIONAL PIPE , VESTAL, NEW YORK

SAMPLE NUMBER	MW-9	MW-10	MW-11	MW-12	MW-13	MW-13A	MW-14	MW-15	MW-15A	MW-15AD	FB-1	NY STD	FED MCL
DATE	1-27-89	2-3-89	1-27-89	1-31-89	1-26-89	2-3-89	1-25-89	1-25-89	2-2-89	2-2-89	2-2-89	(ug/l)	(ug/l)
FIELD PARAMETERS													
Temperature (degrees C)	7	11	6	10	11	7	9	10	9	9	NM	NS	NS
pH	7.1	7.2	7.1	6.7	6.8	7.4	6.4	6.1	7.1	7.1	NM	NS	NS
Conductivity (umhos/cm)	795	550	960	1170	940	390	355	720	530	530	NM	NS	NS
ADDITIONAL PARAMETERS (mg/l)												mg/l	mg/l
Bicarbonate as HCO3	276	236	368	617	288	186	58	78	172	154	<2	NS	NS
Chloride	130.3	43.8	86	66	37	26.3	57	176	42	41	<1.0	250	NS
Dissolved Organic Carbon	65	<1	63	7	67	2	14	19	3	2	<1	NS	NS
Hardness	371	624	424	728	425	196	183	253	219	208	<1.0	NS	NS
Nitrate, as N	0.20	0.04	0.23	<0.02	0.27	0.11	2.43	1.42	0.11	0.08	<0.02	45	45
Sulfate	9.8	39	10	27	26	12	20	28	27	28	<5	250	NS
Sulfide	2.64	1.89	1.69	1.63	1.14	1.56	2.09	1.5	1.64	1.98	<0.1	NS	NS
Total Dissolved Solids	515	373	605	743	377	240	232	412	280	258	<1	NS	NS
Total Organic Carbon	89	<1	66	10	73	<1	16	20	4	22	<1.0	NS	NS

D Duplicate (MW-4, MW-5, MW-15A listed as MW-20, MW-1, MW-16 respectively on the chain of custody)
Q Estimated semi-quantitative value because concentration is below contract required quantitation limit
J Value is a semi-quantitative estimate based on QA/QC review
R Data failed to meet QA/QC requirements
- Not Detected
NM Not Measured
NS Not Specified
NA Not Analyzed
MCL Maximum Contaminant Level, EPA
STD NY State standard for groundwater (Class GA)

TABLE 4§ TOXICITY VALUES FOR THE CONTAMINANTS OF CONCERN AT THE ROBINTECH INC./NATIONAL PIPE CO. SITE

CONTAMINANTS OF CONCERN	ORAL SLOPE FACTOR (mg/kg-day)-1	INHALATION SLOPE FACTOR(m) (mg/kg-day)-1	DERMAL SLOPE FACTOR (o) (mg/kg-day)-1	ORAL RFD (mg/kg-day)	INHALATION RfD (mg/kg-day)	DERMAL RfD (o) (mg/kg-day)	1-DAY HEALTH ADVISORY (a) (mg/l)	LONG-TERM HEALTH ADVISORY (a) (mg/l)
VOLATILES								
Acetone	--	--	--	1.00E-01	--	8.00E-02	--	--
Benzene	2.90E-02	2.90E-02	3.63E-02	**	**	--	2.00E-01	--
Butanone (2-)	--	--	--	5.00E-02	9.00E-02 b	4.00E-02	8.00E+01	9.00E+00
Chlorobenzene	**	**	--	2.00E-02	5.00E-03 b	1.60E-02	--	--
Chloroethane	--	--	--	4.00E-01 r	3.00E+00 r	3.20E-01	--	--
Chloromethane	1.30E-02 b	6.30E-03 b	1.62E-02	--	--	--	--	--
Dichloroethane (1,2-)	9.10E-02	9.10E-02	1.14E-01	--	--	--	7.40E-01	2.60E+00
Dichloroethane (1,1-)	--	--	--	1.00E-01 b	1.00E-01 b	8.00E-02	--	--
Dichloroethylene (1,2-) (q)	--	--	--	1.00E-02 b	--	8.00E-03	4.00E+00	--
Dichloroethylene (1,1-)	6.00E-01	1.20E+00	7.50E-01	9.00E-03	**	7.20E-03	2.00E+00	4.00E+00
Ethylbenzene	--	--	--	1.00E-01	3.00E-01	8.00E-02	3.00E+01	3.00E+00
Methylene Chloride	7.50E-03	1.60E-03 b	9.38E-03	6.00E-02	9.00E-01 b	4.80E-02	1.00E+01	--
Tetrachloroethylene	5.10E-02 b	1.80E-03 b	6.37E-02	1.00E-02	--	8.00E-03	2.00E+00	5.00E+00
Toluene	--	--	--	2.00E-01 b	6.00E-01 b	1.60E-01	2.00E+01	1.00E+01
Trichloroethane (1,1,1-)	--	--	--	9.00E-02	3.00E-01 b	7.20E-02	1.00E+02	1.00E+02
Trichloroethylene	1.10E-02 b	1.70E-02 b	1.38E-02	7.00E-03 r	**	5.60E-03	--	--
Vinyl Chloride	1.90E+00 b	2.90E-01 b	2.37E+00	--	--	--	3.00E+00	5.00E-02
Xylenes	--	--	--	2.00E+00 n	2.00E-01 b,n	1.60E+00	4.00E+01	1.00E+02
BASE NEUTRAL/ ACID EXTRACTABLE (SEMIVOLATILES)								
Anthracene	--	--	--	3.00E-01	--	3.00E-02	--	--
Benzo(a)anthracene	1.15E+01 c	--	--	--	--	--	--	--
Benzo(a)pyrene	1.15E+01 c,d	--	--	--	--	--	--	--
Benzo(b)fluoranthene	1.15E+01 c	--	--	--	--	--	--	--
Benzo(k)fluoranthene	1.15E+01 c	--	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	1.40E-02 b	--	1.40E-01	2.00E-02	--	2.00E-03	--	--
Chrysene	1.15E+01 c	--	--	--	--	--	--	--

TABLE 4 : TOXICITY VALUES FOR THE CONTAMINANTS OF CONCERN AT THE ROBINTECH INC./NATIONAL PIPE CO. SITE (continued)

CONTAMINANTS OF CONCERN	ORAL SLOPE FACTOR (mg/kg-day)-1	INHALATION SLOPE FACTOR(m) (mg/kg-day)-1	DERMAL SLOPE FACTOR (o) (mg/kg-day)-1	ORAL RFD (mg/kg-day)	INHALATION RfD (mg/kg-day)	DERMAL RfD (o) (mg/kg-day)	1-DAY HEALTH ADVISORY (a) (mg/l)	LONG-TERM HEALTH ADVISORY (a) (mg/l)
Di-n-butyl phthalate	--	--	--	1.00E-01	--	1.00E-02	--	--
Fluoranthene	--	--	--	4.00E-02	--	4.00E-03	--	--
Methylnaphthalene (2-)	--	--	--	4.00E-03 e	--	4.00E-04	--	--
Naphthalene	--	--	--	4.00E-03 b,c	--	4.00E-04	5.00E-01	2.00E+00
Phenanthrene	--	--	--	4.00E-03 e	--	4.00E-04	--	--
Pyrene	--	--	--	3.00E-02	--	3.00E-03	--	--
INORGANICS								
Aluminum	--	--	--	--	--	--	--	--
Arsenic	1.75E+00 p	--	1.94E+00	1.00E-03 b	--	9.00E-04	--	--
Barium	--	--	--	7.00E-02	--	7.00E-03	5.00E+00	5.00E+00
Beryllium	4.30E+00	--	4.30E+01	5.00E-03	--	5.00E-04	3.00E+01	2.00E+01
Cadmium	--	--	--	1.00E-03 f	--	1.00E-04	4.00E-02	2.00E-02
Chromium	-- g	--	--	5.00E-03 g	--	5.00E-04	1.40E+00 j	8.00E-01 j
Iron	--	--	--	--	--	--	--	--
Lead	--	--	--	-- i	--	--	--	--
Magnesium	--	--	--	--	--	--	--	--
Mercury	--	--	--	3.00E-04 b	--	3.00E-05	--	2.00E-03
Nickel	--	--	--	2.00E-02 l	--	2.00E-03	1.00E+00	6.00E-01
Silver	--	--	--	3.00E-03	--	3.00E-04	2.00E-01	2.00E-01
Zinc	--	--	--	2.00E-01 b	**	2.00E-02	--	--

Note: Unless otherwise indicated, all data are from IRIS.

-- Not available or not provided because chemical is not a COC for the pathway.

** data pending according to IRIS.

(a) U.S. EPA, Drinking Water Regulations and Health Advisories, Office of Drinking Water, April, 1990.
One-Day HAs are for a 10kg child; Long-Term HAs are for a 70kg adult.

(b) U.S. EPA, Health Effects Assessment Summary Tables (HEAST), Fourth Quarter, FY 1990, September.

(c) Per EPA guidance, the benzo(a)pyrene slope factor is used as a surrogate for other PAHs where sufficient evidence of carcinogenicity exists, as designated in IRIS or HEAST.

(d) U.S.EPA, Health Effects Assessment for polynuclear aromatic hydrocarbons as per 10/26/90 ECAO memo on OERR Policy for PAHs to Marina Stephanidis,
EPA Region II, from Pei-Fung Hurst, Chemical Mixtures Assessment Branch.

(e) The RfD for napthalene is used as a surrogate for PAHs showing evidence of noncarcinogenic effects.

(f) Cadmium - Oral RfD is for food consumption; RfD of 5.0E-04 is used for water consumption.

(g) Slope factor and RfD values are for Chromium VI.

(h) Copper - no RfD calculated; the drinking water standard is 1.3 mg/l.

(i) Given the current knowledge of lead pharmacokinetics, CAG recommends that a numerical estimate not be used for carcinogenic risk.
The RfD Work Group considered the development of an RfD for lead inappropriate because there is essentially no threshold.
OSWER Directive #9355.4-02 ("Interim Guidance on Establishing Soil Clean-up Levels at Superfund Sites") states that the soil clean-up level should be at 500-1000ppm.

TABLE 4 : TOXICITY VALUES FOR THE CONTAMINANTS OF CONCERN AT THE ROBINTECH INC./NATIONAL PIPE CO. SITE (continued)

(j) Health advisories (one-day and long-term) are for Total Chromium

(k) Inhalation slope factor for nickel refinery dust.

(l) RfD values for nickel, soluble salts.

(m) Inhalation slope factors may be derived from Unit Risks according to the following equation:

inhalation slope factor (mg/kg/day)-1 = unit risk (ug/cu.meter)-1 x 70kg x 1/20cu.m/day x 1/10-3mg/ug.

(U.S. EPA, Risk Assessment Guidance for Superfund Vol.I Human Health Evaluation Manual (Part A),p.7-13, EPA/540/1-89/002, Dec.1989)

(n) RfD values for xylenes are for o-xylene

(o) Dermal toxicity values were derived from oral toxicity values by applying an absorption factor:

volatiles 0.80
semivol. 0.10
arsenic 0.90
other inorg. 0.10
(per agreement with EPA Region II)

Dermal slope factors were calculated using the equation: slope factor/absorption factor

Dermal RfDs were calculated using the equation: RfD x absorption factor

(EPA,1989. Risk Assessment Guidance for Superfund Vol.I Human Health Evaluation Manual (Part A) EPA/540/1-89/002. Interim Final.Dec.1989.)

(p) Oral slope factor for arsenic was calculated from Unit Risk provided in IRIS by the following equation:

oral slope factor (mg/kg/day)-1 = unit risk (ug/liter)-1 x 70kg x 1/2liters/day x 1/10-3mg/ug.

(q) Total 1,2-dichloroethylene was analyzed. This compound exists as two isomers, however. The toxicity values for the cis isomer were used because it is the isomer more likely to be found in environmental media.

(r) Interim values provided by ECAO (memorandum on Toxicity Information from Pei-Fung Hurst, Coordinator, Superfund Technical Support Center, Chemical Mixtures Assessment Branch to Marina Stephanidis, EPA, Region II. April 23,1991.)

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TABLE 5 ROBINTECH/NATIONAL PIPE CO., INC. SITE: SUMMARY OF EXPOSURE PATHWAYS

Pathway	Receptor	Time-Frame Evaluated Present	Future	Degree of Assessment Quant.	Qual.	Rationale for Selection or Exclusion
Groundwater:						
Ingestion of Unfiltered Ground Water (From Bedrock & Overburden Aquifers)	Small Child Resident Adult Resident	No No	Yes Yes	X X		Residents currently obtain drinking water from public drinking water supply; Assumes residents obtain drinking water from local well in the future.
Inhalation of Ground Water Contaminants During Showers	Adult Resident	No	Yes	X		Assumes residents obtain water from local wells in the future; several volatiles present in ground water.
Inhalation of Ground Water Contaminants During Baths	Small Child Resident	No	No			Volatilization not as great as showering because less aeration and lower temperature
Dermal Contact with Ground Water Contaminants During Showers/Baths	Adult Resident Small Child Resident	No	No			Exposures assumed to be insignificant in relation to other ground water pathways.
Inhalation of Contaminants that Volatilize from Ground water and Seep in Basements	Local Resident	No	No			Ground water table is shallow; but low avg VOC conc. & westerly flow preclude significant exposure.
Dermal Contact with Onsite Production Well Water	Onsite Worker	No	No			Data inadequate for assessment.
Inhalation of Volatilized Contaminants from Production Well Water	Onsite Worker	No	No			Data inadequate for assessment.

Table 6

SUMMARY STATISTICS FOR SITE, BY CHEMICAL AND MEDIUM/AREA

TYPE=Ground Water (Unfiltered) - Overburden

Chemical Class	Analyte	Num. Times Detected	Num. Samples Analyzed	Lowest Detected Conc.	Highest Detected Conc.	Geom. Mean Conc.	95 Pct. Upp. Conf. Limit	Min. Detect. Limit	Max. Detect. Limit
Volatiles	Vinyl Chloride	2	11	17.00	34.00	6.65	.	10.00	10.00
	Chloroethane	2	11	23.00	46.00	7.03	.	10.00	10.00
	1,1-Dichloroethene	2	11	52.00	110.00	4.65	.	5.00	5.00
	1,1-Dichloroethane	4	11	3.00	370.00	6.82	.	5.00	5.00
	1,2-Dichloroethene (total)	2	11	210.00	400.00	5.93	.	5.00	5.00
	Chloroform	2	11	1.00	3.00	2.34	.	5.00	5.00
	1,2-Dichloroethane	2	11	3.00	5.00	2.71	.	5.00	5.00
	1,1,1-Trichloroethane	5	11	2.00	1100.00	10.87	.	5.00	5.00
	Trichloroethene	3	11	31.00	1000.00	8.71	.	5.00	5.00
	1,1,2-Trichloroethane	1	11	4.00	4.00	2.61	.	5.00	5.00
	Benzene	3	11	2.00	23.00	3.35	.	5.00	5.00
	Tetrachloroethene	2	11	17.00	53.00	3.93	.	5.00	5.00
Inorganics	Aluminum	11	11	486.00	52500.00	4487.61	.	.	.
	Arsenic	1	10	36.70	36.70	1.52	.	2.12	2.30
	Barium	10	11	145.00	1050.00	237.46	.	43.20	43.20
	Calcium	11	11	49000.00	1710001.00	156101.77	.	.	.
	Chromium	2	11	8.80	770.00	5.74	.	3.30	8.80
	Cobalt	1	11	40.00	40.00	13.60	.	20.10	38.50
	Copper	7	11	31.00	320.00	37.13	.	14.00	17.30
	Iron	11	11	2780.00	101000.00	14442.31	.	.	.
	Lead	6	10	1.69	29.20	2.90	.	0.91	2.80
	Magnesium	11	11	8900.00	51200.00	22462.26	.	.	.
	Manganese	11	11	424.00	7480.00	1784.09	.	.	.
	Nickel	6	11	14.20	121.00	19.49	.	8.90	17.80
	Potassium	10	10	542.00	14600.00	2693.25	.	.	.
	Sodium	11	11	5740.00	99100.00	28943.23	.	.	.
	Vanadium	1	11	24.00	24.00	4.23	.	6.34	11.20
	Zinc	10	11	4.10	276.00	30.97	.	2.78	2.78

Table 6 (continued)

SUMMARY STATISTICS FOR SITE, BY CHEMICAL AND MEDIUM/AREA

TYPE=Ground Water (Filtered) - Overburden

Chemical Class	Analyte	Num. Times Detected	Num. Samples Analyzed	Lowest Detected Conc.	Highest Detected Conc.	Geom. Mean Conc.	95 Pct. Upp. Conf. Limit	Min. Detect. Limit	Max. Detect. Limit
Inorganics	Aluminum	2	11	230.00	1030.00	100.99	.	138.00	159.00
	Arsenic	1	11	20.00	20.00	1.41	.	2.12	2.30
	Barium	8	11	48.00	511.00	81.74	.	43.20	46.00
	Calcium	11	11	13000.00	187000.00	87757.62	.	.	.
	Chromium	1	11	14.00	14.00	3.74	.	3.30	8.80
	Iron	8	11	20.51	1630.00	90.51	.	20.50	68.00
	Magnesium	11	11	2960.00	50900.00	15073.96	.	.	.
	Manganese	10	11	110.00	5060.00	502.72	.	5.13	5.13
	Nickel	3	11	15.80	23.00	10.33	.	8.90	17.80
	Potassium	11	11	44.00	14200.00	1212.25	.	.	.
	Sodium	11	11	5370.00	95900.00	30950.86	.	.	.
	Thallium	1	11	1.37	1.37	1.17	.	1.37	7.80
	Vanadium	1	11	31.30	31.30	4.33	.	6.34	11.20
	Zinc	8	11	6.00	180.00	21.75	.	2.78	34.00

Table 6 (continued)

SUMMARY STATISTICS FOR SITE, BY CHEMICAL AND MEDIUM/AREA

TYPE=Ground Water (Unfiltered) - Bedrock

Chemical Class	Analyte	Num. Times Detected	Num. Samples Analyzed	Lowest Detected Conc.	Highest Detected Conc.	Geom. Mean Conc.	95 Pct. Upp. Conf. Limit	Min. Detect. Limit	Max. Detect. Limit
Volatiles	Vinyl Chloride	5	15	4.00	38.00	6.75	.	10.00	10.00
	Chloroethane	5	15	6.00	36.00	6.86	.	10.00	10.00
	Acetone	3	15	14.00	2200.00	10.76	.	10.00	50.00
	1,1-Dichloroethene	5	15	23.00	150.50	7.46	.	5.00	5.00
	1,1-Dichloroethane	10	15	3.00	865.00	18.40	.	5.00	5.00
	1,2-Dichloroethene (total)	5	15	140.00	535.00	12.36	.	5.00	5.00
	Chloroform	1	15	4.00	4.00	3.15	.	5.00	25.00
	1,2-Dichloroethane	2	15	3.00	4.00	3.19	.	5.00	25.00
	2-Butanone	5	15	21.00	510.00	17.11	.	10.00	50.00
	1,1,1-Trichloroethane	8	15	5.00	6950.00	34.80	.	5.00	5.00
	Carbon Tetrachloride	1	15	60.00	60.00	3.77	.	5.00	25.00
	Trichloroethene	7	15	4.00	1350.00	17.33	.	5.00	5.00
	Benzene	6	14	2.00	11.00	3.94	.	5.00	25.00
	Tetrachloroethene	1	15	3.00	3.00	3.09	.	5.00	25.00
	Toluene	11	15	2.00	2250.00	29.45	.	5.00	5.00
	Ethylbenzene	4	15	2.00	73.00	4.35	.	5.00	25.00
	Styrene	1	15	8.00	8.00	3.55	.	5.00	25.00
	Xylene (total)	8	15	3.00	480.00	8.75	.	5.00	25.00
Semivolatiles (BNAs)	bis(2-Ethylhexyl)phthalate	1	12	97.00	97.00	6.40	.	10.00	10.00
Inorganics	Aluminum	8	11	170.00	1290.00	241.95	.	130.00	130.00
	Arsenic	5	11	8.80	27.35	5.01	.	2.12	6.00
	Barium	11	11	59.00	1360.00	254.17	.	.	.
	Cadmium	3	11	5.00	6.00	3.05	.	4.60	5.00
	Calcium	11	11	12500.00	197000.00	73781.09	.	.	.
	Chromium	1	11	30.00	30.00	2.22	.	2.08	43.00
	Cobalt	1	11	21.00	21.00	11.37	.	20.00	38.50
	Iron	11	11	332.00	42400.00	1540.38	.	.	.
	Lead	3	8	5.39	10.60	2.73	.	0.91	5.00
	Magnesium	11	11	7470.00	19300.00	13650.16	.	.	.
	Manganese	10	11	80.00	1440.00	292.18	.	14.70	14.70
	Mercury	2	11	0.14	0.40	0.04	.	0.03	0.10
	Nickel	1	11	18.20	18.20	8.92	.	8.90	17.80
	Potassium	11	11	725.00	39400.00	2123.73	.	.	.
	Sodium	11	11	10500.00	64900.00	32945.97	.	.	.
	Zinc	9	11	23.00	1390.00	132.59	.	2.78	2.78

Table 6 (continued)

SUMMARY STATISTICS FOR SITE, BY CHEMICAL AND MEDIUM/AREA

TYPE=Ground Water (Filtered) - Bedrock

Chemical Class	Analyte	Num. Times Detected	Num. Samples Analyzed	Lowest Detected Conc.	Highest Detected Conc.	Geom. Mean Conc.	95 Pct. Upp. Conf. Limit	Min. Detect. Limit	Max. Detect. Limit
Inorganics	Arsenic	1	4	8.90	8.90	1.80	.	2.12	2.12
	Barium	4	4	121.00	1270.00	513.15	.	.	.
	Calcium	4	4	11000.00	78800.00	39951.52	.	.	.
	Iron	1	4	630.00	630.00	38.54	.	20.10	68.00
	Magnesium	4	4	7580.00	15700.00	10003.03	.	.	.
	Manganese	3	4	60.00	430.00	90.58	.	14.70	14.70
	Potassium	4	4	1030.00	35900.00	4685.01	.	.	.
	Sodium	4	4	8280.00	58400.00	30599.21	.	.	.
	Zinc	1	4	5.00	5.00	1.97	.	2.78	3.10

TABLE 7 SUMMARY OF NONCARCINOGENIC HAZARD INDICES (HI) FOR THE ROBINTECH SITE

Scenario	Receptor	Current/ Future	Acute HI	Chronic HI
Ground Water (overburden)				
Ingestion	Resident	F	3.5×10^{-1}(a) 8.0×10^{-1}(c)	1.3×10^{1}(a)* 3.0×10^{1}(c)*
Volatiles Inhalation While Showering	Resident	F	N/A	1.0×10^{-1}(a)
Ground Water (bedrock)				
Ingestion	Resident	F	2.7×10^{-1}(a) 6.3×10^{-1}(c)	1.4×10^{1}(a)* 3.3×10^{1}(c)*
Volatiles Inhalation While Showering	Resident	F	N/A	5.4×10^{-1}(a)
Surface Soils				
Ingestion - On Site	Trespasser	F	1.0×10^{-1}	7.8×10^{-2}
Dermal Contact - On Site	Trespasser	F	6.1×10^{-2}	5.5×10^{-1}
Ingestion - Skate Estate	Youth	C/F	1.1×10^{-3}	2.0×10^{-3}
Dermal Contact - Skate Estate	Youth	C/F	1.4×10^{-3}	4.4×10^{-2}
Subsurface Soils				
Ingestion - On Site	Worker	C/F	1.2×10^{-3}	5.4×10^{-4}
Dermal Contact - On Site	Worker	C/F	5.5×10^{-4}	1.5×10^{-3}
Sediment				
Ingestion - On Site	Trespasser	C/F	6.4×10^{-4}	3.1×10^{-3}
Dermal Contact - On Site	Trespasser	C/F	3.8×10^{-4}	3.7×10^{-2}
Ingestion - Off Site, Downstream	Youth	C/F	3.4×10^{-4}	1.3×10^{-3}
Dermal Contact - Off Site, Downstream	Youth	C/F	2.0×10^{-4}	9.3×10^{-3}

(a) - adult
(c) - child
* HI exceeds one (1).

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TABLE 8 SUMMARY OF CARCINOGENIC RISK ESTIMATES FOR THE ROBINTECH SITE

Scenario	Receptor	Current/ Future	Incremental Risk
Ground Water (overburden)			
Ingestion	Resident	F	3.8×10^{-3}**
Volatiles Inhalation While Showering	Resident	F	1.0×10^{-3}**
Ground Water (bedrock)			
Ingestion	Resident	F	4.1×10^{-3}**
Volatiles Inhalation While Showering	Resident	F	1.4×10^{-3}**
Surface Soils			
Ingestion - On Site	Trespasser	F	1.2×10^{-5}
Dermal Contact - On Site	Trespasser	F	1.7×10^{-6}
Ingestion - Skate Estate	Youth	C/F	1.4×10^{-7}
Dermal Contact - Skate Estate	Youth	C/F	2.5×10^{-6}
Subsurface Soils			
Ingestion - On Site	Worker	C/F	4.3×10^{-7}
Dermal Contact - On Site	Worker	C/F	1.1×10^{-7}
Sediment			
Ingestion - On Site	Trespasser	C/F	3.4×10^{-7}
Dermal Contact - On Site	Trespasser	C/F	2.8×10^{-6}
Ingestion - Off Site, Downgradient	Youth	C/F	2.8×10^{-7}
Dermal Contact - Off Site, Downgradient	Youth	C/F	1.7×10^{-6}

** Exceeds 10^{-4} risk.

ALLIANCE Technologies Corporation

DRINKING WATER REGULATIONS

AND HEALTH ADVISORIES

by

Office of Water
U.S. Environmental Protection Agency
Washington, D.C.
202-260-7571

SAFE DRINKING WATER HOTLINE
1-800-426-4791
Monday thru Friday, 8:30 AM to 5:00 PM EST

November 1991

Table 9

LEGEND

Abbreviations column descriptions are:

MCLG - Maximum Contaminant Level Goal. A non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.

MCL - Maximum Contaminant Level. Maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

RfD - Reference Dose. An estimate of a daily exposure to the human population that is likely to be without appreciable risk of deleterious effects over a lifetime.

DWEL - Drinking Water Equivalent Level. A lifetime exposure concentration protective of adverse, non-cancer health effects, that assumes all of the exposure to a contaminant is from a drinking water source.

(*) The codes for the Status Reg and Status HA columns are as follows:

F - final
D - draft
L - listed for regulation
P - proposed (Phase II and V proposals)
T - tentative

Other codes found in the table include the following:

NA - not applicable
PS - performance standard 0.5 NTU - 1.0 NTU
TT - treatment technique

** - No more than 5% of the samples per month may be positive. For systems collecting fewer than 40 samples/month, no more than 1 sample per month may be positive.

*** - guidance

- Large discrepancies between Lifetime and Longer-term HA values may occur because of the Agency's conservative policies, especially with regard to carcinogenicity, relative source contribution, and less than lifetime exposures in chronic toxicity testing. These factors can result in a cumulative UF (uncertainty factor) of 10 to 1000 when calculating a Lifetime HA.

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

November 1991 — Table 9 (continued)

	Standards			Health Advisories									
					10-kg Child			70-kg Adult					
Chemicals	Status Reg.*	MCLG (mg/l)	MCL (mg/l)	Status HA*	One-day mg/l	Ten-day mg/l	Longer-term mg/l	Longer-term mg/l	RfD mg/kg/day	DWEL mg/l	Lifetime mg/l	mg/l at 10^{-4} Cancer Risk	Cancer Group
ORGANICS													
Acenaphthylene	-	-	-	-	-	-	-	-	0.06	-	-	-	-
Acifluorfen	-	-	-	F	2	2	0.1	0.4	0.013	0.4	-	0.1	B2
Acrylamide	F	zero	TT	F	1.5	0.3	0.02	0.07	0.0002	0.007	-	0.001	B2
Acrylonitrile	L	-	-	D	0.02	0.02	0.001	0.004	0.0001	0.004	-	0.007	B1
Adipates (diethylhexyl)	P	0.5	0.5	-	-	-	-	-	0.7	20	0.5	-	C
Alachlor	F	zero	0.002	F	0.1	0.1	-	-	0.01	0.4	-	0.04	B2
Aldicarb	F	0.001	0.003	F	-	-	-	-	0.0002	0.004	0.001	-	D
Aldicarb sulfone	F	0.001	0.004	F	-	-	-	-	0.002	0.004	0.001	-	D
Aldicarb sulfoxide	F	0.001	0.002	F	-	-	-	-	0.0002	0.004	0.001	-	D
Aldrin	-	-	-	D	0.0003	0.0003	0.0003	0.0003	0.00003	0.001	-	0.0002	B2
Ametryn	-	-	-	F	9	9	0.9	3	0.009	0.3	0.06	-	D
Ammonium Sulfamate	-	-	-	F	20	20	20	80	0.28	8	2	-	D
Anthracene (PAH)	-	-	-	-	-	-	-	-	0.3	-	-	-	D
Atrazine	F	0.003	0.003	F	0.1	0.1	0.05	0.2	0.005	0.2	0.003	-	C
Baygon	-	-	-	F	0.04	0.04	0.04	0.1	0.004	0.1	0.003	-	C
Bentazon	L	-	-	F	0.3	0.3	0.3	0.9	0.0025	0.09	0.02	-	D
Benz(a)anthracene (PAH)	P	zero	0.0001	-	-	-	-	-	-	-	-	-	B2
Benzene	F	zero	0.005	F	0.2	0.2	-	-	-	-	-	0.1	A
Benzo(a)pyrene (PAH)	P	zero	0.0002	-	-	-	-	-	-	-	-	-	B2*
Benzo(b)fluoranthene (PAH)	P	zero	0.0002	-	-	-	-	-	-	-	-	-	B2
Benzo(g,h,i)perylene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-	D
Benzo(k)fluoranthene (PAH)	P	zero	0.0002	-	-	-	-	-	-	-	-	-	B2
bis-2-Chloroisopropyl ether	-	-	-	F	4	4	4	13	0.04	1	0.3	-	D
Bromacil	L	-	-	F	5	5	3	9	0.13	5	0.09	-	C
Bromobenzene	L	-	-	D	-	-	-	-	-	-	-	-	-

* Under review.

NOTE: Anthracene and Benzo(g,h,i)perylene -- not proposed in Phase V.

Chemicals	Standards: Status Reg.*	Standards: MCLG (mg/l)	Standards: MCL (mg/l)	Health Advisories: Status HA*	10-kg Child: One-day mg/l	10-kg Child: Ten-day mg/l	10-kg Child: Longer-term mg/l	70-kg Adult: Longer-term mg/l	70-kg Adult: RfD mg/kg/day	70-kg Adult: DWEL mg/l	70-kg Adult: Lifetime mg/l	70-kg Adult: mg/l at 10^{-4} Cancer Risk	Cancer Group
Bromochloroacetonitrile	L	-	-	D	-	-	-	-	-	-	-	-	-
Bromochloromethane	-	-	-	F	50	1	1	5	0.013	0.5	0.09	-	-
Bromodichloromethane (THM)	L	-	0.1	D	7	7	4	13	0.02	0.6	-	0.03	B2
Bromoform (THM)	L	-	0.1	D	5	2	2	6	0.02	0.6	-	0.4	B2
Bromomethane	L	-	-	F	0.1	0.1	0.1	0.5	0.001	0.05	0.01	-	D
Butyl benzyl phthalate (PAE)	P	zero	0.1	-	-	-	-	-	0.2	6	-	-	C
Butylate	-	-	-	F	2	2	1	4	0.05	2	0.35	-	D
Butylbenzene n-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butylbenzene sec-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butylbenzene tert-	-	-	-	D	-	-	-	-	-	-	-	-	-
Carbaryl	-	-	-	F	1	1	1	1	0.1	4	0.7	-	D
Carbofuran	F	0.04	0.04	F	0.05	0.05	0.05	0.2	0.005	0.2	0.04	-	E
Carbon Tetrachloride	F	zero	0.005	F	4	0.2	0.07	0.3	0.0007	0.03	-	0.03	B2
Carboxin	-	-	-	F	1	1	1	4	0.1	4	0.7	-	D
Chloral Hydrate	L	-	-	D	7	1.4	0.16	0.56	0.0016	0.056	0.045	-	-
Chloramben	-	-	-	F	3	3	0.2	0.5	0.015	0.5	0.1	-	D
Chlordane	F	zero	0.002	F	0.06	0.06	-	-	0.00006	0.002	-	0.003	B2
Chlorodibromomethane (THM)	L	-	0.1	D	7	7	2	8	0.02	0.7	0.02	-	C
Chloroethane	L	-	-	D	-	-	-	-	-	-	-	-	-
Chloroform (THM)	L	-	0.1	D	4	4	0.1	0.5	0.01	0.5	-	0.6	B2
Chloromethane	L	-	-	F	9	0.4	0.4	1	0.004	0.1	0.003	-	C
Chlorophenol (2-)	-	-	-	D	0.05	0.05	0.05	0.2	0.005	0.2	0.04	-	D
p-Chlorophenyl methyl sulfide/sulfone/sulfoxide	-	-	-	D	-	-	-	-	-	-	-	-	-
Chloropicrin	L	-	-	-	-	-	-	-	-	-	-	-	-
Chlorothalonil	-	-	-	F	0.2	0.2	0.2	0.5	0.015	0.5	-	0.15	B2
Chlorotoluene o-	L	-	-	F	2	2	2	7	0.02	0.7	0.1	-	D
Chlorotoluene p-	L	-	-	F	2	2	2	7	0.02	0.7	0.1	-	D
Chlorpyrifos	-	-	-	D	0.03	0.03	0.03	0.1	0.003	0.1	0.02	-	D
Chrysene (PAH)	P	zero	0.0002	-	-	-	-	-	-	-	-	-	B2
Cyanazine	L	-	-	F	0.1	0.1	0.02	0.07	0.002*	0.07*	0.001	-	C

* Under review. NOTE: Chrysene was proposed in second option.

	Standards			Health Advisories									
					10-kg Child			70-kg Adult					
Chemicals	Status Reg.*	MCLG (mg/l)	MCL (mg/l)	Status HA*	One-day mg/l	Ten-day mg/l	Longer-term mg/l	Longer-term mg/l	RfD mg/kg/day	DWEL mg/l	Lifetime mg/l	mg/l at 10^{-4} Cancer Risk	Cancer Group
Cyanogen Chloride	L	-	-	-	-	-	-	-	-	-	-	-	-
Cymene p-	-	-	-	D	-	-	-	-	-	-	-	-	-
2,4-D	F	0.07	0.07	F	1	0.3	0.1	0.4	0.01	0.4	0.07	-	D
DCPA (Dacthal)	L	-	-	F	80	80	5	20	0.5	20	4	-	D
Dalapon	P	0.2	0.2	F	3	3	0.3	0.9	0.026	0.9	0.2	-	D
Di[2-ethylhexyl]adipate	P	0.4	0.4	-	20	20	20	60	0.6	20	0.4	3	C
Diazinon	-	-	-	F	0.02	0.02	0.005	0.02	0.00009	0.003	0.0006	-	E
Dibenz(a,h)anthracene (PAH)	P	zero	0.0003	-	-	-	-	-	-	-	-	-	B2
Dibromoacetonitrile	L	-	-	D	2	2	2	8	0.02	0.8	0.02	-	C
Dibromochloropropane (DBCP)	F	zero	0.0002	F	0.2	0.05	-	-	-	-	-	0.003	B2
Dibromomethane	L	-	-	-	-	-	-	-	-	-	-	-	D
Dibutyl phthalate (PAE)	-	-	-	-	-	-	-	-	0.1	4	-	-	D
Dicamba	L	-	-	F	0.3	0.3	0.3	1	0.03	1	0.2	-	D
Dichloroacetaldehyde	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloroacetic acid	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloroacetonitrile	L	-	-	D	1	1	0.8	3	0.008	0.3	0.006	-	C
Dichlorobenzene p-	F	0.075	0.075	F	10	10	10	40	0.1	4	0.075	-	C
Dichlorobenzene o-,m-	L	0.6	0.6	F	9	9	9	30	0.9	3	0.6	-	D
Dichlorodifluoromethane	L	-	-	F	40	40	9	30	0.2	5	1	-	D
Dichloroethane (1,1-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloroethane (1,2-)	F	zero	0.005	F	0.7	0.7	0.7	2.6	-	-	-	0.04	B2
Dichloroethylene (1,1-)	F	0.007	0.007	F	2	1	1	4	0.009	0.4	0.007	-	C
Dichloroethylene (cis-1,2-)	F	0.07	0.07	F	4	3	3	11	0.01	0.4	0.07	-	D
Dichloroethylene (trans-1,2-)	F	0.1	0.1	F	20	2	2	6	0.02	0.6	0.1	-	D
Dichloromethane	P	zero	0.005	F	10	2	-	-	0.06	2	-	0.5	B2
Dichlorophenol (2,4-)	-	-	-	D	0.03	0.03	0.03	0.1	0.003	0.1	0.02	-	D
Dichloropropane (1,1-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropane (1,2-)	F	zero	0.005	F	-	0.09	-	-	-	-	-	0.05	B2
Dichloropropane (1,3-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropane (2,2-)	L	-	-	D	-	-	-	-	-	-	-	-	-

Chemicals	Standards: Status Reg.*	Standards: MCLG (mg/l)	Standards: MCL (mg/l)	Health Advisories: Status HA*	10-kg Child: One-day mg/l	10-kg Child: Ten-day mg/l	10-kg Child: Longer-term mg/l	70-kg Adult: Longer-term mg/l	70-kg Adult: RfD mg/kg/day	70-kg Adult: DWEL mg/l	70-kg Adult: Lifetime mg/l	70-kg Adult: mg/l at 10^{-4} Cancer Risk	Cancer Group
Dichloropropene (1,1-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropene (1,3-)	L	-	-	F	0.03	0.03	0.03	0.1	0.0003	0.01	-	0.02	B2
Dieldrin	-	-	-	F	0.0005	0.0005	0.0005	0.002	0.00005	0.002	-	0.0002	B2
Diethyl phthalate (PAE)	-	-	-	D	-	-	-	-	0.8	30	5	-	D
Diethylene glycol dinitrate (DENGDN)	-	-	-	D	-	-	-	-	-	-	-	-	-
Diethylhexyl phthalate (PAE)	P	zero	0.004	D	-	-	-	-	0.02	0.7	-	0.3	B2*
Diisopropyl methylphosphonate	-	-	-	F	8	8	8	30	0.08	3	0.6	-	D
Dimethrin	-	-	-	F	10	10	10	40	0.3	10	2	-	D
Dimethyl methylphosphonate	-	-	-	D	-	-	-	-	0.2	-	-	-	-
Dimethyl phthlate (PAE)	-	-	-	-	-	-	-	-	-	-	-	-	D
1,3-Dinitrobenzene	-	-	-	F	0.04	0.04	0.04	0.14	0.0001	0.005	0.001	-	D
Dinitrotoluene (2,4-)	L	-	-	D	-	-	-	-	0.2	-	-	-	B2
Dinitrotoluene (2,6)	L	-	-	D	-	-	-	-	0.1	-	-	-	B2
Dinoseb	P	0.007	0.007	F	0.3	0.3	0.01	0.04	0.001	0.04	0.007	-	D
Dioxane p-	-	-	-	F	4	0.4	-	-	-	-	-	0.7	B2
Diphenamid	-	-	-	F	0.3	0.3	0.3	1	0.03	1	0.2	-	D
Diquat	P	0.02	0.02	-	-	-	-	-	0.0022	0.08	0.02	-	D
Disulfoton	-	-	-	F	0.01	0.01	0.003	0.009	0.00004	0.001	0.0003	-	E
1,4-Dithiane	-	-	-	D	-	-	-	-	-	-	-	-	-
Diuron	-	-	-	F	1	1	0.3	0.9	0.002	0.07	0.01	-	D
Endothall	P	0.1	0.1	F	0.8	0.8	0.2	0.2	0.02	0.7	0.1	-	D
Endrin	P	0.002	0.002	F	0.02	0.02	0.003	0.01	0.0003	0.01	0.002	-	D
Epichlorohydrin	F	zero	TT	F	0.1	0.1	0.07	0.07	0.002	0.07	-	0.4	B2
Ethylbenzene	F	0.7	0.7	F	30	3	1	3	0.1	3	0.7	-	D
Ethylene dibromide (EDB)	F	zero	0.00005	F	0.008	0.008	-	-	-	-	-	0.00004	B2
Ethylene glycol	-	-	-	F	20	6	6	20	2	40	7	-	D
ETU	L	-	-	F	0.3	0.3	0.1	0.4	0.00008	0.003	-	0.006**	B2
Fenamiphos	-	-	-	F	0.009	0.009	0.005	0.02	0.00025	0.009	0.002	-	D
Fluometuron	-	-	-	F	2	2	2	5	0.013	0.4	0.09	-	D
Fluorene (PAH)	-	-	-	-	-	-	-	-	0.04	-	-	-	D

* Under review. ** Not verified yet.

Chemicals	Standards: Status Reg.*	Standards: MCLG (mg/l)	Standards: MCL (mg/l)	Health Advisories: Status HA*	10-kg Child: One-day mg/l	10-kg Child: Ten-day mg/l	10-kg Child: Longer-term mg/l	70-kg Adult: Longer-term mg/l	70-kg Adult: RfD mg/kg/day	70-kg Adult: DWEL mg/l	70-kg Adult: Lifetime mg/l	70-kg Adult: mg/l at 10^{-4} Cancer Risk	Cancer Group
Fluorotrichloromethane	L	-	-	F	7	7	3	10	0.3	10	2	-	D
Fog Oil	-	-	-	D	-	-	-	-	-	-	-	-	-
Fonofos	-	-	-	F	0.02	0.02	0.02	0.07	0.002	0.07	0.01	-	D
Formaldehyde	-	-	-	D	10	5	5	20	0.15	5	1	-	B1
Gasoline, unleaded (benzene)	-	-	-	D	-	-	-	-	-	-	0.005	-	-
Glyphosate	P	0.7	0.7	F	20	20	1	1	0.1	4	0.7	-	D
Heptachlor	F	zero	0.0004	F	0.01	0.01	0.005	0.005	0.0005	0.02	-	0.0008	B2
Heptachlor epoxide	F	zero	0.0002	F	0.01	-	0.0001	0.0001	1.3E-05	0.0004	-	0.0004	B2
Hexachlorobenzene	P	zero	0.001	F	0.05	0.05	0.05	0.2	0.0008	0.03	-	0.002	B2
Hexachlorobutadiene	L	-	-	F	0.3	0.3	0.1	0.4	0.002	0.07	0.001	-	C
Hexachlorocyclopentadiene	P	0.05	0.05	-	-	-	-	-	0.007	0.2	-	-	D
Hexachloroethane	L	-	-	F	5	5	0.1	0.5	0.001	0.04	0.001	-	C
Hexane (n-)	-	-	-	F	10	4	4	10	-	-	-	-	D
Hexazinone	-	-	-	F	3	3	3	9	0.033	1	0.2	-	D
HMX	-	-	-	F	5	5	5	20	0.05	2	0.4	-	D
Hypochlorite	L	-	-	-	-	-	-	-	-	-	-	-	-
Hypochlorous acid	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3,-c,d)pyrene (PAH)	P	zero	0.0004	D	-	-	-	-	-	-	-	-	B2
Isophorone	L	-	-	D	15	15	15	15	0.2	7	0.1	-	C
Isopropyl methylphosphonate	-	-	-	D	-	-	-	-	0.1	-	-	-	D
Isopropylbenzene	-	-	-	D	-	-	-	-	-	-	-	-	-
Lindane	F	2E-4	0.0002	F	1	1	0.03	0.1	0.0003	0.01	0.0002	-	C
Malathion	-	-	-	D	0.2	0.2	0.2	0.8	0.02	0.8	0.2	-	D
Maleic hydrazide	-	-	-	F	10	10	5	20	0.5	20	4	-	D
MCPA	-	-	-	F	0.1	0.1	0.1	0.4	0.0015	0.05	0.01	-	E
Methomyl	L	-	-	F	0.3	0.3	0.3	0.3	0.025	0.9	0.2	-	D
Methoxychlor	F	0.04	0.04	F	6	2	0.5	0.2	0.005	0.2	0.04	-	D
Methyl ethyl ketone	L	-	-	F	80	8	3	9	0.00005	0.9	0.2	-	D
Methyl parathion	-	-	-	F	0.3	0.3	0.03	0.1	0.00025	0.009	0.002	-	D
Methyl tert butyl ether	L	-	-	D	3	3	0.5	2	0.005	0.2	0.04	-	D

Chemicals	Standards: Status Reg.*	Standards: MCLG (mg/l)	Standards: MCL (mg/l)	Health Advisories: Status HA*	10-kg Child: One-day mg/l	10-kg Child: Ten-day mg/l	10-kg Child: Longer-term mg/l	70-kg Adult: Longer-term mg/l	70-kg Adult: RfD mg/kg/day	70-kg Adult: DWEL mg/l	70-kg Adult: Lifetime mg/l	70-kg Adult: mg/l at 10^{-4} Cancer Risk	Cancer Group
Metolachlor	L	-	-	F	2	2	2	5	0.15	5	0.1	-	C
Metribuzin	L	-	-	F	5	5	0.3	0.9	0.025	0.9	0.2	-	D
Monochloroacetic acid	L	-	-	D	-	-	-	-	-	-	-	-	-
Monochlorobenzene	F	0.1	0.1	F	2	2	2	7	0.02	0.7	0.1	-	D
Naphthalene	-	-	-	F	0.5	0.5	0.4	1	0.004	0.1	0.02	-	D
Nitrocellulose (non-toxic)	-	-	-	F	-	-	-	-	-	-	-	-	-
Nitroguanidine	-	-	-	F	10	10	10	40	0.1	4	0.7	-	D
Nitrophenols p-	-	-	-	D	0.8	0.8	0.8	3	0.008	0.3	0.06	-	D
Oxamyl (Vydate)	P	0.2	0.2	F	0.2	0.2	0.2	0.9	0.025	0.9	0.2	-	E
Ozone by-products	L	-	-	-	-	-	-	-	-	-	-	-	-
Paraquat	-	-	-	F	0.1	0.1	0.05	0.2	0.0045	0.2	0.03	-	E
Pentachloroethane	-	-	-	D	-	-	-	-	-	-	-	-	-
Pentachlorophenol	F	zero	0.001	F	1	0.3	0.3	1	0.03	1	-	0.03	B2
Phenanthrene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	-	-	-	D	6	6	6	20	0.6	20	4	-	D
Picloram	P	0.5	0.5	F	20	20	0.7	2	0.07	2	0.5	-	D
Polychlorinated byphenyls (PCBs)	F	zero	0.0005	P	-	-	-	-	-	-	-	0.0005	B2
Prometon	L	-	-	F	0.2	0.2	0.2	0.5	0.015	0.5	0.1	-	D
Pronamide	-	-	-	F	0.8	0.8	0.8	3	0.075	3	0.05	-	C
Propachlor	-	-	-	F	0.5	0.5	0.1	0.5	0.013	0.5	0.09	-	D
Propazine	-	-	-	F	1	1	0.5	2	0.02	0.7	0.01	-	C
Propham	-	-	-	F	5	5	5	20	0.02	0.6	0.1	-	D
Propylbenzene n-	-	-	-	D	-	-	-	-	-	-	-	-	-
Pyrene (PAH)	-	-	-	-	-	-	-	-	0.03	-	-	-	D
RDX	-	-	-	F	0.1	0.1	0.1	0.4	0.003	0.1	0.002	0.03	C
Simazine	P	0.001	0.001	F	0.07	0.07	0.07	0.07	0.005	0.2	0.004	-	C
Styrene	F	0.1	0.1	F	20	2	2	7	0.2	7	0.1	-	C
2,4,5-T	L	-	-	F	0.8	0.8	0.8	1	0.01	0.35	0.07	-	D
2,3,7,8-TCDD (Dioxin)	P	zero	5E-08	F	1E-06	1E-07	1E-08	4E-08	1E-06	4E-08	-	2E-08	B2
Tebuthiuron	-	-	-	F	3	3	0.7	2	0.07	2	0.5	-	D

* Under review.   NOTE: Phenanthrene -- not proposed.

Chemicals	Standards: Status Reg.*	Standards: MCLG (mg/l)	Standards: MCL (mg/l)	Health Advisories: Status HA*	10-kg Child: One-day mg/l	10-kg Child: Ten-day mg/l	10-kg Child: Longer-term mg/l	70-kg Adult: Longer-term mg/l	70-kg Adult: RfD mg/kg/day	70-kg Adult: DWEL mg/l	70-kg Adult: Lifetime mg/l	70-kg Adult: mg/l at 10^{-4} Cancer Risk	Cancer Group
Terbacil	-	-	-	F	0.3	0.3	0.3	0.9	0.013	0.4	0.09	-	E
Terbufos	-	-	-	F	0.005	0.005	0.001	0.005	0.00013	0.005	0.0009	-	D
Tetrachloroethane (1,1,1,2-)	L	-	-	F	2	2	0.9	3	0.03	1	0.07	0.1	C
Tetrachloroethane (1,1,2,2-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Tetrachloroethylene	F	zero	0.005	F	2	2	1	5	0.01	0.5	-	0.07	B2
Tetranitromethane	-	-	-	D	-	-	-	-	-	-	-	-	-
Toluene	F	1	1	F	20	2	2	7	0.2	7	1	-	D
Toxaphene	F	zero	0.003	F	0.5	0.04	-	-	0.1	0.0035	-	0.003	B2
2,4,5-TP	F	0.05	0.05	F	0.2	0.2	0.07	0.3	0.0075	0.3	0.05	-	D
1,1,2-Trichloro-1,2,2-trifluoroethane	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroacetic acid	L	-	-	D	-	-	-	-	-	-	-	-	-
Trichloroactonitrile	L	-	-	D	0.05	0.05	-	-	-	-	-	-	-
Trichlorobenzene (1,2,4-)	P	0.009	0.009	F	0.1	0.1	0.1	0.5	0.001	0.05	0.009	-	D
Trichlorobenzene (1,3,5-)	-	-	-	F	0.6	0.6	0.6	2	0.006	0.2	0.04	-	D
Trichloroethane (1,1,1-)	F	0.2	0.2	F	100	40	40	100	0.035	1	0.2	-	D
Trichloroethane (1,1,2-)	P	0.003	0.005	F	0.6	0.4	0.4	1	0.004	0.1	0.003	-	C
Trichloroethanol (2,2,2-)	L	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethylene	F	zero	0.005	F	-	-	-	-	-	0.3	-	0.3	B2
Trichlorophenol (2,4,6-)	L	-	-	D	-	-	-	-	-	-	-	0.3	B2
Trichloropropane (1,1,1-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trichloropropane (1,2,3-)	L	-	-	F	0.6	0.6	0.6	2	0.006	0.2	0.04	-	-
Trifluralin	L	-	-	F	0.08	0.08	0.08	0.3	0.0075	0.3	0.005	-	C
Trimethylbenzene (1,2,4-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trimethylbenzene (1,3,5-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trinitroglycerol	-	-	-	F	0.005	0.005	0.005	0.005	-	-	0.005	-	-
Trinitrotoluene	-	-	-	F	0.02	0.02	0.02	0.02	0.0005	0.02	0.002	0.1	C
Vinyl chloride	F	zero	0.002	F	3	3	0.01	0.05	-	-	-	0.0015	A
White phosphorus	-	-	-	F	-	-	-	-	0.00002	0.0005	0.0001	-	D
Xylenes	F	10	10	F	40	40	40	100	2	60	10	-	D

* Under review.

Chemicals	Standards: Status Reg.*	Standards: MCLG (mg/l)	Standards: MCL (mg/l)	Health Advisories: Status HA*	10-kg Child: One-day mg/l	10-kg Child: Ten-day mg/l	10-kg Child: Longer-term mg/l	70-kg Adult: Longer-term mg/l	70-kg Adult: RfD mg/kg/day	70-kg Adult: DWEL mg/l	70-kg Adult: Lifetime mg/l	70-kg Adult: mg/l at 10^{-4} Cancer Risk	Cancer Group
INORGANICS													
Aluminum	L	-	-	D	-	-	-	-	-	-	-	-	-
Ammonia	-	-	-	D	-	-	-	-	-	-	30	-	D
Antimony	P	0.003	0.01/0.005	D	0.015	0.015	0.015	0.015	0.0004	0.015	0.003	-	D
Arsenic	*	-	0.05	D	-	-	-	-	-	-	-	0.003	A
Asbestos (fibers/l > 10um)	F	7 MFL	7 MFL	-	-	-	-	-	-	-	-	700 MFL	A
Barium	F	2	2	F	-	-	-	-	0.07	2	2	-	D
Beryllium	P	zero	0.001	D	30	30	4	20	0.005	0.2	-	0.0008	B2
Boron	L	-	-	D	4	0.9	0.9	3	0.09	3	0.6	-	D
Cadmium	F	0.005	0.005	F	0.04	0.04	0.005	0.02	0.0005	0.02	0.005	-	D
Chloramine	L	-	-	D	1	1	1	1	0.1	3.3	2.6	-	-
Chlorate	L	-	-	D	-	-	-	-	-	-	-	-	-
Chlorine	L	-	-	D	-	-	-	-	-	-	-	-	-
Chlorine dioxide	L	-	-	D	-	-	-	-	-	-	-	-	-
Chlorite*	L	-	-	D	-	-	-	-	-	-	-	-	-
Chromium (total)	F	0.1	0.1	F	1	1	0.2	0.8	0.005	0.2	0.1	-	D
Copper	P	1.3	TT**	-	-	-	-	-	-	-	-	-	D
Cyanide	P	0.2	0.2	F	0.2	0.2	0.2	0.8	0.022	0.8	0.2	-	D
Fluoride*	F	4	4	-	-	-	-	-	0.12	-	-	-	-
Lead (at tap)	F	zero	TT**	-	-	-	-	-	-	-	-	-	B2
Manganese	-	-	-	D	-	-	-	-	0.14	-	-	-	-
Mercury	F	0.002	0.002	F	-	-	-	0.002	0.0003	0.01	0.002	-	D
Molybdenum	L	-	-	D	0.08	0.08	0.01	0.05	0.001	0.05	0.05	-	D
Nickel	P	0.1	0.1	F	1	1	0.1	0.6	0.02	0.6	0.1	-	D
Nitrate (as N)	F	10	10	F	-	10*	-	-	1.6	-	-	-	*
Nitrite (as N)	F	1	1	F	-	1*	-	-	0.16*	-	-	-	*

* Under review.

** Copper - action level 1.3 mg/L
Lead - action level 0.015 mg/L

	Standards			Health Advisories									
					10-kg Child			70-kg Adult					
Chemicals	Status Reg.*	MCLG (mg/l)	MCL (mg/l)	Status HA*	One-day mg/l	Ten-day mg/l	Longer-term mg/l	Longer-term mg/l	RfD mg/kg/day	DWEL mg/l	Lifetime mg/l	mg/l at 10^{-4} Cancer Risk	Cancer Group
Nitrate + Nitrite (both as N)	F	10	10	F	-	-	-	-	-	-	-	-	*
Selenium	F	0.05	0.05	-	-	-	-	-	0.005	-	-	-	-
Silver	-	-	-	D	0.2	0.2	0.2	0.2	0.005	0.2	0.1	-	D
Sodium	-	-	-	D	-	-	-	-	-	20***	-	-	-
Strontium	L	-	-	D	25	25	25	90	2.5	90	17	-	D
Sulfate	P	400/500	400/500	-	-	-	-	-	-	-	-	-	-
Thallium	P	0.0005	0.002/ 0.001	D	0.007	0.007	0.007	0.02	0.00007	0.002	0.0004	-	-
Vanadium	L	-	-	D	0.08	0.08	0.03	0.11	0.003	0.11	0.02	-	D
Zinc	L	-	-	D	4	4	2	9	0.2	9	2	-	D
Zinc chloride	-	-	-	D	-	-	-	-	-	-	-	-	-

RADIONUCLIDES

Beta particle and photon activity (formerly man-made radionuclides)	F	zero	4 mrem	-	-	-	-	-	-	-	-	4 mrem/y	A
Gross alpha particle activity	F	zero	15 pCi/L	-	-	-	-	-	-	-	-	-	A
Radium 226/228	P	zero	20 pCi/L	-	-	-	-	-	-	-	-	22/26 pCi/l	A
Radon	P	zero	300 pCi/L	-	-	-	-	-	-	-	-	150 pCi/l	A
Uranium	P	zero	20 μg/l	-	-	-	-	-	-	-	-	170 pCi/l	A

* Under review.

*** Guidance.

SECONDARY MAXIMUM CONTAMINANT LEVELS

November 1991 Table 9(continued)

Chemicals	Status	SMCLs (mg/l)
Aluminum	F	0.05 to 0.2
Chloride	F	250
Color	F	15 color units
Copper	F	1
Corrosivity	F	non-corrosive
Fluoride*	F	2
Foaming Agents	F	0.5
Hexachlorocyclopentadiene	P	0.008
Iron	F	0.3
Manganese	F	0.05
Odor	F	3 threshold odor numbers
pH	F	6.5 - 8.5
Silver	F	0.10
Sulfate	F	250
Total Dissolved Solids (TDS)	F	500
Zinc	F	5

Status Codes: P - proposed, F - final

* Under review.

COMPARISON OF FEDERAL TO NEW YORK STATE MCLs
(as of January 1991)

ORGANIC

all units are micrograms per liter (ppb)

Chemical	FEDMCL	NYMCL+
Acrylamide @	treatment	-
Benzene	5	5
Bromobenzene	-	5
Bromochloromethane	-	5
Bromomethane	-	5
n-Butylbenzene	-	5
sec-Butylbenzene	-	5
tert-Butylbenzene	-	5
Carbon Tetrachloride	5	5
Chlorobenzene	-	5
Chloroethane	-	5
Chloromethane	-	5
2-Chlortoluene	-	5
4-Chlortoluene	-	5
Dibromomethane	-	5
o-Dichlorobenzene (1,2)@	600	5
m-Dichlorobenzene (1,3)	-	5
p-Dichlorobenzene (1,4)	75	5
Dichlorodifluoromethane	-	5
1,2-Dichloroethane	5	5
1,1-Dichloroethane	-	5
1,1-Dichloroethylene	7	5
cis-1,2-Dichloroethylene@	70	5
trans-1,2-Dichloroethylene@	100	5
1,2-Dichloropropane	5	5
1,3-Dichloropropane	-	5
2,2-Dichloropropane	-	5
1,1-Dichloropropene	-	5
cis-1,3-Dichloropropene	-	5
trans-1,3-Dichloropropene	-	5
Epichlorohydrin @	treatment	-
Ethylbenzene @	700	5
Ethylene dibromide @	0.05	-
Hexachlorobutadiene	-	5
Isopropylbenzene	-	5
p-Isopropyltoluene	-	5
Methylene chloride	-	5

Table 10

POOR QUALITY ORIGINAL

Chemical	FEDMCL	NYMCL+
Monochlorobenzene @	100	-
PCB'S @	0.5	-
n-Propylbenzene	-	5
Styrene @	100	5
1,1,1,2-Tetrachloroethane	-	5
1,1,2,2-Tetrachloroethane	-	5
Tetrachloroethylene @	-	5
Toluene	-	5
1,2,3-Trichlorobenzene	-	5
1,2,4-Trichlorobenzene	-	5
1,1,1-Trichloroethane	200	5
1,1,2-Trichloroethane	-	5
Trichloroethylene	5	5
Trichlorofluoromethane	-	5
1,2,3-Trichloropropane	-	5
1,2,4-Trimethylbenzene	-	5
1,3,5-Trimethylbenzene	-	5
Vinyl Chloride	2	2
Xylenes (total) @	10000	5
Trihalomethanes (total)	100	100
Unspecified organic contaminant (UOC)	N/A	50
Total Principal organic (POCs)+ and UOCs++	N/A	100
PESTICIDES/HERBICIDES		
Alachlor @	2	-
Atrazine @	3	-
2,4-D * @	70	50
2,4,5-TP ** @	50	10
Carbofuran @	40	-
Chlordane @	2	-
Dibromochloropropane @	0.2	-
Endrin	0.2	0.2
Heptachlor @	0.4	-
Heptachlor epoxide @	0.2	-
Lindane @	0.2	4
Methoxychlor @	40	50
Toxaphene @	3	5

Table 10 (continued)

POOR QUALITY ORIGINAL

* 2,4-D: 2,4-Dichlorophenoxypropionic acid

** 2,4,5-TP: 2,4,5-Trichlorophenoxypropionic acid (Silvex)

N/A = not applicable

\+ Principal organic contaminant (POC) means any organic chemical compound belonging to the following classes, <u>except for</u> Total Trihalomethanes, Vinyl Chloride and regulated Pesticides/Herbicides:

1) Halogenated alkane
2) Halogenated ether
3) Halobenzenes and substituted halobenzenes
4) Benzene and alkyl- or nitrogen-substituted benzenes
5) Substituted, unsaturated hydrocarbons
6) Halogenated nonaromatic cyclic hydrocarbons

Further definition of the POCs is contained in Chapture I of the New York Sanitary Code Part 5, Subpart 5-1.1(ab). A table listing the POCs is found in Table 9A of the same document.

++ Unspecified organic contaminant (UOC) means any organic chemical compound not otherwise specified in Chapture I of the New York Sanitary Code Part 5, Subpart 5-1.

@ Phase II MCLs promulgated 1/30/91 in 56 FR 3526 and will take effect for PWSS in 7/92. These MCLs must be adopted or made more stringent by the States by 7/92.

OTHER

The standards for Radiological, Coliform Bacteria and Turbidity have been adopted from the federal MCLs by the states (including VI & PR).

INORGANIC

all units are milligrams per liter (ppm), except as noted

Chemical	FEDMCL	NYMCL
Arsenic	0.05	0.05
Asbestos[1] @	7	-
Barium	1.0	1.0
Cadmium @	0.005	0.01
Chromium @	0.1	0.05
Fluoride (ppm)	4	2.2
Lead	0.05	0.05
Mercury	0.002	0.002
Nitrate (as N) @	10	10
Nitrite (as N) @	1.0	-
Nitrate+Nitrite(as N)@	10	-
Selenium @	0.05	0.01
Silver	0.05	0.05

@ Phase II MCLs promulgated 1/30/91 in 56 FR 3526 and will take effect for PWSS in 7/92. These MCLs must be adopted or made more stringent by the States by 7/92.

[1] The MCL for asbestos apply to fibers longer than 10 micrometers, and are in units of million fibers per liter.