

Health Assessment for

RADIATION TECHNOLOGY, INC.

CERCLIS NO. NJD047684451

ROCKAWAY, MORRIS COUNTY, NEW JERSEY

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Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i)(7)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

**HEALTH ASSESSMENT
RADIATION TECHNOLOGY INCORPORATED
MORRIS COUNTY
ROCKAWAY, NEW JERSEY**

Prepared by:
Division of Science and Research
New Jersey Department of Environmental Protection (NJDEP)
and
Environmental Health Service
New Jersey Department of Health (NJDOH)

Prepared for:
Agency for Toxic Substances and Disease Registry (ATSDR)

BACKGROUND

Radiation Technology, Incorporated (RTI) is currently on the National Priorities List (NPL). The RTI property is located at 108 Lake Denmark Road, in Rockaway Township, Morris County, New Jersey (Appendix 1). RTI's operations are concentrated within a 15-acre parcel of land - referred to as the RTI site. Property owned by RTI at this location includes the RTI site and an adjacent 248-acre parcel of land. All 263 acres were purchased from Thiokol Chemical Corporation or from Morton Thiokol, Inc. during the 1970s. Operations on the RTI site since 1970 have included the following: radiation sterilization, production of architectural products, and production and finishing of hardwood flooring. Radiation sterilization is the only activity currently performed at the facility.

Beginning in 1980, the New Jersey Department of Environmental Protection (NJDEP) and the Rockaway Township Health Department (RTHD) conducted numerous facility and area inspections of the RTI site. These inspections revealed that the company improperly stored and disposed waste drums containing solvents and other organic chemicals. In 1981, the RTHD sampled two RTI water supply wells. The results revealed that a number of volatile organic compounds (VOCs) had contaminated the groundwater of these wells which were subsequently condemned by the New Jersey Department of Health (NJDOH) and NJDEP.

NJDEP undertook a Remedial Investigation/Feasibility Study (RI/FS) in 1986. Groundwater sampling results from Phase I of RI/FS revealed excessive amount of VOCs in the RTI study area. Four areas of contamination have initially been identified in

Phase I of the RI/FS. The RI/FS is scheduled for completion by the end of 1989.

COMMUNITY CONCERNS

Interviews with the Environmental Coordinator of the Rockaway Township Health Department and review of NJDEP records, including transcripts of the Radiation Technology public meeting (5/14/87), identified concerns primarily related to groundwater and surface water quality. The presence of hazardous substances in two aquifer systems beneath the site pose a threat to Lake Denmark as well as nearby streams and potable wells. Specific concerns expressed by the community may be summarized as follows:

- 1) The threat to the water quality of Lake Denmark by contaminants originating at the Radiation Technology site.
- 2) The impact on new development in the area which relies upon potable wells for water supply. (Specifically the Lake Telemark area.)
- 3) Questions concerning the effectiveness of charcoal filters provided by the Rockaway Township Health Department to residents of the Lake Telemark development. Related questions were expressed concerning dermal and pulmonary absorption of volatile organic compounds through showers and other water use where filters were not provided.
- 4) A desire to participate in the review of remediation options recommended in the Feasibility Study.

Additional concerns include the reimbursement of the Township of Rockaway for an estimated one million dollars expended to provide the filters, and the identification and pursuit of responsible parties.

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

A. On-site Contamination

Soil

VOCs were detected in soil samples collected in Phase I of the RI/FS. However, the levels were below the NJDEP Soil Action Levels (1 ppm for VOCs). Phase II of RI/FS will perform additional soil samplings in order to locate possible sources of groundwater contamination.

Ground Water

Analytical results of groundwater sampling taken from monitoring and production wells revealed that the levels of a number of VOCs (shown in Table 1) were above the New Jersey Maximum Contaminant Levels (MCLs). These compounds are benzene, carbon tetrachloride, tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene (TCE), trans-1,2-dichloroethene, 1,1-dichloroethene, and vinyl chloride. The latter 3 compounds are possible biodegradation products of TCE.

TABLE 1. Levels of Chemicals Detected in Groundwater

	Groundwater Samples (ug/l)	New Jersey MCLs (1) (ug/l)
Benzene	3.8	1.0
Carbon Tetrachloride	4.8 - 87	2.0
Tetrachloroethene	4.2	1.0
1,1,1-Trichloroethane	1.0 - 473	26.0
Trichloroethene (TCE)	1.0 - 140	1.0
1,1-Dichloroethene	6.3 - 27	2.0
Trans-1,2-Dichloroethene	2.0 - 87	10.0
Vinyl Chloride	47	2.0

(1) New Jersey Safe Drinking Water Act (N.J.A.C. 7:10-16.7).

The predominant ground water flow is in the northwest direction, discharging into Lake Denmark which is located 0.1 mile northwest of the RTI property. There are no potable wells between the site and Lake Denmark. However, the flow patterns are complicated due to fractured bedrock. In February 1990, DEP sampled 5 potable wells near the site to verify and determine if contamination has/has not occurred. The results of the analysis are awaited.

RTI has utilized radioactive materials, namely, Cobalt 60 "pencils" for the irradiation processes (NJDEP, 1987). Preliminary on-site sampling from groundwater, surface water and sediment was therefore performed for the following radioactivity parameters: gross alpha, gross beta, and gamma. All results were below measurable detection limits.

Surface Water

Surface water samples were collected near the discharge of a pipe originating from a production well. The surface water stream leads to Lake Denmark. VOCs were the only organic

contaminants detected in the surface water sample. Table 2 shows the VOCs levels detected in the surface water that are above the standards provided by ATSDR (carcinogenicity-based value in ambient water which corresponds to an estimated lifetime excess cancer risk of one in one million in humans from ingesting contaminated aquatic organisms only). No inorganic compounds were detected in surface water samples.

TABLE 2. Levels of Chemicals Detected in Surface Water

Surface Water Samples		MCL*
	(ug/l)	(ug/l)
1,1-Dichloroethene	4.3	2
Carbon tetrachloride	22.0	2

(The concentration of 1,1-Dichloroethene was qualified during QA/QC review by NJDEP.)

* = New Jersey Maximum Contaminant Level.

Sediment

Sediment samples were collected near the discharge of a pipe originating from a production well. Neither organic nor inorganic compounds were detected in sediment samples.

Air

Air monitoring was performed for the duration of the drilling operation in order to determine the level of respiratory protection required. In general, air quality was judged to be good throughout the study area. Based on the air monitoring results, no full scale air sampling was performed.

B. Off-site Contamination

There is a residential area consisting of approximately 20 homes located on Lake Denmark Road, immediately adjacent to the RTI site. The closest home to RTI is within 0.25 mile. All of the homes rely on private wells. The 1985 sampling results from two private wells did not indicate the presence of VOCs (NJDEP, 1987). Phase II of the RI/FS will include the sampling of five additional private wells near the RTI site (NJDEP, 1988).

Lake Denmark, located approximately 0.1 mile northwest of the RTI property, is the major surface water body near the site. Lake Denmark is surrounded by the property of the U.S. Military Picatinny Arsenal and is used for recreational

activities by the Arsenal employees. Since the groundwater flows towards Lake Denmark, and in addition, VOC concentrations were detected in a surface water stream connected to Lake Denmark, it is possible that Lake Denmark has been contaminated by the VOCs. However, no sampling was performed for the Lake. The Phase II RI/FS will include sampling from Lake Denmark (NJDEP, 1988).

C. Quality Assurance/Quality Control

All samples collected within the RTI study area were analyzed by Nanco Labs, Inc. using EPA-CLP Tier I protocol. Sample data were reviewed following the NJDEP 1986 "Guidelines for Quality Assurance Data Validation of Analytical Sample Deliverables". Some of the quantitative aspects of the VOC data used in this document were qualified after QA review (NJDEP, 1988). However, there is confidence in the approximated values of the VOC concentrations. Qualifying the environmental data did not markedly reduce the confidence in the conclusions of the health assessment.

D. Physical Hazards

The RTI site (15 acres) is fenced, and the entry to the site is restricted. However, the entire RTI property (265 acres) is not fenced. There do not appear to be any physical hazards present at this site based on the site visit (1988).

POTENTIAL ENVIRONMENTAL AND HUMAN EXPOSURE PATHWAYS

A. Environmental Pathways

On-Site

Phase I of the RI/FS has identified groundwater and surface water as the primary media in which the contaminants have been detected. Groundwater and surface water pathways are therefore the primary environmental pathways of concern. Soil sampling in phase I of RI/FS did not identify any sources of groundwater contamination. Therefore, this will be further investigated in Phase II (NJDEP, 1988).

Since the radioactive material of concern is Cobalt 60 has a half life of approximately five years and previous investigations did not detect gross alpha, gross beta, and gamma radiation above their detection limits, radioactivity is not considered to be a public health concern at the site.

Off-Site

Since there is a potential for groundwater contamination

to migrate towards Lake Denmark, located approximately 0.1 mile northwest of the RTI property, and nearby potable wells, the Lake and the potable wells are also environmental pathways of concern.

B. Human Exposure Pathways

Although the two on-site wells at RTI are not presently used for drinking water, one of them was previously used as a potable well. Thus, human exposure to VOCs might have occurred prior to the condemnation of these wells in 1981.

There is a potential for groundwater contamination to migrate from the RTI site, and for potable wells adjacent to the site to be impacted by the groundwater contamination. Sampling of several potable wells is scheduled to occur during Phase 2 of the RI.

Potential human exposures may include ingestion of the VOCs-contaminated well water, dermal absorption and/or inhalation from cleaning or showering activities. Other human exposure could result from using contaminated well water for home garden irrigation. Possible exposure routes could include ingestion of contaminated crops and ingestion of contaminated soils by children.

Since the possibility exists that the groundwater contamination might have extended to Lake Denmark, human exposure could result from consuming contaminated fish caught from Lake Denmark.

DEMOGRAPHICS

The RTI site is situated within Rockaway in Morris County, New Jersey. The size of population within a 2 mile radius of the site is 20,000. The area around the RTI study area is generally rural in nature. However, there has been significant residential and high industrial development in the region. The RTI site is immediately northeast of the U.S. Military Picatinny Arsenal facilities. Present land use in the RTI study area is light industrial. Past land use in the 263-acre study area indicated the presence of significant industrial activities. The wooded areas surrounding the RTI site are used for hunting (Site visit, 1988).

U.S. EPA Site Inspection Report (1982) does not include information on population, the number of potable wells within a 2 mile radius and the number of potable wells in housing development immediately adjacent to RTI. This information is important for health assessment. Other demographic information can be found in the Human Exposure Pathway section of this

report.

PUBLIC HEALTH IMPLICATIONS

The groundwater sampling from RTI revealed that the groundwater had been contaminated with the following VOCs: benzene, carbon tetrachloride, tetrachloroethene, 1,1,1-trichloroethane, TCE, trans-1,2-dichloroethene, 1,1-dichloroethene, and vinyl chloride. (NJDEP, 1988) Phase I of RI/FS did not detect radioactivity in the groundwater.

Although the two on-site wells at RTI are not presently used for drinking, human VOC exposure might have occurred prior to the condemnation of these wells in 1981. Potential health effects of exposure to VOCs include: hematotoxicity, injuries to liver, lung, heart, bone or gastrointestinal system, CNS disturbances at high levels, as well as a possibility of carcinogenesis.

A surface water stream, originating from a production well and connected to Lake Denmark, was found to be contaminated with VOCs. Thus, there is a potential for VOC contamination from RTI to extend to Lake Denmark.

There is also a potential for VOC contamination from RTI to migrate to nearby potable wells. Potable water sampling from two homes adjacent to RTI did not indicate VOC contamination. Phase II of RI/FS will sample 5 additional potable wells to investigate whether these wells have been contaminated.

No groundwater contamination source areas were identified from soil samples collected in Phase I of RI/FS. Phase II of RI/FS will collect additional soil samples in order to locate possible source areas of contamination.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the information reviewed, the Radiation Technology Incorporated Site is a potential public health concern because humans have probably been exposed to hazardous substances at concentrations that may result in adverse health effects. As noted in the Human Exposure Pathways section above, human exposure to VOC may be occurring through drinking of contaminated water from potable wells located downgradient and adjacent to the RTI property. Human exposure has probably occurred in the past via drinking water from two on-site wells at RTI prior to their condemnation in 1981.

The groundwater and surface water at RTI have been

contaminated with VOCs. Although the two on-site wells at RTI are not presently used for drinking, human VOC exposure might have occurred prior to the condemnation of these wells in 1981. Health effects of VOC exposures include CNS depression, liver, lung, or heart damage, and a possibility of carcinogenesis.

The VOC contamination might have extended off-site to nearby potable wells and Lake Denmark. However, off-site samplings which are crucial to health assessment were not taken in Phase I of RI/FS. Phase II of RI/FS will perform potable well sampling from additional homes as well as sampling from Lake Denmark. It is recommended that potable wells from all residents downgradient and adjacent to RTI be analyzed for VOCs. Until more sampling is performed on these potable wells and Lake Denmark, the off-site health impact of VOC contamination from RTI cannot be evaluated.

Four areas of contamination have initially been identified in Phase I of RI/FS. Continuous investigation in identifying VOC contamination sources will be conducted in Phase II of RI/FS.

In accordance with CERCLA as amended, the Radiation Technology Incorporated site has been evaluated for appropriate follow-up with respect to health effects studies. Since a population exposed to on-site and off-site contaminants at a level of public health concern has not been identified, the Radiation Technology Incorporated site is not being considered for follow-up health studies at this time. However, if data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring or has occurred in the past, ATSDR and NJDOH will reevaluate this site for any indicated follow-up.

This Health Assessment was prepared by the State of New Jersey, Department of Health, Environmental Health Service, under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry. The Division of Health Assessment and Consultation and the Division of Health Studies of ATSDR have reviewed this Health Assessment and concur with its findings.

REFERENCES

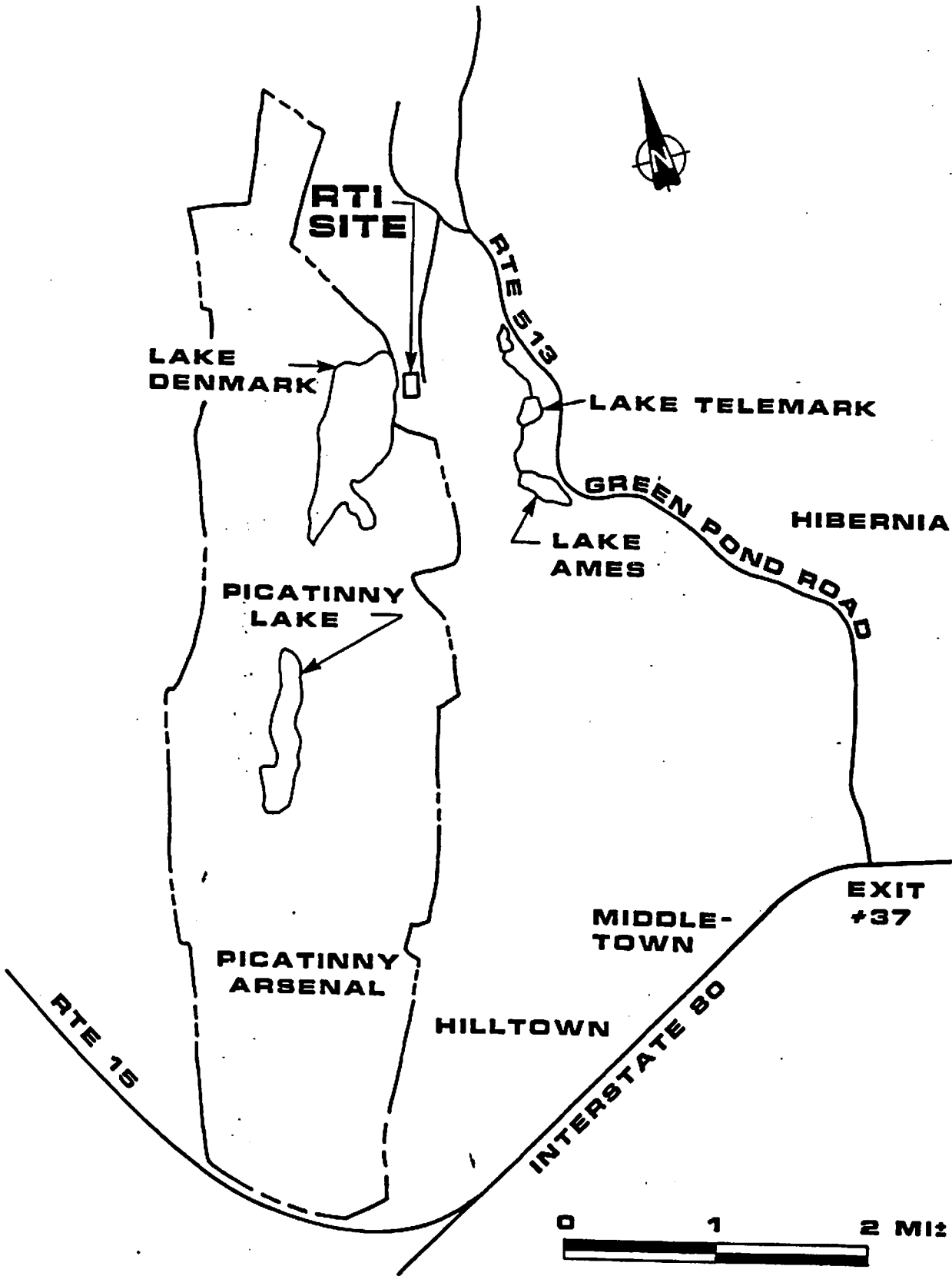
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APPENDIX I



RADIATION TECHNOLOGY SITE (RTI)