AMERICAN THERMOSTAT

CERCLIS NO. NYD002066330

SOUTH CAIRO, NEW YORK

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

HEALTH ASSESSMENT

FOR THE

AMERICAN THERMOSTAT SITE

CERCLIS NO. NYD002066330

SOUTH CAIRO, NEW YORK

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AND IN COOPERATION WITH
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SUMMARY

The American Thermostat National Priority List (NPL) facility is located in South Cairo, Greene County, New York near the Catskill Mountains. As a result of previous waste management practices, soils and groundwater are contaminated, primarily with tetrachloroethylene and trichloroethylene. Groundwater contamination is of concern because all nearby residents use private wells for drinking water. Currently, charcoal filters have been installed at six residences and an air stripper has been installed at one home to remove extremely high contaminant concentrations. Contaminant migration is continuing, and additional residential wells may become contaminated in the future, allowing exposure to occur via ingestion, dermal absorption, and inhalation of contaminant vapors from water. A Record of Decision (ROD) has been signed to extend a nearby village's water supply to affected and potentially affected residences. However, implementation of the ROD may be delayed because of litigation concerning aquifer capacity and other concerns.

BACKGROUND

A. SITE DESCRIPTION

The American Thermostat NPL Groundwater Contamination Site is located in South Cairo, Greene County, New York, approximately 30 miles south of Albany. The property lies on the southwest edge of a valley formed by Catskill Creek and is bounded on the northeast and southwest by county routes 23B and 23, respectively. The site is relatively flat, but the surrounding land drops off steeply to Catskill Creek to the northeast and to two small tributaries to the east and west of the property. These tributaries drain into Catskill Creek.

The American Thermostat Corporation, a manufacturer of thermostats for small appliances, was in operation from 1954 to 1985. During this time, waste solvents were discharged through the plant septic system and poured onto the grounds. In March 1981, two American Thermostat employees were observed dumping solvents on the property. This triggered investigations into the company's waste handling practices by the New York State Department of Environmental Conservation (NYSDEC) and the Attorney General's Office. During April and May 1981, water samples were collected from several privately owned wells in the vicinity of the American Thermostat Site by NYSDEC and the New York State Department of Health (NYSDOH). Analysis of these samples indicated the presence of tetrachloroethylene and trichloroethylene in several of the wells. Concentrations of tetrachloroethylene in five of the wells sampled were above the maximum contaminant level of 0.05 ppm for organic chemicals established by the Commissioner of NYSDOH.

Trichloroethylene was above this level in one well. An on-site surface soil sample taken in March 1981 showed a tetrachloroethylene concentration of 3,400 ppm. Air was not sampled at that time.

Residents with wells containing concentrations of the above compounds in excess of the New York State Guidelines were advised by NYSDOH not to use well water for cooking or drinking. Several law suits were filed by local residents in late 1981. American Thermostat began supplying bottled water to local residents in April 1982, and by November 1982, had installed carbon filters on its own and affected residential wells. The nearest neighbor was connected to the plant's water supply system. A new septic tank and drainage field were installed on the site in 1983, and a State Pollution Discharge Elimination System (SPDES) permit was issued for three separate discharges, the sewage system effluent and two non-contact cooling water discharges. In September 1983, American Thermostat provided carbon filtration for these discharges to lower tetrachloroethylene levels.

In February 1983, New York State entered into an interim consent order with American Thermostat and Amro Realty (land property owner) in which the companies agreed to clean up the site and its surroundings and to provide safe drinking water to affected residents. In addition, they agreed to monitor selected private wells to determine whether contamination had spread beyond the area originally influenced. American Thermostat and Amro, however, did not fully comply with the consent order: they did not clean up the contamination and only temporarily provided the affected residences with clean water.

American Thermostat ceased operations in May 1985. Since then the NYSDOH have continued to sample the residential wells. On April 7, 1986, NYSDEC requested that the Environmental Protection Agency (EPA) assume the operation and maintenance costs for the carbon filters that had been previously installed. Removal actions have been performed by the EPA at the site, including: replacement of a carbon filter at a residence, and installation of air strippers at American Thermostat and the Rath residence.

A Final Draft Focused Feasibility Study has been completed, and sampling for the Remedial Investigation began in September 1988. A ROD was signed December 1987 to extend the Catskill water supply pipeline to nearby residents.

B. SITE VISIT

A site visit to American Thermostat was conducted July 11, 1988, by personnel from the Agency for Toxic Substances and Disease Registry (ATSDR) and the Health Assessment Team from the Office of Risk

Analysis, Oak Ridge National Laboratory, Oak Ridge, Tennessee. The site is located in a rural area near the Catskill mountains. Near the site are several private homes (Appendix A) and a trailer park, as well as cabins and motels for tourists. Three swimming pools were observed within one-half mile northwest and southeast of the site. One pool was not in use and appeared to be in disrepair. A home northwest of the site had a small barn with livestock (horses and geese) and contained a drainage ditch which ran through the pasture.

The site was unfenced and contained a large, apparently empty, manufacturing building which was surrounded by an overgrown gravel parking lot. Windows on the building were boarded over with plywood; however, plywood from one window had been removed, allowing a portion of the building's interior to be viewed. The building was secured from entry, and there was no observable evidence of trespass.

Located in the parking lot behind the building were two portable sheds containing a groundwater pump and air stripper (airlift) system installed by EPA. Water discharged by the air stripper went to lawn sprinklers located on the sloped parking lot. Runoff from the parking lot was to the tributary located north of the building. Plants watered directly by the effluent were dead, although plants along the periphery of the watering system appeared healthy.

At one location alongside the building, water was observed leaking from beneath the foundation, forming a large puddle on the driveway. The interior of the building opposite the leak could be observed from the window. There had been a fire in the building recently, and the leak was believed to be from the sprinkler system; although its source could not be seen.

C. PUBLIC CONCERNS

Residents near the site are concerned about the quality of their water supply. Although a ROD has been signed, implementation of the ROD may be delayed. The community chosen to provide the water supply does not believe it has sufficient water resources to support residents near American Thermostat and continue town growth. For this reason, the ROD may be challenged, and implementation of the ROD may be indefinitely postponed.

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

A. ON-SITE CONTAMINATION

As reported in the Focused Feasibility Study, data concerning on-site contaminated media are minimal and are available only for soil and groundwater. In March 1981, an on-site surface soil sample containing 3,400 ppm tetrachloroethylene was taken at the southern end of the site, at a location where solvents had been dumped. Groundwater measurements performed in June 1985 contained 0.32 mg/L tetrachloroethylene. In 1988, the tetrachloroethylene concentration of the air stripper water discharge, after passing through the sprinkler system, is 16 ug/L (Stripper Design, 1988).

B. OFF-SITE CONTAMINATION

Sampling of groundwater from residential wells has been performed at irregular intervals since 1981. For wells in which contaminants have been detected, the most recent data for unprocessed and processed water sampled in 1986 and 1987 are shown in Table I. The term "Raw" refers to water before it has been processed via charcoal filters or air stripping; the term "Finished" refers to processed water. Water at the Rath residence was sampled several times during 1987; the value shown is the highest measured concentration. Because of fluctuating contaminant levels, an earlier set of monitoring results have been included for the Frank and Cornell residences.

The waters of Catskill Creek and tributaries A and B were sampled once in 1982; the results are shown in Table II.

TABLE I: OFF-SITE CONTAMINANTS: GROUNDWATER

Concentrations (mg/L)

Location*	Date	Tetrachloroethylene Raw	Tetrachloroethylene Finish	Trichloroethylene Raw	Trichloroethylene Finish
R-14	3/26/87	131.5		NA	NA
	8/20/87	24.75	0.001	NA	NA
R-6	2/12/87	36.8	0.001	<1.000	<0.001
R-12	2/12/87	1.070	<0.001	0.023	<0.001
R-11	2/12/87	0.922	<0.001	0.015	<0.001
R-10	2/12/87	0.196	NF[a]	0.002	NF[a]
R-13	2/12/87	0.011	NF[b]	<0.001	NF[b]
R-21	2/20/87	<0.001	<0.001	NA	NA
	9/29/86	0.140	NF[b]	0.005	NF[b]
R-19	4/15/86	<0.001	<0.001	<0.001	<0.001
	6/12/85	0.540	NF[b]	0.094	NF[b]

Standards	Tetrachloroethylene	Trichloroethylene
Safe Drinking Water Act MCL	none	0.005
Health Advisories		
1-Day, 10-Day	2	none
Longer-term child	1.4	none
Longer-term adult	5	none
New York State Water Quality		
Class GA Groundwater standards	none	0.01
Guidance Value	0.0007	0.003

NA = Not Analyzed for

NF[a] = Not Filtered (well does not have filters at residents' request)

NF[b] = Not Filtered (filters had not been installed prior to sampling)

* = Refers to residence locations on Appendix A

TABLE II. OFF-SITE CONTAMINANTS: SURFACE WATER

Concentrations (mg/l)

Contaminant	Catskill Creek near Leeds (6/11/82)	Tributary A (7/22/82)	Tributary B (6/11/82)
Tetrachloroethylene	ND	0.019	0.061
Trichloroethylene	ND	0.007	0.012

ND = Not Detected (below detection limits)

C. PHYSICAL HAZARDS

No physical hazards were observed at the site.

DEMOGRAPHICS

Approximately 5,500 people live within a three-mile radius of the site, primarily in low density residential areas. All residences within one-half mile of the site use private wells. Currently, several homes are affected by contaminated groundwater, although the Focused Feasibility Study (Ebasco, 1987) estimates that 250 persons residing in approximately 80 homes may ultimately be affected by the uncontrolled migration of groundwater contamination.

The area surrounding the American Thermostat Site is crossed by rural, sparsely populated country roads. There is no heavy industry near the site, and American Thermostat is the only manufacturing property in the general area. Proximity to the Catskills makes this region a popular tourist and residential area.

Catskill Creek, located less than a quarter mile east of the site, is classified as a trout stream and therefore has considerable recreational value to local and visiting fishermen.

EVALUATION

A. SITE CHARACTERIZATION

1. Environmental Media

Past environmental sampling at the site has been sporadic and limited. Groundwater is the best characterized medium. It has been sampled in the vicinity of the site by NYSDEC, NYSDOH and EPA at irregular intervals since 1981. The data from this sampling are adequate to identify roughly the areal extent of existing groundwater contamination. However, data specifically aimed at better characterizing the aquifer and the true spatial distribution and rate of expansion of the contaminant plume should be obtained.

The only available soil data are from one sample taken on-site in 1981; this is inadequate to characterize existing on-site soil concentrations, and more current data on contaminant concentrations in soils need to be obtained. Because on-site and off-site soils have not been adequately investigated for this site, their corresponding human exposure pathways are of potential concern. Similarly, surface waters have not been sampled since 1982; more current data on contaminant concentrations in surface waters are needed to assess their degree of contamination. Recent field measurements of on-site air using a photoionization detector (HNu) have been made. While these measurements indicate only low levels of contaminants, the results should be confirmed with air quality monitoring data. Stream sediments and biota have not been sampled. All these media, except biota, are proposed for sampling in the draft Field Sampling and Analysis Plan for the Remedial Investigation. Because air, biota, and surface waters have been inadequately investigated at this time, exposure pathways corresponding to these media are of potential human health concern.

2. Demographics and Land Use

No information on potentially sensitive or high risk subpopulations in the area of the site has been provided.

3. Quality Control and Quality Assurance

No QA/QC information was provided with the American Thermostat Site documentation. The conclusions presented in this Health Assessment are based on the information provided; consequently, the accuracy of these conclusions is determined by the completeness and reliability of the data.

B. ENVIRONMENTAL PATHWAYS

As a result of the facility's closing and various removal actions, there are currently no major sources of new contamination at the site. Present sources of contaminants are residual concentrations in soils and groundwater. Potential environmental pathways for contaminants associated with the American Thermostat Site location are: (1) transport in groundwater, (2) transport in surface water, (3) leaching or resuspension from soils, (4) movement of soils, (5) sediments and biota on which contaminants are adsorbed, and (6) transport in air.

The contaminants of concern have similar physical and chemical properties and can, consequently, be expected to behave in similar ways in the environment. They have relatively high vapor pressures and will readily volatilize when exposed to air. The contaminants are moderately soluble in water and will be likely to dissolve and move moderately in groundwater. However, they have quite high specific gravities, and this property, combined with moderate solubility, suggests that they may also migrate in the subsurface as nonaqueous phase liquids. Based on currently available sampling data and the properties of the contaminants outlined above, transport in groundwater is likely to be the most important environmental pathway for the site.

No reliable air sampling data are available for the site, but recent field measurements indicate that only very low concentrations of total volatile compounds (0.6-0.8 ppm as measured by an HNu photoionization detector) are present. Possible existing sources of air contamination are residual concentrations of contaminants in the soil and emissions from the air strippers located on-site and at the Rath residence. Most of the site is covered with gravel or vegetation, so resuspension of contaminated soil particles should be reduced.

There are no data on sediments in Catskill Creek or its tributaries or on biota on or near the site. On-site terrestrial biota may be affected from uptake of contaminants from the soil and their movement may represent a potential environmental pathway.

There are no stream channels or other surface waters on the American Thermostat Site. The only bodies of surface water near the site are Catskill Creek and tributaries A and B. Water from the site enters the tributaries, and eventually Catskill Creek, chiefly by surface runoff and discharge through a combined sewer pipe and storm drain, and possibly via the influx of groundwater. Plant outflows to two drainage ditches were sampled in 1981 and showed elevated concentrations of volatile organic compounds, primarily tetrachloroethylene and trichloroethylene. Subsequently, outflow concentrations were appreciably reduced by the use of carbon filters.

Catskill Creek and the tributaries have not been sampled since 1982. Since the closing of the plant, the only sources of off-site surface water contamination are surface runoff and groundwater carrying contaminants leached from soils and the subsurface. Transport in surface water cannot be ruled out as a potential environmental pathway without further sampling.

Solvents are known to have been dumped directly onto site soils. One soil sample was collected in March 1981 at a location where dumping had occurred. It is possible that concentrations of contaminants in the soils have decreased appreciably with time through volatilization and leaching, but because there are no more recent soil data, it is not possible to directly test this supposition. The soil at the site was extensively reworked during construction, and is presently classified as Udorthents, loamy, a miscellaneous type with variable properties. Without more specific data on site soil properties (e.g., organic carbon content) it is not possible to evaluate the soil-water distribution coefficient and make a reliable estimate of the probable degree of contaminant retention by the soils. Without further sampling, site soils cannot be ruled out as a reservoir for contaminants, and leaching and resuspension of contaminants from soils may be important environmental pathways.

Transport in groundwater is the best defined environmental pathway for the site. Regionally, depth to the water table varies from less than one foot to almost 300 feet, with an average depth of 30 to 40 feet. In upland areas where the site is located, groundwater is found almost exclusively in bedrock formations. The Plattekill Formation, which forms the drinking water aquifer in the area, consists of interbeded sandstones, siltstones and shales which dip to the west and are highly fractured and jointed. Bedrock joints and fractures are the primary groundwater flow paths in the bedrock aquifer. Although groundwater flow in fracture-controlled aquifers is difficult to predict, the dip of bedding planes is thought to cause regional groundwater to flow to the west at depth.

Contamination of groundwater is well documented from monitoring data from residential wells. The present areal extent of the contaminant plume can be judged from the maximum tetrachloroethylene concentrations found in these wells in 1987 (Appendix 1). The surface trace of the plume covers an elongated area of approximately 100 acres. The primary direction of contaminant movement seems to be northwest, which is consistent with groundwater flow in the general direction of bedding plane dip. The spatial distribution of wells with appreciable concentrations of tetrachloroethylene is rather erratic: concentrations do not decrease uniformly with distance, and wells located quite near to each other show radically different values.

Well data from 1981 to 1987 also do not show consistent trends in the extent of contamination with time. For example, tetrachloroethylene concentrations at residence R-6 have increased ten-fold between 1981 and 1987 but have remained relatively constant at the nearby residence R-11. However, some of the data do suggest that the plume is slowly spreading. The increases in tetrachloroethylene concentrations at residences R-6 and R-21, which are upgradient from the site, are indications of this spread. In addition, the physical and chemical properties of the contaminants suggest they will continue to migrate in groundwater, almost certainly increasing the areal extent of contamination. The data do not indicate appreciable dilution of the contaminants in the vicinity of the site since 1981, suggesting that a subsurface source of contaminants remains, and that natural flushing cannot be relied upon to reduce contamination in nearby wells in the near term.

C. HUMAN EXPOSURE PATHWAYS

The contaminated media which may potentially result in exposure at the site are groundwater, surface water, soil, air, and biota. Of these media, contaminated groundwater is best defined to date. Contaminant reduction devices have been installed at homes that are affected by contaminated groundwater. One resident requested that a filter not be installed, three residences are currently having filters installed by the NYSDEC. All other residences currently known to be affected by contaminated groundwater have contaminant reduction devices. However, the presence of numerous private wells, in conjunction with the probable migration of contaminants, provides the potential for future exposure. In addition, the lack of periodic filter inspection and maintenance potentially may temporarily result in exposure for residents with filters.

Residents using contaminated groundwater from private wells may be exposed by ingestion, dermal absorption through bathing and swimming, and inhalation of vapors and aerosols from showers and household water.

Dermal absorption of surface waters in the tributaries adjacent to the site is not likely to be a important exposure pathway based upon the elimination of plant discharges. The tetrachloroethylene concentration in the air stripper discharge is sufficiently low such that exposure is not likely to be of concern. However, children should be discouraged from playing in these waters.

Currently, exposure pathways associated with contaminated soil are somewhat less likely to be of concern because of the vegetative and gravel surface cover at the site. Although subsurface data are not available, based upon the surface soil sample taken in 1981, subsurface contamination may be appreciable. Therefore, ingestion, dermal absorption, and inhalation of contaminants reentrained in dust may be important exposure pathways for remedial workers performing drilling or excavations of on-site and off-site subsurface soils. Clothing designed for protection of workers as defined by OSHA should be employed by workers coming into contact with subsurface soils. All other applicable OSHA and NIOSH regulations, advisories, and recommendations should be implemented. Optimal dust control measures should be used. Appropriate monitoring should be conducted during remedial activities at the worksite periphery to insure the safety of any nearby non-workers.

PUBLIC HEALTH IMPLICATIONS

Improper waste disposal has resulted in on-site soil contamination and groundwater contamination both on-site and off-site. Because all residents within one-half mile of the American Thermostat Site use private wells, migration of contaminants in groundwater represents a potential threat. Exposures of tetrachloroethylene and trichloroethylene in groundwater via ingestion, dermal absorption, and inhalation of contaminants from water vapors or mists represent the currently best defined potential health concern from the American Thermostat site.

Concentrations of these contaminants vary greatly in different residential wells; however, tetrachloroethylene has been reported at appreciable levels in all wells identified in this report. Tetrachloroethylene has been reported at sufficiently high concentrations from wells at residences R-6 and R-14 that individuals drinking untreated well water at these residences may suffer adverse health effects from acute (short-term) and chronic (lifetime) exposures. Chronic health effects, from tetrachloroethylene exposure in untreated groundwater, may also occur at the other residences identified in this report. Exposure to trichloroethylene, at some residences, from untreated groundwater, may also cause chronic health effects, including cancer. However, previous remedial actions have provided contaminant reduction devices at residential wells which reduces individual contaminants to levels that are generally considered acceptable, even with lifetime exposure.

Although contaminant reduction devices have appreciably reduced contaminant concentrations in household water, the contaminants identified all have similar health effects and may affect the same organs (kidneys and liver). These chemicals may aggravate chronic kidney or liver disease in individuals suffering from these conditions.

To ensure continued reduction of exposure to these contaminants, residents should continue using filters or other contaminant reduction devices at contaminated private wells. Filters should be periodically inspected and maintenance performed as needed. Because continued migration of contaminants is likely, periodic monitoring should be performed at residential wells within a one-half mile area that potentially may become contaminated.

Implementation of the ROD to extend uncontaminated water supplies from a nearby community is desirable and should be implemented. Previously mentioned groundwater monitoring and filter monitoring and maintenance should be performed until implementation of the ROD has been completed.

Soils on-site are also contaminated although exposure to surface soils are less likely to be appreciable because of the current surface cover (gravel overgrown with plants). Subsurface soils may contain levels of contaminants of concern to worker health. Proper protective measures should be undertaken to reduce exposure of contaminants to workers during remedial activities which involve drilling or excavation of subsurface soils.

CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Based upon information reviewed, ATSDR has concluded that this site is of potential health concern because of the potential risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the human exposure pathways section above, human exposure to tetrachloroethylene and trichloroethylene may be occurring and may have occurred in the past via ingestion or dermal absorption or inhalation of contaminants from vapors and aerosols from contaminated groundwater.

The current use of at least twenty-eight private wells for drinking water, swimming pools, and other domestic functions makes contaminated groundwater a potential concern for residents within one-half mile of the American Thermostat Site.

The intent of the ROD chosen for this site (extension of a nearby community's uncontaminated water supply to affected and potentially affected residents) is acceptable, and implementation should reduce health concerns for residents near the American Thermostat Site.

Soils have been contaminated at the site; however, there is insufficient current information to determine the extent and importance of the contamination. Groundwater data do not indicate appreciable dilution of contaminants in the vicinity of the site, suggesting that a subsurface source of contaminants remains.

During site remedial activities involving excavation of subsurface soils there will be increased risk of remedial worker exposure to contaminants through inhalation, ingestion, and dermal absorption. These exposures may be minimized through the use of proper personal protective equipment and work techniques.

B. RECOMMENDATIONS

1. Additional sampling should be performed to characterize the aquifer, true spatial distribution of contaminants, and rate of contaminant migration.

2. Additional sampling of Catskill Creek and its tributaries should be performed to determine current surface water contaminant concentrations.

3. Sampling should be performed to determine the extent and location of soil contamination at the site.

4. Sampling should be performed to determine ambient air concentrations of contaminants from residual contaminant volatilization and air stripper emissions.

5. Potential environmental and human exposure pathways corresponding to contaminated biota also need to be better defined. To reduce excessively expensive and time-consuming sampling of biota, it is recommended that a survey be conducted to identify what potentially contaminated animals and plants (game animals, surface water animals, wild plants, livestock, and crops) are potentially consumed locally or marketed non-locally for consumption.

6. Residents with contaminated wells should continue to use filters for all domestic water.

7. Appropriate actions should be implemented to provide periodic inspection of charcoal filters on residential wells until implementation of the ROD has been achieved.

8. Until implementation of the ROD, private groundwater wells within one-half mile of the site should be routinely monitored, whether they have exhibited contamination in the past or not.

9. Appropriate actions should be implemented to restrict or warn children in nearby residences from playing in the air stripper effluent emissions at the American Thermostat property.

10. Appropriate protective clothing should be worn by workers who may perform soil excavations at the site.

11. During remedial activities optimal dust control measures should be used and appropriate monitoring should be conducted at the worksite periphery to insure the safety of any nearby non-workers.

12. In accordance with CERCLA as amended, the American Thermostat NPL Site, South Cairo, Greene County, NY has been evaluated for appropriate follow-up with respect to health effects studies. Although there are indications that human exposure to off-site contaminants is currently occurring and has previously occurred, this site is not being considered for follow-up health studies at this time because human exposure at levels of public health concern cannot be documented. 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 will reevaluate this site for any indicated follow-up.

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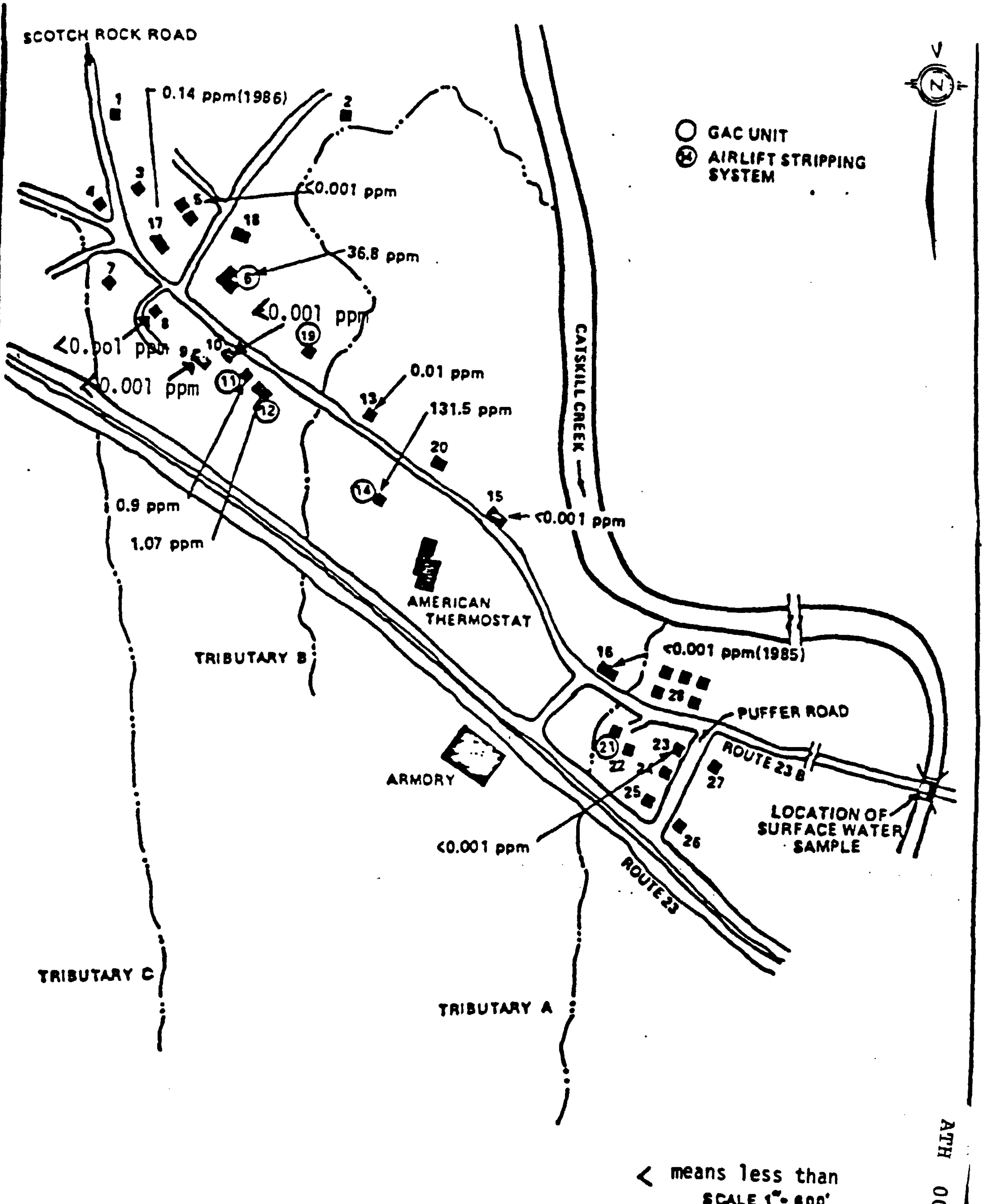
APPENDIX

Appendix A. American Thermostat site map with maximum concentrations tetrachloroethylene at selected residences



SOURCE: NUS CORP. REMEDIAL ACTION MASTER PLAN DECEMBER, 1983

EBASCO SERVICES INCORPORATED

Appendix A
MAXIMUM 1987 PCE CONCENTRATIONS AT SELECTED RESIDENCES