RECORD OF DECISION
GROUND WATER REMEDIATION
OPERABLE UNIT 3
AT NEW BRIGHTON/ARDEN HILLS
SUPERFUND SITE

September 1992

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I. DECLARATION FOR THE RECORD OF DECISION

A. Site Name and Location

New Brighton/Arden Hills (NB/AH) Superfund Site (also known as Twin Cities Army Ammunition Plant or TCAAP) Ramsey County, Minnesota.

B. Statement of Basis and Purpose

This decision document presents the selected remedial action for the ground water contamination at operable unit 3 (OU-3) of the New Brighton/Arden Hills Superfund site (TCAAP) in Ramsey County, Minnesota, 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, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this site. The information supporting this remedial action decision is contained in the Administrative Record for this site. The Minnesota Pollution Control Agency (MPCA) and the U.S. Army (Army) concur with the selected remedy.

C. Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

D. Description of the Selected Remedy

The NB/AH Site has been divided into three operable units. The first operable unit, OU-1, consists of the large north plume of contaminated groundwater in aquifer units 3 and 4 off-TCAAP. A remedy for OU-1 will be proposed in 1993. The second operable unit, OU-2, consists of the on-TCAAP soils, sediments, surface waters, and ground water. A remedy for OU-2 is expected to be proposed in mid 1994. OU-3, addressed by the remedy selected in this Record of Decision, consists of the South Plume of off-TCAAP ground water contamination. Implementation of the remedies for the three operable units, as well as continued operation of the Interim Remedial Action consisting of ground water extraction and treatment on the TCAAP facility and at the TCAAP facility boundary, will comprise the final remedy for this site.

The major components of the selected remedy include the following:

- extraction of ground water at the leading edge of the South Plume

- treatment of extracted ground water for the removal of volatile organic compounds (VOCs) by a pressurized granular activated carbon (GAC) system
- discharge of treated ground water to the potable water supply of the City of New Brighton
- monitoring of the ground water to verify the effectiveness of the remedy.

E. 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 or resource recovery technologies, to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Valdas V. Adamkus _____ Date

Regional Administrator
U. S. Environmental Protection Agency
Region V

Charles W. Williams _____ Date

Commissioner
Minnesota Pollution Control Agency

Lewis D. Walker 9/30/92

Lewis D. Walker Date

Deputy Assistant Secretary
of Army for Environment,
Safety and Occupational Health

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David A. Ullrich for 9/30/92

Valdas V. Adamkus Date
Regional Administrator
U. S. Environmental Protection Agency
Region V

Charles W. Williams Date
Commissioner
Minnesota Pollution Control Agency

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_____ _____
Valdas V. Adamkus Date
Regional Administrator
U. S. Environmental Protection Agency
Region V

Cynthia C Jepsen 9-24-92
Charles W. Williams Date
Commissioner
Minnesota Pollution Control Agency

_____ _____
Lewis D. Walker Date
Deputy Assistant Secretary
of Army for Environment,
Safety and Occupational Health

II. DECISION SUMMARY

A. Site Name, Location, and Description

The New Brighton/Arden Hills (NB/AH) Superfund Site consists of a 25-square mile area located in Ramsey County, Minnesota just north of the Minneapolis-St. Paul metropolitan area. It includes the 4-square-mile Twin Cities Army Ammunition Plant (TCAAP) and portions of seven nearby communities. These communities are New Brighton, St. Anthony, Arden Hills, Shoreview, Mounds View, Columbia Heights, and Minneapolis, with the predominant land uses being mixed residential, commercial and industrial. As presently defined, the site covers much of the U.S. Geological Survey's New Brighton, Minnesota 7.5-minute quadrangle (**Figure 1**).

Within the New Brighton/Arden Hills study area, ground water is found in both bedrock and glacial deposit aquifers. In general, there are four aquifer units at the site. The first consists of the surficial lacustrine deposits that form a shallow, unconfined aquifer. The second is composed of glacial Twin Cities Till, which acts as an aquitard, preventing hydraulic communication between the surface and the underlying major glacial aquifer. The third is composed of the Hillside and Arsenal Sands and is the major glacial aquifer in the area. The fourth is the Prairie du Chien/Jordan bedrock aquifer, which is hydraulically connected to the overlying Hillside Sand.

The site consists of gently rolling, postglacial terrain with several hills and surface water bodies, including lakes and streams, but no extreme relief. The site is located within the Rice Creek watershed. Rice Creek and its surrounding marshes and woodlands provide cover for a variety of vegetation and wildlife. Much of the lowland area adjacent to Rice Creek has lush and vigorous vegetation creating a wildlife habitat well suited to small animals.

Rice Creek meanders across the northwestern portion of TCAAP and leaves TCAAP at the western boundary. Among the many small lakes located in the Rice Creek Basin, several are located on and near the TCAAP facility (**Figure 2**). Surface waters in the Rice Creek watershed are not currently used for drinking water, but they are used for recreational purposes.

The TCAAP facility is currently operated by Federal Cartridge Company (FCC) and used by two manufacturing lessees, Alliant Techsystems (previously a branch of Honeywell, Inc.) and 3M Corporation. Approximately 1,500 people are currently employed at TCAAP. Access to TCAAP is controlled by a 6-foot-high chain-link fence. The boundary is patrolled by guards.

In general, the off-TCAAP area is suburban in character, is becoming increasingly urban to the south, and is rural to the northeast. According to the 1990 census, the population in the New Brighton quadrangle area is approximately 100,000. Residential areas virtually surround TCAAP with the heaviest developments to the west-southwest and east-southeast. Many schools are located within 2 miles of the TCAAP facility.

The TCAAP facility contains a large number of source areas with resulting soil, sediment, surface, and ground water contamination. The source areas associated with on-TCAAP will be addressed by OU-2.

B. Site History and Enforcement Activities

TCAAP has been use to manufacture, store, and test small arms ammunition and related materials since 1941. Between 1941 and 1981, waste material, including volatile organic compounds (VOCs), heavy metals, corrosive materials, and explosives, were used and/or disposed of at the 14 source areas within TCAAP **(Figure 3)**. In 1981, the Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Health (MDH) began ground water sampling and analysis from wells in the TCAAP area. The analytical results from these samples indicated that private drinking water wells and wells at TCAAP were contaminated by VOCs. As a result, the following actions were taken:

- The City of New Brighton abandoned several municipal wells and either placed on standby or deepened several others.
- The Village of St. Anthony decommissioned one well and connected a portion of the village with Roseville water supplies for an indefinite, but temporary period.
- A number of New Brighton/Arden Hills residents drawing contaminated drinking water were provided municipal water through construction of a water main extension.
- Residents of the Arden Manor Trailer Park drawing contaminated drinking water were provided with new wells finished in an aquifer with potable water. The wells were provided by Arden Manor Trailer Park, which was later reimbursed by the Army.

The NB/AH Site was proposed for inclusion on the National Priorities List (NPL) in July 1982 and finalized in September 1983, with a Hazard Ranking System (HRS) score of 59 and a ranking of 43 on the (NPL). In 1981 the Army began a Phase I investigation at TCAAP which involved a significant quantity of monitoring wells and sampling efforts designed to identify the overall contribution of TCAAP to the NB/AH Site contamination. In 1983, EPA's Field Investigation Team (FIT) completed a

documentation record and site assessment for the site. The assessment documented high concentrations of synthetic organic compounds in ground water at the site. Releases of these compounds from the site to surface water and direct human contact with the compounds were also documented. The elevated HRS score and correspondingly high NPL ranking reflect the following site conditions: 1) the relatively large number of individuals exposed to contaminated ground water through their potable water supplies, and 2) the potentially carcinogenic nature of the compounds.

The NB/AH site, as currently defined, consists primarily of portions of several regional aquifers that are contaminated to differing degrees with volatile organic compounds (VOCs). Concentrations for several of these compounds exceed current health based criteria. The affected aquifers supply water to TCAAP and the municipalities of New Brighton, St. Anthony, Fridley, and Moundsview. On TCAAP itself, contamination of soils, sediments and surface waters is also of concern.

PROBLEM DEFINITION

Ground water contamination emanating from TCAAP, identified as the primary source of ground water contamination within the area of the NB/AH sites, has posed a potential health hazard. This hazard potentially results from direct human contact (dermal contact, inhalation or ingestion) of ground water with industrial solvents including trichlorethene (TCE), dichlorethene (DCE), trichlorethane (TCA) and dichloroethane (DCA). Studies concerning volatile organic compounds (VOCs) in ground water within the study area have been undertaken primarily by the Army, Alliant Techsystems, MPCA, EPA, and private entities. These studies have largely involved the installation and sampling of monitoring wells and water quality surveys of production, municipal, and residential wells. The objectives and results of the studies are summarized as follows.

PREVIOUS STUDIES

Army reports of investigations and studies at TCAAP in 1983 and 1984 identified major and minor disposal areas on the facility that were sources of release or threatened release of hazardous substances (mainly VOCs). In their review of these reports, EPA and MPCA noted that additional information was needed to address the extent and magnitude of contaminated ground water, to fill data gaps relative to off-site contamination, and to complete an assessment of the disposal areas identified on TCAAP.

In 1984 and 1985 the Army submitted investigative reports addressing VOC contamination at Alliant-TCAAP buildings 103 and

502 (Sites I and K). The reports indicated that the buildings' operations were a source of VOC-contaminated ground water migrating toward Rice Creek from Building 103 and also to the west or southwest from the Building 502 area. As a result of these findings, Alliant announced a three-phase off-TCAAP investigation on July 28, 1984, to supplement work being conducted by MPCA to identify off-TCAAP sources of release.

In the spring of 1985, EPA initiated an investigation of the force mains off-TCAAP because a number of documented breaks had occurred in the line in the study area and because VOCs and other hazardous wastes and metals had been detected in the sewer sediments on-TCAAP.

Also in 1985, MPCA released the Phase I Final Report, New Brighton/Arden Hills, Minnesota Multi-Point Source Remedial Investigation. The report identified four potential source areas of VOC release in the study area that had possibly contaminated the ground water. The source areas included two areas at TCAAP and two areas adjacent to TCAAP. A second phase of the off-TCAAP RI, Phase IA, was initiated in July, 1986 and completed in February, 1991. The purpose of the Phase IA RI was to further define the nature and extent of ground water contamination in off-TCAAP areas.

In 1988, the Army initiated an on-TCAAP RI designed to characterize the nature and extent of contamination within the facility boundary, addressing soils, sediments, surface and ground water. The on-TCAAP RI was completed in April, 1991.

Additionally, in 1991, EPA completed the Human Health Risk Assessment and Army completed the Environmental Risk Assessment. The completion of these four documents has led to the development of feasibility studies for final remedial actions at the NB/AH site.

INTERIM REMEDIAL ACTIONS

Most of the interim remedial actions (IRAs) taken at TCAAP have been implemented under the Army Installation Restoration Program (IRP). These actions have been coordinated with federal and state regulatory agencies prior to implementation. Alliant Techsystems entered into an agreement with the Army in 1985 to investigate and pursue the cleanup of sites at TCAAP associated with Alliant operations. Industrial operations at TCAAP have generated most of the contamination currently migrating from the site. The interim remedial actions being conducted by the Army and Alliant have concentrated on contaminant source control, with a focus on individual site cleanups and ground water (aquifer) remediation. Actions that have already been taken can be divided into the categories of: a) alternate water supplies, b)

unilateral actions by the Army, c) actions with EPA and state concurrence and d) other actions initiated by EPA and/or Army.

a) Alternate Water Supplies

In addition to the previously mentioned alternate water supplies that were provided shortly after the discovery of contamination at the site, the following systems have been completed:

- A temporary, followed by a permanent, GAC treatment system constructed for the City of New Brighton by the Army as part of a litigation settlement agreement. The permanent system, completed in June 1990, presently treats water from New Brighton Wells 3, 4, 5 and 6 and has a capacity of 3200 gallons per minute (gpm).

- A temporary, followed by a permanent, GAC system constructed for the Village of St. Anthony by EPA/MPCA. The permanent system is a remedial action pursuant to a Record of Decision (ROD) signed in September 1986. The system, completed in April 1991, treats water from St. Anthony Wells 3, 4 and 5 and has a capacity of 2400 gpm.

b) Unilateral Actions by the Army

Unilateral removal actions have been taken by the U.S. Army using its own delegated removal authorities under CERCLA Section 104. These actions have included:

- In-situ soil vapor extraction (ISV) systems for the remediation of contaminated soils at Sites D and G on-TCAAP. The ISV systems were implemented in 1986 and, since then, have removed over 114 tons of VOCs from site soils.

- A ground water pump-and-treat system at Site A, where the surficial aquifer is contaminated with VOCs. The system, installed by the Army in 1988, utilizes liquid-phase activated carbon to treat extracted groundwater, which is then surface-discharged.

- Ground water pump-and-treat systems installed in 1988 at Sites I and K, Alliant operations buildings. Groundwater underneath the buildings is contaminated with VOCs with the likely source identified as leaks from floor drains and sewer lines. The extracted ground water is treated by air stripping. The treated ground water from Site K is discharged to a sewer under a National Pollutant Discharge Elimination System (NPDES) permit issued by the state. The treated ground water from Site I is discharged to the TCAAP Ground Water Recovery System (TGRS). The TGRS is more fully described in the next section.

c) Actions with EPA and State Concurrence

- In 1987 the Army implemented the Boundary Groundwater Recovery System (BGRS), for which EPA signed a Record of Decision (ROD) in September 1987. This system initially consisted of a series of six groundwater extraction wells located along the southwest boundary of TCAAP and designed to prevent any further migration of contaminated ground water off of TCAAP. After a period of performance monitoring, the system was expanded in 1989 to twelve wells. Eight of the BGRS wells draw water from the Hillside Sand aquifer with the other four drawing from the Prairie du Chien.

  The BGRS operates at an extraction rate of approximately 2100 gpm. Extracted water is pumped to an air stripping facility for the removal of VOCs. From there the treated water is pumped to the Arsenal Sand and Gravel Pit in the north-central portion of TCAAP, where it is discharged and allowed to infiltrate back into the ground. Over 5 billion gallons of water have been treated and 45 tons of VOCs removed by this system.

- In addition to the implementation of the BGRS, the Army subsequently installed five source control (SC) wells downgradient of Sites D, G and I. The BGRS and the SC wells together comprise the TCAAP groundwater recovery system (TGRS). The BGRS and TGRS are designed to provide regional ground water remediation at TCAAP and prevent additional contamination from migrating beyond the facility boundaries.

d) Other Actions Initiated by EPA and/or Army

- Site J, the sanitary sewer system at TCAAP, has been investigated in several studies. In 1983, integrity testing was conducted on part of the upper plant sewer and on the 18-inch and 24-inch force mains. During 1984, approximately 50 percent of the sanitary sewer system (over 42,000 linear feet) was inspected, cleaned, and tested. By July 1986, cleaning of all sewer lines was completed.

- Between 1984 and 1986, Alliant Techsystems removed contaminated sludge from the sewers leading away from Building 502, containerized the sludge in drums and stored it in a building called the Retrievable Monitored Containment Structure (RMCS). In addition, in 1985, Alliant excavated PCB-contaminated soils around Building 502 and placed them in the RMCS.

- 1400 cubic yards of PCB-contaminated soil at Site D were thermally treated in 1989. EPA prepared the ROD and the risk assessment report for this action.

- The Army completed a two-phase water management study to evaluate feasible alternatives for the disposal of treated ground water anticipated from future remedial measures.

CERCLA ENFORCEMENT ACTIVITIES

Pursuant to Section 120 of the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Army entered into a Federal Facility Agreement (FFA) with EPA and the State of Minnesota. The TCAAP FFA, which became effective on December 31, 1987, was the first to be negotiated between EPA and any federal agency since the enactment of SARA. The general purposes of the FFA are to:

1) Ensure that the environmental impacts associated with past and present activities at TCAAP are thoroughly investigated and that appropriate remedial actions are taken to protect the public health, welfare and the environment.

2) Establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions in accordance with CERCLA/SARA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Superfund guidance and policy, The Resource Conservation and Recovery Act (RCRA), and RCRA guidance and policy.

3) Ensure cooperation, information exchange and participation of the parties in such actions.

The specific purposes of the agreement are to:

1) Identify interim remedial action alternatives appropriate for preventing further migration of contaminated ground water prior to the implementation of final remedial actions for the site.

2) Establish requirements for conducting the on-TCAAP RI to determine fully the nature and extent of the threat to the public health, welfare, or the environment caused by the release and threatened release of hazardous substances, pollutants, or contaminants at TCAAP.

3) Establish requirements for conducting an FS for the site to identify, evaluate, and select alternatives for the appropriate remedial action(s) to prevent, mitigate, or abate the release or threatened release of hazardous substances, pollutants, or contaminants at the site in accordance with CERCLA and SARA.

4) Identify the nature, objective, and schedule of response actions to be taken at the site. Response actions at the

site shall attain that degree of cleanup of hazardous substances, pollutants, or contaminants mandated by CERCLA and SARA.

5) Implement the selected interim and final remedial action(s).

6) Assure compliance with federal and state hazardous waste laws and regulations for matters covered by the agreement.

C. Highlights of Community Participation

The community near TCAAP has been involved in site activities since the environmental problems related to the TCAAP facility were identified. Numerous fact sheets have been sent and public meetings have been held to keep the community apprised of the various remedial activities at the site.

For the remedy selection for OU-3, the public participation requirements of CERCLA sections 113 (k)(a)(B)(i-v) and 117 were met through the issuance of a fact sheet and Proposed Plan, notification of the availability of the Proposed Plan by newspaper, and the holding of a public meeting on August 18, 1992. The public comment period for the Proposed Plan began on July 22, 1992, and ended on August 21, 1992.

D. Scope and Role of Operable Unit Within Site Strategy

OU-3 is one of three operable units for this site. OU-3 will address the off-TCAAP ground water contamination occurring in the South Plume in aquifer Unit 3 and Unit 4. OU-1 will address the off-TCAAP ground water contamination occurring in the North Plume. OU-2 will address the on-TCAAP source areas including contaminated soils, sediments, surface water and ground water. These three operable units, combined with the currently operating TGRS, will comprise the final remedy for this site. OU-3 provides for the containment and eventual restoration of the South Plume of contaminated ground water located off-TCAAP in aquifer Unit 3 and Unit 4.

The division of the site into three operable units for purposes of the final remedial action is based upon the following considerations:

1) The on-TCAAP RI recommended that additional site characterization work be performed within the boundaries of TCAAP for soils, surface waters, sediments and groundwater. This additional work must be completed before remedial alternatives can be proposed for these media. The operation of the BGRS interim remedial action, designed to prevent the further migration of contaminated groundwater past the TCAAP boundary, has allowed off-TCAAP groundwater contamination to be considered separately from on-TCAAP sources and

contaminated media. Therefore, delaying a response to off-TCAAP groundwater contamination until the completion of the additional on-TCAAP work is not warranted.

2) Based upon the results of the off-TCAAP RI, proposed remedial alternatives for the large off-TCAAP North Plume of contaminated groundwater, OU-1, will require a more involved analysis than is necessary for the smaller South Plume, OU-3. This analysis will include detailed groundwater modeling and an evaluation of the effects of the alternate water supplies provided to the City of New Brighton and the Village of St. Anthony. The separation of the South Plume into a separate operable unit prevents the migration of the South Plume into uncontaminated portions of the affected aquifer in a more timely fashion.

In sum, EPA has determined that a phased approach is appropriate, given the size and complexity of the site , and will expedite the completion of total site cleanup. EPA has also concluded that OU-3 will not be inconsistent with nor preclude implementation of other components of the final site remedy.

E. Summary of Site Characteristics

Within the New Brighton/Arden Hills study area, ground water is found in both bedrock and glacial deposit aquifers. On top of the irregular bedrock surface, a series of unconsolidated glacial sediments has been deposited. Several of these units are water bearing and have been affected by the spread of contaminants from TCAAP.

The Prairie du Chien/Jordan Sandstone aquifer is the principal aquifer in the Twin Cities Basin. This aquifer is referred to as Unit 4. Permeability in the Prairie du Chien/Jordan Sandstone aquifer is controlled by the extent of fractures and joints in the Prairie du Chien unit and the porosity of the Jordan Sandstone unit. Ground water flow through this aquifer is generally in a west-southwest to south-southwest direction off-TCAAP toward the Mississippi River. Recharge to the Prairie du Chien/Jordan Sandstone aquifer occurs by infiltration through the overlying glacial units. Aquifer performance tests involving the Prairie du Chien/Jordan Sandstone aquifer, as well as subsequent modeling, suggest that a semiconfining layer may exist between the Jordan Sandstone and Prairie du Chien units.

The Hillside Sand and the Arsenal Sand are referred to as Unit 3. Within the New Brighton quadrangle, the Hillside/Arsenal Sand outcrops in four areas: the Arsenal Kame within TCAAP; the southwestern corner of the quadrangle within Minneapolis; two small areas in Columbia Heights in the vicinity of Silver Lake; and along the southern edge of Snail Lake. Except for the exposure in Minneapolis, the Hillside/Arsenal Sand directly

overlies the Prairie du Chien/Jordan Sandstone aquifer; the other three surface exposures provide direct recharge to both units. The ground water in the Unit 3 flows predominantly southwest.

The Twin Cities Till overlies the Hillside Sand in much of the area and is referred to as Unit 2. The Twin Cities Till acts as a confining layer, preventing direct hydraulic communication between the overlying Lacustrine Deposits and the Hillside Sand below.

The Lacustrine Deposits (Unit 1) are predominantly fine to medium sands with interbedded silt layers and occasional minor peat and clay layers. These units form the shallow surface aquifer between and to the north of the Hilltop and Arden Hills moraines. Private wells installed in Unit 1 exist to the north of TCAAP. Ground water in this unit is perched and discontinuous. Any ground water flow is localized and toward the closest small lake.

Ground water in Unit 3 and Unit 4 aquifers is considered Class II in accordance with, "EPA Guidelines for Ground water Classifications." Class II groundwater is groundwater that may potentially be used as a potable water supply. Unit 3 and 4 ground water is of potable quality and is currently used as a drinking water supply.

Ground water in aquifer Units 1, 3, and 4 has been contaminated by one or more of the 14 source areas identified on the TCAAP facility. Off-TCAAP, VOCs within the South Plume migrate horizontally and downward vertically in response to corresponding hydraulic gradients. The South Plume migrates in a southwesterly direction off TCAAP in both the Hillside and Prairie du Chien aquifers. The north and South Plumes diverge immediately off-TCAAP with the South Plume moving in a more southerly direction **(Figure 4)**.

The South Plume extends approximately 10,000 feet beyond TCAAP. The down gradient limit of the South Plume is evidenced by low level of VOCs at wells in the Unit 4 aquifer. Unit 3 no longer exists at the leading edge of the plume, so any contamination present will be found in the Unit 4 aquifer.

In the Operable Unit 3 Feasibility Study, six VOCs have been identified at concentrations above 1 μg/l in the South Plume, as follows, in descending order based on concentration:

- Trichloroethene
- Cis-1,2-Dichloroethene
- 1,1-Dichloroethene
- 1,1-Dichloroethane
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane

Of these six VOCs, trichloroethene is of most concern because it is present in the highest concentration and because it is carcinogenic. Concentrations of trichloroethene in Unit 3 range from < 1 µg/l to 3,800 µg/l. Trichloroethene concentrations in Unit 4 range from < 2.6 µg/l to 420 µg/l. Concentrations decrease away from the center of the plume and with increasing distance from the site. **Figure 5** shows concentrations for trichloroethene in Unit 3. **Figure 6** shows concentrations for trichloroethene in Unit 4.

F. Summary of OU-3 Risks

In 1990 EPA conducted a Human Health Risk Assessment for the site. The Risk Assessment evaluated both on-TCAAP and off-TCAAP areas affected by contamination under current and future use for both the probable and reasonable maximum exposure (RME) scenarios. The portions of the Risk Assessment regarding off-TCAAP ground water risks are summarized in this section of the ROD. It should be noted that both the South Plume and North Plume for Unit 3 and Unit 4 were included in the off-TCAAP ground water risk assessment. The V, W, X, Y, and Z areas of Unit 3 and Unit 4, as shown in Figures 5 and 6, are based on general concentration levels of trichloroethene. These general concentration areas of Unit 3 and Unit 4 occur in both the South and North Plumes. The arithmetic averages and upper-bound 95% confidence levels for the contaminants of concern were calculated based on contaminant concentrations in the South and North Plumes. Human health risks were evaluated using a four step process: 1) contaminant identification, 2) exposure assessment, 3) toxicity assessment, and 4) risk characterization. Each of these steps is summarized below.

1) <u>Contaminant identification</u>

The media of concern for OU-3 is ground water in the South Plume of aquifer Unit 3 and Unit 4. **Table 1** specifies the contaminants of concern for the South Plume according to the Risk Assessment Exposure Areas labeled V, W, X, Y, and Z. The contaminant concentrations used in quantifying risks from ground water exposure are presented in **Table 2**. The probable exposure scenario used the arithmetic average for individual contaminant concentrations. The upper-bound 95% confidence limit on the arithmetic average for individual contaminants was the concentration used to calculate the reasonable maximum exposure (RME). The maximum concentration measured for a given exposure point was used to represent RME conditions when the upper-bound 95% confidence limit on the arithmetic average exceeded the maximum concentration.

2) Exposure Assessment

Both the current and future potential risk from exposure to off-TCAAP contamination was evaluated. The current and future uses were the same for the ground water pathway. Currently, most residents living off-TCAAP receive their potable water from municipal water supply wells. The water from these wells is either contaminant-free when drawn from the ground or, in the case of the municipal water supply wells of New Brighton and St. Anthony, runs through granular activated carbon (GAC) treatment systems that reduce contamination to required levels before being distributed to the public. The only way that residents would be exposed to contaminated ground water would be if the current GAC treatment systems fail. Such failures are not expected because of the redundancy built into the system, with the carbon units operating in series.

Officials from off-TCAAP municipalities have acknowledged that a small number of unidentified private water supply wells may exist off-TCAAP to the southwest. EPA, MPCA and Army have solicited information regarding private well use in the area. Army has notified local residents through various media in an effort to identify private wells impacted by the contaminated plumes off-TCAAP and none have, at this time, been identified. Currently, Army is conducting an additional well search in the area. This effort is being coordinated with the State of Minnesota and EPA. The present number of private wells within the plume extending southwest from TCAAP cannot be determined at this time.

In the future, ground water in Unit 3 and Unit 4 will continue to be used as potable water for municipal supplies and may be used by private well users near the site. The rate of usage will likely increase as the area grows and develops further.

Exposure to chemicals in ground water may occur via three routes: (1) ingestion, (2) inhalation of volatiles during showering, and (3) dermal absorption during bathing. If any of the water users are commercial/industrial operations, then exposure would be assumed to occur primarily via ingestion unless specific instances of bathing could be documented.

The parameter values used in quantification of exposure for the probable and RME scenarios are listed in **Table 3**. The exposure doses or chronic daily intakes per pathway for the probable and RME scenarios are presented in **Table 4**.

3) Toxicity Assessment

A toxicity assessment is conducted to provide qualitative and quantitative information regarding the potential for particular contaminants to cause adverse effects in exposed individuals. Toxicity values, such as slope factors and reference doses, are

derived from the quantitative assessment and used together with exposure assessment values to characterize risk.

Cancer potency or slope factors (SFs) have been developed by EPA's Carcinogenic Assessment Group 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 provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for evaluating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, above which there may be an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

Table 5 lists the oral and inhalation reference doses for the contaminants of concern. **Table 6** lists the oral slope factors for the contaminants of concern. **Table 7** lists the inhalation slope factors for the contaminants of concern.

4) Risk Characterization

The quantitative risk characterization combines the results of the exposure assessment and toxicity assessment to characterize the carcinogenic and noncarcinogenic risks posed by contaminants at the site.

The determination of carcinogenic risk is based upon calculating how much of an **increased** risk a chemical poses over the average or "background" level. For the general population, the background risk of cancer is about one chance in three, or 33 percent, of developing some form of cancer in one's lifetime.

EPA uses a range of increased cancer risk of between **one in ten thousand** to **one in one million** (1×10^{-4} to 1×10^{-6}) as the level at which it requires that action be taken to reduce risk.

The determination of noncarcinogenic risk is based upon the calculation of a term called the **Hazard Index.** If the Hazard index for a risk pathway is less than one, noncarcinogenic risk is not expected at the site. A Hazard Index greater than one represents a potential for the occurrence of noncarcinogenic health risks.

For off-TCAAP ground water, there is a greater than 1×10^{-4} carcinogenic risk associated with 1,1-dichloroethene and trichloroethene in portions of both Unit 3 and Unit 4 aquifers. Noncarcinogenic hazard indices were less than one in nearly all cases. There were some exceedances of a hazard index of one for a few individual chemicals. These exceedances were slight and do not cause a noncarcinogenic risk for Unit 3 or Unit 4 ground water in the areas encompassed by this operable unit.

Table 8 presents the non-carcinogenic and carcinogenic risks for the probable and RME scenarios. Unit 3 and Unit 4 were divided into areas based on the concentration of trichloroethene (see Figures 5 and 6). Both the chronic and acute hazard indices were evaluated for noncarcinogenic risks.

Table 9 summarizes the areas of uncertainty and their effects on the risk estimates.

An ecological assessment was conducted for the Site by the Army. This assessment will be augmented by additional work during the Feasibility Study for OU-2. OU-3 is not ecologically impacted because Unit 3 and Unit 4 ground water aquifers are deep and do not affect surface waters in the area of contamination.

Actual or threatened releases of hazardous substances from this 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.

G. Description of Alternatives

The OU-3 Feasibility Study examined appropriate remedial technologies (**Table 10**) and combined these technologies into various remedial alternatives. The remedial alternatives were screened and evaluated, resulting in the retention of three alternatives plus the no-action alternative, for detailed analysis. A description of the alternatives analyzed in detail is presented below:

Alternative 1: No Action With Monitoring

Evaluation of the No Action Alternative is required by the NCP. The No Action Alternative serves as a baseline alternative for comparison to the "action" alternatives. Under this alternative, no additional remedial action would be undertaken for the South Plume. Access to contaminated ground water could be somewhat controlled by enforcing well drilling permit regulations to help prevent the potential exposure to persons consuming water from private wells in the area. Ground water monitoring would continue under the existing Federal Facilities Agreement. The no action alternative provides no additional protection of human health or the environment. The South Plume would continue to migrate beyond the current monitoring well network and impact currently "clean" portions of the deep aquifers (Units 3 and 4).

Capital Cost: $0
Annual O&M: $50,000
Present Worth: $471,000

Alternative 2: Ground Water Extraction, Treatment at TCAAP Air Stripping Facility, Discharge to Arsenal Sand and Gravel Pit

Alternative 2 proposes installation of a ground water extraction well located in aquifer Unit 4 at the leading edge of the South Plume. Water would need to be pumped from Unit 4 at a rate of 1,000 gallons per minute to contain the South Plume. Near the leading edge of the South Plume Unit 3 merges with Unit 4. Therefore pumping of Unit 3 would not be necessary. At present one extraction well is proposed. However, based on the results of pump tests, additional wells would be added if they were needed to contain the South Plume. Monitoring wells would be added to the Unit 4 network to verify hydraulic capture.

The extracted ground water would be piped to TCAAP and undergo treatment by air stripping at the existing TCAAP treatment system. The existing system would be expanded to accommodate the additional flow, with the treated water being discharged to the Arsenal Sand and Gravel Pit. The Arsenal Sand and Gravel Pit is currently used for discharge of treated water from the TGRS. The major disadvantage of this discharge option is the potential limitation to the amount of water that can be recharged to the gravel pit without affecting VOC capture by the BGRS.

The area of attainment for this alternative is the areal and vertical extent of Unit 3 and Unit 4 now encompassed by the South Plume. The South Plume extends approximately 10,000 feet beyond the TCAAP boundary and is approximately 2,000 feet wide. The point of compliance for monitoring would be at the leading edge of the South Plume. The final performance monitoring system would be established during the remedial design/remedial action.

There are two major Applicable or Relevant and Appropriate Requirements (ARARs) for Alternative 2. One relates to ground water cleanup levels, and the other relates to operation of the treatment system. The contaminated ground water in the South Plume must be extracted and treated until the concentration of the six VOCs reaches the cleanup levels specified in this Record of Decision. As Class II ground water aquifers, Units 3 and 4 should be restored to drinking water quality. The estimated aquifer restoration timeframe is 30-to-50 years. The Safe Drinking Water Act (SDWA) MCLs and non-zero MCLGs are considered relevant and appropriate based on Section 300.400(g) of the NCP. The State of Minnesota Recommended Allowable Limits (RALs) are to be considered (TBCs) as cleanup standards also. The following table lists MCLGs, MCLs and RALs for the contaminants of concern.

MCLG/MCL/RAL TABLE

Compound	MCLG (µg/l)	MCL (µg/l)	RAL (µg/l)
1,1- Dichloroethane	-	-	70
1,1- Dichloroethene	7	7	6
Cis-1,2- Dichloroethene	70	70	70
1,1,1- Trichloroethane	200	200	600
1,1,2- Trichloroethane	3*	5*	3
Trichloroethene	Zero	5	30

*Proposed MCL/MCLG

Because the affected aquifer may potentially be used for both public and private drinking water supplies, the lowest concentration value among the MCL, non-zero MCLG or RAL would be followed. If a particular contaminant does not have an MCL or non-zero MCLG, such as 1,1-dichloroethane, the RAL would be followed.

If contaminants of concern reach static concentrations over a period of time, the extraction system would be evaluated to determine if alternate pumping strategies would enhance contaminant recovery. Ground water monitoring would be required until restoration of the aquifer is achieved and the extraction system is shut down.

The RCRA requirements of 40 CFR 264 Subpart AA, limiting total organic emissions from air strippers would be relevant and appropriate to Alternative 2. Alternative 2 would comply with this ARAR.

The water well drilling regulations established by the State of Minnesota is an institutional control that would be used to help prevent the installation of private wells in the South Plume before cleanup standards are achieved. These regulations also protect aquifers from the spread of contamination by requiring

specific construction procedures and materials, maintenance standards and abandonment procedures from all wells, including monitoring and pumping wells.

Alternative 2 would take approximately 4 months to implement.

Capital Cost: $2,764,000
Annual O&M: $ 258,000
Present Worth: $5,196,000

Alternative 3: Ground Water Extraction, Treatment with Granular Activated Carbon (GAC), Discharge to New Brighton Municipal Water Supply

Alternative 3 would use the same extraction system proposed for Alternative 2. The extracted ground water would be conveyed to a new GAC treatment system (**Figure 7**) and inorganic treatment facility to be constructed at the New Brighton Public Works garage area. A pilot study would be conducted to determine the most efficient and cost effective precipitation/filtration combination to be used for treatment of inorganics. Treated ground water would be discharged to the City of New Brighton municipal water supply system, through a newly constructed force main. New Brighton would use the treated water for its potable water supply.

The area of attainment and point of compliance described in Alternative 2 also applies to Alternative 3. In addition to the ARARs and institutional controls outlined in Alternative 2, Alternative 3 would have to comply with RCRA 40 CFR Part 268 Subpart D for the disposal of spent carbon. The tanks used for treatment of the ground water would need to comply with the substantive requirements for tanks set forth in 40 CFR Part 264 Subpart J.

Iron and manganese, the two predominant inorganics, would be removed to comply with SDWA Secondary Drinking Water Standards. The treated ground water must meet the cleanup standards specified in this ROD, which are MCLs and/or RALs, for the six VOCs of concern. The time to implement Alternative 3 would be approximately 6-9 months.

Capital Cost: $2,249,000
Annual O&M: $ 276,000
Present Worth: $4,851,000

Alternative 4: Extraction of Ground water, Treatment with GAC, Discharge to Mississippi River

This alternative would consist of the same extraction system described in Alternative 2. The treatment system would be the same as for Alternative 3, except that it would not include

inorganics removal. Treated water would be discharged via a pipeline from the New Brighton Public Works garage area to the Mississippi River. This pipeline would be constructed along the I-694 right-of-way. This option would require a variance from the U.S. Department of Transportation regulations that regulate utilities along interstate highway right-of-ways.

The area of attainment and point of compliance for Alternative 4 is the same as that described for Alternative 2. Major ARARs for Alternative 4 include MCLs and RALs for ground water cleanup, RCRA regulations regarding tanks used in the treatment process and disposal of spent carbon, and National Pollution Discharge Elimination System (NPDES) effluent limitations established by the Clean Water Act 40 CFR Parts 104-140, 401-469. The institutional controls described in Alternative 2 also apply to Alternative 4.

The implementation time for Alternative 4 would be approximately 6-12 months.

Capital Cost: $6,521,000
Annual O&M: $ 366,000
Present Worth: $9,971,000

H. Summary of the Comparative Analysis of Alternatives

The NCP requires that the alternatives be evaluated on the basis of the nine evaluation criteria listed below. This section summarizes how the alternatives retained for detailed analysis compare to one another when measured against the nine criteria.

EPA's Nine Evaluation Criteria for addressing hazardous waste sites are:

1) Overall Protection of Human Health and the Environment

   The assessment against this criterion describes how the alternative, as a whole, achieves and maintains protection of human health and the environment.

2) Compliance with Applicable or Relevant and Appropriate Requirements (ARAR)

   The assessment against this criterion describes how the alternative complies with existing federal, state and municipal laws, regulations, and other established standards or, if a waiver is required, how it is justified. The assessment also addresses other information from advisories, criteria, and guidance that are to be considered.

3) Long-Term Effectiveness and Permanence

The assessment of alternatives against this criterion evaluates the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response objectives have been met.

4) Reduction of Toxicity, Mobility, and Volume Through Treatment

The assessment against this criterion evaluates the anticipated performance of the specific treatment technologies employed by an alternative.

5) Short-Term Effectiveness

The assessment against this criterion examines the effectiveness of the alternative in protecting human health and the environment during the construction and implementation of a remedy until response objectives have been met.

6) Implementability

This assessment evaluates the technical and administrative feasibility of alternatives and the availability of required goods and services.

7) Cost

This assessment evaluates the capital and operation and maintenance (O&M) costs of each alternative.

8) State Acceptance

This assessment reflects the state's apparent preferences among or concerns about alternatives.

9) Community Acceptance

This assessment reflects the community's apparent preferences or concerns about alternatives.

Comparative Evaluation of Alternatives

A comparative evaluation of the four alternatives for each of the nine criteria is presented below and summarized in **Table 11.**

Threshold Criteria

1. Overall Protection of Human Health and the Environment

The no action alterative provides no additional protection of human health or the environment such that the site would continue to present an imminent and substantial endangerment to human health and the environment. The remaining three alternatives all provide the same degree of overall protection of human health and the environment in limiting further migration of contaminants from the South Plume. However, the discharge of treated water to the Arsenal Sand and Gravel Pit could potentially compromise the BGRS by causing an increased flow of contaminated ground water between the BGRS wells. Therefore, Alternative 2 would not be as protective as Alternatives 3 and 4.

Institutional controls, such as water well drilling regulations will help to prevent consumption of contaminated ground water in the South Plume until the cleanup standards are met. The extraction of ground water will prevent further migration of contaminants, protecting ground water users downgradient of the South Plume.

2. Compliance with ARARs

The no action alternative allows contamination present in the ground water to remain and migrate. The remaining alternatives remove contamination so that the treated ground water meets all ARARs.

The extraction and treatment portions of Alternatives 2, 3, and 4 would meet the requirements of the Safe Drinking Water Act (40 CFR Parts 141-149) for MCLs, the Minnesota RAL for 1,1-Dichloroethane and 1,1-Dichloroethene, and the requirements of the Resource Conservation and Recovery Act (RCRA) (40 CFR Part 268 Subpart D) for the disposal of spent carbon. In addition, the tanks used for the treatment of the ground water would comply with the substantive requirements for tanks set forth in 40 CFR Part 264 Subpart J. Alternative 2 would also comply with RCRA requirements limiting total organic emissions from air strippers (40 CFR 264 Subpart AA). Finally, Alternative 4 would comply with the effluent limitations of NPDES which was established under the Clean Water Act (40 CFR Parts 104-140, 401-469).

Primary Balancing Criteria

3. Long-Term Effectiveness

The no action alternative, which includes continued ground water monitoring, provides no long-term effectiveness. Alternative 2, in the absence of supplemental water discharge options, will eventually have a negative, long-term impact on contaminant capture because additional ground water will re-enter in the Arsenal Sand and Gravel Pit and likely effect contaminant capture at the BGRS. Alternatives 3 and 4 will remain effective on a long-term basis. Alternative 3 will provide a long-term source of treated water for use by the City of New Brighton. Because it provides the best use of the local ground water resource, Alternative 3 is considered to be better than Alternative 4. The uncertainty associated with the extraction system's ability to achieve cleanup standards in the long-term affects Alternative 2, 3, and 4 equally.

4. Reduction of Toxicity, Mobility, and Volume (TMV)

The no action alterative provides no reduction of TMV. Alternatives 2, 3, and 4 reduce toxicity by treating VOCs, and reduce the volume of contamination by removing it from the ground water. Alternatives 2, 3, and 4 are, therefore, equally effective for reduction of TMV.

5. Short-Term Effectiveness

The no action alternative, which includes continued monitoring, provides no short-term effectiveness. Alternatives 2 and 4, in their requirement for the construction of pipeline along rights-of-way to the Arsenal Sand and Gravel Pit and to the Mississippi River, respectively, would take somewhat longer to construct and would have greater short-term impacts than Alternative 3. Alternative 3, in which well(s) and conveyances are all contained within the same area of New Brighton, has the fewest short-term environmental impacts. Alternatives 2, 3, and 4 each require the same amount of time to restore ground water to cleanup standards, and use institutional controls to help prevent use of contaminated ground water until cleanup standards are reached. Alternatives 2, 3, and 4 are all considered acceptable when evaluated against this criterion.

6. Implementability

Alternative 1, the No Action alternative, does not require implementation. Alternative 2 utilizes conventional extraction and treatment technologies; however, the

forcemain will require significant access arrangements and cooperation from various government units and private parties. Thus, installation of the forcemain could be delayed. Alternative 3 is fully implementable using conventional construction technologies. New Brighton is willing to accept the treated water and to provide easements for a forcemain and the treatment plant construction. Alternative 4 is implementable using conventional construction technologies but would require forcemain construction through highly developed areas and an exemption from Federal Transportation Department regulations, either of which will require substantial lead times. Alternative 3, therefore, is the most implementable alternative.

7. Cost

The capital, O&M, and present worth costs (based on a 30 year period and 10% discount rate) for the four alternatives are summarized below:

	Capital Cost	Annual O&M Cost	Present Worth
Alternative 1	$0	$50,000	$ 471,000
Alternative 2	$2,764,000	$258,000	$5,196,000
Alternative 3	$2,249,000	$276,000	$4,851,000
Alternative 4	$6,521,000	$366,000	$9,971,000

Modifying Criteria

8. State Acceptance

Based on the State's objective of obtaining an expedited remediation, the No Action alternative is not acceptable. Alternative 2 consists of expanding the existing, approved system. The State has voiced concerns in two areas: (1) the long-term impact of additional ground water recharge to the Arsenal Sand and Gravel Pit on VOC capture at the BGRS, and (2) the fact that recharge in the Arsenal Sand and Gravel Pit may not provide the most beneficial use of the ground water resource. The State accepts Alternative 3 because this alternative would prevent further migration of the South Plume, and it is the most beneficial use of treated ground water. Alternative 4 is not acceptable to the State because it is not a beneficial use of the ground water resource.

9. Community Acceptance

Community acceptance of Alternative 3 is anticipated based upon the desire of the City of New Brighton for additional

potable water, which Alternative 3 would provide, and the general desire of citizens living in the area that effective ground water remediation proceed as soon as possible. Based upon public comments received during the public comment period and during the public meeting for the proposed plan and feasibility study for the site, the community prefers Alternative 3.

I. The Selected Remedy

The selected remedy for the OU-3 ground water cleanup is Alternative 3. Based upon hydrogeologic and chemical data collected across the study area, EPA and MPCA estimate that one or more extraction wells will be needed to meet the objectives of containing and remediating the South Plume ground water contamination off-TCAAP. The extraction well(s) will be drilled into the deep aquifer (Unit 4) to capture South Plume contamination. At the proposed ground water extraction well location, Unit 3 merges with Unit 4. Preliminary estimates indicate that pumping ground water at a rate of approximately 1,000 gallons per minute will effectively contain the plume. Based on additional work to be performed, EPA and MPCA will determine if the pumping rate is sufficient to contain the South Plume. If the pumping rate is found not to contain the South Plume, the system will be expanded or modified to meet the cleanup objectives.

A forcemain will be constructed from the location of the extraction well(s) to the treatment system. The forcemain will carry treated water from the system to the New Brighton water supply main. The length of the forcemain will depend on the distance between the extraction well(s), which have not been installed, and the treatment plant. The length of the forcemain between the treatment plant and the water main will be approximately 600 feet. This forcemain will be located on city property. The treatment system will utilize precipitation and filtration for inorganic solids removal and a pressurized GAC system for VOC removal. The removal of inorganic solids, primarily iron and manganese, is needed to make the water acceptable to the City of New Brighton. Iron and manganese are naturally found in water, and they must be removed to prevent the fouling of pipe and well screen openings, to prevent yellow staining of clothing, and to remove taste and odor problems. Treated ground water will be discharged to the 12-inch New Brighton water main, which runs approximately 600 feet west of the proposed treatment plant location (Figure 8).

CLEANUP STANDARDS

Following are the specific contaminant cleanup standards to be attained in the aquifer before the remedy can be considered complete:

Contaminant	Cleanup Standard µg/l	Regulatory Basis
1,1-Dichloroethane	70	RAL
1,1-Dichloroethene	6	RAL
cis-1,2-Dichloroethene	70	MCL, MCLG, RAL
1,1,1-Trichloroethane	200	MCL, MCLG
1,1,2-Trichloroethane	3	MCLG (proposed), RAL
Trichloroethene	5	MCL

Alternative 3 will achieve substantial risk reduction by effectively containing the contaminant plume while at the same time putting the treated water to its highest use. In addition, the South Plume will be extracted until ground water cleanup standards are achieved. The cleanup standards are based upon the ARARs identified for the remedy and upon the Minnesota RALs for private potable water supplies. Extracted ground water will be treated to meet MCLs and non-zero MCLGs established by the Safe Drinking Water Act. The most carcinogenic and pervasive compound, trichloroethene, will be reduced to 5 µg/l or below, which corresponds to a 1.7×10^{-6} cancer risk. The State of Minnesota RAL will be the cleanup goal for 1,1- dichloroethane because no Federal MCL/MCLG exists for this compound. The RAL will be the cleanup goal for 1,1,-dichloroethene and 1,1,2-trichloroethane because the affected aquifer may, in the future, be used as a private potable water supply. The regulation of water well drilling by the State of Minnesota is the institutional control to be used to restrict drilling of private wells in the South Plume before cleanup standards are achieved.

The point of compliance will be at the leading edge of the South Plume. The area of attainment is considered to be the complete areal and vertical extent of the South Plume. If contaminants of concern reach static concentrations over a period of time, the extraction system will be evaluated to determine if alternate pumping strategies would enhance contaminant recovery. Groundwater monitoring will be required until restoration of the aquifer is achieved and the extraction system is shut down.

Treatment residuals such as spent carbon and filter cake from the metals precipitation process will be disposed of in accordance with applicable Federal and State law. It is anticipated that the spent carbon will be a characteristic hazardous waste under RCRA. The metals precipitate can probably be handled as a solid waste; proper disposal requirements will be determined during the pilot test.

Unlike Alternative 2, Alternative 3 does not have the potential to compromise the BGRS. Unlike Alternative 4, the ground water resource is not wasted. In addition, the cost of Alternative 3 is roughly half that of Alternative 4.

The capital cost of the selected remedy is $2,249,000. The annual operating cost is $276,000. The present worth of the selected remedy, based on a 30-year period at a discount rate of 10%, is $4,851,000. **Table 12** presents a more detailed breakdown of the remedy's cost.

J. Statutory Determinations

This section discusses how the selected remedy for OU-3 meets the five statutory requirements established by CERCLA.

Protection of Human Health and the Environment

The selected remedy will provide overall protection of human health and the environment through extraction and treatment of contaminated ground water. The extraction of the ground water will contain the contaminant plume and restore the water quality within the plume to drinking water standards. The extracted water will be treated to meet drinking water standards and discharged to a public water supply. Institutional controls on the drilling of private wells will help to prevent consumption of contaminated water before cleanup standards are achieved. The remedy will attain a 10^{-4} to 10^{-6} risk level for carcinogens. The contaminated ground water does not exceed a noncarcinogenic hazard index of one. No unacceptable short-term risks or cross-media impacts will be caused by implementation of the remedy.

Compliance with ARARs

The selected remedy will comply with ARARs and TBCs. The following is a list of ARARs and TBCs for the remedy:

Chemical Specific

- SDWA 40 CFR Parts 141-149, Non-zero Maximum Contaminant Level Goals and Maximum Contaminant Levels-Finalized and proposed, for 1, 1-dichloroethene, Cis-1,2-dichloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and trichloroethene. - Relevant and Appropriate for Ground Water Restoration and Applicable for Discharge to Public Water Supply

- National Secondary Drinking Water Standards (40 CFR 143) for Iron and Manganese - Applicable for Discharge to Public Water Supply

- State of Minnesota Recommended Allowable Limits for 1,1-dichloroethane and 1,1-dichloroethene - To Be Considered

Action Specific

- RCRA 40 CFR Part 268 Subpart D - Regulates the disposal of spent carbon -Applicable
- RCRA 40 CFR Part 264 Subpart J - Requirements for tanks used for the treatment of waste - Applicable
- Minn. Stat. §103H.175 - Requirements for the Reporting of Groundwater Monitoring - Relevant and Appropriate
- Minn. Stat. §103H.275 - Implementation of best management practices where groundwater is polluted - Relevant and Appropriate
- Minn. Rules Part 7060.0400 - Uses of Underground Waters - Relevant and Appropriate
- Minn. Rule Chapt. 4720, Public Water Supplies - Regulates community and non-community public water supplies - Applicable
- Minn. Rule Chapt. 4725, Water Well Code - Establishes well construction standards - Applicable

Cost Effectiveness

The selected remedy provides an effective remedy proportionate to its cost. The degree of long-term effectiveness and permanence, reduction of mobility, toxicity, or volume of contaminants, and ease of implementability, afforded by this remedy for the cost make it a reasonable value.

Utilization of Permanent Solutions and Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy meets the statutory requirement to utilize permanent solutions and resource recovery technologies to the maximum extent practicable.

The selected remedy, Alternative 3, provides the best balance among the four alternatives with respect to the primary balancing evaluation criteria. Alternative 3 provides a greater degree of long-term effectiveness and permanence than Alternatives 2 and 4. All alternatives provide a reduction in toxicity, mobility and volume of contaminants. Alternative 3 will take the least amount of time to implement and therefore is more effective in the short-term than Alternatives 2 and 4. Alternative 3 is the least costly and easier to implement than Alternatives 2 and 4. Of the five primary balancing criteria, long-term effectiveness and permanence, implementability and cost were the most decisive

factors in the selection decision. Unlike Alternatives 2 and 4, the selected remedy puts the treated ground water to its highest beneficial use as potable water. By using the treated ground water in the municipal water supply system of New Brighton, the local contaminated ground water resource is recovered and the uncontaminated local ground water resource is conserved. The State of Minnesota and the community support the selected remedy and would not support Alternatives 1, 2, or 4.

Preference for Treatment as a Principal Element

The selected remedy removes and treats VOCs in the ground water using GAC. Therefore, it satisfies the statutory preference for remedies that employ treatment as a principal element.
The selected remedy is protective of human health and the environment, complies with ARARs, is cost-effective, utilizes permanent solutions and resource recovery to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

K. Documentation of Significant Changes

The selected remedy is the preferred alternative presented in the proposed plan. No significant changes were made to the preferred alternative selected as the remedy for OU-3.

APPENDIX A
TABLES

TABLE 1

CHEMICAL OF POTENTIAL CONCERN AT SOURCE AREA "V"

	Inorganics	Organics	Radioactives
Ground Water - Unit 3	Aluminum[b] Calcium[b] Magnesium[b] Potassium[b] Sodium[b] Chromium Copper Iron[b] Lead[a] Nickel Vanadium Zinc	Benzene Chloroform Choroethane[b] Ethylbenzene 1,1-Dichloroethane 1,1-Dichloroethene Trichloroethene Di-n-octyl Phthalate Bis(2-ethylhexyl)Phthalate Benzoic Acid 1,1,1-Trichloroethane 1,2-Dichloroethane	None

Notes:

a Risk factors are not available for this compound. However, a qualitative discussion on potential risk is included in Chapter 5.

b Risk factors are not available for these compounds. Therefore, risks due to these compounds were not evaluated.

TABLE 1 (continued)

CHEMICAL OF POTENTIAL CONCERN AT SOURCE AREA "W"

	Inorganics	Organics	Radiactives
Ground Water - Unit 3	None	1,1-Dichloroethane 1,1-Dichloroethene 1,1,1-Trichloroethane Trichloroethene	None
Ground Water - Unit 4	Aluminum[a] Calcium[a] Chromium Copper Iron[a] Magnesium[a] Nickel Potassium[a] Sodium[a] Zinc	Carbon tetrachloride Chloroform Methylene chloride 1,1-Dichloroethane 1,1-Dichloroethene 1,1,1-Trichloroethane 1,1,2-Trichloroethene Trichloroethene Bis(2-ethylhexyl)Phthalate Benzoic Acid Tetrachloroethene[b] Cis-1,2-Dichloroethene[c]	None

Notes:

a Risk factors are not available for these compounds. Therefore, risks due to these compounds were not evaluated.

b Although tetrachloroethene was not present at concentrations significantly higher than background levels, it was included as a chemical of potential concern due to its known association with the site.

c Risk factors are not available for this compound. Risk factors for 1,2-dichloroethene were used.

TABLE 1 (continued)

CHEMICAL OF POTENTIAL CONCERN AT SOURCE AREA "X"

	Inorganics	Organics	Radiactives
Ground Water - Unit 3	None	1,1-Dichloroethane 1,1-Dichloroethene 1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,2-Dichloroethane Trichloroethene	None
Ground Water - Unit 4	Aluminum[b] Antimony Cobalt[b] Cadmium Cacium[b] Chromium Copper Iron[b] Lead[a] Magnesium[b] Nickel Potassium[b] Sodium[b] Vanadium	Benzene Chloroform Toluene 1,1-Dichloroethane 1,1-Dichloroethene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethene Cis-1,2-Dichloroethene[c] Tetrachloroethene[d] N-butyl benzyl Phthalate Di-n-octyl Phthalate Bis(2-ethylhexyl)Phthalate Di-n-butyl Phthalate Benzoic Acid	None

Notes:

a Risk factors are not available for this compound. However, a qualitative discussion on potential risk is included in Chapter 5.

b Risk factors are not available for these compounds. Therefore, risks due to these compounds were not evaluated.

c Risk factors are not available for this compound. Risk factors for 1,2-dichloroethene were used.

d Although tetrachloroethene was not present at concentrations significantly higher than background levels, it was included as a chemical of potential concern due to its known association with the site.

TABLE 1 (continued)

CHEMICAL OF POTENTIAL CONCERN AT SOURCE AREA "Y"

	Inorganics	Organics	Radioactives
Ground Water - Unit 3	None	Chloroform Chloroethane[a] Ethylbenzene Methylene Chloride 1,1-Dichloroethane 1,1-Dichloroethene 1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,2-Dichloroethane Trans-1,2-Dichloroethene[b] Trichloroethene 1,2-Dichloroethene Cis-1,2-Dichloroethene[b] Xylene Acetone 2-Butanone	None
Ground Water - Unit 4	None	Bromodichloromethane Chloroform Toluene Methylene Chloride 1,1-Dichloroethane 1,1-Dichloroethene 1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,2-Dichloroethane Trichloroethene Cis-1,2-Dichloroethene Xylene Tetrachloroethene[c]	None

Notes:

a Risk factors are not available for this compound. Therefore, risks due to this compound were not evaluated.

b Risk factors are not available for this compound. Risk factors for 1,2-dichloroethene were used.

c Although tetrachloroethene was not present at concentrations significantly higher than background levels, it was included as a chemical of potential concern due to its known association with the site.

TABLE 1 (continued)

CHEMICAL OF POTENTIAL CONCERN AT SOURCE AREA "Z"

	Inorganics	Organics	Radioactives
Ground Water - Unit 3	Aluminum[a] Calcium[a] Magnesium[a] Potassium[a] Sodium[a] Vanadium Chromium Copper Iron[a] Lead[b] Nickel Zinc	Chloroform 1,1-Dichloroethane 1,1-Dichloroethene 1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,2-Dichloroethane Trichloroethene 1,2-Dichloroethene Di-n-octyl Phthalate Phenol	None
Ground Water - Unit 4	Chromium Copper Lead Nickel Zinc Aluminum Calcium Magnesium Potassium Sodium Iron	Toluene 1,1-Dichloroethane 1,1-Dichloroethene 1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,2-Dichloroethane Trichloroethene 1,2-Dichloroethene Cis-1,2-Dichloroethene[c] Tetrachloroethene[d] Benzoic Acid Acetone	None

Notes:

a Risk factors are not available for these compounds. Therefore, risks due to these compounds were not evaluated.

b Risk factors are not available for this compound. However, a qualitative discussion on potential risk is included in Chapter 5.

c Risk factors are not available for this compound. Risk factors for 1,2-dichloroethene were used.

d Although tetrachloroethene was not present at concentrations significantly higher than background levels, it was included as a chemical of potential concern due to its known association with the site.

TABLE 2

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 3 AREA V

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
CHLOROFORM	3/12	3/12	0.0339	0.0392	0.070-0.090	0.0250	0.0551
BENZENE, HEXADECONE	2/12	2/12	0.150	0.444	0.33-4.0	1.12	1.15
CHLOROETHANE	1/12	1/12	0.275	0.282	0.52-0.52	0.0751	0.329
ETHYLBENZENE	1/12	1/12	0.124	0.200	1.3-1.3	0.346	0.420
1,1-DICHLOROETHANE	3/16	3/16	0.106	0.516	0.070-4.5	1.22	1.16
1,1-DICHLOROETHYLENE	3/16	3/16	0.116	0.303	0.13-1.2	0.649	0.649
1,1,1-TRICHLOROETHANE	2/12	2/12	0.0534	1.03	0.070-12	3.45	3.23
1,2-DICHLOROETHANE	1/16	1/16	0.0327	0.190	0.080-0.080	0.617	0.519
TRICHLOROETHYLENE	7/12	7/12	0.225	0.344	0.17-0.94	0.286	0.525
TETRACHLOROETHYLENE	1/16	1/16	0.0328	0.905	14-14	3.49	2.76
DI-N-OCTYL PHTHALATE	1/2	1/2	3.16	3.50	2.0-2.0	2.12	22.5
BIS(2-ETHYLHEXYL) PHTHALAT	2/2	2/2	4.24	4.50	3.0-6.0	2.12	23.5
BENZOIC ACID	1/2	1/2	41.2	46.5	68-68	30.4	320

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 3 AREA V

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
ALUMINUM	2/2	2/2	150	151	145-156	7.77	220
BARIUM	2/2	2/2	73.1	73.6	65-82	11.8	180
CALCIUM	2/2	2/2	55887	55950	53300-58600	3748	89621
MAGNESIUM	2/2	2/2	20888	20900	20200-21600	990	29794
POTASSIUM	2/2	2/2	1925	1925	1890-1960	49.4	2370
SODIUM	2/2	2/2	6238	6255	5790-6720	658	12163
VANADIUM	1/2	1/2	2.82	3.00	4.0-4.0	1.41	15.7
CHROMIUM	2/2	2/2	30.2	65.7	7.4-124	82.4	806
COPPER	2/2	2/2	19.3	19.7	16-24	5.30	67.3
IRON	2/2	2/2	41801	43100	32600-53600	14849	176513
LEAD	2/2	2/2	13.3	17.1	6.4-28	15.1	153
MANGANESE	2/2	2/2	485	485	467-503	25.4	714
NICKEL	2/2	2/2	42.4	54.7	20-89	48.8	494
ZINC	2/2	2/2	304	381	152-609	323	3284

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 3 AREA W

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
1,1-DICHLOROETHANE	2/5	2/5	0.258	1.39	1.9-4.9	2.11	4.02
1,1-DICHLOROETHYLENE	2/5	2/5	0.148	0.258	0.19-0.87	0.346	0.687
1,1,1-TRICHLOROETHANE	2/4	2/4	0.902	4.99	6.8-13	6.20	14.8
TRICHLOROETHYLENE	3/4	3/4	1.33	1.87	1.0-4.3	1.71	4.60

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS

UNIT 3 AREA W

No detected data could be obtained for this group

TABLE 2 (continued)

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 3 AREA X

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
1,1-DICHLOROETHANE	3/7	3/7	0.331	1.17	0.56-4.4	1.66	2.71
1,1-DICHLOROETHYLENE	2/7	2/7	0.269	1.31	0.24-6.2	2.33	3.47
1,1,1-TRICHLOROETHANE	2/4	2/4	0.256	1.11	0.060-1.9	1.27	3.14
1,1,2-TRICHLOROETHANE	2/7	2/7	0.172	5.30	0.52-34	12.6	17.0
1,2-DICHLOROETHANE	2/7	2/7	0.183	0.504	0.20-0.41	0.889	1.32
TRICHLOROETHYLENE	2/4	2/4	0.256	1.82	0.17-7.0	3.45	7.31
TETRACHLOROETHYLENE	3/7	3/7	0.313	13.0	0.21-87	32.6	43.2

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS

UNIT 3 AREA X

No detected data could be obtained for this group

TABLE 2 (continued)

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 3 AREA Y

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
CHLOROFORM	2/14	2/14	0.632	1.63	0.13-0.21	1.20	2.33
CHLOROETHANE	1/14	1/14	1.91	4.30	19-19	4.81	7.08
ETHYLBENZENE	1/14	1/14	0.946	1.72	1.2-1.2	1.11	2.36
METHYLENE CHLORIDE	2/14	2/14	1.48	1.92	1.7-1.9	0.924	2.45
1,1-DICHLOROETHANE	15/19	15/19	8.45	60.8	0.28-480	120	119
1,1-DICHLOROETHYLENE	14/19	14/19	6.20	36.8	0.61-190	62.1	66.8
1,1,1-TRICHLOROETHANE	8/14	8/14	6.39	68.5	14-230	83.8	117
1,1,2-TRICHLOROETHANE	6/19	6/19	1.80	53.0	1.7-860	196	148
1,2-DICHLOROETHANE	5/18	5/18	0.839	2.64	0.12-7.0	2.76	4.01
TRANS-1 2-DICHLOROETHYLENE	1/5	1/5	0.0585	0.0620	0.11-0.11	0.0268	0.0953
TRICHLOROETHYLENE	12/14	12/14	63.6	302	0.41-800	289	469
DICHLOROETHENE, 1,2-	9/9	9/9	25.4	38.7	7.0-100	36.2	66.6
CIS-1 2-DICHLOROETHYLENE .	4/5	4/5	0.781	1.94	0.32-6.9	2.82	5.44
XYLENE	1/14	1/14	1.69	2.22	6.7-6.7	1.58	3.14
ACETONE	1/14	1/14	7.72	8.42	10-10	4.04	10.7
TETRACHLOROETHYLENE	7/19	7/19	2.28	178	0.22-2800	641	487
METHYL ETHYL KETONE	2/7	2/7	3.91	5.21	11-13	4.67	9.53

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS

UNIT 3 AREA Y

No detected data could be obtained for this group

TABLE 2 (continued)

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 3 AREA Z

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
CHLOROFORM	1/6	1/6	4.45	10.6	4.0-4.0	19.2	30.9
1,1-DICHLOROETHANE	7/8	7/8	16.8	29.2	2.0-95	31.1	55.3
1,1-DICHLOROETHYLENE	7/8	7/8	18.6	38.4	1.4-140	45.6	76.6
1,1,1-TRICHLOROETHANE	4/6	4/6	51.5	152	14-480	192	354
1,1,2-TRICHLOROETHANE	2/8	2/8	5.37	10.8	10-14	16.4	24.6
1,2-DICHLOROETHANE	1/6	1/6	4.89	11.1	7.0-7.0	19.1	31.2
TRICHLOROETHYLENE	6/6	6/6	1862	2017	1100-3800	952	3016
DICHLOROETHENE, 1,2-	5/6	5/6	48.4	71.5	8.0-150	55.5	130
TETRACHLOROETHYLENE	3/8	3/8	15.2	675	9.0-5300	1869	2238
DI-N-OCTYL PHTHALATE	1/1	1/1	4.00	4.00	4.0-4.0	***	***
PHENOL(C6H5OH)-SINGLE COMP	1/1	1/1	13.0	13.0	13-13	***	***

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 3 AREA Z

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
ALUMINUM	1/1	1/1	318	318	318-318	***	***
BARIUM	1/1	1/1	44.0	44.0	44-44	***	***
CALCIUM	1/1	1/1	75200	75200	75200-75200	***	***
MAGNESIUM	1/1	1/1	28600	28600	28600-28600	***	***
POTASSIUM	1/1	1/1	2170	2170	2170-2170	***	***
SODIUM	1/1	1/1	7930	7930	7930-7930	***	***
VANADIUM	1/1	1/1	6.00	6.00	6.0-6.0	***	***
CHROMIUM	1/1	1/1	55.1	55.1	55-55	***	***
COPPER	1/1	1/1	101	101	101-101	***	***
IRON	1/1	1/1	110000	110000	110000-11000	***	***
LEAD	1/1	1/1	26.0	26.0	26-26	***	***
MANGANESE	1/1	1/1	809	809	809-809	***	***
NICKEL	1/1	1/1	40.4	40.4	40-40	***	***
ZINC	1/1	1/1	114	114	114-114	***	***

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 4 AREA W

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
CARBON TETRACHLORIDE	1/12	1/12	0.0719	0.0992	0.53-0.53	0.136	0.185
CHLOROFORM	1/12	1/12	0.0265	0.0271	0.050-0.050	0.00722	0.0317
METHYLENE CHLORIDE	2/12	2/12	0.306	0.398	0.54-0.84	0.384	0.642
1,1-DICHLOROETHANE	2/12	2/12	0.0872	2.27	2.9-24	6.89	6.65
1,1-DICHLOROETHYLENE	3/12	3/12	0.142	1.10	0.13-10	2.88	2.93
1,1,1-TRICHLOROETHANE	1/12	1/12	0.0576	2.26	25-25	7.17	6.82
1,1,2-TRICHLOROETHANE	2/12	2/12	0.0157	0.0392	0.080-0.29	0.0815	0.0910
TRICHLOROETHYLENE	6/12	6/12	0.362	22.4	0.12-210	60.6	60.9
CIS-1 2-DICHLOROETHYLENE .	2/12	2/12	0.165	0.425	1.7-2.4	0.774	0.917
TETRACHLOROETHYLENE	2/12	2/12	0.0239	0.0533	0.22-0.27	0.0902	0.111
BIS(2-ETHYLHEXYL) PHTHALAT	1/1	1/1	3.00	3.00	3.0-3.0	***	***
BENZOIC ACID	1/1	1/1	9.00	9.00	9.0-9.0	***	***

Notes:

Data compiled primarily from AHL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 4 AREA W

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
ALUMINUM	1/1	1/1	94.5	94.5	95-95	***	***
BARIUM	1/1	1/1	37.0	37.0	37-37	***	***
CALCIUM	1/1	1/1	23800	23800	23800-23800	***	***
MAGNESIUM	1/1	1/1	19000	19000	19000-19000	***	***
POTASSIUM	1/1	1/1	3490	3490	3490-3490	***	***
SODIUM	1/1	1/1	5370	5370	5370-5370	***	***
CHROMIUM	1/1	1/1	11.2	11.2	11-11	***	***
COPPER	1/1	1/1	11.8	11.8	12-12	***	***
IRON	1/1	1/1	27100	27100	27100-27100	***	***
LEAD	1/1	1/1	14.9	14.9	15-15	***	***
MANGANESE	1/1	1/1	204	204	204-204	***	***
NICKEL	1/1	1/1	13.4	13.4	13-13	***	***
ZINC	1/1	1/1	2670	2670	2670-2670	***	***

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 4 AREA X

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
CHLOROFORM	1/7	1/7	0.0337	0.0371	0.080-0.080	0.0204	0.0560
TOLUENE	1/7	1/7	0.877	19.6	135-135	50.8	66.6
BENZENE, HEXADECONE	1/7	1/7	0.113	0.120	0.24-0.24	0.0529	0.169
1,1-DICHLOROETHANE	6/10	6/10	0.166	0.298	0.090-1.2	0.366	0.560
1,1-DICHLOROETHYLENE	3/9	3/9	0.108	0.152	0.16-0.60	0.174	0.285
1,1,1-TRICHLOROETHANE	1/7	1/7	0.147	0.261	0.75-0.75	0.256	0.498
1,1,2-TRICHLOROETHANE	3/9	3/9	0.0226	0.0389	0.030-0.13	0.0451	0.0736
TRICHLOROETHYLENE	8/9	8/9	1.57	2.96	0.42-9.3	2.95	5.23
CIS-1 2-DICHLOROETHYLENE .	1/8	1/8	0.141	0.288	1.6-1.6	0.530	0.731
TETRACHLOROETHYLENE	2/9	2/9	0.0299	0.197	0.070-1.6	0.526	0.602
N-BUTYL BENZYL PHTHALATE .	1/1	1/1	2.00	2.00	2.0-2.0	***	***
DI-N-OCTYL PHTHALATE	1/1	1/1	95.0	95.0	95-95	***	***
BIS(2-ETHYLHEXYL) PHTHALAT	1/1	1/1	68.0	68.0	68-68	***	***
DI-N-BUTYL PHTHALATE	1/1	1/1	7.00	7.00	7.0-7.0	***	***
BENZOIC ACID	1/1	1/1	4.00	4.00	4.0-4.0	***	***

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 4 AREA X

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
ALUMINUM	1/1	1/1	201	201	201-201	***	***
ANTIMONY	1/1	1/1	37.3	37.3	37-37	***	***
BARIUM	1/1	1/1	113	113	113-113	***	***
CALCIUM	1/1	1/1	63900	63900	63900-63900	***	***
COBALT	1/1	1/1	8.60	8.60	8.6-8.6	***	***
MAGNESIUM	1/1	1/1	23500	23500	23500-23500	***	***
POTASSIUM	1/1	1/1	2260	2260	2260-2260	***	***
SODIUM	1/1	1/1	5980	5980	5980-5980	***	***
VANADIUM	1/1	1/1	6.10	6.10	6.1-6.1	***	***
CADMIUM	1/1	1/1	8.20	8.20	8.2-8.2	***	***
CHROMIUM	1/1	1/1	113	113	113-113	***	***
COPPER	1/1	1/1	38.4	38.4	38-38	***	***
IRON	1/1	1/1	104000	104000	104000-10400	***	***
LEAD	1/1	1/1	24.0	24.0	24-24	***	***
MANGANESE	1/1	1/1	801	801	801-801	***	***
NICKEL	1/1	1/1	92.7	92.7	93-93	***	***
ZINC	1/1	1/1	183	183	183-183	***	***

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 4 AREA Y

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
BROMODICHLOROMETHANE	1/14	1/14	0.0925	0.404	0.11-0.11	0.888	0.917
CHLOROFORM	1/14	1/14	0.0751	0.409	0.30-0.30	0.889	0.922
TOLUENE	1/14	1/14	0.273	6.44	84-84	22.3	19.3
METHYLENE CHLORIDE	2/14	2/14	0.404	0.641	0.53-0.73	0.804	1.10
1,1-DICHLOROETHANE	14/15	14/15	1.10	1.80	0.12-5.0	1.67	2.73
1,1-DICHLOROETHYLENE	13/15	13/15	0.996	1.42	0.16-4.0	1.12	2.04
1,1,1-TRICHLOROETHANE	10/14	10/14	3.05	6.21	0.76-22	6.64	10.0
1,1,2-TRICHLOROETHANE	7/15	7/15	0.0778	0.418	0.030-0.55	0.856	0.892
1,2-DICHLOROETHANE	6/14	6/14	0.0754	0.410	0.040-0.14	0.887	0.922
TRICHLOROETHYLENE	15/15	15/15	33.6	43.0	3.3-78	24.8	56.7
CIS-1 2-DICHLOROETHYLENE .	10/13	10/13	0.586	1.25	0.26-4.5	1.58	2.21
XYLENE	1/14	1/14	0.674	0.843	1.3-1.3	0.733	1.26
TETRACHLOROETHYLENE	7/14	7/14	0.0682	0.403	0.030-0.13	0.889	0.917

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS

UNIT 4 AREA Y

No detected data could be obtained for this group

TABLE 2 (continued)

TCAAP GROUND WATER ORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 4 AREA Z

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
TOLUENE	3/12	3/12	1.75	23.3	7.0-250	71.4	68.7
1,1-DICHLOROETHANE	12/13	12/13	7.28	25.7	0.090-160	45.0	52.9
1,1-DICHLOROETHYLENE	11/13	11/13	7.02	26.4	0.55-130	44.3	53.2
1,1,1-TRICHLOROETHANE	8/12	8/12	18.5	106	17-570	180	220
1,1,2-TRICHLOROETHANE	5/13	5/13	0.768	2.79	0.12-20	5.20	5.93
1,2-DICHLOROETHANE	5/13	5/13	0.686	1.57	0.30-4.0	1.28	2.34
TRICHLOROETHYLENE	12/12	12/12	168	311	0.73-860	238	462
DICHLOROETHENE, 1,2-	4/6	4/6	11.6	26.3	8.0-96	35.9	64.1
CIS-1 2-DICHLOROETHYLENE	5/6	5/6	2.64	5.38	1.4-13	4.68	10.3
ACETONE	1/12	1/12	7.43	7.79	7.0-7.0	2.38	9.30
TETRACHLOROETHYLENE	5/13	5/13	0.758	9.73	0.050-110	30.1	27.9
BENZOIC ACID	1/1	1/1	170	170	170-170	***	***

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 2 (continued)

TCAAP GROUND WATER INORGANIC OFF SITE SAMPLE DATA STATISTICS
UNIT 4 AREA Z

Parameter	Detection Frequency(1)	Adjusted Detection Frequency(2)	Geometric Mean ug/l	Arithmetic Mean ug/l	Range(3) Low/high	Standard Deviation ug/l	Confidence Interval(4) ug/l
ALUMINUM	1/1	1/1	298	298	298-298	***	***
BARIUM	1/1	1/1	16.6	16.6	17-17	***	***
CALCIUM	1/1	1/1	36500	36500	36500-36500	***	***
MAGNESIUM	1/1	1/1	23200	23200	23200-23200	***	***
POTASSIUM	1/1	1/1	3510	3510	3510-3510	***	***
SODIUM	1/1	1/1	7500	7500	7500-7500	***	***
CHROMIUM	1/1	1/1	28.2	28.2	28-28	***	***
COPPER	1/1	1/1	21.4	21.4	21-21	***	***
IRON	1/1	1/1	39400	39400	39400-39400	***	***
LEAD	1/1	1/1	31.8	31.8	32-32	***	***
MANGANESE	1/1	1/1	232	232	232-232	***	***
NICKEL	1/1	1/1	26.9	26.9	27-27	***	***
ZINC	1/1	1/1	2820	2820	2820-2820	***	***

Notes:

Data compiled primarily from ANL, 1990 and CDM, 1991 except as noted in the text.
*** Cannot be calculated.
(1) Detection frequency = a/b
where:
a = Number of times a compound was detected
b = Total number of samples tested
(2) Adjusted detection frequency omits sample results that were qualified with the flags, "A" or "R" as described in U.S. EPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Office of Emergency Response and Remedial Response, Interim Final, Washington, D.C., EPA/540/1-89-002. Only sample results included in the adjusted detection frequency were used to determine mean, range, standard deviation, and confidence interval results.
(3) Range = the range of detected values.
(4) The 95 percent upper confidence limit is calculated for the standard error of the arithmetic mean.

TABLE 3

PARAMETER VALUES USED IN EXPOSURE DOSE CALCULATIONS
SOURCE: TCAAP GROUND WATER
SCENARIO: FUTURE ALTERNATE LAND USE - PROBABLE CASE

	Amount Ingested (L/day)	Body Weight (kg)	Frequency of Contact (days)	Duration of Each Event (hr/day)	Years of Exposure (yrs)
INGESTION					
Child:					
0 - 1	0.307	7.3	365	NA	1
2 - 4	0.743	13.3	365	NA	3
5 - 9	0.861	22.5	365	NA	5
10 - 14	1.025	37.9	365	NA	5
15 - 19	1.241	60.1	365	NA	5
Adult	1.4	70	365	NA	11
INHALATION	$(m^3/hr)^a$				
Child:					
0 - 6	0.8	14.2	365	0.12[c]	6
7 - 18	1.1	41.3	365	0.12[c]	12
Adult	0.6	70	365	0.12[c]	12
DERMAL SORPTION[b]	(m^2)				
Child:					
0 - 6	0.72	14.2	365	0.12	6
7 - 12	1.13	29.8	365	0.12	6
13 - 17	1.62	51.7	365	0.12	5
Adult	1.82	70	365	0.12	13

Notes:

a The inhalation rates must be converted from m^3/hr to L/minute for use in the shower model (Appendix E). To make the conversion, each value must be multiplied by a factor of 914/60. The derivation of this factor is described in the text of Appendix C.

b Calculation of exposure doses via dermal sorption also requires the use of permeability constants to determine how much of each chemical is absorbed into the body. The use of permeability constants is discussed in Section II.C.2.

c The value of 0.12 hours/day corresponds to 7 minutes/day.

TABLE 3 (continued)

PARAMETER VALUES USED IN EXPOSURE DOSE CALCULATIONS
SOURCE: TCAAP GROUND WATER
SCENARIO: FUTURE ALTERNATE LAND USE - REASONABLE MAXIMUM CASE

	Amount Ingested (L/day)	Body Weight (kg)	Frequency of Contact (days)	Duration of Each Event (hr/day)	Years of Exposure (yrs)
INGESTION					
Child:					
0 - 1	0.396	7.3	365	NA	1
2 - 4	0.787	13.3	365	NA	3
5 - 9	0.898	22.5	365	NA	5
10 - 19	1.060	37.9	365	NA	5
15 - 19	1.280	60.1	365	NA	5
Adult	2.0	70	365	NA	51
INHALATION	(m^3/hr)[a]				
Child:					
0 - 6	0.8	14.2	365	0.20[c]	6
7 - 18	1.1	41.3	365	0.20	12
Adult	0.6	70	365	0.20	52
DERMAL SORPTION[b]	(m^2)				
Child:					
0 - 6	0.726	14.2	365	0.20	6
7 - 12	1.13	29.8	365	0.20	6
13 - 17	1.62	51.7	365	0.20	5
Adult	1.82	70	365	0.20	53

Notes:

a The inhalation rates must be converted from m^3/hr to 4 minutes for use in the shower model (Appendix E). To make the conversion, each value must be multiplied by a factor of 914/60.

b Calculation of exposure doses via dermal sorption also require the use of permeability constants to determine how much of each chemical is absorbed into the body. The use of permeability constants is explained in Section II.C.2.

c The value of 0.20 hours/day corresponds to 12 minutes/day.

TABLE 4-1

EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$		Upperbound Excess Lifetime Cancer Risk
AREA V												
Benzene	A	4.44E-04	2.67E-07	1.06E-06	1.21E-06	8.57E-07	6.55E-07	1.39E-06	5.45E-06	2.9E-02		2E-07
Chloroform	B2	3.92E-05	2.36E-08	9.39E-08	1.07E-07	7.57E-08	5.78E-08	1.23E-07	4.81E-07	6.1E-03		2E-09
1,1-Dichloroethane	C	5.16E-04	3.10E-07	1.23E-06	1.41E-06	1.00E-06	7.64E-07	1.62E-06	6.93E-06	9.1E-02		6E-07
1,1-Dichloroethene	C	3.03E-04	1.81E-07	7.24E-07	8.29E-07	5.85E-07	4.47E-07	9.52E-07	3.72E-06	6E-01		2E-06
1,2-Dichloroethane	B2	1.90E-04	1.14E-07	4.54E-07	5.19E-07	3.67E-07	2.80E-07	5.97E-07	2.33E-06	9.1E-02		2E-07
Trichloroethene	B2	3.44E-04	2.07E-07	8.23E-07	9.43E-07	6.64E-07	5.07E-07	1.08E-06	4.22E-06	1.1E-02		5E-08
Bis(2-ethylhexyl)phthalate	B2	4.50E-03	2.70E-06	1.08E-05	1.23E-05	8.71E-06	6.64E-06	1.41E-05	5.53E-05	1.4E-02		8E-07
											Total Pathway	4E-06
AREA W												
1,1-Dichloroethane	C	1.39E-03	8.36E-07	3.33E-06	3.80E-06	2.69E-06	2.05E-06	4.37E-06	1.71E-05	9.1E-02		2E-06
1,1-Dichloroethene	C	2.58E-04	1.56E-07	6.17E-07	7.05E-07	4.99E-07	3.81E-07	8.11E-07	3.20E-06	6E-01		2E-06
Trichloroethene	B2	1.87E-03	1.12E-06	4.46E-06	5.11E-06	3.61E-06	2.79E-06	5.88E-06	2.30E-05	1.1E-02		3E-07
											Total Pathway	4E-06
AREA X												
1,1-Dichloroethane	C	1.17E-03	7.03E-07	2.80E-06	3.20E-06	2.26E-06	1.73E-06	3.68E-06	1.44E-05	9.1E-02		1E-06
1,1-Dichloroethene	C	1.31E-03	7.87E-07	3.14E-06	3.58E-06	2.53E-06	1.94E-06	4.12E-06	1.61E-05	6E-01		1E-05
1,1,2-Trichloroethane	C	5.30E-03	3.19E-06	1.27E-05	1.45E-05	1.02E-05	7.79E-06	1.67E-05	6.51E-05	5.7E-02		4E-06
1,2-Dichloroethane	B2	5.04E-04	3.03E-07	1.21E-06	1.38E-06	9.70E-07	7.43E-07	1.59E-06	6.20E-06	9.1E-02		6E-07
Trichloroethene	B2	1.82E-03	1.09E-06	4.37E-06	4.97E-06	3.51E-06	2.69E-06	5.72E-06	2.24E-05	1.1E-02		3E-07
											Total Pathway	2E-05
AREA Y												
Chloroform	B2	1.63E-03	9.79E-09	3.90E-06	4.46E-06	3.15E-06	2.41E-06	5.12E-06	2.0E-05	6.1E-03		1E-07
Methylene chloride	B2	1.92E-03	1.15E-06	4.59E-06	5.25E-06	3.71E-06	2.83E-06	6.03E-06	2.36E-05	7.5E-03		2E-07
1,1-Dichloroethane	C	6.08E-02	3.66E-05	1.46E-04	1.66E-04	1.17E-04	9.00E-05	1.92E-04	7.48E-04	9.1E-02		7E-05
1,1-Dichloroethene	C	3.68E-02	2.21E-05	8.83E-05	1.01E-04	7.11E-05	5.43E-05	1.16E-04	4.53E-04	6E-01		3E-04
1,1,2-Trichloroethane	C	5.30E-02	3.19E-05	1.27E-04	1.45E-04	1.02E-04	7.79E-05	1.67E-04	6.51E-04	5.7E-02		4E-05
1,2-Dichloroethane	B2	2.64E-03	1.59E-06	6.30E-06	7.21E-06	5.10E-06	3.89E-06	8.30E-06	3.24E-05	9.1E-02		3E-06
Trichloroethene	B2	3.02E-01	1.81E-04	7.24E-04	8.29E-04	5.84E-04	4.46E-04	9.49E-04	3.71E-03	1.1E-02		4E-05
											Total Pathway	4E-04
AREA Z												
Chloroform	B2	1.06E-02	6.37E-06	2.54E-05	2.90E-05	2.05E-05	1.56E-05	3.33E-05	1.30E-04	6.1E-03		8E-07
1,1-Dichloroethane	C	2.92E-02	1.76E-05	6.99E-05	8.00E-05	5.64E-05	4.31E-05	9.18E-05	3.59E-04	9.1E-02		3E-05
1,1-Dichloroethene	C	3.84E-02	2.30E-05	9.21E-05	1.05E-04	7.43E-05	5.66E-05	1.21E-04	4.72E-04	6E-01		3E-04
1,1,2-Trichloroethane	C	1.08E-02	6.49E-06	2.58E-05	2.95E-05	2.09E-05	1.59E-05	3.39E-05	1.32E-04	5.7E-02		8E-06
1,2-Dichloroethane	B2	1.11E-02	6.67E-06	2.66E-05	3.04E-05	2.14E-05	1.64E-05	3.49E-05	1.36E-04	9.1E-02		1E-05
Trichloroethene	B2	2.02E+00	1.21E-03	4.84E-03	5.51E-03	3.89E-03	2.97E-03	6.33E-03	2.48E-02	1.1E-02		3E-04
											Total Pathway	6E-04

TABLE 4-2

EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$		Upperbound Excess Lifetime Cancer Risk
AREA V												
Benzene	A	1.15E-03	8.91E-07	2.92E-06	3.28E-06	2.30E-06	1.74E-06	2.38E-05	3.49E-05	2.9E-02		1E-06
Chloroform	B2	5.51E-05	4.27E-08	1.40E-07	1.57E-07	1.10E-07	8.36E-08	1.14E-06	1.67E-06	6.1E-03		1E-08
1,1-Dichloroethane	C	1.16E-03	8.99E-07	2.94E-06	3.31E-06	2.31E-06	1.76E-06	2.41E-05	3.55E-05	9.1E-02		3E-06
1,1-Dichloroethene	C	6.49E-04	5.03E-07	1.65E-06	1.85E-06	1.30E-06	9.86E-07	1.35E-05	1.98E-05	6E-01		1E-05
1,2-Dichloroethane	B2	8.00E-05	6.20E-08	2.03E-07	2.28E-07	1.60E-07	1.21E-07	1.67E-06	2.44E-06	9.1E-02		2E-07
Trichloroethene	B2	5.25E-04	4.07E-07	1.33E-06	1.50E-06	1.05E-06	8.00E-07	1.09E-05	1.60E-05	1.1E-02		2E-07
Bis(2-ethylhexyl)phthalate	B2	6.0E-03	4.64E-06	1.52E-05	1.71E-05	1.20E-05	9.14E-06	1.25E-04	1.83E-04	1.4E-02		3E-06
											Total Pathway	2E-05
AREA W												
1,1-Dichloroethane	C	4.02E-03	3.11E-06	1.02E-05	1.14E-05	8.00E-06	6.11E-06	8.38E-05	1.23E-04	9.1E-02		1E-05
1,1-Dichloroethene	C	6.87E-04	5.33E-07	1.74E-06	1.96E-06	1.37E-06	1.04E-06	1.43E-05	2.10E-05	6E-01		1E-05
Trichloroethene	B2	4.30E-03	3.33E-06	1.09E-05	1.23E-05	8.57E-06	6.54E-06	8.96E-05	1.31E-04	1.1E-02		1E-06
											Total Pathway	2E-05
AREA X												
1,1-Dichloroethane	C	2.71E-03	2.10E-06	6.86E-06	7.71E-06	5.41E-06	4.12E-06	5.64E-05	8.26E-05	9.1E-02		8E-06
1,1-Dichloroethene	C	3.47E-03	2.69E-06	8.79E-06	9.86E-06	6.94E-06	5.28E-06	7.22E-05	1.10E-04	6E-01		6E-05
1,1,2-Trichloroethane	C	1.7E-02	1.32E-05	4.33E-05	4.84E-05	3.39E-05	2.59E-05	3.54E-04	5.19E-04	5.7E-02		3E-05
1,2-Dichloroethane	B2	4.10E-04	3.17E-07	1.04E-06	1.17E-06	8.21E-07	6.24E-07	8.52E-06	1.25E-05	9.1E-02		1E-06
Trichloroethene	B2	7.0E-03	5.43E-06	1.77E-05	1.99E-05	1.40E-05	1.06E-05	1.46E-04	2.14E-04	1.1E-02		2E-06
											Total Pathway	1E-04
AREA Y												
Chloroform	B2	2.10E-04	1.63E-07	5.31E-07	5.99E-07	4.19E-07	3.19E-07	4.37E-06	6.40E-06	6.1E-03		4E-08
Methylene chloride	B	1.90E-03	1.47E-06	4.80E-06	5.41E-06	3.79E-06	2.89E-06	3.96E-05	5.80E-05	7.5E-03		4E-07
1,1-Dichloroethane	C	1.19E-01	9.23E-05	3.02E-04	3.39E-04	2.38E-04	1.81E-04	2.48E-03	3.63E-03	9.1E-02		3E-04
1,1-Dichloroethene	C	6.68E-02	5.17E-05	1.69E-04	1.91E-04	1.34E-04	1.01E-04	1.39E-03	2.04E-03	6E-01		1E-03
1,1,2-Trichloroethane	C	1.48E-01	1.15E-04	3.75E-04	4.22E-04	2.94E-04	2.25E-04	3.08E-03	4.51E-03	5.7E-02		3E-04
1,2-Dichloroethane	B2	4.01E-03	3.11E-06	1.02E-05	1.14E-05	8.00E-06	6.10E-06	8.38E-05	1.23E-04	9.1E-02		1E-05
Trichloroethene	B2	4.69E-01	3.63E-04	1.19E-03	1.34E-03	9.36E-04	7.14E-04	9.76E-03	1.43E-02	1.1E-02		2E-04
											Total Pathway	2E-03
AREA Z												
Chloroform	B2	4.0E-03	3.10E-06	1.02E-05	1.14E-05	8.00E-06	6.09E-06	8.31E-05	1.20E-04	6.1E-03		7E-07
1,1-Dichloroethane	C	5.53E-02	4.29E-05	1.40E-04	1.58E-04	1.11E-04	8.43E-05	1.15E-03	1.69E-03	9.1E-02		2E-04
1,1-Dichloroethene	C	7.66E-02	5.94E-05	1.94E-04	2.19E-04	1.53E-04	1.16E-04	1.60E-03	2.34E-03	6E-01		1E-03
1,1,2-Trichloroethane	C	1.43E-02	1.11E-05	3.63E-05	4.08E-05	2.83E-05	2.18E-05	2.98E-04	4.44E-04	5.7E-02		3E-05
1,2-Dichloroethane	B2	7.0E-03	5.43E-06	1.77E-05	1.99E-05	1.40E-05	1.06E-05	1.46E-04	2.14E-04	9.1E-02		2E-05
Trichloroethene	B2	3.02E+00	2.34E-03	7.63E-03	8.57E-03	6.03E-03	4.59E-03	6.28E-02	9.20E-02	1.1E-02		1E-03
											Total Pathway	2E-03

TABLE 4-3

EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor $(mg/kg/day)^{-1}$	Upperbound Excess Lifetime Cancer Risk
					ARPA V				
Benzene	A	4.44E-04	2.59E-07	1.94E-07	1.34E-07	2.88E-07	8.75E-07	2.9E-02	3E-08
Trichloroethene	B2	3.44E-04	1.81E-06	1.35E-06	9.29E-07	2.02E-06	6.11E-06	1.2E-02	7E-08
Chloroform	B2	3.92E-05	2.07E-07	1.55E-07	1.06E-04	2.29E-07	6.98E-07	6.1E-03	4E-09
1,1-Dichloroethane	C	5.16E-04	2.71E-06	2.03E-06	1.40E-06	3.03E-06	9.18E-06	1.3E-01	1E-06
1,1-Dichloroethene	C	3.03E-04	1.59E-06	1.19E-06	8.21E-07	1.77E-06	5.36E-06	6.5E-01	3E-06
1,2-Dichloroethane	B2	1.90E-04	1.00E-06	7.49E-07	5.16E-07	1.11E-06	3.37E-06	1.3E-01	4E-07
Bis(2-ethylhexyl)phthalate	B2	4.50E-03	1.17E-07	8.81E-08	6.03E-08	1.30E-07	3.96E-07	9.3E-02	4E-08
								Total Pathway	4E-06
					ARPA W				
1,1-Dichloroethane	C	1.39E-03	7.32E-06	5.47E-06	3.77E-06	8.13E-06	2.46E-05	1.3E-01	3E-06
1,1-Dichloroethene	C	2.58E-04	1.36E-06	1.02E-05	6.99E-07	1.50E-06	4.57E-06	6.5E-01	3E-06
Trichloroethene	B2	1.87E-03	9.84E-06	7.37E-06	5.08E-06	1.09E-05	3.32E-05	1.2E-02	4E-07
								Total Pathway	6E-06
					ARPA X				
1,1-Dichloroethane	C	1.17E-03	6.17E-06	4.61E-06	3.17E-06	6.84E-06	2.03E-05	1.3E-01	3E-06
1,1-Dichloroethene	C	1.31E-03	6.91E-06	5.16E-06	3.55E-06	7.66E-06	2.32E-05	6.5E-01	2E-05
1,1,2-Trichloroethane	C	5.30E-03	2.79E-05	2.08E-05	1.44E-05	3.09E-05	9.41E-05	6.3E-02	6E-06
1,2-Dichloroethane	B2	5.04E-04	2.65E-06	1.98E-06	1.38E-06	2.95E-06	8.96E-06	1.3E-01	1E-06
Trichloroethene	B2	1.82E-03	9.58E-06	7.17E-06	4.94E-06	1.06E-05	3.23E-05	1.2E-02	4E-07
								Total Pathway	3E-05
					ARPA Y				
Chloroform	B2	1.63E-03	8.59E-06	7.32E-06	4.42E-06	9.54E-06	2.89E-05	6.1E-03	2E-07
Methylene chloride	B2	1.92E-03	1.01E-05	7.56E-06	5.21E-06	1.12E-05	3.41E-05	7.5E-03	2E-07
1,1-Dichloroethane	C	6.08E-02	3.21E-04	2.38E-04	1.65E-04	3.56E-04	1.08E-03	1.3E-02	1E-05
1,1-Dichloroethene	C	3.68E-02	1.93E-04	1.45E-04	1.00E-04	2.15E-04	6.54E-04	6.5E-01	4E-04
1,1,2-Trichloroethane	C	5.30E-02	2.79E-04	2.08E-04	1.44E-04	3.09E-04	9.41E-04	6.3E-02	6E-05
1,2-Dichloroethane	B2	2.64E-03	1.40E-04	1.04E-05	7.16E-06	1.54E-05	4.70E-05	1.3E-01	6E-06
Trichloroethene	B2	3.02E-01	1.59E-03	1.19E-03	8.19E-04	1.77E-03	5.37E-03	1.2E-02	6E-05
								Total Pathway	5E-04
					ARPA Z				
Chloroform	B2	1.06E-02	5.58E-05	4.18E-05	2.87E-05	6.21E-05	1.80E-04	6.1E-03	1E-06
1,1-Dichloroethane	C	2.92E-02	1.54E-04	1.15E-04	7.92E-05	1.70E-05	5.18E-04	1.3E-01	7E-05
1,1-Dichloroethene	C	3.84E-02	2.02E-04	1.52E-04	1.05E-05	2.25E-05	6.82E-04	6.5E-01	4E-04
1,1,2-Trichloroethane	C	1.08E-02	5.69E-05	4.25E-05	2.93E-05	6.23E-05	1.92E-04	6.3E-02	1E-05
1,2-Dichloroethane	B2	1.11E-02	5.84E-05	4.37E-05	3.02E-05	6.49E-05	1.97E-04	1.3E-01	3E-05
Trichloroethene	B2	2.02E+00	1.06E-02	7.94E-03	5.48E-03	1.17E-02	3.58E-02	1.2E-02	4E-04
								Total Pathway	9E-04

TABLE 4-4

EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Upperbound Excess Lifetime Cancer Risk
					ARPA V				
Benzene	A	1.15E-03	1.13E-06	8.38E-07	5.76E-07	5.07E-06	7.61E-06	2.9E-02	2E-07
Chloroform	B2	5.51E-05	4.87E-07	3.61E-07	2.49E-07	2.18E-06	3.28E-06	6.1E-03	2E-08
1,1-Dichloroethane	C	1.16E-03	1.03E-05	7.61E-06	5.25E-06	4.62E-05	6.93E-05	1.3E-01	9E-06
1,1-Dichloroethene	C	6.49E-04	5.74E-06	4.27E-06	2.93E-06	2.58E-05	5.83E-05	6.5E-01	4E-05
1,2-Dichloroethane	B2	8.00E-05	7.08E-07	5.25E-07	3.61E-07	3.18E-06	4.77E-06	1.3E-01	6E-07
Trichloroethene	B2	5.25E-04	4.65E-06	3.45E-06	2.37E-06	2.08E-05	3.12E-05	1.2E-02	4E-07
Bis(2-ethylhexyl)phthalate	B2	6.00E-03	2.63E-07	1.95E-07	1.34E-07	1.18E-06	1.77E-06	9.3E-02	2E-07
								Total Pathway	5E-05
					ARPA W				
1,1-Dichloroethane	C	4.02E+03	3.56E-05	2.64E-05	1.82E-05	1.59E-04	2.39E-04	1.3E-01	3E-05
1,1-Dichloroethene	C	6.87E-04	6.09E-06	4.51E-06	3.12E-06	2.74E-05	4.10E-05	6.5E-01	3E-05
Trichloroethene	B2	4.30E-03	3.81E-05	2.83E-05	1.94E-05	1.72E-04	2.58E-04	1.2E-02	3E-06
								Total Pathway	6E-05
					ARPA X				
1,1-Dichloroethane	C	2.71E-03	2.40E-05	1.78E-05	1.23E-05	1.08E-04	1.62E-04	1.3E-01	2E-05
1,1-Dichloroethene	C	3.47E-03	3.07E-05	2.29E-05	1.57E-05	1.38E-04	2.06E-04	6.5E-01	1E-04
1,1,2-Trichloroethane	C	1.70E-02	1.50E-04	1.11E-04	7.69E-05	6.75E-04	1.01E-03	6.3E-02	6E-05
1,2-Dichloroethane	B2	4.10E-04	3.62E-06	2.69E-06	1.86E-06	1.63E-05	2.44E-05	1.3E-01	3E-06
Trichloroethene	B2	7.00E-03	6.20E-05	4.60E-05	3.17E-05	2.78E-04	4.18E-04	1.2E-02	5E-06
								Total Pathway	2E-04
					ARPA Y				
Chloroform	B2	2.10E-04	1.86E-06	1.38E-06	9.46E-07	8.36E-06	1.25E-05	6.1E-03	8E-08
1,1-Dichloroethane	C	1.19E-01	1.05E-03	7.81E-04	5.38E-04	4.73E-03	7.11E-03	1.3E-01	9E-04
1,1-Dichloroethene	C	6.68E-02	5.91E-04	4.38E-04	3.02E-04	2.65E-03	3.98E-03	6.5E-01	3E-03
1,1,2-Trichloroethane	C	1.48E-01	1.31E-03	9.72E-04	6.69E-04	5.28E-03	8.84E-03	6.3E-02	6E-04
1,2-Dichloroethane	B2	4.01E-03	3.55E-05	2.63E-05	1.82E-05	1.59E-04	2.37E-04	1.3E-01	3E-05
Trichloroethene	B2	4.69E-01	4.15E-03	3.08E-03	2.12E-03	1.87E-02	2.80E-02	1.2E-02	3E-04
Methylene chloride	B2	1.90E-03	1.68E-05	1.24E-05	8.60E-06	7.55E-05	1.13E-04	7.5E-03	8E-07
								Total Pathway	4E-03
					ARPA Z				
Chloroform	B2	4.00E-03	3.54E-05	2.63E-05	1.82E-05	1.59E-04	2.38E-04	6.1E-03	1E-06
1,1-Dichloroethane	C	5.53E-02	4.89E-04	3.64E-04	2.50E-04	2.20E-03	3.29E-03	1.3E-01	4E-04
1,1-Dichloroethene	C	7.66E-02	6.78E-04	5.04E-04	3.46E-04	5.06E-03	4.88E-03	6.5E-01	3E-03
1,1,2-Trichloroethane	C	1.43E-02	1.26E-04	9.39E-05	6.46E-05	5.68E-04	8.52E-04	6.3E-02	5E-05
1,2-Dichloroethane	B2	7.00E-03	6.20E-05	4.60E-05	3.17E-05	2.78E-04	4.17E-04	1.3E-01	5E-05
Trichloroethene	B2	3.02E+00	2.68E-02	1.99E-02	1.36E-02	1.19E-01	1.79E-01	1.2E-02	2E-03
								Total Pathway	6E-03

TABLE 4-5

EXPOSURE VIA INHALATION OF VOLATILES FROM OFF-TCAAP GROUND-WATER (UNIT 3)
RME FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (ug/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-18	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Upperbound Excess Lifetime Cancer Risk
					AREA V			
Benzene	A	4.44E-01	1.01E-06	4.80E-07	1.54E-07	1.64E-06	2.9E-02	5E-08
Chloroform	B2	3.92E-01	9.68E-07	9.17E-07	2.95E-07	2.18E-06	8.1E-02	2E-07
1,1-Dichloroethene	C	3.03E-01	8.18E-07	7.75E-07	2.49E-07	1.84E-06	1.2E+00	2E-06
1,2-Dichloroethane	B2	1.90E-01	4.52E-07	4.27E-07	1.38E-07	1.02E-06	9.1E-02	9E-08
Trichloroethene	B2	3.44E-01	8.56E-07	8.11E-07	2.61E-07	1.93E-06	1.7E-02	3E-08
							Total Pathway	2E-06
					AREA W			
1,1-Dichloroethene	C	2.58E-01	6.96E-07	6.60E-07	2.12E-07	1.57E-06	1.2E+00	2E-06
Trichloroethene	B2	1.87E+00	4.66E-06	4.41E-06	1.42E-06	1.05E-05	1.7E-02	2E-07
							Total Pathway	2E-06
					AREA X			
1,1-Dichloroethene	C	1.31E+00	3.51E-06	3.35E-06	1.08E-06	7.94E-06	1.2E+00	1E-05
1,1,2-Trichloroethane	C	5.30E+00	1.16E-05	1.09E-05	3.51E-06	2.60E-05	5.7E-02	2E-06
1,2-Dichloroethane	B2	5.04E-01	1.20E-06	1.13E-06	3.66E-07	2.70E-06	9.1E-02	3E-07
Trichloroethene	B2	1.82E+00	4.53E-06	4.30E-06	1.38E-06	1.02E-05	1.7E-02	2E-07
							Total Pathway	1E-05
					AREA Y			
Chloroform	B2	1.63E+00	4.03E-06	3.81E-06	1.23E-06	9.07E-06	8.1E-02	7E-07
Methylene chloride	B2	1.92E+00	4.74E-06	5.00E-06	1.60E-06	1.13E-05	1.4E-02	2E-07
1,1-Dichloroethene	C	3.68E-01	9.93E-07	9.42E-07	3.02E-07	2.24E-06	1.2E+00	3E-06
1,1,2-Trichloroethane	C	5.30E+01	1.16E-04	1.09E-04	3.51E-05	2.60E-04	5.7E-02	2E-05
1,2-Dichloroethane	B2	2.64E+00	6.28E-06	5.94E-06	1.92E-06	1.41E-05	9.1E-02	1E-06
Trichloroethene	B2	3.02E+02	7.52E-04	7.13E-04	2.29E-04	1.69E-03	1.7E-02	3E-05
							Total Pathway	5E-05
					AREA Z			
Chloroform	B2	1.06E+01	2.62E-05	2.48E-05	7.98E-06	5.90E-05	8.1E-02	5E-06
1,1-Dichloroethene	C	3.84E+01	1.04E-04	9.83E-05	3.16E-05	2.34E-04	1.2E+00	3E-04
1,1,2-Trichloroethane	C	1.08E+01	2.37E-05	2.22E-05	7.15E-06	5.31E-05	5.7E-02	3E-06
1,2-Dichloroethane	B2	1.11E+01	2.64E-05	2.50E-05	8.07E-06	5.95E-05	9.1E-02	5E-06
Trichloroethene	B2	2.02E+03	5.03E-03	4.77E-03	1.53E-03	1.13E-02	1.7E-02	2E-04
							Total Pathway	5E-04

TABLE 4-6

EXPOSURE VIA INHALATION OF VOLATILES FROM OFF-TCAAP GROUND-WATER (UNIT 3)
RME FUTURE LAND USE
RME CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (ug/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-18	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor $(mg/kg/day)^{-1}$	Upperbound Excess Lifetime Cancer Risk
				AREA V				
Benzene	A	1.15E+00	3.12E-06	1.48E-06	4.76E-07	5.08E-06	2.9E-02	1E-07
Chloroform	B2	5.51E-02	3.27E-07	3.10E-07	4.31E-07	1.07E-06	8.1E-02	9E-08
1,1-Dichloroethene	C	6.49E-01	4.22E-06	3.98E-06	5.56E-06	1.38E-05	1.2E+00	2E-05
1,2-Dichloroethane	B2	8.00E-02	4.56E-07	4.31E-07	6.02E-07	1.49E-06	9.1E-02	1E-07
Trichloroethene	B2	5.25E-01	3.15E-06	2.97E-06	4.15E-06	1.03E-05	1.7E-02	2E-07
							Total Pathway	2E-05
				AREA W				
1,1-Dichloroethene	C	6.87E-01	4.47E-06	4.21E-06	5.89E-06	1.46E-05	1.2E+00	2E-05
Trichloroethene	B2	4.30E+00	2.58E-05	2.43E-05	3.40E-05	8.41E-05	1.7E-02	1E-06
							Total Pathway	2E-05
				AREA X				
1,1-Dichloroethene	C	3.47E+00	2.26E-05	2.13E-05	2.97E-05	7.36E-05	1.2E+00	9E-05
1,1,2-Trichloroethane	C	1.7E+01	8.87E-05	8.38E-05	1.17E-04	2.90E-04	5.7E-02	2E-05
1,2-Dichloroethane	B2	4.1E-01	2.34E-06	2.21E-06	3.09E-06	9.64E-06	9.1E-02	7E-07
Trichloroethene	B2	7.00E+00	4.20E-05	3.96E-05	5.53E-05	1.37E-04	1.7E-02	2E-06
							Total Pathway	1E-04
				AREA Y				
Chloroform	B2	2.10E-01	1.25E-06	1.18E-06	1.65E-06	4.08E-06	8.1E-02	3E-07
Methylene chloride	B2	1.90E+00	1.26E-05	1.19E-05	1.65E-05	4.10E-05	1.4E-02	6E-07
1,1-Dichloroethene	C	6.68E+01	4.34E-04	4.09E-04	5.72E-04	1.42E-03	1.2E+00	2E-03
1,1,2-Trichloroethane	C	1.48E+02	7.73E-04	7.30E-04	1.02E-03	2.52E-03	5.7E-02	1E-04
1,2-Dichloroethane	B2	4.01E+00	2.29E-05	2.16E-05	3.02E-05	7.47E-05	9.1E-02	7E-06
Trichloroethene	B2	4.69E+02	2.81E-03	2.65E-03	3.71E-03	9.17E-03	1.7E-02	2E-04
							Total Pathway	2E-03
				AREA Z				
Chloroform	B2	4.00E+00	2.38E-05	2.25E-05	3.14E-05	7.77E-05	8.1E-02	6E-06
1,1-Dichloroethene	C	7.66E+01	4.98E-04	4.70E-04	6.56E-04	1.62E-03	1.2E+00	2E-03
1,1,2-Trichloroethane	C	1.43E+01	7.46E-05	7.05E-05	9.85E-05	2.44E-04	5.7E-02	1E-05
1,2-Dichloroethane	B2	7.00E+00	4.00E-05	3.77E-05	5.27E-05	1.30E-04	9.1E-02	1E-03
Trichloroethene	B2	3.02E+03	1.81E-02	1.71E-02	2.39E-02	5.91E-02	1.7E-02	1E-03
							Total Pathway	4E-03

TABLE 4-7

EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor $(mg/kg/day)^{-1}$		Upperbound Excess Lifetime Cancer Risk
ARPA W												
Carbon Tetrachloride	B2	1.03E-04	6.19E-08	2.46E-07	2.81E-07	1.99E-07	1.52E-07	3.24E-07	1.26E-06	1.3E-01		2E-07
Chloroform	B2	2.73E-05	1.64E-08	6.56E-08	7.43E-08	5.27E-08	4.03E-08	8.58E-08	3.35E-07	6.1E-03		2E-09
Methylene Chloride	B2	4.15E-04	2.50E-07	9.94E-07	1.14E-06	8.00E-07	6.12E-07	1.30E-06	5.10E-06	7.5E-03		4E-08
1,1-Dichloroethane	C	2.47E-03	1.49E-06	5.91E-06	6.75E-06	4.77E-08	3.64E-06	7.76E-06	2.56E-05	9.1E-02		2E-06
1,1-Dichloroethene	C	1.19E-03	7.14E-07	2.85E-06	3.25E-06	2.30E-06	1.76E-06	3.74E-06	1.46E-05	6.0E-01		9E-06
1,1,2-Trichloroethane	C	4.18E-05	2.51E-08	1.00E-07	1.14E-07	8.07E-08	6.16E-08	1.31E-07	5.12E-07	5.7E-02		3E-08
Trichloroethene	B2	2.44E-02	1.47E-05	5.83E-05	6.67E-05	4.71E-05	3.60E-05	7.67E-05	3.00E-04	1.1E-02		3E-06
Tetrachloroethene	B2	5.68E-05	3.41E-08	1.36E-07	1.55E-07	1.10E-07	8.36E-08	1.79E-07	6.97E-07	5.1E-02		4E-08
Bis(2-ethylhexyl)phthalate	B2	3.00E-03	1.80E-06	7.20E-06	8.21E-06	5.79E-06	4.42E-06	9.43E-06	3.69E-05	1.4E-02		5E-07
											Total Pathway	2E-05
ARPA X												
Benzene	A	1.17E-04	7.03E-08	2.80E-07	3.19E-07	2.26E-07	1.73E-07	3.68E-07	1.44E-06	2.9E-02		4E-08
Chloroform	B2	3.56E-05	2.14E-08	8.53E-08	9.71E-08	6.88E-08	5.25E-08	1.12E-07	4.37E-07	6.1E-03		2E-09
1,1-Dichloroethane	C	2.88E-04	1.73E-07	6.90E-07	7.86E-07	5.56E-07	4.25E-07	9.05E-07	3.54E-06	9.1E-02		3E-07
1,1-Dichloroethene	C	1.71E-04	1.03E-07	4.09E-07	4.67E-07	3.30E-07	2.52E-07	5.37E-07	2.10E-06	6.0E-01		1E-06
1,1,2-Trichloroethane	C	3.60E-05	2.16E-08	8.61E-08	9.86E-08	6.96E-08	5.31E-08	1.13E-07	4.42E-07	5.7E-02		3E-08
Trichloroethene	B2	3.61E-03	2.17E-06	8.66E-06	9.86E-06	6.97E-06	5.32E-06	1.13E-05	4.43E-05	1.1E-02		5E-07
Bis(2-ethylhexyl)phthalate	B2	6.80E-02	4.09E-05	1.63E-04	1.86E-04	1.31E-04	1.00E-04	2.14E-04	8.35E-04	1.4E-02		1E-05
Tetrachloroethene	B2	1.79E-04	1.08E-07	4.29E-07	4.89E-07	3.46E-07	2.64E-07	5.63E-07	2.20E-06	5.1E-02		1E-07
											Total Pathway	8E-05
ARPA Y												
Bromodichloromethane	B2	4.04E-04	2.43E-07	9.69E-07	1.11E-06	7.79E-07	5.96E-07	1.27E-06	4.97E-06	1.3E-01		6E-07
Chloroform	B2	4.09E-04	2.46E-07	9.77E-07	1.12E-06	7.93E-07	6.04E-07	1.29E-06	5.03E-06	6.1E-03		3E-08
Methylene Chloride	B2	6.41E-04	3.86E-07	1.53E-06	1.75E-06	1.24E-06	9.43E-07	2.01E-06	7.86E-06	7.5E-03		6E-08
1,1-Dichloroethane	C	1.80E-03	1.08E-06	4.33E-06	4.92E-06	3.48E-06	2.66E-06	5.66E-06	2.21E-05	9.1E-02		2E-06
1,1-Dichloroethene	C	1.42E-03	8.53E-07	3.40E-06	3.88E-05	2.74E-06	2.09E-06	4.46E-06	1.74E-05	6.0E-01		1E-05
1,1,2-Trichloroethane	C	4.18E-04	2.51E-07	1.00E-06	1.14E-06	8.07E-07	6.16E-07	1.31E-06	5.12E-06	5.7E-02		3E-07
1,2-Dichloroethane	B2	4.10E-04	2.46E-07	9.81E-07	1.12E-06	7.93E-07	6.05E-07	1.29E-06	5.04E-06	9.1E-02		5E-07
Trichloroethene	B2	4.30E-02	2.59E-05	1.03E-04	1.18E-04	8.29E-05	6.34E-05	1.35E-04	5.28E-04	1.1E-02		6E-06
Tetrachloroethene	B2	4.03E-04	2.41E-07	9.64E-07	1.10E-06	7.79E-07	5.94E-07	1.27E-06	4.95E-06	5.1E-02		3E-07
											Total Pathway	2E-05

TABLE 4-7 (continued)

EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor $(mg/kg/day)^{-1}$	Upperbound Excess Lifetime Cancer Risk
						ARBA Z					
1,1-Dichloroethane	C	2.57E-02	1.54E-05	6.17E-05	7.02E-05	4.96E-05	3.79E-05	8.08E-05	3.16E-04	9.1E-02	3E-05
1,1-Dichloroethene	C	2.64E-02	1.59E-05	6.30E-05	7.21E-05	5.10E-05	3.89E-05	8.30E-05	3.24E-04	6.0E-01	2E-04
1,1,2-Trichloroethane	C	2.67E-03	1.67E-06	6.69E-06	7.64E-06	5.39E-06	4.11E-06	8.77E-06	3.43E-05	5.7E-02	2E-06
1,2-Dichloroethane	B2	1.57E-03	9.43E-07	3.76E-06	4.29E-06	3.04E-06	2.31E-06	4.93E-06	1.93E-05	9.1E-02	2E-06
Trichloroethene	B2	3.11E-01	1.87E-04	7.46E-04	8.50E-04	6.01E-04	4.59E-04	9.77E-04	3.82E-03	1.1E-02	4E-05
Tetrachloroethene	B2	9.73E-03	5.84E-06	2.33E-05	2.66E-05	1.88E-05	1.44E-05	3.06E-05	1.20E-04	5.1E-02	6E-06
										Total Pathway	3E-04

TABLE 4-8

EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$		Upperbound Excess Lifetime Cancer Risk
AREA W												
Carbon Tetrachloride	B2	1.98E-04	1.53E-07	5.01E-07	5.64E-07	3.96E-07	3.01E-07	4.12E-06	6.04E-06	1.3E-01		8E-07
Chloroform	B2	3.23E-05	2.50E-08	8.19E-08	9.21E-08	6.45E-08	4.91E-08	6.72E-07	9.84E-07	6.1E-03		6E-09
Methylene Chloride	B2	6.82E-04	5.29E-07	1.73E-06	1.94E-06	1.36E-06	1.04E-06	1.42E-05	2.08E-05	7.5E-03		2E-07
1,1-Dichloroethane	C	7.30E-03	5.66E-06	1.85E-05	2.08E-05	1.46E-05	1.11E-05	1.52E-04	2.23E-04	9.1E-02		2E-05
1,1-Dichloroethene	C	3.21E-03	2.49E-06	8.14E-06	9.14E-06	6.41E-06	4.89E-06	6.68E-05	9.79E-05	6E-01		6E-05
1,1,2-Trichloroethane	C	9.89E-05	7.66E-08	2.51E-07	2.82E-07	1.98E-07	1.51E-07	2.06E-06	3.02E-06	5.7E-02		2E-07
Trichloroethene	B2	6.68E-02	5.17E-05	1.69E-04	1.91E-04	1.34E-04	1.01E-04	1.39E-03	2.04E-03	1.1E-02		2E-05
Tetrachloroethene	B2	1.20E-04	9.30E-08	3.04E-07	3.42E-07	2.40E-07	1.83E-07	2.50E-06	3.66E-06	5.1E-02		2E-07
Bis(2-ethylhexyl)phthalate	B2	3.0E-03	2.32E-06	7.60E-06	8.55E-06	1.11E-05	4.56E-06	6.24E-05	9.65E-05	1.4E-02		1E-06
											Total Pathway	1E-04
AREA X												
Benzene	A	1.59E-04	1.23E-07	4.05E-07	4.54E-07	3.19E-07	2.41E-07	3.32E-06	4.85E-06	2.9E-02		1E-07
Chloroform	B2	5.18E-05	4.01E-08	1.32E-07	1.48E-07	1.04E-07	7.86E-08	1.08E-06	1.58E-06	6.1E-03		9E-09
1,1-Dichloroethane	C	5.22E-04	4.04E-07	1.32E-06	1.49E-06	1.04E-06	7.93E-07	1.09E-05	1.59E-05	9.1E-02		1E-06
1,1-Dichloroethene	C	2.97E-04	2.30E-07	7.54E-07	8.50E-07	5.94E-07	4.52E-07	6.19E-06	9.07E-06	6E-01		6E-06
1,1,2-Trichloroethane	C	6.71E-05	5.20E-08	1.70E-07	1.91E-07	1.34E-07	1.02E-07	1.40E-06	2.05E-06	5.7E-02		1E-07
Trichloroethene	B2	6.09E-03	4.71E-06	1.54E-05	1.74E-05	1.21E-05	9.29E-06	1.27E-04	1.86E-04	1.1E-02		2E-06
Tetrachloroethene	B2	5.36E-04	4.16E-07	1.36E-06	1.53E-06	1.07E-06	8.14E-07	1.11E-05	1.63E-05	5.1E-02		8E-07
Bis(2-ethylhexyl)phthalate	B2	6.8E-02	5.27E-05	1.72E-04	1.94E-04	2.72E-05	1.03E-04	1.42E-03	1.97E-03	1.4E-02		3E-05
											Total Pathway	2E-04
AREA Y												
Bromodichloromethane	B2	1.10E-04	8.53E-08	2.79E-07	3.14E-07	2.20E-07	1.67E-07	2.29E-06	3.36E-06	1.3E-01		4E-07
Chloroform	B2	3.0E-04	2.33E-07	7.63E-07	8.57E-07	5.99E-07	4.56E-07	6.24E-06	9.15E-06	6.1E-03		6E-08
Methylene Chloride	B2	7.3E-04	5.66E-07	1.85E-06	2.08E-06	1.46E-06	1.11E-06	1.52E-05	2.23E-05	7.5E-03		2E-07
1,1-Dichloroethane	C	2.73E-03	2.11E-06	6.94E-06	7.79E-06	5.46E-06	4.15E-06	5.68E-05	8.33E-05	9.1E-02		8E-06
1,1-Dichloroethene	C	2.04E-03	1.59E-06	5.19E-06	5.81E-06	4.08E-06	3.10E-06	4.25E-05	6.23E-05	6E-01		4E-05
1,1,2-Trichloroethane	C	5.50E-04	4.26E-07	1.39E-06	1.57E-06	1.10E-06	8.36E-07	1.14E-05	1.67E-05	5.7E-02		1E-06
1,2-Dichloroethane	B2	1.40E-04	1.08E-07	3.55E-07	3.99E-07	2.80E-07	2.13E-07	2.91E-06	4.27E-06	9.1E-02		4E-07
Trichloroethene	B2	5.67E-02	4.40E-05	1.44E-05	1.61E-04	1.14E-04	8.64E-05	1.18E-03	1.73E-03	1.1E-02		2E-05
Tetrachloroethene	B2	1.30E-04	1.01E-07	3.30E-07	3.71E-07	2.60E-07	1.98E-07	2.70E-06	3.96E-06	5.1E-02		2E-07
											Total Pathway	4E-05

TABLE 4-8 (continued)

EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Upperbound Excess Lifetime Cancer Risk
						ARPA Z					
1,1-Dichloroethane	C	5.29E-02	4.10E-05	1.34E-04	1.51E-04	1.06E-04	8.07E-05	1.10E-03	1.61E-03	9.1E-02	2E-04
1,1-Dichloroethene	C	5.32E-02	4.13E-05	1.35E-04	1.51E-04	1.06E-04	8.07E-05	1.11E-03	1.62E-03	6.0E-01	1E-03
1,1,2-Trichloroethane	C	5.93E-03	4.60E-06	1.50E-05	1.69E-05	1.19E-06	9.00E-06	1.23E-04	1.80E-04	5.7E-02	1E-05
1,2-Dichloroethane	B2	2.34E-03	1.81E-06	5.91E-06	6.67E-06	4.67E-06	3.56E-06	4.87E-05	7.13E-05	9.1E-02	7E-06
Trichloroethene	B2	4.62E-01	3.59E-04	1.17E-03	1.31E-03	9.21E-04	7.03E-04	9.62E-03	1.41E-02	1.1E-02	2E-04
Tetrachloroethene	B2	2.79E-02	2.16E-05	7.07E-05	7.93E-05	5.57E-05	4.24E-05	5.81E-04	8.51E-04	5.1E-02	4E-05
										Total Pathway	1E-03

TABLE 4-9

EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Upperbound Excess Lifetime Cancer Risk
					AREA W				
Carbon Tetrachloride	B2	1.03E-04	5.42E-07	4.05E-07	2.79E-07	6.02E-07	1.82E-06	1.6E-01	3E-07
Chloroform	B2	2.73E-05	1.44E-07	1.08E-07	7.40E-08	1.59E-07	4.85E-07	6.1E-03	3E-09
Methylene Chloride	B2	4.15E-04	2.18E-06	2.06E-07	1.13E-06	2.44E-06	7.37E-06	7.5E-03	6E-08
1,1-Dichloroethane	C	2.47E-03	1.30E-05	9.73E-06	6.70E-06	1.45E-05	4.39E-05	1.3E-01	6E-06
1,1-Dichloroethene	C	1.19E-03	6.26E-06	4.68E-06	3.23E-06	6.70E-06	2.11E-05	6.5E-02	1E-06
1,1,2-Trichloroethane	C	4.18E-05	2.20E-07	1.64E-07	1.13E-07	2.43E-07	7.40E-07	6.3E-02	5E-08
Trichloroethene	B2	2.44E-02	1.29E-04	9.61E-05	6.61E-05	1.43E-04	5.77E-04	1.2E-02	7E-06
Tetrachloroethene	B2	5.68E-05	2.99E-07	2.23E-07	1.54E-07	3.33E-07	1.01E-06	5.7E-02	6E-08
Bis(2-ethylhexyl)phthalate	B2	3.00E-03	7.81E-08	5.84E-08	4.03E-08	8.69E-08	2.63E-07	9.3E-02	2E-08
								Total Pathway	1E-05
					AREA X				
Benzene	A	1.17E-04	6.82E-08	4.70E-08	3.24E-08	6.98E-08	2.17E-07	2.9E-02	6E-09
Chloroform	B2	3.56E-05	1.87E-07	1.40E-07	9.65E-08	2.08E-07	6.21E-07	6.1E-03	4E-09
1,1-Dichloroethane	C	2.88E-04	1.52E-06	1.14E-06	7.81E-07	1.69E-06	5.11E-06	1.3E-01	7E-07
1,1-Dichloroethene	C	1.71E-04	9.00E-07	6.73E-07	4.63E-07	1.00E-06	3.03E-06	6.5E-02	2E-07
1,1,2-Trichloroethane	C	3.60E-05	1.89E-07	1.41E-07	9.73E-08	2.11E-07	6.39E-07	6.3E-02	4E-08
Trichloroethene	B2	3.61E-03	1.91E-05	1.41E-05	9.83E-06	2.11E-05	6.44E-05	1.2E-02	8E-07
Tetrachloroethene	B2	1.79E-04	9.43E-07	7.06E-07	4.85E-07	1.05E-06	3.18E-06	5.7E-02	2E-07
Bis(2-ethylhexyl)phthalate	B2	6.80E-02	1.78E-06	1.33E-06	9.13E-07	1.98E-06	6.00E-06	9.3E-02	6E-07
								Total Pathway	3E-06

TABLE 4-9 (continued)

EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Upperbound Excess Lifetime Cancer Risk
AREA Y									
Bromodichloromethane	B2	4.04E-04	2.13E-06	1.59E-06	1.10E-06	2.37E-06	7.20E-06	1.4E-01	1E-06
Chloroform	B2	4.09E-04	2.16E-06	1.62E-06	1.11E-06	2.39E-06	7.26E-06	6.1E-03	4E-08
Methylene Chloride	B2	6.41E-04	3.37E-06	2.53E-06	1.74E-06	3.74E-06	1.14E-05	7.5E-03	9E-08
1,1-Dichloroethane	C	1.80E-03	9.48E-06	7.08E-06	4.87E-06	1.05E-05	3.19E-05	1.3E-01	4E-06
1,1-Dichloroethene	C	1.42E-03	7.47E-06	5.59E-06	3.85E-06	8.29E-06	2.51E-05	6.5E-01	2E-05
1,1,2-Trichloroethane	C	4.18E-04	2.20E-06	1.64E-06	1.14E-06	2.44E-06	7.41E-06	6.3E-02	5E-07
1,2-Dichlorethane	B2	4.10E-04	2.16E-06	1.62E-06	1.11E-06	2.39E-06	7.26E-06	1.3E-01	9E-07
Trichloroethene	B2	4.30E-02	2.26E-04	1.70E-04	1.16E-04	2.51E-05	5.37E-04	1.2E-02	6E-06
Tetrachloroethene	B2	4.03E-04	2.12E-06	1.59E-06	1.01E-06	2.37E-06	7.17E-06	5.7E-02	4E-07
								Total Pathway	3E-05
AREA Z									
1,1-Dichloroethane	C	2.57E-02	1.35E-04	1.01E-04	6.97E-05	1.50E-04	4.56E-04	1.3E-01	6E-05
1,1-Dichloroethene	C	2.64E-02	1.40E-04	1.04E-04	7.16E-05	1.54E-04	4.70E-04	6.5E-02	3E-05
1,1,2-Trichloroethane	C	2.79E-03	1.48E-05	1.10E-05	7.56E-06	1.63E-05	4.96E-05	6.3E-02	3E-06
1,2-Dichloroethane	B2	1.57E-03	8.27E-06	6.19E-06	4.25E-06	9.19E-06	2.79E-05	1.3E-01	4E-06
Trichloroethene	B2	3.11E-01	1.63E-03	1.22E-03	8.45E-04	1.82E-03	5.52E-03	1.2E-02	7E-05
Tetrachloroethene	B2	9.73E-03	5.13E-05	3.83E-05	2.64E-05	5.69E-05	1.72E-04	5.7E-02	1E-05
								Total Pathway	2E-04

TABLE 4-10

EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Upperbound Excess Lifetime Cancer Risk
					AREA W				
Carbon Tetrachloride	B2	1.98E-04	1.75E-06	1.30E-06	8.95E-07	7.88E-06	1.18E-05	1.6E-01	2E-06
Chloroform	B2	3.23E-05	2.85E-07	2.12E-07	1.46E-07	1.28E-06	1.92E-06	6.1E-03	1E-08
Methylene Chloride	B2	6.82E-04	6.03E-06	4.10E-06	3.08E-06	2.71E-05	4.07E-05	7.5E-03	3E-07
1,1-Dichloroethane	C	7.30E-03	6.46E-05	4.80E-05	3.30E-05	2.90E-04	4.36E-04	1.3E-01	6E-05
1,1-Dichloroethene	C	3.21E-03	2.84E-05	2.11E-05	1.45E-05	1.28E-04	5.66E-05	6.5E-01	4E-05
1,1,2-Trichloroethane	C	9.89E-05	8.75E-07	6.49E-07	4.47E-07	3.93E-06	5.90E-06	6.3E-02	4E-07
Trichloroethene	B2	6.68E-02	5.91E-04	4.38E-04	3.02E-04	2.65E-03	3.98E-03	1.2E-02	5E-05
Tetrachloroethene	B2	1.20E-04	1.06E-06	7.88E-07	5.43E-07	4.77E-06	7.16E-06	5.7E-02	4E-07
Bis(2-ethylhexyl)phthalate	B2	3.00E-03	1.53E-06	1.14E-06	9.38E-07	7.75E-07	4.38E-06	9.3E-02	4E-07
								Total Pathway	2E-04
					AREA X				
Benzene	A	1.59E-04	1.56E-07	1.16E-07	8.00E-08	7.02E-07	1.05E-06	2.9E-02	3E-08
Chloroform	B2	5.18E-05	4.58E-07	3.40E-07	2.35E-07	2.06E-06	3.08E-06	6.1E-03	2E-08
1,1-Dichloroethane	C	5.22E-04	4.62E-06	3.43E-06	2.36E-06	2.07E-05	3.11E-05	1.3E-01	4E-06
1,1-Dichloroethene	C	2.97E-04	2.63E-06	1.94E-06	1.34E-06	1.19E-05	1.77E-05	6.5E-01	1E-05
1,1,2-Trichloroethane	C	6.71E-05	5.95E-07	4.41E-07	3.03E-07	2.66E-06	4.00E-06	6.3E-02	3E-07
Trichloroethene	B2	6.09E-03	5.39E-05	3.99E-05	2.75E-05	2.42E-04	3.63E-04	1.2E-02	4E-06
Tetrachloroethene	B2	5.36E-04	4.73E-06	3.52E-06	2.42E-06	2.13E-05	3.19E-05	5.7E-02	2E-06
Bis(2-ethylhexyl)phthalate	B2	6.80E-02	3.48E-05	2.58E-05	2.13E-05	1.77E-05	9.94E-06	9.3E-02	9E-07
								Total Pathway	2E-05

TABLE 4-10 (continued)

EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
REASONABLE MAXIMUM EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Upperbound Excess Lifetime Cancer Risk
AREA Y									
Bromodichloromethane	B2	1.10E-04	9.73E-07	7.22E-07	4.97E-07	4.38E-06	6.57E-06	1.4E-01	9E-07
Chloroform	B2	3.00E-04	2.65E-06	1.97E-06	1.35E-06	1.19E-05	1.78E-05	6.1E-03	1E-07
Methylene Chloride	B2	7.30E-04	6.46E-06	4.80E-06	3.30E-06	2.90E-05	4.36E-05	7.5E-03	3E-07
1,1-Dichloroethane	C	2.73E-03	2.41E-05	1.79E-05	1.24E-07	1.09E-04	1.63E-04	1.3E-01	2E-05
1,1-Dichloroethene	C	2.04E-03	1.81E-05	1.34E-05	9.20E-06	5.59E-05	9.64E-05	6.5E-01	6E-05
1,1,2-Trichloroethane	C	5.50E-04	4.87E-06	3.61E-06	2.49E-06	2.18E-05	3.27E-05	6.3E-02	2E-06
1,2-Dichlorethane	B2	1.40E-04	1.24E-06	9.19E-07	6.33E-07	5.57E-06	8.36E-06	1.3E-01	1E-06
Trichloroethene	B2	5.67E-02	5.02E-04	3.72E-04	2.56E-04	2.26E-03	3.40E-03	1.2E-02	4E-05
Tetrachloroethene	B2	1.30E-04	1.15E-06	8.53E-07	5.88E-07	5.17E-06	7.76E-06	5.7E-02	4E-07
								Total Pathway	1E-04
AREA Z									
1,1-Dichloroethane	C	5.29E-02	4.68E-04	3.47E-04	2.39E-04	2.11E-03	3.17E-03	1.3E-01	4E-04
1,1-Dichloroethene	C	5.32E-02	4.71E-04	3.50E-04	2.41E-04	2.11E-03	3.17E-03	6.5E-01	2E-03
1,1,2-Trichloroethane	C	5.93E-03	5.25E-05	3.90E-05	2.68E-05	2.36E-04	3.55E-04	6.3E-02	2E-05
1,2-Dichloroethane	B2	2.34E-03	2.07E-05	1.54E-05	1.06E-05	9.30E-05	1.40E-04	1.3E-01	2E-05
Trichloroethene	B2	4.62E-01	4.09E-03	3.03E-03	2.10E-03	1.83E-02	2.75E-02	1.2E-02	3E-04
Tetrachloroethene	B2	2.79E-02	2.46E-04	1.83E-04	1.26E-04	1.11E-04	1.65E-03	5.7E-02	9E-05
								Total Pathway	3E-03

TABLE 4-11

EXPOSURE VIA INHALATION OF VOLATILES FROM OFF-TCAAP GROUND-WATER DURING SHOWERING (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (ug/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-18	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Upperbound Excess Lifetime Cancer Risk
				AREA W				
Chloroform	B2	2.73E-02	6.74E-08	6.38E-08	2.05E-08	1.51E-07	8.1E-02	1E-08
Methylene chloride	B2	4.15E-01	1.14E-06	1.08E-06	3.45E-07	2.57E-06	1.4E-02	4E-08
1,1-Dichloroethene	C	1.19E+00	3.21E-06	3.05E-06	9.78E-07	7.24E-06	1.2E+00	9E-06
1,1,2-Trichloroethane	C	4.18E-02	9.15E-08	8.61E-08	2.76E-08	4.54E-07	5.7E-02	3E-08
Trichloroethene	B2	2.44E+01	6.08E-05	5.76E-05	1.85E-05	1.37E-04	1.7E-02	2E-06
Tetrachloroethene	B2	5.68E-02	1.31E-07	1.23E-07	3.98E-08	2.93E-07	3.3E-03	1E-11
							Total Pathway	1E-05
				AREA X				
Benzene	A	1.17E-01	3.89E-07	1.84E-07	5.91E-08	6.32E-07	2.9E-02	2E-08
Chloroform	B2	3.56E-02	8.79E-08	8.33E-08	2.68E-08	1.98E-07	8.1E-02	2E-08
1,1-Dichloroethene	C	1.17E-01	3.15E-07	2.99E-07	9.61E-08	7.10E-07	1.2E+00	9E-07
1,1,2-Trichloroethane	C	3.60E-02	7.88E-08	7.41E-08	2.38E-08	1.76E-07	5.7E-02	1E-08
Trichloroethene	B2	3.61E+00	8.99E-06	8.52E-06	2.74E-06	2.03E-06	1.7E-02	3E-07
Tetrachloroethene	B2	1.79E-01	4.11E-07	3.90E-07	1.25E-07	9.26E-07	3.3E-03	3E-09
							Total Pathway	1E-06
				AREA Y				
Chloroform	B2	4.09E-01	1.01E-06	9.57E-07	3.07E-07	2.27E-06	8.1E-02	2E-07
Methylene chloride	B2	6.41E-01	1.76E-06	1.67E-06	5.33E-07	3.96E-06	1.4E-02	6E-08
1,1-Dichloroethene	C	1.42E+00	3.83E-06	3.64E-06	1.17E-06	8.64E-06	1.2E+00	1E-05
1,1,2-Trichloroethane	C	4.18E-01	9.15E-07	8.61E-07	2.76E-07	2.05E-06	5.7E-02	1E-07
1,2-Dichloroethane	B2	4.10E-01	9.75E-07	9.22E-07	2.98E-07	2.20E-06	9.1E-02	2E-07
Trichloroethene	B2	4.30E+01	1.07E-04	1.01E-04	3.26E-05	2.41E-04	1.7E-02	4E-06
Tetrachloroethene	B2	4.03E-01	9.26E-07	8.78E-07	2.82E-07	2.09E-06	3.3E-03	6E-09
							Total Pathway	1E-05
				AREA Z				
1,1-Dichloroethene	C	2.64E+01	7.13E-05	6.76E-05	2.17E-05	1.61E-04	1.2E+00	2E-04
1,1,2-Trichloroethane	C	2.67E+00	5.85E-06	5.50E-06	1.77E-06	1.31E-05	5.7E-02	7E-07
1,2-Dichloroethane	B2	1.57E+00	3.74E-06	3.53E-06	1.14E-06	8.41E-06	9.1E-02	8E-07
Trichloroethene	B2	3.11E+02	7.74E-04	7.34E-05	2.36E-04	1.08E-03	1.7E-02	2E-05
Tetrachloroethene	B2	9.73E+00	2.24E-05	2.12E-05	6.82E-06	5.04E-05	3.3E-03	2E-07
							Total Pathway	2E-04

TABLE 4-12

EXPOSURE VIA INHALATION OF VOLATILES FROM OFF-TCAAP GROUND-WATER DURING SHOWERING (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
CARCINOGENIC EFFECTS

Compounds	EPA Weight of Evidence	Concentration (ug/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-18	Adult	Lifetime Exposure Dose (mg/kg/day)	Slope Factor $(mg/kg/day)^{-1}$	Upperbound Excess Lifetime Cancer Risk
				AREA W				
Chloroform	B2	3.23E-02	1.92E-07	1.81E-07	2.53E-07	6.26E-07	8.1E-02	5E-08
Methylene chloride	B2	6.82E-01	4.51E-06	4.26E-06	5.93E-06	1.47E-05	1.4E-02	2E-07
1,1-Dichloroethene	C	3.21E+00	2.09E-05	1.97E-05	2.75E-05	6.81E-05	1.2E+00	8E-05
1,1,2-Trichloroethane	C	9.89E-02	5.16E-07	4.87E-07	6.81E-07	1.68E-06	5.7E-02	1E-07
Trichloroethene	B2	6.68E+01	4.01E-04	3.78E-04	5.28E-04	1.31E-03	1.7E-02	2E-05
Tetrachloroethene	B2	1.20E-01	6.61E-07	6.30E-07	8.73E-07	2.16E-06	3.3E-03	7E-09
							Total Pathway	1E-04
				AREA X				
Benzene	A	1.59E-01	1.20E-06	5.69E-07	1.83E-07	1.95E-06	2.9E-02	6E-08
Chloroform	B2	5.18E-02	3.08E-07	2.91E-07	4.06E-07	1.01E-06	8.1E-02	8E-08
1,1-Dichloroethene	C	2.97E-01	1.93E-06	1.82E-06	2.55E-06	6.30E-06	1.2E+00	8E-06
1,1,2-Trichloroethane	C	6.71E-02	3.50E-07	3.30E-07	4.62E-07	1.14E-06	5.7E-02	8E-08
Trichloroethene	B2	6.09E+00	3.65E-05	3.45E-05	4.81E-05	1.19E-04	1.7E-02	2E-06
Tetrachloroethene	B2	5.36E-01	2.95E-06	2.81E-06	3.90E-06	9.66E-06	3.3E-03	3E-08
							Total Pathway	1E-05
				AREA Y				
Chloroform	B2	3.00E-01	1.79E-06	1.69E-06	2.35E-06	5.83E-06	8.1E-02	5E-07
Methylene chloride	B2	7.30E-01	4.83E-06	4.56E-06	6.35E-06	1.57E-05	1.4E-02	2E-07
1,1-Dichloroethene	C	2.04E+00	1.33E-05	1.25E-05	1.75E-05	4.33E-05	1.2E+00	5E-05
1,1,2-Trichloroethane	C	5.50E-01	2.87E-06	2.71E-06	3.79E-06	9.37E-06	5.7E-02	2E-07
1,2-Dichloroethane	B2	1.40E-01	7.99E-07	7.54E-07	1.05E-06	2.60E-06	9.1E-02	2E-07
Trichloroethene	B2	5.67E+01	3.40E-04	3.21E-04	4.48E-04	1.11E-03	1.7E-02	2E-05
Tetrachloroethene	B2	1.30E-01	7.16E-07	6.82E-07	9.46E-07	2.34E-06	3.3E-03	7E-09
							Total Pathway	7E-05
				AREA Z				
1,1-Dichloroethene	C	5.32E+01	3.46E-04	3.26E-04	4.56E-04	1.13E-03	1.2E+00	1E-03
1,1,2-Trichloroethane	C	5.93E+00	3.10E-05	2.92E-05	4.09E-05	1.01E-04	5.7E-02	6E-06
1,2-Dichloroethane	B2	2.34E+00	1.34E-05	1.26E-05	1.76E-05	4.36E-05	9.1E-02	4E-06
Trichloroethene	B2	4.62E+02	2.77E-03	2.61E-03	3.65E-03	9.03E-03	1.7E-02	2E-04
Tetrachloroethene	B2	2.79E+01	1.54E-04	1.46E-04	2.03E-04	5.03E-04	3.3E-03	2E-06
							Total Pathway	1E-03

ACUTE EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA V														
Vanadium	3.0E-03	1.26E-04	1.68E-04	1.15E-04	8.11E-05	6.19E-05	6.00E-05	9E-03	1.4E-02	1.9E-02	1.3E-02	9.0E-03	6.9E-03	6.7E-03
Chromium	6.57E-02	2.76E-03	3.65E-03	2.51E-03	1.78E-03	1.36E-03	1.31E-03	1E+01	2.8E-04	3.7E-04	2.5E-04	1.8E-04	1.4E-04	1.3E-04
Copper	1.97E-02	8.28E-04	1.10E-03	7.54E-04	5.33E-04	4.07E-04	3.94E-04	4E-02	2.1E-02	2.8E-02	1.9E-02	1.3E-02	1.0E-02	9.9E-03
Nickel	5.47E-02	2.30E-03	3.06E-03	2.09E-03	1.48E-03	1.13E-03	1.09E-03	2E-02	1.2E-01	1.5E-01	1.0E-01	7.4E-02	5.7E-02	5.5E-02
Zinc	3.81E-01	1.60E-02	2.13E-02	1.46E-02	1.03E-02	7.87E-03	7.62E-03	2E-01	8.0E-02	1.1E-01	7.3E-02	5.2E-02	3.9E-02	3.8E-02
Chloroform	3.92E-05	1.65E-06	2.19E-06	1.50E-06	1.06E-06	8.09E-07	7.84E-07	1E-02	1.7E-04	2.2E-04	1.5E-04	1.1E-04	8.1E-05	7.8E-05
Ethylbenzene	2.00E-04	8.41E-06	1.12E-05	7.65E-06	5.41E-06	4.13E-06	4.00E-06	1E+00	8.4E-06	1.1E-06	7.7E-06	5.4E-06	4.1E-06	4.0E-06
1,1-Dichloroethane	5.16E-04	2.17E-05	2.88E-05	1.97E-05	1.40E-05	1.07E-05	1.03E-05	1E+00	2.2E-05	2.9E-05	2.0E-05	1.4E-05	1.1E-05	1.0E-05
1,1-Dichloroethylene	3.03E-04	1.27E-05	1.69E-05	1.16E-05	8.19E-06	6.26E-06	6.06E-06	9E-03	1.4E-03	1.9E-03	1.3E-03	9.1E-04	7.0E-04	6.7E-04
1,1,1-Trichloroethane	1.03E-03	4.33E-05	5.75E-05	3.94E-05	2.79E-05	2.13E-05	2.06E-05	9E-01	4.8E-05	6.4E-05	4.4E-05	3.1E-05	2.4E-05	2.3E-05
Bis(2-ethylhexyl)phthalate	4.50E-03	1.89E-04	2.51E-04	1.72E-04	1.22E-04	9.29E-05	9.00E-05	2E-02	9.5E-03	1.3E-02	8.6E-03	6.1E-03	4.6E-03	4.5E-03
Benzoic Acid	4.65E-02	1.96E-03	2.60E-03	1.78E-03	1.26E-03	9.60E-04	9.30E-04	4E+00	4.9E-04	6.5E-04	4.4E-04	3.2E-04	2.4E-04	2.3E-04
								Hazard Index	2.5E-01	3.3E-01	2.1E-01	1.5E-01	1.2E-01	1.1E-01
AREA W														
1,1-Dichloroethane	1.39E-03	5.85E-05	7.77E-05	5.32E-05	3.76E-05	2.87E-05	2.78E-05	1E+00	5.9E-05	7.8E-05	5.3E-05	3.8E-05	2.9E-05	2.8E-05
1,1-Dichloroethene	2.58E-04	1.09E-05	1.44E-05	9.87E-06	6.98E-06	5.33E-06	5.16E-06	9E-03	1.2E-03	1.6E-03	1.1E-03	7.8E-04	5.9E-04	5.7E-04
1,1,1-Trichloroethane	4.99E-03	2.10E-04	2.79E-04	1.91E-04	1.35E-04	1.06E-04	9.98E-05	9E-01	2.3E-04	3.1E-04	2.1E-04	1.5E-04	1.1E-04	1.1E-04
								Hazard Index	1.5E-03	2.0E-03	1.4E-03	9.7E-04	7.3E-04	7.1E-04
AREA X														
1,1-Dichloroethane	1.17E-03	4.92E-05	6.54E-05	4.48E-05	3.16E-05	2.42E-05	2.34E-05	1E+00	4.9E-05	6.5E-05	4.5E-05	3.2E-05	2.4E-05	2.3E-05
1,1-Dichloroethene	1.31E-03	5.51E-05	7.32E-05	5.01E-05	3.54E-05	2.71E-05	2.62E-05	9E-03	6.1E-03	8.1E-03	5.6E-03	3.9E-04	3.0E-03	2.9E-03
1,1,1-Trichloroethane	1.11E-03	4.67E-05	6.20E-05	4.25E-05	3.00E-05	2.29E-05	2.22E-05	9E-01	5.2E-05	6.9E-05	4.7E-05	3.3E-05	2.5E-05	2.5E-05
1,1,2-Trichloroethane	5.30E-03	2.23E-04	2.96E-04	2.03E-04	1.43E-04	1.09E-04	1.06E-04	4E-02	5.6E-03	7.4E-03	5.1E-03	3.6E-03	2.7E-03	2.7E-03
								Hazard Index	1.2E-02	1.6E-02	1.1E-02	4.1E-03	5.7E-03	5.6E-03

TABLE 4-13 (continued)

ACUTE EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA Y														
Chloroform	1.63E-03	6.85E-05	9.11E-05	6.24E-05	4.41E-05	3.37E-05	3.26E-05	1E-02	6.9E-03	9.1E-03	6.2E-03	4.4E-03	3.4E-03	3.3E-03
Ethylbenzene	1.72E-03	7.23E-05	9.61E-05	6.58E-05	4.65E-05	3.55E-05	3.44E-05	1E+00	7.2E-05	9.6E-05	6.6E-05	4.7E-05	3.6E-05	3.4E-05
Methylene Chloride	1.92E-03	8.07E-05	1.07E-04	7.35E-05	5.19E-05	3.96E-05	3.84E-05	6E-01	1.3E-04	1.8E-04	1.2E-04	8.7E-05	6.6E-05	6.4E-05
1,1-Dichloroethane	6.08E-02	2.56E-03	3.40E-03	2.33E-03	1.64E-03	1.26E-03	1.22E-03	1E+00	2.6E-03	3.4E-03	2.3E-03	1.6E-03	1.3E-03	1.2E-03
1,1-Dichloroethylene	3.68E-02	1.55E-03	2.06E-03	1.41E-03	9.95E-04	7.60E-04	7.36E-04	9E-03	1.7E-01	2.3E-01	1.6E-01	5.0E-02	3.8E-02	3.7E-02
1,1,1-Trichloroethane	6.85E-02	2.88E-03	3.83E-03	2.62E-03	1.85E-03	1.41E-03	1.37E-03	9E-01	3.2E-03	4.3E-03	2.9E-03	2.1E-03	1.6E-03	1.5E-03
1,1,2-Trichloroethane	5.30E-02	2.23E-03	2.96E-03	2.03E-03	1.43E-03	1.09E-03	1.06E-03	4E-02	5.6E-02	7.4E-02	5.1E-02	3.6E-02	2.7E-02	2.7E-02
1,2-Dichloroethene	3.87E-02	1.63E-03	2.16E-03	1.48E-03	1.05E-03	7.99E-04	7.74E-04	2E-01	8.2E-03	1.1E-02	7.4E-03	5.3E-03	4.0E-03	3.9E-03
Xylene	2.22E-03	9.34E-05	1.24E-04	8.50E-05	6.00E-05	4.58E-05	4.44E-05	4E+00	2.4E-05	3.1E-05	2.2E-05	1.5E-05	1.2E-05	1.1E-05
2-Butanone	5.21E-03	2.19E-04	2.91E-04	1.99E-04	1.41E-04	1.08E-04	1.04E-04	5E-01	4.4E-04	5.8E-04	4.0E-04	2.8E-04	2.2E-04	2.1E-04
								Hazard Index	2.5E-01	3.3E-01	2.3E-01	1.0E-01	7.6E-02	7.4E-02
AREA Z														
Di--octyl phthalate	4.00E-03	1.68E-04	2.23E-04	1.53E-04	1.08E-04	8.26E-05	8.00E-05	2E-02	8.4E-03	1.1E-02	7.7E-03	5.4E-03	4.1E-03	4.0E-03
Chloroform	1.06E-02	4.46E-04	5.92E-04	4.06E-04	2.87E-04	2.19E-04	2.12E-04	1E-02	4.5E-02	5.9E-02	4.1E-02	2.9E-02	2.2E-02	2.1E-02
1,1-Dichloroethane	2.92E-02	1.23E-03	1.63E-03	1.12E-03	7.90E-04	6.03E-04	5.84E-04	1E+00	1.2E-03	1.6E-03	1.1E-03	7.9E-04	6.0E-04	5.8E-04
1,1-Dichloroethene	3.84E-02	1.61E-03	2.15E-03	1.47E-03	1.04E-03	7.93E-04	7.68E-04	9E-03	1.8E-01	2.4E-01	1.6E-01	1.2E-01	8.8E-02	8.5E-02
1,1,1-Trichloroethane	1.52E-01	6.39E-03	8.49E-03	5.82E-03	4.11E-03	3.14E-03	3.04E-03	9E-01	7.1E-03	9.4E-03	6.5E-03	4.6E-03	3.5E-03	3.4E-03
1,1,2-Trichloroethane	1.08E-02	4.54E-04	6.03E-04	4.13E-04	2.92E-04	2.23E-04	2.16E-04	4E-02	1.1E-02	1.5E-02	1.0E-02	7.3E-03	5.6E-03	5.4E-03
1,2-Dichloroethene	7.15E-02	3.01E-03	3.99E-03	2.74E-03	1.93E-03	1.48E-03	1.43E-03	2E-01	1.5E-02	2.0E-02	1.4E-02	9.7E-03	7.4E-03	7.2E-03
Phenol	1.30E-02	5.47E-04	7.26E-04	4.97E-04	3.52E-04	2.68E-04	2.60E-04	6E-01	9.1E-04	1.2E-03	8.3E-04	5.9E-04	4.5E-04	4.3E-04
Vanadium	6.00E-03	2.52E-04	3.35E-04	2.30E-04	1.62E-04	1.24E-04	1.20E-04	9E-03	2.8E-02	3.7E-02	2.6E-02	1.8E-02	1.4E-02	1.3E-02
Chromium	5.51E-02	2.32E-03	3.08E-03	2.11E-03	1.49E-03	1.14E-03	1.10E-03	1E+01	2.3E-04	3.1E-04	2.1E-04	1.5E-04	1.1E-04	1.1E-04
Copper	1.01E-01	4.25E-03	5.64E-03	3.86E-03	2.73E-03	2.09E-03	2.20E-03	4E-02	1.1E-01	1.4E-01	9.7E-02	6.8E-02	5.2E-02	5.5E-02
Nickel	4.04E-02	1.70E-03	2.26E-03	1.55E-03	1.09E-03	8.34E-04	8.08E-04	2E-02	8.5E-02	1.1E-01	7.8E-02	5.5E-02	4.2E-02	4.0E-02
Zinc	1.14E-01	4.79E-03	6.37E-03	4.36E-03	3.08E-03	2.35E-03	2.28E-03	2E-01	2.4E-02	3.2E-02	2.2E-02	1.5E-02	1.2E-02	1.1E-02
								Hazard Index	5.1E-01	6.8E-01	4.7E-01	3.4E-01	2.5E-01	2.4E-01

TABLE 4-14

ACUTE EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
RME FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA V														
Vanadium	4.0E-03	2.17E-04	2.37E-04	1.60E-04	1.12E-04	8.52E-05	1.14E-04	9E-03	2.4E-02	2.6E-02	1.8E-02	1.2E-02	9.5E-03	1.3E-02
Chromium	1.24E-01	6.73E-03	7.34E-03	4.95E-03	3.47E-03	2.64E-03	3.54E-03	1E+01	6.7E-04	7.3E-04	5.0E-04	3.5E-04	2.6E-04	3.5E-04
Copper	2.35E-02	1.27E-03	1.39E-03	9.38E-04	6.57E-04	5.0E-04	6.71E-04	4E-02	3.2E-02	3.5E-02	2.3E-02	1.6E-02	1.3E-02	1.7E-02
Nickel	8.93E-02	4.84E-03	5.28E-03	3.56E-03	2.50E-03	1.90E-03	2.55E-03	2E-02	2.4E-01	2.6E-01	1.8E-01	1.3E-01	9.5E-02	1.3E-01
Zinc	6.09E-01	3.3E-02	3.60E-02	2.43E-02	1.70E-02	1.30E-02	1.74E-02	2E-01	1.7E-02	1.8E-01	1.2E-01	8.5E-02	6.5E-02	8.7E-02
Chloroform	5.51E-05	2.99E-06	3.26E-06	2.2E-06	1.54E-06	1.17E-06	1.57E-06	1E-02	3.0E-04	3.3E-04	2.2E-04	1.5E-04	1.2E-04	1.6E-04
Ethylbenzene	4.20E-04	2.28E-05	2.49E-05	1.68E-05	1.17E-06	8.95E-06	1.20E-05	1E+00	2.3E-05	2.5E-05	1.7E-05	1.2E-05	9.0E-06	1.2E-05
1,1-Dichloroethane	1.16E-03	6.29E-05	6.86E-05	4.63E-05	3.24E-05	2.47E-05	3.31E-05	1E+00	6.3E-05	6.9E-05	4.6E-05	3.2E-05	2.5E-05	3.3E-05
1,1-Dichloroethene	6.49E-04	3.52E-05	3.84E-05	2.59E-05	1.82E-05	1.38E-05	1.85E-05	9E-03	3.9E-03	4.3E-03	2.9E-03	2.0E-03	1.5E-03	2.1E-03
1,1,1-Trichloroethane	3.23E-03	1.75E-04	1.91E-04	1.29E-04	9.03E-05	6.88E-05	9.23E-05	9E-01	1.9E-04	2.1E-04	1.4E-04	1.0E-04	7.6E-05	1.0E-04
Bis(2-ethylhexyl)phthalate	6.0E-03	3.25E-04	3.55E-04	2.39E-04	1.68E-04	1.28E-04	1.71E-04	2E-02	1.6E-02	1.8E-02	1.2E-02	8.4E-03	6.4E-03	8.6E-03
Benzoic Acid	6.8E-02	3.69E-03	4.02E-03	2.71E-03	1.90E-03	1.45E-03	1.94E-03	4E+00	9.2E-04	1.0E-03	6.8E-04	4.8E-04	3.6E-04	4.9E-04
								Hazard Index	3.3E-01	5.2E-01	3.6E-01	2.5E-01	1.8E-01	2.5E-01
AREA W														
1,1-Dichloroethane	4.02E-03	2.18E-04	2.38E-04	1.60E-04	1.12E-04	8.56E-05	1.15E-04	1E+00	2.2E-04	2.4E-04	1.6E-04	1.1E-04	8.6E-05	1.2E-04
1,1-Dichloroethene	6.87E-04	3.73E-05	4.07E-05	2.74E-05	1.92E-05	1.46E-05	1.96E-05	9E-03	4.1E-03	4.5E-03	3.0E-03	2.1E-03	1.6E-03	2.2E-03
1,1,1-Trichloroethane	1.30E-02	7.05E-04	7.65E-04	5.19E-04	3.64E-04	2.77E-04	3.71E-04	9E-01	7.8E-04	8.5E-04	5.8E-04	4.0E-04	3.1E-04	4.1E-04
								Hazard Index	5.1E-03	5.6E-03	3.7E-03	2.6E-03	2.0E-03	2.7E-03
AREA X														
1,1-Dichloroethane	2.71E-03	1.47E-04	1.60E-04	1.08E-04	7.58E-05	5.77E-05	7.74E-05	1E+00	1.5E-04	1.6E-04	1.1E-04	7.6E-05	5.8E-05	7.7E-05
1,1-Dichloroethene	3.47E-03	1.88E-04	2.05E-04	1.38E-04	9.71E-05	7.39E-05	9.91E-05	9E-03	2.1E-02	2.3E-02	1.5E-02	1.1E-02	8.2E-03	1.1E-02
1,1,1-Trichloroethylene	1.90E-03	1.03E-04	1.12E-04	7.58E-05	5.31E-05	4.05E-05	5.43E-05	9E-01	1.1E-04	1.2E-04	8.4E-05	5.9E-05	4.5E-05	6.0E-05
1,1,2-Trichloroethane	1.70E-02	9.22E-04	1.01E-03	6.78E-04	4.75E-04	3.62E-04	4.86E-04	4E-02	2.3E-02	2.5E-02	1.7E-02	1.2E-02	9.1E-03	1.2E-02
								Hazard Index	4.4E-02	4.8E-02	3.2E-02	2.3E-02	1.7E-02	2.3E-02

TABLE 4-14 (continued)

ACUTE EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
RME FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA Y														
Chloroform	2.10E-04	1.14E-05	1.24E-05	8.38E-05	5.87E-06	4.47E-06	6.00E-05	1E-02	1.1E-03	1.2E-03	8.4E-04	5.9E-04	4.5E-04	6.0E-04
Ethylbenzene	1.20E-03	6.51E-05	7.10E-05	4.79E-05	3.36E-05	2.56E-05	3.43E-05	1E+00	6.5E-05	7.1E-05	4.8E-05	3.4E-05	2.6E-05	3.4E-05
Methylene Chloride	1.90E-03	1.03E-04	1.12E-04	7.58E-04	5.31E-03	4.05E-05	5.43E-05	6E-02	1.7E-03	1.9E-03	1.3E-03	8.9E-04	6.8E-04	9.1E-04
1,1-Dichloroethane	1.19E-01	6.46E-03	7.04E-03	4.75E-03	3.33E-03	2.53E-03	3.40E-03	1E+00	6.5E-03	7.0E-03	4.8E-03	3.3E-03	2.5E-03	3.4E-03
1,1-Dichloroethene	6.68E-02	3.62E-03	3.95E-03	2.67E-03	1.87E-03	1.42E-03	1.91E-04	9E-03	4.0E-01	4.4E-01	3.0E-01	2.1E-01	1.6E-01	2.1E-01
1,1,1-Trichloroethane	1.17E-01	6.35E-03	6.92E-03	4.67E-03	3.27E-03	2.49E-03	3.34E-03	9E-01	7.1E-03	7.7E-03	5.2E-03	3.6E-03	2.8E-03	3.7E-03
1,1,2-Trichloroethane	1.48E-01	8.03E-03	8.76E-03	5.91E-03	4.14E-03	3.15E-03	4.23E-03	4E-02	2.0E-01	2.2E-01	1.5E-01	1.0E-01	7.9E-02	1.1E-01
1,2-Dichloroethene	6.66E-02	3.61E-03	3.94E-03	2.66E-03	1.86E-03	1.42E-03	1.90E-04	2E-01	1.8E-02	2.0E-02	1.3E-02	9.3E-03	7.1E-03	9.5E-03
Xylene	3.14E-03	1.70E-04	1.86E-04	1.25E-04	8.78E-05	6.69E-05	8.97E-05	4E+00	4.3E-05	4.7E-05	3.2E-05	2.2E-05	1.7E-05	2.3E-05
2-Butanone	9.53E-03	5.17E-04	5.64E-04	3.80E-04	2.67E-04	2.03E-04	2.72E-04	5E-01	1.0E-03	1.1E-03	7.6E-04	5.3E-04	4.1E-04	5.4E-04
								Hazard Index	8.0E-01	8.9E-01	6.0E-01	4.1E-01	3.2E-01	4.2E-01
AREA Z														
Vanadium	6.0E-03	3.25E-04	3.55E-04	2.39E-04	1.68E-04	1.28E-04	1.71E-04	9E-03	3.6E-02	3.9E-02	2.7E-02	1.9E-02	1.4E-02	1.9E-02
Chromium	5.5E-02	2.98E-03	3.25E-03	2.20E-03	1.54E-03	1.17E-03	1.57E-03	1E+01	3.0E-04	3.3E-04	2.2E-04	1.5E-04	1.2E-04	1.6E-04
Copper	1.01E-01	5.48E-03	5.98E-03	4.03E-03	2.82E-03	2.15E-03	2.89E-03	4E-02	1.4E-01	1.5E-01	1.0E-01	7.1E-02	5.4E-02	7.2E-02
Nickel	4.0E-03	2.17E-03	2.37E-03	1.60E-03	1.12E-03	8.52E-04	1.14E-03	2E-02	1.1E-01	1.2E-01	8.0E-02	5.6E-02	4.3E-02	5.7E-02
Zinc	1.14E-01	6.18E-03	6.75E-03	4.55E-03	3.19E-03	2.43E-03	3.26E-03	2E-01	3.1E-02	3.4E-02	2.3E-02	1.6E-02	1.2E-02	1.6E-02
Chloroform	4.0E-03	2.17E-04	2.37E-04	1.60E-04	1.12E-04	8.52E-05	1.14E-04	1E-02	2.2E-02	2.4E-02	1.6E-02	1.1E-02	8.5E-03	1.1E-02
1,1-Dichloroethane	5.53E-02	3.00E-03	3.27E-03	2.21E-03	1.55E-04	1.18E-03	1.58E-03	1E+00	3.0E-03	3.3E-03	2.2E-03	1.6E-03	1.2E-03	1.6E-03
1,1-Dichloroethene	7.66E-02	4.16E-03	4.53E-03	3.06E-03	2.14E-03	1.63E-03	2.19E-03	9E-03	4.6E-01	5.0E-01	3.4E-01	2.4E-01	1.8E-01	2.4E-01
Di-n-octyl phthalate	4E-03	2.17E-04	2.37E-04	1.60E-04	1.12E-04	8.52E-05	1.14E-04	2E-02	1.1E-02	1.2E-02	8.0E-03	5.6E-03	4.3E-03	5.7E-03
1,1,1-Trichloroethane	3.54E-01	1.92E-02	2.09E-02	1.41E-02	9.90E-03	7.54E-03	1.01E-02	9E-01	2.1E-02	2.3E-02	1.6E-02	1.1E-02	8.4E-03	1.1E-02
1,1,2-Trichloroethane	1.43E-02	7.76E-04	8.46E-04	5.71E-04	4.00E-04	3.05E-04	4.09E-04	4E-02	1.9E-02	2.1E-02	1.4E-02	1.0E-02	7.6E-03	1.0E-02
1,2 Dichloroethene	1.30E-01	7.05E-03	7.69E-03	5.19E-03	3.64E-03	2.77E-03	3.71E-03	2E-01	3.5E-02	3.8E-02	2.6E-02	1.8E-02	1.4E-02	1.9E-02
Phenol	1.3E-02	7.05E-04	7.69E-04	5.19E-04	3.64E-04	2.77E-04	3.71E-04	6E-01	1.2E-03	1.3E-01	8.6E-04	6.1E-04	4.6E-04	6.2E-04
								Hazard Index	8.9E-01	1.0E+00[b]	6.6E-01	4.6E-01	3.5E-01	4.7E-01

TABLE 4-15

ACUTE EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
RME FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					ARPA V					
Vanadium	3.00E-03	2.74E-07	2.04E-07	1.69E-07	1.40E-07	5E-04	5.5E-04	4.1E-04	3.4E-04	2.8E-04
Chromium	6.57E-02	8.40E-06	6.27E-06	5.20E-06	4.31E-06	1E-01	8.4E-05	6.3E-05	5.2E-05	4.3E-05
Copper	1.97E-02	1.80E-06	1.34E-06	1.11E-06	9.22E-07	2E-02	9.0E-05	6.7E-05	5.6E-05	4.6E-05
Nickel	5.47E-02	4.99E-06	3.73E-06	3.09E-06	2.57E-06	6E-04	8.3E-03	6.2E-03	5.2E-03	4.3E-03
Zinc	3.81E-01	3.47E-05	2.61E-05	2.16E-05	1.78E-05	1E-01	3.5E-04	2.6E-04	2.2E-04	1.8E-04
Chloroform	3.92E-05	2.41E-06	1.81E-06	1.49E-06	1.23E-06	1E-02	2.4E-04	1.8E-04	1.5E-04	1.2E-04
Ethylbenzene	2.00E-04	9.84E-06	7.35E-06	6.08E-06	5.04E-06	8E-01	1.2E-05	9.2E-06	7.6E-06	6.3E-06
1,1-Dichloroethane	5.16E-04	3.17E-05	2.37E-05	1.96E-05	1.63E-05	7E-01	4.5E-05	3.4E-05	2.8E-05	2.3E-05
1,1-Dichloroethene	3.03E-04	1.86E-05	1.39E-05	1.15E-05	9.54E-06	8E-03	2.3E-03	1.7E-03	1.4E-03	1.2E-03
1,1,1-Trichloroethane	1.03E-03	6.34E-05	4.73E-05	3.91E-05	3.24E-05	8E-01	7.9E-05	5.9E-05	4.9E-05	4.1E-05
Bis(2-ethylhexyl)phtlalate	4.50E-03	1.37E-06	1.03E-06	8.44E-07	7.00E-09	3E-03	4.6E-04	3.4E-04	2.8E-04	2.3E-06
Benzoic Acid	4.65E-02	1.41E-05	1.06E-05	8.75E-06	7.25E-06	2E+00	4.7E-03	3.5E-03	2.9E-03	2.4E-03
						Hazard Index	1.8E-02	1.3E-02	1.1E-02	8.6E-03
					ARPA W					
1,1-Dichloroethane	1.39E-03	8.55E-05	6.39E-05	5.28E-05	4.38E-05	7E-01	1.2E-04	9.1E-05	7.5E-05	6.3E-05
1,1-Dichloroethene	2.58E-04	1.59E-05	1.18E-05	9.80E-06	8.13E-06	8E-03	2.0E-03	1.5E-03	1.2E-03	1.0E-03
1,1,1-Trichloroethane	4.99E-03	3.07E-04	2.30E-04	1.89E-04	1.58E-04	8E-01	3.8E-04	2.9E-04	2.4E-04	2.0E-04
						Hazard Index	2.5E-03	1.9E-03	1.5E-03	1.3E-03
					ARPA X					
1,1-Dichloroethane	1.17E-03	7.20E-05	5.39E-05	4.44E-05	3.67E-05	7E-01	1.0E-04	7.7E-05	6.3E-05	5.2E-05
1,1-Dichloroethene	1.31E-03	8.05E-05	6.02E-06	4.97E-05	4.13E-05	8E-03	1.0E-02	7.5E-04	6.2E-03	5.2E-03
1,1,1-Trichloroethane	1.11E-03	6.82E-05	5.10E-05	4.22E-05	3.50E-05	8E-01	8.5E-05	6.4E-05	5.3E-05	4.4E-05
1,1,2-Trichloroethane	5.30E-03	3.26E-04	2.44E-04	2.01E-04	1.67E-04	4E-02	8.2E-03	6.1E-03	5.0E-03	4.2E-03
						Hazard Index	1.8E-02	7.0E-03	1.1E-02	9.5E-03

TABLE 4-15 (continued)

ACUTE EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
RME FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA Y					
Chloroform	1.63E-03	1.00E-04	7.49E-05	6.19E-05	5.14E-05	1E-02	1.0E-02	7.5E-03	6.2E-03	5.1E-03
Ethylbenzene	1.72E-03	8.45E-05	6.32E-05	5.22E-05	4.33E-05	8E-01	1.1E-04	7.9E-05	6.5E-05	5.4E-05
Methylene chloride	1.92E-03	1.18E-04	8.82E-05	7.30E-05	6.05E-05	6E-02	2.0E-03	1.5E-03	1.2E-03	1.1E-03
1,1-Dichloroethane	6.08E-02	3.74E-03	2.79E-03	2.31E-03	1.92E-03	7E-01	5.3E-03	4.0E-03	3.3E-03	2.7E-03
1,1-Dichloroethene	3.68E-02	2.26E-03	1.69E-03	1.40E-03	1.16E-03	8E-03	2.8E-01	2.1E-01	1.8E-01	1.5E-01
1,1,1-Trichloroethane	6.85E-02	4.20E-03	3.14E-03	2.60E-03	2.16E-03	8E-01	5.3E-03	3.9E-03	3.3E-03	2.7E-03
1,1,2-Trichloroethane	5.30E-02	3.26E-03	2.44E-03	2.01E-03	1.67E-03	4E-02	8.2E-02	6.1E-02	5.0E-02	4.2E-02
1,2-Dichloroethene	3.87E-02	2.37E-03	1.78E-03	1.40E-03	1.22E-03	2E-02	1.2E-01	8.9E-02	7.3E-02	6.1E-02
Xylene	2.22E-03	1.36E-05	1.02E-04	8.43E-05	6.99E-05	4E+00	3.4E-06	2.6E-05	2.1E-05	1.7E-05
2-Butanone	5.21E-03	2.57E-04	1.92E-04	1.59E-04	1.31E-04	5E-01	5.1E-04	3.8E-04	3.2E-04	2.6E-04
						Hazard Index	4.9E-01	3.8E-01	3.2E-01	2.6E-01
					AREA Z					
Vanadium	6.00E-03	5.48E-07	4.09E-07	3.38E-07	2.81E-07	5E-04	1.1E-03	8.2E-04	6.8E-04	5.6E-04
Chromium	5.51E-02	7.04E-06	5.28E-06	4.36E-06	3.62E-06	1E-01	7.0E-05	5.3E-05	4.4E-05	3.6E-05
Copper	1.01E-01	9.23E-06	6.90E-06	5.70E-06	4.73E-06	2E-02	4.6E-04	3.5E-04	2.9E-04	2.4E-04
Nickel	4.04E-02	3.69E-06	2.76E-06	2.29E-06	1.89E-06	6E-04	6.2E-03	4.6E-03	3.8E-03	3.2E-03
Zinc	1.14E-01	1.04E-06	7.78E-06	6.43E-06	5.34E-06	1E-01	1.0E-05	7.8E-05	6.4E-05	5.3E-05
Chloroform	1.06E-02	6.51E-04	4.90E-04	4.03E-04	3.35E-04	1E-02	6.5E-02	4.9E-02	4.0E-02	3.4E-02
1,1-Dichloroethane	2.92E-02	1.79E-03	1.34E-03	1.11E-04	9.20E-04	7E-01	2.6E-03	1.9E-03	1.6E-03	1.3E-03
1,1-Dichloroethene	3.84E-02	2.36E-03	1.77E-03	1.46E-03	1.21E-03	8E-03	3.0E-01	2.2E-01	1.8E-01	1.5E-01
1,1,1-Trichloroethane	1.52E-01	9.34E-03	6.98E-03	5.77E-03	4.78E-03	8E-01	1.2E-02	8.7E-03	7.2E-03	6.0E-03
1,1,2-Trichloroethane	1.08E-02	6.64E-04	4.96E-04	4.10E-04	3.41E-04	4E-02	1.7E-02	1.2E-02	1.0E-02	8.5E-03
1,2-Dichloroethene	7.15E-02	4.39E-03	3.29E-03	2.71E-03	2.25E-03	2E-01	2.2E-02	1.6E-02	1.4E-02	1.1E-02
Phenol	1.30E-02	3.96E-06	2.96E-06	2.44E-06	2.03E-06	5E-01	1.6E-06	5.9E-06	4.9E-06	4.1E-06
Di-n-octylphthalate	4.00E-03	1.22E-06	9.11E-07	7.51E-07	6.25E-07	3E-03	4.1E-04	3.0E-04	2.5E-04	2.1E-04
						Hazard Index	4.3E-01	3.1E-01	2.6E-01	2.1E-01

TABLE 4-16

ACUTE EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
RME FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA V					
Vanadium	4.00E-03	6.13E-07	4.56E-07	3.77E-07	3.11E-07	5E-04	1.2E-03	9.1E-04	7.5E-04	6.2E-04
Chromium	1.24E-01	2.65E-05	1.97E-05	1.63E-05	1.35E-05	1E-01	2.7E-04	2.0E-04	1.6E-04	1.4E-04
Copper	2.35E-02	3.60E-06	2.68E-06	2.21E-06	1.83E-06	2E-02	1.8E-04	1.3E-04	1.1E-04	9.2E-05
Nickel	8.93E-02	1.37E-06	1.02E-05	8.40E-06	6.96E-06	6E-04	2.3E-02	1.7E-02	1.4E-02	1.2E-02
Zinc	6.09E-01	9.34E-05	6.92E-05	5.72E-05	4.74E-05	1E-01	9.3E-04	6.9E-04	5.7E-04	4.7E-05
Chloroform	5.51E-05	5.69E-06	4.22E-06	3.48E-06	2.89E-06	1E-02	5.7E-04	4.2E-04	3.5E-04	2.9E-05
Ethylbenzene	4.20E-04	3.47E-06	2.58E-05	2.13E-05	1.77E-05	8E-01	4.3E-06	3.2E-05	2.7E-05	2.2E-05
1,1-Dichloroethane	1.16E-03	1.20E-04	8.89E-05	7.35E-05	6.10E-05	7E-01	1.7E-04	1.3E-04	1.1E-04	8.7E-05
1,1-Dichloroethene	6.49E-04	6.70E-05	4.97E-05	4.10E-05	3.41E-05	8E-03	8.4E-03	6.2E-03	5.1E-03	4.3E-03
1,1,1-Trichloroethane	3.23E-03	3.33E-04	2.47E-04	2.05E-04	1.73E-04	8E-01	4.2E-04	3.1E-04	2.6E-04	2.2E-04
Bis(2-ethylhexyl)phtlalate	6.00E-03	3.07E-06	2.28E-06	1.88E-06	1.56E-06	3E-03	1.0E-03	7.6E-04	6.3E-04	5.2E-04
Benzoic Acid	6.80E-02	3.48E-05	2.58E-05	2.13E-05	1.77E-05	2E+00	1.7E-05	1.3E-05	1.1E-05	8.9E-06
						Hazard Index	3.3E-02	2.3E-02	2.0E-02	1.7E-02
					AREA W					
1,1-Dichloroethane	4.02E-03	4.15E-04	3.08E-04	2.55E-04	2.11E-04	7E-01	5.9E-04	4.4E-04	3.6E-04	3.0E-04
1,1-Dichloroethene	6.87E-04	7.10E-05	5.26E-05	4.34E-05	3.61E-05	8E-03	8.9E-03	6.6E-03	5.4E-03	4.5E-03
1,1,1-Trichloroethane	1.30E-02	1.34E-03	9.96E-04	8.23E-04	6.83E-04	8E-01	1.7E-03	1.2E-03	1.0E-03	8.5E-04
						Hazard Index	1.1E-02	8.2E-03	6.8E-03	5.7E-03
					AREA X					
1,1-Dichloroethane	2.71E-03	2.80E-04	2.07E-04	1.72E-04	1.43E-04	7E-01	4.0E-04	3.0E-04	2.5E-05	2.0E-04
1,1-Dichloroethene	3.47E-03	3.59E-04	2.66E-04	2.20E-04	1.82E-04	8E-03	4.5E-02	3.3E-02	2.8E-02	2.3E-02
1,1,1-Trichloroethane	1.90E-03	1.96E-04	1.45E-04	1.20E-04	9.97E-05	8E-01	2.5E-04	1.8E-04	1.5E-04	1.2E-04
1,1,2-Trichloroethane	1.70E-02	1.75E-03	1.30E-03	1.08E-03	8.93E-04	4E-02	4.4E-02	3.3E-02	2.7E-02	2.2E-02
						Hazard Index	8.9E-02	6.6E-02	5.5E-02	4.5E-02

TABLE 4-16 (continued)

ACUTE EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
RME FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day)				RfD (mg/kg/day)	Hazard Quotient			
		Child 0-6	Child 7-12	Child 13-17	Adult		Child 0-6	Child 7-12	Child 13-17	Adult
					AREA Y					
Chloroform	2.10E-04	2.17E-05	1.73E-05	1.33E-05	1.10E-05	1E-02	2.2E-03	1.7E-03	1.3E-03	1.1E-03
Ethylbenzene	1.20E-03	9.92E-05	7.35E-05	6.08E-05	5.04E-05	8E-01	1.2E-04	9.2E-05	7.6E-05	6.3E-05
Methylene chloride	1.90E-03	1.96E-04	1.45E-04	1.20E-04	9.97E-05	6E-02	3.3E-03	2.3E-03	2.0E-03	1.7E-03
1,1-Dichloroethane	1.19E-01	1.23E-02	9.11E-03	7.54E-03	6.25E-03	7E-01	1.8E-02	1.3E-02	1.1E-02	8.9E-03
1,1-Dichloroethene	6.68E-02	6.89E-03	5.11E-03	4.23E-03	3.51E-03	8E-03	8.6E-01	6.4E-01	5.3E-01	4.4E-01
1,1,1-Trichloroethane	1.17E-01	1.21E-02	8.96E-03	7.41E-03	6.15E-03	8E-01	1.5E-02	1.1E-02	9.3E-03	7.7E-03
1,1,2-Trichloroethane	1.48E-01	1.53E-02	1.13E-02	9.37E-03	7.78E-03	4E-02	3.8E-01	2.8E-01	2.3E-01	1.9E-01
1,2-Dichloroethene	6.66E-02	6.88E-03	5.10E-03	4.22E-03	3.50E-03	2E-01	3.4E-02	2.6E-02	2.1E-02	1.8E-02
Xylene	3.14E-03	3.24E-04	2.41E-04	1.98E-04	1.65E-04	4E+00	8.1E-05	6.0E-05	5.0E-05	4.1E-05
2-Butanone	9.53E-03	4.87E-06	3.61E-06	2.99E-06	2.48E-06	5E-01	9.7E-06	7.2E-06	6.0E-06	5.0E-06
						Hazard Index	1.3E+00[b]	9.7E-01	7.9E-01	6.5E-01
					AREA Z					
Vanadium	6.00E-03	9.21E-07	6.83E-07	5.64E-07	4.69E-07	5E-04	1.8E-03	1.4E-03	1.1E-03	9.4E-04
Chromium	5.50E-02	1.28E-05	8.77E-06	7.25E-06	6.01E-06	1E-01	1.3E-04	8.8E-05	7.3E-05	6.0E-05
Copper	1.01E-01	1.55E-05	1.15E-05	9.49E-06	7.88E-06	2E-02	7.8E-04	5.8E-04	4.8E-04	3.9E-04
Nickel	4.00E-02	6.13E-06	4.56E-06	3.77E-06	3.11E-06	6E-04	1.0E-02	7.6E-03	6.3E-03	5.2E-03
Zinc	1.14E-01	1.75E-05	1.30E-05	1.07E-05	8.89E-06	1E-01	1.8E-04	1.3E-04	1.1E-04	8.9E-05
Chloroform	4.00E-03	4.13E-04	3.07E-04	2.54E-04	2.10E-04	1E-02	4.1E-02	3.1E-02	2.5E-02	2.1E-02
1,1-Dichloroethane	5.53E-02	5.71E-03	4.24E-03	3.50E-03	2.90E-03	7E-01	8.2E-03	6.1E-03	5.0E-03	4.1E-03
1,1-Dichloroethene	7.66E-02	7.92E-03	5.87E-03	4.85E-03	4.03E-03	8E-03	9.9E-01	7.3E-01	6.1E-01	5.0E-01
1,1,1-Trichloroethane	3.54E-01	3.66E-02	2.71E-02	2.23E-02	1.86E-02	8E-01	4.6E-02	3.3E-02	2.8E-02	2.3E-02
1,1,2-Trichloroethane	1.43E-02	1.48E-03	1.10E-03	9.05E-04	7.51E-04	4E-02	3.7E-02	2.8E-02	2.3E-02	1.9E-02
1,2-Dichloroethene	1.30E-01	1.34E-02	9.96E-03	8.23E-03	6.83E-03	2E-01	6.7E-02	5.0E-02	4.1E-02	3.4E-02
Phenol	1.30E-02	6.63E-06	4.93E-06	4.07E-06	3.38E-06	5E-01	3.3E-05	2.5E-05	2.0E-05	1.7E-05
Di-n-octylphthalate	4.00E-03	2.04E-06	1.52E-06	1.25E-06	1.04E-06	3E-03	6.8E-04	5.1E-04	4.2E-04	3.5E-04
						Hazard Index	1.2E+00[b]	8.7E-01	7.3E-01	6.1E-01

CHRONIC EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA V														
Vanadium	3.0E-03	1.26E-04	1.68E-04	1.15E-04	8.11E-05	6.19E-05	6.00E-05	9E-03	1.4E-02	1.9E-02	1.3E-02	9.0E-03	6.9E-03	6.7E-03
Chromium	6.57E-02	2.76E-03	3.65E-03	2.51E-03	1.78E-03	1.36E-03	1.31E-03	1E+00	2.8E-03	3.7E-03	2.5E-03	1.8E-03	1.4E-03	1.3E-03
Copper	1.97E-02	8.28E-04	1.10E-03	7.54E-04	5.33E-04	4.07E-04	3.94E-04	4E-02	2.1E-02	2.8E-02	1.9E-02	1.3E-02	1.0E-02	9.9E-03
Nickel	5.47E-02	2.30E-03	3.06E-03	2.09E-03	1.48E-03	1.13E-03	1.09E-03	2E-02	1.2E-01	1.5E-01	1.0E-01	7.4E-02	5.7E-02	5.5E-02
Zinc	3.81E-01	1.60E-02	2.13E-02	1.46E-02	1.03E-02	7.87E-03	7.62E-03	2E-01	8.0E-02	1.1E-01	7.3E-02	5.2E-02	3.9E-02	3.8E-02
Chloroform	3.92E-05	1.65E-06	2.19E-06	1.50E-06	1.06E-06	8.09E-07	7.84E-07	1E-02	1.7E-04	2.2E-04	1.5E-04	1.1E-04	8.1E-05	7.8E-05
Ethylbenzene	2.00E-04	8.41E-06	1.12E-05	7.65E-06	5.41E-06	4.13E-06	4.00E-06	1E-01	8.4E-05	1.1E-04	7.7E-05	5.4E-05	4.1E-05	4.0E-05
1,1-Dichloroethane	5.16E-04	2.17E-05	2.88E-05	1.97E-05	1.40E-05	1.07E-05	1.03E-05	1E-01	2.2E-04	2.9E-04	2.0E-04	1.4E-04	1.1E-04	1.0E-04
1,1-Dichloroethene	3.03E-04	1.27E-05	1.69E-05	1.16E-05	8.19E-06	6.26E-06	6.06E-06	9E-03	1.4E-03	1.9E-03	1.3E-03	9.1E-04	7.0E-04	6.7E-04
1,1,1-Trichloroethane	1.03E-03	4.33E-05	5.75E-05	3.94E-05	2.79E-05	2.13E-05	2.06E-05	9E-02	4.8E-04	6.4E-04	4.4E-04	3.1E-04	2.4E-04	2.3E-04
Bis(2-ethylhexyl)phthalate	4.50E-03	1.89E-04	2.51E-04	1.72E-04	1.22E-04	9.29E-05	9.00E-05	2E-02	9.5E-03	1.3E-02	8.6E-03	6.1E-03	4.6E-03	4.5E-03
Benzoic Acid	4.65E-02	1.96E-03	2.60E-03	1.78E-03	1.26E-03	9.60E-04	9.30E-04	4E+00	4.9E-04	6.5E-04	4.4E-04	3.2E-04	2.4E-04	2.3E-04
								Hazard Index	2.5E-01	3.3E-01	2.1E-01	1.6E-01	1.2E-01	1.2E-01
AREA W														
1,1-Dichloroethane	1.39E-03	5.85E-05	7.77E-05	5.32E-05	3.76E-05	2.87E-05	2.78E-05	1E-01	5.9E-04	7.8E-04	5.3E-04	3.8E-04	2.9E-04	2.8E-04
1,1-Dichloroethene	2.58E-04	1.09E-05	1.44E-05	9.87E-06	6.98E-06	5.33E-06	5.16E-06	9E-03	1.2E-03	1.6E-03	1.1E-03	7.8E-04	5.9E-04	5.7E-04
1,1,1-Trichloroethane	4.99E-03	2.10E-04	2.79E-04	1.91E-04	1.35E-04	1.06E-04	9.98E-05	9E-02	2.3E-03	3.1E-03	2.1E-03	1.5E-03	1.1E-03	1.1E-03
								Hazard Index	4.1E-03	5.5E-03	3.7E-03	2.7E-03	2.0E-03	2.0E-03
AREA X														
1,1-Dichloroethane	1.17E-03	4.92E-05	6.54E-05	4.48E-05	3.16E-05	2.42E-05	2.34E-05	1E-01	4.9E-04	6.5E-04	4.5E-04	3.2E-04	2.4E-04	2.3E-04
1,1-Dichloroethene	1.31E-03	5.51E-05	7.32E-05	5.01E-05	3.54E-05	2.71E-05	2.62E-05	9E-03	6.1E-03	8.1E-03	5.6E-03	3.9E-04	3.0E-03	2.9E-03
1,1,1-Trichloroethane	1.11E-03	4.67E-05	6.20E-05	4.25E-05	3.00E-05	2.29E-05	2.22E-05	9E-02	5.2E-04	6.9E-04	4.7E-04	3.3E-04	2.5E-04	2.5E-04
1,1,2-Trichloroethane	5.30E-03	2.23E-04	2.96E-04	2.03E-04	1.43E-04	1.09E-04	1.06E-04	4E-03	5.6E-02	7.4E-02	5.1E-02	3.6E-02	2.7E-02	2.7E-02
								Hazard Index	6.3E-02	8.3E-02	6.0E-02	4.1E-02	3.1E-02	3.0E-02

TABLE 4-17 (continued)

CHRONIC EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA Y														
Chloroform	1.63E-03	6.85E-05	9.11E-05	6.24E-05	4.41E-05	3.37E-05	3.26E-05	1E-02	6.9E-03	9.1E-03	6.2E-03	4.4E-03	3.4E-03	3.3E-03
Ethylbenzene	1.72E-03	7.23E-05	9.61E-05	6.58E-05	4.65E-05	3.55E-05	3.44E-05	1E-01	7.2E-04	9.6E-04	6.6E-04	4.7E-04	3.6E-04	3.4E-04
Methylene Chloride	1.92E-03	8.07E-05	1.07E-04	7.35E-05	5.19E-05	3.96E-05	3.84E-05	6E-02	1.3E-03	1.8E-03	1.2E-03	8.7E-04	6.6E-04	6.4E-04
1,1-Dichloroethane	6.08E-02	2.56E-03	3.40E-03	2.33E-03	1.64E-03	1.26E-03	1.22E-03	1E-01	2.6E-02	3.4E-02	2.3E-02	1.6E-02	1.3E-02	1.2E-02
1,1-Dichloroethene	3.68E-02	1.55E-03	2.06E-03	1.41E-03	9.95E-04	7.60E-04	7.36E-04	9E-03	1.7E-01	2.3E-01	1.6E-01	5.0E-02	3.8E-02	3.7E-02
1,1,1-Trichloroethane	6.85E-02	2.88E-03	3.83E-03	2.62E-03	1.85E-03	1.41E-03	1.37E-03	9E-02	3.2E-02	4.3E-02	2.9E-02	2.1E-02	1.6E-02	1.5E-02
1,1,2-Trichloroethane	5.30E-02	2.23E-03	2.96E-03	2.03E-03	1.43E-03	1.09E-03	1.06E-03	4E-03	5.6E-01	7.4E-01	5.1E-01	3.6E-01	2.7E-01	2.7E-01
1,2-Dichloroethene	3.87E-02	1.63E-03	2.16E-03	1.48E-03	1.05E-03	7.99E-04	7.74E-04	2E-02	8.2E-02	1.1E-01	7.4E-02	5.3E-02	4.0E-02	3.9E-02
Xylene	2.22E-03	9.34E-05	1.24E-04	8.50E-05	6.00E-05	4.58E-05	4.44E-05	2E+00	4.7E-05	6.2E-05	4.3E-05	3.0E-05	2.3E-05	2.2E-05
2-Butanone	5.21E-03	2.19E-04	2.91E-04	1.99E-04	1.41E-04	1.08E-04	1.04E-04	5E-02	4.4E-03	5.8E-03	4.0E-03	2.8E-03	2.2E-03	2.1E-03
								Hazard Index	8.8E-01	1.2E+00[b]	8.1E-01	5.1E-01	3.8E-01	3.8E-01
AREA Z														
Chloroform	1.06E-02	4.46E-04	5.92E-04	4.06E-04	2.87E-04	2.19E-04	2.12E-04	1E-02	4.5E-02	5.9E-02	4.1E-02	2.9E-02	2.2E-02	2.1E-02
1,1-Dichloroethane	2.92E-02	1.23E-03	1.63E-03	1.12E-03	7.90E-04	6.03E-04	5.84E-04	1E-01	1.2E-02	1.6E-02	1.1E-02	7.9E-03	6.0E-03	5.8E-03
1,1-Dichloroethene	3.84E-02	1.61E-03	2.15E-03	1.47E-03	1.04E-03	7.93E-04	7.68E-04	9E-03	1.8E-01	2.4E-01	1.6E-01	1.2E-01	8.8E-02	8.5E-02
Di-n-octyl phthalate	4.00E-03	1.68E-04	2.23E-04	1.53E-04	1.08E-04	8.26E-05	8.00E-05	2E-02	8.4E-03	1.1E-02	7.7E-03	5.4E-03	4.1E-03	4.0E-03
1,1,1-Trichloroethane	1.52E-01	6.39E-03	8.49E-03	5.82E-03	4.11E-03	3.14E-03	3.04E-03	9E-02	7.1E-02	9.4E-02	6.5E-02	4.6E-02	3.5E-02	3.4E-02
1,1,2-Trichloroethane	1.08E-02	4.54E-04	6.03E-04	4.13E-04	2.92E-04	2.23E-04	2.16E-04	4E-03	1.1E-01	1.5E-01	1.0E-01	7.3E-02	5.6E-02	5.4E-02
1,2-Dichloroethene	7.15E-02	3.01E-03	3.99E-03	2.74E-03	1.93E-03	1.48E-03	1.43E-03	2E-02	1.5E-01	2.0E-01	1.4E-01	9.7E-02	7.4E-02	7.2E-02
Phenol	1.30E-02	5.47E-04	7.26E-04	4.97E-04	3.52E-04	2.68E-04	2.60E-04	6E-01	9.1E-04	1.2E-03	8.3E-04	5.9E-04	4.5E-04	4.3E-04
Vanadium	6.00E-03	2.52E-04	3.35E-04	2.30E-04	1.62E-04	1.24E-04	1.20E-04	9E-03	2.8E-02	3.7E-02	2.6E-02	1.8E-02	1.4E-02	1.3E-02
Chromium	5.51E-02	2.32E-03	3.08E-03	2.11E-03	1.49E-03	1.14E-03	1.10E-03	1E+00	2.3E-03	3.1E-03	2.1E-03	1.5E-03	1.1E-03	1.1E-03
Copper	1.01E-01	4.25E-03	5.64E-03	3.86E-03	2.73E-03	2.09E-03	2.20E-03	4E-02	1.0E-01	1.4E-01	9.7E-02	6.8E-02	5.2E-02	5.5E-02
Nickel	4.04E-02	1.70E-03	2.26E-03	1.55E-03	1.09E-03	8.34E-04	8.08E-04	2E-02	8.5E-02	1.1E-01	7.8E-02	5.5E-02	4.2E-02	4.0E-02
Zinc	1.14E-01	4.79E-03	6.37E-03	4.36E-03	3.08E-03	2.35E-03	2.28E-03	2E-01	2.4E-02	3.2E-02	2.2E-02	1.5E-01	1.2E-01	1.1E-01
								Hazard Index	8.1E-01	1.1E+00[b]	7.5E-01	6.8E-01	5.1E-01	4.9E-01

CHRONIC EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day)						RfD (mg/kg/day)	Hazard Quotient					
		Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult		Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
ARPA V														
Vanadium	4.0E-03	2.17E-04	2.37E-04	1.60E-04	1.12E-04	8.52E-05	1.14E-04	9E-03	2.4E-02	2.6E-02	1.8E-02	1.2E-02	9.5E-03	1.3E-02
Chromium	1.24E-01	6.73E-03	7.34E-03	4.95E-03	3.47E-03	2.64E-03	3.54E-03	1E+00	6.7E-03	7.3E-03	5.0E-03	3.5E-03	2.6E-03	3.5E-03
Copper	2.35E-02	1.27E-03	1.39E-03	9.38E-04	6.57E-04	5.0E-04	6.71E-04	4E-02	3.2E-02	3.5E-02	2.3E-02	1.6E-02	1.3E-02	1.7E-02
Nickel	8.93E-02	4.84E-03	5.28E-03	3.56E-03	2.50E-03	1.90E-03	2.55E-03	2E-02	2.4E-01	2.6E-01	1.8E-01	1.3E-01	9.5E-02	1.3E-01
Zinc	6.09E-01	3.3E-02	3.60E-02	2.43E-02	1.70E-02	1.30E-02	1.74E-02	2E-01	1.7E-02	1.8E-01	1.2E-01	8.5E-02	6.5E-02	8.7E-02
Chloroform	5.51E-05	2.99E-06	3.26E-06	2.2E-06	1.54E-06	1.17E-06	1.57E-06	1E-02	3.0E-04	3.3E-04	2.2E-04	1.5E-04	1.2E-04	1.6E-04
Ethylbenzene	4.20E-04	2.28E-05	2.49E-05	1.68E-05	1.17E-06	8.95E-06	1.20E-05	1E-01	2.3E-04	2.5E-04	1.7E-04	1.2E-04	9.0E-05	1.2E-04
1,1-Dichloroethane	1.16E-03	6.29E-05	6.86E-05	4.63E-05	3.24E-05	2.47E-05	3.31E-05	1E-01	6.3E-04	6.9E-04	4.6E-04	3.2E-04	2.5E-04	3.3E-04
1,1-Dichloroethene	6.49E-04	3.52E-05	3.84E-05	2.59E-05	1.82E-05	1.38E-05	1.85E-05	9E-03	3.9E-03	4.3E-03	2.9E-03	2.0E-03	1.5E-03	2.1E-03
1,1,1-Trichloroethane	3.23E-03	1.75E-04	1.91E-04	1.29E-04	9.03E-05	6.88E-05	9.23E-05	9E-02	1.9E-03	2.1E-03	1.4E-03	1.0E-03	7.6E-04	1.0E-03
Bis(2-ethylhexyl)phthalate	6.0E-03	3.25E-04	3.55E-04	2.39E-04	1.68E-04	1.28E-04	1.71E-04	2E-02	1.6E-02	1.8E-02	1.2E-02	8.4E-03	6.4E-03	8.6E-03
Benzoic Acid	6.8E-02	3.69E-03	4.02E-03	2.71E-03	1.90E-03	1.45E-03	1.94E-03	4E+00	9.2E-04	1.0E-03	6.8E-04	4.8E-04	3.6E-04	4.9E-04
								Hazard Index	4.9E-01	5.3E-01	3.7E-01	2.5E-01	2.0E-01	2.6E-01
ARPA W														
1,1-Dichloroethane	4.02E-03	2.18E-04	2.38E-04	1.60E-04	1.12E-04	8.56E-05	1.15E-04	1E-01	2.2E-03	2.4E-03	1.6E-03	1.1E-03	8.6E-04	1.2E-03
1,1-Dichloroethene	6.87E-04	3.73E-05	4.07E-05	2.74E-05	1.92E-05	1.46E-05	1.96E-05	9E-03	4.1E-03	4.5E-03	3.0E-03	2.1E-03	1.6E-03	2.2E-03
1,1,1-Trichloroethane	1.30E-02	7.05E-04	7.65E-04	5.19E-04	3.64E-04	2.77E-04	3.71E-04	9E-02	7.8E-03	8.5E-03	5.8E-03	4.0E-03	3.1E-03	4.1E-03
								Hazard Index	1.4E-02	1.5E-02	1.0E-02	7.2E-03	5.6E-03	7.5E-03
ARPA X														
1,1-Dichloroethane	2.71E-03	1.47E-04	1.60E-04	1.08E-04	7.58E-05	5.77E-05	7.74E-05	1E-01	1.5E-03	1.6E-03	1.1E-03	7.6E-04	5.8E-04	7.7E-04
1,1-Dichloroethene	3.47E-03	1.88E-04	2.05E-04	1.38E-04	9.71E-05	7.39E-05	9.91E-05	9E-03	2.1E-02	2.3E-02	1.5E-02	1.1E-02	8.2E-03	1.1E-02
1,1,1-Trichloroethane	1.90E-03	1.03E-04	1.12E-04	7.58E-05	5.31E-05	4.05E-05	5.43E-05	9E-02	1.1E-03	1.2E-03	8.4E-04	5.9E-04	4.5E-04	6.0E-04
1,1,2-Trichloroethane	1.70E-02	9.22E-04	1.01E-03	6.78E-04	4.75E-04	3.62E-04	4.86E-04	4E-03	2.3E-01	2.5E-01	1.7E-01	1.2E-01	9.1E-02	1.2E-01
								Hazard Index	2.5E-01	2.8E-01	1.9E-01	1.3E-01	1.0E-01	1.3E-01

TABLE 4-18 (continued)

CHRONIC EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA Y														
Chloroform	2.10E-04	1.14E-05	1.24E-05	8.38E-05	5.87E-06	4.47E-06	6.00E-05	1E-02	1.1E-03	1.2E-03	8.4E-04	5.9E-04	4.5E-04	6.0E-04
Ethylbenzene	1.20E-03	6.51E-05	7.10E-05	4.79E-05	3.36E-05	2.56E-05	3.43E-05	1E-01	6.5E-04	7.1E-04	4.8E-04	3.4E-04	2.6E-04	3.4E-04
Methylene Chloride	1.90E-03	1.03E-04	1.12E-04	7.58E-04	5.31E-03	4.05E-05	5.43E-05	6E-02	1.7E-03	1.9E-03	1.3E-03	8.9E-04	6.8E-04	9.1E-04
1,1-Dichloroethane	1.19E-01	6.46E-03	7.04E-03	4.75E-03	3.33E-03	2.53E-03	3.40E-03	1E-01	6.5E-02	7.0E-02	4.8E-02	3.3E-02	2.5E-02	3.4E-02
1,1-Dichloroethene	6.68E-02	3.62E-03	3.95E-03	2.67E-03	1.87E-03	1.42E-03	1.91E-04	9E-03	4.0E-01	4.4E-01	3.0E-01	2.1E-01	1.6E-01	2.1E-01
1,1,1-Trichloroethane	1.17E-01	6.35E-03	6.92E-03	4.67E-03	3.27E-03	2.49E-03	3.34E-03	9E-02	7.1E-02	7.7E-02	5.2E-02	3.6E-02	2.8E-02	3.7E-02
1,1,2-Trichloroethane	1.48E-01	8.03E-03	8.76E-03	5.91E-03	4.14E-03	3.15E-03	4.23E-03	4E-03	2.0E+00	2.2E+00	1.5E+00	1.0E+00	7.9E-01	1.1E+00
1,2-Dichloroethene	6.66E-02	3.61E-03	3.94E-03	2.66E-03	1.86E-03	1.42E-03	1.90E-04	2E-02	1.8E-01	2.0E-01	1.3E-01	9.3E-02	7.1E-02	9.5E-02
Xylene	3.14E-03	1.70E-04	1.86E-04	1.25E-04	8.78E-05	6.69E-05	8.97E-05	2E+00	8.5E-05	9.3E-05	6.3E-05	4.4E-05	3.3E-05	4.5E-05
2-Butanone	9.53E-03	5.17E-04	5.64E-04	3.80E-04	2.67E-04	2.03E-04	2.72E-04	5E-02	1.0E-02	1.1E-02	7.6E-03	5.3E-03	4.1E-03	5.4E-03
								Hazard Index	2.7E+00[a]	3.0E+00[a]	2.0E+00[a]	1.4E+00[a]	1.1E+00	1.5E+00[a]
AREA Z														
Vanadium	6.0E-03	3.25E-04	3.55E-04	2.39E-04	1.68E-04	1.28E-04	1.71E-04	9E-03	3.6E-02	3.9E-02	2.7E-02	1.9E-02	1.4E-02	1.9E-02
Chromium	5.5E-02	2.98E-03	3.25E-03	2.20E-03	1.54E-03	1.17E-03	1.57E-03	1E+00	3.0E-03	3.3E-03	2.2E-03	1.5E-03	1.2E-03	1.6E-03
Copper	1.01E-01	5.48E-03	5.98E-03	4.03E-03	2.82E-03	2.15E-03	2.89E-03	4E-02	1.4E-01	1.5E-01	1.0E-01	7.1E-02	5.4E-02	7.2E-02
Nickel	4.0E-03	2.17E-03	2.37E-03	1.60E-03	1.12E-03	8.52E-04	1.14E-03	2E-02	1.1E-01	1.2E-01	8.0E-02	5.6E-02	4.3E-02	5.7E-02
Zinc	1.14E-01	6.18E-03	6.75E-03	4.55E-03	3.19E-03	2.43E-03	3.26E-03	2E-01	3.1E-02	3.4E-02	2.3E-02	1.6E-02	1.2E-02	1.6E-02
Chloroform	4.0E-03	2.17E-04	2.37E-04	1.60E-04	1.12E-04	8.52E-05	1.14E-04	1E-02	2.2E-02	2.4E-02	1.6E-02	1.1E-02	8.5E-03	1.1E-02
1,1-Dichloroethane	5.53E-02	3.00E-03	3.27E-03	2.21E-03	1.55E-04	1.18E-03	1.58E-03	1E-01	3.0E-02	3.3E-02	2.2E-02	1.6E-02	1.2E-02	1.6E-02
1,1-Dichloroethene	7.66E-02	4.16E-03	4.53E-03	3.06E-03	2.14E-03	1.63E-03	2.19E-03	9E-03	4.6E-01	5.0E-01	3.4E-01	2.4E-01	1.8E-01	2.4E-01
Di-n-octyl phthalate	4.0E-03	2.17E-04	2.37E-04	1.59E-04	1.12E-04	8.53E-05	1.14E-04	2E-02	1.1E-02	1.2E-02	8.0E-03	5.6E-03	4.3E-03	5.7E-03
1,1,1-Trichloroethane	3.54E-01	1.92E-02	2.09E-02	1.41E-02	9.90E-03	7.54E-03	1.01E-02	9E-02	2.1E-01	2.3E-01	1.6E-01	1.1E-01	8.4E-02	1.1E-01
1,1,2-Trichloroethane	1.43E-02	7.76E-04	8.46E-04	5.71E-04	4.00E-04	3.05E-04	4.09E-04	4E-03	1.9E-01	2.1E-01	1.4E-01	1.0E-01	7.6E-02	1.0E-01
1,2 Dichloroethene	1.30E-01	7.05E-03	7.69E-03	5.19E-03	3.64E-03	2.77E-03	3.71E-03	2E-02	3.5E-01	3.8E-01	2.6E-01	1.8E-01	1.4E-01	1.9E-01
Phenol	1.30E-02	7.05E-04	7.69E-04	5.19E-04	3.64E-04	2.77E-04	3.71E-04	6E-01	1.2E-03	1.3E-01	8.6E-04	6.1E-04	4.6E-04	6.2E-04
								Hazard Index	1.6E+00[b]	1.8E+00[b]	1.2E+00[b]	8.3E-01	6.2E-01	8.4E-01

TABLE 4-19

CHRONIC EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					ARFA V					
Vanadium	3.00E-03	2.74E-07	2.04E-07	1.69E-07	1.40E-07	5E-04	5.5E-05	4.1E-05	3.4E-05	2.8E-05
Chromium	6.57E-02	8.40E-06	6.27E-06	5.20E-06	4.31E-06	1E-02	8.4E-04	6.3E-04	5.2E-04	4.3E-04
Copper	1.97E-02	1.80E-06	1.34E-06	1.11E-06	9.22E-07	2E-02	9.0E-05	6.7E-05	5.6E-05	4.6E-05
Nickel	5.47E-02	4.99E-06	3.73E-06	3.09E-06	2.57E-06	6E-04	8.3E-03	6.2E-03	5.2E-03	4.3E-03
Zinc	3.81E-01	3.47E-05	2.61E-05	2.16E-05	1.78E-05	1E-01	3.5E-04	2.6E-04	2.2E-04	1.8E-04
Chloroform	3.92E-05	2.41E-06	1.81E-06	1.49E-06	1.23E-16	1E-02	2.4E-04	1.8E-04	1.5E-04	1.2E-04
Ethylbenzene	2.00E-04	9.84E-06	7.35E-06	6.08E-06	5.04E-06	8E-02	1.2E-04	9.2E-05	7.6E-05	6.3E-05
1,1-Dichloroethane	5.16E-04	3.17E-05	2.37E-05	1.96E-05	1.63E-05	7E-02	4.5E-04	3.4E-04	2.8E-04	2.3E-04
1,1-Dichloroethene	3.03E-04	1.86E-05	1.39E-05	1.15E-05	9.54E-06	8E-03	2.7E-04	2.0E-04	1.6E-04	1.4E-04
1,1,1-Trichloroethane	1.03E-03	6.33E-05	4.73E-05	3.91E-05	3.24E-05	8E-02	7.9E-04	5.9E-04	4.9E-04	4.1E-04
Bis(2-ethylhexyl)phtlalate	4.50E-03	1.37E-06	1.03E-06	8.44E-07	7.60E-07	3E-03	4.6E-04	3.4E-04	2.8E-04	2.3E-06
Benzoic Acid	4.65E-02	1.41E-05	1.06E-05	8.75E-06	7.25E-06	2E+00	7.1E-06	5.3E-06	4.4E-06	3.6E-06
						Hazard Index	1.3E-02	8.7E-03	7.3E-03	5.8E-03
					ARFA W					
1,1-Dichloroethane	1.39E-03	8.55E-05	6.39E-05	5.28E-05	4.38E-05	7E-02	1.2E-03	9.1E-04	7.5E-04	6.3E-04
1,1-Dichloroethene	2.58E-04	1.59E-05	1.19E-05	9.80E-06	8.13E-06	8E-03	2.0E-03	1.5E-03	1.2E-03	1.0E-03
1,1,1-Trichloroethane	4.99E-03	3.07E-04	2.30E-04	1.89E-04	1.58E-04	8E-02	3.8E-03	2.9E-03	2.4E-03	2.0E-03
						Hazard Index	7.0E-03	5.3E-03	4.4E-03	3.6E-03
					ARFA X					
1,1-Dichloroethane	1.17E-03	7.20E-05	5.38E-05	4.44E-05	3.69E-05	7E-02	1.0E-03	7.7E-04	6.3E-04	5.3E-04
1,1-Dichloroethene	1.31E-03	8.05E-05	6.02E-05	4.97E-05	9.13E-05	8E-03	1.0E-02	7.5E-03	6.2E-03	5.2E-03
1,1,1-Trichloroethane	1.11E-03	6.82E-05	5.10E-05	4.22E-05	3.50E-05	8E-02	8.5E-04	6.4E-04	5.3E-04	4.4E-04
1,1,2-Trichloroethane	5.30E-03	3.26E-04	2.44E-04	2.01E-04	1.67E-04	4E-03	8.2E-02	6.1E-02	5.0E-02	4.2E-02
						Hazard Index	9.4E-02	7.0E-02	5.7E-02	4.8E-02

TABLE 4-19 (continued)

CHRONIC EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA Y					
Chloroform	1.63E-03	1.00E-04	7.49E-05	6.19E-05	5.14E-05	1E-02	1.0E-02	7.5E-03	6.2E-03	5.1E-03
Ethylbenzene	1.72E-03	1.74E-05	6.32E-05	5.22E-05	4.33E-05	8E-02	2.2E-04	7.9E-04	6.5E-04	5.4E-04
Methylene Chloride	1.92E-03	1.18E-04	8.82E-05	7.30E-05	6.05E-05	6E-02	2.0E-03	1.5E-03	1.2E-03	1.0E-03
1,1-Dichloroethane	6.08E-02	3.74E-03	2.79E-03	2.31E-03	1.92E-03	7E-02	5.3E-02	4.0E-02	3.3E-02	2.7E-02
1,1-Dichloroethene	3.68E-02	2.26E-03	1.67E-03	1.40E-03	1.16E-03	8E-03	2.8E-01	2.1E-01	1.8E-01	1.5E-01
1,1,1-Trichloroethane	6.85E-02	4.20E-03	3.14E-03	2.60E-03	2.16E-03	8E-02	5.3E-02	3.9E-02	3.3E-02	2.7E-02
1,1,2-Trichloroethane	5.30E-02	3.26E-03	2.44E-03	2.01E-03	1.67E-03	4E-03	8.2E-01	6.1E-01	5.0E-01	4.2E-01
1,2-Dichloroethene	3.87E-02	2.37E-03	1.78E-03	1.46E-03	1.22E-03	2E-02	1.2E-01	8.9E-02	7.3E-02	6.1E-02
Xylene	2.22E-03	1.36E-04	1.02E-04	8.43E-05	6.99E-05	2E+00	6.8E-05	5.1E-05	4.2E-05	3.5E-05
2-Butanone	5.21E-03	1.59E-06	1.12E-06	9.81E-07	8.12E-07	5E-02	3.2E-05	2.4E-05	2.0E-05	1.6E-05
						Hazard Index	1.3E+00[b]	1.0E+00[b]	8.3E-01	6.9E-01
					AREA Z					
Vanadium	6.00E-03	5.48E-07	4.09E-07	3.38E-07	2.81E-07	5E-04	1.1E-03	8.2E-04	6.8E-04	5.6E-04
Chromium	5.51E-02	7.04E-06	5.28E-06	4.36E-06	3.62E-06	1E-02	7.0E-04	5.3E-04	4.4E-04	3.6E-04
Copper	1.01E-01	9.22E-06	6.90E-06	5.70E-06	4.73E-06	2E-02	4.6E-04	3.5E-04	2.9E-04	2.4E-04
Nickel	4.04E-02	3.69E-06	2.76E-06	2.29E-06	1.89E-06	6E-04	6.2E-03	4.6E-03	3.8E-03	3.1E-03
Zinc	1.14E-01	1.04E-05	7.78E-06	6.43E-06	5.34E-06	1E-01	1.0E-04	7.8E-05	6.4E-05	5.3E-05
Chloroform	1.06E-02	6.51E-04	4.90E-04	4.03E-04	3.34E-04	1E-02	6.5E-02	4.9E-02	4.0E-02	3.3E-02
1,1-Dichloroethane	2.92E-02	1.79E-03	1.34E-03	1.11E-03	9.20E-04	7E-02	2.6E-02	1.9E-02	1.6E-02	1.3E-02
1,1-Dichloroethene	3.84E-02	2.36E-03	1.77E-03	1.46E-03	1.21E-03	8E-03	3.0E-01	2.2E-01	1.8E-01	1.5E-01
1,1,1-Trichloroethane	1.52E-01	9.34E-03	6.98E-03	5.77E-03	4.78E-03	8E-02	1.2E-01	8.8E-02	7.3E-02	6.0E-02
1,1,2-Trichloroethane	1.08E-02	6.64E-04	4.96E-04	4.10E-04	3.41E-04	4E-03	1.7E-01	1.2E-01	1.0E-01	8.5E-02
1,2-Dichloroethene	7.15E-02	4.39E-03	3.28E-03	2.71E-03	2.25E-04	2E-02	2.2E-01	1.6E-01	1.4E-01	1.1E-01
Phenol	1.30E-02	3.96E-06	2.96E-06	2.44E-06	2.03E-06	5E-01	7.9E-06	5.9E-06	4.9E-06	4.0E-06
Di-n-octylphthalate	4.00E-03	1.22E-06	9.1E-07	7.51E-07	6.25E-07	3E-03	4.1E-04	3.0E-04	2.5E-04	2.1E-04
						Hazard Index	9.1E-01	6.8E-01	5.7E-01	4.6E-01

TABLE 4-20

CHRONIC EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA V					
Vanadium	4.00E-03	6.13E-07	4.56E-07	3.77E-07	3.11E-07	5E-04	1.2E-03	9.2E-04	7.6E-04	6.3E-04
Chromium	1.24E-01	2.65E-05	1.97E-05	1.63E-05	1.35E-05	1E-02	2.7E-03	2.0E-03	1.6E-03	1.4E-03
Copper	2.35E-02	3.60E-06	2.68E-06	2.21E-06	1.83E-06	2E-02	1.8E-04	1.4E-04	1.1E-04	9.2E-05
Nickel	8.93E-02	1.37E-05	1.01E-05	8.40E-06	6.96E-06	6E-04	2.3E-02	1.7E-02	1.4E-02	1.2E-02
Zinc	6.09E-01	9.34E-05	6.92E-05	5.72E-05	4.74E-05	1E-01	9.3E-04	6.9E-04	5.7E-04	4.7E-04
Chloroform	5.51E-05	5.69E-06	4.22E-16	3.48E-06	2.89E-06	1E-02	5.7E-04	4.2E-04	3.5E-04	2.9E-04
Ethylbenzene	4.20E-04	3.47E-06	2.58E-05	2.13E-05	1.77E-05	8E-02	4.3E-05	3.3E-05	2.7E-05	2.2E-05
1,1-Dichloroethane	1.16E-03	1.20E-04	8.89E-05	7.35E-05	6.10E-05	7E-02	1.7E-03	1.3E-03	1.1E-07	8.8E-04
1,1-Dichloroethene	6.49E-04	6.70E-05	4.97E-05	4.10E-05	3.41E-05	8E-03	8.4E-03	6.3E-03	5.2E-03	4.3E-03
1,1,1-Trichloroethane	3.23E-03	3.33E-04	2.47E-04	2.05E-04	1.73E-04	8E-02	4.2E-03	3.1E-03	2.6E-03	2.1E-03
Bis(2-ethylhexyl)phtlalate	6.00E-03	3.07E-06	2.28E-06	1.88E-06	1.56E-06	3E-03	1.0E-03	7.7E-04	6.4E-04	5.2E-04
Benzoic Acid	6.80E-02	3.49E-05	2.58E-05	2.13E-05	1.77E-05	2E+00	1.7E-05	1.3E-05	1.1E-05	8.9E-05
						Hazard Index	4.4E-02	3.3E-02	2.7E-02	2.3E-02
					AREA W					
1,1-Dichloroethane	4.02E-03	4.15E-04	3.08E-04	2.55E-04	2.11E-04	7E-02	5.9E-03	4.4E-03	3.7E-03	3.0E-03
1,1-Dichloroethene	6.87E-04	7.10E-05	5.26E-05	4.34E-05	3.61E-05	8E-03	8.9E-03	6.7E-03	5.5E-03	4.5E-03
1,1,1-Trichloroethane	1.30E-02	1.34E-03	9.96E-04	8.23E-04	6.84E-04	8E-02	1.7E-02	1.3E-02	1.0E-02	8.6E-03
						Hazard Index	3.2E-02	2.4E-02	1.9E-02	1.6E-02
					AREA X					
1,1-Dichloroethane	2.71E-03	2.80E-04	2.67E-04	1.72E-04	1.43E-04	7E-02	4.0E-03	3.0E-03	2.5E-03	2.0E-03
1,1-Dichloroethene	3.47E-03	3.59E-04	2.66E-04	2.20E-04	1.82E-04	8E-03	4.5E-02	3.4E-02	2.8E-02	2.3E-02
1,1,1-Trichloroethane	1.90E-03	1.96E-04	1.45E-04	1.20E-04	9.97E-05	8E-02	2.5E-03	1.8E-03	1.5E-03	1.3E-02
1,1,2-Trichloroethane	1.70E-02	1.75E-03	1.30E-03	1.08E-03	8.93E-04	4E-03	4.4E-01	3.3E-01	2.7E-01	2.2E-01
						Hazard Index	4.9E-01	3.7E-01	3.1E-01	2.5E-01

TABLE 4-20 (continued)

CHRONIC EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 3)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA Y					
Chloroform	2.10E-04	2.17E-05	1.60E-05	1.33E-05	1.10E-05	1E-02	2.2E-03	1.6E-03	1.3E-03	1.1E-03
Ethylbenzene	1.20E-03	9.92E-05	7.35E-05	6.08E-05	5.04E-05	8E-02	1.2E-03	9.3E-04	7.7E-04	6.3E-04
Methylene chloride	1.90E-03	1.96E-04	1.45E-04	1.20E-04	9.97E-05	6E-02	3.3E-03	2.5E-03	2.0E-03	1.7E-03
1,1-Dichloroethane	1.19E-01	1.23E-02	9.11E-03	7.54E-03	6.25E-03	7E-02	1.8E-01	1.3E-01	1.1E-01	9.0E-02
1,1-Dichloroethene	6.68E-02	6.89E-03	5.11E-03	4.23E-03	3.51E-03	8E-03	8.6E-01	6.5E-01	5.4E-01	4.4E-01
1,1,1-Trichloroethane	1.17E-01	1.21E-02	8.96E-03	7.41E-03	6.15E-03	8E-02	1.5E-01	1.1E-01	9.4E-02	7.7E-02
1,1,2-Trichloroethane	1.48E-01	1.53E-02	1.26E-02	9.36E-03	7.78E-03	4E-03	3.8E+00	2.9E+00	2.4E+00	2.0E+00
1,2-Dichloroethene	6.66E-02	6.88E-03	5.10E-03	4.22E-03	3.50E-03	2E-02	3.4E-01	2.6E-01	2.1E-01	1.8E-01
Xylene	3.14E-03	3.24E-04	2.41E-04	1.98E-04	1.65E-04	2E+00	1.6E-04	1.2E-04	1.0E-04	8.3E-05
2-Butanone	9.53E-03	4.88E-06	3.61E-06	2.99E-06	2.48E-06	5E-02	9.8E-05	7.3E-05	6.1E-05	5.0E-05
						Hazard Index	5.3E+00[a]	4.0E+00[a]	3.3E+00[a]	2.7E+00[a]
					AREA Z					
Vanadium	6.00E-03	9.21E-07	6.83E-07	5.64E-07	4.69E-07	5E-04	1.8E-03	1.4E-03	1.1E-03	9.4E-04
Chromium	5.50E-02	1.18E-05	8.77E-06	7.24E-06	6.01E-06	1E-02	1.2E-03	8.8E-04	7.2E-04	6.0E-04
Copper	1.01E-01	1.55E-06	1.15E-06	9.49E-06	7.88E-06	2E-02	7.8E-05	5.8E-05	4.8E-05	4.0E-05
Nickel	4.00E-02	6.13E-06	4.56E-06	3.77E-06	3.11E-06	6E-04	1.0E-02	7.7E-03	6.4E-03	5.2E-03
Zinc	1.14E-01	1.75E-05	1.30E-05	1.07E-05	8.89E-06	1E-01	1.8E-04	1.3E-04	1.1E-04	8.9E-05
Chloroform	4.00E-03	4.13E-04	3.07E-04	2.54E-04	2.10E-04	1E-02	4.1E-02	3.1E-02	2.5E-02	2.1E-02
1,1-Dichloroethane	5.53E-02	5.71E-03	4.24E-03	3.50E-03	2.90E-03	7E-02	8.2E-02	6.1E-02	5.1E-02	4.2E-02
1,1-Dichloroethene	7.66E-02	7.92E-03	5.87E-03	4.85E-03	4.03E-03	8E-03	9.9E-01	7.4E-01	6.2E-01	5.1E-01
1,1,1-Trichloroethane	3.54E-01	3.66E-02	2.71E-02	2.23E-02	1.86E-02	8E-02	4.6E-01	3.4E-01	2.8E-01	2.3E-01
1,1,2-Trichloroethane	1.43E-02	1.48E-03	1.10E-03	9.05E-03	7.51E-03	4E-03	3.7E-01	2.8E-01	2.3E-01	1.9E-01
1,2-Dichloroethene	1.30E-01	1.34E-02	9.96E-03	8.23E-03	6.83E-03	2E-02	6.7E-01	5.0E-01	4.2E-01	3.4E-01
Di-n-octyl phthalate	4.00E-03	2.04E-06	1.52E-06	1.25E-06	1.04E-06	3E-03	6.8E-04	5.1E-04	4.2E-04	3.5E-04
Phenol	1.30E-02	6.63E-06	4.93E-06	4.07E-06	3.38E-06	5E-02	1.3E-04	9.9E-05	8.3E-05	6.8E-05
						Hazard Index	2.6E+00[b]	2.0E+00[b]	1.6E+00[b]	1.3E+00[b]

TABLE 4-21

CHRONIC EXPOSURE VIA INHALATION OF VOLATILES FROM OFF-TCAAP GROUND WATER DURING SHOWERING (UNIT 3)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-18	Adult	RfD mg/kg/day	Hazard Quotient Child 0-6	Child 7-18	Adult
				AREA V				
1,1-Dichloroethane	5.16E-04	1.63E-08	7.74E-09	2.48E-09	1E-01	1.6E-07	7.7E-08	2.5E-08
1,1,1-Trichloroethane	1.03E+00	3.00E-05	1.42E-05	4.75E-06	3E-01	1.0E-04	4.7E-05	1.6E-05
					Hazard Index:	1.0E-04	4.7E-04	1.6E-05
				AREA W				
1,1-Dichloroethane	1.39E+00	4.39E-05	2.01E-05	6.69E-06	1E-01	4.4E-04	2.0E-04	6.7E-05
1,1,1-Trichloroethane	4.99E+00	1.45E-04	6.89E-05	2.30E-05	3E-01	4.8E-04	2.3E-04	7.7E-05
					Hazard Index:	9.2E-04	4.3E-04	1.4E-04
				AREA X				
1,1-Dichloroethane	1.17E+00	3.70E-05	1.76E-05	5.63E-06	1E-01	3.7E-04	1.8E-04	5.6E-05
1,1,1-Trichloroethane	1.11E+00	3.23E-05	1.53E-05	5.12E-06	3E-01	1.1E-04	5.1E-05	1.7E-05
					Hazard Index:	4.8E-04	2.3E-04	7.3E-05
				AREA Y				
Chloroform	1.63E+00	4.69E-05	2.23E-05	7.16E-06	1E-02	4.7E-03	2.2E-03	7.2E-04
Methylene chloride	1.92E+00	6.14E-05	2.92E-05	9.27E-06	6E-02	1.0E-03	4.9E-04	1.5E-04
1,1-Dichloroethane	6.08E+01	1.92E-03	9.12E-04	2.92E-04	1E-01	1.9E-02	9.1E-03	2.9E-03
1,1,1-Trichloroethane	6.85E+01	1.99E-03	9.45E-04	3.16E-04	3E-01	6.6E-03	3.2E-03	1.1E-03
Xylene	2.22E+00	6.97E-05	3.29E-05	1.06E-05	9E-02	7.7E-04	3.7E-04	1.2E-04
2-Butanone	5.21E+00	2.55E-05	1.21E-05	3.88E-06	9E-02	2.8E-04	1.3E-04	4.3E-05
					Hazard Index:	3.2E-02	1.5E-02	5.0E-03
				AREA Z				
1,1-Dichloroethane	2.92E+01	9.23E-04	4.38E-04	1.40E-04	1E-01	9.2E-03	4.4E-03	1.4E-03
1,1,1-Trichloroethane	1.52E+02	4.42E-03	2.10E-03	7.01E-04	3E-01	1.5E-02	7.0E-03	2.3E-03
					Hazard Index:	2.4E-02	1.1E-02	3.7E-03

TABLE 4-22

CHRONIC EXPOSURE VIA INHALATION OF VOLATILES FROM OFF-TCAAP GROUND WATER DURING SHOWERING (UNIT 3)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-18	Adult	RfD mg/kg/day	Hazard Quotient Child 0-6	Child 7-18	Adult
				AREA V				
1,1-Dichloroethane	1.16E-03	8.81E-08	4.16E-08	1.34E-08	1E-01	8.8E-07	4.2E-07	1.3E-07
1,1,1-Trichloroethane	3.23E+00	2.26E-04	1.07E-04	3.46E-05	3E-01	7.5E-04	3.6E-04	1.2E-04
					Hazard Index:	7.5E-04	3.6E-04	1.2E-04
				AREA W				
1,1-Dichloroethane	4.02E+00	3.06E-04	1.44E-04	4.66E-05	1E-01	3.1E-03	1.4E-03	4.7E-04
1,1,1-Trichloroethane	1.30E+01	9.10E-04	4.30E-04	1.39E-04	3E-01	3.0E-03	1.4E-03	4.6E-04
					Hazard Index:	6.1E-03	2.8E-03	9.3E-04
				AREA X				
1,1-Dichloroethane	2.71E+00	2.06E-04	9.73E-05	3.14E-05	1E-01	2.1E-03	9.7E-04	3.1E-04
1,1,1-Trichloroethane	1.90E+00	1.33E-04	6.29E-05	2.03E-05	3E-01	4.4E-04	2.1E-04	6.8E-03
					Hazard Index:	2.5E-03	1.2E-03	3.8E-04
				AREA Y				
Methylene chloride	1.90E+00	1.46E-04	6.90E-05	2.22E-05	9E-01	1.6E-04	7.7E-05	2.5E-05
1,1-Dichloroethane	1.19E+02	9.04E-03	4.27E-03	1.38E-03	1E-01	9.0E-02	4.3E-02	1.4E-02
1,1,1-Trichloroethane	1.17E+02	8.19E-03	3.87E-03	1.25E-03	3E-01	2.7E-02	1.3E-02	4.2E-03
Xylene	3.14E+00	2.36E-04	1.12E-04	3.61E-05	9E-02	2.6E-03	1.2E-03	4.0E-04
2-Butanone	9.53E+00	1.12E-04	5.36E-05	1.70E-05	9E-02	1.2E-03	6.0E-04	1.9E-04
					Hazard Index:	1.2E-01	5.8E-02	1.9E-02
				AREA Z				
1,1-Dichloroethane	5.53E+01	4.20E-03	1.99E-03	6.41E-04	1E-01	4.2E-02	2.0E-02	6.4E-03
1,1,1-Trichloroethane	3.54E+02	2.48E-02	1.17E-02	3.79E-03	3E-01	8.3E-02	3.9E-02	1.3E-02
					Hazard Index:	1.3E-01	5.9E-02	1.9E-02

TABLE 4-23

ACUTE EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
						AREA W								
Chromium	1.12E-02	4.71E-04	6.26E-04	4.29E-04	3.03E-04	2.31E-04	2.24E-04	1E+01	4.7E-05	6.3E-05	4.3E-05	3.0E-05	2.3E-05	2.2E-05
Copper	1.18E-02	4.96E-04	6.59E-04	4.52E-04	3.19E-04	2.44E-04	2.36E-04	4E-02	1.2E-02	1.6E-02	1.1E-02	8.0E-03	6.1E-03	5.9E-03
Nickel	1.34E-02	5.64E-04	7.49E-04	5.13E-04	3.62E-04	2.77E-04	2.68E-04	2E-02	2.8E-02	3.7E-02	2.6E-02	1.8E-02	1.4E-03	1.3E-02
Zinc	2.67E+00	1.12E-01	1.49E-01	1.02E-01	7.22E-02	5.51E-02	5.34E-02	2E-01	5.6E-01	7.5E-01	5.1E-01	3.6E-01	2.8E-01	2.7E-01
Carbon Tetrachloride	1.03E-04	4.33E-06	5.75E-06	3.94E-06	2.79E-06	2.13E-06	2.06E-06	7E-03	6.2E-04	8.2E-04	5.6E-04	4.0E-04	3.0E-04	2.9E-04
Chloroform	2.73E-05	1.15E-06	1.53E-06	1.04E-06	7.38E-07	5.64E-07	5.46E-07	1E-02	1.2E-04	1.5E-04	1.0E-04	7.4E-05	5.6E-05	5.5E-05
Methylene Chloride	4.15E-04	1.75E-05	2.32E-05	1.59E-05	1.12E-05	8.57E-06	8.30E-06	6E-02	2.9E-04	3.9E-04	2.6E-04	1.9E-04	1.4E-04	1.4E-04
1,1-Dichloroethane	2.47E-03	1.04E-04	1.38E-04	9.45E-05	6.68E-05	5.10E-05	4.94E-05	1E+00	1.0E-04	1.4E-04	9.5E-05	6.7E-05	5.1E-05	4.9E-05
1,1-Dichloroethene	1.19E-03	5.00E-05	6.65E-05	4.55E-05	3.22E-05	2.46E-05	2.38E-05	9E-03	5.6E-03	7.4E-03	5.1E-03	3.8E-03	2.7E-03	2.6E-03
1,1,1-Trichloroethane	2.46E-03	1.03E-04	1.37E-04	9.41E-05	6.65E-05	5.08E-05	4.92E-05	9E-01	1.1E-04	1.5E-04	1.0E-04	7.4E-05	5.6E-05	5.5E-05
1,1,2-Trichloroethane	4.18E-05	1.76E-06	2.34E-06	1.60E-06	1.13E-06	8.63E-07	8.36E-07	4E-02	4.4E-05	5.9E-05	4.0E-05	2.8E-05	2.2E-05	2.1E-05
Tetrachloroethene	5.68E-05	2.39E-06	3.17E-06	2.17E-06	1.54E-06	1.17E-06	1.14E-06	1E-01	2.4E-05	3.2E-05	2.2E-05	1.5E-05	1.2E-05	1.1E-05
Bis(2-ethylhexyl)phthalate	3.00E-03	1.26E-04	1.68E-04	1.15E-04	8.11E-05	6.19E-05	6.00E-05	2E-02	6.3E-03	8.4E-03	5.8E-03	4.1E-03	3.1E-03	3.0E-03
Benzoic Acid	9.00E-03	3.78E-04	5.03E-04	3.44E-04	2.43E-04	1.86E-04	1.80E-04	4E+00	9.5E-05	1.3E-04	8.6E-05	6.1E-05	4.6E-05	4.5E-05
								Hazard Index	6.6E-01	8.8E-01	6.0E-01	4.2E-01	3.1E-01	3.2E-01
						AREA X								
Antimony	3.73E-02	1.57E-03	2.08E-03	1.43E-03	1.01E-03	7.70E-04	7.46E-04	4E-04	3.9E+00	5.2E+00	3.6E+00	2.5E+00	1.9E+00	1.9E+00
Vanadium	6.10E-03	2.57E-04	3.41E-04	2.33E-04	1.65E-04	1.26E-04	1.22E-04	9E-03	2.9E-02	3.8E-02	2.6E-02	1.8E-02	1.4E-02	1.4E-02
Chromium	1.13E-02	4.75E-03	6.31E-03	4.32E-03	3.06E-03	2.33E-03	2.26E-03	1E+01	4.8E-04	6.3E-04	4.3E-04	3.1E-04	2.3E-04	2.3E-04
Copper	3.84E-02	1.61E-03	2.15E-03	1.47E-03	1.04E-03	7.93E-04	7.68E-04	4E-02	4.0E-02	5.4E-02	3.7E-02	2.6E-02	2.0E-02	1.9E-02
Nickel	9.27E-02	3.90E-03	5.18E-03	3.55E-03	2.15E-03	1.91E-03	1.85E-03	2E-02	2.0E-01	2.6E-01	1.8E-01	1.3E-01	9.6E-02	9.3E-02
Chloroform	3.56E-05	1.50E-06	1.99E-06	1.36E-06	9.63E-07	7.35E-07	7.12E-07	1E-02	1.5E-04	2.0E-04	1.4E-04	9.6E-05	7.4E-05	7.1E-05
Toluene	1.72E-02	7.23E-04	9.61E-04	6.58E-04	4.65E-04	3.55E-04	3.44E-04	4E-01	1.8E-03	2.4E-03	1.7E-03	1.2E-03	9.0E-04	8.3E-04
1,1-Dichloroethane	2.88E-04	1.21E-05	1.61E-05	1.10E-05	7.79E-06	5.95E-06	5.76E-06	1E+00	1.2E-05	1.6E-05	1.1E-05	7.8E-06	6.0E-06	5.8E-06
1,1-Dichloroethene	1.71E-04	7.19E-06	9.55E-06	6.54E-06	4.62E-06	3.53E-06	3.42E-06	9E-03	8.0E-04	1.1E-03	7.3E-04	5.1E-04	3.9E-04	3.8E-04
1,1,1-Trichloroethane	7.54E-04	3.17E-05	4.21E-05	2.89E-05	2.04E-05	1.56E-05	1.51E-05	9E-01	3.5E-05	4.7E-05	3.2E-05	2.3E-05	1.7E-05	1.7E-05
1,1,2-Trichloroethane	3.60E-05	1.51E-06	2.01E-06	1.38E-06	9.74E-07	7.43E-07	7.20E-07	4E-02	3.8E-05	5.0E-05	3.5E-05	2.4E-05	1.9E-05	1.8E-05
Tetrachloroethene	1.79E-04	7.5E-06	1.00E-05	6.85E-06	4.84E-06	3.70E-06	3.58E-06	1E-01	7.5E-05	1.0E-04	6.9E-05	4.8E-05	3.7E-05	3.6E-05
Bis(2-ethylhexyl)phthalate	6.8E-02	2.86E-03	3.80E-03	2.60E-03	1.84E-03	1.40E-03	1.36E-03	2E-02	1.4E-01	1.9E-01	1.3E-01	9.2E-02	7.0E-02	6.8E-02
Di-n-butylphthalate	7.00E-03	2.94E-04	3.91E-04	2.68E-04	1.89E-04	1.45E-04	1.40E-04	1E+00	2.9E-03	3.9E-03	2.7E-03	1.9E-03	1.5E-03	1.4E-03
Di-n-octyl phthalate	9.5E-02	4.00E-03	5.30E-03	3.64E-03	2.57E-03	1.96E-03	1.90E-03	2E-02	2.0E-01	2.7E-01	1.8E-01	1.3E-01	8.9E-02	9.5E-02
Benzoic Acid	4.00E-03	1.68E-04	2.23E-04	1.53E-04	1.08E-04	8.26E-05	8.00E-05	4E+00	4.2E-05	5.6E-05	3.8E-05	2.7E-05	2.1E-05	2.0E-05
N-butyl benzyl phthalate	2.00E-03	8.40E-03	1.12E-04	7.65E-05	5.40E-05	4.18E-05	4.00E-05	2E-01	4.2E-04	5.6E-04	3.8E-04	2.7E-04	2.1E-04	2.0E-04
								Hazard Index	4.9E+00[a]	6.6E+00[a]	4.2E+00[a]	2.9E+00[a]	2.2E+00[a]	2.2E+00[a]

TABLE 4-23 (continued)

ACUTE EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
						AREA Y								
Bromodichloroethane	4.04E-04	1.70E-05	2.26E-05	1.55E-05	1.09E-05	8.34E-06	8.08E-06	2E-02	8.5E-04	1.1E-03	7.8E-04	5.5E-04	4.2E-04	4.0E-04
Chloroform	4.09E-04	1.72E-05	2.28E-05	1.57E-05	1.11E-05	8.45E-06	8.18E-06	1E-02	1.7E-03	2.3E-03	1.6E-03	1.1E-03	8.5E-04	8.2E-04
Toluene	6.44E-03	2.71E-04	3.60E-04	2.46E-04	1.74E-04	1.33E-04	1.29E-04	4E-01	6.8E-04	9.0E-04	6.2E-04	4.4E-04	3.3E-04	3.2E-04
Methylene Chloride	6.41E-04	2.70E-05	3.58E-05	2.45E-05	1.73E-05	1.32E-05	1.28E-05	6E-02	4.5E-04	6.0E-04	4.1E-04	2.9E-04	2.2E-04	2.1E-04
1,1-Dichloroethane	1.80E-03	7.57E-05	1.01E-04	6.89E-05	4.87E-05	3.72E-05	3.60E-05	1E+00	7.6E-05	1.0E-04	6.9E-05	4.9E-05	3.7E-05	3.6E-05
1,1-Dichloroethene	1.42E-03	5.97E-05	7.93E-05	5.43E-05	3.84E-05	2.93E-05	2.84E-05	9E-03	6.6E-03	8.8E-03	6.0E-03	4.3E-03	3.3E-03	3.2E-03
1,1,1-Trichloroethane	6.21E-03	2.61E-04	3.47E-04	2.38E-04	1.68E-04	1.28E-04	1.24E-04	9E-01	2.9E-04	3.9E-04	2.6E-04	1.9E-04	1.4E-04	1.4E-04
1,1,2-Trichloroethane	4.18E-04	1.76E-05	2.34E-05	1.60E-05	1.13E-05	8.63E-06	8.36E-06	4E-02	4.4E-04	5.9E-04	4.0E-04	2.8E-04	2.2E-04	2.1E-04
Xylene	8.43E-04	3.55E-05	4.71E-05	3.23E-05	2.28E-05	1.74E-05	1.69E-05	4E+00	3.6E-05	4.8E-05	3.2E-05	2.2E-05	1.7E-05	1.7E-05
Tetrachloroethene	4.03E-04	1.69E-05	2.25E-05	1.54E-05	1.09E-05	8.32E-06	8.06E-06	1E-01	1.7E-04	2.3E-04	1.5E-04	1.1E-04	8.3E-05	8.1E-05
								Hazard Index	1.1E-02	1.5E-02	9.7E-03	7.3E-03	5.6E-03	5.4E-03
						AREA Z								
Chromium	2.82E-02	1.19E-03	1.58E-03	1.08E-03	7.63E-04	5.82E-04	5.64E-04	1E+01	1.2E-04	1.6E-04	1.1E-04	7.6E-05	5.8E-05	5.6E-05
Copper	2.14E-02	9.00E-04	1.20E-03	8.19E-04	5.79E-04	4.42E-04	4.28E-04	4E-02	2.3E-02	3.0E-02	2.0E-02	1.4E-02	1.1E-02	1.1E-02
Nickel	2.69E-02	1.13E-03	1.50E-03	1.03E-03	7.28E-04	5.55E-04	5.38E-04	2E-02	5.7E-02	7.5E-02	5.2E-02	3.6E-02	2.8E-02	2.7E-02
Zinc	2.82E+00	1.19E-01	1.58E-01	1.08E-01	7.63E-02	5.82E-02	5.64E-02	2E-01	5.9E-01	7.9E-01	5.4E-01	3.8E-01	2.9E-01	2.8E-01
Toluene	2.33E-02	9.80E-04	1.30E-03	8.92E-04	6.30E-04	4.81E-04	4.66E-04	4E-01	2.5E-03	3.2E-03	2.3E-03	1.6E-03	1.2E-03	1.2E-03
1,1-Dichloroethane	2.57E-02	1.80E-03	1.44E-03	9.83E-04	6.95E-04	5.31E-04	5.14E-04	1E+00	1.1E-03	1.4E-03	9.8E-04	7.0E-04	5.3E-04	5.1E-04
1,1-Dichloroethene	2.64E-02	1.11E-03	1.47E-03	1.01E-03	7.14E-04	5.45E-04	5.28E-04	9E-03	1.2E-01	1.6E-01	1.1E-01	7.9E-02	6.1E-02	5.9E-02
1,1,1-Trichloroethane	1.06E-01	4.46E-03	5.92E-03	4.06E-03	2.87E-03	2.19E-03	2.12E-03	9E-01	5.0E-03	6.6E-03	4.5E-03	3.2E-03	2.4E-03	2.4E-03
1,1,2-Trichloroethane	2.79E-03	1.17E-04	1.56E-04	1.07E-04	7.55E-05	5.76E-05	5.58E-05	4E-02	2.9E-03	3.9E-03	2.7E-03	1.9E-03	1.4E-03	1.4E-03
1,2-Dichloroethane	2.63E-02	1.11E-03	1.47E-03	1.01E-03	7.11E-04	5.43E-04	5.26E-04	2E-01	5.6E-03	7.4E-03	5.1E-03	3.6E-03	2.7E-03	2.6E-03
Tetrachloroethene	9.73E-03	4.09E-04	5.44E-04	3.72E-04	2.63E-04	2.01E-04	1.95E-04	1E-01	4.1E-03	5.4E-03	3.7E-03	2.6E-03	2.0E-03	2.0E-03
Benzoic Acid	1.70E-01	7.15E-03	9.50E-03	6.51E-03	4.60E-03	3.51E-03	3.40E-03	4E+00	1.8E-03	2.4E-03	1.6E-03	1.2E-03	8.8E-04	8.5E-04
								Hazard Index	8.5E-01	1.1E+00[b]	7.7E-01	5.4E-01	4.2E-01	4.0E-01

ACUTE EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA W														
Chromium	1.10E-02	5.97E-04	6.51E-04	4.39E-04	3.08E-04	2.34E-04	3.14E-04	1E+01	6.0E-05	6.5E-05	4.4E-05	3.1E-05	2.3E-05	3.1E-05
Copper	1.20E-02	6.51E-04	7.10E-04	4.79E-04	3.36E-04	2.56E-04	3.43E-04	4E-02	1.6E-02	1.8E-02	1.2E-02	8.4E-03	6.4E-03	8.6E-03
Nickel	1.30E-02	7.05E-04	7.69E-04	5.19E-04	3.64E-04	2.77E-04	3.71E-04	2E-02	3.5E-02	3.8E-02	2.6E-02	1.8E-02	1.4E-02	1.9E-02
Zinc	2.67E+00	1.45E-01	1.58E-01	1.07E-01	7.47E-02	5.69E-02	7.63E-02	2E-01	7.3E-01	7.9E-01	5.4E-01	3.7E-01	2.8E-01	3.8E-01
Carbon Tetrachloride	1.98E-04	1.07E-05	1.17E-05	7.90E-06	5.54E-06	4.22E-06	5.66E-06	7E-03	1.5E-03	1.7E-03	1.1E-03	7.9E-04	6.0E-04	8.1E-04
Chloroform	3.23E-05	1.75E-06	1.91E-06	1.29E-06	9.03E-07	6.88E-07	9.23E-07	1E-02	1.8E-04	1.9E-04	1.3E-04	9.0E-05	6.9E-05	9.2E-05
Methylene Chloride	6.82E-04	3.70E-05	4.04E-05	2.72E-05	1.91E-05	1.45E-05	1.95E-05	6E-02	6.2E-04	6.7E-04	4.5E-04	3.2E-04	2.4E-04	3.3E-04
1,1-Dichloroethane	7.30E-03	3.96E-04	4.32E-04	2.91E-04	2.04E-04	1.55E-04	2.09E-04	1E+00	4.0E-04	4.3E-04	2.9E-04	2.0E-04	1.6E-04	2.1E-04
1,1-Dichloroethene	3.21E-03	1.74E-04	1.90E-04	1.28E-04	8.98E-05	6.84E-05	9.17E-05	9E-03	1.9E-02	2.0E-02	1.4E-02	1.0E-02	7.6E-03	1.0E-02
1,1,1-Trichloroethane	7.50E-03	4.07E-04	4.44E-04	2.99E-04	2.10E-04	1.60E-04	2.14E-04	9E-01	4.5E-04	4.9E-04	3.3E-04	2.3E-04	1.8E-04	2.4E-04
1,1,2-Trichloroethane	9.89E-05	5.36E-06	5.85E-06	3.95E-06	2.77E-06	2.11E-06	2.83E-06	4E-02	1.3E-04	1.5E-04	9.9E-05	6.9E-05	5.3E-05	7.1E-05
Tetrachloroethene	1.20E-04	6.51E-06	7.10E-06	4.79E-06	3.36E-06	2.56E-06	3.43E-06	1E-01	6.5E-05	7.1E-05	4.8E-05	3.4E-05	2.6E-05	3.4E-05
Bis(2-ethylhexyl)phthalate	3.00E-03	1.63E-04	1.78E-04	1.20E-04	8.39E-05	6.39E-05	8.57E-05	2E-02	8.2E-03	8.9E-03	6.0E-03	4.2E-03	3.2E-03	4.3E-03
Benzoic Acid	9.00E-03	4.88E-04	5.33E-04	3.59E-04	2.52E-04	1.92E-04	2.57E-04	4E+00	1.2E-04	1.3E-04	9.0E-05	3.2E-03	4.8E-05	6.4E-05
								Hazard Index	8.1E-01	8.8E-01	5.7E-01	4.2E-01	3.1E-01	4.2E-01
AREA X														
Antimony	3.70E-02	2.01E-03	2.19E-03	1.48E-03	1.03E-03	7.88E-04	1.06E-03	4E-04	5.0E+00	5.5E+00	3.7E+00	2.6E+00	2.0E+00	2.7E+00
Vanadium	6.10E-03	3.3E-04	3.61E-04	2.43E-04	1.71E-04	1.30E-04	1.74E-04	9E-03	3.7E-02	4.0E-02	2.7E-02	1.9E-02	1.4E-02	1.9E-02
Chromium	1.13E-01	6.13E-03	6.69E-03	4.51E-03	3.16E-03	2.41E-03	3.23E-03	1E+01	6.1E-04	6.7E-04	4.5E-04	3.2E-04	2.4E-04	3.2E-04
Copper	3.80E-02	2.06E-03	2.25E-03	1.52E-03	1.06E-03	8.09E-04	1.09E-03	4E-02	5.2E-02	5.6E-02	3.8E-02	2.7E-02	2.0E-02	2.7E-02
Nickel	9.30E-02	5.04E-03	5.51E-03	3.71E-03	2.60E-03	1.98E-03	2.66E-03	2E-02	2.5E-01	2.8E-01	1.9E-01	1.3E-01	9.9E-02	1.3E-02
n-Butyl benzyl phthalate	2.00E-03	1.08E-04	1.18E-04	8.00E-05	5.60E-05	4.26E-05	5.70E-05	2E+00	5.5E-05	6.0E-05	4.0E-05	2.8E-05	2.1E-05	2.9E-05
Chloroform	5.18E-05	2.81E-06	3.07E-06	2.07E-06	1.45E-06	1.10E-06	1.48E-06	1E-02	2.8E-04	3.1E-04	2.1E-04	1.5E-04	1.1E-04	1.5E-04
Di-n-octyl phthalate	8.50E-02	5.16E-03	5.62E-03	3.80E-03	2.64E-03	2.02E-03	2.72E-03	2E-02	2.6E-01	2.8E-01	1.9E-01	1.3E-01	1.0E-01	1.4E-01
Toluene	5.70E-02	3.09E-03	3.37E-03	2.27E-03	1.59E-03	1.21E-03	1.63E-03	4E-01	7.5E-03	8.3E-03	5.7E-03	4.0E-03	3.0E-03	4.1E-03
1,1-Dichloroethane	5.22E-04	2.83E-05	3.09E-05	2.08E-05	1.46E-05	1.11E-05	1.49E-05	1E+00	2.8E-04	3.1E-04	2.1E-04	1.5E-04	1.1E-04	1.5E-04
1,1-Dichloroethene	2.97E-04	1.61E-05	1.76E-05	1.19E-05	8.31E-06	6.33E-06	8.49E-06	9E-03	1.8E-03	2.0E-03	1.3E-03	9.2E-04	7.0E-04	9.4E-04
1,1,1-Trichloroethane	1.93E-03	1.05E-04	1.14E-04	7.70E-05	5.40E-05	4.11E-05	5.51E-05	9E-01	1.2E-04	1.3E-04	8.6E-05	6.0E-05	4.6E-05	6.1E-05
1,1,2-Trichloroethane	6.71E-05	3.64E-06	3.97E-06	2.68E-06	1.88E-06	1.43E-06	1.92E-06	4E-02	9.1E-05	9.9E-05	6.7E-05	4.7E-05	3.6E-05	4.8E-05
Tetrachloroethene	5.36E-04	2.91E-05	3.17E-05	2.14E-05	1.50E-05	1.41E-05	1.53E-05	1E-01	2.9E-04	3.2E-04	2.1E-04	1.5E-04	1.1E-04	1.5E-04
Bis(2-ethylhexyl)phthalate	6.80E-02	3.69E-03	4.02E-03	2.7E-03	1.90E-03	1.45E-03	1.94E-03	2E-01	1.8E-02	2.0E-02	1.4E-02	9.5E-03	7.2E-03	9.7E-03
Di-n-Butylphthalate	7.00E-03	3.80E-04	4.14E-04	2.79E-04	1.96E-04	1.49E-04	2.0E-04	1E+00	3.8E-04	4.1E-04	2.8E-04	2.0E-04	1.5E-04	2.0E-04
Benzoic Acid	4.00E-03	2.17E-04	2.37E-04	1.60E-04	1.12E-04	8.52E-05	1.14E-05	4E+00	5.4E-05	5.9E-05	4.0E-05	2.8E-05	2.1E-05	2.9E-05
								Hazard Index	5.6E+00[a]	6.2E+00[a]	4.2E+00[a]	2.9E+00[a]	2.2E+00[a]	2.9E+00[a]

TABLE 4-24 (continued)

ACUTE EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
						AREA Y								
Bromodichloromethane	1.10E-04	5.97E-06	6.51E-06	4.39E-06	3.08E-06	2.34E-06	3.14E-06	2E-02	3.0E-04	3.3E-04	2.2E-04	1.5E-04	1.2E-04	1.6E-04
Chloroform	3.00E-04	1.63E-05	1.78E-05	1.20E-05	8.39E-06	6.39E-06	8.57E-06	1E-02	1.6E-03	1.8E-03	1.2E-03	8.4E-04	6.4E-04	8.6E-04
Toluene	1.93E-02	1.05E-03	1.14E-03	7.70E-04	5.40E-04	4.11E-04	5.51E-04	4E-01	2.6E-03	2.9E-03	2.0E-03	1.4E-03	1.1E-03	1.4E-03
Methylene Chloride	7.30E-04	3.96E-05	4.32E-05	2.91E-05	2.04E-05	1.55E-05	2.09E-05	6E-02	6.6E-04	7.2E-04	4.9E-04	3.4E-04	2.6E-04	3.5E-04
1,1-Dichloroethane	2.73E-03	1.48E-04	1.62E-04	1.09E-04	7.64E-05	5.81E-05	7.80E-05	1E+00	1.5E-04	1.6E-04	1.1E-04	7.6E-05	5.8E-05	7.8E-05
1,1-Dichloroethene	2.04E-03	1.11E-04	1.21E-04	8.14E-05	5.71E-05	4.34E-05	5.83E-05	9E-03	1.2E-02	1.3E-02	9.1E-03	6.3E-03	4.8E-03	6.5E-03
1,1,1-Trichloroethane	1.00E-02	5.42E-04	5.92E-04	3.99E-04	2.80E-04	2.13E-04	2.86E-04	9E-01	6.0E-04	6.6E-04	4.4E-04	3.1E-04	2.4E-04	3.2E-04
1,1,2-Trichloroethane	5.50E-04	2.98E-05	3.25E-05	2.20E-05	1.54E-05	1.17E-05	1.57E-05	4E-02	7.5E-04	8.1E-04	5.5E-04	3.9E-04	2.9E-04	3.9E-04
Xylene	1.26E-03	6.84E-05	7.46E-05	5.03E-05	3.52E-05	2.68E-05	3.60E-05	4E+00	1.7E-05	1.9E-05	1.3E-05	9.0E-05	6.5E-05	9.0E-05
Tetrachloroethene	1.30E-04	7.05E-06	7.69E-06	5.19E-06	3.64E-06	2.77E-06	3.71E-06	1E-01	7.1E-05	7.7E-05	5.2E-05	3.6E-05	2.8E-05	3.7E-05
								Hazard Index	1.9E-02	2.1E-02	1.4E-02	9.9E-03	7.6E-03	1.0E-02
						AREA Z								
Chromium	2.80E-02	1.52E-03	1.66E-03	1.12E-03	7.83E-04	5.96E-04	8.00E-04	1E+01	1.5E-04	1.7E-04	1.1E-04	7.8E-05	6.0E-05	8.0E-05
Copper	2.10E-02	1.14E-03	1.24E-03	8.38E-04	5.87E-04	4.47E-04	6.00E-04	4E-02	2.9E-02	3.1E-02	2.1E-02	1.5E-02	1.1E-02	1.5E-02
Nickel	2.70E-02	1.46E-03	1.60E-03	1.08E-03	7.55E-04	5.75E-04	7.71E-04	2E-02	7.3E-02	8.0E-02	5.4E-02	3.8E-02	2.9E-02	3.9E-02
Zinc	2.82E+00	1.53E-01	1.67E-01	1.13E-01	7.89E-02	6.01E-02	8.06E-02	2E-01	7.7E-01	8.4E-01	5.6E-01	3.9E-01	3.0E-01	4.0E-01
Toluene	6.87E-02	3.73E-03	4.07E-03	2.74E-03	1.92E-03	1.46E-03	1.96E-03	4E-01	9.0E-03	1.1E-02	6.8E-03	4.8E-03	3.7E-03	4.9E-03
1,1-Dichloroethane	5.29E-02	2.87E-03	3.13E-03	2.11E-03	1.48E-03	1.13E-03	1.51E-03	1E+00	2.9E-03	3.1E-03	2.1E-03	1.5E-03	1.1E-03	1.5E-03
1,1-Dichloroethene	5.32E-02	2.89E-03	3.15E-03	2.12E-03	1.49E-03	1.13E-03	1.52E-03	9E-03	3.2E-01	3.5E-01	2.4E-01	1.7E-01	1.3E-01	1.7E-01
1,1,1-Trichloroethane	2.20E-01	1.19E-02	1.30E-02	8.78E-03	6.15E-03	4.69E-03	6.29E-03	9E-01	1.3E-02	1.4E-02	9.8E-03	6.8E-03	5.2E-03	7.0E-03
1,1,2-Trichloroethane	5.93E-03	3.22E-04	3.51E-04	2.37E-04	1.66E-04	1.26E-04	1.69E-04	4E-02	8.1E-03	8.8E-03	5.9E-03	4.2E-03	3.2E-03	4.2E-03
1,2-Dichloroethene	6.41E-02	3.48E-03	3.79E-03	2.56E-03	1.79E-03	1.37E-03	1.83E-03	2E-01	1.7E-02	1.9E-02	1.3E-02	9.0E-03	6.9E-03	9.2E-03
Tetrachloroethene	2.79E-02	1.51E-04	1.65E-03	1.11E-03	7.8E-04	5.94E-04	7.97E-04	1E-01	1.5E-02	1.7E-02	1.1E-02	7.8E-03	5.9E-03	8.0E-04
Benzoic Acid	1.70E-01	9.22E-03	1.01E-02	6.78E-03	4.75E-03	3.62E-03	4.86E-03	4E+00	2.3E-03	2.5E-03	1.7E-03	1.2E-03	9.1E-04	1.2E-03
								Hazard Index	1.3E+00[b]	1.4E+00[b]	9.3E-01	6.5E-01	5.0E-01	6.5E-01

TABLE 4-25

ACUTE EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA W					
Chromium	1.12E-02	1.43E-06	1.07E-06	8.85E-05	7.35E-07	1E-01	1.4E-05	1.1E-05	8.9E-06	7.4E-06
Copper	1.18E-02	1.08E-06	8.06E-07	6.66E-07	5.53E-07	2E-02	5.4E-05	4.1E-05	3.4E-05	2.8E-05
Nickel	1.34E-02	1.22E-06	9.15E-07	7.56E-07	6.26E-07	6E-04	2.0E-03	1.5E-03	1.3E-03	1.0E-03
Zinc	2.67E+00	2.44E-04	1.82E-04	1.51E-04	1.25E-04	1E-01	2.4E-03	1.8E-03	1.5E-03	1.3E-03
Carbon Tetrachloride	1.03E-04	6.44E-06	4.73E-06	3.91E-06	3.24E-06	6E-03	1.1E-03	8.1E-04	6.7E-04	5.5E-04
Chloroform	2.73E-05	1.68E-06	1.25E-06	1.04E-06	8.59E-07	1E-02	1.7E-04	1.3E-04	1.0E-04	8.6E-05
Methylene Chloride	4.15E-04	2.55E-05	1.91E-05	1.58E-05	1.31E-05	6E-02	4.3E-04	3.2E-04	2.6E-04	2.2E-04
1,1-Dichloroethane	2.47E-03	1.52E-04	1.13E-04	9.38E-05	7.79E-05	7E-01	2.2E-04	1.6E-04	1.4E-04	1.1E-04
1,1-Dichloroethene	1.19E-03	7.31E-05	5.47E-05	4.52E-05	3.75E-05	8E-03	9.1E-03	6.9E-03	5.7E-03	4.7E-03
1,1,1-Trichloroethane	2.46E-03	1.52E-04	1.13E-04	9.34E-05	7.75E-05	8E-01	1.9E-04	1.4E-04	1.2E-04	9.7E-05
1,1,2-Trichloroethane	4.18E-05	2.56E-06	1.92E-06	1.59E-06	1.31E-06	4E-02	6.4E-05	4.8E-05	4.0E-05	3.3E-05
Tetrachloroethene	5.68E-05	3.48E-06	2.61E-06	2.16E-06	1.79E-06	9E-02	3.9E-05	2.9E-05	2.4E-05	2.0E-05
Bis(2-ethylhexyl)phthalate	3.00E-03	9.13E-07	6.81E-07	5.64E-07	4.68E-07	3E-03	3.0E-04	2.3E-04	1.9E-04	1.6E-04
Benzoic Acid	9.00E-03	2.74E-06	2.05E-06	1.69E-06	1.41E-06	2+00	1.4E-06	1.0E-06	8.4E-07	6.9E-07
						Hazard Index	1.6E-02	1.2E-02	1.0E-02	8.3E-03
					AREA X					
Barium	1.13E-02	1.03E-06	7.72E-07	6.36E-07	5.29E-07	5E-03	2.1E-04	1.5E-04	1.3E-04	1.1E-04
Antimony	3.73E-02	3.41E-06	2.55E-06	2.10E-06	1.75E-07	2E-05	1.7E-01	1.3E-01	1.1E-01	8.7E-02
Vanadium	6.10E-03	5.57E-07	4.16E-07	3.43E-07	2.85E-07	5E-04	1.1E-03	8.4E-04	6.9E-04	5.7E-04
Chromium	1.13E-01	1.44E-05	1.08E-05	9.11E-06	7.40E-06	1E-01	1.4E-04	1.1E-04	9.1E-05	7.4E-05
Copper	3.84E-02	3.51E-06	2.63E-06	2.18E-06	1.80E-06	2E-02	1.8E-04	1.3E-04	1.1E-04	9.0E-05
Nickel	9.27E-02	7.78E-06	6.32E-06	5.23E-06	4.33E-06	6E-04	1.3E-02	9.7E-03	8.1E-03	6.6E-03
Zinc	1.83E-01	1.67E-05	1.25E-05	1.03E-05	8.56E-06	1E-01	1.7E-04	1.3E-04	1.0E-04	8.6E-05
Chloroform	3.56E-05	2.18E-06	1.64E-06	1.35E-06	1.12E-06	1E-02	2.2E-04	1.6E-04	1.4E-04	1.1E-04
Toluene	1.72E-02	1.19E-03	8.89E-04	7.34E-04	6.09E-04	4E-01	3.0E-03	2.2E-03	1.9E-03	1.5E-03
1,1-Dichloroethane	2.88E-04	1.77E-05	1.33E-05	1.09E-05	9.08E-06	7E-01	2.5E-05	1.9E-05	1.6E-05	1.3E-05
1,1-Dichloroethene	1.71E-04	1.05E-05	7.85E-06	6.49E-06	5.39E-06	8E-05	1.3E-03	9.8E-04	8.1E-04	6.7E-04
1,1,1-Trichloroethane	7.54E-04	4.63E-05	3.46E-05	2.87E-05	2.37E-05	8.1E-01	5.7E-05	4.3E-05	3.6E-05	2.9E-05
1,1,2-Trichloroethane	3.60E-05	2.21E-06	1.65E-06	1.36E-06	1.13E-16	4E-02	5.5E-05	4.1E-05	3.4E-05	2.8E-05
Tetrachloroethene	1.79E-04	1.10E-05	8.23E-06	6.79E-06	5.64E-06	9E-02	1.2E-04	9.2E-05	7.6E-05	6.2E-05
Bis(2-ethylhexyl)phthalate	6.80E-02	2.07E-05	1.55E-05	1.28E-05	1.06E-05	3E-03	6.9E-03	5.2E-03	4.2E-03	3.5E-03
Di-n-butylphthalate	7.00E-03	2.13E-06	1.59E-06	1.32E-06	1.09E-06	2E-01	1.1E-05	8.0E-06	6.6E-06	5.4E-06
Benzoic Acid	4.00E-03	1.22E-06	9.13E-07	7.50E-07	6.24E-07	2E+00	6.1E-07	4.6E-07	3.8E-07	3.1E-07
Di-n-octylphthalate	9.50E-02	2.89E-05	2.17E-05	1.78E-05	1.48E-05	2E-02	1.4E-03	1.1E-03	8.9E-04	7.4E-04
N-Butylbenzylphthalate	2.00E-03	6.10E-07	4.57E-07	3.75E-07	3.12E-07	2E-01	3.1E-06	2.3E-06	1.9E-06	1.6E-06
						Hazard Index	2.0E-01	1.5E-01	1.2E-01	1.0E-01

TABLE 4-25 (continued)

ACUTE EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA Y					
Bromodichloromethane	4.04E-04	2.49E-05	1.86E-05	1.54E-05	1.28E-05	2E-02	1.2E-03	9.3E-04	7.8E-04	6.4E-04
Chloroform	4.09E-04	2.51E-05	1.88E-05	1.55E-05	1.29E-05	1E-02	2.5E-03	1.9E-03	1.6E-03	1.3E-03
Toluene	6.44E-03	4.46E-04	3.33E-04	2.75E-04	2.29E-04	4E-01	1.1E-03	8.4E-04	6.9E-04	5.7E-04
Methylene Chloride	6.41E-04	3.94E-05	2.94E-05	2.44E-05	2.02E-05	6E-02	6.6E-04	4.9E-04	4.1E-04	3.4E-04
1,1-Dichloroethane	1.80E-03	1.11E-04	8.27E-05	6.83E-05	5.67E-05	7E-01	1.2E-04	1.2E-04	9.9E-05	8.2E-05
1,1-Dichloroethene	1.42E-03	8.72E-05	6.53E-05	5.39E-05	4.42E-05	8E-03	1.1E-02	8.2E-03	6.8E-03	5.6E-03
1,1,1-Trichloroethane	6.21E-03	3.81E-04	2.85E-04	2.36E-04	1.96E-04	8E-01	4.8E-04	3.6E-04	3.0E-04	2.4E-04
1,1,2-Trichloroethane	4.18E-04	2.56E-05	1.92E-05	1.59E-05	1.31E-05	4E-02	6.4E-04	4.8E-04	4.0E-04	3.3E-04
Xylene	8.43E-04	5.18E-05	3.87E-05	3.21E-05	2.65E-05	4E+00	1.3E-05	9.7E-06	8.1E-06	6.6E-06
Tetrachloroethene	4.03E-04	2.47E-05	1.86E-05	1.53E-05	1.28E-05	9E-02	2.7E-04	2.1E-04	1.7E-04	1.4E-04
						Hazard Index	1.8E-02	1.3E-02	1.1E-02	9.2E-03
					AREA Z					
Barium	1.66E-02	1.52E-06	1.14E-06	9.34E-07	7.78E-07	5E-03	3.0E-04	2.3E-04	1.9E-04	1.6E-04
Chromium	2.82E-02	3.60E-06	2.70E-06	2.23E-06	1.85E-06	1E-01	3.6E-05	2.7E-05	2.2E-05	1.9E-05
Copper	2.14E-02	1.95E-06	1.46E-06	1.21E-06	1.00E-06	2E-02	9.8E-05	7.3E-05	6.1E-05	5.0E-05
Nickel	2.69E-02	2.46E-06	1.84E-06	1.52E-06	1.26E-06	6E-04	4.1E-03	3.1E-03	2.6E-03	2.1E-03
Zinc	2.82E+00	2.57E-04	1.93E-04	1.59E-04	1.32E-04	1E-01	2.6E-03	1.9E-03	1.6E-03	1.3E-03
Toluene	2.33E-02	1.62E-03	1.20E-03	9.96E-04	8.26E-04	4E-01	4.1E-03	3.0E-03	2.5E-03	2.1E-03
1,1-Dichloroethane	2.57E-02	1.59E-03	1.18E-03	9.76E-04	8.09E-04	7E-01	2.3E-03	1.7E-03	1.4E-03	1.2E-03
1,1-Dichloroethene	2.64E-02	1.63E-03	1.21E-03	1.00E-03	8.32E-03	8E-03	2.0E-01	1.5E-01	1.3E-01	1.1E-01
1,1,1-Trichloroethane	1.06E-01	6.51E-03	4.88E-03	4.03E-03	3.35E-03	8E-01	8.1E-03	6.1E-03	5.1E-03	4.2E-03
1,1,2-Trichloroethane	2.79E-03	1.72E-04	1.29E-04	1.06E-04	8.79E-05	4E-02	4.3E-03	3.2E-03	2.7E-03	2.2E-03
1,2 Dichloroethene	2.63E-02	1.62E-03	1.21E-03	9.99E-04	8.28E-04	2E-01	8.1E-03	6.1E-03	5.0E-03	4.1E-03
Tetrachloroethene	9.73E-03	5.98E-04	4.47E-04	3.70E-04	3.07E-04	9E-02	6.6E-03	5.0E-03	4.1E-03	3.4E-03
Benzoic Acid	1.70E-01	5.17E-05	3.87E-05	3.19E-05	2.65E-05	2E+00	2.6E-05	1.9E-05	1.6E-05	1.3E-05
						Hazard Index	2.4E-01	1.8E-01	1.5E-01	1.2E-01

TABLE 4-26

ACUTE EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA W					
Barium	3.70E-02	5.63E-06	4.22E-06	3.47E-06	2.89E-06	5E-03	1.1E-03	8.6E-04	6.9E-04	5.8E-04
Chromium	1.10E-02	2.36E-06	1.75E-06	1.45E-06	1.20E-06	1E-01	2.4E-05	1.8E-05	1.5E-05	1.2E-05
Copper	1.20E-02	1.84E-06	1.37E-06	1.13E-06	9.36E-07	2E-02	9.2E-05	7.2E-05	5.8E-05	4.8E-05
Nickel	1.30E-02	1.99E-06	1.48E-06	1.22E-06	1.01E-06	6E-04	3.3E-03	2.6E-03	2.1E-03	1.7E-03
Zinc	2.67E+00	4.09E-04	3.04E-04	2.51E-04	2.08E-04	1E-01	4.1E-03	3.0E-03	2.5E-03	2.1E-03
Carbon Tetrachloride	1.98E-04	2.12E-05	1.52E-05	1.25E-05	1.04E-05	6E-03	3.5E-03	2.8E-03	2.2E-03	1.9E-03
Chloroform	3.23E-05	3.33E-06	2.47E-06	2.05E-06	1.69E-06	1E-02	3.3E-04	2.5E-04	2.1E-04	1.7E-04
Methylene Chloride	6.82E-04	7.04E-05	5.23E-05	4.32E-05	3.59E-05	6E-02	1.2E-03	9.2E-04	7.3E-04	6.2E-04
1,1-Dichloroethane	7.30E-03	7.54E-04	5.59E-04	4.62E-04	3.84E-04	7E-01	1.1E-03	8.4E-04	6.7E-04	5.6E-04
1,1-Dichloroethene	3.21E-03	3.32E-04	2.46E-04	2.03E-04	1.69E-04	8E-03	4.2E-02	3.2E-02	2.6E-02	2.2E-02
1,1,1-Trichloroethane	7.50E-03	7.75E-04	5.74E-04	4.75E-04	3.94E-04	8E-01	9.7E-04	7.6E-04	6.0E-04	5.1E-04
1,1,2-Trichloroethane	9.89E-05	1.02E-05	7.58E-06	6.26E-06	5.19E-06	4E-02	2.6E-04	2.0E-04	1.6E-04	1.3E-04
Tetrachloroethene	1.20E-04	1.24E-05	9.19E-06	7.60E-06	6.30E-06	9E-02	1.4E-04	1.1E-04	8.6E-05	7.2E-05
Bis(2-ethylhexyl)phthalate	3.00E-03	1.53E-06	1.14E-06	9.38E-07	7.75E-07	3E-03	5.1E-03	4.0E-03	3.2E-03	2.7E-03
Benzoic Acid	9.00E-03	4.60E-06	3.41E-06	2.82E-06	2.34E-06	2E+00	2.3E-06	1.8E-06	1.4E-06	1.2E-06
						Hazard Index	6.1E-02	4.8E-02	3.8E-02	3.2E-02
					AREA X					
Barium	1.13E-02	1.72E-06	1.29E-06	1.06E-06	8.81E-07	5E-03	3.4E-04	2.7E-04	2.1E-04	1.8E-04
Antimony	3.70E-02	5.68E-06	4.20E-06	3.49E-06	2.89E-06	2E-05	2.8E-01	2.2E-01	1.8E-01	1.5E-01
Vanadium	6.10E-03	9.36E-07	6.94E-07	5.74E-07	4.76E-07	5E-04	1.9E-03	1.5E-03	1.2E-03	9.8E-04
Chromium	1.13E-02	1.13E-05	1.80E-05	1.49E-05	1.23E-05	1E-01	1.1E-04	1.8E-04	1.5E-04	1.2E-04
Copper	3.80E-02	5.83E-06	4.33E-06	3.58E-06	2.96E-06	2E-02	2.9E-04	2.2E-04	1.8E-04	1.5E-04
Nickel	9.30E-02	1.43E-05	1.06E-05	8.74E-06	7.26E-06	6E-04	2.4E-02	1.9E-02	1.5E-02	1.2E-02
Chloroform	5.18E-05	5.35E-06	3.96E-06	3.28E-06	2.71E-06	1E-02	5.4E-04	4.0E-04	3.3E-04	2.7E-04
Toluene	5.70E-02	5.89E-03	4.36E-03	3.60E-06	2.99E-03	4E-01	1.5E-02	1.1E-02	9.2E-03	7.7E-03
1,1-Dichloroethane	5.22E-04	5.39E-05	4.00E-05	3.31E-05	2.74E-05	7E-01	7.7E-05	6.0E-05	4.8E-05	4.0E-05
1,1-Dichloroethene	2.97E-04	3.07E-05	2.27E-05	1.88E-05	1.57E-05	8E-03	3.8E-03	3.0E-03	2.4E-03	2.0E-03
1,1,1-Trichloroethane	1.93E-04	1.99E-04	1.48E-04	1.22E-04	1.01E-04	8E-01	2.5E-04	1.9E-04	1.6E-04	1.3E-04
1,1,2-Trichloroethane	6.71E-05	6.93E-06	5.14E-06	4.24E-06	3.52E-06	4E-02	1.7E-04	1.4E-04	1.1E-04	9.1E-05
Tetrachloroethene	5.36E-04	5.53E-05	4.10E-05	3.40E-05	2.82E-05	9E-02	6.1E-04	4.8E-04	3.8E-04	3.2E-04
Bis(2-ethylhexyl)phthalate	6.80E-02	3.48E-05	2.58E-05	2.13E-05	1.77E-05	3E-03	1.2E-02	9.0E-03	7.2E-03	6.1E-03
Di-n-Butylphthalate	7.00E-03	3.58E-06	2.65E-06	2.19E-06	1.82E-06	2E-01	1.8E-05	1.4E-05	1.1E-05	9.1E-06
Benzoic Acid	4.00E-03	2.04E-06	1.51E-06	1.26E-06	1.04E-06	2E+00	1.0E-06	8.0E-07	6.4E-07	5.3E-07
N-Butylbenzylphthalate	2.00E-03	1.02E-06	7.55E-07	6.30E-07	5.20E-07	3E-01	3.4E-06	2.5E-06	2.1E-06	1.7E-06
Di-n-octylphthalate	9.50E-02	4.85E-05	3.59E-05	2.99E-05	2.47E-05	3E-03	1.6E-02	1.2E-02	1.0E-02	8.2E-03
						Hazard Index	3.4E-01	2.6E-01	2.1E-01	1.8E-01

TABLE 4-26 (continued)

ACUTE EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA Y					
Bromodichloromethane	1.10E-04	1.14E-05	8.42E-06	6.96E-06	5.78E-06	2E-02	5.7E-04	4.2E-04	3.5E-04	2.9E-04
Chloroform	3.00E-04	3.09E-05	2.30E-05	1.89E-05	1.58E-05	1E-02	3.1E-03	2.3E-03	1.9E-03	1.6E-03
Toluene	1.93E-02	2.00E-03	1.48E-03	1.22E-03	1.01E-06	4E-01	5.0E-03	3.7E-03	3.1E-03	2.5E-03
Methylene Chloride	7.30E-04	7.54E-05	5.59E-05	4.62E-05	3.84E-05	6E-02	1.3E-03	9.3E-04	7.7E-04	6.4E-04
1,1-Dichloroethane	2.73E-03	2.82E-04	2.10E-04	1.73E-04	1.44E-04	7E-01	4.0E-04	3.0E-04	2.5E-04	2.1E-04
1,1-Dichloroethene	2.04E-03	2.11E-04	1.57E-04	1.29E-04	1.07E-04	8E-03	2.6E-02	2.0E-02	1.6E-02	1.3E-02
1,1,1-Trichloroethane	1.00E-02	1.03E-03	7.66E-04	6.33E-04	5.25E-04	8E-01	1.3E-03	9.5E-04	7.9E-04	6.6E-04
1,1,2-Trichloroethane	5.50E-04	5.68E-05	4.22E-05	3.48E-05	2.89E-05	4E-02	1.4E-03	1.1E-03	8.7E-04	7.2E-04
Xylene	1.26E-03	1.30E-04	9.65E-05	7.98E-05	6.62E-05	4E+00	3.3E-05	2.4E-05	2.0E-05	1.7E-05
Tetrachloroethene	1.30E-04	1.34E-05	9.96E-06	8.23E-06	6.83E-06	9E-02	1.5E-04	1.1E-04	9.1E-05	7.6E-05
						Hazard Index	3.8E-02	2.8E-02	2.3E-02	1.9E-02
					AREA Z					
Barium	1.66E-02	2.53E-06	1.89E-06	1.57E-06	1.30E-06	5E-03	5.1E-04	3.8E-04	3.1E-04	2.6E-04
Chromium	2.80E-02	6.01E-06	4.46E-06	3.68E-06	3.05E-06	1E-01	6.0E-05	4.5E-05	3.7E-05	3.1E-05
Copper	2.10E-02	3.23E-06	2.38E-06	1.97E-06	1.64E-06	2E-02	1.6E-04	1.2E-04	1.0E-04	8.3E-05
Nickel	2.70E-02	4.14E-06	3.08E-06	2.53E-06	2.10E-06	6E-04	6.9E-03	5.2E-03	4.3E-03	3.5E-03
Zinc	2.82E+00	4.33E-04	3.21E-04	2.64E-04	2.19E-04	1E-01	4.3E-03	3.2E-03	2.6E-03	2.2E-03
Toluene	6.87E-02	7.10E-03	5.26E-03	4.34E-03	3.69E-03	4E-01	1.8E-02	1.3E-03	1.1E-03	9.1E-03
1,1-Dichloroethane	5.29E-02	5.47E-03	4.05E-03	3.35E-03	2.78E-03	7E-01	7.8E-03	5.8E-03	4.9E-03	4.0E-03
1,1-Dichloroethene	5.32E-02	5.49E-03	4.08E-03	3.37E-03	2.79E-03	8E-03	6.9E-01	5.1E-01	4.2E-01	3.5E-01
1,1,1-Trichloroethane	2.20E-01	2.27E-02	1.68E-02	1.39E-02	1.16E-02	8E-01	2.8E-02	2.1E-02	1.8E-02	1.5E-02
1,1,2-Trichloroethane	5.93E-03	6.12E-04	4.55E-04	3.75E-04	3.12E-04	4E-02	1.5E-02	1.1E-02	9.5E-03	7.9E-03
1,2 Dichloroethane	6.41E-02	6.62E-03	4.91E-03	4.05E-03	3.37E-03	2E-01	3.3E-02	2.5E-02	2.1E-02	1.7E-02
Tetrachloroethene	2.79E-02	2.88E-03	2.13E-03	1.77E-03	1.46E-03	9E-02	3.2E-02	2.4E-02	2.0E-02	1.6E-02
Benzoic Acid	1.72E-01	8.69E-05	6.44E-05	5.33E-05	4.42E-05	2E+00	4.3E-05	3.2E-05	2.7E-05	2.2E-05
						Hazard Index	8.4E-01	6.2E-01	5.2E-01	4.3E-01

TABLE 4-27

CHRONIC EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA W														
Chromium	1.12E-02	4.71E-04	6.26E-04	4.29E-04	3.03E-04	2.31E-04	2.24E-04	1E+00	4.7E-04	6.3E-04	4.3E-04	3.0E-04	2.3E-04	2.2E-04
Copper	1.18E-02	4.96E-04	6.59E-04	4.52E-04	3.19E-04	2.44E-04	2.36E-04	4E-02	1.2E-02	1.6E-02	1.1E-02	8.0E-03	6.1E-03	5.9E-03
Nickel	1.34E-02	5.64E-04	7.49E-04	5.13E-04	3.62E-04	2.77E-04	2.68E-04	2E-02	2.8E-02	3.7E-02	2.6E-02	1.8E-02	1.4E-03	1.3E-02
Zinc	2.67E+00	1.12E-01	1.49E-01	1.02E-01	7.22E-02	5.51E-02	5.34E-02	2E-01	5.6E-01	7.5E-01	5.1E-01	3.6E-01	2.8E-01	2.7E-01
Carbon Tetrachloride	1.03E-04	4.33E-06	5.75E-06	3.94E-06	2.79E-06	2.13E-06	2.06E-06	7E-04	6.2E-03	8.2E-03	5.6E-03	4.0E-03	3.0E-03	2.9E-03
Chloroform	2.73E-05	1.15E-06	1.53E-06	1.04E-06	7.38E-07	5.64E-07	5.46E-07	1E-02	1.2E-04	1.5E-04	1.0E-04	7.4E-05	5.6E-05	5.5E-05
Methylene Chloride	4.15E-04	1.75E-05	2.32E-05	1.59E-05	1.12E-05	8.57E-06	8.30E-06	6E-02	2.9E-04	3.9E-04	2.6E-04	1.9E-04	1.4E-04	1.4E-04
1,1-Dichloroethane	2.47E-03	1.04E-04	1.38E-04	9.45E-05	6.68E-05	5.10E-05	4.94E-05	1E-01	1.0E-03	1.4E-03	9.5E-04	6.7E-04	5.1E-04	4.9E-04
1,1-Dichloroethene	1.19E-03	5.00E-05	6.65E-05	4.55E-05	3.22E-05	2.46E-05	2.38E-05	9E-03	5.6E-03	7.4E-03	5.1E-03	3.8E-03	2.7E-03	2.6E-03
1,1,1-Trichloroethane	2.46E-03	1.03E-04	1.37E-04	9.41E-05	6.65E-05	5.08E-05	4.92E-05	9E-02	1.1E-03	1.5E-03	1.0E-03	7.4E-04	5.6E-04	5.5E-04
1,1,2-Trichloroethane	4.18E-05	1.76E-06	2.34E-06	1.60E-06	1.13E-06	8.63E-07	8.36E-07	4E-03	4.4E-04	5.9E-04	4.0E-04	2.8E-04	2.2E-04	2.1E-04
Tetrachloroethene	5.68E-05	2.39E-06	3.17E-06	2.17E-06	1.54E-06	1.17E-06	1.14E-06	1E-02	2.4E-04	3.2E-04	2.2E-04	1.5E-04	1.2E-04	1.1E-04
Bis(2-ethylhexyl)phthalate	3.00E-03	1.26E-04	1.68E-04	1.15E-04	8.11E-05	6.19E-05	6.00E-05	2E-02	6.3E-03	8.4E-03	5.8E-03	4.1E-03	3.1E-03	3.0E-03
Benzoic Acid	9.00E-03	3.78E-04	5.03E-04	3.44E-04	2.43E-04	1.86E-04	1.80E-04	4E+00	9.5E-05	1.3E-04	8.6E-05	6.1E-05	4.6E-05	4.5E-05
								Hazard Index	6.2E-01	8.3E-01	5.7E-01	4.0E-01	3.0E-01	3.0E-01
AREA X														
Antimony	3.73E-02	1.57E-03	2.08E-03	1.43E-03	1.01E-03	7.70E-04	7.46E-04	4E-04	3.9E+00	5.2E+00	3.6E+00	2.5E+00	1.9E+00	1.9E+00
Vanadium	6.10E-03	2.57E-04	3.41E-04	2.33E-04	1.65E-04	1.26E-04	1.22E-04	9E-03	2.9E-02	3.8E-02	2.6E-02	1.8E-02	1.4E-02	1.4E-02
Cadmium	8.20E-03	3.45E-04	4.58E-04	3.14E-04	2.22E-04	1.69E-04	1.64E-04	5E-04	6.9E-01	9.2E-01	6.3E-01	4.4E-01	3.4E-01	3.3E-01
Chromium	1.13E-02	4.75E-03	6.31E-03	4.32E-03	3.06E-03	2.33E-03	2.26E-03	1E+00	4.8E-03	6.3E-03	4.3E-03	3.1E-03	2.3E-03	2.3E-03
Copper	3.84E-02	1.61E-03	2.15E-03	1.47E-03	1.04E-03	7.93E-04	7.68E-04	4E-02	4.0E-02	5.4E-02	3.7E-02	2.6E-02	2.0E-02	1.9E-02
Nickel	9.27E-02	3.90E-03	5.18E-03	3.55E-03	2.15E-03	1.91E-03	1.85E-03	2E-02	2.0E-01	2.6E-01	1.8E-01	1.3E-01	9.6E-02	9.3E-02
n-ButylBenzylPhthalate	2.00E-03	8.40E-05	1.12E-05	7.65E-05	5.40E-05	4.13E-05	4.00E-05	2E-01	4.2E-04	5.6E-04	3.8E-04	2.7E-04	2.1E-04	2.0E-04
Chloroform	3.56E-05	1.50E-06	1.99E-06	1.36E-06	9.63E-07	7.35E-07	7.12E-07	1E-02	1.5E-04	2.0E-04	1.4E-04	9.6E-05	7.4E-05	7.1E-05
Di-n-octyl phthalate	9.50E-02	3.99E-03	5.30E-03	3.63E-03	2.57E-03	1.96E-03	1.90E-03	2E-02	2.0E-01	2.7E-01	1.8E-01	1.3E-01	9.8E-02	9.5E-02
Toluene	1.72E-02	7.23E-04	9.61E-04	6.58E-04	4.65E-04	3.55E-04	3.44E-04	3E-01	2.4E-03	3.2E-03	2.2E-03	1.6E-03	1.2E-03	1.1E-03
1,1-Dichloroethane	2.88E-04	1.21E-05	1.61E-05	1.10E-05	7.79E-06	5.95E-06	5.76E-06	1E-01	1.2E-04	1.6E-04	1.1E-04	7.8E-05	6.0E-05	5.8E-05
1,1-Dichloroethene	1.71E-04	7.19E-06	9.55E-06	6.54E-06	4.62E-06	3.53E-06	3.42E-06	9E-03	8.0E-04	1.1E-03	7.3E-04	5.1E-04	3.9E-04	3.8E-04
1,1,1-Trichloroethane	7.54E-04	3.17E-05	4.21E-05	2.89E-05	2.04E-05	1.56E-05	1.51E-05	9E-02	3.5E-04	4.7E-04	3.2E-04	2.3E-04	1.7E-04	1.7E-04
1,1,2-Trichloroethane	3.60E-05	1.51E-06	2.01E-06	1.38E-06	9.74E-07	7.43E-07	7.20E-07	4E-03	3.8E-04	5.0E-04	3.5E-04	2.4E-04	1.9E-04	1.8E-04
Tetrachloroethene	1.79E-04	7.5E-06	1.00E-05	6.85E-06	4.84E-06	3.70E-06	3.58E-06	1E-02	7.5E-04	1.0E-03	6.9E-04	4.8E-04	3.7E-04	3.6E-04
Bis(2-ethylhexyl)phthalate	6.80E-02	2.86E-03	3.80E-03	2.60E-03	1.84E-03	1.40E-03	1.36E-03	2E-02	1.4E-01	1.9E-01	1.3E-01	9.2E-02	7.0E-02	6.8E-02
Di-n-Butylphthalate	7.00E-03	2.94E-04	3.91E-04	2.68E-04	1.89E-04	1.45E-04	1.40E-04	1E-01	2.9E-03	3.9E-03	2.7E-03	1.9E-03	1.5E-03	1.4E-03
Benzoic Acid	4.00E-03	1.68E-04	2.23E-04	1.53E-04	1.08E-04	8.26E-05	8.00E-05	4E+00	4.2E-05	5.6E-05	3.8E-05	2.7E-05	2.1E-05	2.0E-05
								Hazard Index	5.0E+00a	6.7E+00[a]	4.6E+00a	3.2E+00[a]	2.4E+00[a]	2.4E+00[a]

TABLE 4-27 (continued)

CHRONIC EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
						AREA Y								
Bromodichloroethane	1.10E-04	5.97E-06	6.51E-06	4.39E-06	3.08E-06	2.34E-06	3.14E-06	2E-02	3.0E-04	3.3E-04	2.2E-04	1.5E-04	1.2E-04	1.6E-04
Chloroform	3.00E-04	1.63E-05	1.78E-05	1.20E-05	8.39E-06	6.39E-06	8.57E-06	1E-02	1.6E-03	1.8E-03	1.2E-03	8.4E-04	6.4E-04	8.6E-04
Toluene	6.44E-03	2.71E-04	3.60E-04	2.46E-04	1.74E-04	1.33E-04	1.29E-04	3E-01	9.0E-04	1.2E-03	8.2E-04	5.8E-04	4.4E-04	4.3E-04
Methylene Chloride	6.41E-04	2.70E-05	3.58E-05	2.45E-05	1.73E-05	1.32E-05	1.28E-05	6E-02	4.5E-04	6.0E-04	4.1E-04	2.9E-04	2.2E-04	2.1E-04
1,1-Dichloroethane	1.80E-03	7.57E-05	1.01E-04	6.89E-05	4.87E-05	3.72E-05	3.60E-05	1E-01	7.6E-04	1.0E-03	6.9E-04	4.9E-04	3.7E-04	3.6E-04
1,1-Dichloroethene	1.42E-03	5.97E-05	7.93E-05	5.43E-05	3.84E-05	2.93E-05	2.84E-05	9E-03	6.6E-03	8.8E-03	6.0E-03	4.3E-03	3.3E-03	3.2E-03
1,1,1-Trichloroethane	6.21E-03	2.61E-04	3.47E-04	2.38E-04	1.68E-04	1.28E-04	1.24E-04	9E-02	2.9E-03	3.9E-03	2.6E-03	1.9E-03	1.4E-03	1.4E-03
1,1,2-Trichloroethane	4.18E-04	1.76E-05	2.34E-05	1.60E-05	1.13E-05	8.63E-06	8.36E-06	4E-03	4.4E-03	5.9E-03	4.0E-03	2.8E-03	2.2E-03	2.1E-03
Xylene	8.43E-04	3.55E-05	4.71E-05	3.23E-05	2.28E-05	1.74E-05	1.69E-05	2E+00	1.8E-05	2.4E-05	1.6E-05	1.1E-05	8.7E-06	8.5E-06
Tetrachloroethene	4.03E-04	1.69E-05	2.25E-05	1.54E-05	1.09E-05	8.32E-06	8.06E-06	1E-02	1.7E-05	2.3E-03	1.5E-03	1.1E-03	8.3E-04	8.1E-04
								Hazard Index	1.8E-02	2.6E-02	1.7E-02	1.2E-02	9.5E-03	9.5E-03
						AREA Z								
Chromium	2.82E-02	1.19E-03	1.58E-03	1.08E-03	7.63E-04	5.82E-04	5.64E-04	1E+00	1.2E-03	1.6E-03	1.1E-03	7.6E-04	5.8E-04	5.6E-04
Copper	2.14E-02	9.00E-04	1.20E-03	8.19E-04	5.79E-04	4.42E-04	4.28E-04	4E-02	2.3E-02	3.0E-02	2.0E-02	1.4E-02	1.1E-02	1.1E-02
Nickel	2.69E-02	1.13E-03	1.50E-03	1.03E-03	7.28E-04	5.55E-04	5.38E-04	2E-02	5.7E-02	7.5E-02	5.2E-02	3.6E-02	2.8E-02	2.7E-02
Zinc	2.82E+00	1.19E-01	1.58E-01	1.08E-01	7.63E-02	5.82E-02	5.64E-02	2E-01	5.9E-01	7.9E-01	5.4E-01	3.8E-01	2.9E-01	2.8E-01
Acetone	7.00E-03	2.94E-04	3.91E-04	2.68E-04	1.89E-04	1.45E-04	1.40E-04	1E-01	2.9E-03	3.9E-03	2.7E-03	1.9E-03	1.5E-03	1.4E-03
Toluene	2.33E-02	9.80E-04	1.30E-03	8.92E-04	6.30E-04	4.81E-04	4.66E-04	3E-01	3.3E-03	4.3E-03	3.0E-03	2.1E-03	1.6E-03	1.6E-03
1,1-Dichloroethane	2.57E-02	1.80E-03	1.44E-03	9.83E-04	6.95E-04	5.31E-04	5.14E-04	1E-01	1.1E-02	1.4E-02	9.8E-03	7.0E-03	5.3E-03	5.1E-03
1,1-Dichloroethene	2.64E-02	1.11E-03	1.47E-03	1.01E-03	7.14E-04	5.45E-04	5.28E-04	9E-03	1.2E-01	1.6E-01	1.1E-01	7.9E-02	6.1E-02	5.9E-02
1,1,1-Trichloroethane	1.06E-01	4.46E-03	5.92E-03	4.06E-03	2.87E-03	2.19E-03	2.12E-03	9E-02	5.0E-02	6.6E-02	4.5E-02	3.2E-02	2.4E-02	2.4E-02
1,1,2-Trichloroethane	2.79E-03	1.17E-04	1.56E-04	1.07E-04	7.55E-05	5.76E-05	5.58E-05	4E-03	2.9E-02	3.9E-02	2.7E-02	1.9E-02	1.4E-02	1.4E-02
1,2-Dichloroethene	2.63E-02	1.11E-03	1.47E-03	1.01E-03	7.11E-04	5.43E-04	5.26E-04	2E-02	5.6E-02	7.4E-02	5.1E-02	3.6E-02	2.7E-02	2.6E-02
Tetrachloroethene	9.73E-03	4.09E-04	5.44E-04	3.72E-04	2.63E-04	2.01E-04	1.95E-04	1E-02	4.1E-02	5.4E-02	3.7E-02	2.6E-02	2.0E-02	2.0E-02
Benzoic Acid	1.70E-01	7.15E-03	9.50E-03	6.51E-03	4.60E-03	3.51E-03	3.40E-03	4E+00	1.8E-03	2.4E-03	1.6E-03	1.2E-03	8.8E-04	8.5E-04
								Hazard Index	9.9E-01	1.3E+00[b]	9.0E-01	6.3E-01	4.8E-01	4.7E-01

CHRONIC EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND RME FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
AREA W														
Chromium	1.10E-02	5.97E-04	6.51E-04	4.39E-04	3.08E-04	2.34E-04	3.14E-04	1E+00	6.0E-04	6.5E-04	4.4E-04	3.1E-04	2.3E-04	3.1E-04
Copper	1.20E-02	6.51E-04	7.10E-04	4.79E-04	3.36E-04	2.56E-04	3.43E-04	4E-02	1.6E-02	1.8E-02	1.2E-02	8.4E-03	6.4E-03	8.6E-03
Nickel	1.30E-02	7.05E-04	7.69E-04	5.19E-04	3.64E-04	2.77E-04	3.71E-04	2E-02	3.5E-02	3.8E-02	2.6E-02	1.8E-02	1.4E-02	1.9E-02
Zinc	2.67E+00	1.45E-01	1.58E-01	1.07E-01	7.47E-02	5.69E-02	7.63E-02	2E-01	7.3E-01	7.9E-01	5.4E-01	3.7E-01	2.8E-01	3.8E-01
Carbon Tetrachloride	1.98E-04	1.07E-05	1.17E-05	7.90E-06	5.54E-06	4.22E-06	5.66E-06	7E-04	1.5E-02	1.7E-02	1.1E-02	7.9E-03	6.0E-03	8.1E-03
Chloroform	3.23E-05	1.75E-06	1.91E-06	1.29E-06	9.03E-07	6.88E-07	9.23E-07	1E-02	1.8E-04	1.9E-04	1.3E-04	9.0E-05	6.9E-05	9.2E-05
Methylene Chloride	6.82E-04	3.70E-05	4.04E-05	2.72E-05	1.91E-05	1.45E-05	1.95E-05	6E-02	6.2E-04	6.7E-04	4.5E-04	3.2E-04	2.4E-04	3.3E-04
1,1-Dichloroethane	7.30E-03	3.96E-04	4.32E-04	2.91E-04	2.04E-04	1.55E-04	2.09E-04	1E-01	4.0E-03	4.3E-03	2.9E-03	2.0E-03	1.6E-03	2.1E-03
1,1-Dichloroethene	3.21E-03	1.74E-04	1.90E-04	1.28E-04	8.98E-05	6.84E-05	9.17E-05	9E-03	1.9E-02	2.0E-02	1.4E-02	1.0E-02	7.6E-03	1.0E-02
1,1,1-Trichloroethane	7.50E-03	4.07E-04	4.44E-04	2.99E-04	2.10E-04	1.60E-04	2.14E-04	9E-02	4.5E-03	4.9E-03	3.3E-03	2.3E-03	1.8E-03	2.4E-03
1,1,2-Trichloroethane	9.89E-05	5.36E-06	5.85E-06	3.95E-06	2.77E-06	2.11E-06	2.83E-06	4E-03	1.3E-03	1.5E-03	9.9E-04	6.9E-04	5.3E-04	7.1E-04
Tetrachloroethene	1.20E-04	6.51E-06	7.10E-06	4.79E-06	3.36E-06	2.56E-06	3.43E-06	1E-02	6.5E-04	7.1E-04	4.8E-04	3.4E-04	2.6E-04	3.4E-04
Bis(2-ethylhexyl)phthalate	3.00E-03	1.63E-04	1.78E-04	1.20E-04	8.39E-05	6.39E-05	8.57E-05	2E-02	8.2E-03	8.9E-03	6.0E-03	4.2E-03	3.2E-03	4.3E-03
Benzoic Acid	9.00E-03	4.88E-04	5.33E-04	3.59E-04	2.52E-04	1.92E-04	2.57E-04	4E+00	1.2E-04	1.3E-04	9.0E-05	3.2E-03	4.8E-05	6.4E-05
								Hazard Index	8.4E-01	9.0E-01	6.2E-01	4.3E-01	3.2E-01	4.4E-01
AREA X														
Antimony	3.70E-02	2.01E-03	2.19E-03	1.48E-03	1.03E-03	7.88E-04	1.06E-03	4E-04	5.0E+00	5.5E+00	3.7E+00	2.6E+00	2.0E+00	2.7E+00
Vanadium	6.10E-03	3.3E-04	3.61E-04	2.43E-04	1.71E-04	1.30E-04	1.74E-04	9E-03	3.7E-02	4.0E-02	2.7E-02	1.9E-02	1.4E-02	1.9E-02
Cadmium	8.20E-03	4.45E-04	4.85E-04	3.27E-04	2.29E-04	1.75E-04	2.34E-04	5E-04	8.9E-01	9.7E-01	6.5E-01	4.6E-01	3.5E-01	4.7E-01
Chromium	1.13E-01	6.13E-03	6.69E-03	4.51E-03	3.16E-03	2.41E-03	3.23E-03	1E+00	6.1E-03	6.7E-03	4.5E-03	3.2E-03	2.4E-03	3.2E-03
Copper	3.80E-02	2.06E-03	2.25E-03	1.52E-03	1.06E-03	8.09E-04	1.09E-03	4E-02	5.2E-02	5.6E-02	3.8E-02	2.7E-02	2.0E-02	2.7E-02
Nickel	9.30E-02	5.04E-03	5.51E-03	3.71E-03	2.60E-03	1.98E-03	2.66E-03	2E-02	2.5E-01	2.8E-01	1.9E-01	1.3E-01	9.9E-02	1.3E-02
Chloroform	5.18E-05	2.81E-06	3.07E-06	2.07E-06	1.45E-06	1.10E-06	1.48E-06	1E-02	2.8E-04	3.1E-04	2.1E-04	1.5E-04	1.1E-04	1.5E-04
n-Butyl benzyl phthalate	2.00E-03	1.09E-04	1.19E-04	8.00E-05	5.60E-05	4.26E-05	5.70E-05	2E-01	5.5E-04	6.0E-04	4.0E-04	2.8E-04	2.1E-04	2.9E-04
Di-n-octyl phthalate	9.50E-02	5.16E-03	5.62E-03	3.80E-03	2.64E-03	2.02E-03	2.72E-03	2E-02	2.6E-01	2.8E-01	1.9E-01	1.3E-01	1.0E-01	1.4E-01
Toluene	5.70E-02	3.09E-03	3.37E-03	2.27E-03	1.59E-03	1.21E-03	1.63E-03	3E-01	1.0E-02	1.1E-02	7.6E-03	5.3E-03	4.0E-03	5.4E-03
1,1-Dichloroethane	5.22E-04	2.83E-05	3.09E-05	2.08E-05	1.46E-05	1.11E-05	1.49E-05	1E-01	2.8E-04	3.1E-04	2.1E-04	1.5E-04	1.1E-04	1.5E-04
1,1-Dichloroethene	2.97E-04	1.61E-05	1.76E-05	1.19E-05	8.31E-06	6.33E-06	8.49E-06	9E-03	1.8E-03	2.0E-03	1.3E-03	9.2E-04	7.0E-04	9.4E-04
1,1,1-Trichloroethane	1.93E-03	1.05E-04	1.14E-04	7.70E-05	5.40E-05	4.11E-05	5.51E-05	9E-02	1.2E-03	1.3E-03	8.6E-04	6.0E-04	4.6E-04	6.1E-04
1,1,2-Trichloroethane	6.71E-05	3.64E-06	3.97E-06	2.68E-06	1.88E-06	1.43E-06	1.92E-06	4E-03	9.1E-04	9.9E-04	6.7E-04	4.7E-04	3.6E-04	4.8E-04
Tetrachloroethene	5.36E-04	2.91E-05	3.17E-05	2.14E-05	1.50E-05	1.41E-05	1.53E-05	1E-02	2.9E-03	3.2E-03	2.1E-03	1.5E-03	1.1E-03	1.5E-03
Bis(2-ethylhexyl)phthalate	6.80E-02	3.69E-03	4.02E-03	2.7E-03	1.90E-03	1.45E-03	1.94E-03	2E-02	1.8E-01	2.0E-01	1.36E-01	9.5E-02	7.2E-02	9.7E-02
Di-n-Butylphthalate	7.00E-03	3.80E-04	4.14E-04	2.79E-04	1.96E-04	1.49E-04	2.0E-04	1E-01	3.8E-03	4.1E-03	2.8E-03	2.0E-03	1.5E-03	2.0E-03
Benzoic Acid	4.00E-03	2.17E-04	2.37E-04	1.60E-04	1.12E-04	8.52E-05	1.14E-04	4E+00	5.4E-05	5.9E-05	4.0E-05	2.8E-05	2.1E-05	2.9E-05
								Hazard Index	6.8E+00[a]	7.4E+00[a]	5.0E+00[a]	3.5E+00[a]	2.7E+00[a]	3.6E+00[a]

TABLE 4-28 (continued)

CHRONIC EXPOSURE VIA INGESTION OF OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND RME FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-1	Child 2-4	Child 5-9	Child 10-14	Child 15-19	Adult
						AREA Y								
Bromodichloromethane	1.10E-04	5.97E-06	6.51E-06	4.39E-06	3.08E-06	2.34E-06	3.14E-06	2E-02	3.0E-04	3.3E-04	2.2E-04	1.5E-04	1.2E-04	1.6E-04
Chloroform	3.00E-04	1.63E-05	1.78E-05	1.20E-05	8.39E-06	6.39E-06	8.57E-06	1E-02	1.6E-03	1.8E-03	1.2E-03	8.4E-04	6.4E-04	8.6E-04
Toluene	1.93E-02	1.05E-03	1.14E-03	7.70E-04	5.40E-04	4.11E-04	5.51E-04	3E-01	3.5E-03	3.8E-03	2.6E-03	1.8E-03	1.4E-03	1.8E-03
Methylene Chloride	7.30E-04	3.96E-05	4.32E-05	2.91E-05	2.04E-05	1.55E-05	2.09E-05	6E-02	6.6E-04	7.2E-04	4.9E-04	3.4E-04	2.6E-04	3.5E-04
1,1-Dichloroethane	2.73E-03	1.48E-04	1.62E-04	1.09E-04	7.64E-05	5.81E-05	7.80E-05	1E-01	1.5E-03	1.6E-03	1.1E-03	7.6E-04	5.8E-04	7.8E-04
1,1-Dichloroethene	2.04E-03	1.11E-04	1.21E-04	8.14E-04	5.71E-05	4.34E-05	5.83E-05	9E-03	1.2E-02	1.3E-02	9.0E-03	6.3E-03	4.8E-03	6.5E-03
1,1,1-Trichloroethane	1.00E-02	5.42E-04	5.92E-04	3.99E-04	2.80E-04	2.13E-04	2.86E-04	9E-02	6.0E-03	6.6E-03	4.4E-03	3.1E-03	2.4E-03	3.2E-03
1,1,2-Trichloroethane	5.50E-04	2.98E-05	3.25E-05	2.20E-05	1.54E-05	1.17E-05	1.57E-05	4E-03	7.5E-03	8.1E-03	5.5E-03	3.9E-03	2.9E-03	3.9E-03
Xylene	1.26E-03	6.84E-05	7.46E-05	5.03E-05	3.52E-05	2.68E-05	3.60E-05	2E+02	3.4E-05	3.7E-05	2.5E-05	1.8E-05	1.3E-05	1.8E-05
Tetrachloroethene	1.30E-04	7.05E-06	7.69E-06	5.19E-06	3.64E-06	2.77E-06	3.71E-06	1E-02	7.1E-04	7.7E-04	5.2E-04	3.6E-04	2.8E-04	3.7E-04
								Hazard Index	3.4E-02	3.7E-02	2.5E-02	1.8E-02	1.3E-02	1.8E-02
						AREA Z								
Chromium	2.80E-02	1.52E-03	1.66E-03	1.12E-03	7.83E-04	5.96E-04	8.00E-04	1E+00	1.5E-03	1.7E-03	1.1E-03	7.8E-04	6.0E-04	8.0E-04
Copper	2.10E-02	1.14E-03	1.24E-03	8.38E-04	5.87E-04	4.47E-04	6.00E-04	4E-02	2.9E-02	3.1E-02	2.1E-02	1.5E-02	1.1E-02	1.5E-02
Nickel	2.70E-02	1.46E-03	1.60E-03	1.08E-03	7.55E-04	5.75E-04	7.71E-04	2E-02	7.3E-02	8.0E-02	5.4E-02	3.8E-02	2.9E-02	3.9E-02
Zinc	2.82E+00	1.53E-01	1.67E-01	1.13E-01	7.89E-02	6.01E-02	8.06E-02	2E-01	7.7E-01	8.4E-01	5.6E-01	3.9E-01	3.0E-01	4.0E-01
Acetone	7.00E-03	3.80E-04	4.16E-04	2.79E-04	1.96E-04	1.49E-04	2.00E-04	1E-01	3.8E-03	4.2E-03	2.8E-03	2.0E-03	1.5E-04	2.0E-04
Toluene	6.87E-02	3.73E-03	4.07E-03	2.74E-03	1.92E-03	1.46E-03	1.96E-03	3E-01	1.2E-02	1.4E-02	9.1E-03	6.4E-03	4.9E-03	6.5E-03
1,1-Dichloroethane	5.29E-02	2.87E-03	3.13E-03	2.11E-03	1.48E-03	1.13E-03	1.51E-03	1E-01	2.9E-02	3.1E-02	2.1E-02	1.5E-02	1.1E-02	1.5E-02
1,1-Dichloroethene	5.32E-02	2.89E-03	3.15E-03	2.12E-03	1.49E-03	1.13E-03	1.52E-03	9E-03	3.2E-01	3.5E-01	2.4E-01	1.7E-01	1.3E-01	1.7E-01
1,1,1-Trichloroethane	2.20E-01	1.19E-02	1.30E-02	8.78E-03	6.15E-03	4.69E-03	6.29E-03	9E-02	1.3E-01	1.4E-01	9.8E-02	6.8E-02	5.2E-02	7.0E-02
1,1,2-Trichloroethane	5.93E-03	3.22E-04	3.51E-04	2.37E-04	1.66E-04	1.26E-04	1.69E-04	4E-03	8.1E-02	8.8E-02	5.9E-02	4.2E-02	3.2E-02	4.2E-02
1,2 Dichloroethene	6.41E-02	3.48E-03	3.79E-03	2.56E-03	1.80E-03	1.37E-03	1.83E-03	2E-02	1.7E-01	1.9E-01	1.3E-01	9.0E-02	6.9E-02	9.2E-02
Tetrachloroethene	2.79E-02	1.51E-04	1.65E-03	1.11E-03	7.8E-04	5.94E-04	7.97E-04	1E-02	1.5E-01	1.7E-01	1.1E-01	7.8E-02	5.9E-02	8.0E-03
Benzoic Acid	1.70E-01	9.22E-03	1.01E-02	6.78E-03	4.75E-03	3.62E-03	4.86E-03	4E+00	2.3E-03	2.5E-03	1.7E-03	1.2E-03	9.1E-04	1.2E-03
								Hazard Index	1.8E+00[b]	1.9E+00[b]	1.3E+00[b]	9.2E-01	7.0E-01	8.6E-01

TABLE 4-29

CHRONIC EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA W					
Chromium	1.12E-02	1.43E-06	1.07E-06	8.85E-07	7.35E-07	1E-02	1.4E-04	1.1E-04	8.9E-05	7.4E-05
Copper	1.18E-02	1.08E-06	8.06E-07	6.66E-07	5.53E-07	2E-02	5.4E-05	4.0E-05	3.4E-05	2.8E-05
Nickel	1.34E-02	1.22E-06	9.15E-07	7.56E-07	6.26E-07	6E-04	2.0E-03	1.5E-03	1.3E-03	1.0E-03
Zinc	2.67E+00	2.44E-04	1.82E-04	1.51E-04	1.25E-04	1E-01	2.4E-03	1.8E-03	1.5E-03	1.3E-03
Carbon Tetrachloride	1.03E-04	6.44E-06	4.73E-06	3.91E-06	3.24E-06	6E-04	1.1E-02	8.0E-03	6.7E-03	5.5E-03
Chloroform	2.73E-05	1.68E-06	1.25E-06	1.04E-06	8.60E-06	1E-02	1.7E-04	1.3E-04	1.0E-04	8.6E-05
Methylene Chloride	4.15E-04	2.55E-05	1.91E-05	1.58E-05	1.31E-05	6E-02	4.3E-04	3.2E-04	2.6E-04	2.2E-04
1,1-Dichloroethane	2.47E-03	1.52E-04	1.13E-04	9.38E-05	7.79E-05	7E-02	2.2E-03	1.6E-03	1.3E-03	1.1E-03
1,1-Dichloroethene	1.19E-03	7.31E-05	5.47E-05	4.52E-05	3.75E-05	8E-03	9.1E-03	6.8E-03	5.7E-03	4.7E-03
1,1,1-Trichloroethane	2.46E-03	1.52E-04	1.13E-04	9.34E-05	7.75E-05	8E-02	1.9E-03	1.4E-03	1.2E-03	9.6E-04
1,1,2-Trichloroethane	4.18E-05	2.56E-06	1.92E-06	1.59E-06	1.31E-06	4E-03	6.4E-04	4.8E-04	4.0E-04	3.3E-04
Tetrachloroethene	5.68E-05	3.48E-06	2.61E-06	2.16E-06	1.79E-06	9E-03	3.9E-04	2.9E-04	2.4E-04	2.0E-04
Bis(2-ethylhexyl)phthalate	3.00E-03	9.13E-07	6.81E-07	5.64E-07	4.68E-07	2E-02	4.6E-05	3.4E-05	2.8E-05	2.3E-05
Benzoic Acid	9.00E-03	2.74E-06	2.05E-06	1.69E-06	1.41E-06	2E+00	1.4E-06	1.0E-06	8.5E-07	7.0E-07
						Hazard Index	3.0E-02	2.3E-02	1.9E-02	1.6E-02
					AREA X					
Antimony	3.73E-02	3.41E-06	2.55E-06	2.29E-06	1.75E-06	2E-05	1.7E-01	1.3E-01	1.1E-01	9.5E-02
Vanadium	6.10E-03	5.57E-07	4.16E-07	3.43E-07	2.85E-07	5E-04	1.1E-03	8.3E-04	6.9E-04	5.7E-04
Cadmium	8.20E-03	7.48E-07	5.61E-07	4.63E-07	3.84E-07	3E-05	2.5E-02	1.9E-02	1.5E-02	1.3E-02
Chromium	1.13E-01	1.44E-05	1.07E-05	9.11E-06	7.40E-06	1E-02	1.4E-03	1.1E-03	9.1E-04	7.4E-04
Copper	3.84E-02	3.51E-06	2.63E-06	2.18E-06	1.80E-06	2E-02	1.8E-04	1.3E-04	1.1E-04	9.0E-05
Nickel	9.27E-02	7.78E-06	6.32E-06	5.23E-06	4.33E-06	6E-04	1.3E-02	9.7E-03	8.0E-03	6.7E-03
Chloroform	3.56E-05	2.18E-06	1.64E-06	1.35E-06	1.12E-06	1E-02	2.2E-04	1.6E-04	1.4E-04	1.1E-04
Toluene	1.72E-02	1.06E-03	7.90E-04	6.53E-04	5.42E-04	3E-01	3.5E-03	2.6E-03	2.2E-03	1.8E-03
1,1-Dichloroethane	2.88E-04	1.77E-05	1.33E-05	1.09E-05	9.08E-06	7E-02	2.5E-04	1.9E-04	1.6E-04	1.3E-04
1,1-Dichloroethene	1.71E-04	1.05E-05	7.85E-06	6.49E-06	5.39E-06	8E-03	1.3E-03	9.8E-04	8.1E-04	6.7E-04
1,1,1-Trichloroethane	7.54E-04	4.63E-05	3.46E-05	2.87E-05	2.37E-05	8E-02	5.8E-04	4.3E-04	3.6E-04	3.0E-04
1,1,2-Trichloroethane	3.60E-05	2.21E-06	1.65E-06	1.36E-06	1.13E-06	4E-03	5.5E-04	4.1E-04	3.4E-04	2.8E-04
Tetrachloroethene	1.79E-04	1.10E-05	8.23E-06	6.78E-06	5.64E-06	9E-03	1.2E-03	9.1E-04	7.6E-04	6.3E-04
Bis(2-ethylhexyl)phthalate	6.80E-02	2.07E-05	1.55E-05	1.28E-05	1.06E-05	3E-03	6.9E-03	5.1E-03	4.3E-03	3.5E-03
Di-n-Butylphthalate	7.00E-03	2.13E-06	1.59E-06	1.32E-06	1.09E-06	2E-02	1.1E-04	8.0E-05	6.6E-05	5.5E-05
Benzoic Acid	4.00E-03	1.22E-06	9.13E-07	7.50E-07	6.23E-07	2E+00	6.1E-07	4.6E-07	3.8E-07	3.1E-03
n-Butyl benzyl phthalate	2.00E-03	6.10E-07	4.57E-07	3.75E-07	3.12E-07	3E-02	2.0E-05	1.5E-05	1.3E-05	1.0E-05
Di-n-octyl phthalate	9.50E-02	2.90E-05	2.17E-05	1.78E-05	1.48E-05	3E-03	9.7E-03	7.2E-03	5.9E-03	4.9E-03
						Hazard Index	2.4E-01	1.8E-01	1.5E-01	1.3E-01

TABLE 4-29 (continued)

CHRONIC EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA Y					
Bromodichloromethane	4.04E-04	2.49E-05	1.86E-05	1.54E-05	1.28E-05	2E-02	1.2E-03	9.3E-04	7.7E-04	6.4E-04
Chloroform	4.09E-04	2.51E-05	1.88E-05	1.55E-05	1.29E-05	1E-02	2.5E-03	1.9E-03	1.6E-03	1.3E-03
Toluene	6.44E-03	3.96E-04	2.96E-04	2.45E-04	2.03E-04	3E-01	1.3E-02	9.9E-03	8.2E-03	6.8E-03
Methylene Chloride	6.41E-04	3.94E-05	2.94E-05	2.44E-05	2.20E-05	6E-02	6.6E-04	4.9E-04	4.1E-04	3.4E-04
1,1-Dichloroethane	1.80E-03	1.11E-04	8.27E-05	6.83E-05	5.67E-05	7E-02	1.6E-03	1.2E-03	9.8E-04	8.1E-04
1,1-Dichloroethene	1.42E-03	8.72E-05	6.53E-05	5.39E-05	4.42E-05	8E-03	1.1E-02	8.2E-03	6.7E-03	5.5E-03
1,1,1-Trichloroethane	6.21E-03	3.81E-04	2.85E-04	2.36E-04	1.96E-04	8E-02	4.8E-03	3.6E-03	3.0E-03	2.5E-03
1,1,2-Trichloroethane	4.18E-04	2.56E-05	1.92E-05	1.59E-05	1.31E-05	4E-03	6.4E-03	4.8E-03	4.0E-03	3.3E-03
Xylene	8.43E-04	5.18E-05	3.88E-05	3.21E-05	2.65E-05	2E+00	2.6E-05	1.9E-05	1.6E-05	1.3E-05
Tetrachloroethene	4.03E-04	2.47E-05	1.86E-05	1.53E-05	1.28E-05	9E-03	2.7E-03	2.1E-03	1.7E-03	1.4E-03
						Hazard Index	4.4E-02	3.3E-02	2.7E-02	2.3E-02
					AREA Z					
Barium	1.66E-02	1.52E-06	1.14E-06	9.34E-07	7.78E-07	5E-03	3.0E-04	2.3E-04	1.9E-04	1.6E-04
Chromium	2.82E-02	3.60E-06	2.70E-06	2.23E-06	1.85E-06	1E-02	3.6E-04	2.7E-04	2.2E-04	1.9E-04
Copper	2.14E-02	1.95E-06	1.46E-06	1.21E-06	1.00E-06	2E-02	9.8E-05	7.3E-05	6.1E-05	5.0E-05
Nickel	2.69E-02	2.46E-06	1.84E-06	1.52E-06	1.26E-06	6E-04	4.1E-03	3.1E-03	2.5E-03	2.1E-03
Zinc	2.82E+00	2.57E-04	1.93E-04	1.59E-04	1.32E-04	1E-01	2.6E-03	1.9E-03	1.6E-03	1.3E-03
Toluene	2.33E-02	1.44E-03	1.07E-03	8.85E-04	7.34E-04	3E-01	4.8E-03	3.6E-03	3.0E-03	2.4E-03
1,1-Dichloroethane	2.57E-02	1.58E-03	1.18E-03	9.76E-04	8.09E-04	7E-02	2.3E-02	1.7E-02	1.4E-02	1.2E-02
1,1-Dichloroethene	2.64E-02	1.63E-03	1.21E-03	1.00E-03	8.32E-04	8E-03	2.0E-01	1.5E-01	1.3E-01	1.0E-01
1,1,1-Trichloroethane	1.06E-01	6.51E-03	4.87E-03	4.03E-03	3.35E-03	8E-02	8.1E-02	6.1E-02	5.0E-02	4.2E-02
1,1,2-Trichloroethane	2.79E-03	1.72E-04	1.29E-04	1.06E-04	8.79E-05	4E-03	4.3E-02	3.2E-02	2.7E-02	2.2E-02
1,2 Dichloroethane	2.63E-02	1.62E-03	1.21E-03	9.99E-04	8.28E-04	2E-02	8.1E-02	6.1E-02	5.0E-02	4.1E-02
Tetrachloroethene	9.73E-03	5.98E-04	4.47E-04	3.70E-04	3.07E-04	9E-03	6.6E-02	5.0E-02	4.1E-02	3.4E-02
Benzoic Acid	1.70E-01	5.17E-05	3.87E-05	3.19E-05	2.65E-05	2E+00	2.6E-05	1.9E-05	1.6E-05	1.3E-05
						Hazard Index	5.1E-01	3.8E-01	3.2E-01	2.6E-01

TABLE 4-30

CHRONIC EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA W					
Chromium	1.10E-02	2.36E-06	1.75E-06	1.45E-06	1.20E-06	1E-02	2.4E-04	1.8E-04	1.5E-04	1.2E-04
Copper	1.20E-02	1.84E-06	1.37E-06	1.13E-06	9.36E-07	2E-02	9.2E-05	6.9E-05	5.7E-05	4.7E-05
Nickel	1.30E-02	1.99E-06	1.48E-06	1.22E-06	1.01E-06	6E-04	3.3E-03	2.4E-03	2.1E-03	1.7E-03
Zinc	2.67E+00	4.09E-04	3.04E-04	2.51E-04	2.08E-04	1E-01	4.1E-03	3.0E-03	2.5E-03	2.1E-03
Carbon Tetrachloride	1.98E-04	2.05E-05	1.52E-05	1.25E-05	1.04E-05	6E-04	3.4E-02	2.6E-02	2.1E-02	1.7E-02
Chloroform	3.23E-05	3.33E-06	2.47E-06	2.04E-06	1.69E-06	1E-02	3.3E-04	2.5E-04	2.0E-04	1.7E-04
Methylene Chloride	6.82E-04	7.04E-05	5.23E-05	4.32E-05	3.59E-05	6E-02	1.2E-036	8.7E-04	7.2E-04	6.0E-04
1,1-Dichloroethane	7.30E-03	7.54E-04	5.59E-04	4.62E-04	3.84E-04	7E-02	1.1E-02	8.0E-03	6.7E-03	5.5E-03
1,1-Dichloroethene	3.21E-03	3.32E-04	2.42E-04	2.03E-04	1.69E-04	8E-03	4.2E-02	3.1E-02	2.6E-02	2.1E-02
1,1,1-Trichloroethane	7.50E-03	7.75E-04	5.79E-04	4.75E-04	3.94E-04	8E-02	9.7E-03	7.2E-03	6.0E-03	5.0E-03
1,1,2-Trichloroethane	9.89E-05	1.02E-05	7.58E-06	6.26E-06	5.19E-06	4E-03	2.6E-03	1.9E-03	1.6E-03	1.3E-03
Tetrachloroethene	1.20E-04	1.24E-05	9.19E-06	7.60E-06	6.30E-06	9E-03	1.4E-03	1.0E-03	8.6E-04	7.1E-04
Bis(2-ethylhexyl)phthalate	3.00E-03	1.53E-06	1.14E-06	9.38E-07	7.75E-07	3E-03	5.1E-04	3.8E-04	3.2E-04	2.6E-04
Benzoic Acid	9.00E-06	4.60E-06	3.41E-06	2.82E-06	2.34E-06	2E+00	2.3E-06	1.7E-06	1.4E-06	1.2E-06
						Hazard Index	1.1E-01	8.2E-02	6.9E-02	5.7E-02
					AREA X					
Antimony	3.70E-02	6.21E-06	4.20E-06	3.49E-06	2.89E-06	2E-05	3.1E-01	2.3E-01	1.9E-01	1.6E-01
Vanadium	6.10E-03	9.36E-07	6.94E-07	5.74E-07	4.76E-07	5E-04	1.9E-03	1.4E-03	1.2E-03	9.6E-04
Cadmium	8.20E-03	1.26E-06	9.34E-07	7.71E-07	6.39E-07	3E-05	4.2E-02	3.1E-02	2.6E-02	2.2E-02
Chromium	1.13E-02	1.11E-05	1.80E-05	1.49E-05	1.23E-05	1E-02	1.1E-03	1.8E-03	1.5E-03	1.2E-03
Copper	3.80E-02	5.83E-06	4.33E-06	3.58E-06	2.96E-06	2E-02	2.9E-04	2.2E-04	1.8E-04	1.5E-04
Nickel	9.30E-02	1.43E-05	1.06E-05	8.74E-06	7.26E-06	6E-04	2.4E-02	1.8E-02	1.5E-02	1.2E-02
Chloroform	5.18E-05	5.35E-06	3.96E-06	3.28E-06	2.71E-06	1E-02	5.4E-04	4.0E-04	3.3E-04	2.7E-04
Toluene	5.70E-02	5.89E-03	4.36E-03	3.60E-03	3.00E-03	3E-01	2.0E-02	1.5E-02	1.2E-02	1.0E-02
1,1-Dichloroethane	5.22E-04	5.59E-05	4.00E-05	3.31E-05	2.74E-05	7E-02	7.7E-04	5.8E-04	4.8E-04	4.0E-04
1,1-Dichloroethene	2.97E-04	3.07E-05	2.27E-05	1.88E-05	1.56E-05	8E-03	3.8E-03	2.9E-03	2.4E-03	2.0E-03
1,1,1-Trichloroethane	1.93E-04	1.79E-04	1.48E-04	8.43E-05	1.01E-04	8E-02	1.4E-05	1.1E-05	8.9E-06	7.4E-06
1,1,2-Trichloroethane	6.71E-05	6.93E-06	5.14E-06	4.24E-06	3.52E-06	4E-03	1.7E-03	1.3E-03	1.1E-03	8.9E-04
Tetrachloroethene	5.36E-04	5.53E-05	4.10E-05	3.40E-05	2.02E-05	9E-03	6.1E-03	4.6E-03	3.8E-03	3.2E-03
Bis(2-ethylhexyl)phthalate	6.80E-02	3.48E-05	2.58E-06	2.13E-05	1.77E-05	3E-03	1.1E-02	9.6E-03	8.0E-03	6.6E-03
Di-n-Butyl phthalate	7.00E-03	3.58E-06	2.65E-06	2.19E-06	1.82E-05	2E-02	1.8E-04	1.3E-04	1.1E-04	9.2E-05
Benzoic Acid	4.00E-03	2.04E-06	1.51E-06	1.26E-06	1.04E-06	2E+00	1.0E-06	7.6E-07	6.3E-07	5.2E-07
n-Butyl benzyl phthalate	2.00E-03	1.02E-06	7.55E-07	6.30E-07	5.20E-07	3E-02	3.4E-05	2.5E-05	2.1E-05	1.7E-05
Di-n-Octyl phthalate	4.50E-02	4.85E-05	3.59E-05	2.99E-05	2.47E-05	3E-03	1.6E-02	1.2E-02	1.0E-02	8.2E-03
						Hazard Index	4.4E-01	3.3E-01	2.7E-01	2.3E-01

TABLE 4-30 (continued)

CHRONIC EXPOSURE VIA DERMAL CONTACT WITH OFF-TCAAP GROUND-WATER (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECT

Compounds	Concentration (mg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-12	Child 13-17	Adult	RfD (mg/kg/day)	Hazard Quotient Child 0-6	Child 7-12	Child 13-17	Adult
					AREA Y					
Bromodichloromethane	1.10E-04	1.14E-05	8.42E-06	6.96E-06	5.78E-06	2E-02	5.7E-04	4.3E-04	3.5E-04	2.9E-04
Chloroform	3.00E-04	3.09E-05	2.30E-05	1.89E-05	1.58E-05	1E-02	3.1E-03	2.3E-03	1.9E-03	1.6E-03
Toluene	1.93E-02	2.17E-03	1.48E-03	1.22E-03	1.01E-03	3E-01	7.2E-03	5.4E-03	4.5E-03	3.7E-03
Methylene Chloride	7.30E-04	7.54E-05	5.59E-05	4.62E-05	3.84E-08	6E-02	1.3E-03	9.4E-04	7.8E-04	6.5E-04
1,1-Dichloroethane	2.73E-03	2.82E-04	2.10E-04	1.73E-04	1.44E-04	7E-02	4.0E-03	3.0E-03	2.5E-03	2.1E-03
1,1-Dichloroethene	2.04E-03	2.11E-04	1.57E-04	1.29E-04	1.07E-04	8E-03	2.6E-02	2.0E-02	1.6E-02	1.4E-05
1,1,1-Trichloroethane	1.00E-02	1.03E-04	1.66E-04	6.38E-04	5.25E-04	8E-02	1.3E-03	9.6E-04	8.0E-04	6.6E-04
1,1,2-Trichloroethane	5.50E-04	5.68E-05	4.22E-05	3.48E-05	2.89E-05	4E-03	1.4E-02	1.1E-02	8.8E-03	7.3E-03
Xylene	1.26E-03	1.30E-04	9.65E-05	7.98E-05	6.62E-05	2E+00	6.5E-05	4.9E-05	4.0E-05	3.3E-05
Tetrachloroethene	1.3E-04	1.34E-05	9.96E-06	8.23E-06	6.83E-06	9E-03	1.5E-03	1.1E-03	9.2E-04	7.7E-04
						Hazard Index	5.8E-02	4.4E-02	3.6E-02	3.0E-02
					AREA Z					
Chromium	2.80E-02	6.01E-06	4.46E-06	3.68E-06	3.05E-06	1E-02	6.0E-04	4.5E-04	3.7E-04	3.1E-04
Copper	2.10E-02	3.23E-06	2.38E-06	1.97E-06	1.64E-06	2E-02	1.6E-04	1.2E-04	1.0E-04	8.3E-05
Nickel	2.70E-02	4.14E-06	3.08E-06	2.53E-06	2.10E-06	6E-04	6.9E-03	5.1E-03	4.3E-03	3.5E-03
Zinc	2.82E+00	4.33E-04	3.21E-04	2.64E-04	2.19E-04	1E-01	4.3E-03	3.2E-03	2.6E-03	2.2E-03
Toluene	6.87E-02	7.09E-03	5.26E-03	4.34E-03	3.61E-03	3E-01	2.4E-02	1.8E-02	1.5E-02	1.2E-02
1,1-Dichloroethane	5.29E-02	5.47E-03	4.05E-03	3.35E-03	2.78E-03	7E-02	7.8E-02	5.8E-02	4.8E-02	4.0E-02
1,1-Dichloroethene	5.32E-02	5.49E-03	4.08E-03	3.37E-03	2.79E-03	8E-03	4.4E-05	3.3E-05	2.7E-05	2.3E-05
1,1,1-Trichloroethane	2.20E-01	2.27E-02	1.68E-02	1.39E-02	1.16E-02	8E-02	2.8E-01	2.1E-01	1.8E-01	1.5E-01
1,1,2-Trichloroethane	5.93E-03	6.12E-04	4.55E-04	3.75E-04	3.12E-04	4E-03	1.5E-01	1.1E-01	9.5E-02	7.9E-02
1,2 Dichloroethane	6.41E-02	6.62E-03	4.91E-03	4.05E-03	3.37E-03	2E-02	3.3E-01	2.5E-01	2.1E-01	1.7E-01
Tetrachloroethene	2.79E-02	2.88E-03	2.13E-03	1.77E-03	1.46E-03	9E-03	3.2E-01	2.4E-01	2.0E-01	1.6E-01
Benzoic Acid	1.72E-01	8.69E-05	6.44E-05	5.33E-05	4.42E-05	2E+00	4.3E-05	3.2E-05	2.7E-05	2.2E-05
Acetone	7.00E-03	7.23E-04	5.34E-04	4.44E-04	3.66E-04	9E-02	8.0E-03	5.9E-03	4.9E-03	4.1E-03
						Hazard Index	1.2E+00[b]	8.9E-01	7.4E-01	6.1E-01

TABLE 4-31

CHRONIC EXPOSURE VIA INHALATION OF VOLATILES FROM OFF-TCAAP GROUND WATER DURING SHOWERING (UNIT 4)
CURRENT AND FUTURE LAND USE
PROBABLE EXPOSURE CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (µg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-18	Adult	RfD mg/kg/day	Hazard Quotient Child 0-6	Child 7-18	Adult
				AREA W				
Methylene Chloride	4.15E-01	1.33E-05	6.31E-06	2.03E-06	9E-01	1.5E-05	7.0E-06	2.3E-06
1,1-Dichloroethane	2.47E+00	7.81E-05	3.71E-05	1.19E-05	1E-01	7.8E-04	3.7E-04	1.2E-04
1,1,1-Trichloroethane	2.46E+00	7.16E-05	3.39E-05	1.13E-05	3E-01	2.4E-04	1.1E-04	3.8E-05
					Hazard Index:	1.0E-03	4.9E-04	1.6E-04
				AREA X				
Toluene	1.72E+01	5.68E-04	2.68E-04	8.62E-05	6E-01	9.5E-04	4.5E-04	1.4E-04
1,1-Dichloroethane	2.88E-01	9.10E-06	4.32E-06	1.39E-06	1E-01	9.0E-05	4.3E-05	1.4E-05
1,1,1-Trichloroethane	7.54E-01	2.19E-05	1.04E-05	3.48E-06	3E-01	7.3E-05	3.5E-05	1.2E-05
					Hazard Index:	1.1E-03	5.3E-04	1.7E-04
				AREA Y				
Toluene	6.44E+00	2.13E-04	1.00E-04	3.23E-05	6E-01	3.6E-04	1.7E-04	5.4E-05
Methylene Chloride	6.41E-01	2.05E-05	9.74E-06	3.10E-06	9E-01	2.3E-05	1.1E-05	3.4E-06
1,1-Dichloroethane	1.80E+00	5.69E-05	2.70E-05	8.66E-06	1E-01	5.7E-04	2.7E-04	8.7E-05
1,1,1-Trichloroethane	6.21E+00	1.81E-04	8.57E-05	2.86E-05	3E-01	6.0E-04	2.9E-04	9.5E-05
Xylene	8.43E-01	2.65E-05	1.25E-05	4.02E-06	9E-02	2.9E-04	1.4E-04	4.5E-05
					Hazard Index:	1.8E-03	8.8E-04	2.8E-04
				AREA Z				
Toluene	2.38E+01	7.69E-04	3.63E-04	1.17E-04	6E-01	1.3E-03	6.1E-04	2.0E-04
1,1-Dichloroethane	2.57E+01	8.12E-04	3.86E-04	1.24E-04	1E-01	8.1E-03	3.9E-03	1.2E-03
1,1,1-Trichloroethane	1.06E+02	3.08E-03	1.46E-03	4.89E-04	3E-01	1.0E-02	4.9E-03	1.6E-03
					Hazard Index:	1.9E-02	9.4E-03	3.0E-03

TABLE 4-32

CHRONIC EXPOSURE VIA INHALATION OF VOLATILES FROM OFF-TCAAP GROUND WATER DURING SHOWERING (UNIT 4)
CURRENT AND FUTURE LAND USE
RME CONDITIONS
NONCARCINOGENIC EFFECTS

Compounds	Concentration (µg/L)	Exposure Dose (mg/kg/day) Child 0-6	Child 7-18	Adult	RfD mg/kg/day	Hazard Quotient Child 0-6	Child 7-18	Adult
				AREA W				
Methylene Chloride	6.82E-01	4.89E-05	2.48E-05	7.98E-06	9E-01	5.4E-05	2.8E-05	9.9E-06
1,1-Dichloroethane	7.30E+00	5.55E-04	2.62E-04	8.47E-05	1E-01	5.6E-03	2.6E-03	8.5E-04
1,1,1-Trichloroethane	7.50E+00	5.25E-04	2.48E-04	8.03E-05	3E-01	1.8E-03	8.3E-04	2.7E-04
					Hazard Index:	7.5E-03	3.5E-03	1.1E-03
				AREA X				
Toluene	5.70E+01	4.51E-03	2.13E-03	6.84E-04	6E-01	7.5E-03	3.6E-03	1.1E-03
1,1-Dichloroethane	5.22E-01	3.97E-05	1.87E-05	6.06E-06	1E-01	4.0E-04	1.9E-04	6.1E-05
1,1,1-Trichloroethane	1.93E+00	1.35E-04	6.39E-05	2.07E-05	3E-01	4.5E-04	2.1E-04	6.9E-05
					Hazard Index:	8.4E-03	4.0E-03	1.2E-03
				AREA Y				
Toluene	1.93E+01	1.53E-03	7.22E-04	2.32E-04	6E-01	2.6E-03	1.2E-03	3.9E-04
Methylene Chloride	7.30E-01	5.63E-05	2.66E-05	8.54E-06	9E-01	6.3E-05	3.0E-05	9.5E-06
1,1-Dichloroethane	2.73E+00	2.07E-04	9.80E-05	3.17E-05	1E-01	2.1E-03	9.8E-04	3.2E-04
1,1,1-Trichloroethane	1.00E+01	7.00E-04	3.31E-04	1.07E-04	3E-01	2.3E-03	1.1E-03	3.6E-04
Xylene	1.26E+00	9.45E-05	4.50E-05	1.45E-05	9E-02	1.1E-03	5.0E-04	1.6E-04
					Hazard Index:	8.2E-03	3.8E-03	1.2E-03
				AREA Z				
Toluene	6.87E+01	5.43E-03	2.57E-03	8.27E-04	6E-01	9.1E-03	4.3E-03	1.4E-03
1,1-Dichloroethane	5.29E+01	4.02E-03	1.90E-03	6.14E-04	1E-01	4.0E-02	1.9E-02	6.1E-03
1,1,1-Trichloroethane	2.20E+02	1.54E-02	7.28E-03	2.35E-03	3E-01	5.1E-02	2.4E-02	7.8E-03
					Hazard Index:	1.0E-01	4.7E-02	1.5E-02

TABLE 5

NONCARCINOGENIC CONTAMINANT INHALATION REFERENCE DOSES (RfDs)

Chemical Parameter	Chronic/ Subchronic (mg/kg/day)	Critical Effect	RfD Basis/Source	Combined Uncertainty Factors
Acetone	1E-1[a,b]/ NA[a,b]	Increased liver and kidney weight, nephrotoxicity	HEAST[c] HEAST	1,000 100
2-Butanone	9E-02[d]/ 9E-01	Central Nervous System (CNS) effects CNS effects	HEAST HEAST	1,000 100
1,1-Dichloroethane	1E-01/ 1E+00	Kidney damage Kidney damage	HEAST HEAST	1,000 100
Manganese	3E-04/ 3E-04	CNS effects CNS effects	HEAST HEAST	100 100
Methylene Chloride	9E-01[e,f]/ 9E-01[e,f]	None observed None observed	HEAST HEAST	100 100
Toluene	6E-01[e,f]/ 6E-01[e,f]	CNS effects, eye and nose irritation CNS effects, eye and nose irritation	HEAST HEAST	100 100
1,1,1-Trichloroethane	3E-01[g]/ 3E+00[g]	Hepatotoxicity Hepatotoxicity	HEAST HEAST	1,000 100
Xylene	9E-02[e,f]/ 9E-02[e,f]	CNS effects, nose and throat irritation CNS effects, nose and throat irritation	HEAST HEAST	100 100

Notes:

[a] Developmental effects have been used as the basis of calculation.

[b] Carcinogen Risk Assessment Verification Endeavor (CRAVE) verified as Carcinogenic Assessment Group (CAG) group D substance.

[c] Health Effects Assessment Summary Tables, U.S. EPA, 1990c.

[d] Under review by RfD workshop.

[e] Verified, Work Group concurrence on final database file and IRIS input pending.

[f] Values derived from reference concentrations identified in HEAST.

[g] These values differ from those in U.S. EPA (1984) because the study chosen as the basis for inhalation RfD values was changed to conform to the inhalation study chosen as the basis for oral RfDs derived on IRIS.

TABLE 5 (continued)

NONCARCINOGENIC CONTAMINANT ORAL REFERENCE DOSES (RfDs)

Chemical Parameter	Chronic/ Subchronic (mg/kg/day)	Conf.[a] Level	Critical Effect	RfD Basis/Source	Combined Uncertainty Factors
Anthracene	3E-01[m,f]/	NA	No effects	Gavage/HEAST[b]	3,000
	3E+00		No effects	Gavage/HEAST	300
Antimony	4E-04[e]/	L	Reduced life span, altered blood chemistries	Water/HEAST	1,000
	4E-04		Reduced life span, altered blood chemistries	Water/HEAST	1,000
Arsenic	1E-03[c]/	NA	Keratosis, hyperpigmentation[d]	Oral/HEAST	1
	1E-03		Keratosis, hyperpigmentation	Oral/HEAST	1
Benzoic Acid	4E+00[e]/	M	Irritation, malaise	Diet/HEAST	1
	4E+00		Irritation, malaise	Diet/HEAST	1
Bis(2-ethylhexyl)phthalate	2E-02[e]/	M	Increased relative liver weight[d]	Diet/HEAST	1,000
	2E-02		Increased relative liver weight	Diet/HEAST	1,000
Bromodichloromethane	2E-02[e]/	M	Renal cytomegaly[d]	Gavage/HEAST	1,000
	2E-02		Renal cytomegaly	Gavage/HEAST	1,000
2-Butanone	5E-02[f,g,h,j]/	M	Fetotoxicity	Oral/HEAST	1,000
	5E-01[g,h]		Fetotoxicity	Oral/HEAST	100
Cadmium	5E-04/	H	Renal damage	Water/HEAST	10
	ND		NA	NA	NA
Carbon Tetrachloride	7E-04[e]/	H	Liver lesions[d]	Oral/HEAST	1,000
	7E-03		Liver lesions	Oral/HEAST	100

TABLE 5 (continued)

NONCARCINOGENIC CONTAMINANT ORAL REFERENCE DOSES (RfDs)

Chemical Parameter	Chronic/ Subchronic (mg/kg/day)	Conf. Level	Critical Effect	RfD Basis/Source	Combined Uncertainty Factors
Chloroform	1E-02[a]/	M	Liver lesions[d]	Oral/HEAST	1,000
	1E-02		Liver lesions	Oral/HEAST	1,000
Chromium	1E+00[a,j]/	L	None observed	Diet/IRIS[a]	1,000
	1E+01[j]		None observed	Diet/IRIS	1,000
Copper	4E-02[k]/	M	Local Gastro intestinal (GI) irritation	Oral/IRIS	1,000
	4E-02[k]		Local GI irritation	Oral/IRIS	1,000
Cyanide	2E-02[a]/	M	Weight loss, thyroid effects, and myelin degeneration	Diet/HEAST	500
	2E-02		Weight loss, thyroid effects, and myelin degeneration	Diet/HEAST	500
1,1-Dichloroethane	1E-01[c]/	NA	None observed[d]	Diet/HEAST	1,000
	1E+00		None observed	Diet/HEAST	100
1,1-Dichloroethene	9E-03[j]/	M	Liver lesions[d]	Water/HEAST	1,000
	9E-03		Liver lesions	Water/HEAST	1,000
1,2-Dichloroethene	2E-02[a,j]/	L	Increased serum alkaline phosphatase	Water/HEAST	1,000
	2E-01		Increased serum alkaline phosphatase	Water/HEAST	100
Di-n-butylphthalate	1E-01/	L	Mortality	Diet/IRIS	1,000
	1E+00[a]		Mortality	Diet/IRIS	1,000
Di-n-octylphthalate	2E-02/	NA	Elevated liver and kidney weights; increased serum glutamic-oxaloacetic transaminase (SGOT) and serum glutamic-pyruvic transaminase (SGPT).	Diet/HEAST	1,000
	2E-02		Elevated liver and kidney weights; increased SGOT and SGPT.	Diet/HEAST	1,000

TABLE 5 (continued)

NONCARCINOGENIC CONTAMINANT ORAL REFERENCE DOSES (RfDs)

Chemical Parameter	Chronic/ Subchronic (mg/kg/day)	Conf. Level	Critical Effect	RfD Basis/Source	Combined Uncertainty Factors
Ethylbenzene	1E-01[e,f]/	L	Hepatotoxicity, nephrotoxicity	Oral/HEAST	1,000
	1E+00		Hepatotoxicity, nephrotoxicity	Oral/HEAST	100
Manganese	2E-01[m]/	NA	CNS	Water/HEAST	100
	5E-01		Reproduction	Gestation/HEAST	100
Mercury	3E-04[m]/	M	Kidney effects	Oral/HEAST	1,000
	3E-04		Kidney effects	Oral/HEAST	1,000
Methylene Chloride	6E-02[e]/	M	Liver toxicity[d]	Water/IRIS	100
	6E-02		Liver toxicity	Water/IRIS	100
Nickel	2E-02[i]/	M	Reduced body/organ weight	Diet/HEAST	300
	2E-02		Reduced body/organ weight	Diet/HEAST	300
Phenol	6E-01[e,f,g]/	L	Reduced fetal body weight	Gavage/HEAST	100
	6E-01[g]		Reduced fetal body weight	Gavage/HEAST	100
Pyrene	3E-02[m]/	NA	Renal effects	Gavage/HEAST	3,000
	3E-01		Renal effects	Gavage/HEAST	300
Selenium	3E-03[m,n]/	H	Hair/nail loss, dermatitis	Diet/HEAST	15
	3E-03[i]		Hair/nail loss, dermatitis	Diet/HEAST	15
Silver	3E-03[e]/	M	Argyria	Therapeutic/IRIS	2
	3E-03		Argyria	Therapeutic/IRIS	2
Tetrachloroethene	1E-02[e]/	M	Hepatotoxicity[d]	Oral/HEAST	1,000
	1E-01		Hepatotoxicity	Oral/HEAST	100

TABLE 5 (continued)

NONCARCINOGENIC CONTAMINANT ORAL REFERENCE DOSES (RfDs)

Chemical Parameter	Chronic/ Subchronic (mg/kg/day)	Conf. Level	Critical Effect	RfD Basis/Source	Combined Uncertainty Factors
Thallium	7E-05[o]/	NA	Increased SGOT and serum lactic dehydrogenase (LDH) level, alopecia	Oral/HEAST	3,000
	7E-04[o]		Increased SGOT and serum LDH level, alopecia	Oral/HEAST	300
Toluene	3E-01[e,f,h]/	M	CNS effects	Oral/HEAST	100
	4E-01		CNS effects	Gavage/HEAST	100
1,1,1-Trichloroethane	9E-02[a,h]/	M	Hepatotoxicity	Oral/HEAST	1,000
	9E-01[h]		Hepatotoxicity	Oral/HEAST	100
1,1,2-Trichloroethane	4E-03[a]/	M	Clinical chemistry alterations[d]	Water/HEAST	1,000
	4E-02		Clinical chemistry alterations	Water/HEAST	100
Vanadium	9E-03[c]/	L	Decreased hair cystine	Oral/IRIS	100
	9E-03		Decreased hair cystine	Oral/IRIS	100
Xylene	2E+00[p]/	M	Hyperactivity, decreased body weight, increased mortality	Oral/HEAST	100
	4E+00[p]		None observed	Oral/HEAST	100
Zinc	2E-01[c]/	NA	Anemia	Therapeutic/HEAST	10
	2E-01		Anemia	Therapeutic/HEAST	10

TABLE 5 (continued)

NONCARCINOGENIC CONTAMINANT ORAL REFERENCE DOSES (RfDs)

Notes:

* Confidence level: L = low, M = medium, and H = high.

[a] Verified, available on IRIS.
[b] Health Effects Assessment Summary Tables, U.S. EPA, 1990c.
[c] Under review by RfD Work Group.
[d] Also see Table 4-5.
[e] A new RfD will be verified, and the old number on IRIS will be changed.
[f] CRAVE-verified as a CAG Group D substance.
[g] Developmental effects have been used as the basis of calculation.
[h] Based on route-to-route extrapolation.
[i] The oral RfD, although still available on IRIS, is being reconsidered by the RfD Work Group.
[j] Values for trivalent chromium as a soluble salt.
[k] Estimated from drinking water standard of 1.3 mg/L.
[l] Values are for 1,2-t-dichloroethene; data for 1,2-c-Dichloroethene are not adequate.
[m] Verified, Work Group concurrence on final database file and IRIS input pending.
[n] Value for selenious acid.
[o] Value for thallium in soluble salts.
[p] Value for o-xylene.
[q] U.S. Environmental Protection Agency, 1990f. Integrated Risk Information System (IRIS), On-line Database.

NA Not applicable or not available.
ND Not determined.

TABLE 6

CARCINOGENIC CONTAMINANT ORAL SLOPE FACTORS (SF)

Compound	SF $(mg/kg\text{-}day)^{-1}$	Weight of Evidence Classification[a]	Type of Cancer	SF Basis/Source
Arsenic	1.8E+00[b]	A	Skin	Water/HEAST[d]
Benzene	2.9E-02[a,c]	A	Leukemia	Occupational/HEAST
Bis(2-ethylhexyl)phthalate	1.4E-02[a]	B2	Liver[c]	Diet/HEAST
Bromodichloromethane	1.3E-01[f]	B2	Liver	Gavage/HEAST
Carbon Tetrachloride	1.3E-01[a]	B2	Liver[c]	Gavage/HEAST
Chloroform	6.1E-03[a]	B2	Kidney[c]	Water/HEAST
1,1-Dichloroethane	9.1E-02[f]	C	Hemangiosarcoma	Gavage/HEAST
1,2-Dichloroethane	9.1E-02[a]	B2	Circulatory system	Gavage/HEAST
1,1-Dichloroethene	6.0E-01[a]	C	Adrenal	Gavage/HEAST
2,4-Dinitrotoluene	6.8E-01[f,h]	B2	NA	Diet/HEAST
Methylene Chloride	7.5E-03[g]	B2	Liver[c]	Air, Water/HEAST
N-Nitrosodiphenylamine	4.9E-03[a]	B2	Urinary bladder	Diet/HEAST
Polychlorinated biphenyls	7.7E+00[a]	B2	Liver	Diet/HEAST
Polycyclic Aromatic Hydrocarbons	1.15E+01[i]	B2	Stomach	Diet/HEAST
Tetrachloroethene	5.1E-02[j]	B2	Liver[c]	Gavage/HEAST
1,1,2-Trichloroethane	5.7E-02[a]	C	Liver[c]	Gavage/HEAST

TABLE 6 (continued)

CARCINOGENIC CONTAMINANT ORAL SLOPE FACTORS (SF)

Compound	SF $(mg/kg\text{-}day)^{-1}$	Weight of Evidence Classification*	Type of Cancer	SF Basis/Source
Trichloroethene	1.1E-02[f,k]	B2	Liver	Gavage/HEAST
Vinyl Chloride	2.3E+00[j]	A	Lung	Diet/HEAST

Notes:

a Verified, available on IRIS.
b Slope factor derived from unit risk proposed by Risk Assessment Forum and noted in HEAST, U.S. EPA, 1990c.
c Also see Table 4-3.
d Health Effects Assessment Summary Tables, U.S. EPA, 1990c.
e Based on route-to-route extrapolation.
f Verified, Work Group concurrence on final database file and IRIS input pending.
g The slope factor, although still available on IRIS, is being reconsidered by CRAVE Work Group.
h This value applies to a mixture of 2,4- and 2,6-dinitrotoluene isomers.
i Value for benzo(a)pyrene is used for the carcinogenic PAHs benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene as directed in memorandum from P.F. Hurst, Environmental Criteria and Assessment Office, U.S. EPA, August 8, 1990.
j Under review by CRAVE.
k Based on metabolized dose.
* U.S. EPA weight of evidence classification.

Group A Human Carcinogen (sufficient evidence of carcinogenicity in humans)

Group B Probable Human Carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or no evidence of carcinogenicity in humans)

Group C Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or no human data)

Group D Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)

Group E Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in adequate studies)

TABLE 7

CARCINOGENIC CONTAMINANT INHALATION SLOPE FACTORS (SF)

Compound	SF (mg/kg-day)$^{-1}$	Weight of Evidence Classification*	Type of Cancer	SF Basis/Source
Arsenic	5.0E+01[a,b]	A	Respiratory tract[c]	Air/HEAST[d]
Benzene	2.9E-02[a]	A	Leukemia	Occupational/HEAST
Cadmium	6.1E+00[e]	B1	Respiratory tract[c]	Occupational/HEAST
Carbon Tetrachloride	1.3E-01[g]	B2	Liver[c]	Gavage/HEAST
Chloroform	8.1E-02[a]	B2	Liver[c]	Water/HEAST
Chromium	4.1E+01[a,e]	A	Lung[c]	Occupational/HEAST
1,2-Dichloroethane	9.1E-02[a,g]	B2	Circulatory system	Gavage/HEAST
1,1-Dichloroethene	1.2E+00[a,h]	C	Kidney[c]	Air/HEAST
Methylene Chloride	1.4E-02[i]	B2	Lung, liver[c]	Air/HEAST
Nickel	1.7E+00[a,f]	A	Respiratory tract[c]	Occupational/HEAST
Tetrachloroethene	3.3E-03	B2	Leukemia, liver[c]	Air/HEAST
1,1,2-Trichloroethane	5.7E-02[a,g]	C	Liver[c]	Gavage/HEAST
Trichloroethene	1.7E-02[b,j]	B2	Lung	Air/HEAST
Vinyl Chloride	3.0E-01[b,j]	A	Liver	Air/HEAST

Notes:

a Verified, available on IRIS.
b An absorption factor of 30 percent is used in calculation of the unit risk.
c Also see Table 4-2.
d Health Effects Assessment Summary Tables, U.S. EPA, 1990c.
e Values are for hexavalent chromium.
f Values are for nickel subsulfide.
g Based on route-to-route extrapolation.
h Based on metabolized dose.
i Still available on IRIS, but under review by Work Group.
j Verified, Work Group concurrence on final database file and IRIS input pending.
* U.S. EPA weight of evidence classification.

TABLE 8

SUMMARY OF RISKS FOR EXPOSURE TO OFF-TCAAP GROUND WATER
PROBABALE AND REASONABLE MAXIMUM EXPOSURES
CURRENT AND PROBABLE FUTURE & RME FUTURE LAND USE CONDITIONS

Exposure Area/Unit	Pathway	Exposure	Upperbound Excess Cancer Risks	Acute Hazard Indices		Chronic Hazard Indices	
			Resident	Child[a]	Adult	Child[a]	Adult
1S Unit 1	Ingestion	Probable[b]	4E-08	3.7E-03	1.3E-03	3.7E-03	1.3E-03
		RME[c]	2E-07	7.0E-03	3.4E-03	7.0E-03	3.4E-03
	Inhalation	Probable	2E-07	–	–	–	–
		RME	2E-06	–	–	–	–
	Dermal Contact	Probable	6E-08	3.1E-03	1.6E-03	4.0E-03	2.1E-03
		RME	3E-07	1.0E-02	5.1E-03	1.2E-02	6.2E-03
TOTAL		Probable	3E-07	ND	ND	ND	ND
		RME	3E-06	ND	ND	ND	ND
3V Unit 3	Ingestion	Probable	4E-06	3.3E-01	1.1E-01	3.3E-01	1.2E-01
		RME	2E-05	5.6E-01	2.5E-01	5.3E-01	2.6E-01
	Inhalation	Probable	2E-06	NA	NA	1.0E-04	1.6E-05
		RME	2E-05	NA	NA	7.5E-04	1.2E-04
	Dermal Contact	Probable	4E-06	1.8E-02	8.6E-03	1.3E-02	5.8E-03
		RME	5E-05	3.3E-02	1.7E-02	4.4E-02	2.3E-02
TOTAL		Probable	1E-05	ND	ND	ND	ND
		RME	9E-05	ND	ND	ND	ND
3W Unit 3	Ingestion	Probable	4E-06	2.0E-03	7.1E-04	5.5E-03	2.0E-03
		RME	2E-05	5.6E-03	2.7E-03	1.5E-02	7.5E-03
	Inhalation	Probable	2E-06	NA	NA	9.2E-04	1.4E-04
		RME	2E-05	NA	NA	6.1E-03	9.3E-04
	Dermal Contact	Probable	6E-06	2.5E-03	1.3E-03	7.0E-03	3.6E-03
		RME	6E-05	1.1E-02	5.7E-03	3.2E-02	1.6E-02
TOTAL		Probable	1E-05	ND	ND	ND	ND
		RME	1E-04	ND	ND	ND	ND

TABLE 8 (continued)

SUMMARY OF RISKS FOR EXPOSURE TO OFF-TCAAP GROUND WATER
PROBABALE AND REASONABLE MAXIMUM EXPOSURES
CURRENT AND PROBABLE FUTURE & RME FUTURE LAND USE CONDITIONS

Exposure Area/Unit	Pathway	Exposure	Upperbound Excess Cancer Risks	Acute Hazard Indices		Chronic Hazard Indices	
			Resident	Child[a]	Adult	Child[a]	Adult
3X Unit 3	Ingestion	Probable	2E-05	1.6E-02	5.6E-03	8.3E-02	3.0E-02
		RME	1E-04	4.8E-02	2.3E-02	2.8E-01	1.3E-01
	Inhalation	Probable	1E-05	NA	NA	4.8E-04	7.3E-05
		RME	1E-04	NA	NA	2.5E-03	3.8E-04
	Dermal Contact	Probable	3E-05	1.8E-02	9.5E-03	9.4E-02	4.8E-02
		RME	2E-04	8.9E-02	4.5E-02	4.9E-01	2.5E-01
TOTAL		Probable	6E-05	ND	ND	ND	ND
		RME	4E-04	ND	ND	ND	ND
3Y Unit 3	Ingestion	Probable	4E-04	3.3E-01	7.4E-02	1.2E+00[e]	3.8E-01
		RME	2E-03	8.9E-01	4.2E-01	3.0E+00[e]	1.5E+00[e]
	Inhalation	Probable	5E-05	NA	NA	3.2E-02	5.0E-03
		RME	2E-03	NA	NA	1.2E-01	1.9E-02
	Dermal Contact	Probable	5E-04	4.9E-01	2.6E-01	1.3E+00[e]	6.9E-01
		RME	4E-03	1.3E+00[e]	6.5E-01	5.3E+00[e]	2.7E+00[e]
TOTAL		Probable	1E-03	ND	ND	ND	ND
		RME	8E-03	ND	ND	ND	ND
3Z Unit 3	Ingestion	Probable	6E-04	6.8E-01	2.4E-01	1.1E+00[e]	4.9E-01
		RME	2E-03	1.0E+00[e]	4.7E-01	1.8E+00[e]	8.4E-01
	Inhalation	Probable	5E-04	NA	NA	2.4E-02	3.7E-03
		RME	4E-03	NA	NA	1.3E-01	1.9E-02
	Dermal Contact	Probable	9E-04	4.3E-01	2.1E-01	9.1E-01	4.6E-01
		RME	6E-03	1.2E+00[e]	6.1E-01	2.6E+00[e]	1.3E+00[e]
TOTAL		Probable	2E-03	NA	ND	ND	ND
		RME	1E-02	NA	ND	ND	ND

TABLE 8 (continued)

SUMMARY OF RISKS FOR EXPOSURE TO OFF-TCAAP GROUND WATER
PROBABALE AND REASONABLE MAXIMUM EXPOSURES
CURRENT AND PROBABLE FUTURE & RME FUTURE LAND USE CONDITIONS

Exposure Area/Unit	Pathway	Exposure	Upperbound Excess Cancer Risks	Acute Hazard Indices		Chronic Hazard Indices	
			Resident	Child[a]	Adult	Child[a]	Adult
4W Unit 4	Ingestion	Probable	2E-05	8.8E-01	3.2E-01	8.3E-01	3.0E-01
		RME	1E-04	8.8E-01	4.2E-01	9.0E-01	4.4E-01
	Inhalation	Probable	1E-05	NA	NA	1.0E-03	1.6E-04
		RME	1E-04	NA	NA	7.5E-03	1.1E-03
	Dermal Contact	Probable	1E-05	1.6E-02	8.3E-03	3.0E-02	1.6E-02
		RME	2E-04	6.1E-02	3.2E-02	1.1E-01	5.7E-02
TOTAL		Probable	4E-05	ND	ND	ND	ND
		RME	4E-04	ND	ND	ND	ND
4X Unit 4	Ingestion	Probable	8E-05	6.0E+00[b]	2.2E+00[b]	6.7E+00[b]	2.4+00[b]
		RME	2E-04	6.2E+00[b]	2.9E+00[b]	7.4E+00[b]	3.6E+00[b]
	Inhalation	Probable	1E-06	NA	NA	1.1E-03	1.7E-04
		RME	1E-05	NA	NA	8.4E-03	1.2E-03
	Dermal Contact	Probable	3E-06	1.5E-01	1.0E-01	2.4E-01	1.3E-01
		RME	2E-05	3.4E-01	1.8E-01	4.4E-01	2.3E-01
TOTAL		Probable	8E-05	ND	ND	ND	ND
		RME	2E-04	ND	ND	ND	ND
4Y Unit 4	Ingestion	Probable	2E-05	1.5E-02	5.4E-03	2.6E-02	9.5E-03
		RME	4E-05	2.1E-02	1.0E-02	3.7E-02	1.8E-02
	Inhalation	Probable	1E-05	NA	NA	1.8E-03	2.8E-04
		RME	7E-05	NA	NA	8.2E-03	1.2E-03
	Dermal Contact	Probable	3E-05	1.8E-02	9.2E-03	4.4E-02	2.3E-02
		RME	1E-04	3.8E-02	1.9E-02	5.8E-02	3.0E-02
TOTAL		Probable	6E-05	ND	ND	ND	ND
		RME	2E-04	ND	ND	ND	ND

TABLE 4 (continued)

SUMMARY OF RISKS FOR EXPOSURE TO OFF-TCAAP GROUND WATER PROBABALE AND REASONABLE MAXIMUM EXPOSURES CURRENT AND PROBABLE FUTURE & RME FUTURE LAND USE CONDITIONS

Exposure Area/Unit	Pathway	Exposure	Upperbound Excess Cancer Risks	Acute Hazard Indices		Chronic Hazard Indices	
			Resident	Child[a]	Adult	Child[a]	Adult
4Z Unit 4	Ingestion	Probable	3E-04	1.1E+00[d]	4.0E-01	1.3+00[d]	4.7E-01
		RME	1E-03	1.4E+00[d]	6.5E-01	1.9E+00[d]	8.6E-01
	Inhalation	Probable	2E-04	NA	NA	1.9E-02	3.0E-03
		RME	1E-03	NA	NA	1.0E-01	1.5E-02
	Dermal Contact	Probable	2E-04	2.4E-01	1.2E-01	5.1E-01	2.6E-01
		RME	3E-03	8.4E-01	4.3E-01	1.2E+00[d]	6.1E-01
TOTAL		Probable	7E-04	ND	ND	ND	ND
		RME	5E-03	ND	ND	ND	ND

TABLE 8 (continued)

[a] The risk estimates listed under this heading are for the child age group most at risk.

[b] Probable = Probable exposure conditions

[c] RME = Reasonable maximum exposure

[d] Hazard index (HI) greater than 1, including at least one individual chemical with a hazard quotient (HQ) greater than 1. This HI indicates the potential for adverse noncarcinogenic health effects via the associated exposure pathway.

[e] HI greater than 1 with no chemical-specific HQ greater than 1, and no sum of chemical-specific HQs (effect-specific HIs) associated with similar target organs or chemical effect are greater than 1. Because all effect-specific HIs are less than 1, exposures via the associated pathway are not expected to result in adverse noncarcinogenic health effects.

[f] HI greater than 1 with no chemical-specific HQ greater than 1, but at least one sum of chemical-specific HQs (effect-specific HI) associated with similar target organs or chemical effect is greater than 1. Because at least one effect-specific HI is greater than 1, exposure via the associated pathway has the potential to cause adverse health effects.

-- = Used to represent upperbound excess cancer risks less than 1E-07 or noncarcinogenic risks (HQ and HI) less than 1E-02.

ND = Not determined; the sum of chemical specific HQ across exposure pathways was not estimated due to the complexity of evaluating noncarcinogenic effects associated with similar target organs or chemical effects. However, any combination of exposure pathways which include chemical-specific HQ greater than 1 (footnoted d as discussed above) or including target organs or chemical effect sums greater than 1 (footnoted f as discussed above) is associated with the potential for adverse noncarcinogenic health effects.

NA = Not assessed; risks were not evaluated for these particular exposure pathways. (See discussion in Chapter 3).

TABLE 9

AREAS OF UNCERTAINTY AND EFFECTS ON RISK ESTIMATES

Area of Uncertainty	May Overestimate Exposure	May Underestimate Exposure	May Over-or Underestimate Exposure
Risk Factors			
– Extrapolation Most risk factors are extrapolated from animal test results. Extrapolations may be made for species, exposure dose, and exposure period; extrapolations are generally conservative.	X		
– Adjustment of Oral Risk Factors In order to characterize risks from dermal exposures, generally expressed as absorbed doses, oral risk factors are adjusted to account for oral absorption efficiency.	X		
– Slope Factors (SF) SFs represent upper 95-percent confidence limit values; carcinogenic risks calculated using SFs generally represent upper-bound estimates.	X		
– Lack of Risk Factors Risks from exposure to chemicals with no available chemical-specific or substitute risk factors cannot be quantitatively characterized.		X	
Risk Summations			
Risks from chemical mixtures are characterized by summing the individual chemical risks. This procedure assumes that chemicals have the same toxic end points and mechanisms of action and do not interact, either synergistically or antagonistically. These assumptions may be incorrect.			X
Exposure Periods			
Acute exposures are characterized by comparison to subchronic risk factors. Evaluating exposures using risk factors based on a longer exposure period is conservative.	X		

TABLE 10

SCREENING OF GROUNDWATER
REMEDIAL TECHNOLOGIES

Remedial Technology	Applicable as a Remedial Alternative Component	Comments
1. Groundwater Monitoring	Yes	Common to most NPL sites.
2. Institutional Controls		
- Deed Restrictions	Yes	Readily implemented.
- Zoning Restrictions	No	Site already zoned for multiple uses.
- Well Permitting Restrictions	Yes	MDOH permitting process already instituted.
3. Groundwater Containment, Slurry Wall	No	Mainly used for source containment. Technically impractical to implement. Costly to construct.
4. Hydraulic Containment		
- Extraction Wells	Yes	Collects groundwater and prevents future migration. Will reduce levels of contamination over time.
- Subsurface Drain	No	Technically impractical to implement at these depths. Costly to construct.
5. Groundwater Treatment		
- Activated Sludge (POTW)	No	Difficult to sustain process with low levels of hydrocarbon feed from groundwater environment. Unacceptable to MWCC due to hydraulic loading.
- Fixed Film Systems	No	Difficult to sustain process with low levels of hydrocarbon feed from groundwater.
- Activated Carbon Adsorption	Yes	Effective in treating large array of organic contaminants. Can be used as primary treatment or as polisher in combination with other treatment technologies.
- Air Stripper	Yes	Effective in removing volatile compounds.
- Aeration Basin	No	Not as effective as air stripping. May require additional polishing by other technology. Difficult to implement due to space limitations.
- Chemical Oxidation	No	High cost of materials.
- Ion Exchange	No	Used to treat inorganic waste (i.e. metals), therefore, not applicable at this Site.

TABLE 10 (CONT'D)

SCREENING OF GROUNDWATER
REMEDIAL TECHNOLOGIES

Remedial Technology	Applicable as a Remedial Alternative Component	Comments
5. Groundwater Treatment (Cont'd) - Reverse Osmosis	No	Used to treat inorganic waste (i.e. metals) and high molecular weight organics, therefore, not generally applicable at this Site. Also, highly subject to fouling by precipitates and biological growth.
- Spray Evaporization	No	May be effective in treating volatile compounds. Presence of other nonvolatile compounds may restrict use of this technology. Effectiveness is difficult to evaluate. Large area needed.
- Ultraviolet Oxidation	No	High cost of power and materials compared to similar acceptable technologies.
6. Groundwater Disposal - Injection	Yes	Accoleration of remediation. Reuse of extracted groundwater. Pilot study required.
- Discharge to Surface Water	Yes	Cost effective. Groundwater must meet surface water criteria prior to discharge. NPDES permit required.
- Discharge to POTW	No	Would be restricted by operating permit of POTW. May not be required if groundwater treated on-Site. Unacceptable to MWCC due to hydraulic loading concerns.
- Municipal Use	Yes	Redily implementable. Prudent use of groundwater resource.
- Groundwater Recharge	Yes	Reuse of extracted groundwater. No institutional constraints.

TABLE 11
ALTERNATIVE ANALYSIS SUMMARY

Assessment Factors	Alternative 1 - No Action, with Monitoring	Alternative 2 - Groundwater Extraction, Treatment at TCAAP	Alternative 3 - Groundwater Extraction, Local Treatment and Discharge	Alternative 4 - Groundwater Extraction, Local Treatment, Mississippi River Discharge
Description	No further remedial work on South Plume groundwater contamination	Groundwater is pumped from the Unit 4 aquifer, is pumped via forcemain to TCAAP. Water is air-stripped and discharged at TCAAP.	Groundwater is pumped as in Alternative 2 and is treated in the New Brighton Public Works Garage area using GAC. Treated water is discharged to New Brighton municipal system.	Groundwater pumping and treatment as in Alternative 3. Treated water discharge via forcemain to the Mississippi River.
1. Overall Protection of Human Health and Environment	The no action alternative provides no additional protection of human health or the environment.	Hydraulic containment, extraction and treatment of VOC impacted groundwater prevents future exposure to previously unexposed persons.	Hydraulic containment, extraction and treatment of VOC impacted groundwater prevents future exposure to previously unexposed persons.	Hydraulic containment, extraction and treatment of VOC impacted groundwater prevents future exposure to previously unexposed persons.
2. Compliance with ARARs	ARARs established for the PGRS will not be met. Currently uncontaminated parts of the affected aquifer could become contaminated.	Utilizes well proven and demonstrated technologies which will likely meet proposed ARARs.	Utilizes well proven and demonstrated technologies which will likely meet proposed ARARs.	Utilizes well proven and demonstrated technologies which will likely meet proposed ARARs.
3. Long Term Effectiveness	No action provides no long term effectiveness.	This alternative as part of the overall remedy for TCAAP will prevent further migration of the South Plume. Potential negative impact on BGRS capture if the gravel pit is the sole discharge point has not been determined.	Alternative 3 effectively contains the South Plume for the long term. This discharge alternative is a permanent discharge option with no adverse impact on existing interim remedies.	Alternative 4 effectively contains the South Plume for the long term. This discharge alternative is permanent unless water discharge criteria are lowered or ice safety becomes an issue.
4. Reduction of Toxicity, Mobility and Volume (TMV)	There is no reduction in TMV.	This alternative significantly reduces the mobility by preventing further migration of the south plume. The toxicity of the VOC contaminated water is also reduced by treatment. Volume of VOCs is reduced by extraction of VOC contaminated groundwater	This alternative significantly reduces the mobility by preventing further migration of the south plume. The toxicity of the VOC contaminated water is also reduced by treatment. Volume of VOCs is reduced by extraction of VOC contaminated groundwater	This alternative significantly reduces the mobility by preventing further migration of the south plume. The toxicity of the VOC contaminated water is also reduced by treatment. Volume of VOCs is reduced by extraction of VOC contaminated groundwater

TABLE 11 (CONT'D)
ALTERNATIVE ANALYSIS SUMMARY

Assessment Factors	Alternative 1 - No Action	Alternative 2 - Groundwater Extraction, Treatment at TCAAP	Alternative 3 - Groundwater Extraction, Local Treatment and Discharge	Alternative 4 - Groundwater Extraction, Local Treatment, Mississippi River Discharge
5. Short Term Effectiveness	No action provides no short term effectiveness for preventing adverse human health and environment impacts.	Provides short term effectiveness by hydraulic containment and removal of VOCs immediately after start-up. Effectiveness could be achieved at least for a period upon system start-up.	Provides short term effectiveness by hydraulic containment and removal of VOCs immediately after start-up.	Provides short term effectiveness by hydraulic containment and removal of VOCs immediately after start-up.
6. Implementability	No action does not require construction and is therefore, intrinsically implementable.	This alternative is implementable using conventional extraction and treatment technologies. Discharge to the TCAAP gravel pit will require regulatory and/or municipal cooperation and access from private parties for forcemain installation.	This alternative is implementable using conventional extraction and treatment technologies. Local municipalities are willing to accept treated water. Most readily implementable alternative.	This alternative is implementable using conventional extraction and treatment technologies. Would require forcemain construction through highly developed area or an exemption from Federal Transportation Department regulations.
7. Cost				
- Capital	$0	$2,764,000	$2,249,000	$6,521,000
- Annual O & M	$50,000	$258,000	$276,000	$366,000
- Present Worth[1]	$471,000	$5,196,000	$4,851,000	$9,971,000
8. State Acceptance	No action will not meet the requirements of CERCLA, SARA or the NCP and will not be acceptable to the State.	Consists of expansion of existing approved system. State acceptance likely contingent on addressing water management issues.	State acceptance is very likely in that it prevents further migration of VOCs and the treated water use by the municipalities represents good utilization of the groundwater resource.	The State is unlikely to accept this alternative because the discharge alternative does not represent good utilization of the groundwater resource.
9. Community Acceptance	It is unlikely that the community would accept the "no action" alternative.	Would provide additional remediation with temporary disturbance of some areas during construction. Community acceptance is unlikely, however, due to water discharge option.	Local municipalities are willing to use the treated water and to assist with implementation of Alternative 3.	Community acceptance is not unlikely due to the water discharge alternative.

Notes:

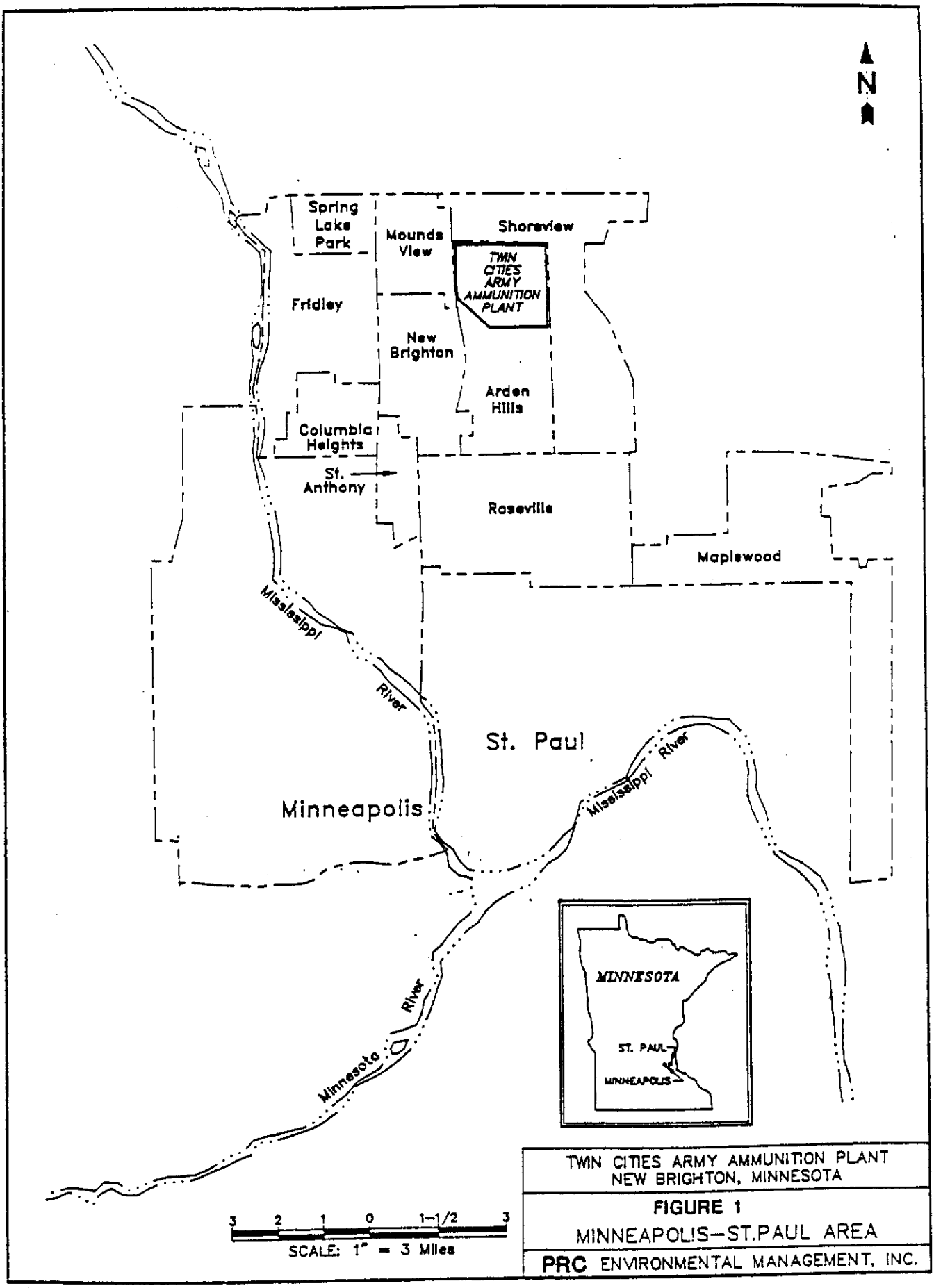
1. Present worth of capital and O & M costs for a 30 year period discounted 10%.

Table 12

TCAAP OU3 COST ESTIMATE
ALTERNATIVE 3:GROUNDWATER EXTRACTION, LOCAL TREATMENT & DISCHARGE

Item	Unit Price	Cost
CAPITAL COSTS		
Extraction wells (2)	$ 164,000	
Pumphouse with elec/ mech	$ 96,000	
Forcemain to treatment plant	$ 10,000	
Inorganics treatment plant	$ 562,000	
Granular carbon system	$1,391,000	
Effluent forcemain	$ 26,000	
TOTAL CAPITAL COST		$2,249,000
OPERATION AND MAINTENANCE COSTS		
Effluent monitoring	$ 12,000	
Groundwater monitoring	$ 50,000	
Electrical	$ 94,000	
Equipment maintenance	$ 44,000	
Carbon usage	$ 51,000	
Chemical costs	$ 25,000	
Total Annual Cost	$ 276,000	
PRESENT VALUE 30 years @ 10%		$2,602,000
TOTAL COST:		$4,851,000

APPENDIX B
FIGURES

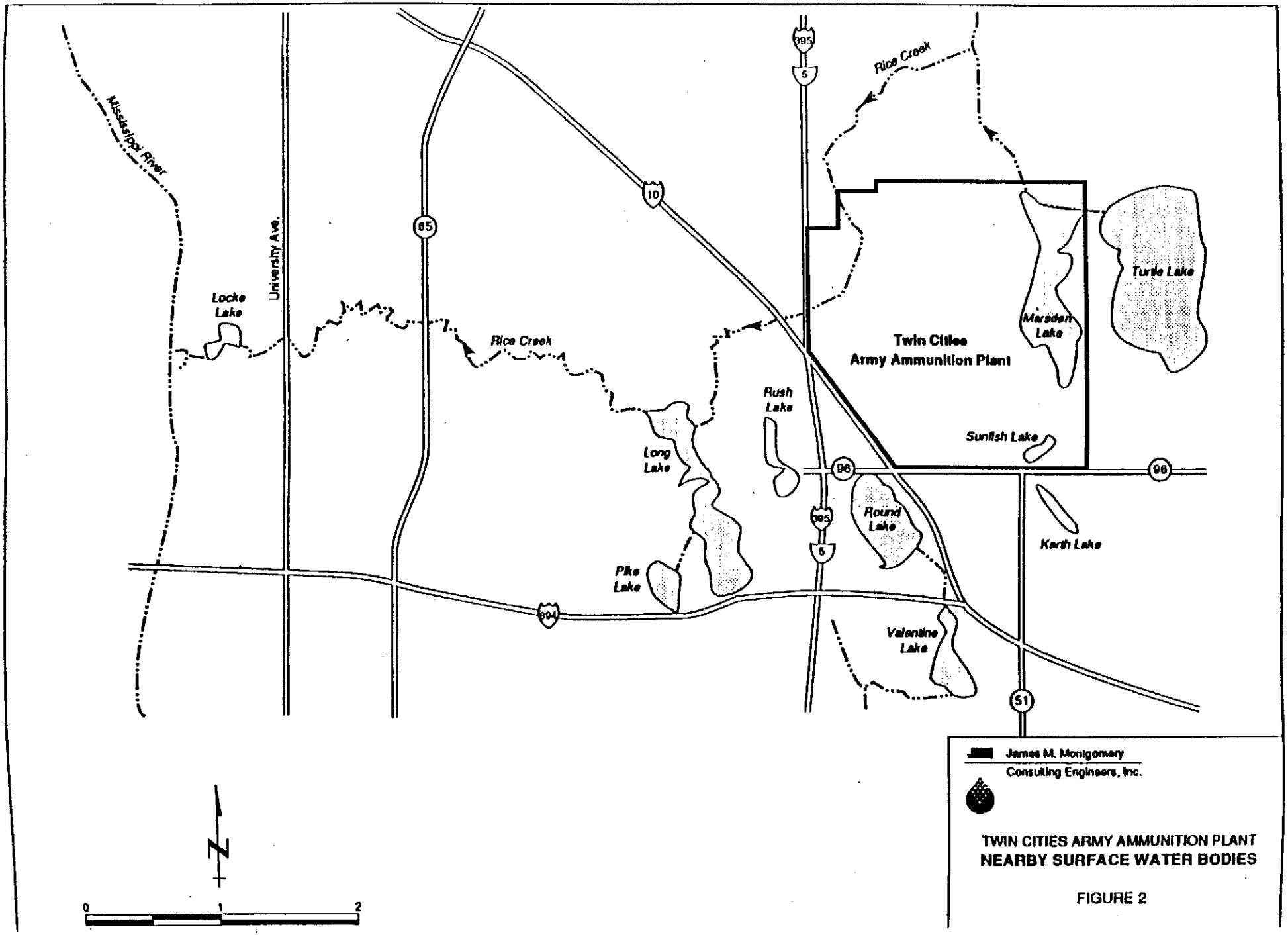


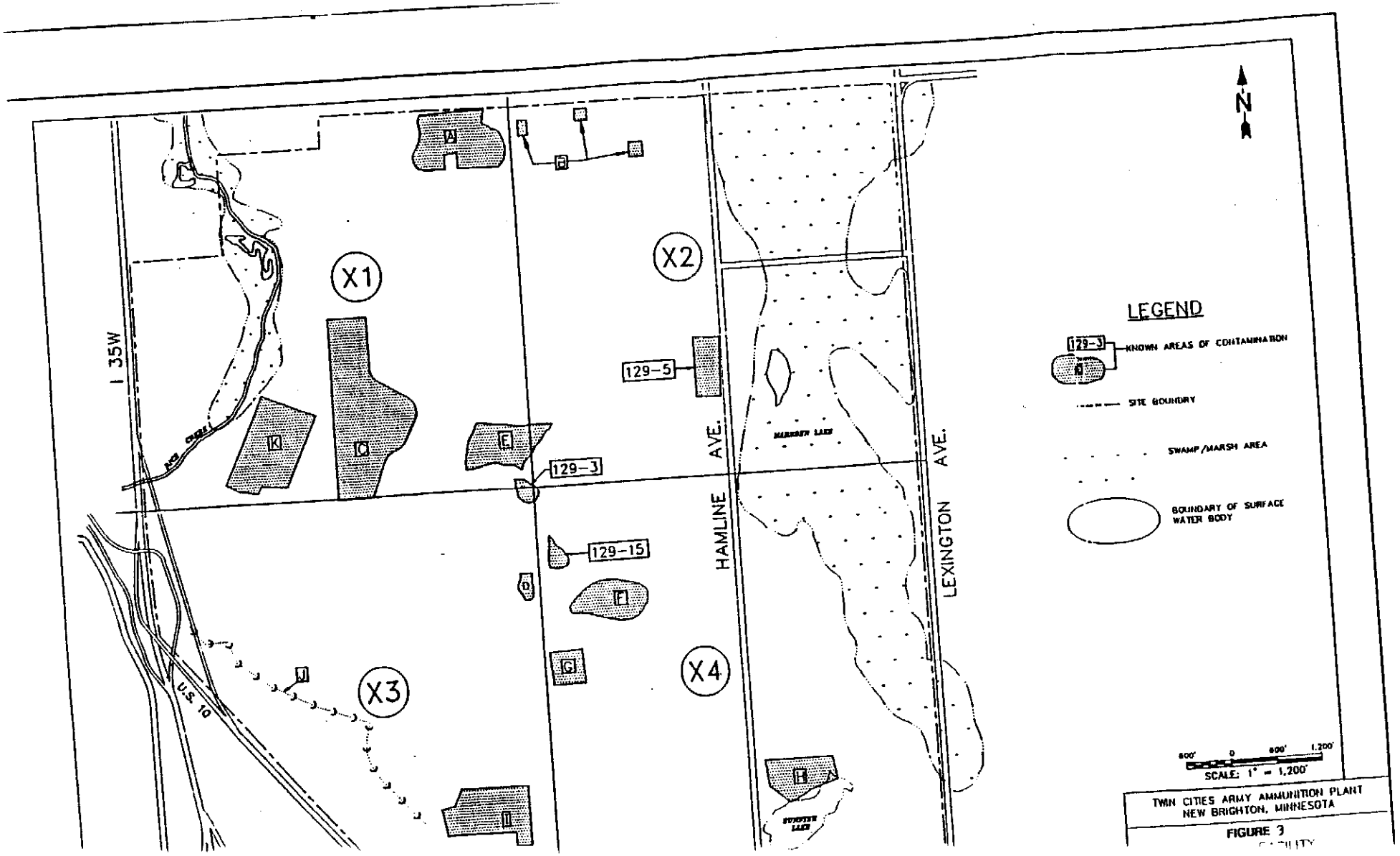
TWIN CITIES ARMY AMMUNITION PLANT
NEW BRIGHTON, MINNESOTA

FIGURE 1

MINNEAPOLIS–ST.PAUL AREA

PRC ENVIRONMENTAL MANAGEMENT, INC.


Mississippi River
University Ave.
Locke Lake
Rice Creek
Rice Creek
Rush Lake
Long Lake
Pike Lake
Round Lake
Sunfish Lake
Marsden Lake
Turtle Lake
Twin Cities Army Ammunition Plant
Karth Lake
Valentine Lake
35
10
5
35E
94
96
51
N
0
1
2
James M. Montgomery
Consulting Engineers, Inc.
TWIN CITIES ARMY AMMUNITION PLANT
NEARBY SURFACE WATER BODIES
FIGURE 2


I 35W
HAMLINE AVE.
LEXINGTON AVE.
X1
X2
X3
X4
A
B
C
D
E
F
G
H
I
J
K
129-3
129-5
129-15
U.S. 10
N
LEGEND
129-3
KNOWN AREAS OF CONTAMINATION
SITE BOUNDRY
SWAMP/MARSH AREA
BOUNDARY OF SURFACE WATER BODY
600' 0 600' 1,200'
SCALE: 1" = 1,200'
TWIN CITIES ARMY AMMUNITION PLANT
NEW BRIGHTON, MINNESOTA
FIGURE 3

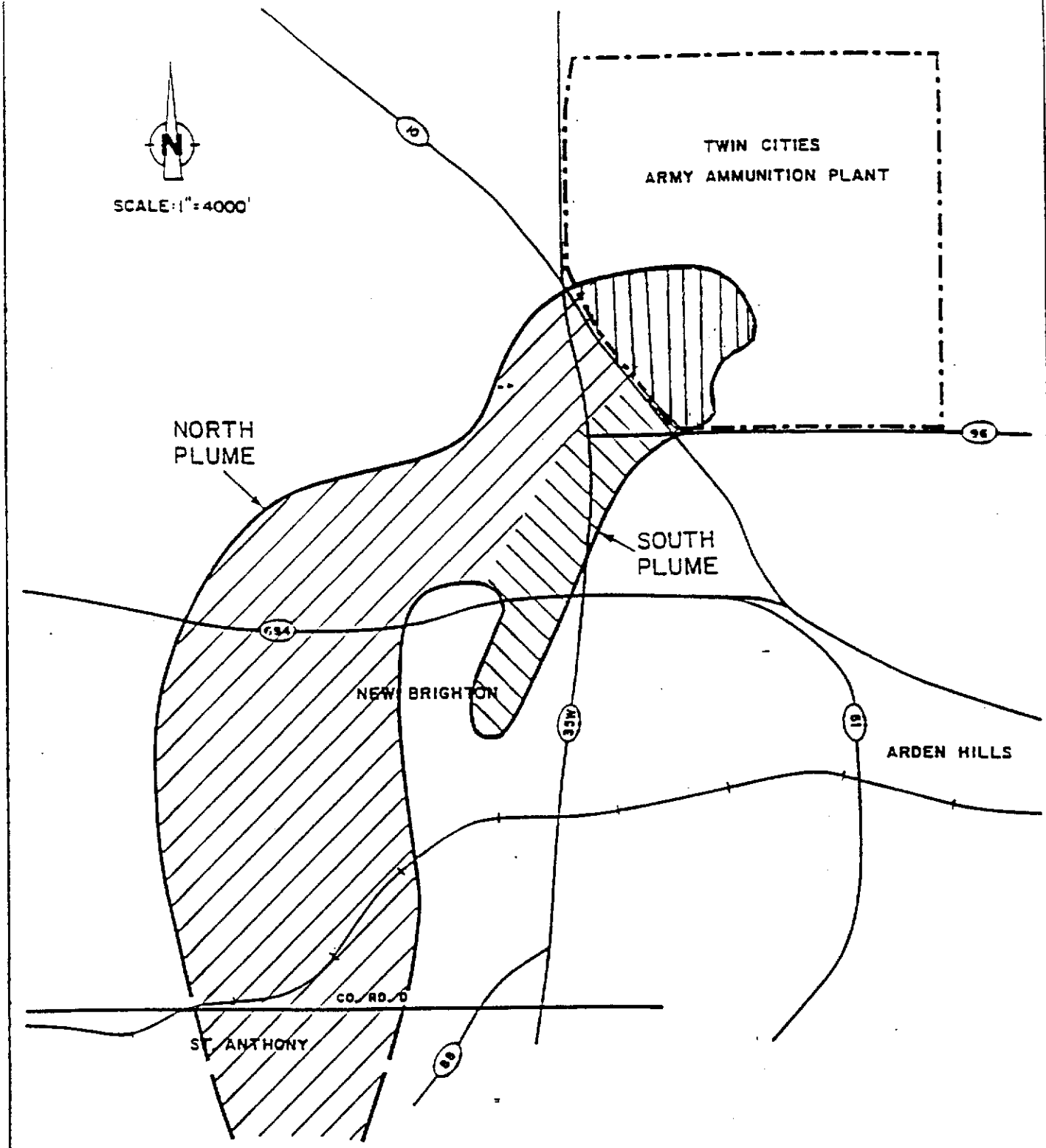
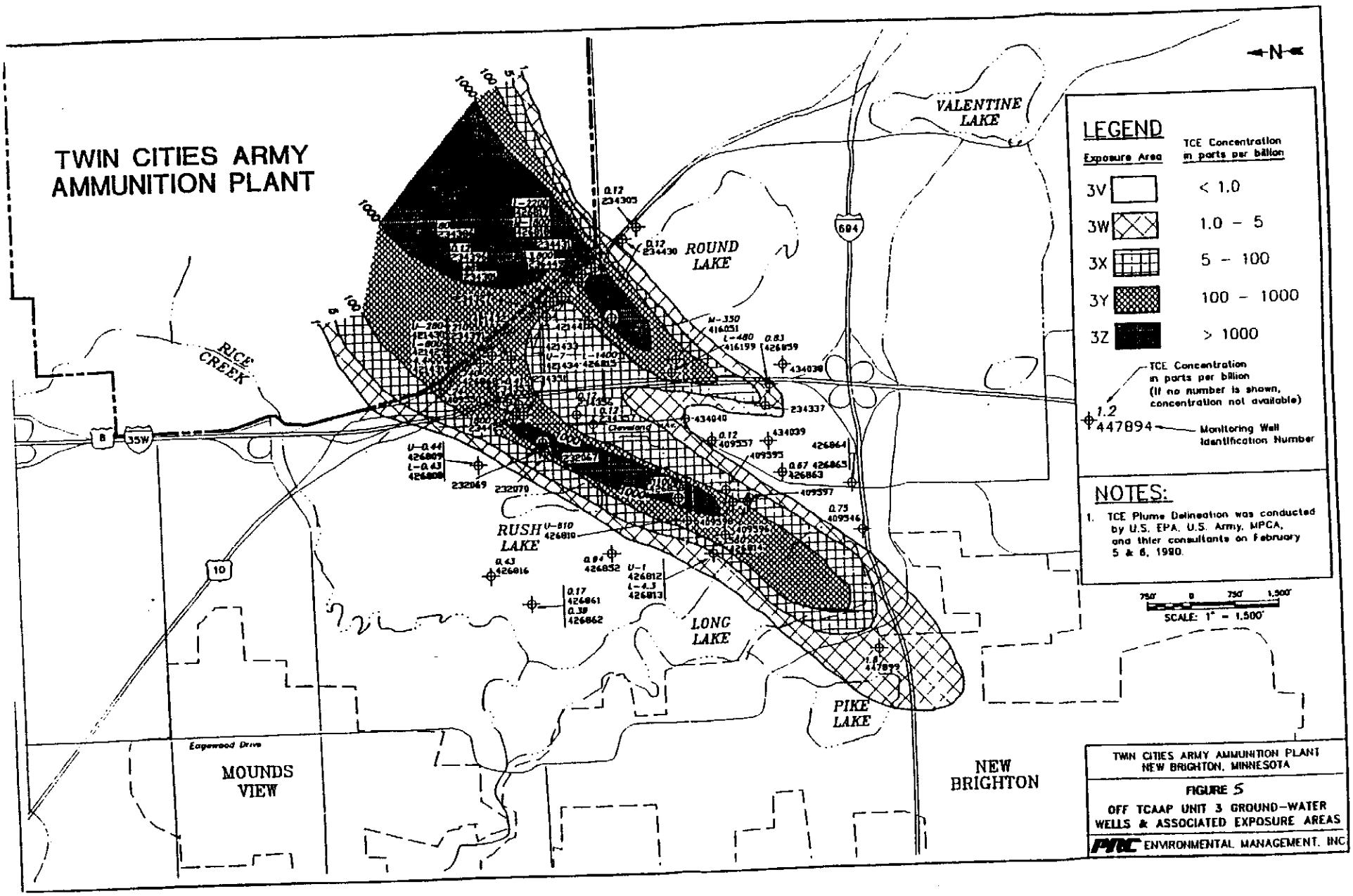


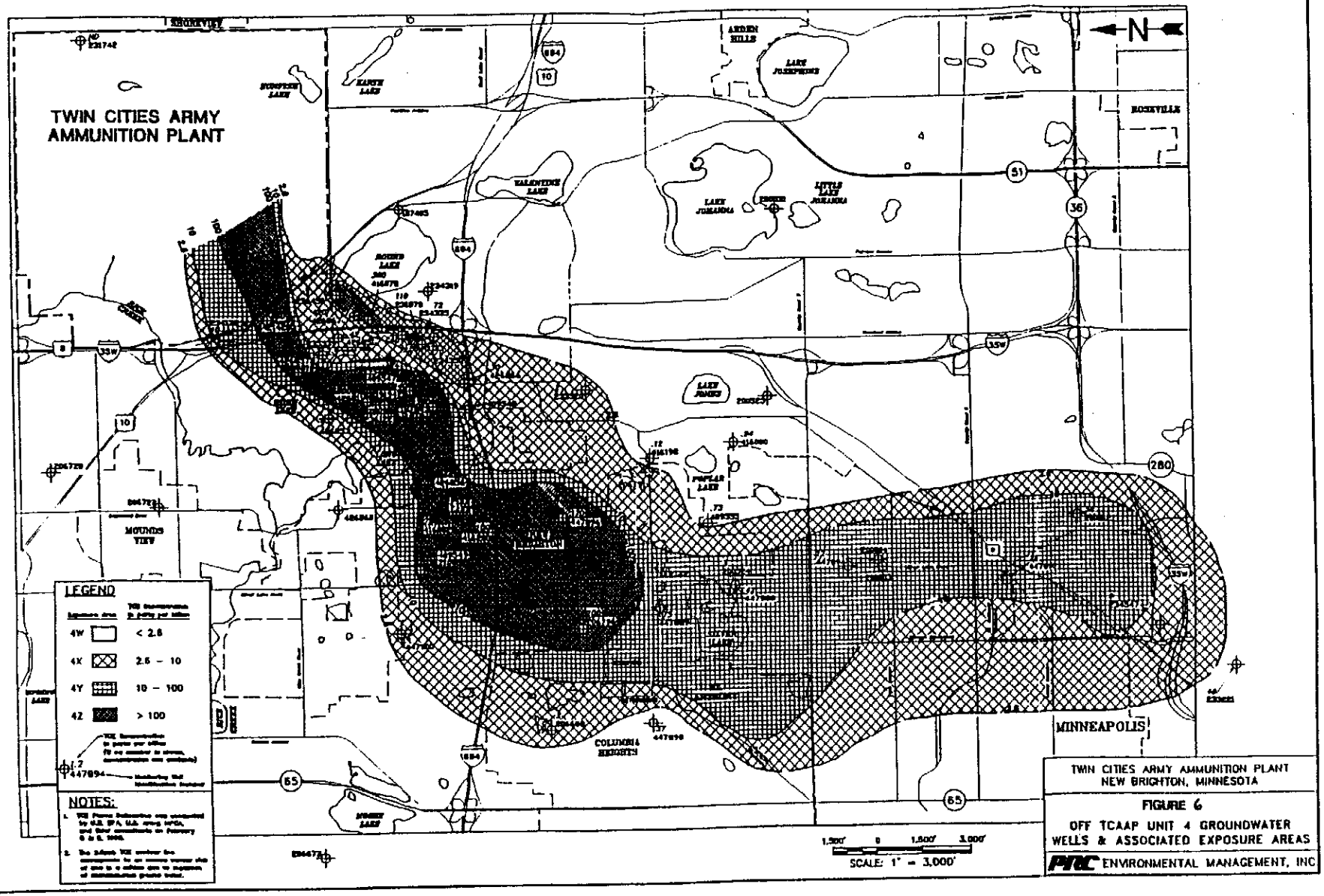
figure 4

CONCEPTUAL ILLUSTRATION OF THE
TCAAP NORTH AND SOUTH PLUMES
TCAAP OU3

CRA

3877-23/03/92-M


TWIN CITIES ARMY AMMUNITION PLANT
N
LEGEND
Exposure Area
TCE Concentration in parts per billion
3V < 1.0
3W 1.0 - 5
3X 5 - 100
3Y 100 - 1000
3Z > 1000
TCE Concentration in parts per billion (If no number is shown, concentration not available)
1.2
447894
Monitoring Well Identification Number
NOTES:
1. TCE Plume Delineation was conducted by U.S. EPA, U.S. Army, MPCA, and thier consultants on February 5 & 6, 1990.
SCALE: 1" = 1,500'
VALENTINE LAKE
ROUND LAKE
RICE CREEK
RUSH LAKE
LONG LAKE
PIKE LAKE
MOUNDS VIEW
NEW BRIGHTON
Edgewood Drive
694
35W
10
TWIN CITIES ARMY AMMUNITION PLANT
NEW BRIGHTON, MINNESOTA
FIGURE 5
OFF TCAAP UNIT 3 GROUND-WATER WELLS & ASSOCIATED EXPOSURE AREAS
ENVIRONMENTAL MANAGEMENT, INC.


TWIN CITIES ARMY AMMUNITION PLANT
N
LEGEND
4W < 2.6
4X 2.6 – 10
4Y 10 – 100
4Z > 100
NOTES:
MINNEAPOLIS
MOUNDS VIEW
COLUMBIA HEIGHTS
ROSEVILLE
ARDEN HILLS
SCALE: 1" = 3,000'
TWIN CITIES ARMY AMMUNITION PLANT
NEW BRIGHTON, MINNESOTA
FIGURE 6
OFF TCAAP UNIT 4 GROUNDWATER WELLS & ASSOCIATED EXPOSURE AREAS
ENVIRONMENTAL MANAGEMENT, INC

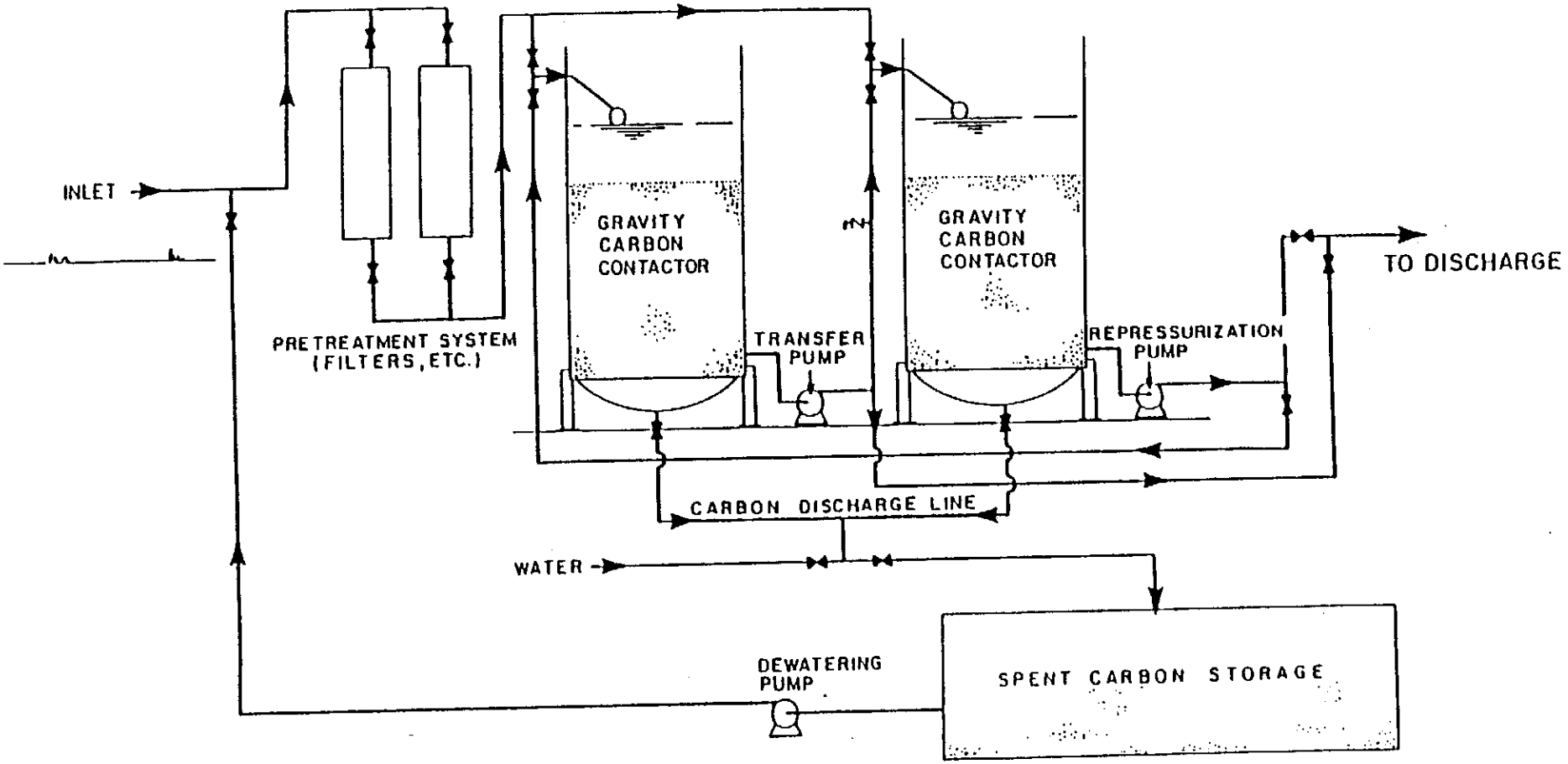


figure 7

CARBON TREATMENT SCHEMATIC
GRAVITY SYSTEM
TCAAP OU3

CRA

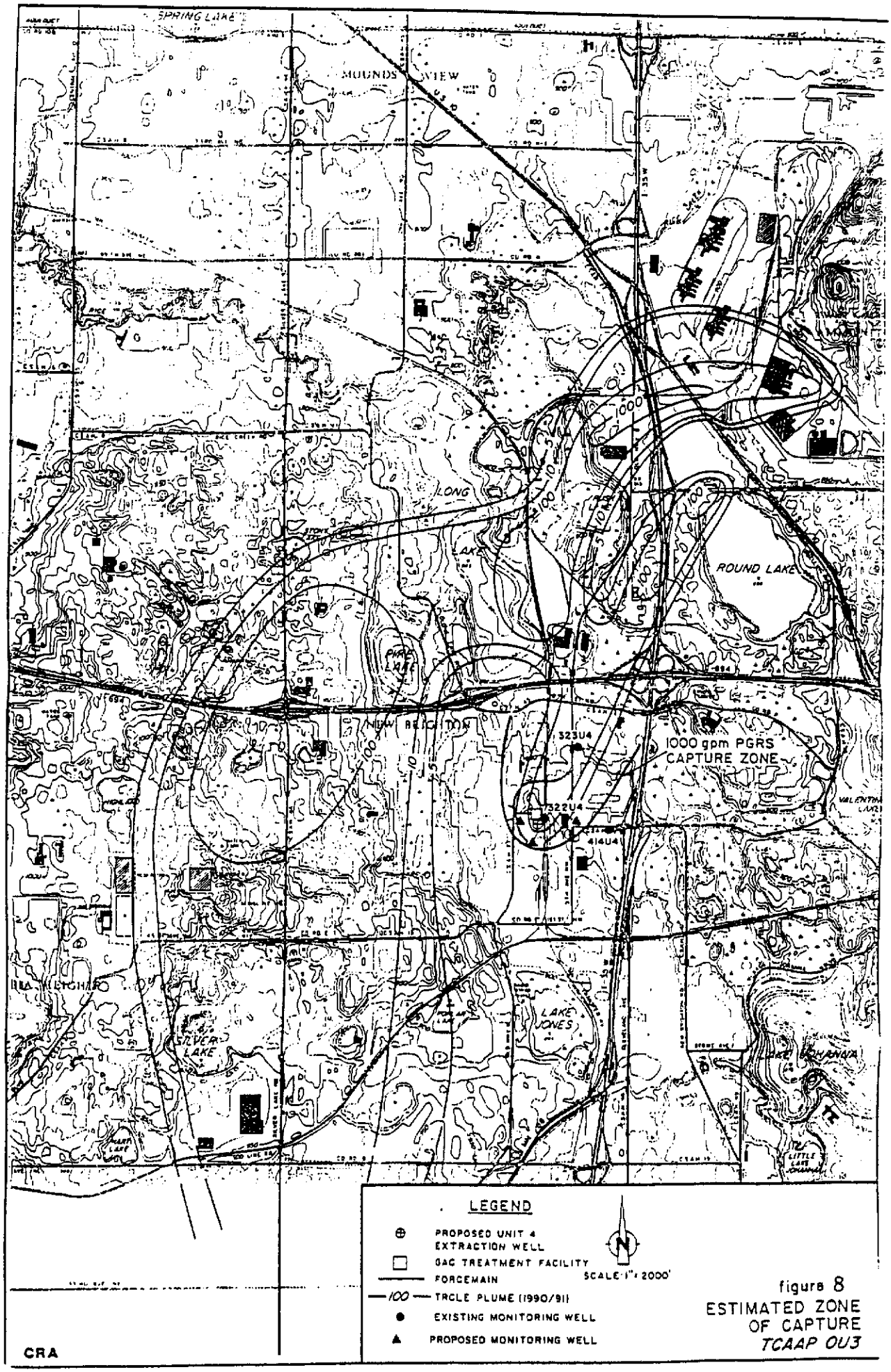


figure 8
ESTIMATED ZONE OF CAPTURE
TCAAP OU3

APPENDIX C
ADMINISTRATIVE RECORD INDEX

TWIN CITIES ARMY AMMUNITION PLANT
New Brighton, Minnesota

CERCLA ADMINISTRATIVE RECORD
New Brighton/Arden Hills NPL Site

ADMINISTRATIVE RECORD FILE:

FINAL REMEDIAL MEASURES

OPERABLE UNIT NO. 3

PLUME GROUNDWATER RECOVERY SYSTEM

Prepared by:

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Purchase Order No.: 1225-04
File No.:4008543/52765

July 28, 1992

TWIN CITIES ARMY AMMUNITION PLANT
New Brighton, Minnesota

CERCLA ADMINISTRATIVE RECORD
New Brighton/Arden Hills NPL Site

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I. Scope:

Operable Unit 3 - Installation of Plume Groundwater Recovery System (PGRS) to prevent further migration of volatile organic compounds in South plume from TCAAP.

II. Record of Decision:

Dated: Pending

Computer No.:

III. Index of Records Considered or Relied Upon

A. Site Specific Technical Reports

1. Chronological Listing

Description	Date	Computer No./Comments
United States Army Toxic & Hazardous Materials Agency (USATHAMA), Installation Assessment of Twin Cities Army Ammunition Plant, Report No. 129	October 1978	Cross Reference ROD #6; ERT #21; (03) 163696
Soil Exploration Co., Report of Hydrogeologic Study Former Northwest Petroleum Site Minnesota Transfer Railway Company Property (#120-5952)	October 1980	ERT #160; (03) 163772
Bionetics Corporation, Installation Assessment TCAAP Minnesota (Contract no. 68-03-2844) (TS-PIC-0066)	May 1981	(50) 510195
Soil Exploration Company, Study of Subsurface Contamination Federal Cartridge Corporation, TCAAP New Brighton, Minnesota (P.O. #1210-03) (Sec. #120-7709)	September 1981	ERT #23; (03) 163698
Soil Exploration Company, Subsurface Exploration for Soil and Groundwater Contamination, Honeywell, Inc., TCAAP New Brighton, Minnesota (P.O. #376434) (Sec. No. 120-7678-A)	September 30, 1981	ERT #24; (03) 163699
STS Consultants, Ltd., Review of Geologic and Hydrogeologic Data and Reports (STS Job #92765)	November 5, 1981	ERT #25; (03) 087847

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Bionetics Corporation, Potential Groundwater Contamination Sources, Twin Cities/New Brighton, Minnesota (Contract No. 68-03-2844) (TS-PIC-2001)	August 1982	ERT #26; (03) 163700
Bionetics Corporation, Potential Groundwater Contamination Sources, Twin Cities/New Brighton, Minnesota Addendum (Contract No. 68-03-2844) (TS-PIC-82001)	November 1982	ERT #27; (03) 163701
Ecology and Environmental, Inc. Field Investigation Uncontrolled Hazardous Waste Sites, FIT Project, Task Report to Environmental Protection Agency (TDD #F05-8206-01 and 03) (Contract no. 68-01-6056)	November 1, 1982	(03) 091997
Lockheed Engineering and Management Services Company, Inc., Aerial Photographic Analysis of Hazardous Waste Disposal Areas, Minnesota (Contract No. 68-03-3049)	January 1983	(50) 502901
CH2M Hill, Ecology & Environment, Inc. Final Remedial Action Master Plan New Brighton Area (EPA No. 01-5V40.0/W65140)	January 1983	Cross Ref. ROD #1; ERT # 165; (03) 163777
Bonestroo, Rosene, Anderlik & Associates, Inc./ Barr Engineering Co., Report on Water Supply System for St. Anthony, Minnesota	March 30, 1983	ERT #129; (03) 094678
STS Consultants Ltd., TCAAP Environmental Contamination Survey, Phase I Report, Volumes 1-3 (Rpt. No. DRXTH-AS-CR-83197)	May 16, 1983	Cross Reference ROD #6; ERT #29; (03) 087883; (03) 087882; (03) 087875

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Conestoga-Rovers & Associates, Inc. (CRA), Phase I - Sampling Program Storm Sewer Discharge Bldg. 103 TCAAP Environmental Investigation (Ref. no. 1219)	July 1983	ERT #83; (03) 087850
Conestoga-Rovers & Associates, Inc. (CRA), Final Report Phase I - PCB Sampling Program Bldg. 502 and Vicinity, TCAAP Environmental Investigation	September 1, 1983	ERT #96; (03) 087839
Conestoga-Rovers & Associates, Inc. (CRA), Final Report Phase I - Sampling Program Bldg. 103 Storm Sewer Discharge (Ref. no. 1244)	October 1983	ERT #84; (03) 087850
Conestoga-Rovers & Associates, Inc. (CRA), Phase II - Sampling Program Bldg. 502 and Vicinity, TCAAP Environmental Investigation (Ref. no. 1282)	November 24, 1983	ERT #99; (03) 097173
Conestoga-Rovers & Associates, Inc. (CRA), Final Report Remedial PCB Investigation/ Feasibility Study Bldg. 502 and Vicinity. TCAAP Environmental Investigation (Ref. no. 1282)	June 1984	ERT #102; (03) 087851 Includes comments by EPA
Roy F. Weston Inc., Twin Cities Army Ammunition Plant, Engineering Analysis of Alternative Remedial Action Measures, Phase III Report, Volumes I and II (Draft Report) (Contract DACA87-82C-0063) (Report No. DRXTH-AS-CR-84295)	June 4, 1984	Cross Reference ROD #8; ERT #33; (03) 087888

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
STS Consultants Ltd., Twin Cities Army Ammunition Plant, Environmental Contamination Survey, Phase II Report, Volumes I-V (Rpt. No. DRXTH-AS-CR-83197)	June 30, 1984	Cross Reference ROD #6; ERT #34; (03) 087881; (03) 087877; (03) 087879; (03) 087878; (03) 087878A
Building Technology, Inc., Historic Properties Report TCAAP, New Brighton, Minnesota (Final Report)	August 1984	ERT #52; (03) 097180
Conestoga-Rovers & Associates, Inc. (CRA), Remedial Investigation: Bldg. 103 Storm Sewer Discharge, TCAAP Environmental Investigation (Final Report) (Ref. No. 1281)	August 1984	ERT #86; (03) 087843; Includes MPCA comments
Conestoga-Rovers & Associates, Inc. (CRA), Remedial Feasibility Study Bldg. 502 Sewers TCAAP Environmental Investigation (Ref. #1251)	October 1984	ERT #106; (03) 097176
Conestoga-Rovers & Associates, Inc. (CRA), Bldg. 502 Baseline Study Assessment of Sewer Water and Sediment Quality, TCAAP Environmental Investigation (Ref. no. 1251)	October 1984	ERT #105; (03) 097177
Conestoga-Rovers & Associates, Inc. (CRA), Supplemental Remedial Investigation/ Feasibility Study, Bldg. 103, TCAAP Environmental Investigation (Ref. No. 1281)	December 1984	ERT #87; (03) 087845
Eugene A. Hickok and Associates, Potable Water Source Study, TCAAP	December 1984	ERT #65; (03) 097188

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Professional Services Group, Inc., TCAAP Sewer System Evaluation Survey, Interim Report	December 1984	ERT #79; (03) 097189
Conestoga-Rovers & Associates, Inc. (CRA), Remedial Work Plan Bldg. 103 TCAAP (Ref. No. 1496)	January 1985	ERT #88; (03) 087846
Camp, Dresser and McKee (CDM), Volume I - Work Plan Technical Submittal, New Brighton/ Arden Hills Force Main RI Phase I, New Brighton, Minnesota	January 1985 (19867)	ERT #141; (04) 156157
Conestoga-Rovers & Associates, Inc. (CRA), Addendum to Supplemental RI/FS, Bldg. 103 TCAAP (Ref. No. 1281)	January 11, 1985	ERT #89; (03) 163745
CH2M Hill, Ecology & Environment, Preliminary Survey of Industrial Waste Disposal Practices for the New Brighton/Arden Hills, Ramsey County, Minnesota Area (FIT 5 Report)	February 1985	ERT #43; (03) 087858
Camp Dresser and McKee (CDM), Project Operation Plan for New Brighton/Arden Hills, Minnesota Multi-Point Source Remedial Investigation	February 1985	(04) 300860
Conestoga-Rovers & Associates, Inc. (CRA), Final Engineering Report Sewer Grouting Program Bldg. 103 TCAAP (Ref. no. 1496)	March 1985	ERT #90; (03) 097174
Conestoga-Rovers & Associates, Inc. (CRA), Final Engineering Report Sewer Cleaning Program Bldg. 502 TCAAP, Text, Appendices A, B, C, D	March 29, 1985	ERT #109; (03) 097182

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Conestoga-Rovers & Associates, Inc. (CRA), Final Engineering Report Sewer Cleaning Program Bldg. 502, Appendices E, F, G	March 29, 1985	ERT #110; (03) 097185
STS D'Appolonia Ltd., Work Plan Groundwater Remedial Action Alternatives Analysis (Project No. 92797K)	April 1985	ERT #41; (03) 087895
Conestoga-Rovers & Associates, Inc. (CRA), VOC Remedial Investigation, Bldg. 502 and Vicinity, TCAAP Environmental Investigation	April 3, 1985	ERT #108; (03) 163753
Camp, Dresser and McKee (CDM), Work Plan for New Brighton Municipal Well No. 7 Phased Feasibility Study, New Brighton, Minnesota (Doc. #108-WP1-WP BBJK-1) (Work Assignment No. 102-5L40) (Draft)	May 1, 1985	(04) 300746
Camp, Dresser and McKee (CDM), Work Plan for New Brighton/Arden Hills Generic Technical Support for Document Review, New Brighton, Minnesota (Doc. #108-WP1-BBNQ-1) (Work Assignment #102-5L40) (Draft)	May 8, 1985	(04) 300567
Camp, Dresser & McKee (CDM), New Brighton-Arden Hills Phase I Multi-Point Source Remedial Investigation and Appendices	May 21, 1985	Cross Reference ROD #4 and #5; ERT #48; (03) 087859; (03) 087857; includes Phase I report revisions dated 10/24/86

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
STS Consultants, Ltd., TCAAP Bedrock Valley Survey, Volume I (Contamination Report), Volume II (Geotechnical Report), and Volume III (Geotechnical Appendix) (Report Nos. AMXTH-AS-CR-85020; AMXTH-AS-CR-85019; AMXTH-AS-CR-850) (Draft Final Report)	June 7, 1985	ERT #40; (03) 163707; (03) 163708; (03) 163709
Memorandum from Paul Goudreault, MPCA, re: MPCA/Honeywell/Army Sample Splits 2/11-22/85	June 25, 1985	(50) 509518
Bison Instruments, Inc. Geophysical Investigation TCAAP Site G, New Brighton, Minnesota (Bison Job # SJ 308)	July-August 1985	ERT #54; (03) 163719
Conestoga-Rovers & Associates, Inc. (CRA), Off-TCAAP Study, Phase I: 96-10-8 Triangle (Ref. No. 1500)	September 1985	ERT #50
Conestoga-Rovers & Associates, Inc. (CRA), Final Response Action Plan PCB Remediation Bldg. 502 TCAAP (Ref. No. 1482)	October 1985	ERT #111; (03) 097183
Minnesota Department of Health, Feasibility of Community-Wide Epidemiologic Studies of Drinking Water and Health St. Louis Park and New Brighton, Minn.	December 31, 1985	ERT #53; (03) 163718;
Donohue & Associates, Inc., Trio Solvent Site Remedial Investigation, Volumes 1-3	January 1986	ERT #55; (03) 163720; (03) 163721; (03) 163722

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Conestoga-Rovers & Associates, Inc. (CRA), Extraction Well Pump Test Report (EW542U3), Bldg. 502, TCAAP Groundwater Remediation Program (Ref. 1499)	February 1986	ERT #113; (03) 163755
STS Consultants, Ltd., Installation Restoration Program, Twin Cities Army Ammunition Plant, Groundwater Remedial Action Alternatives Analysis (GRAAA) (Draft Final Report) (AMXTH-AS-CR-86065)	February 1986	Cross Reference ROD #6; ERT #56; (03) 163723
U.S. Environmental Protection Agency (EPA) Comprehensive Summary Report, Potential Groundwater Contamination Sources, TCAAP and New Brighton, Minn., Volume 1 and 2 (TS-PIC-85001M)	February 1986	ERT #22; (03) 163697; (03) 163697A
Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell, Groundwater Remediation Program Plan (GRPP) (Ref. DAAA09-86-R-0416)	June 18, 1986	Cross Reference ROD #6; ERT #218; (03) 202177
Professional Services Group, Inc., TCAAP Phase II Sewer System Remedial Action, Final Report, Volumes I and II and Addendum	July 1986	(03) 192477; (03) 192478; (03) 192479
Braun Environmental Laboratories, Ground Water Investigation, Northwest Quadrant of I-694 and I-35W, New Brighton, Minn. (E86-080)	July 24, 1986	(04) 162560
Conestoga-Rovers & Associates, Inc. (CRA), Quality Assurance Project Plan (QAPP) Off-TCAAP Study (Ref. No. 1695)	November 26, 1986	ERT #150; (03) 163607

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Camp, Dresser and McKee (CDM), Final Report Phased Feasibility Study for St. Anthony, Minnesota (Doc. #108-FS2-RT-DCTC-1) (Work Assignment #102-5L40.10)	December 10, 1986	ERT #152; (03) 163763
Conestoga-Rovers & Associates, Inc. (CRA), Off-TCAAP, Phase II, Old Northwest Refinery Site, Data Report (Ref. No. 1638)	February 1987	ERT #97
Conestoga-Rovers & Associates, Inc. (CRA), Off-TCAAP, Phase II, Herbst Landfill, Data Report (Ref. No. 1638)	February 1987	ERT #196; (03) 167612
Petrex, Final Report For The Findings of the Petrex Soil Gas Survey at TCAAP, Site "F" in Arden Hills, Minnesota	February 1987	(03) 192491
Conestoga-Rovers & Associates, Inc. (CRA), Off-TCAAP, Phase I: 96-10-8 Triangle Supplement Report (Ref. No. 1695)	February 17, 1987	ERT #195; (03) 167611
STS Consultants Ltd., Electromagnetic Inductance and Ground Probing Radar Survey, TCAAP Site F, (Project no. 92797-S)	February 18, 1987	ERT #180; (03) 163787
Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell, BGRS Extraction Well Pumping Test Report (Draft Final Report) (Contract #DAAA09-76-E-0030)	April 1, 1987	(03) 163783; ERT #176
Conestoga-Rovers & Associates, Inc. (CRA), Off-TCAAP, Phase II, Old Miller Dump Site, Data Report (Ref. No. 1638)	April 1987	ERT #190; (03) 163800

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell, Off-TCAAP Study, Phase III: Plume Definition Report	August 5, 1987	(03) 171378; ERT #205 (Maps located separately)
Federal Facility Agreement (FFA), between Army, U.S. EPA and MPCA	August 12, 1987	Cross Reference ROD #7; (03) 169131
International Technology Corporation, Letter Report Trichloroethylene Permeability Study, Twin Cities Till Project (Project no. 303301)	September 2, 1987	(03) 198628
U.S. EPA, Record of Decision (ROD) for Gradient Control System, for TCAAP	Sept. 25, 1987	Cross Reference ROD #7
Camp, Dresser and McKee (CDM), Remedial Design Work Plan for Alternative Water Supply Volume I - Technical Submittal for New Brighton/Arden Hills (Doc. #108-PPI-WP-FJGP-1) (Work Assignment No. 420-5N40)	October 1987	(04) 162919
Delta Environmental Consultants, Final Remedial Investigation Trio Solvent, New Brighton, Minn. (Delta no. 10-87-068)	October 26, 1987	ERT #208; (03) 178253
Conestoga-Rovers & Associates, Inc. (CRA), IRP-BGRS, Quality Assurance Project Plan (QAPP) IRA Monitoring Program TCAAP (Contract No. DAA09-76-E-0030)	November 1987	(03) 178575
Argonne National Laboratory (ANL), Preliminary Assessment for Twin Cities Army Ammunition Plant	February 1988	Cross Reference ROD #10; (03) 193032

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell, IRA-BGRS Water Balance Report (Final Report) (Contract #DAA09-76-E-0030)	February 18, 1988	(03)192821
Conestoga-Rovers & Associates, Inc. (CRA), IRA-BGRS Monitoring Plan (Final Report) (Contract No. DAA09-76-E-0030)	February 19, 1988	(03) 192820
STS Consultants Ltd., IRP-TCAAP Contamination Sources Remedial Investigation, Shallow Gas Exploration Site C-1; Site E (Grid-1); Site E (Grid E-2); Site F (Grid F-1); Site FG; Site H (Grid H-1); and Site H (Grid H-2)	April 1988	(04) 300707
Camp, Dresser and McKee (CDM), Design Report for New Brighton/Arden Hills, St. Anthony, Minnesota Remedial Design, St. Anthony, Minnesota (Doc. #108-DE1-RT-GBRL-1) (Work Assignment #420-5N40)	May 1988	(04) 300861
Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell/Army, IRA-BGRS Performance Assessment Report	May 1988	(03) 197363; ERT #211
Argonne National Laboratory (ANL), Installation Restoration Program: Remedial Investigation Work Plan for TCAAP (AMXTH-IR-CR-88003) (ANL/EES-LD-5) (Final Report)	June 1988	ERT #219; (03) 202611
Minnesota Geophysical Associates, Inc., Results of Borehole Geophysics and Video Inspections, Off-Post Study TCAAP	August-November 1988	(04) 302257

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Camp, Dresser and McKee (CDM), Final Remedial Investigation Report, New Brighton/ Arden Hills TCAAP Force Main, New Brighton, Minnesota (Doc. No. 108-RI1-RT-GSWG-1) (Work Assignment No. 102-5L40)	December 1988	ERT #247; (03) 212395
Conestoga-Rovers & Associates, Inc. (CRA), Focused Feasibility Study (FFS), TCAAP Plume Groundwater Recovery System (PGRS) (Draft) (Ref. No. 2738)	June 21, 1989	(04) 3010401; (04) 301190; includes EPA/MPCA comments
Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell, IRA-BGRS Annual Monitoring Plan - Volumes 1 & 2 (Final Report) (Contract #DAA09-76-E-0030)	October 1989	(04) 303026; Draft Report not included; Draft located at (04) 300602-03
Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell, Aquifer Characterization Study, Off TCAAP Study, Phase III: Supplement (Ref. No. 1119)	November 1, 1989	(03) 212996; ERT #254
Wenck Associates, Inc., Installation Restoration Program TCAAP 1989 Annual Monitoring Report, Volumes 1-3 (Final Report)	May 1990	Includes comments by MPCA
Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell, IRA-TGRS 1989 Annual Monitoring Plan - Volumes 1 & 2 (Draft Final Report) (Contract #DAA09-76-E-0030)	May 21, 1990	(03) 218320; (03) 218321 ERT #269, #270; Draft Final dated April, 1990 not included.

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Camp Dresser and McKee (CDM), Inc., Phase IA Final Report, New Brighton/Arden Hills, Minnesota, Multi-Point Source Ground Water Remediation Investigation	February 1991	Maps Separate (03) 222174; ERT #284; ERT #285
Argonne National Laboratory (ANL), Installation Program, Remedial Investigation Report for the Twin Cities Army Ammunition Plant, Volumes 1-4 (CETHA-IR-CR-91015)	April 1991	
PRC Environmental Management, Inc., Final Report: Human Health Risk Assessment, New Brighton/ Arden Hills Superfund Site Including Twin Cities Army Ammunition Plant, Ramsey County, MN, Volumes I-II (Work Assignment No. 04-5140) (ARCS 68-W8-0084)	April 1991	
Conestoga-Rovers & Associates, Inc. (CRA)/ Alliant Techsystems, Inc., IRA-TGRS, Site I and Site K, 1990 Annual Monitoring Report Volumes 1 and 2 (Contract no. DAA09-76-E-0030) (Final Report)	July 1991	
Wenck Associates, Inc., Installation Restoration Program, Twin Cities Army Ammunition Plant Fiscal Year 1990 Annual Monitoring Report	July 1991	Maps separate
United States Army Environmental Hygiene Agency, Ecological Assessment TCAAP, New Brighton, Minn. February 1, 1990-April 1, 1991 and Appendices	October 4, 1991	

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
James M. Montgomery, Consulting Engineers Twin Cities Army Ammunition Plant Water Management Study, Phase II	December 1991	
Conestoga-Rovers & Associates, Inc. (CRA)/ Barr Engineering, PGRS Design Data Collection Study	March 1992	
Engineering Technologies Associates, Inc., Ground Water Model In Support of the Feasibility Study - Modeling Progress (Contract No. DAAA-15-89-D-0009/0004)	April 7, 1992	
Conestoga-Rovers & Associates, Inc. (CRA), Operable Unit 3 Feasibility Study (Ref. No. 3877(4))	May 14, 1992	Not computerized
Sampling, testing data, chain of custody forms, quality control and quality assurance documentation for referenced reports or studies is available from U.S. Army Toxic & Hazardous Materials Agency (USATHAMA), Aberdeen Proving Ground, Maryland 21010-5401; Conestoga-Rovers & Associates, Inc. (CRA), 1801 Old Highway 8, St. Paul, Minnesota. Contact TCAAP remedial project manager for further information and access to these records.	N/A	Exempt from administrative record file requirements pursuant to 40 C.F.R. § 300.805(a)(1).

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
A. Site Specific Technical Reports		
2. Alphabetical Listing.		
Argonne National Laboratory (ANL), Preliminary Assessment for Twin Cities Army Ammunition Plant	February 1988	Cross Reference ROD #10; (03) 193032
Argonne National Laboratory (ANL), Installation Restoration Program: Remedial Investigation Work Plan for TCAAP (AMXTH-IR-CR-88003) (ANL/EES-LD-5) (Final Report)	June 1988	ERT #219; (03) 202611
Argonne National Laboratory (ANL), Installation Program, Remedial Investigation Report for the Twin Cities Army Ammunition Plant, Volumes 1-4 (CETHA-IR-CR-91015)	April 1991	
Bionetics Corporation, Installation Assessment TCAAP Minnesota (Contract no. 68-03-2844) (TS-PIC-0066)	May 1981	(50) 510195
Bionetics Corporation, Potential Groundwater Contamination Sources, Twin Cities/New Brighton, Minnesota (Contract No. 68-03-2844) (TS-PIC-2001)	August 1982	ERT #26; (03) 163700
Bionetics Corporation, Potential Groundwater Contamination Sources, Twin Cities/New Brighton, Minnesota Addendum (Contract No. 68-03-2844) (TS-PIC-82001)	November 1982	ERT #27; (03) 163701

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Bison Instruments, Inc. Geophysical Investigation TCAAP Site G, New Brighton, Minnesota (Bison Job # SJ 308)	July-August 1985	ERT #54; (03) 163719
Bonestroo, Rosene, Anderlik & Associates, Inc./ Barr Engineering Co., Report on Water Supply System for St. Anthony, Minnesota	March 30, 1983	ERT #129; (03) 094678
Braun Environmental Laboratories, Ground Water Investigation, Northwest Quadrant of I-694 and I-35W, New Brighton, Minn. (E86-080)	July 24, 1986	(04) 162560
Building Technology, Inc., Historic Properties Report TCAAP, New Brighton, Minnesota (Final Report)	August 1984	ERT #52; (03) 097180
Camp, Dresser and McKee (CDM), Volume I - Work Plan Technical Submittal, New Brighton/ Arden Hills Force Main RI Phase I, New Brighton, Minnesota	January 1985 (1986?)	ERT #141; (04) 156157
Camp Dresser and McKee (CDM), Project Operation Plan for New Brighton/Arden Hills, Minnesota Multi-Point Source Remedial Investigation	February 1985	(04) 300860
Camp, Dresser and McKee (CDM), Work Plan for New Brighton Municipal Well No. 7 Phased Feasibility Study, New Brighton, Minnesota (Doc. #108-WP1-WP BBJK-1) (Work Assignment No. 102-5L40) (Draft)	May 1, 1985	(04) 300746

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Camp, Dresser and McKee (CDM), Work Plan for New Brighton/Arden Hills Generic Technical Support for Document Review, New Brighton, Minnesota (Doc. #108-WP1-BBNQ-1) (Work Assignment #102-5L40) (Draft)	May 8, 1985	(04) 300567
Camp, Dresser & McKee (CDM), New Brighton-Arden Hills Phase I Multi-Point Source Remedial Investigation and Appendices	May 21, 1985	Cross Reference ROD #4 and #5; ERT #48; (03) 087859; (03) 087857; includes Phase I report revisions dated 10/24/86
Camp, Dresser and McKee (CDM), Final Report Phased Feasibility Study for St. Anthony, Minnesota (Doc. #108-FS2-RT-DCTC-1) (Work Assignment #102-5L40.10)	December 10, 1986	ERT #152; (03) 163763
Camp, Dresser and McKee (CDM), Remedial Design Work Plan for Alternative Water Supply Volume I - Technical Submittal for New Brighton/Arden Hills (Doc. #108-PPI-WP-FJGP-1) (Work Assignment No. 420-5N40)	October 1987	(04) 162919
Camp, Dresser and McKee (CDM), Design Report for New Brighton/Arden Hills, St. Anthony, Minnesota Remedial Design, St. Anthony, Minnesota (Doc. #108-DE1-RT-GBRL-1) (Work Assignment #420-5N40)	May 1988	(04) 300861

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Camp, Dresser and McKee (CDM), Final Remedial Investigation Report, New Brighton/ Arden Hills TCAAP Force Main, New Brighton, Minnesota (Doc. No. 108-RI1-RT-GSWG-1) (Work Assignment No. 102-5L40)	December 1988	ERT #247; (03) 212395
Camp Dresser and McKee (CDM), Inc., Phase IA Final Report, New Brighton/Arden Hills, Minnesota, Multi-Point Source Ground Water Remediation Investigation	February 1991	Maps Separate (03) 222174; ERT #284; ERT #285
CH2M Hill, Ecology & Environment, Inc. Final Remedial Action Master Plan New Brighton Area (EPA No. 01-5V40.0/W65140)	January 1983	Cross Ref. ROD #1; ERT # 165; (03) 163777
CH2M Hill, Ecology & Environment, Preliminary Survey of Industrial Waste Disposal Practices for the New Brighton/Arden Hills, Ramsey County, Minnesota Area (FIT 5 Report)	February 1985	ERT #43; (03) 087858
Conestoga-Rovers & Associates, Inc. (CRA), Phase I - Sampling Program Storm Sewer Discharge Bldg. 103 TCAAP Environmental Investigation (Ref. no. 1219)	July 1983	ERT #83; (03) 087850
Conestoga-Rovers & Associates, Inc. (CRA), Final Report Phase I - PCB Sampling Program Bldg. 502 and Vicinity, TCAAP Environmental Investigation	September 1, 1983	ERT #96; (03) 087839

III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Conestoga-Rovers & Associates, Inc. (CRA), Final Report Phase I - Sampling Program Bldg. 103 Storm Sewer Discharge (Ref. no. 1244)	October 1983	ERT #84; (03) 087850
Conestoga-Rovers & Associates, Inc. (CRA), Phase II - Sampling Program Bldg. 502 and Vicinity, TCAAP Environmental Investigation (Ref. no. 1282)	November 24, 1983	ERT #99; (03) 097173
Conestoga-Rovers & Associates, Inc. (CRA), Final Report Remedial PCB Investigation/ Feasibility Study Bldg. 502 and Vicinity. TCAAP Environmental Investigation (Ref. no. 1282)	June 1984	ERT #102; (03) 087851 Includes comments by EPA
Conestoga-Rovers & Associates, Inc. (CRA), Remedial Investigation: Bldg. 103 Storm Sewer Discharge, TCAAP Environmental Investigation (Final Report) (Ref. No. 1281)	August 1984	ERT #86; (03) 087843; Includes MPCA comments
Conestoga-Rovers & Associates, Inc. (CRA), Remedial Feasibility Study Bldg. 502 Sewers TCAAP Environmental Investigation (Ref. #1251)	October 1984	ERT #106; (03) 097176
Conestoga-Rovers & Associates, Inc. (CRA), Bldg. 502 Baseline Study Assessment of Sewer Water and Sediment Quality, TCAAP Environmental Investigation (Ref. no. 1251)	October 1984	ERT #105; (03) 097177
Conestoga-Rovers & Associates, Inc. (CRA), Supplemental Remedial Investigation/ Feasibility Study, Bldg. 103, TCAAP Environmental Investigation (Ref. No. 1281)	December 1984	ERT #87; (03) 087845

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Description	Date	Computer No./Comments
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Description	Date	Computer No./Comments
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Conestoga-Rovers & Associates, Inc. (CRA), Off-TCAAP, Phase II, Old Northwest Refinery Site, Data Report (Ref. No. 1638)	February 1987	ERT #97
Conestoga-Rovers & Associates, Inc. (CRA), Off-TCAAP, Phase II, Herbst Landfill, Data Report (Ref. No. 1638)	February 1987	ERT #196; (03) 167612
Conestoga-Rovers & Associates, Inc. (CRA), Off-TCAAP, Phase I: 96-10-8 Triangle Supplement Report (Ref. No. 1695)	February 17, 1987	ERT #195; (03) 167611
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Description	Date	Computer No./Comments
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Conestoga-Rovers & Associates, Inc. (CRA), IRP-BGRS, Quality Assurance Project Plan (QAPP) IRA Monitoring Program TCAAP (Contract No. DAA09-76-E-0030)	November 1987	(03) 178575
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Description	Date	Computer No./Comments
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Conestoga-Rovers & Associates, Inc. (CRA)/ Honeywell, IRA-TGRS 1989 Annual Monitoring Plan - Volumes 1 & 2 (Draft Final Report) (Contract #DAA09-76-E-0030)	May 21, 1990	(03) 218320; (03) 218321 ERT #269, #270; Draft Final dated April, 1990 not included.
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Description	Date	Computer No./Comments
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III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
Sampling, testing data, chain of custody forms, quality control and quality assurance documentation for referenced reports or studies is available from U.S. Army Toxic & Hazardous Materials Agency (USATHAMA), Aberdeen Proving Ground, Maryland 21010-5401; Conestoga-Rovers & Associates, Inc. (CRA), 1801 Old Highway 8, St. Paul, Minnesota. Contact TCAAP remedial project manager for further information and access to these records.	N/A	Exempt from administrative record file requirements pursuant to 40 C.F.R. § 300.805(a)(1).
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Description	Date	Computer No./Comments
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III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
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III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
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III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
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III. Index of Records Considered or Relied Upon (continued)

Description	Date	Computer No./Comments
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Willenbring P. R., E. A. Hickok, and W. D. Lueidenbacker, E. A. Hickok and Associates, Non-Point Source Pollution in the Rice Creek Watershed District -- The Results of 10 Years of Water Quality Monitoring, Wayzata, Minnesota		
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Wright, H. E. Jr. 1972, "Quaternary History of Minnesota": In Sims and Morey, Geology of Minnesota: A Centennial Volume, p. 515-547	1972	
Zandlo, J. A., Minnesota Department of Natural Resources, State Climatology Office, Western and South Central Twin Cities Flash Flood, July 23-24	1987	

IV. National Resource Damage Documentation

Description	Date	Computer No./Comments
Letter from Tom Barounis, EPA, to Martin McCleery, TCAAP	July 16, 1992	

V. Public Participation Documentation

Description	Date	Computer No./Comments
Twin Cities Army Ammunition Plant, New Brighton, Minnesota Community Relations Plan	May 1991	
Public Meeting Transcript and Exhibits Regarding TCAAP Remedial Investigation (RI) Studies, Edgewood Middle School Cafeteria	November 14, 1991	
U.S. EPA/MPCA, Proposed Plan for Groundwater Remediation for Operable Unit 3 at the New Brighton/Arden Hills Superfund Site	Pending	
TCAAP Compendium of Newspaper Articles and Press Releases Relating to Environmental Investigation and Remediation	Various	Located with ROD #1 Materials

APPENDIX D
RESPONSIVENESS SUMMARY

Responsiveness Summary
New Brighton/Arden Hills Operable Unit 3
Record of Decision

I. OVERVIEW

The public comment period for the proposed plan began on July 22 and ended on August 21. A public notice summarizing the proposed plan and announcing the public comment period and public meeting was printed in the Minneapolis Star Tribune and the St. Paul Pioneer Press July 20, 1992. Public notice was also printed in several local newspapers covering the areas of Columbia Heights, Arden Hills, Shoreview, New Brighton, St. Anthony, Moundsview, North Oaks and Vadnais Heights.

During the public comment period written comments were received from the City of New Brighton and the City of Fridley. Both cities strongly supported the preferred alternative specified in the proposed plan. Their comment letters are appended to this responsiveness summary. No other written comments were received.

At the public meeting, which was held on Tuesday, August 18, 1992 at the Shoreview Community Center, questions received from the audience related to the contaminants found in the groundwater at Operable Unit 3, the quality of the treated water that will be distributed to the New Brighton municipal water supply system and the amount of time that it will take to remediate the aquifer. A transcript of the public meeting minutes has been included in the Administrative Record for the Site. Statements for the record during the public meeting came from representatives of the Cities of New Brighton and Fridley, who strongly support the proposed plan.

Judging from the comments received, the community is very supportive of the proposal to pump and treat groundwater from the south plume off-TCAAP and distribute the treated water for municipal use.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

Contaminated groundwater has been an issue of very high concern in the communities surrounding TCAAP since it was first discovered by MPCA in 1981. The focus of community concerns has been possible health effects from contamination at the site, the apparent delays in getting the site cleaned up, and the role and responsibility of the U.S. Army in addressing these concerns. The Army has been the focus of several lawsuits by the City of New Brighton, the Village of St. Anthony and a citizens' groups over these concerns. These lawsuits have since been settled.

Interim remedial actions taken by the U.S. EPA and the U.S.

Army, particularly those involving the provision of alternate water supplies to affected residents, are addressing local community concerns. With the signing of the Federal Facility Agreement among the Army, EPA and MPCA in 1987, a more coordinated effort toward site remediation was begun. The FFA and Community Relations Plan prepared by the Army, with EPA and MPCA oversight, have substantially improved community relations.

Following are highlights of past community relations actions taken by the Army, EPA and MPCA at the Site:

July 1981: Operators of public water supplies in the City of New Brighton and the Arden Manor trailer park were notified in person by Army officials of contamination and information was distributed to water users.

September 1981: News release announced the presence of contamination on-site at TCAAP. A meeting to discuss the contamination problem was held with state and local public officials and affected residents.

May 1983: Public meeting held to discuss recommendation for a Granular Activated Carbon (GAC) treatment system to be used for temporary water supply at New Brighton.

June 1985: Remedial Investigation Phase I information presented to the New Brighton City Council.

June 1986: Public meeting held to discuss the recommendation of a Feasibility Study to replace New Brighton Well #7.

May 10, 1987 - June 1, 1987: Public notice of Draft Record of Decision (ROD) and Public Meeting concerning the Boundary Groundwater Recovery System at TCAAP.

July 1987: News conference conducted by Attorney General for the State of Minnesota and the Army to announce the signing of the Federal Facility Agreement (FFA) for the TCAAP Environmental Restoration Program.

February 2, 1988: Informational meeting held for residents of Edgetown Acres/Shoreview regarding Site A. Those in attendance were informed that testing of private shallow wells would be conducted as a result of findings of apparent low levels of contamination discovered at Site A, at the northwest corner of TCAAP.

May 23, 1989: Public meeting held for the Record of Decision on the Interim Remedial Action Plan, Site D:

PCB-Contaminated Soils.

November 7-9, 1989: Community interviews conducted by U.S. Army representatives with participation by EPA and MPCA.

November 18, 1991: Public meeting held to announce the completion and discuss the results of the on-TCAAP and off-TCAAP remedial investigations.

Ongoing community relations activities at TCAAP include:

Technical Review Committee (TRC): Established in 1985 pursuant to SARA, Section 211, the TRC is open to the public and held at least quarterly.

TCAAP Environmental Restoration Program Hotline: Established in 1987 to respond to questions from the public.

TCAAP Environmental Update: Published monthly and mailed to all of those on the community relations mailing list.

III. SUMMARY OF COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD

Comments raised during the New Brighton/Arden Hills Operable Unit 3 public comment period on the draft FS and proposed plan are summarized briefly below. The comment period was held from July 22 to August 21, 1992.

1. Mr. Les Proper, director of public works with the City of New Brighton, stated for the record that the city has been involved in the water contamination problem since 1981 and that the city has been using granular activated carbon (GAC) treatment since 1988. The water coming out of the New Brighton system is tested monthly and they have not had a test show any detectable amounts of volatile organics. New Brighton can use the additional potable water that would be produced by the operation of the OU-3 remediation system and strongly supports the preferred alternative.

   EPA Response: Comment noted.

2. Mr. John Flora, director of public works for the City of Fridley stated for the record that he submitted a letter in support of the preferred alternative. Mr. Flora noted that the aquifer is a limited resource and that the ability to pump and purify the water and use it for public consumption is an alternative that the

city supports. Mr. Flora noted that Fridley joins with New Brighton to be able to come into a program to use any excess water that they may have to benefit the City of Fridley.

EPA Response: Comment noted.

IV. REMAINING CONCERNS

No remaining public concerns regarding the Operable Unit 3 remedial action have been identified.

city of NEW BRIGHTON
the city that works for you

August 10, 1992

Mr. Tom Barounis
U.S. EPA Region 5
HSRM-6J
77 West Jackson Boulevard
Chicago, IL 60604

Re: New Brighton/Arden Hills Superfund Site (Ramsey County, MN)
Operable Unit 3 Feasibility Study

Dear Mr. Barounis

The City of New Brighton supports the United States Environmental Protection Agency's (USEPA) and Minnesota Pollution Control Agency (MPCA) preference for Alternative 3, as described in the Operable Unit 3 Feasibility Study prepared for the referenced site, as the remedy for OU 3. The City joins the agencies in their belief that this alternative will protect human health and the environment, comply with all applicable state and federal regulations, reduce contaminant concentrations and movement, and be cost-effective.

Municipal consumption of the high quality water that will be produced by the preferred alternative represents the highest and best use of this critical resource. The City pledges its best efforts to cooperate with all concerned parties to facilitate construction and operation of the preferred alternative.

Thank you for the opportunity to comment.

Sincerely

Leslie Proper

Leslie J. Proper, P.E.
Director of Public Works

cc: Mayor and Council Members
David M. Childs, City Manager
John E. Drawz, Esq.
Greg D. Keil, P.E., Barr Engineering
John Flora, City of Fridley
Dagmar Roman, Minnesota Pollution Control Agency
Doug Fullen, P.E., ATI
Martin McCleery, TCAAP

CITY OF FRIDLEY

FRIDLEY MUNICIPAL CENTER • 6431 UNIVERSITY AVE. N.E. FRIDLEY, MN 55432 • (612) 571-3450 • FAX (612) 571-1287

July 27, 1992

PW92-131

Mr. Tom Barounis
US EPA Region 5 HSRM-6J
77 W Jackson Boulevard
Chicago, IL 60604

Subject: New Brighton-Arden Hills Super Fund Site

Dear Mr. Barounis:

For the past three years the City has been supporting the interconnection of New Brighton and Fridley to the Twin City Army Ammunition Plant's (TCAAP) ground water cleanup filter system. The City supports the maximization and proper utilization of the ground water assets. The Department of the Army will be required to treat the TCAAP contamination to undetectable levels. Accordingly, the limited aquifer assets should be maximized for their best use; namely, municipal distribution.

The cities of New Brighton and Fridley obtain their major water production from the Mount Simon and Jordan aquifers. These are the same aquifers which have the TCAAP contamination. Pumping the water and disposing of it per alternate No's 2 and 4, would be a waste of effort and resource. Alternate No. 3 is the only viable solution.

The City of Fridley is committed to interconnecting to the New Brighton system and sharing in the use of the TCAAP treated ground water. Attached is Resolution 45-1992 which was submitted to the Department of the Army in support of their proposed treatment plan.

Request this letter be incorporated into the testimony for the public hearing scheduled for August 18, 1992 at the Shoreview Committee Center.

Thank you,

John G. Flora
Director of Public Works

JGF:cz
Attachment

RESOLUTION NO. 45 - 1992

ACCEPTING THE ARMY'S PLAN FOR DISTRIBUTING POTABLE WATER TO THE CITIES OF NEW BRIGHTON AND FRIDLEY

WHEREAS, the Department of the Army has constructed a Permanent Granular Activated Carbon Water Treatment Facility (PGACWTF) for treatment of contaminated water from the Twin City Army Ammunition Plant (TCAAP), and

WHEREAS, the Army proposes to construct a Plume Groundwater Recovery System (PGRS) for additional treatment of ground water from the TCAAP, and

WHEREAS, the total production of these two water treatment facilities will reduce the trichlorethylene (TCE) contamination and other VOCs to nondetectable levels, and

WHEREAS, the distribution of this treated water highest and best use is for potable water municipal consumption, and

WHEREAS, the treated water can be provided to the City of New Brighton and interconnected to the City of Fridley, and

WHEREAS, the Army proposes to construct this interconnection as well as developing and designing the necessary control and system modifications for this distribution system, and

WHEREAS, the Army will also ensure any additional treatments such as iron and manganese removal would be provided as necessary to ensure the water supplied is compatibile with the Fridley water system, and

WHEREAS, the overall benefit to the City will result in savings to the aquifers currently used by the City, and

WHEREAS, the City is interested in assisting the Army in disposing of the TCAAP treated water.

NOW, THEREFORE, BE IT RESOLVED THAT the City of Fridley supports the conceptual interconnection of the cities of New Brighton and Fridley for the PGACWTF and PGRS waters, and

BE IT FURTHER RESOLVED THAT the Mayor and City Manager of the City of Fridley are authorized to enter into the necessary agreements with the City of New Brighton and/or the Army for this interconnection system.

PASSED AND ADOPTED BY THE CITY COUNCIL OF THE CITY OF FRIDLEY THIS 29TH DAY OF JUNE, 1992.

William J. Nee

WILLIAM J. NEE - MAYOR

ATTEST:

Shirley A. Haapala

SHIRLEY A. HAAPALA - CITY CLERK