RECORD OF DECISION
FOR THE
PIPER AIRCRAFT CORPORATION SITE

THE DECLARATION

SITE NAME AND LOCATION
Piper Aircraft Corporation Site
Vero Beach, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Piper Aircraft Site, in Vero Beach, Florida, chosen in accordance with the Comprehensive Environmental Response Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 SARA 42 U.S.C. Section 9601 et.seq. and, to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site.

The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the Remedial Investigation and Feasibility Study process for the Piper Aircraft Corporation site. In accordance with 40 CFR 300.430, as the support agency, FDEP has provided EPA with input during the process. Based upon comments received from FDEP, it is expected that written concurrence will be forthcoming; however, a letter formally recommending concurrence of the remedy has not yet been received.

ASSESSMENT OF THE SITE

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.

DESCRIPTION OF THE REMEDY

This remedy addresses the contaminated ground water at the site. This remedy addresses the principal threat remaining at the site by extraction and treatment of groundwater contaminated with volatile organic compounds (VOCs). Ground water remediation will continue until the aquifer meets the clean-up goals identified in the ROD and monitoring up-gradient of the canal confirms that ground water discharge to the canal meets surface water standards for site related contaminants. Residuals from the treatment that may have low levels of contaminants will be disposed of off-site, such that the site will not require any long-term management.

The major components of the selected remedy include:

- Air stripping of VOCs to meet surface water discharge criteria
- Existing water line and extraction well used to the extent practical
- Installation of additional extraction wells to effectively capture entire plume
- Surface discharge of treated ground water in accordance with all applicable state and federal regulations and other required Performance Standards
- Modeling of air emissions and/or analysis of actual air emissions from the ground water treatment unit will be conducted during the Remedial Design and/or Remedial Action in order to determine the need for air emission control equipment to assure compliance with state and federal air quality standards.

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 reduce toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-site, 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. These reviews will be conducted every five years or until remediation goals are achieved.

Patrick M Tobin — 12-23-93

PATRICK M. TOBIN,
ACTING REGIONAL ADMINISTRATOR

DATE

OPERRY/PACROD WP./ PACROD DISK/DECEMBER 16, 1993

4WD-SSRB PERRY 12-16-93	4WD-SSRB MCGUIRE 12/17/93	4ORC BUSSEY RB 12/16/93
4WD-SSRB MUNDRICK 12/17/93	4WD GREEN RB 12/17/93	4WD FRANZMATHES 12/17/93

RECORD OF DECISION
FOR THE
PIPER AIRCRAFT CORPORATION
SUPERFUND SITE
VERO BEACH, FLORIDA

REGION IV
U.S. ENVIRONMENTAL PROTECTION AGENCY

TABLE OF CONTENTS

TABLE OF CONTENT (continued)

FIGURES

TABLES

RECORD OF DECISION
The Decision Summary
Piper Aircraft Corporation Site
Vero Beach, Florida

1.0 Site Location and Description

Piper Aircraft Corporation (PAC or Piper) is an active facility located at 2926 Piper Drive, and occupies approximately eight acres at the Vero Beach Municipal Airport. The facility is located at the intersection of Aviation Boulevard and Piper Drive.(See Figure 1)

The site and surrounding area is relatively flat with surface water removal capabilities which include natural and man-made conveyances. The soil is not conductive to ponding. The man-made conveyances (i.e., ditch/channel/canal system) are designed such that no water remains standing in any of the areas for very long after a rain event. The PAC facility is bordered to the north and east by the municipal airport, to the west by undeveloped property, and to the south by the Main Relief Canal (Canal). A residential area is located less than a half mile south of the Canal. The general area surrounding the site is agricultural, commercial, and residential.

The facility has large buildings with concrete floors, paved parking and driving areas, and storm drain systems. There is very little topographic relief across the site. Overland flow for storm water runoff on the west side of the facility is towards a ditch (west ditch) located approximately 75 feet west of the dewatering/extraction well (site). The ditch services a network of drains from the parking lots and the loading/receiving area. Water from the ditch flows south to the Canal, east to the Indian River, and continues east to empty into the Atlantic Ocean. (See Figure 1)

The main facility is fenced with access gates located throughout. The ground surface in the immediate vicinity of the dewatering well is covered with asphalt and/or concrete, with the exception of the drainage ditch, a grassy area to the north, and a small grassy area located along the western fence.

2.0 Site History and Enforcement Activities

The PAC facility used trichloroethylene (TCE), which was stored in an underground storage tank, in the assembly process of airplanes and component parts. In October 1978, testing of the Vero Beach City water supply (well head #15), revealed TCE contamination. The samples of shallow ground water adjacent to the storage tank revealed a TCE concentration of 39,000 parts per billion (ppb). The City immediatley secured the well and following an investigation, the TCE was tracked to an underground storage

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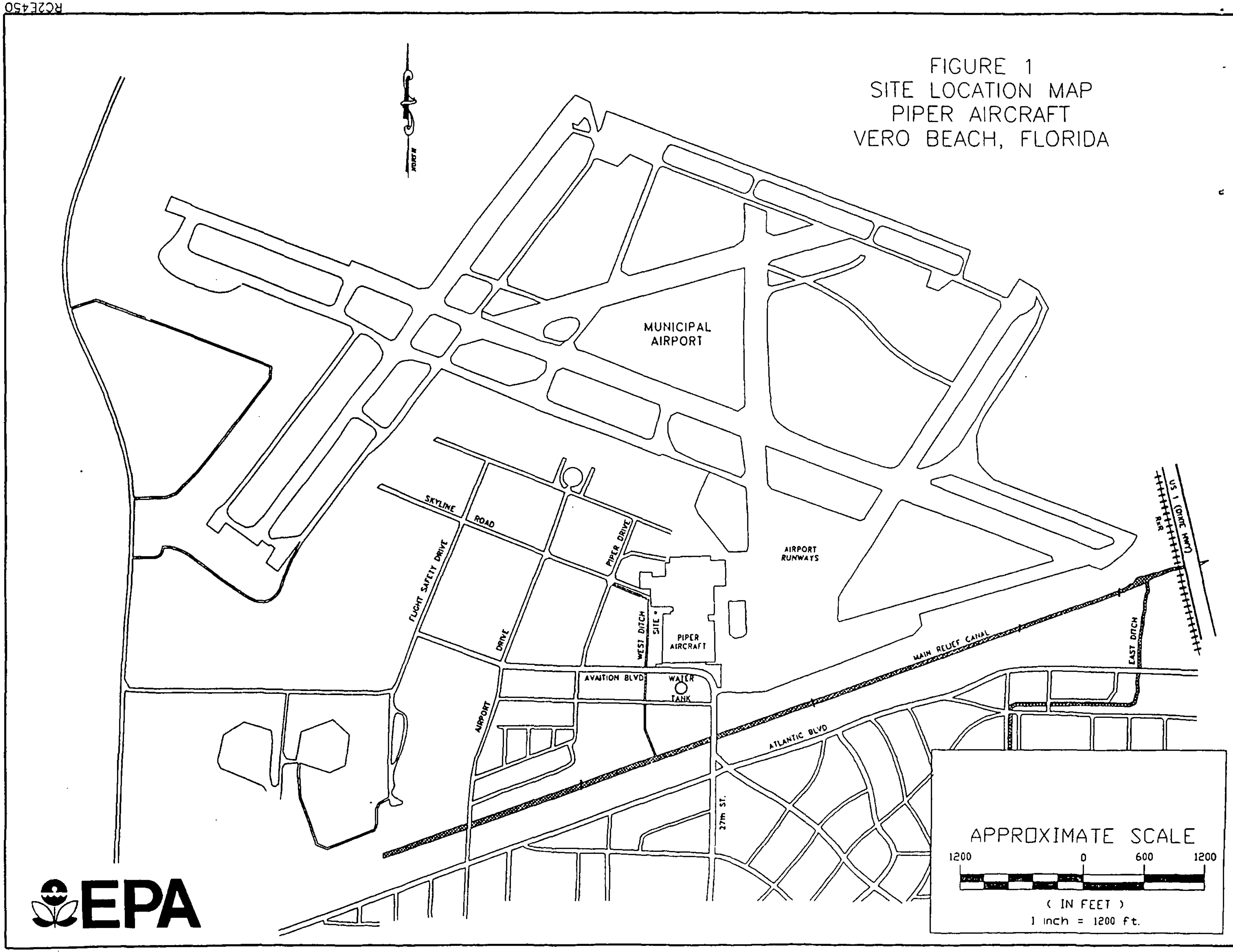

FIGURE 1
SITE LOCATION MAP
PIPER AIRCRAFT
VERO BEACH, FLORIDA

system at Piper. Piper promptly removed the TCE from the tank. The tank was tested, found to be tight, and an additional investigations revealed a leak in the underground piping system at the top of the tank connection. Piper installed well points in the tank area with test results yielding confirmation of TCE contamination. The tank had been in place approximately three years, but the volume of the spill was undetermined since the duration and leak rate was unknown.

In March 1979, the City of Vero Beach along with Piper Aircraft hired a contactor who recommended a better discharge rate for dewatering the area, stop withdrawal from well #15 completely, and the installation of a new well and a discharge header at spillway in the main relief canal. Based on these recommendations the City of Vero Beach and PAC applied for a National Pollutant Discharge Elimination System (NPDES) Permit from EPA to authorize the discharge of effluent into surface waters/main relief canal. EPA deferred the permit pending collection of a baseline survey of TCE levels in the water, sediment and aquatic life in the main relief canal and the adjacent portion of the Indian River.

In late 1980 a six inch dewatering well was installed adjacent to the area where the underground storage tank had been removed to a depth of approximately 50 feet below land surface (bls) .

In 1981, Piper signed a consent agreement with the Florida Department Environmental Protection (FDEP), formerly Florida Department Environmental Regulation (FDER), which authorized them to remediate the site. Piper began pumping ground water to the spray headers located above the main relief canal to reduce contaminant levels of TCE.

Piper, with oversight provided by FDER, began pumping at a rate of approximately 225 gallons per minute from the dewatering well. This system is still in operation today. Water is piped through a buried polyvinyl chloride (PVC) pipe to a discharge point located approximately one mile east of the site. The contaminated ground water is sprayed into the air to enhance the removal of volatile organic compounds (VOCs).

In 1985 EPA began to evaluate the site for the National Priorities List (NPL). Piper received a score of 31.13, which was high enough for EPA to propose the site for inclusion on the NPL.

In June 1989, Piper continued the remediation process, which was over-seen by FDER, by removing the underground storage tank and the soil to a level of 14' feet deep by 40' wide by 100' long, aerated the soil to remove the TCE, tested and returned the treated soil to the site.

The PAC facility was added to the NPL on February 16, 1990, due to the presence of ground water contamination. In October of

1991, EPA mailed a special notice letter to Piper Aircraft Corporation notifing them of the potential liability and necessary investigative activities at the site. Piper expressed an interest in conducting the Remedial Investigation (RI) with EPA's oversight, however, Piper later informed EPA that they would not be able to pay for the RI due to bankruptcy proceedings. Following Piper's annoucment of inability to fund the RI, EPA began procedures to aquire Superfund monies to pay for the investigation. On August 3, 1992, EPA began field work at the PAC site, to investigate the nature and extent of contamination. The Final RI report indicates that ground water beneath the site is contaminated with trichloroethene [trichloroethylene] (TCE) and it's degradation products and air quality in the immediate vicinity of the existing ground water treatment system may also have been impacted. The degradation products of TCE include 1,1-dichloroethene [1,1-dichloroethlene], cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride.

3.0 History of Community Participation

In June of 1991, EPA started its community relation efforts by conducting community interviews and holding a public meeting at the Vero Beach City Hall. The meeting was held to address concerns expressed by the citizens and inform them of EPA's planned Remedial Investigation activities. This meeting was attended by thirty-five citizens of Vero Beach and representatives from FDEP.

A public comment period for the proposed remedial action was held from September 29, 1993 through October 30, 1993. During this time a Proposed Plan fact sheet was released to the public in order to inform the public of EPA's findings and notifing the public that they could review details of the RI/FS reports at the Indian River County Main Library. In addition, a public meeting was held on October 20, 1993. In the course of this meeting, EPA and the FDEP answered questions about problems at the site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision (ROD). This decision document presents the selected remedial action for the PAC Site, in Vero Beach, Florida, chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. The decision for this site is based on the Administrative Record.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

This ROD discloses the planned remedial activities at the site. The cleanup remedy will address the ground water contaminants which remain at the site. The function of this remedy is to reduce the risks associated with exposure to contaminated ground water and to protect the surficial aquifer system present beneath the site. The ROD is the only ROD anticipated for this site since the contamination present at this site will be addressed as a single operable unit.

5.0 Summary of Site Characteristics

The ground surface in the immediate vicinity of the dewatering well is covered with concrete, with the exception of the drainage ditch, a grassy area to the north, and a small grassy area located along the western fence. The facility uses storm drains to remove water from the parking and receiving areas. These drains empty into the drainage ditch which flows south into the Canal. The canal flows east into the Indian River and eventually to the Atlantic Ocean.

5.1 Geology

Indian River County is underlain by a thick sequence of marine limestone, dolomite, shale, sand, and anhydrite, ranging in total thickness from about 5,500 to 12,000 feet. These formations collectively dip slightly southeastward. In order of increasing age, the main formations of interest underlying the area are described below. The youngest formation present is the Anastasia Formation. It is present along the coast and grades inland into the Fort Thompson Formation. The Anastasia Formation is Pleistocene in age. It consists primarily of tan to buff consolidated beds of calcium carbonate-cemented sandstone (cemented sand) and coquina (cemented shell fragments). It varies in thickness from 100 to 150 feet.

Below the Anastasia Formation are the undifferentiated deposits of the upper Miocene. These deposits are comprised of shell, sandy clay, some zones being more cemented than others, and is generally 50 to 125 feet in thickness. Below these deposits are the Miocene-age Hawthorn Formation, a major regional deposit characterized primarily by a predominance of clay. It characteristically contains a distinctive green and brown clay and is up to 200 feet thick.

Beneath the Miocene deposits is a sequence of Oligocene and Eocene Limestones. The combined thickness of these formations may approach 1000 feet.

The site is underlain by approximately 100 feet of mixed sands and shell beds, followed by another 25 feet of mixed sands, shell and clay, followed by at least 25 feet of predominantly clay of a dark olive green color.

The stratigraphy for the area of investigation can be best described based on an evaluation of boring logs completed during drilling at the three temporary well locations. Within the upper eighty feet, five distinct stratigraphic zones were identified.

These are described below:

Zone 1 - Generally thin zone (maximum 5 feet thickness) of interbedded light to dark colored fine to medium grained sands containing some orange brown streaks.

Zone 2 - Fairly uniform fine grained sand with dark brown organic material and some clay encountered at one boring. Zone 2 also has a maximum thickness of about 5 feet.

Zone 3 - Generally light tan to medium gray colored fine grained sand. Occasional white streaks and some clay present. Thickness averages about 15 feet. Ground water encountered in this zone at all borings, ranging in depth from 10 feet bls, at borings TW-01 and TW-03, to about 18 feet in boring TW-02.

Zone 4 - Very uniform dark gray/dark brown fine to medium grained sand. Extremely variable in thickness, ranging from 3 feet to 20 feet in thickness.

Zone 5 - Medium to dark gray/brown fine to medium grained sand with varying amounts of shell fragments. Locally the amount of shell fragments may be so great as to approach a coquina-like texture. Color within this unit may also vary, with occasional minor light colored (tan, golden brown) units. Zone 5 was not completely penetrated during boring, but appears to be at least 40 feet thick in the vicinity.

5.2 Hydrology

The formations and deposits found within the Anastasia Formation form the framework for the uppermost aquifer in the region. This aquifer is referred to as the surficial aquifer system. Well yields in the eastern part of the county may approach 250 to 1,000 gallons per minute. Ground water movement in the shallow aquifer system is generally to the southeast with localized influences created by pumping of the aquifer.

Located beneath the surficial aquifer system in Indian River County is a major regional confining unit comprised of the previously described Miocene deposits. Due to its thickness (on the order of several hundred feet) and its lithology (primarily clays) it is considered to be generally impermeable with poor water yield. It is generally found at a depth of approximately 125 feet in the eastern part of the county.

The major regional aquifer, the Floridan aquifer, is located beneath the regional confining unit. It is made up of all of the Oligocene and Eocene limestones beneath the Hawthorn and although water yields may vary from one formation to the next, the Floridan is generally considered to be, in total, a prolific aquifer and is capable of supplying millions of gallons of water per day to well fields.

5.3 Nature and Extent of Contamination

Sampling conducted during the remedial investigation at the site indicates the primary contaminated media is ground water which contains trichloroethene (trichloroethylene), as well as, its associated degradation compounds including: 1,1-dichloroethene (1,1-dichloroethylene), cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride.

Migration appears to be limited to the south and southeast of the Piper Aircraft facility. No contamination was detected south of the main relief canal. Monitor well 15.2, located approximately 1,000 feet due east of the water tank, appears to be at or near the eastern edge of the plume. The estimated aerial extent of the contaminant plume extends from the drainage ditch to the west, the main relief canal to the south, and a line 50 feet north of the extraction well which runs east from the drainage ditch until it intersects the main relief canal.

5.3.1 Soil Contamination

Surface soil (SS) samples were collected during Phase I to confirm the success of the 1989 soil treatment by PAC. A background grab sample was collected northwest of the site to establish a control. A composite sample was collected from the area where the excavated soil was aerated (see Figure 2).

As shown on Table 1, on-site levels of inorganics are comparable to the background; however, chlordane and its degradation products were detected in the composite sample. The chlordane and heptachlor compounds share a common association. Chlordane was once combined with heptachlor to produce a product that was sold under the name Termide©. Because of their wide-spread use, the presence of the parent compounds (chlordane and heptachlor) and their associated degradation product compounds (alpha-chlordane, cis-nonachlor, gama chlordane, and trans-nonachlor along with heptachlor epoxide, respectively) are believed to be are attributable to application of and subsequent degradation of insecticides applied for termite control and not leakage from the underground tank.

FIGURE 2
SURFACE SOIL SAMPLE LOCATIONS
PIPER AIRCRAFT
VERO BEACH, FLORIDA

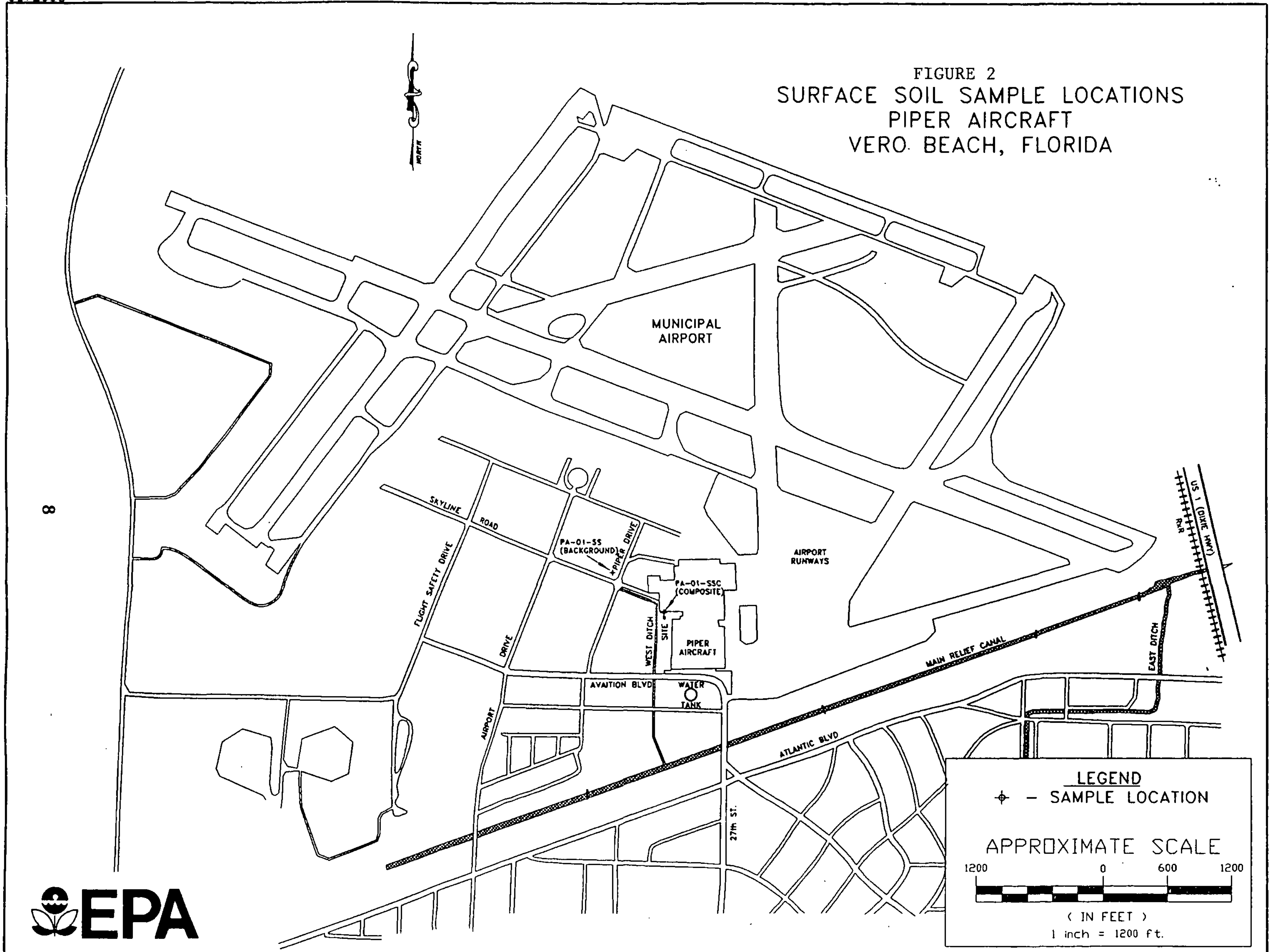

TABLE 1

SURFACE SOIL SAMPLE ANALYTICAL DATA SUMMARY
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA
AUGUST 1992

	PA-01-SS BCKGRND	PA-01-SSC TREATMENT
PESTICIDE/PCB COMPOUNDS	µg/kg	µg/kg
ALPHA-CHLORDANE /2	NA	96
CIS-NONACHLOR /2	NA	40
GAMMA-CHLORDANE /2	NA	89
TRANS-NONACHLOR /2	NA	130
total Chlordane		355
HEPTACHLOR	NA	3.6J
HEPTACHLOR EPOXIDE	NA	8.4J
INORGANIC ELEMENTS	mg/kg	mg/kg
ALUMINUM	1400	890
ARSENIC	1.3	0.8
BARIUM	--	2.4
CALCIUM	160000	1800
CHROMIUM	--	2.0
COPPER	--	9.0
IRON	1400	430
LEAD	5.9	2.7
MAGNESIUM	940	54
MANGANESE	21	8.3
MERCURY	0.06	0.06
SODIUM	1600	--
STRONTIUM	660	10
TITANIUM	54	82
VANADIUM	--	1.3
ZINC	--	3.9

FOOTNOTES:

NA - NOT ANALYZED - The composite surface soil sample was selected and submitted for Pesticide Analysis
J - ESTIMATED VALUE
N - PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED
/2 - CONSTITUENTS OR METABOLITES OF TECHNICAL CHLORDANE

5.3.2 Ground Water Contamination

Ground water flow was determined to be southeast and locally influenced by the pumping of the on-site dewatering/extraction well and city well #15.

Thirty-four ground water samples were collected during the three phases of the RI (see Figure 3 - Ground Water Sampling Location). During all phases of the RI, the greatest concentration of VOCs were detected in the on-site extraction well. Sampling results are provided in Table 2.

Four VOCs typically associated with aviation fuels were detected in the sample collected from the extraction well. Ethyl benzene, o-xylene, (m- and/or p-) xylene, and toluene were detected at low concentrations that were estimated to range from 4.1 μg/l to 8.8 μg/l. All these values are less than the maximum contaminant levels (MCLs).

TCE and two of its degradation products, trans 1,2-dichloroethene and cis-1,2-dichloroethene, were detected on-site in the extraction well and MW-02. Higher concentrations of TCE (300 μg/l decreasing to 50 μg/l) and cis-1,2-dichloroethene were detected in shallow monitoring well, MW-02 during Phase II and III, respectively. These levels exceeded Federal MCLs of 5.0 μg/l TCE and 70 μg/l (cis-1,2-dichloroethene).

Cis-1,2-dichloroethene was also detected south, southeast, and west of the site in municipal wells MW #15, municipal monitor wells, MW #15.4 and MW #15.2 (at approximately 100 ft bls), and in two temporary monitor wells, TW-06 and TW-02 (at approximately 80 ft bls). The highest levels of cis-1,2-DCE were detected in MW #15. The levels were above (76 μg/l - Phase I) and below (68A μg/l -Phase II) the MCL of 70 μg/l. Note that MW #15 has been returned to pumping status by the Vero Beach Water and Sewer Department and is continuously pumped and the contaminants are removed via an air stripper as part of the municipal water system for Vero Beach. The well is located south/southeast of the site. As for the concentrations detected in temporary wells TW-06 and TW-02, they were very low, less than 3 μg/l. Furthermore, considering ground water flow direction is to the southeast, the source for the cis-1,2-DCE detected in TW-02 is more likely from an unrelated plume located west of the site. (The forementioned plume is located at the Stump Dump site, which is northwest of the PAC site and is unrelated because of the southeastern ground water flow.)

Trans-1,2-DCE exhibited similar characteristics to cis-1,2-DCE in that it was detected in both on-site wells, EXT-WELL and MW-02, and to the south, MW #15, and southeast, TW-06 (80 ft bls).

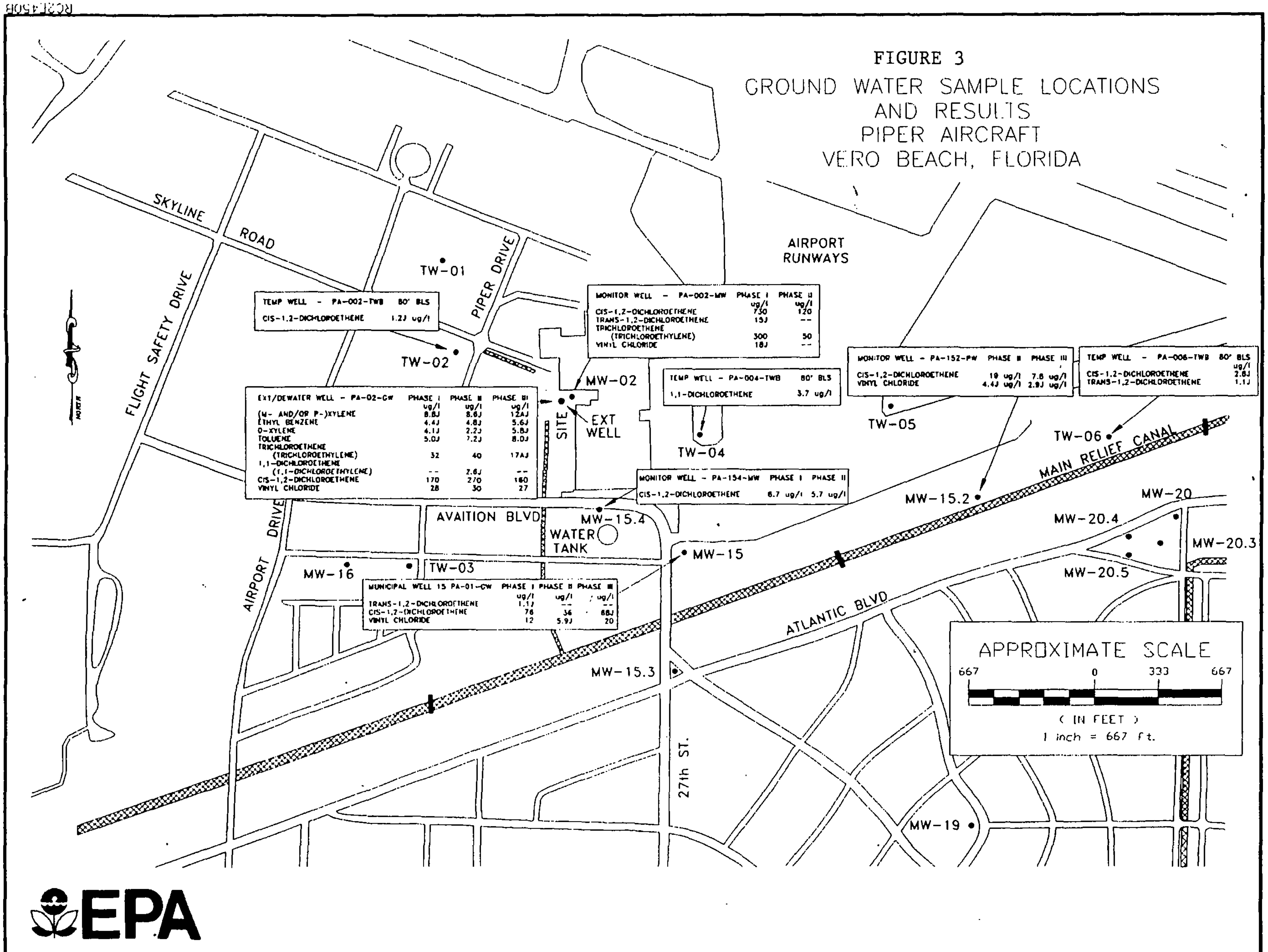
FIGURE 3
GROUND WATER SAMPLE LOCATIONS
AND RESULTS
PIPER AIRCRAFT
VERO BEACH, FLORIDA
AIRPORT RUNWAYS
SKYLINE ROAD
FLIGHT SAFETY DRIVE
PIPER DRIVE
AIRPORT DRIVE
AVAITION BLVD
ATLANTIC BLVD
27th ST.
MAIN RELIEF CANAL
SITE
EXT WELL
WATER TANK
NORTH
TW-01
TW-02
TW-03
TW-04
TW-05
TW-06
MW-02
MW-15
MW-15.2
MW-15.3
MW-15.4
MW-16
MW-19
MW-20
MW-20.3
MW-20.4
MW-20.5
TEMP WELL - PA-002-TWB 80' BLS
CIS-1,2-DICHLOROETHENE 1.2J ug/l
MONITOR WELL - PA-002-MW PHASE I PHASE II
ug/l ug/l
CIS-1,2-DICHLOROETHENE 730 120
TRANS-1,2-DICHLOROETHENE 15J --
TRICHLOROETHENE (TRICHLOROETHYLENE) 300 50
VINYL CHLORIDE 18J --
TEMP WELL - PA-004-TWB 80' BLS
1,1-DICHLOROETHENE 3.7 ug/l
EXT/DEWATER WELL - PA-02-GW PHASE I PHASE II PHASE III
ug/l ug/l ug/l
(M- AND/OR P-)XYLENE 8.8J 8.6J 12AJ
ETHYL BENZENE 4.4J 4.8J 5.6J
O-XYLENE 4.1J 2.2J 5.8J
TOLUENE 5.0J 7.2J 8.0J
TRICHLOROETHENE (TRICHLOROETHYLENE) 32 40 17AJ
1,1-DICHLOROETHENE (1,1-DICHLOROETHYLENE) -- 2.6J --
CIS-1,2-DICHLOROETHENE 170 270 160
VINYL CHLORIDE 28 30 27
MONITOR WELL - PA-154-MW PHASE I PHASE II
CIS-1,2-DICHLOROETHENE 6.7 ug/l 5.7 ug/l
MONITOR WELL - PA-152-PW PHASE II PHASE III
CIS-1,2-DICHLOROETHENE 19 ug/l 7.6 ug/l
VINYL CHLORIDE 4.4J ug/l 2.9J ug/l
TEMP WELL - PA-006-TWB 80' BLS
ug/l
CIS-1,2-DICHLOROETHENE 2.6J
TRANS-1,2-DICHLOROETHENE 1.1J
MUNICIPAL WELL 15 PA-01-GW PHASE I PHASE II PHASE III
ug/l ug/l ug/l
TRANS-1,2-DICHLOROETHENE 1.1J -- --
CIS-1,2-DICHLOROETHENE 76 36 68J
VINYL CHLORIDE 12 5.9J 20
APPROXIMATE SCALE
667 0 333 667
(IN FEET)
1 inch = 667 ft.
EPA

TABLE 2 (VOC)

GROUND-WATER SAMPLES
ANALYTICAL DATA SUMMARY
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

PHASE I - AUGUST 1992

	MCL	PA-01-GW MW-#15 DRINKING	PA-03-GW PRIVATE IRRIGAT'N	PA-02-GW ON-SITE EXT-WELL
PURGEABLE ORGANIC COMPOUNDS	µg/L	µg/l	µg/l	µg/l
ETHYL BENZENE	700	--	--	4.4J
O-XYLENE	10,000	--	--	4.1J
(M- AND/OR P-)XYLENE	10,000	--	--	8.8J
TOLUENE	100	--	--	5.0J
TRICHLOROETHENE (TRICHLOROETHYLENE)	5.0	--	--	32
TRANS-1,2-DICHLOROETHENE	100	1.1J	--	--
CIS-1,2-DICHLOROETHENE	70	76	--	170
VINYL CHLORIDE	2.0	12	--	28

TEMPORARY MONITOR WELLS
PHASE II - SEPTEMBER 1992

	MCL	001-TWA 40' BLS	001-TWB 80' BLS	002-TWA 40' BLS	002-TWB 80' BLS	003-TWA 40' BLS	003-TWB 80' BLS
PURGEABLE ORGANIC COMPOUNDS	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
TRICHLOROETHENE (TRICHLOROETHYLENE)	5.0	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	100	--	--	--	--	--	--
CIS-1,2-DICHLOROETHENE	70	--	--	--	1.2J	--	--
VINYL CHLORIDE	2.0	--	--	--	--	--	--

MUNICIPAL WELLS AND EXTRACTION WELL
PHASE II - SEPTEMBER 1992

	MCL	015-PW MW-#15 DRINKING	016-PW MW-#16 DRINKING	019-PW MW-#19 DRINKING	152-PW MW-#15.2 MONITOR	153-PW MW-#15.3 MONITOR	154-MW MW-#15.4 MONITOR	EXT-MW ON-SITE EXT-WELL	002-MW ON-SITE MONITOR
PURGEABLE ORGANIC COMPOUNDS	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
ETHYL BENZENE	700	--	--	--	--	--	--	4.8J	--
O-XYLENE	10,000	--	--	--	--	--	--	2.2J	--
(M- AND/OR P-)XYLENE	10,000	--	--	--	--	--	--	8.6J	--
TOLUENE	1000	--	--	--	--	--	--	7.2J	--
TRICHLOROETHENE (TRICHLOROETHYLENE)	5.0	--	--	--	--	--	--	40	300
TRANS-1,2-DICHLOROETHENE	100	--	--	--	--	--	--	2.0J	15J
CIS-1,2-DICHLOROETHENE	70	36	--	--	19	--	6.7	270	730
1,1-DICHLOROETHENE (1,1-DICHLOROETHYLENE)	7.0	--	--	--	--	--	--	2.6J	--
VINYL CHLORIDE	2.0	5.9J	--	--	4.4J	--	--	30	18J

FOOTNOTES:
J - ESTIMATED VALUE
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED

TABLE 2 (Continued)

GROUND-WATER SAMPLES
ANALYTICAL DATA SUMMARY
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

PHASE III - JUNE 1993

TEMPORARY WELLS

	MCL	004-TWA 40' BLS MONITOR	004-TWB 80' BLS MONITOR	005-TWA 40' BLS MONITOR	005-TWB 80' BLS MONITOR	006-TWA 40' BLS MONITOR	006-TWB 80' BLS MONITOR
PURGEABLE ORGANIC COMPOUNDS	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
TRICHLOROETHENE (TRICHLOROETHYLENE)	5.0	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	100	--	--	--	--	--	1.1J
CIS-1,2-DICHLOROETHENE	70	--	--	--	--	--	2.8J
1,1-DICHLOROETHANE	5.0	3.7J	--	--	--	--	--
VINYL CHLORIDE	2.0	--	--	--	--	--	--

PERMANENT WELLS

	MCL	015-MW MW-#15 DRINKING	016-MW MW-#16 DRINKING	019-MW MW-#19 DRINKING	152-MW MW-#15.2 MONITOR	153-MW MW-#15.3 MONITOR	154-MW MW-#15.4 MONITOR	203-MW MW-#20.3 MONITOR	204-MW MW-#20.4 MONITOR	205-MW MW-#20.5 MONITOR	EXT-MW ON-SITE EXT-WELL	002-MW ON-SITE MONITOR
PURGEABLE ORGANIC COMPOUNDS	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
(M- AND/OR P-)XYLENE	10,000	--	--	--	--	--	--	--	--	--	12.AJ	--
ETHYL BENZENE	700	--	--	--	--	--	--	--	--	--	5.6J	--
O-XYLENE	10,000	--	--	--	--	--	--	--	--	--	5.8AJ	--
TOLUENE	1000	--	--	--	--	--	--	--	--	--	8.0AJ	--
TRICHLOROETHENE (TRICHLOROETHYLENE)	5.0	--	--	--	--	--	--	--	--	--	17.AJ	50
CIS-1,2-DICHLOROETHENE	70	68A	--	--	7.8	--	5.7	--	--	--	160A	120
VINYL CHLORIDE	2.0	20	--	--	2.9J	--	--	--	--	--	27	--

FOOTNOTES:

A - AVERAGE VALUE (SAMPLE ANALYZED TWICE AND AVERAGED)
J - ESTIMATED VALUE
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED

However, the concentrations detected, 1 μg/l to 15 μg/l, are much less than the current MCL of 100 μg/l.

East of the site 1,1-dichloroethane was detected in the shallow temporary well PA-004-TWA less than the MCL of 5 μg/l.

1,1-dichloroethene (1,1-dichloroethylene) was detected once on-site in the extraction well during the Phase III sampling event at a concentration less than Florida standard of 1 μg/l.

Vinyl chloride is a chemical degradation product of TCE. The Federal MCL for vinyl chloride is 2.0 μg/l. Vinyl chloride was detected in both on-site wells, EXT-WELL and MW-02, at 18 μg/l and 30 μg/l, respectively. Vinyl chloride has migrated off-site to the municipal drinking water well, MW #15. The levels detected during three sampling events range from 5 μg/l to 20 μg/l, which are greater than the MCL. These levels indicate that the municipal well has a potential overriding affect in ground-water movement at the site. Vinyl chloride has migrated to the east to a deep monitor well MW #15.2 and the concentrations demonstrate a marked decrease from Phase II and Phase III sampling events (Table 2 and 3).

The Canal is acting as a hydraulic barrier preventing the contaminants from migrating to the south side of the Canal (e.g., no VOCs detected south of the canal).

5.3.3 Surface Water and Sediment Investigations

Six sets of surface water and sediment samples were collected from the Canal during Phase I. Two additional surface water and sediment samples were collected during Phase II. These samples were used to establish the extent of VOC migration in surface water. The sample locations were selected based on accessibility, depositional characteristics in the canal, location of the pipelines, and confluence of the ditch and canal. A background/control sample was collected west of the confluence of the west ditch and main canal.

Trichloroethene (TCE), cis-1,2-dichloroethene, and vinyl chloride were detected in the first sample located downstream of the spray nozzle system, PA-06-SW. As a result of these findings, two more surface water samples, PA-007-SW and PA-008-SW, were collected farther downstream during Phase II (September, 1992). Cis-1,2-dichloroethene was the only compound detected in these two samples (Table 4a).

No purgeable organic compounds were detected in any sediment samples (Table 4b). No pesticides or PCBs were detected in the one surface water/sediment sample collected.

TABLE 3

GROUND-WATER - VOC MIGRATION SUMMARY
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

ON-SITE (VOC's)

PURGEABLE ORGANIC COMPOUNDS	Phase I EXT-WELL µg/l	Phase II EXT-WELL µg/l	Phase III EXT-WELL µg/l
ETHYL BENZENE	4.4J	4.8J	5.6J
O-XYLENE	4.1J	2.2J	5.8AJ
(M- AND/OR P-)XYLENE	8.8J	8.6J	12.AJ
TOLUENE	5.0J	7.2J	8.0AJ

ON-SITE
(TCE AND DEGRADATION PRODUCTS OF TCE)

PURGEABLE ORGANIC COMPOUNDS	Phase I EXT-WELL µg/l	Phase II EXT-WELL µg/l	Phase III EXT-WELL µg/l	Phase II MW-02 µg/l	Phase III MW-02 µg/l
TRICHLOROETHENE (TRICHLOROETHYLENE)	32	40	17.AJ	300	50
TRANS-1,2-DICHLOROETHENE	--	15J	--	15	--
CIS-1,2-DICHLOROETHENE	170	270	160A	730	120
1,1-DICHLOROETHENE (1,1-DICHLOROETHYLENE)	--	2.6J	--	--	--
VINYL CHLORIDE	28	30	27	18J	--

	SOUTH					SOUTHEAST	
	Phase I	Phase II	Phase III	PHASE II	PHASE III	PHASE II	PHASE III
	MW #15	MW #15	MW #15	MW #15.4	MW #15.4	MW #15.2	MW #15.2
PURGEABLE ORGANIC COMPOUNDS	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
TRANS-1,2-DICHLOROETHENE	1.1J	--	--	--	--	--	--
CIS-1,2-DICHLOROETHENE	76	36	68A	6.7	5.7	19	7.8A
VINYL CHLORIDE	12	5.9J	20	--	--	4.4J	2.9J

TEMPORARY MONITOR WELLS

	WEST	EAST	
	Phase II	Phase III	
	002-TWB 80' BLS	004-TWA 40' BLS	006-TWB 80' BLS
PURGEABLE ORGANIC COMPOUNDS	µg/l	µg/l	µg/l
TRANS-1,2-DICHLOROETHENE	--	--	1.1J
CIS-1,2-DICHLOROETHENE	1.2J	--	2.8J
1,1-DICHLOROETHANE	--	3.7J	--

FOOTNOTES:

A - AVERAGE VALUE (SAMPLE ANALYZED TWICE AND AVERAGED)
J - ESTIMATED VALUE
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED

TABLE 4a

SURFACE WATER SAMPLES
ANALYTICAL DATA SUMMARY
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

PHASE I - AUGUST 1992

	MCL[1]	PA-01-SW BCKGRND	PA-02-SW 27TH AVE	PA-03-SW 1st PIPE	PA-04-SW 2nd PIPE	PA-05-SW UPS NZZL	PA-06-SW DNS NZZL
PURGEABLE ORGANIC COMPOUNDS	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
(M- AND/OR P-)XYLENE	10,000	--	--	--	--	--	--
ETHYL BENZENE	700	--	--	--	--	--	--
O-XYLENE	10,000	--	--	--	--	--	--
TOLUENE	100	--	--	--	--	--	--
TRICHLOROETHENE (TRICHLOROETHYLENE)	5.0	--	--	--	--	--	0.78AJ
TRANS-1,2-DICHLOROETHENE	100	--	--	--	--	--	--
CIS-1,2-DICHLOROETHENE	70	--	--	--	--	--	5.3AJ
VINYL CHLORIDE	2.0	--	--	--	--	--	0.53AJ

PHASE II - SEPTEMBER 1992

	MCL	007-SW DS NZZL	008-SW US RXR
PURGEABLE ORGANIC COMPOUNDS	µg/l	µg/l	µg/l
CIS-1,2-DICHLOROETHENE	70	1.4J	1.2J

(Metals)

PHASE I - AUGUST 1992

	MCL	PA-01-SW BCKGRND	PA-02-SW 27TH AVE	PA-03-SW 1st PIPE	PA-04-SW 2nd PIPE	PA-05-SW UPS NZZL	PA-06-SW DNS NZZL
INORGANIC ELEMENTS		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
CALCIUM		92	90	91	95	96	100
IRON		0.59	0.62	0.60	0.47	0.46	0.55
MAGNESIUM		22	22	23	24	24	24
POTASSIUM		4.6	4.9	5.0	4.6	4.4	4.4
SODIUM		110	100	110	120	120	120
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
ALUMINUM		150	180	160	140	170	210
BARIUM	2000	36	36	37	36	36	36
MANGANESE		58	61	74	65	64	64
STRONTIUM		3100	3000	3400	3600	3600	3500
TITANIUM		--	--	--	--	--	11
ZINC		15	16	16	15	15	16

FOOTNOTES:

1 - MCL - *Maximum Contaminant Level*
A - AVERAGE VALUE
J - ESTIMATED VALUE
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED

TABLE 4b

SEDIMENT SAMPLE ANALYTICAL DATA SUMMARY
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

PHASE I - AUGUST 1992

	PA-01-SD BCKGRND	PA-02-SD 27th AVE	PA-03-SD 1st PIPE	PA-04-SD 2nd PIPE	PA-05-SD UPS NZZL	PA-06-SD DWS NZZL	PA-07-SDC WEST DITCH
EXTRACTABLE ORGANIC COMPOUNDS	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
BENZO(A)ANTHRACENE	--	--	--	--	--	--	180J
BENZO(B AND/OR K)FLUORANTHENE	--	--	--	--	--	--	240J
BENZOFLUORANTHENE (NOT B OR K)	--	--	--	--	--	--	200JN
CHRYSENE	--	--	--	--	--	--	230J
FLUORANTHENE	--	--	--	--	--	--	500J
PHENANTHRENE	--	--	--	--	--	--	250J
PYRENE	--	--	--	--	--	--	380J
BENZYL BUTYL PHTHALATE	--	--	--	--	--	--	1600
PESTICIDE/PCB COMPOUNDS	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
ALPHA-CHLORDANE /2	NA	NA	NA	NA	--	NA	NA
CIS-NONACHLOR /2	NA	NA	NA	NA	--	NA	NA
GAMMA-CHLORDANE /2	NA	NA	NA	NA	--	NA	NA
TRANS-NONACHLOR /2	NA	NA	NA	NA	--	NA	NA
HEPTACHLOR	NA	NA	NA	NA	--	NA	NA
HEPTACHLOR EPOXIDE	NA	NA	NA	NA	--	NA	NA
INORGANIC ELEMENTS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ALUMINUM	290	200	900	9800	5400	2400	2400
ARSENIC	--	--	--	3.4	1.8	0.8	3.0
BARIUM	1.7	1.9	4.5	46	13	22	7.0
CALCIUM	830	650	2600	19000	1400	180000	2600
CHROMIUM	--	--	2.0	17	6.0	--	78
COPPER	2.7	33	7.3	79	5.1	--	12
IRON	210	220	800	13000	2300	1900	930
LEAD	0.85	0.61	1.6	22	2.9	6.3	11
MAGNESIUM	27	29	110	1200	320	1800	200
MANGANESE	2.3	2.2	7.6	80	32	94	4.5
MERCURY	--	--	--	0.12	0.06	--	0.08
SODIUM	--	--	--	360	--	--	--
STRONTIUM	10	12	37	380	74	780	27
TITANIUM	40	17	74	36	65	79	34
VANADIUM	--	--	1.9	16	4.4	--	3.8
YTTRIUM	--	--	--	5.5	1.5	--	--
ZINC	4.8	4.2	10	110	8.0	20	58

FOOTNOTES:

NA - NOT ANALYZED - PA-05-SD was selected and submitted for Pesticide/PCB analysis.
J - ESTIMATED VALUE
N - PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED
/2 - CONSTITUENTS OR METABOLITES OF TECHNICAL CHLORDANE

Prior to the RI, EPA nor its contractors had collected samples at the PAC site; and in order to satisfy the inorganic portion for the site, samples were also collected and analyzed for inorganic elements. The concentrations of metals detected in the surface water and sediment samples, were not signifcantly above the concentrations detected in the control samples.

5.3.4 Air Investigation

Four 24-hour air samples were collected over a two day period. Sites were chosen to evaluate the potential release of VOCs to the air from the aeration of volatiles via the spray nozzles at the canal. Wind direction was determined by calling the control tower at the airport. A duplicate sample was collected at the downwind station each day. A total of six canisters were set out.

Two compounds were detected in the downwind sample, PA-01-AIR (Figure 4). 1,1-dichloroethene (1,1-dichloroethylene) was detected at 16 $\mu g/m^3$ and 1,1,1-trichloroethane was detected at an estimated value of 4,100 $\mu g/m^3$. In addition to these compounds, toluene was detected in the same sample at an estimated value of 12 $\mu g/m^3$ (Table 5). 1,1,1-trichloroethane is used to clean the controller, a diaphragm used to regulate flow into the canister. The source for 1,1-dichloroethene is not known. On the other hand, toluene is associated with fuels and could be found in the air near airports.

6.0 Summary of Site Risks

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

CERCLA directs EPA to conduct a baseline risk assessment to determine whether a Superfund Site poses a current or potential threat the human health and the environment in the absence of any remedial action. The baseline risk assessment provides the basis for taking action and indicates contaminants and the exposure pathways that need to be addressed by the remedial action. This section of the ROD contains a summary of the results of the baseline risk assessment conducted for this site.

6.1 Contaminants of Concern

Chemicals which were evaluated in the risk assessment are referred to as chemicals of potential concern (COPCs). The selection of the COPCs is based on several factors including chemical toxicity, prevalence and concentration.

Chemicals were included in the Summary of Site Risk Section if the results of the risk assessment indicate that a COPC might pose a significant current or future risk. These chemicals are referred

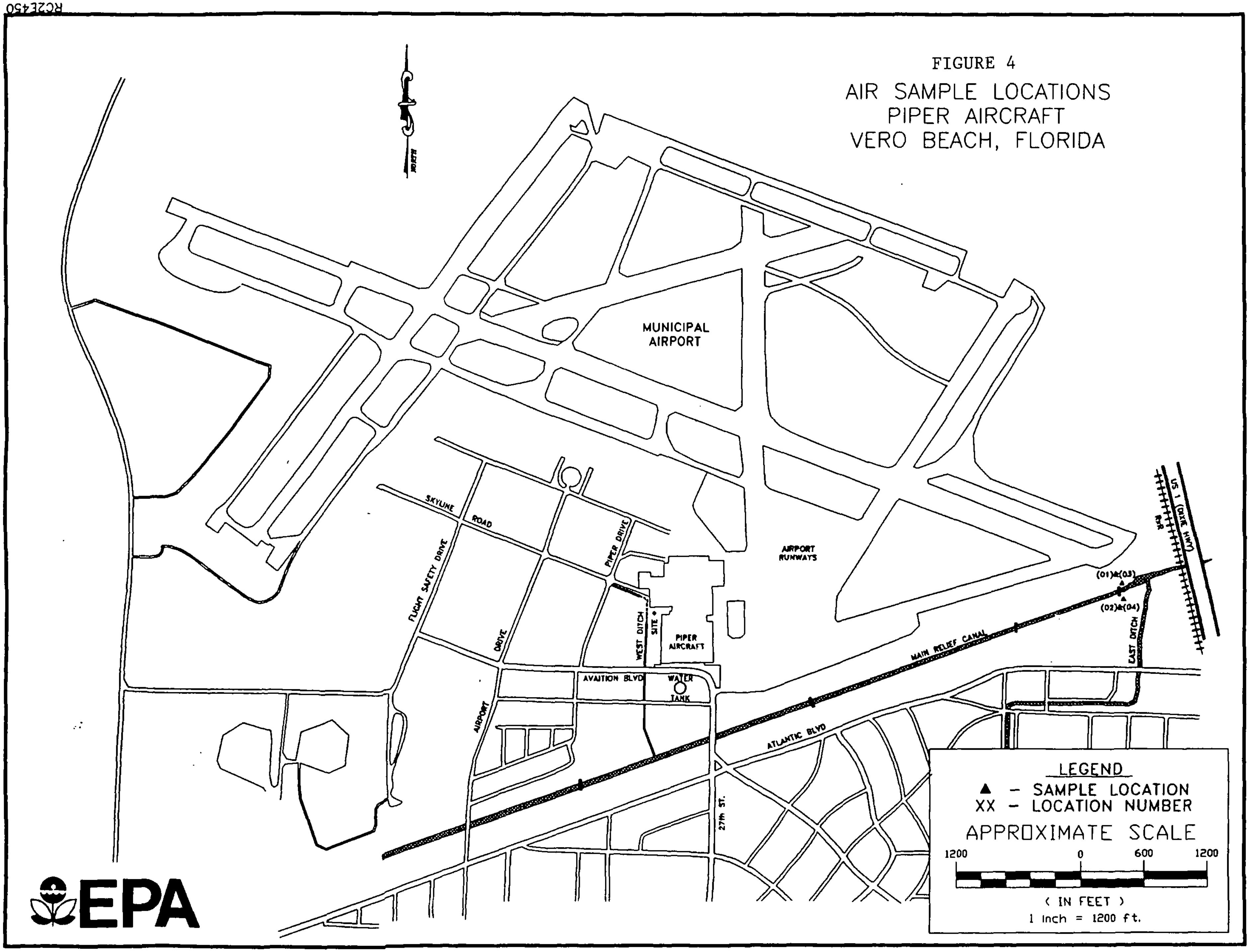

FIGURE 4
AIR SAMPLE LOCATIONS
PIPER AIRCRAFT
VERO BEACH, FLORIDA

TABLE 5

AIR SAMPLES
ANALYTICAL DATA SUMMARY
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

PHASE I - AUGUST 1992

	PA-01-AIR	PA-02-AIR	PA-03-AIR	PA-04-AIR
PURGEABLE ORGANIC COMPOUNDS	μg/m^3	μg/m^3	μg/m^3	μg/m^3
TOLUENE	12J	NA	--	NA
1,1-DICHLOROETHENE (1,1-DICHLOROETHYLENE)	16	NA	--	NA
1,1,1-TRICHLOROETHANE	4100	NA	--	NA

FOOTNOTES:

NA - NOT ANALYZED
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED

TABLE 6

EXPOSURE POINT CONCENTRATIONS

Chemicals of Concern	Exposure Point Concentration
Groundwater Current Scenario (mg/l)	
Vinyl Chloride	.009
Ground Water Future Scenario (mg/l)	
1,1-Dichloroethene	.003
cis-1,2-Dichloroethene	0.22
Strontium	0.99
Trichloroethene	0.30
Vinyl Chloride	0.03
Air ($\mu g/m^3$)	
1,1-Dichloroethene	16
1,1,1-Trichloroethane	4100
Toluene	12

to as COCs. The criteria for determining the COCs are those contaminant that contribute to a pathway that exceeds a 1E-4 risk or a hazard index (HI) of 1; chemicals contributing risk to these pathways are not included if their individual carcinogenic riskcontribution is less than 1E-6 or their noncarcingenic hazard quotient (HQ) is less than 0.1.

The COCs that meet the above criteria and the exposure concertrations for these chemicals are contained in Table 6.Ground water and air are the only media containing chemicals meeting the COC criteria. The exposure concentrations represent the 95 percent upper confidence limit (UCL) on the exceeds the maximum.

6.2 Exposure Assessment

Whether a chemical is actually a concern to human health and the environment depends upon the likelihood of exposure, i.e. whether the exposure pathway is currently complete or could be complete in the future. A complete exposure pathway (a sequence of events leading to contact with a chemical) is defined by the following four elements:

- A source and mechanism of chemical release,
- A transport medium (e.g., surface water, air) and mechanisms of migration through the medium,
- The presence or potential presence of a receptor at the exposure point, and
- A route of exposure (ingestion, inhalation, dermal absorption).

If all four elements are present, the pathway is considered complete.

An evaluation was undertaken of all potential exposure pathways which could connect chemical sources at the site with potential receptors. All possible pathways were first hypothesized and evaluated for completeness using the above criteria. Eight current exposure pathways and eight future exposure pathways remained after screening. The current pathways represent exposure pathways which could exist under current site conditions while the future pathways represent exposure pathways which could exist, in the future, if the current exposure conditions change.

Three age groups were evaluated for the residential scenarios; child (1-6 years), child (7-12 years) and an adult. Body weights of 15 kg and 27 kg were used for 1-6 years and 7-12 years respectively. A 70 kg body weight was assumed for the adult. The ingestion rate was assumed to be 1 liter for the child and 2 liters per day.

The potential current and future exposure pathways are:

- Ingestion of groundwater by a current or future resident;
- Inhalation of VOCs while showering by or current or future resident;
- Incidental ingestion of surface water by children ages 7-12;
- Dermal contact with surface water by children ages 7-12;
- Ingestion of fish by children ages 7-12 and residents only;
- Incidental ingestion of sediment by children ages 7-12;
- Dermal contact with sediment by children ages 7-12;
- Inhalation of ambient air by site worker or current or future resident;

6.3 Toxicity Assessment

Toxicity values are used in conjunction with the results of the exposure assessment to characterize site risk. EPA has developed toxicity values for many carcinogens and noncarcinogens.

Cancer slope factor (CSF) have been developed for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CSFs, which are expressed in units of $(mg/kg/day)^{-1}$, 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 associate with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CSF. Use of this conservative approach makes underestimation of the actual cancer risk highly unlikely. Cancer slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which mathematical extrapolation from high-to-low dose and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating 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 that are likely to be without risk of adverse effect. Estimated intakes of chemicals from environmental media 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).

(See table 7). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

6.4 Risk Characterization

Human health risks are characterized for potential carcinogenic and noncarcinogenic effects by combining exposure and toxicity information. Excess lifetime cancer risks are determined by multiplying the estimated daily intake level with cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a reasonable maximum estimate, an individual has a one in one million additional (above their normal risk) chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the assumed specific exposure conditions at a site.

EPA considers individual excess cancer risks in the range of $1x10^{-4}$ to $1x10^{-6}$ as protective; however, the $1x10^{-6}$ risk level is generally used as the point of departure for setting cleanup levels at Superfund sites. The point of departure risk level $1x10^{-6}$ expresses EPA's preference for remedial actions that result in risks at the more protective end of the risk range.

The potential for non-carcinogenic effects is evaluated by comparing an exposure levelover a specified time period (e.g., life-time) with a reference dose derive for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) within a medium or across all media to which a given population may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely.

The HQ is calculated as follows:

Non-cancer HQ=CDI/RfD

where:

CDI=Chronic daily intake

RfD=reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

TABLE 7

Toxicity Values

CANCER SLOPE FACTORS $(mg/kg\text{-}day)^{-1}$		
Chemical	**Oral**	**Inhalator**
1,1-Dichloroethene	6.0E-1	1.75E-1
Trichloroethene	1.1E-2	6E-3
Vinyl Chloride	1.9E+0	3.0E-1

REFERENCE DOSES (mg/kg-day)		
CHEMICAL	**ORAL**	**INHALATION**
1,1-Dichloroethene	9.0E-3	9.0E-3
cis-1,2-Dichloroethene	1.0E-2	1.0E-2
Strontium	6.0E-1	-
Toluene	2.0E-1	1.14E-1
1,1,1-Trichloroethane	9.0E-2	2.86E-1

The current scenario is based on a potential current scenario; not on actual current exposures. The current potential scenrio assumes that ground water from Vero Beach Water and Sewer Production Well 15 is currently being used without treatment. This does not represent actual exposures since the water is treated to acceptable levels before being released into the distribution system. In addition, this screnario assumes that a house is located adjacent to the spray treatment nozzle on the main relief canal and that residents daily breathe the air in the vicinity of the nozzle over a 30 year expoxure period.

The cumulative potential current residential carcinogenic risk level is 1.1E-3. The two media pathways responsible for this risk level are ground water and air. The ground water risk of (3.9E-4) can be wholly attributed to vinyl chloride. The air pathway risk (6.8E-4) is due to the presence of 1,1 -dichloroethene in the vicinity of the spray treatment nozzle. The exposure to surface water and sediments and the ingestion of fish did not produce unacceptable risk levels.

The cumulative cancer risk level for the future resident is 1.8E-3. The ground water risk of 1.1E-3 can be attributed to 1,1 -dichloroethene, trichloroethene and vinyl chloride. The risk associated with future inhalation of air near the spray treatment nozzle is 6.8E-4. This is due to 1,1 -dichloroethene. The risks associated with exposure to surface water and sediment and fish ingestion did not produce unacceptable risk levels. The contaminant-specific carcinogenic risk levels are contained in Table 8.

The HIs for the potential current resident are 20, 10 and 5 for 1-6 years, 7-12 years and adult, respectively. Air was the only exposure media contributing to a HI greater than1.0. The air chemicals with a HQ greater than 1.0 are 1,1-dichloroethene and 1,1,1-trichloroethane.

The HIs for the future resident are 30, 20 and 8 for 1-6 years, 7-12 years and adult, respectively. Air and ground water contributed to the risk levels greater than unity. The ground water contaminants with HIs greater than 1.0 are cis-1,2-dichloroethene and trichloroethene. The air contaminants with an HI greater than 1.0 are 1,1-dichloroethene and 1,1,1-trichloroethane. The noncarcinogenic risk levels are summarized in Table 9.

In addition, maximum concentrations of cis-1,2-dichloroethene, trichlorothene and vinyl chloride exceed federal ground water standards (MCLs) and State of Florida standards. Violation of MCLs or state standards generally warrant remedial action.

TABLE 8

Substances of Concern
That Pose a Carcinogenic Risk
Exceeding One in One Million (10^{-6})

Exposure Medium	Current Resident	Future Resident
Air Inhalation	1.1-Dichloroethene (6.8E-4)	1,1-Dichloroethene (6.8E-4)
Fish Ingestion	NE	NE
Ground Water	Vinyl Chloride (3.9E-4)	1,1-Dichloroethene (3.6E-5) Trichloroethene (7.9E-4) Vinyl Chloride (9.9E-4)
Surface Water	NE	NE
Sediment	NE	NE

Table 9

Substances of Concern (Reasonable Maximum Concentration)
Exceeding a Hazard Index of 0.1 when Hazard Index of Exposure Scenario Exceeded 1.0

Exposure Medium	Current Resident			Future Resident		
	1-6 year old	7-12 year old	Adult	1-6 year old	7-12 year old	Adult
Ground Water	None	None	None	Strontium (1.1E-1) cis-1,2-Dichloroethene (2.8E+0) Trichloroethene (6.4E+0)	cis-1,2-Dichloroethene (1.6E+0) Trichloroethane (3.6E+0)	cis-1,2-Dichloroethene (1.2E+0) Trichloroethane (2.8E+0)
Surface Water	NE	None	NE	NE	None	NE
Sediment	NE	None	NE	NE	None	NE
Air	Toluene (1.4E-1) 1,1-Dichloroethene (2.3E+0) 1,1,1-Trichloroethane (1.9E+1)	1,1-Dichloroethene (1.3E+0) 1,1,1-Trichloroethane (1.0E+1)	1,1-Trichloroethane (3.9E+0) 1,1-Dichloroethene (4.8E-1)	1,1-Dichloroethane (2.3E+0) 1,1,1-Trichloroethane (1.9E+1) Toluene (1.4E-1)	1,1-Dichloroethene (1.3E+0) 1,1,1-Trichloroethane (1.0E+1)	1,1,1-Trichloroethane (3.9E+0) 1,1-Dichloroethene (4.8E-1)
Fish	NE	None	None	NE	None	None

NE - Not Evaluated

6.5 Environmental Risk

A qualitative risk assessment was conducted to determine if contaminants present in site ground water and sediment have impacted or can potentially impact flora and fauna in the area. As a primarily industrial/commercial property with extensive areas of asphalt, there is little suitable habitat for terrestrial flora and fauna. Given the industrial nature of the site and the surrounding area, impacts to local flora and fauna are not expected. No endangered or threatened species have been identified in the immediate vicinity of the site.

6.6 Uncertainties

At all stages of the risk assessment, conservative estimates and assumptions were made so as not to underestimate potential risk. Nevertheless, uncertainties and limitations are inherent in the risk assessment process.

Site specific uncertainties include the following:

- The assumption that air concentrations in the residential areas are the same as monitored by the air canisters will overestimate the risk.
- The "worst case" assumption of people residing next to the canal will overestimate risk associated with inhalation.
- The assumption that VOCs will not degrade over time will overestimate the risk.

7.0 Description of Alternatives

The following site specific alternatives represent a range of distinct actions addressing human health and environmental concerns. The analysis presented below reflects the fundamental components of the various alternatives considered feasible for this site.

Four ground water (GW) alternatives have been identified for evaluation and are listed below:

- Alternative GW1 — No action
- Alternative GW2 — Ground Water Use Restrictions
- Alternative GW3 — Ex-Situ Treatment;Effluent Discharge
- Alternative GW4 — In-situ Treatment (bioremediation)

7.1 Alternative GW 1 - No Action

Under the no action alternative, the site is left "as is" and no funds are expended for monitoring or to actively control or cleanup the ground water. The NCP requires consideration of this alternative.

7.2 Alternative GW 2 - Ground Water Use Restrictions

Under this alternative, institutional controls would be implemented to restrict the use of ground water in the area. Restrictions would include deed restrictions preventing current and future use of the contaminated aquifer for such purposes as potable and industrial water supplies, and irrigation. Permit restrictions would require the State of Florida to restrict all well drilling permits issued for new wells which are or may be impacted by the contaminated ground water plume. These restrictions would be written into the property deeds to inform future property owners.

Ground water monitoring would be conducted to track the movement and change in contaminant concentrations.

7.3 Alternative GW 3 - Ex-Situ Treatment

As part of this alternative the existing extraction well would be kept in service and additional well(s) would be installed. The extracted ground water would be pumped to either on-site or off-site treatment facility.

The primary treatment component for treating the ground water is air stripping. If required, the ground water would be filtered prior to treatment or additional processing may be needed to attain discharge criteria.

The air stripping process option is a unit operation in which a volatile component of a solution is transferred into a gaseous phase. The efficiency of the air stripping process is mainly dependent on the air-to-water ratio, the contact time, the temperature and the physical and chemical properties of the constituents of concern.

Bench and or pilot studies may have to be conducted to determine if the liquid effluent would have to undergo further treatment prior to discharge. The vapor effluent, off-gas, may have to undergo additional treatment to destroy or remove the contaminants stripped from the ground water prior to being discharged to the atmosphere.

7.3.1 Alternative GW 3a - Ex-Situ Treatment; Surface Discharge

Treated water from the air stripper will be discharged to surface water, at a location either on-site or off-site. On-site discharge include treated ground water being discharged to an on-site drainage ditch. Off-site discharge would include treated ground water being discharged to the main relief canal or potable water system. All discharges will meet NPDES permit criteria, where applicable, or requirements of the City of Vero Beach should discharge be to the potable water system.

7.3.2 Alternative GW3b - Ex-Situ Treatment; Gradient Control; Injection Well Disposal

Alternative GW3b is identical to alternative GW3a, except that the treated ground water would be reinjected back into the aquifer. The injection wells used for disposal would be down gradient of the extraction wells. Re-injecting the treated ground water back into the aquifer would provide gradient control of the ground water plume.

7.4 Alternative GW 4 - In-Situ Treatment (Bioremediation)

Bioremediation schemes attempt to either stimulate naturally occurring aerobic microorganisms to degrade contaminants in-situ, or introduce microorganisms capable of degrading the contaminants. Typically, biodegradable contaminants can be degraded at rates which are orders of magnitude greater than the leaching rate of the contaminants in an aquifer system, provided growth limiting nutrients and oxygen are added.

7.4.1 Alternative GW4a - In-Situ Treatment; Injection Well

Alternative GW4a involves the use of in-situ bioremediation to degrade the contaminants of concern in the aquifer. The process involves installing a(n) injection well(s) at an appropriate location(s) which would be used to introduce microorganisms, nutrients and an oxygen source. This system may require an external source of water and a holding/mixing tank for combining the water, nutrients and oxygen source prior to injection into the aquifer.

7.4.2 Alternative GW4b - In-Situ Treatment; Gradient Control; Ex-Situ Treatment; Injection Well Disposal

This alternative is similar to alternative GW4a in that the majority of the degradation of the contaminants of concern is accomplished through in-situ bioremediation.

This alternative also includes using injection well(s), extraction well(s) and possibly, ex-situ treatment. The unit processes involve installing an injection well(s) at an appropriate location which would be used to introduce microorganisms, nutrients and an oxygen source. An extraction well(s) would be installed down gradient of the injection well(s). An advantage of this alternative is that the extraction well(s) would provide the source of water needed to mix the microorganisms, nutrients and oxygen source, and at the same time provide gradient control. If the extracted ground water needed additional treatment prior to reinjection, an ex-situ treatment system could be added. This ex-situ treatment system might include: media filtration, air stripping, GAC adsorption or oxidation/UV photolysis.

8.0 Comparative Analysis of Alternatives

The alternatives are evaluated against one another by using the following nine criteria:

- Overall protection of human health and the environment.
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).
- Long term effectiveness and permanence.
- Reduction of toxicity, mobility, or volume through treatment.
- Short term effectiveness.
- Implementability.
- Costs.
- State Acceptance.
- Community Acceptance

The NCP categorized the nine criteria into three groups:

(1) Threshold criteria: the first two criteria, overall protection of human health and the environment and compliance with ARARs (or invoking a waiver), are the minimum criteria that must be met in order for an alternative to be eligible for selection

(2) Primary balancing criteria: the next five criteria are considered primary balancing criteria and are used to weigh major trade-offs among alternative cleanup methods

(3) Modifying criteria: state and community acceptance are modifying criteria that are formally taken into account after public comment is received on the proposed plan. State and community acceptance is addressed in the responsiveness summary of the ROD.

8.1 Comparative Analysis of Human Health and the Environment

The comparative analysis of the alternatives proposed for this Site are presented in this section.

1.<u>Overall Protection of Human Health and the Environment</u>

With the exception of the no action alternative, all of the alternatives would provide protection for human health and the environment, to some degree. Alternative GW2 would require institutional controls for prevention of direct contact or use of the contaminated ground water. The remaining alternatives all provide treatment of the contaminated ground water.

2.<u>Compliance with ARARs</u>

The no action alternative would not comply with ARARs because contaminants would remain in excess of ground water action level and contaminants would continue to migrate. A decrease in contaminant concentration is anticipated with alternative GW2, however, the decrease may not be sufficient to attain ARARs. Alternatives GW3 both a&b, and GW4 both a&b, include ground water treatment, and would comply with ARARs. Alternative GW3a would meet the ground water remedial goals established for the site and surface water discharge requirements prior to discharge to the canal or other discharge criteria established for discharges to the potable water system. GW3b is expected to comply with ARARs, as a result of ground water having to be treated to MCL's and/or other limitations established by the Underground Injection Control Regulations of FDEP. Both GW4a and GW4b use an in-situ bioremediation process that would continue until the goals were attained; however, alternative GW4's compliance is largely dependent on the degradative abilities of the microorganisms. Alternative GW4b may also include additional measures such as air stripping, GAC adsorption, etc. to ensure compliance with ARARs.

3.<u>Long-Term Effectiveness and Permanence</u>

All of the alternatives, with the exception of the "no action", would reduce potential risks and/or environmental impacts. Alternative GW2 would not provide for active remediation and, therefore, contamination would remain for an extended period of time. Long term monitoring results and actual effectiveness of the institutional controls would require periodic reassessment for alternative GW2. The treatment process in alternatives GW3 a&b would be monitored and modified as necessary to insure the effectiveness of the treatment system in attaining cleanup goals. The effectiveness of alternatives GW4 a&b is dependent on the ability of the microorganisms to feed on the contamination.

4.<u>Reduction of Toxicity, Mobility, and Volume</u>

All of the alternatives will aid in the reduction of toxicity, mobility and volume with the exception of GW1 & GW2. Niether alternative would provide for reduction in toxicity, mobility, or volume of contaminated ground water. Alternative GW 3 & 4 both provide for a reduction of contaminant levels to attain MCL. By reducing the concentration, the mobility, toxicity and volume of the contaminated ground water is reduced.

5. Short-Term Effectiveness

With the exception of alternatives GW1 and GW2 (which provide no treatment of the contaminated ground water), all the alternatives present some potential risks to remediation workers and the environment during implementation. These risks would be controlled during construction by restricting access in the construction area and implementing a Health and Safety Plan. In alternative GW3a&b the treatment facilities would be located within the fenced area, to insure the integrity of the treatment unit and further restrict public access the treatment unit.

6. Implementability

The no action alternative (alternative GW1) is the easiest to implement yet it provides no protection of human health and environment. The second alternative would require the negotiation of institutional controls to provide any degree of protectiveness. Treatment alternatives GW3 and GW4 may require that a treatability study or pilot test be performed to design the treatment process. Alternative GW3 a&b have both been demonstrated to be effective on the contaminants of concern. It is anticipated that portions of the existing system could be incorporated into the design of this system Alternative 3b would be more difficult to implement than 3a, due to the greater potential for additional treatment necessary for re-injection of treated ground water. Alternative 4 a&b rely on enhancement of the natural degradation of contamination, and the effectiveness of the overall treatment process may be questionable. The insitu process could be difficult to control. Since TCE degrades to vinyl chloride, alternative 4 may cause an increase in vinyl chloride concentration in the ground water.

7. Cost

A summary of the present worth costs (Capital and O&M) for each of the alternatives is presented below:

Alternative	Description	Capital Cost/ Range	O&M Cost Annual Cost/ Range	Total - Capital & 10 Yr O&M Range	Construction Period
Alt. No. 1	No Action	$0	$0	$0	Not Applicable
Alt. No. GW2	Groundwater Monitoring Restrictions	$29,500	$79,400	$605,380	Not Applicable
Alt. No. GW3a	Ex-Situ/Surf Discharge	$857,3755	$155,125	$1,955,878	Four Months
Alt. No. GW3b	Ex-Situ/Well Discharge	$888,250	$155,125	$1,985,727	Four Months
Alt. No. GW4a	In-Situ/Ext. Water	$1,003,125	$147,825	$2,043,744	Four Months
Alt. No. GW4b	In-Situ/Site Water	$1,105,625	$146,000	$2,129,575	Four Months

Note: Cost listed in above cost table for Alternative GW 3a&b reflect purchase of only one additional well, more wells may be needed. Also, if an alternative requires a Reverse Osmosis for treatment of inorganic, EPA estimates that the cost will be an additional $980,000 in capital cost and $195,000 in O&M making the total - capital and 10 year O&M cost $2,364,127.

8. State Acceptance

The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the Remedial Investigation and Feasibility Study process for the Piper Aircraft Corporation site. In accordance with 40 CFR 300.430, as the support agency, FDEP has provided EPA with input during the process. Based upon comments received from FDEP, it is expected that written concurrence will be forthcoming; however, a letter formally recommending concurrence of the remedy has not yet been received.

9.Community Acceptance

The majority of comments received during comment period indicated the local community believes that Piper Aircraft has acted responsibly and should be allowed to continue the remediation process using the existing system. The community is concerned that EPA will cause Piper to go back into bankruptcy, due to the cost of the remedy. If a remedy must implemented then the citizens would prefer that Piper Aircraft perform the remedial design and remedial action. EPA acknowledges the communities concerns and plans to negotiate the implementation of the Remedial Design/Remedial Action with Piper Aircraft Corporation.

8.2 Synopsis of Comparative Analysis of Alternatives

All the alternatives, except for No-Action, would provide some degree of overall protection of human health and the environment and would comply with ARARs. Alternative GW 3a represents the best balance among the criteria used to evaluate remedies. GW3a is believed to be protective of human health and the environment, would attain ARARs, would be cost effective, and utilize alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

9.0 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected GW 3a recover treatment of disposal as the remedy for this site. At the completion of this remedy, the risk associated with this Site has been determined to be in the range from $1x10^{-4}$ to $1x10^{-6}$ which is considered to be protective of human health and the environment.

The total present worth cost of the selected remedy, Alternative GW 3a, is estimated at $1,955,878. This includes capital costs $857,375 and annual O&M costs of $155,125.

A. Ground Water Remediation

Contaminated ground water will be removed by pumping from extraction well(s) designed to provide effective capture of all site related contaminants exceeding ground water clean-up goals. The extracted ground water will then be treated by air stripping and carbon polishing, as necessary, to meet surface water discharge criteria. The treated ground water will be surfaced discharged via drainage ditch or directly to the main relief canal. Discharges from the treatment system to surface waters will be monitored and controlled so as to avoid any adverse impact to aquatic habitats supported by the receiving water body.

A.1 Components of Ground Water Remediation for Implementation

Extraction of contaminated ground water and treatment by air stripping at the Site; and

a. Treated ground water will be surface discharged via on-site drainage ditch or main relief canal in accordance with all applicable regulations, including 17-302 F.A.C. (General and Class III surface water standards) and other Performance Standards.

b. Air emissions will be modelled during RD and sampled during the initial operation of the water treatment system. Air emission control equipment will be added if EPA determines such equipment is necessary to meet state and federal air quality standards including 17-2, F.A.C.

A.2 Extraction, Treatment, and Discharge of Contaminated Ground Water

The VOC contaminated ground water will be treated by using the air stripping technology to remove the VOCS. The specific type of air stripping system will be determined during the RD and will depend upon flow rates, influent concentrations, efficiency rates, etc.

The need for treatment of inorganics will be determined during the RD/RA. This may be accomplished during a pilot scale operation of the air stripping tower. If contaminants are detected above discharge standards, then appropriate treatment methods shall be designed. If inorganic contaminants are detected consistently during periodic effluent sampling from the full scale operation of the ground water treatment system, then an EPA approved design for inorganics treatment shall be implemented.

Treated ground water will be surface discharged to an on-site drainage ditch or directly to the main relief canal. The treatment system will include components to insure the effluent attains discharge criteria at the exit point of effluent from the treatment system. Discharge criteria include NPDES requirement and general and Class III surface water standards as defined in 17-302, F.A.C.

A.3. Performance Standards

a. Extraction Standards

Site related ground water contamination which exceeds federal and/or state ground water standards, particularly those listed in the following table, will be extracted. Current pumping rates of the existing treatment unit is 225 gpm. EPA estimated the pumping rate to range between

700 gpm to 1000 gpm was be necessary to capture the entire plume. The actual extraction rate and number of extraction well(s) will be established during the remedial design. The goal of this remedial action is to restore ground water to its beneficial use as a potential drinking water source. Ground water shall be treated until federal and/or state ground water standards are met. These standards include the levels listed in the following table "Ground Water Cleanup Standards".

Some of the ground water treatment standards include promulgated State ground water standards that are more stringent than Federal standards. These State standards are ARARs that shall also be complied with and include, Chapters 17-550, F.A.C, 17-3, F.A.C., and 17-520 F.A.C. and:

GROUND WATER CLEANUP STANDARDS	
Chemicals in Ground Water	Federal/State MCL (µg/L)
Trichloroethene	5.0 / 3.0
cis-1,2-Dichloroethene	70.0 / 70.0
Vinyl Chloride	2.0 / 1.0
1,1-Dichloroethene	7.0 / 7.0
Federal and State MCLs are listed respectively	

It may become apparent during the implementation or operation of the treatment unit that contaminant levels have ceased to decline and are remaining constant at levels higher than the above treatment standards. In such a case, the system's performance may be re-evaluated by EPA, in consultation with FDEP.

b. Treatment/Discharge Standards

Discharges from the ground water treatment system shall comply with all ARARs prior to discharge to surface water, including but not limited to, federal and state surface water standards, substantive requirements of the NPDES permitting program under the Clean Water Act, and all effluent limits established by EPA as well as Florida Regulations in Florida Administrative Code, Chapter 17-302, general criteria and class III surface water criteria.

Air emissions from the ground water treatment system shall comply with EPA Office of Solid Waste and Emergency Response Directive 9355.0-28 titled Control of Air Emissions from Superfund Air Strippers from Superfund Ground Water Sites. This guidance indicates that air emission sources need controls if their actual emission rates for total VOCs exceed:

3 pounds/hour or
15 pounds/day or
10 pounds/day

Air emissions shall also comply with levels included and/or referred to in the guidance document entitled "Estimation of Air Impacts for Air Stripping of Contaminated Water" (EPA-450/1-91-002, dated 5/91).

Air emissions must also comply with State regulations identified for this Site. Florida regulations in Florida Admistrative Code, Chapter 17-2, provides requirements for sources which emit pollutants. If any contaminant regulated by these standards are released by the planned remedial action, the regulations shall be followed.

c. Design Standards

The design, construction and operation of the ground water treatment system shall be conducted in accordance with all ARARS, including the pertinent requirements set forth in 40 C.F.R. Part 264 (Subpart F).

B. Compliance Testing

A long-term monitoring system shall be implemented to monitor the progress of ground water remediation and the effectiveness of continued operation of the ground water treatment system. After demonstration of compliance with ground water clean-up standards, the ground water shall be monitored for at least five years. If monitoring indicates that the ground water standards set forth in Paragraph A.3 are being exceeded at any time after pumping has been discontinued, extraction and treatment of the ground water will recommence until the ground water standards are once again achieved.

Treated ground water will also be monitored on a regular basis to ensure that the treated water meets the necessary discharge standards. Discharge standards include federal and state standards for discharges to the surface water. An appropriate sampling and analysis plan for the remedial action will be prepared during the RD. In addition to analyses of organic contaminants, inorganic contaminants will be analyzed. If, at any time, metals are present above federal or state standards, then treatment for metals may be deemed to be necessary by EPA.

Air emissions monitoring will be performed periodically during the remedial action to evaluate the air emissions from the treatment system to determine if air emission controls are necessary. If violations of state or federal standards are observed, the treatment system will be modified as necessary to bring it into compliance.

10.0 STATUTORY DETERMINATIONS

EPA has determined that the selected remedy will satisfy the statutory determinations of Section 121 of CERCLA. The remedy will be protective of human health and the environment, will comply with ARARs, will be cost effective, and will use permanent solutions and alternative treatment technologies to the maximum extent practicable.

Furthermore, the regulatory preference for treatment as a principal element and the bias against off-site land disposal of untreated wastes are satisfied to the extent practicable.

10.1 Protection of Human Health and The Environment

The ground water treatment component of the selected remedy will protect human health and the environment by reducing or preventing further migration of the contaminated ground water and by reducing the contaminant concentrations in ground water until the concentrations are less than or equal to the performance Standards. Compliance with MCLs will be protective at this site. The long-term cancer risk associated with possible ingestion of the ground water will be reduced to within EPA's acceptable risk range of $1x10^{-4}$ and $1x10^{-6}$ and the non carcinogenic risk would be reduced to the EPA goal of 1. Periodic groundwater monitoring will be conducted to evaluate the performance of the groundwater treatment system.

10.2 Compliance with ARARs

Implementation of this remedy will comply with all Federal and State ARARs and will not require a waiver. The groundwater extraction and treatment system will meet the groundwater performance standards noted in Section 9.A.3, which are based on Federal and State MCLs. Federal and State MCLs are considered relevant and appropriate in the cleanup of contaminated groundwater. Performance standards will be met with respect to the discharge of treated groundwater and long-term groundwater monitoring to assess progress and effectiveness of cleanup.

Air emissions from the groundwater treatment systems shall comply with EPA Directive 9355.0-28 which provides guidelines for the control of air emissions from air stripping towers at Superfund groundwater sites. In addition, State standards for air emissions are found in FAC Chapter 17-2.300. These standards would apply if regulated pollutants are emitted to the atmosphere during the remedial action.

Treated water discharged to the surface shall meet the standards required for surface water discharge including, but not limited to, NPDES requirements.

10.3 Cost-Effectiveness

The selected remedy, Alternative GW 3a, is a cost effective remedy. The total estimated present worth cost of this alternative is $1,955,878 which includes capital costs and annual operation and maintenance costs. EPA has determined that the cost of implementing the remedy is appropriate given the threat dosed by the contaminated ground water.

10.4 Use of Permanent Solutions and Treatment Technologies

The selected remedy uses permanent solutions and treatment technologies to the maximum extent practicable. Ground water extraction and treatment will involve active measures to reduce the toxicity, mobility, and volume of contaminants in ground water.

10.5 Preference for Treatment as a Principal Element

The statutory preference for treatment will be met because the selected remedy includes active treatment for ground water. Ground water remediation will be accomplished through extraction and air stripping of the contaminated groundwater. Air stripping will remove the VOCs from groundwater and discharge them to the air at levels that will not pose an unacceptable level of risk to human health or the environment.

11.0 <u>DOCUMENTATION OF SIGNIFICANT CHANGES</u>

The remedy described in this Record of Decision is the preferred alternative described in the Proposed Plan for this Site. There have been no significant changes in the selected remedy.

RESPONSIVENESS SUMMARY

The U.S. Environmental Protection Agency (EPA) held a public comment period from September 30 to October 29 for interested parties to comment on EPA's Proposed Plan for the Piper Aircraft site, which addressed contaminated ground water. During the comment period, EPA conducted a public meeting at the Vero Beach City Hall in Vero Beach, Florida on October 20, 1993. During this meeting, representatives of EPA presented the results of the studies undertaken at the site and EPA's preferred alternative for addressing ground water contamination.

A summary of EPA's response to comments received during the public comment period, known as the responsiveness summary, is required under Section 117 of CERCLA. EPA has considered all of the comments summarized in this responsiveness summary in determining the final selected remedy presented in the Record of Decision.

This responsiveness summary consists of the following sections:

A. Background of Community Involvement and Concerns: This section provides a brief history of community interest and concerns regarding the Piper Aircraft site.

B. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's Responses: This section presents both oral and written comments submitted during the public meeting and public comment period, and provides the responses to these comments.

A. Background of Community Involvement and Concerns

In accordance with Sections 113 and 117 of CERCLA, EPA has conducted community relation activities at the Piper Aircraft site to ensure that the public remains informed of the concerning progress. During the numerous investigative activities, EPA held meetings with the city and state officials to advise them of the progress of activities at the site.

A community relations plan (CRP) was developed in 1992 to establish EPA's plan for community participation during remedial activities. Prior to the initiation of the RI/FS, EPA held an Availability Session in Vero Beach, Florida to present to the public the activities scheduled for the RI. Following completion of the Remedial Investigation and Feasibility Study (RI/FS), a Proposed Plan fact sheet was mailed to local residents and public officials in September 1993. The fact sheet detailed EPA's preferred alternative for addressing the source of contamination at the Piper Aircraft site. Additionally, the Administrative Record for the site, which contains site related documents including the RI and FS reports and the Proposed Plan, was made available for public review at the information repository in the Indian River County Main Library. A notice of the availability of the Administrative Record for the Piper Aircraft site was published in the Press Journal, which serves Vero Beach and the surrounding areas, on September 29, 1993, and again on October 17, 1993.

A 30-day public comment period was held from September 30, 1993, to October 29, 1993, to solicit public input on EPA's preferred ground water remediation alternative. Comments were received from citizens of Vero Beach, and representatives for Piper Aircraft Corporation and Piper Aircraft employees, City of Vero Beach Water and Sewer Department, and Florida Department of Environmental Protection (FDEP). The Piper Aircraft Corporation and it's employees have expressed concerns about the selected remedy. Based on comments received Piper feels they have acted responsibly and should be allowed to continue their existing remediation process. If a remedy must be done, then Piper has expressed interest in designing and performing the selected remedy. FDEP has verbally expressed agreement with the selected remedy.

In addition to the comment period, EPA held a public meeting in Vero Beach, Florida on October 20, 1993, at the Vero Beach City Hall to discuss the remedial alternatives under consideration and to answer any questions concerning the Proposed Plan for the Piper Aircraft Superfund site. The meeting was attended by approximately 60 area residents and public officials. EPA's response to the comments received at the meeting or during the comment period are summarized in Section II below. Additionally, a transcript of this public meeting was prepared by a certified court reporter, and this document is a part of the Administrative Record upon which the remedy selected in the Record of Decision is based.

Following the issuance of the final Record of Decision, EPA will continue to keep the community informed about progress at the site through fact sheets and informational meetings as needed. Additionally, design and construction documents pertaining to the implementation of the ground water remedy will be placed in the information repository at the Indian River County Main Library.

II. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's Responses

1. **Comment:**

How current was the data that EPA used to write the Proposed Plan?

Response:

EPA relied on data from samples collected as part of the Remedial Investigation (RI) to prepare the Proposed Plan. EPA's RI sampling event was conducted in three phases; Phase I conducted in August 1992, Phase II conducted in September 1992; and Phase III conducted in June 1993. EPA collected three ground water samples during Phase I, fourteen samples during Phase II, and 7 samples during Phase III. Six sets of surface water and sediment samples, were collected from the Canal during Phase I, and two additional samples were collected during Phase II. Two twenty-four hour composite air samples along with one grab and one composite soil sample were collected during Phase I sampling only. Sampling results are available in the RI and are summarized in this ROD.

2. **Comment:**

If the site was evaluated for the National Priorities List (NPL) today, what would be the score?

Response:

EPA has revised the scoring system (i.e. Hazard Ranking System) since Piper Aircraft was evaluated for placement on the NPL in 1985. However, under today's system Piper would probably receive a score higher than the previous 31.13, due to the contamination of the municipal well and the number of people affected by the municipal well.

3. **Comment:**

Why is EPA continuing to investigate the contamination at this site when all the remedial action that needs to be taken to treat the ground water has been taken by Piper Aircraft?

Response:

As a Superfund site, EPA must ensure that the clean-up is conducted in a manner such that contaminants are reduced to levels that are protective of human health and the environment. However, the results of EPA's investigation indicate that the existing treatment unit is not sufficient to treat the ground water to levels protective of human health. Hence, modifications to the system are necessary to achieve the proper degree of protection as required by Federal and State Law.

4. **Comment:**

What is the problem with the contaminant levels remaining at the current concentration?

Response:

Contaminant concentrations are still well above the Federal and State MCL. The maximum concentration of TCE detected was 100 times greater than the MCL. The carcinogenic risk posed by using this contaminated ground water is 10^{-3}, which is above EPA acceptable risk range of 10^{-4} to 10^{-6}. The non-carcinogenic risk posed by the contamination is 30, which is 30 times greater than EPA's goal of 1.

5. **Comment:**

Since one of the City's wells is located within the boundary of contamination, are the citizens of Vero Beach drinking water with elevated levels of contaminants?

Response:

No, the surrounding area is on municipal water which is treated by the City of Vero Beach Water and Sewer Department. Based on discussions with the City, city water is treated to levels below the MCL.

6. **Comment:**

If the drinking water was treated by the City why is it necessary for EPA to propose additional treatment of ground water?

Response:

Presently, the City of Vero Beach is working with Piper Aircraft to treat only that portion of the ground water necessary to provide a safe source of drinking water to the public. However, under CERCLA and the NCP EPA has a broader responsibility, to return contaminated aquifers to the beneficial use. Moreover, EPA does not feel it's appropriate to rely on the City to restore the aquifer to it's beneficial use given that the City is not responsible for the contamination. The selected alternative not only ensures a safe drinking water source, but also restores the aquifer.

7. **Comment:**

What was the maximum level of TCE that EPA detected when the site was placed on the NPL?

Response:

The Preliminary Assessment conducted in December 1988 indicated a maximum concentration of 301 μg/l. The maximum level of TCE detected during the RI was 300 μg/l. Both these levels exceed the State MCL of 3.0 μg/l.

8. **Comment:**

How did EPA evaluate the inhalation risk posed by the open aeration system, and what was the assumed density of the population at the spray head across the main canal?

Response:

The inhalation risk was calculated at 6.8×10^{-4} (EPA's acceptable range is 10^{-4} to 10^{-6}) should people reside in the vicinity of the spray heads. The actual number of residents in this area is zero. Nonetheless, EPA must theorize the most conservative scenario,thereby ensuring protectiveness. EPA must assume that it is possible for people to come into contact with this contamination. During several visits to the site we observed beer cans and other signs of this area being used as a place of congregation were observed.

Although the Risk Assessment indicates a risk in excess of EPA's established risk range, it should be noted that this risk is based on data collected from a monitoring station located close to the spray heads. The contaminant levels significantly decreases as the distance from the unit increases.

9. **Comment:**

What is the extent of the plume and how far out should someone be concerned if they wanted to drill a well?

Response:

Based on information collected during the EPA's RI, the migration of the plume is limited to the south and southeast of the Piper facility. No contamination was detected south of the main relief canal. Monitoring well #15.2 (located approximately 1,000 feet due east of the water tank) appears to be at or near the eastern edge of the plume. Consequently, the aerial extent of the contaminant plume is estimated from the drainage ditch to the west, the main relief canal to the south, and a line 50 feet north of the extraction well which runs east from the drainage ditch until it intersects the main relief canal (Figure 1.2 of Feasibility Study).

10. **Comment:**

Is there soil contamination present at the site?

Response:

In 1989, Piper removed contaminated soil surrounding an underground storage tank. The dimensions of the excavation were 14 feet deep by 40 feet wide by 100 feet long. The soil was aerated to remove the TCE, tested, and used to backfill the excavation. This action was conducted with oversight by FDER. According to EPA's confirmatory soil sampling conducted in June 1992, there is no indication of any remaining soil contamination.

11. Comment:

The citizens of Vero Beach and the management of Piper Aircraft are interested to know if EPA will allow Piper an opportunity to perform the remedial design and remedial action.

Response:

Pursuant to CERCLA Section 122 and 104, EPA will special notice Piper Aircraft, following the selection of a remedial alternative. The special notice will serve to provide Piper Aircraft the opportunity to negotiate a Consent Decree with EPA for the design and implementation of the cleanup under EPA's oversight. Following the negotiation of a Consent Decree, Piper Aircraft will implement the remedial design and remedial action. However, should negotiation with Piper be unsuccessful, EPA will conduct the design and construction using funds from the Superfund.

12. Comments:

Why did EPA proceed with inclusion of this site on the NPL when FDER was already taking action at the site to clean it up?

Response:

EPA has been aware of FDER's involvement with the Piper Aircraft Site as early as September 1984, as stated in an EPA response to a letter opposing the EPA's policy for listing of the site from Victoria J. Tschinkel, 1984 FDER Secretary. EPA stated then, as well as now that the factors the Agency considered in developing this HRS policy include the purpose of the NPL as stated in the CERCLA legislative history, the objectives of protecting public health and the environment, and the need to administer the program consistently.

Once a site is placed on the NPL, EPA must adhere to the requirements of 40 CFR 300.430 to remove the site from the NPL. An RI and risk assessment must be performed in order to determine the nature and extent of contamination, and to evaluate relative risks to human health and the environment. This information is used to evaluate if remediation is warranted. The potentially responsible parties are offered an opportunity to conduct this investigation and every effort is taken to prevent duplication of any other agency's efforts. If the RI reveals that the site is not a risk to human health or the environment, the site may be removed from the NPL. On the other hand, if the site is a risk to human health and/or the environment, then a Feasibility Study is done followed by a Remedial Design/Remedial Action (RD/RA). When the RA is completed and cleanup goals attained, a site may be removed from the NPL.

13. **Comment:**

Why did EPA not consider mixing the contaminated water with the Vero Beach Water Supply, thus allowing the dilution of contaminants?

Response:

EPA has evaluted this alternative, however, the City would require treatment of ground water before discharging to the City water supply. Thus, EPA would still have to treat the ground water.

14. **Comment:**

Can the existing remediation unit (i.e. spray header and associated water line and extraction well) which Piper installed be used as part of the remedial action?

Response:

Yes, alternative GW3a, the preferred remedy, incorporates the existing system, to the extent practicable. In fact, the Piper extraction well and the water lines associated with the well, if practicable, will be included in the remedy design. Use of other components of the existing system was not considered during the estimation of cost; however, the cost effectiveness of upgrading these other components will be decided upon during the remedial design.

15. **Comment:**

Alternative GW3b, Ex-Situ Treatment; Gradient Control; Injection Well Disposal is an option which may warrant more consideration. This may be the lowest cost and most effective option.

Response:

Alternative GW3b would require re-injection of the ground water thus, the remedy would not be the lowest cost and would be more difficult to implement. Iron exceeds secondary MCL and may present a premitting problem.

16. **Comment:**

Will EPA allow the reuse of the treated ground water?

Response:

If ground water meets EPA's clean-up levels, then ground water may be reused if approved by EPA.