

Health Consultation

NORTH INDIAN BEND WASH MILLER ROAD TREATMENT FACILITY

SCOTTSDALE, MARICOPA COUNTY, ARIZONA

EPA FACILITY ID: AZD980695969

MARCH 1, 2006

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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SCOTTSDALE, MARICOPA COUNTY, ARIZONA

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Prepared by:

Arizona Department of Health Services
Office of Environmental Health
Environmental Health Consultation Services
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Introduction

The North Indian Bend Wash (NIBW) Superfund site was added to the National Priorities List in 1983. As part of the remediation, the Miller Road Treatment Facility (MRTF) was built by the Arizona American Water Company (AAWC) to treat groundwater in order to reduce volatile organic compounds (VOCs) that have contaminated the aquifers. The MRTF uses a process called Air Stripping to remove VOCs from water. The NIBW Community Involvement group has expressed concern regarding the release of VOCs such as trichloroethylene (TCE), perchloroethylene (PCE), and chloroform into the ambient air by this treatment facility. In response, the Arizona Department of Health Services reviewed existing data and performed a health consultation to evaluate the potentially adverse health effects due to VOCs created by air emissions from the Miller Road Treatment Facility.

Background

The Indian Bend Wash Superfund site is located in Scottsdale and Tempe, Arizona in Maricopa County. The site is approximately 13 square miles and has been divided into the North Indian Bend Wash and the South Indian Bend Wash. The NIBW site is bounded by Chaparral Road on the north, the Salt River to the south, the Price Freeway (Loop 101) on the east, and Scottsdale Road on the west. The Miller Road Treatment Facility is located at 5975 North Miller Road at the intersection of Miller Road and McDonald Drive in Scottsdale, Arizona. In the area, there are residences, manufacturing facilities, retail outlets, parks, open spaces, golf courses, and waterways. There are no schools, hospitals, churches, commercial day care facilities, or convalescent homes known to be located within 3,000 feet of the Miller Road Treatment Facility. The MRTF site is approximately 1.5 acres and is located just north of the northernmost tip of the contaminant plume (Appendix A).

Prior to the existence of our current environmental regulations, local industries improperly disposed of organic solvents directly onto the ground or into dry wells. Various industrial companies took advantage of this practice within the NIBW site up until the 1970's, a practice which subsequently contaminated all three levels of the aquifer. The solvents traveled through the soil matrix into the underlying aquifers, and contaminated the upper, middle, and lower aquifers with VOCs. The current levels of VOCs in the groundwater exceed the current water quality standard established by the US Environmental Protection Agency (EPA). Maximum Contaminant Levels (MCLs) are enforceable standards established by the EPA which are designed for use as a screening tool to look for potential health risks. Currently, three extraction wells supply water to the Miller Road Treatment Facility. These extraction wells are monitored on a monthly basis prior to treatment for five VOCs: 1,1,1- trichloroethane, 1,1-dichloroethene, chloroform (also called trichloromethane or TCM), tetrachloroethylene (also called perchloroethylene or PCE), and trichloroethylene (TCE). In 2004 and the first two Quarters of 2005, only one of the wells (PCX-1) had any VOCs above the MCL for drinking water. The only contaminant that was above the MCL was TCE. The MCL for TCE is 5 parts per billion (ppb), and the TCE in the PCX-1 well ranged from 59 to 77 ppb (12 to 15 times the MCL).

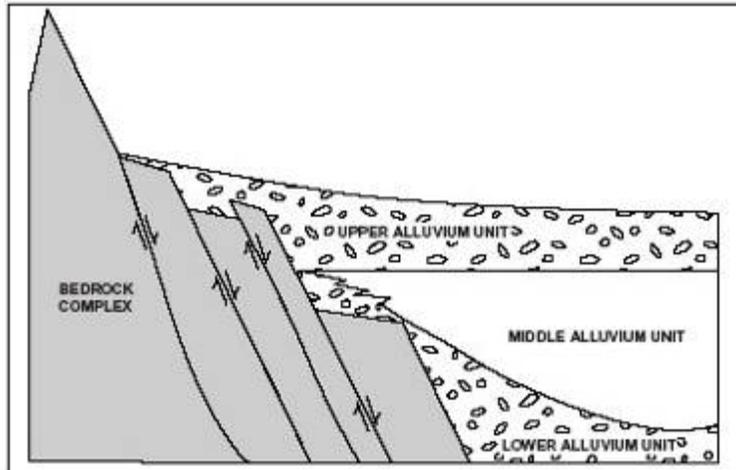


Figure 1. Components of Groundwater Aquifers

Image from EPA's Region 9 April 2001, North Indian Bend Wash North Area Proposed Plan

The MRTF was built as a result to remedial actions to remove the contaminants from the lower alluvial groundwater. The project was established in 1997 and permitted by the Arizona Department of Environmental Quality. Three groundwater extraction wells provide the water to the treatment facility. There are three air stripper columns in the MRTF and each air stripper column was designed to remove the NIBW Contaminants of Concern (COCs) to below MCLs. A tower influent manifold allows water from specific wells to be routed to any one of three air stripper columns. Treated water is then directed to either the Arizona Canal or to the common clearwell which is pumped to the AAWC's distribution system. Below is a drawing of an air stripping unit.

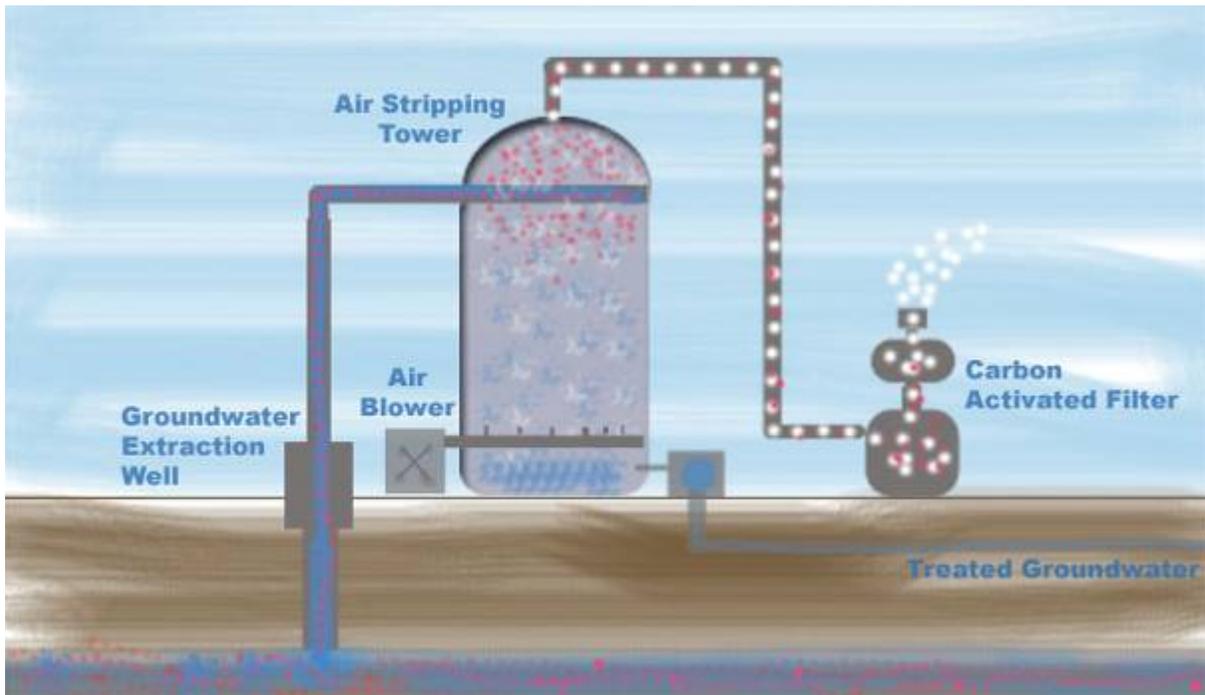


Figure 2. Air Stripping Unit

Discussion

Data Collection:

After passing through the carbon filters, air samples from the three air stripping stacks are collected and evaluated quarterly via an EPA certified method called TO-15 (EPA 1999). In this method, air is pumped into a specially prepared evacuated stainless steel canister. Components of the canister regulate the rate and duration of sampling. The canister valve is then closed and an identification tag is attached, at which point the canister is transported to the laboratory for analysis. The canister is designed to be able to effectively store the sample for up to 30 days. On analysis, a known volume of the sample is concentrated and excess moisture is removed from the air sample. The components of the air sample are separated out via a method called gas chromatography. Each purified separation is then analyzed by mass spectrometry. In mass spectrometry, the sample is scanned, and a computer generates the result in the form of a graph. Every compound has its own characteristic peak, and therefore, the compound can be identified. The intensity of the peak is able to determine the concentration of the compound (Table 1).

Quarterly, “ambient” air samples are also collected on-site and analyzed for TCE. The MRTF technician was instructed to go to the furthest edge of the property, and collect air samples using the TO-15 method. The results were then kept in an Excel Spreadsheet along with the results from the air stripper air samples. Although the date of the sampling was recorded, the exact location, time or weather conditions for the ambient air sampling were not recorded. Since these methods do not have acceptable quality control measures, these data were not included in the analyses in this health consultation.

In February 2005, ambient air sampling was conducted in the NIBW area by CH2M Hill (CH2M Hill 2005). Four samples were collected on the MRTF property, and four “background” samples were collected at the intersection of Miller Road and Thomas Road. The four samples at MRTF were collected one in each cardinal direction (An aerial photo with the exact location of the sampling sites is found in Appendix B). All samples were evaluated for the presence and concentration of the following VOCs: vinyl chloride, 1,3-butadiene, 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, dichloromethane, 1,1-dichloroethane, cis-1,2-dichloroethene, chloroform, 1,1,1-trichloroethane, carbon tetrachloride, benzene, trichloroethylene, 1,2-dichloropropane, tetrachloroethylene, and 1,2-dichlorobenzene. These results are in Table 2.

For the purpose of this report, the “background” samples collected by CH2M Hill are not considered true background samples, since it is located within the boundaries of the North Indian Bend Wash Superfund site, and within close proximity to three facilities currently using the air stripping method to remove VOCs from contaminated groundwater. Instead, for this report, data gleaned from the EPA’s “AirData: Access to Air Pollution Data” website will be used as background data for VOC concentrations in the ambient air in Metropolitan Phoenix (EPA 2005).

Exposure Pathways:

Identifying exposure pathways is important in a health consultation, because presence of a contaminant in the environment does not necessarily mean that people are actually coming into contact with that contaminant, thereby allowing the contaminant to be a threat to public health. Exposure pathways have been divided into three categories: Completed, Potential, and Eliminated. There are five elements to be considered when identifying exposure pathways: Source of Contamination, Environmental Medium through which chemicals travel, Point of Exposure, Route of Exposure, and Receptor Population. A completed exposure pathway is observed when all five elements are present. In a potential exposure pathway, one or more elements of the pathway cannot be identified, but it is possible that the element might be present or might have been present. In an eliminated exposure pathway, at least one element of the pathway is not present and either will never be present or is extremely unlikely to ever be present. Identifying an exposure pathway does not admit the presence or concentration of potential contaminants; it is simply a way of determining the possibility of exposure as if the contaminants were present in the medium.

In the case of the North Indian Bend Wash Miller Road Treatment Facility's possible emission of VOCs into the ambient air, the exposure pathway is considered to be a Completed Exposure Pathway. The Source of Contamination is the MRTF. The MRTF was identified as the source of contamination because it treats well water that is known to be contaminated with VOCs (the chemicals or contaminants of concern). The Environmental Medium is the air. The Point of Exposure is the outdoor ambient air surrounding the MRTF. The Route of Exposure is inhalation. The Receptor Population is the community surrounding the MRTF.

Health Effects Evaluation:

A completed exposure pathway has been identified; however, people can be harmed only if they contact a chemical over time at levels high enough to cause adverse health effects. To determine whether residents in the vicinity of the MRTF were being exposed to contaminants over time and at levels high enough to cause adverse health effects, existing data was reviewed

The first step (after identifying exposure pathways) is to determine if the contaminants are present at concentrations that are concerning (above the comparison values). If a contaminant is above the comparison value, it is selected for further analysis. However, if a contaminant is above the comparison value, it does not mean that the contaminant *will* cause adverse health effects. Comparison values are simply used as a screening tool to identify contaminants that should be looked at more closely to determine if there *may* be any adverse health effect risks. In none of the data available, were any of the concentrations of VOCs in the air higher than the comparison values. Therefore, no contaminant was selected for further evaluation.

Table 1 shows the results of the air sampling from the air stripper stacks. The samples were collected in two of the quarters in 2003, all four quarters in 2004, and the first 2 quarters in 2005. The Air Comparison Value (CV) is ATSDR's Environmental Media Evaluation Guide (EMEG) for air. An EMEG is a Comparison Value used to screen for potential health hazards. For TCE the Air EMEG is 100 ppb. Note: GAC = Granulated Activated Carbon; NIS = Not in Service; ppb = Parts per Billion.

Table 1: Quarterly Air Sampling Results (presented as averages for time period indicated)				
Year	Stack	TCE Concentration (ppb)	Environmental Media Evaluation Guide (EMEG) (ppb)	Chemical of Concern?
2005 (1-2 Quarters)	GAC #1	NIS	100	No
	GAC #2	0.080		No
	GAC #3	0.045		No
2004 (1-4 Quarters)	GAC #1	NIS		No
	GAC #2	0.075		No
	GAC #3	0.073		No
2003 (2-3 Quarters)	GAC #1	NIS		No
	GAC #2	0.15		No
	GAC #3	0.16		No

Table 2 shows the results of the ambient air sampling that was done by CH2M Hill for the EPA, along with the background concentrations for Metropolitan Phoenix. Note: ppb = Parts per Billion; N/A = Not Available; ND = Non-Detect.

Table 2: Air Sampling Results for MRTF					
Contaminant	Background Level in Metropolitan Phoenix in 2004 (ppb)	Average Level at the Intersection (ppb)	Average Concentration On-Site (ppb)	Comparison Value (CV) (ppb)	Chemical of Concern?
Benzene	1.01	0.480	0.360	4 ¹	No
1,3- Butadiene	0.21	0.076	0.045	0.9 ²	No
Carbon tetrachloride	0.09	0.085	0.080	30 ³	No
Chloroform (TCM)	0.05	0.049	0.049	20 ³	No
Dichloromethane (DCM)	0.31	0.160	0.285	300 ³	No
Tetrachloroethylene (PCE)	0.18	0.150	0.145	40 ³	No
Trichloroethylene (TCE)	0.025	0.033	0.051	100 ¹	No
1,1,2- Trichloro- 1,2,2- trifluoromethane	N/A	0.071	0.065	4000 ⁴	No
1,1,1-Trichloroethane	0.05	ND	ND	700 ¹	No
1,1-Dichloroethene	0.39	ND	ND	20 ¹	No
Vinyl Chloride	0.02	ND	ND	30 ¹	No
1,1-Dichloroethane	0.025	ND	ND	126 ⁴	No
Cis-1,2-Dichloroethene	N/A	ND	ND	N/A	No
1,2-Dichloropropane	0.037	ND	ND	7 ¹	No
1,2-Dichlorobenzene	N/A	ND	ND	26 ⁴	No

¹ ATSDR's Intermediate Environmental Media Evaluation Guide (EMEG)

² EPA's Reference Concentration (RfC): (0.2 ug/m³)

³ ATSDR's Chronic EMEG

⁴ EPA Region 3's Risk Based Concentration (RBC)

For all air samples (On-Site, at the intersection, and in Metropolitan Phoenix), **all contaminants** were below the Comparison Value. The following comparisons can be made:

- Contaminant that tested higher on-site than both the intersection and background:
 - TCE.
- Contaminant that tested higher on-site than at the intersection sample, but lower than the background:
 - DCM
- Contaminant that tested lower on-site than the intersection samples, but higher than the background:
 - 1,3-Butadiene
- Contaminants that tested lower on-site than both at the intersection and the background:
 - Benzene,
 - Carbon tetrachloride,
 - Chloroform,
 - Tetrachloroethylene,
 - 1,1,1-Trichloroethane, and
 - 1,1-Dichloroethene.
- Contaminant that tested higher on-site than at the intersection, but for which background samples were not tested
 - 1,1,2-Trichloro-1,2,2-trifluoroethane

Conclusions

Based on the data presented in this report, and the current functionality of the Miller Road Treatment Facility, the facility poses **no apparent public health hazard**.

Recommendations

The Arizona Department of Health Services has the following recommendation:

- Continued monitoring of the ambient air and of the air released from the air stripping towers to determine if future actions are required to avoid exposures to the VOCs.

Public Health Action Plan

- The Arizona Department of Health Services will continue to review and evaluate data provided for this site
- The Arizona Department of Health Services will notify the property owners in the area of the findings of this health consultation.

References

CH2M Hill 2005. Technical Memorandum. Prepared for the U.S. Environmental Protection Agency. NIBW Ambient Air Sampling Results from the February 14 to February 19, 2005 Air Sampling Event, April 12, 2005.

EPA 2005. AirData: Access to Air Pollution Data. EPA'S database on air pollution. Available at: www.epa.gov/air/data/. Last accessed on January 18, 2006.

EPA 1999. Compendium of Methods for Toxic Organic Air Pollutants. Pp. 15-1 to 15-4.

Preparers of Report

Arizona Department of Health Services, Office of Environmental Health

Jennifer Botsford, MS, Environmental Health Scientist

Hsin-I Lin, ScD, Health Assessor, Program Manager

Don Herrington, Office Chief, Principal Investigator

ATSDR Technical Project Officer

Charisse Walcott

Division of Health Assessment and Consultation

Superfund Site Assessment Branch

State Programs Section

ATSDR Regional Representative

Gwen Eng

Office of Regional Operations, Region IX

Office of the Assistant Administrator

Certification

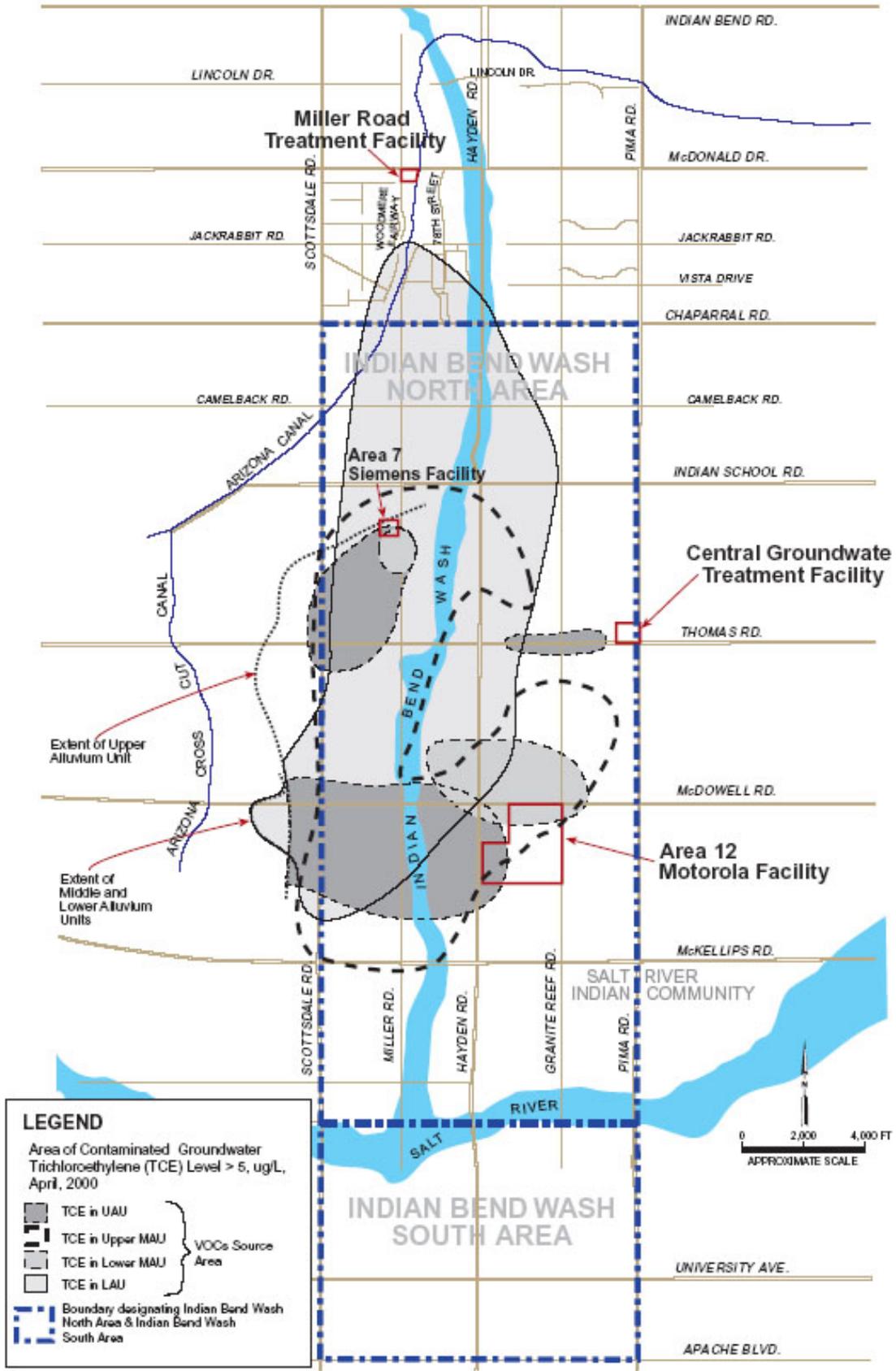
This North Indian Bend Wash, Miller Road Treatment Facility Health Consultation was prepared by the Arizona Department of Health Services under cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the exposure investigation report was begun.

Charisse Walcott
Technical Project Officer
CAT, SSAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation and concurs with the findings.

Alan Yarbrough
Team Leader-Cooperative agreement Program
CAT, SSAB, DHAC, ATSDR

APPENDIX A



APPENDIX B

MRTF

Results of Ambient Air Sampling on February 15-16, 2005



- CH2M Hill Air Sample Location with TCE Concentration in $\mu\text{g}/\text{m}^3$ (24-Hour Sample)
- NIBW PCs Air Sample Location with TCE Concentration in $\mu\text{g}/\text{m}^3$ (Grab Sample)

Comparative 'Health-Based' TCE Levels:

24-Hour AAAQG = $210 \mu\text{g}/\text{m}^3$

ATSDR Comparison Value = $540 \mu\text{g}/\text{m}^3$

NIOSH = 10-Hour Recommended Exposure Level = $135,000 \mu\text{g}/\text{m}^3$

Notes:

AAAQG = Arizona Ambient Air Quality Guidelines

ATSDR = Agency for Toxic Substances and Disease Registry

NIOSH = National Institute for Occupational Safety and Health

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter