

Health Consultation

NORTH INDIAN BEND WASH AREA 12 TREATMENT FACILITY

CITY OF SCOTTSDALE, MARICOPA COUNTY, ARIZONA

EPA FACILITY ID: AZD980695969

MARCH 28, 2005

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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Prepared by:
U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
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North Indian Bend Wash Area 12 Treatment facility

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CERCLIS No. AZD980695969

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Division of Health Assessment and Consultation**

Purpose

This consult is in response to requests from the North Indian Bend Wash Community Advisory Board (CAB) to determine if any air emissions of volatile organic compounds such as trichloroethylene (TCE), perchloroethylene (PCE), dichloroethylene (DCE), and chloroform from the facility at Area 12 are creating an adverse health impact on area residents.

There are currently four treatment facilities associated with the NIBW contamination, located over a wide area within the site boundaries. Because of the wide range of locations, the Arizona Department of Health Services (ADHS) determined that a separate evaluation of the treatment facilities would provide a more site-specific approach to answering the CAB's concerns.

Introduction

The North Indian Bend Wash (NIBW) Superfund site is an area of approximately 15 square miles in Scottsdale, Maricopa County, Arizona. The site is bounded by the Salt River on the south, Chaparral Road on the north, Scottsdale Road on the west, and the Price Freeway (Loop 101) on the east. The area consists of various land uses, from single family residential to heavy industry, including manufacturing facilities, retail outlets, houses, apartments, parks, open spaces, golf courses, and waterways.

The primary contaminants of the area are volatile organic compounds (VOCs) such as trichloroethylene (TCE), tetrachloroethylene (PCE), dichloroethylene (DCE), and chloroform (CFM). These chemicals were disposed in dry wells or directly onto the ground at various facilities in the area beginning in the 1960's. The chloroform was probably result of a breakdown of parts of the main contaminants, which contain chlorine. Groundwater contamination was discovered in 1981. The area was placed on the National Priorities List (NPL), or Superfund list, in 1983.

This consultation focuses on the potential for exposures to air emissions from the Area 12 treatment facility located at 8201 East McDowell Rd. The attached maps (Appendix) show the location of the facility area in relation to the NIBW site boundaries.

Background

The Area 12 facility consists of approximately 160 acres, which has been used for the manufacturing of electronic equipment from the 1960's to the present. The actual remediation site is approximately 2 acres, located at the southeast corner edge of the site.

Prior to the introduction of regulations on waste disposal in the 1970's, chemicals were routinely disposed of either in holding ponds or in dry wells located on the property.

The use of solvents to clean electronic components at the site dates from the original start-up of the manufacturing operation in the 1960's. Prior to the introduction of regulations on waste disposal in the 1970's, chemicals were routinely disposed of either in holding ponds or in dry wells located on the property. The industrial solvents used in these operations, including TCE, PCE, DCE, and chloroform based materials, traveled through the soil matrix into the underlying aquifers. The upper, middle, and lower aquifers have been contaminated by these solvents at concentrations in excess of the 5 micrograms per liter ($\mu\text{g/l}$) for TCE, PCE, and Chloroform. DCE has an MCL of 7 micrograms per liter. Maximum Contaminant Level (MCL) standard for

TCE, DCE, PCE, and chloroform was established by the US Environmental Protection Agency (EPA 1992).

Remedial actions to remove the contaminants from the lower alluvial groundwater have resulted in the construction and operation of the air stripper and adsorption media located on the site. Treated water is then transferred to the adjacent Salt River Project canal. This project was established in 1999 and permitted by the Arizona Department of Environmental Quality as a viable method of reducing the contamination in the aquifers.

The remediation process, as permitted by the local, State, and Federal agencies, has required air emissions of the VOC's be reduced as much as possible. The design of the air system uses forced air to 'strip' the contaminants from the water, after which the air is then forced into the adsorption vessels where the air is scrubbed by the media beds, before the air is finally routed through carbon filters. The air is then released back into the ambient atmosphere.

Discussion

Data used

Comprehensive characterization has been conducted in the area to determine the extent of contamination. Water samples from monitoring wells are taken several times during each year. Water is sampled after it has passed through the air stripper mechanism and activated carbon system prior to routing to the canal. The facility uses a sealed system from the air stripper to the adsorption filters and carbon filters, with virtually no fugitive emissions. Once the influent passes through the air stripper, the concentrations of contaminants in water are reduced to levels below detection limits. The air column is then routed to the catalyst beds and finally through the carbon filters. Air samples are taken from the air column after it has passed through the activated carbon filters.

Contaminants of Concern

This section identifies the contaminants of concern for the Area 12 site of the NIBW site. The discussion addresses available data, the methodology used in the identification process, the criteria for selection, and the extent and levels of contamination.

The aquifers are used for the drinking water supply for the City of Scottsdale and the Town of Paradise Valley. A private water company also utilizes water from the aquifers to supply a limited area of service.

TCE, DCE, and PCE are classified as volatile organic compounds, meaning they are comprised of carbon, hydrogen, and other elements in complex structures. They were developed as cleaning agents that would evaporate rapidly from the part being cleaned to make the manufacturing process faster. Chloroform is another cleaning agent similar to TCE and PCE in its physical characteristics.

Area residents are concerned the contaminants release to the atmosphere may pose a threat to public health.

Water Quality Data

The contaminants TCE, DCE, and PCE are present in the groundwater at concentrations exceeding the EPA Maximum Contaminant Levels (MCLs) established for the detected VOCs. Data for this consultation were taken from the last four quarterly reports for the facility (4th quarter 2003 through 3rd quarter 2004). Table 1 details the detected concentrations for the contaminants.

Table 1. Volatile Organic Compounds in water influent to Area 12 treatment facility in North Indian Bend Wash, 4th quarter 2003 to 3rd quarter 2004 (EPA 2004)

TCE (MCL 5 µg/L) Range micrograms per liter (µg/L)		DCE (MCL 7 µg/L) Range micrograms per liter (µg/L)		PCE (MCL 5 µg/L) Range micrograms per liter (µg/L)		Chloroform (MCL 5 µg/L) Range micrograms per liter (µg/L)	
minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
55	120	0.8	8.4	2.3	16	1.1	3

Abbreviations: PCE-perchloroethylene; DCE- dichloroethylene; TCE- trichloroethylene; MCL: Maximum Contaminant Level; µg/L: micrograms per liter

All effluent from the facility has been reduced to below the MCL's for the TCE, DCE, PCE and chloroform. Table 2 displays this information for all four contaminants.

Table 2. Volatile Organic Compounds in water effluent from Area 12 treatment facility in North Indian Bend Wash, 4th quarter 2003 to 3rd quarter 2004 (EPA 2004)

TCE (MCL 5 µg/L)	DCE (MCL 7 µg/L)	PCE (MCL 5 µg/L)	Chloroform (MCL 5 µg/L)
<0.5 µg/L*	<0.5 µg/L*	<0.5 µg/L*	<0.5 µg/L*

* These concentrations are at or below the current detection limits

Abbreviations: PCE-perchloroethylene; DCE- dichloroethylene; TCE- trichloroethylene; MCL: Maximum Contaminant Level; µg/L: micrograms per liter

Air Monitoring Data

Air monitoring data for the treatment facility is taken from the air service port of the system, after the activated carbon filters. The discharge vents for the airstream are approximately 5 feet above ground level. The discharge rate of the air column from the system is 5400 cubic feet per minute (CFM).

Table 3. Volatile Organic Compounds in discharge air column from Area 12 treatment facility in North Indian Bend Wash, 4th quarter 2003 to 3rd quarter 2004 (SRP 2004) *

TCE micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)	DCE micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)	PCE micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)	Chloroform micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)
1007	440	218	219

* annual average concentration derived from weekly sampling of air stream

Abbreviations: PCE-perchloroethylene; DCE- dichloroethylene; TCE- trichloroethylene; MCL: Maximum Contaminant Level; $\mu\text{g}/\text{m}^3$: micrograms per cubic meter

This data can be used to estimate ambient air concentrations by calculating the air mass. These estimated concentrations were derived using the “box” model contained in the appendix. Table 4 shows the calculated ambient air concentrations at a point 100 meters from the discharge vent of the air stripper. The concentrations were calculated using the annual average wind speed of 3 meters per second for the Phoenix area. The factors used for this model are contained in the appendix.

Table 4. Average air concentrations of contaminants 100 meters from the Area 12 air stripper facility (ADHS, 2004)

TCE ($\mu\text{g}/\text{m}^3$)	DCE ($\mu\text{g}/\text{m}^3$)	PCE ($\mu\text{g}/\text{m}^3$)	Chloroform ($\mu\text{g}/\text{m}^3$)
8.56#	3.73#	1.85#	1.86#

Annual average air concentrations derived from 4th quarter 2003 – 3rd quarter 2004 reports

Ambient air monitoring data from ADEQ for the contaminants of concern in the Phoenix metropolitan area are shown in Table 5.

Table 5. Average air concentrations of contaminants, Phoenix (ADEQ HAPS, 1995)

TCE ($\mu\text{g}/\text{m}^3$)	DCE ($\mu\text{g}/\text{m}^3$)	PCE ($\mu\text{g}/\text{m}^3$)	Chloroform ($\mu\text{g}/\text{m}^3$)
0.24	#	1.16	0.35

DCE was not sampled for during this study

Potential Exposure Pathways

An exposure pathway consists of five elements: a source of contamination, transport through an environmental medium, a point of exposure, a route of exposure, and a receptor population.

The Arizona Department of Health Services (ADHS) evaluated the environmental and human components that lead to human exposure to determine whether people are exposed to contaminants from the site.

ADHS categorizes an exposure pathway as completed or potential exposure pathway if the exposure pathway cannot be eliminated. In completed exposure pathways, all five elements exist,

and exposure to a contaminant has occurred in the past, is occurring, or will occur in the future. In potential pathways, at least one of the five elements is missing but could exist. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring, or could occur in the future. This exposure assessment focuses on persons who reside adjacent to the site. It estimates the types and magnitudes of exposures to chemicals of potential concern and possible exposure pathways associated with contamination detected at the site.

Complete Exposure Pathways

Based upon the sampling data from the site, the water from the treatment system contains less than 0.5 µg/L of each of the contaminants. Air emissions from the air stream leaving the carbon filters do contain measurable concentrations of TCE, DCE, PCE, and chloroform.

Air Emissions exposures

Because the air stream from the system vents to the atmosphere, contaminants remaining in the air stream after passing through the carbon filters would become part of the ambient air. The concentrations of these contaminants at the property line can be determined by calculating the mass of air exiting the system. Using the EPA exposure calculations found in *Risk Assessment Guidance for Superfund (RAGS)*, ADHS is able to determine the concentration of the contaminants area residents may be exposed to. Table 6 details the calculated air concentrations of the 4 contaminants and compares them with the ATSDR comparison values (CVs) for air contaminants. Air CVs are protective of human health, including children, over a lifetime. Chemical concentrations in air that exceed CVs may not necessarily represent a health risk. Rather, when contaminant concentrations exceed these guidelines, further evaluation may be necessary to determine whether there is a true threat to human health.

Table 6. Average air concentrations of contaminants 100 meters from the Area 12 air stripper facility (ADHS, 2004)

TCE (CV 540 µg/m ³)	DCE (CV 240 µg/m ³)	PCE (CV 11 µg/m ³)	Chloroform (CV 100 µg/m ³)
8.56#	3.74#	1.85#	1.86#

Annual average air concentrations based upon 4th quarter 2003-3rd quarter 2004 data

Limitations

The scope of this consult is limited to the question of whether the remediation process allows the release of VOCs in quantities that could affect public health. Sampling data for the discharge air from the remediation facility was used to determine if any adverse health effects would be observed. Using very specific criteria to determine the air mass from which the concentrations of the contaminants are determined can result in lower concentrations. This in turn may result in lower than actual exposure doses. ADHS used reasonable figures to calculate the air mass, and thus the exposure rates the nearest residents might be exposed to. Ambient air samples are not available for this specific site; data is available for the Phoenix area as a whole. Ambient air concentrations can also be diluted due to wind movements at velocities greater than that used in the model. The nearest residence is approximately 100 meters from the discharge vents of the

treatment facility; this would also allow for increased mixing of ambient air into the airstream, further diluting the concentrations of the contaminants. During periods of high water levels in the Indian Bend Wash into which the treated effluent is discharged, the system is deactivated. This occurs several times per year, most often in the winter. The time in which the system is deactivated can persist for several weeks, until the water levels in the Indian Bend Wash subside.

Health Concerns

Water pumped from the contaminated aquifer to the North Indian Bend Wash Area 12 Treatment Facility contains up to 120 µg/L of TCE, 8.4 µg/L of DCE, 16 µg/ of PCE, and 2.7µg/L of chloroform. The MCL for TCE, PCE, and chloroform is 5 µg/L. The MCL for DCE is 7 µg/L. There is no exposure to these contaminants from drinking the water as it is not used for drinking water purposes. Water taken from the aquifer is treated to reduce the contaminants to concentrations below the MCL before it is transferred to the canal.

Air emissions from the system are below the CVs for TCE, PCE, DCE, and Chloroform. The potential for exposure to the VOCs from the North Indian Bend Wash Area 12 Site is very limited. Unless the system was to have a catastrophic failure of the carbon filters, emissions will be below levels of concern.

Child Health Issues

Because exposures to any of the VOCs from the NIBW Area 12 property are below the CVs, no child health issues are expected from this site.

Conclusions

Under the current conditions at the site, the NIBW Area 12 remediation facility poses **no public health hazard**.

Recommendations

The Arizona Department of Health Services has the following recommendations:

- Continued monitoring of the site to determine if future actions are required to avoid exposures to the VOC's.
- If future remediation programs result in the removal of the carbon filters, air monitoring should be implemented to determine air emissions levels.

Public Health Action Plan

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

References

ADEQ 1995. Arizona Hazardous Air Pollution Research Program Final Report Volume 2: Findings. December 1995

EPA 2004. Quarterly reports for the North Indian Bend Wash water treatment facilities, March 2004

EPA 1991 Risk Assessment Guidance for Superfund (RAGS), Supplemental Guidance Standard Default Exposure Factors (OSWER Directive, 9285.6-03) dated March 25, 1991

Preparers of Report

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CERTIFICATION

The Arizona Department of Health Services, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), prepared this North Indian Bend Wash (NIBW) Superfund site health consultation. It was prepared in accordance with approved methodology and procedures existing at the time.

Charisse J. Walcott
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Superfund and Program Assessment Branch
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The Division of Health Assessment and Consultation has reviewed this health consultation and concurs with its findings.

Bobbie Erlwein
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ATSDR

APPENDIX

Factors used in determining the amount of contaminants present 100 meters from the discharge vents

C: Contaminant Concentration in milligrams per cubic meter

D: Discharge rate of air system 5400 cubic feet per minute (9175 cubic meters per hour)

MB: Modelled box 10 meters X 10 meters X wind speed (10800 meters per hour) = 1080000 cubic meters per hour

Where: $\frac{CD}{MB}$

Attached map

MILLER ROAD
TREATMENT
FACILITY

AREA 7
TREATMENT
FACILITY

INDIAN BEND ROAD

LINCOLN DRIVE

85253

MCDONALD DRIVE

JACKRABBIT ROAD

JACKRABBIT ROAD

VISTA DRIVE

CHAPARRAL ROAD

CAMELBACK ROAD

CAMELBACK ROAD

INDIAN SCHOOL RD.

Limit of Area Served by
Scottsdale Central Groundwater
Treatment Facility (CGTF)

CENTRAL
GROUNDWATER
TREATMENT FACILITY

THOMAS ROAD

Extent of Upper
Alluvium Unit

MCDOWELL ROAD

Extent of
Middle and
Lower Alluvium
Units

MCKELLIPS RD.

LEGEND

Area of Contaminated Groundwater
Trichloroethylene (TCE) Level > 5, ug/L,
October, 2003

TCE in UAU

TCE in Upper MAU

TCE in LAU



0 2,000 4,000

APPROXIMATE SCALE

SALT RIVER
INDIAN COMMUNITY

AREA 12
TREATMENT
FACILITY

HAYDEN ROAD

GRANITE LEEF ROAD

PIMA ROAD

SALT RIVER

North Indian Bend Wash Scottsdale, Arizona