

Letter Health Consultation

NORTH INDIAN BEND WASH

SCOTTSDALE, MARICOPA COUNTY, ARIZONA

EPA FACILITY ID: AZD980695969

SEPTEMBER 30, 2008

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.

You May Contact ATSDR Toll Free at
1-800-CDC-INFO

or

Visit our Home Page at: <http://www.atsdr.cdc.gov>

LETTER HEALTH CONSULTATION

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SCOTTSDALE, MARICOPA COUNTY, ARIZONA

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Prepared By:

U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation



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and Disease Registry
Atlanta GA 30333

SEP 23 2008

This letter will inform you of our activities regarding your 2007 request to the Agency for Toxic Substances and Disease Registry (ATSDR) for a public health evaluation at the North Indian Bend Wash (NIBW) site in Scottsdale, Arizona. You will recall that you inquired about any potential past exposures to trichloroethylene (TCE) in the NIBW site drinking water system that might have occurred before the system's contaminated wells were closed in 1981.

In response to your request, ATSDR collected and reviewed relevant and available groundwater and municipal water data from

- the U.S. Environmental Protection Agency (USEPA);
- the U.S. Geological Service (USGS);
- the City of Scottsdale, City of Phoenix, and the Arizona Department of Health Services (AZDHS);
- Arizona Department of Environmental Quality (AZDEQ);
- Arizona Department of Water Resources;
- Maricopa County Court;
- the Salt River Project, and
- the consultant to the potentially responsible parties.

ATSDR staff visited the site and met with personnel from the above agencies, met with community members, and reviewed documents at the AZDEQ, the USGS regional office, and Maricopa County Court. A list of available documents ATSDR reviewed regarding past exposures is enclosed. We describe our findings below.

Since the late 1980s, ATSDR has conducted several evaluations for the NIBW site. A 1989 public health assessment concluded that exposures to contaminated municipal drinking water may have occurred in the past, but after the 1981 closure of the contaminated wells, the exposures were expected to be low. In 1993, ATSDR completed a review and update for the site, and staff from ATSDR's Division of Health Studies recommended no additional studies. To address community concerns on childhood cancers at the site and the surrounding area, ATSDR reviewed with AZDHS the available state cancer incidence data. In 1988, 1990, and 1997, AZDHS issued three reports on the incidence and mortality of childhood cancers in Maricopa County. The reports stated that compared with rates in other areas of Maricopa County,

childhood cancer and leukemia cases in the NIBW area during the 1965–1990 study periods were not elevated. Between 2005 and 2007, in response to a request from the NIBW Community Involvement Group, AZDHS completed four health consultations to evaluate potential adverse health effects due to air emissions from treatment facilities at the site. The ATSDR and AZDHS documents are on the Web at

<http://www.atsdr.cdc.gov/HAC/PHA/HCPHA.asp?State=Arizona>

<http://www.azdhs.gov/phs/phstats/acr/>

<http://www.azdhs.gov/phs/azchaa/>

www.epa.gov/region09/northindianbendwash

Currently, exposures to TCE through the NIBW public drinking water system are expected to be minimal; they are in all likelihood below the U.S. EPA drinking water standards for TCE. NIBW is one of the largest of the U.S. EPA's groundwater cleanups under the Superfund program. As stated in previous ATSDR documents, we know that before the contaminated wells were closed in 1981, people who lived in the NIBW area were exposed to TCE in the municipal drinking water system. Exposures occurred through ingestion of the water, dermal contact during showering or bathing, and inhalation of TCE vapors released during water use.

In specific reference to your inquiry, however, few pre-1981 data are available—before the 1981 shutdown, only a handful of samples were collected at the municipal drinking water source wells. Consequently, these data cannot quantify the TCE concentrations to which people were exposed in the months and years before 1981. Reconstructing the amount of TCE that people were exposed to in the past not only requires data on the occurrence of TCE at source wells. It also requires information about the fate and transport of TCE in groundwater (that is, from the TCE “source areas” to the wells) and in the distribution system that delivers drinking water to the public. In that regard, we understand that various stakeholders have already developed some studies and models of these systems for use in connection with litigation involving this site. Nevertheless, because of diverse study objectives and models, as well as general limitations and uncertainties of modeling efforts, the usefulness of such models is limited for estimating pre-1981 TCE concentrations in the NIBW water distribution system. Moreover, given available resources within ATSDR, development of independent models to reconstruct past exposures to the public is not practicable. Consequently, ATSDR cannot estimate the past TCE exposure levels for the Indian Bend Wash community.

That said, ATSDR has reviewed animal studies, occupational studies, and residential exposure studies to TCE exposures through drinking water. We have summarized the specific health effects and estimated exposure doses for specific concentration ranges of TCE in water for persons using municipal well water as the sole source of drinking water and other household uses. We have enclosed with this letter a table of TCE toxicological information, maps of the site demographics, and a table of the limited TCE data for the municipal water system during the period of concern.

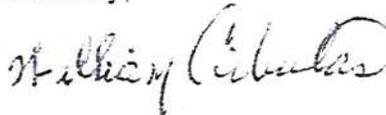
With regard to these estimates, however, we caution that as stated previously, the pre-1981 TCE concentrations measured at municipal wells were not representative of the concentration to which people were exposed. The municipal wells fed into the NIBW water distribution system, which is a complex network of source wells, storage tanks, and water pipes that delivered drinking water to the public. We caution further that ATSDR's estimates cannot determine the cause of any individual person's disease or identify whether a particular exposure caused a disease.

You may be aware that we have received several requests asking why ATSDR has not initiated multi-year health studies at the NIBW community similar to those done at Camp Lejeune, North Carolina, or at other sites with TCE contamination. Although epidemiologic research is a tool we use to advance our knowledge of the harmful effects of exposure to contaminants, it is rarely helpful for preventing disease among persons who were exposed in the past. ATSDR considers primary prevention to be the principal strategy for addressing exposures to hazardous substances, and our first priority is to stop ongoing exposures to harmful contaminants. With regard to Camp Lejeune, the following factors led ATSDR to study health effects associated with TCE exposures there:

- the levels of contamination in Camp Lejeune drinking water,
- the identification of a large group of exposed (and unexposed) persons likely to produce statistically sound results,
- the ability to determine who was and was not exposed,
- the availability of data on health outcomes, and
- community support for the study.

We believe the Camp Lejeune study results should provide meaningful information to other communities exposed to TCE-contaminated drinking water. Thank you for forwarding your concerns to ATSDR. If you have additional questions, please contact the lead environmental health scientist for this site Dr. Jane Zhu at 770-488-0669, or 800-CDC-INFO, or email her at jzhu@cdc.gov.

Sincerely,



William Cibulas Jr., Ph.D.
CAPT, U.S. Public Health Service
Director
Division of Health Assessment and Consultation

NIBW Document List

ATSDR Documents:

ATSDR Health Assessment for North Indian Bend Wash, April 1989.

ATSDR Site Review and Update, September 1993.

Area 12 Health Consult. March 2005.

Central Ground Treatment Facility (CGTF) Health Consult, September 2006.

Miller Road Treatment Facility (MRTF) Health Consult, March 2006.

EPA Documents:

Community Well Sampling Plan, November 1984.

Community Well Sampling Report - Appendix H.

Map - Location of Wells for Community Well Sampling Program.

Memo - Three Changes to Community Well Sampling Plan dated, December 1986.

Draft Preliminary Public Health Assessment endangerment assessment by CH2Mhill, November 1987.

Comments on EPA 11-12-1987 draft preliminary public health assessment from Motorola, January 1988.

Comments on Draft Preliminary Public Health Assessment, January 1988.

Comments on Draft Preliminary Public Health Endangerment Assessment from ADEQ, January 1988.

Transmits draft Preliminary public health assessment for comments without attachments October 1987.

Record of Decision (ROD) Scottsdale Groundwater operable unit, September 1988.

Record of Decision (ROD) Shallow GW and Soils, September 1991.

Record of Decision (ROD) Amendment, September 2001.

Record of Decision, North Indian Bend Wash Superfund Site

Phase 1 RI Report - vol 1 of 3

Phase 1 RI Report - vol 2 of 3 - App A – C

Phase 1 RI Report - vol 3 of 3 - App E – O

Phase 2 RI Report - public draft - vol 1 of 5

Phase 2 RI Report - public draft - vol 2 of 5

Phase 2 RI Report - public draft - vol 3 of 5

Phase 2 RI Report - public draft - vol 4 of 5

Comments on Remedial Action Master Plan, June 1983.

DOD and TCE Highlight of GAO-07-1042T, a testimony before the subcommittee on readiness, committee on Armed Services, House of Representatives.

FS Addendum to GW Model Final Report - vol 1 - Text and Tables - April 1999.

FS Addendum to GW Model Final Report - vol 2 - Appendices - April 1999.

Operable unit feasibility study of Scottsdale's OU FS for Remediation of GW in Southern Scottsdale Area - public comment draft - April 1988.

City of Scottsdale and City of Phoenix Documents:

Comments on Remedial Action Master Plan, June 1983.

Memo TCE studies test of Phoenix Well 35, May 1982.

Preliminary TCE results for Maricopa County, March 1982.

Results of initial GW quality monitoring phase, January 1981.

Summary of NIBW site history activities June 1983.

Symposium on history of development of water supply in arid areas, January 1983

Transmittal Letter of City of Phoenix well production facilities, June 1980.

Water System Modifications, Project No: W6501, Phase 1-Study, City of Scottsdale, April 1987.
The City of Phoenix well production facilities and some other related information (June 1980) include one well location map and one semi-monthly water production report.

AZDHS Reports and Data available for the NIBW site:

City of Scottsdale – Central Ground Treatment Facility (CGTF): Compliance Monitoring Report
1st QTR – 2006.

Production and Facility Totals.

Maintenance Report.

2003 Site Monitoring Report: Prepared by: NIBW Participating Companies.

April 12, 2005 CH2MHill: NIBW Ambient Air Sampling Results from the February 14 to
February 19, 2005 Air Sampling Event.

Figure G-3. Miller Road Treatment Facility (MRTF) Facility Plan.

Figure G-3. Miller Road Treatment Facility (MRTF Building Elevations).

Miller Road Treatment Facility (MRTF) Aerial Photo with markups, February 2005.

Draft Preliminary Risk Assessment Miller Road Treatment Facility North Indian Bend Wash
Superfund Site Scottsdale, Arizona, September 24, 2004.

Miller Road Treatment Facility (MRTF) TCE Jan. - Jun. 2005 (TCE data – excel spreadsheet).

Miller Road Treatment Facility (MRTF) TCE Jan. - Dec. 2004 (TCE data – excel spreadsheet).

Miller Road Treatment Facility (MRTF) TCE Apr. - Sep. 2003 (TCE data – excel spreadsheet).

QUARTERLY REPORT July – September 2004 North Indian Bend Wash Superfund Site
Scottsdale, Arizona.

QUARTERLY REPORT January – March 2004 North Indian Bend Wash Superfund Site
Scottsdale, Arizona.

Results of On-Site and Ambient Air Sampling: Area 7 and Area 12; May 2005.

QUARTERLY REPORT April – June 2004 North Indian Bend Wash Superfund Site Scottsdale,
Arizona.

2004 Site Monitoring Report (Amended Report April 7, 2005): Prepared by: NIBW Participating
Companies.

2006 Site Monitoring Report Prepared by: NIBW Participating Companies.

2004 Site Monitoring Report Prepared by: NIBW Participating Companies.

Other:

1999_ASCE_Conf_Harding&Walski.

Historical TCE Concentrations Maryvale, 1997.

Walski TM, Harding BL, 1997a. Historical TCE Concentrations in Drinking Water in South Scottsdale and Adjacent Areas of Phoenix, AZ. Hydrosphere Resource Consultants, Inc. Boulder, CO.

Walski TM, Harding BL, 1997b. Historical TCE Concentrations in Drinking Water in Maryvale Area of West Central Phoenix, AZ. Hydrosphere Resource Consultants, Inc. Boulder, CO.

City of Tempe water well system evaluation final report, January 1983.

Symposium on history of development of water supply in an arid area in southwestern United States--Salt River Valley, Arizona, by H. E. Skibitzke et al. (For presentation October 1961 to International Association of Scientific Hydrology - United Nations Educational, Scientific and Cultural Organization symposium, Athens, Greece. Publication authorized by the Director, U. S. Geological Survey).

AZ Department of water resources. Revised groundwater modeling results for the East Valley Water Forum (EVWF), December 2004.

Preliminary Report Water Quality SRP.

Summary of water sample taken for TCE concentration from well 23.6-9N of SRP, May 1982.

Summary of Health Effects Associated with Specific Levels of Exposure to TCE and Corresponding Concentrations of TCE in Water

| TCE Exposure Conc. (ppb) | Chronic Exposure Dose* (adult/child) (mg/kg-day) | Possible Health Effects from Chronic Drinking Water TCE Exposure† | | | |
|--------------------------|--|--|---|-------------------------|--|
| | | Human Studies | | Animal Studies | |
| | | Cancer | Other effects | Cancer | Other effects |
| >30,000 | 156/500 | | | Renal and kidney tumors | liver, kidney, neurological, reproductive, developmental |
| | 78/250 | | | | liver, kidney, neurological, reproductive, developmental |
| | 32/100 | | | | |
| | 10.378/34.380 | | | | |
| | 3.579/11.460 | | | | |
| >10,000 | 3.579/11.460 | | | | |
| >3,000 | 1.073/3.438 | | | | developmental |
| >1,000 | 0.357/1.146 | | Woburn exposure group: cardiac, respiratory, immune, dermal, birth outcomes; New Jersey exposure group: adverse birth outcomes. | no information | fetal heart abnormalities at 0.18 mg/kg-day (Dawson et al, 1993); at 0.048 - 0.218 mg/kg-day, not statistically significant (Jonson et al, 2003) |
| >300 | 0.107/0.343 | Woburn exposure group: increased acute lymphocytic leukemias (Maximum 267 ppb in wells) | | | |
| >100 | 0.035/0.114 | New Jersey exposure group: increased risk of leukemia and non-Hodgkins lymphoma in drinking water study (average 23 µg/L, and highest assigned 67 µg/L; Cohn et al., 1994, ATSDR 2003) | | | |
| >30 | 0.010/0.034 | | no demonstrated effect | | no demonstrated effect |
| >5 | 0.001/0.005 | | | | |
| <5 | <0.001/0.005 | no demonstrated effect | | | |

* Chronic exposure dose is the estimated total dose of TCE from ingestion intake, inhalation intake, and dermal intake. Child and adult intake rates and body weights are based on the U.S. EPA's Exposure Factors Handbook, 1997. The following equations were used:

$$\text{Ingestion dose} = \text{Water Concentration} \times \text{Intake Rate} \times \text{Exposure Factor} / \text{Body weight}$$

Water intake for preschool child is 0.61 liters per day (L/day), body weight 10 kilogram (kg); Water intake for adult is 1.41 L/day, body weight 70 kg, and Exposure Factor is conservatively assumed to be 1.

$$\text{Inhalation Dose} = C \text{ air max} / \text{inhalation rates} / \text{body weight}$$

where,

$$C \text{ air max} = \text{maximum concentration in air during the shower and after period in bathroom} = (k) (Fw) (Ts) (Cw) / Va$$

k = fraction of chemical that evaporates from water while showering (assumed to be 0.6),
Fw = flow rate of water through shower head in L/minute (assumed to be 8 liters/minute),
Ts = duration of shower in minutes (assumed to be 30 minutes for shower and 30 minutes stay after shower in bathroom),
Va = volume of shower and bathroom in liters, (assumed to be 10,000 liters, the approximate size of a small bathroom), and
Cw = concentration of chemical in water in mg/L.

Dermal dose = (skin permeability constant) (duration of exposure)(total body surface area)(percent of body surface area exposed)(chemical concentration in water)(fraction remaining after volatilization)

The permeability constant for chlorinated organic chemicals is assumed to be 0.001 L/cm-hr (Brown et al. 1984) and 40% of the chemicals are assumed to remain in the shower water after volatilization (Andelman 1985, McKone 1991). For adults the assumed breathing rate for light activity is 1.39 m³/hr; for children the assumed breathing rate for light activity is 0.84 m³/hr. For skin surface area, the assumed area is 18,150 cm² for adults and 11,750 cm² for children (U.S. EPA 1997).

† Possible health effects from chronic inhalation TCE exposure from occupational studies are not listed in the table.

Indian Bend Wash Area
Scottsdale, AZ



EPA Facility ID: AZD980695989

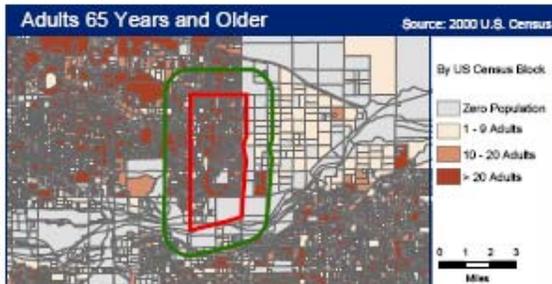
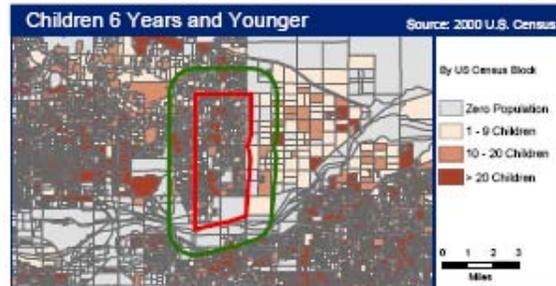
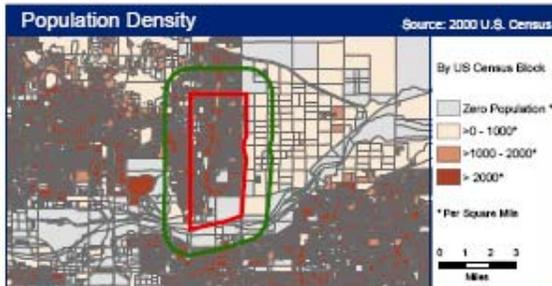


Demographic Statistics Within One Mile of Site*

| | |
|--|--------|
| Total Population | 88,940 |
| White Alone | 76,568 |
| Black Alone | 1,438 |
| Am. Indian & Alaska Native Alone | 1,466 |
| Asian Alone | 2,140 |
| Native Hawaiian & Other Pacific Islander Alone | 114 |
| Some Other Race Alone | 4,978 |
| Two or More Races | 2,235 |
| Hispanic or Latino** | 12,136 |
| Children Aged 6 and Younger | 5,779 |
| Adults Aged 65 and Older | 15,636 |
| Females Aged 15 to 44 | 20,810 |
| Total Housing Units | 45,696 |

Base Map Source: Geographic Data Technology, May 2005.
Site Boundary Data Source: ATSDR Geospatial Research, Analysis, and Services Program.
Current as of Generate Date (bottom left-hand corner).
Coordinate System (All Panels): NAD 1983 StatePlane Arizona Central FIPS 0202 Feet

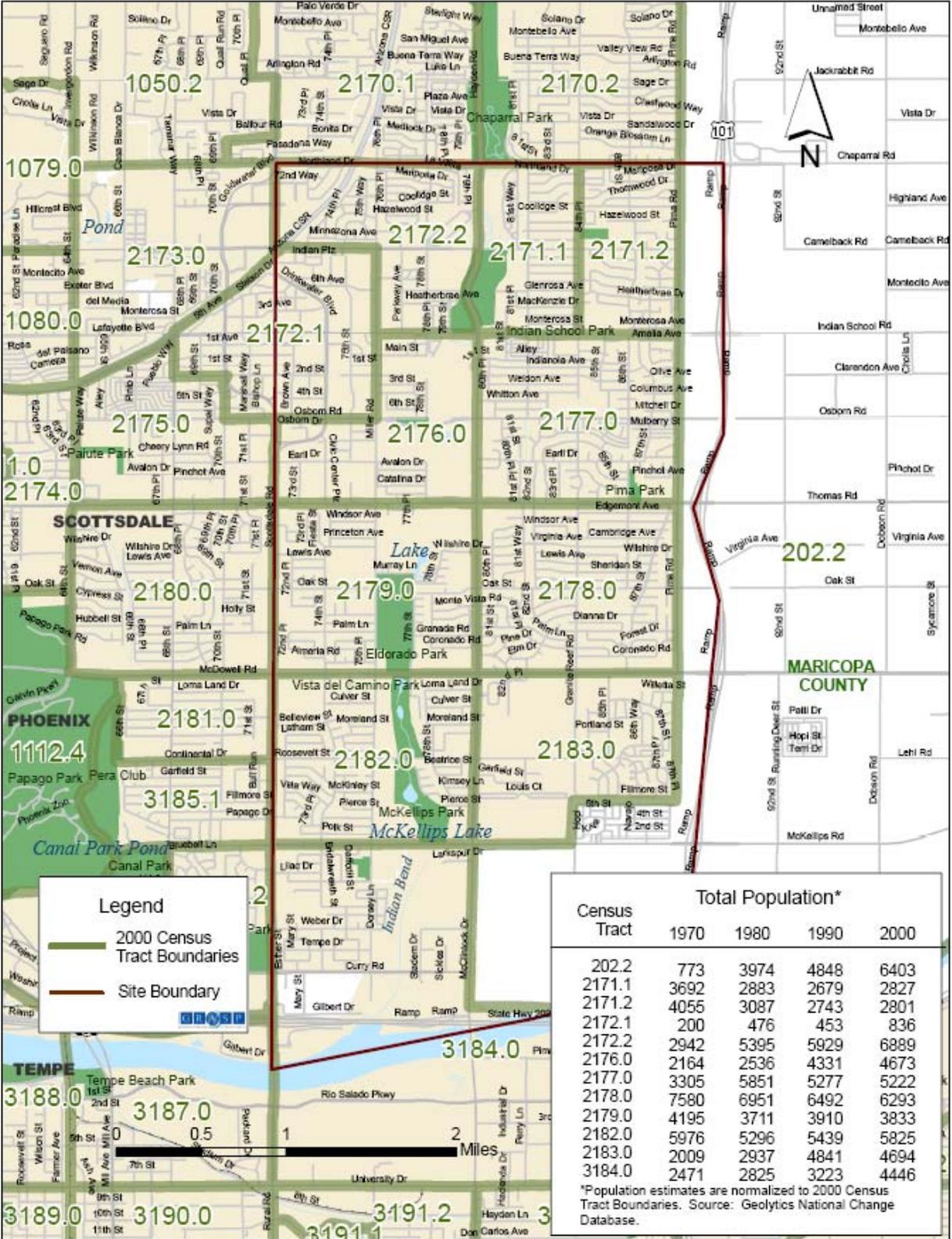
Demographics Statistics Source: 2000 U.S. Census
* Calculated using an area-proportion spatial analysis technique
** People who identify their origin as Hispanic or Latino may be of any race.



*proj=+3027+us80+RAD+geo+Maricopa, County, AZ+keyw=AZD980695989, Indian Bend



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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY | UNITED STATES DEPARTMENT OF HEALTH AND HUMAN SERVICES



Available TCE Data NIBW Site (1970-1981)

| | Well ID | TCE Concentration (ppb) | Sample Date | Note | Data source |
|---|----------------|--------------------------------|--------------------|-----------------------------------|----------------------|
| COP wells | Well36 | 143 | 10/29/1981 | shut down | Laboratory report |
| | | 16.8-103.3 | 1970-1981 | Adjusted well head concentrations | 1997 Modeling report |
| | Well35 | 223 | 10/9/1981 | shut down | Laboratory report |
| | | 52-218.6 | 1970-1981 | Adjusted well head concentrations | 1997 Modeling report |
| | Well 34 | 3.8 | 10/9/1981 | | Laboratory report |
| | | 3.4-6.6 | 1970-1981 | Adjusted well head concentrations | 1997 Modeling report |
| COS wells | Well 31 | 13.7 | 10/30/1981 | shutdown | Laboratory report |
| | | 3.9-24.9 | 1970-1981 | Adjusted well head concentrations | 1997 Modeling report |
| | Well 6 | 23.8 | 10/30/1981 | shut down | Laboratory report |
| | | 9.7-92.7 | 1970-1981 | Adjusted well head concentrations | 1997 Modeling report |
| COP wells | Not available | 14 | Not available | Active wells | 1993 ATSDR PHA |
| COS wells | Not available | 7 | Not available | Active wells | 1993 ATSDR PHA |
| COS wells | Not available | 520 | Not available | Inactive wells | 1993 ATSDR PHA |
| COS wells | Not available | 390 | Not available | Inactive wells | 1988 ROD Amendment |
| Maximum simulated TCE concentration, in parts per billion (ppb), across various drinking water service areas in and around South Scottsdale during 1970-1981 (Walski & Harding 1997a). | | | | | |
| 1970 | 2.6 | | 1976 | 16.6 | |
| 1971 | 3.9 | | 1977 | 18.1 | |
| 1972 | 5.7 | | 1978 | 75.2 | |
| 1973 | 6.0 | | 1979 | 83.1 | |
| 1974 | 7.1 | | 1980 | 16.2 | |
| 1975 | 14 | | 1981 | 16.8 | |

Note: TCE concentrations measured at municipal wells and modeled at the wellheads were not representative of the concentration to which people were actually exposed.