# HEALTH CONSULTATION

**Motorola 56th Street Facility**
**Phoenix, Maricopa County, Arizona**

**EPA Facility ID:**
**AZD980883300**

Prepared by:

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

## Introduction

The purpose of this health consultation is to determine whether contaminants in groundwater from the Motorola 56th Street facility represent a threat to public health.

## Background

The Motorola 56th Street facility is located on the northwest corner of 56th Street and Earll Drive in Phoenix, Arizona. The facility is in an area primarily surrounded by residential and commercial property. The site is surrounded by single-family houses on the north, 56th Street on the east and Earll Drive on the south. The 56th Street facility occupies about 14 acres of land that contain four buildings, parking lots, and landscaped areas.

The facility is located in a suburban area of residential properties ranging from very small to approximately 1 acre, with approximately 3000 persons living within 1 mile. Many homeowners have lived in the homes for 20+ years. Some new homes have been built on previously vacant lots or on properties recently subdivided.

The Motorola 56th Street facility was first occupied in the spring of 1950 as the Western Military Electronics Center. From 1950 to 1958, it was primarily used for bench type electronics, electronic assembly, and semiconductor production. The chemicals used in these processes included solvent degreasers such as trichloroethylene, acetone, and freon, and metals such as cadmium, chromium, and arsenic.[1]

From 1959 through 1961, the facility was used primarily for document storage. Beginning in 1962, manufacturing of electronics resumed to include assembly of circuit boards, plating, and degreasing. Chemicals used between 1962 and 1974 included trichloroethylene, tetrachloroethylene, and a number of acids and metals including arsenic. In 1975, the facility began manufacturing liquid crystal products. These activities continued until 1982, when it was converted to office use.[1]

The investigations that have been conducted to date have shown that there are residual levels of arsenic and fluoride in down-gradient private wells west of the facility. Solvent contaminants that were found in the 1980s are no longer present at detectable levels in down-gradient private wells.

Groundwater data from the affected area are currently available for 5 private irrigation wells down-gradient (west) of the facility. All of the homes receive their drinking water from the city of Phoenix municipal water system. There are no municipal production wells in the known area of contamination. The closest currently operating public supply well is located 3.5 miles up-gradient (east) of the facility.[2]

Attempts to locate the actual irrigation well sites at the private homes were undertaken on 4

occasions: February 18, March 6, March 19, and March 20, 2003. ADHS staff located all of the 5 current well owners and spoke to the residents about the wells and their uses. In all cases, the irrigation wells were specifically used to water outside plants, or were no longer being used. In addition, the occupants were all aware of the non-potable nature of the water.

## Discussion

### Data Used

Comprehensive organic priority pollutant and inorganic chemical analyses were performed on groundwater samples collected from 5 down-gradient irrigation wells in 1993. The samples were analyzed for common volatile organic compounds and metals.[3]

### Contaminants of Concern

This section identifies the chemicals of concern for the Motorola Inc. 56th Street facility. The discussion addresses the available data; the methodology used in the identification process; the criteria for selection; and determination of the extent and levels of contamination.

*Groundwater*

Table 1 displays the frequency and ranges of detection for the 2 compounds that were present in at least one private well above the ATSDR Comparison Values of 3 µg/L for arsenic and 4 µg/L for fluoride (The Arizona Department of Health Services used the U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level for Fluoride as a surrogate for a comparison value (CV) because ATSDR does not have a CV for Fluoride). Solvent contaminants that were found in the 1980s are no longer present at detectable levels in the wells. Only arsenic and fluoride are present in water above an ATSDR CV or the EPA Maximum Contaminant Level. There are several monitoring wells in the area placed to track the progress of the contaminants as they moved through the aquifers. The sampling of these wells has indicated a steady decline in levels of the industrial solvents in the groundwater.

**Table 1. Private Well Sampling Results**

| Chemical | Frequency of Detection | Range (µg/L) | ATSDR Child Comparison Value (µg/L) | Frequency of Detection Above Comparison Value | Contaminant of Concern? |
|---|---|---|---|---|---|
| **Arsenic** | 5/5 | 8-96 | 3 | 5/5 | **Yes** |
| **Fluoride** | 4/5 | 6-16 | 4* | 4/5 | **Yes** |

*USEPA Maximum Contaminant Level. No ATSDR Comparison Value Available

## Exposure Pathways

It is possible that dermal, inhalation, and ingestion exposures have occurred and may continue when residents irrigate their lawns and flowers and when children play in the irrigation water. ADHS evaluated the environmental and human components that lead to human exposure to determine whether people are exposed to contaminants from the site. 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.

ADHS categorizes an exposure pathway as a 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 residents who live west of the facility and have private irrigation wells. 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

There are 5 known exposure points (private irrigation wells) to chemicals in the groundwater plume. Complete exposure pathways are identified in Table 2. Exposure is through incidental contact with irrigation water.

ADHS staff spoke to current residents who owned 5 irrigation wells, and all were aware of the non-potable nature of the water from the wells. The water from the wells is used for outside watering purposes such as for trees, flowers, and grass.

**Table 2. Complete Exposure Pathways**

| Source | EXPOSURE PATHWAY ELEMENTS | | | | |
|---|---|---|---|---|---|
| | **Media** | **Point of Exposure** | **Route of Exposure** | **Estimated Population** | **COC** |
| Motorola 56th St | Groundwater | Exposure to irrigation water | ingestion inhalation dermal | 30 | Arsenic Fluoride |

COC = contaminant of concern

*Groundwater*

There are currently 5 wells near or in the area of known contamination. Table 3 lists the private irrigation wells in the vicinity of the groundwater plume.

Exposures to irrigation water containing the chemicals of concern were estimated by assuming that a child plays in the flood irrigation water once per week for a 4 hour time period. While playing in the water, the child is assumed to incidentally ingest 0.05 liters (50 milliliters) during each play event. The estimate assumes a standard child's body weight of 15 kilograms. Inhalation and dermal contact with the water did not contribute to the dose estimate because arsenic and fluoride are inorganic, nonvolatile, and very poorly absorbed through the skin. Childhood doses were compared to ATSDR Minimal Risk Levels, which are exposure doses below which no adverse, non-cancer health effects are expected.

**Table 3. Arsenic Dose Estimates and Minimal Risk Levels (MRLs)**

| Well Number | Arsenic Concentration (mg/L) | Child's Estimated Daily Dose (mg/kg/day) | MRL (mg/kg day) | Child Dose Exceeds MRL? |
|---|---|---|---|---|
| | | | | |
| 55-502277 | 0.016 | 0.000028 | 0.0003 | No |
| 55-638243 | 0.008 | 0.000016 | 0.0003 | No |
| 55-633954 | 0.025 | 0.00004 | 0.0003 | No |
| 55-639604 | 0.027 | 0.00004 | 0.0003 | No |
| 55-501995 | 0.096 | 0.00016 | 0.0003 | No |

**Table 4. Fluoride Dose Estimates and Minimal Risk Levels (MRLs)**

| Well Number | Fluoride Concentration (mg/L) | Child's Estimated Daily Dose (mg/kg/day) | MRL (mg/kg day) | Child Dose Exceeds MRL? |
|---|---|---|---|---|
| | | | | |
| 55-502277 | 9 | 0.016 | 0.06 | No |
| 55-638243 | ND | -- | 0.06 | No |
| 55-633954 | 7 | 0.012 | 0.06 | No |
| 55-639604 | 6 | 0.012 | 0.06 | No |
| 55-501995 | 16 | 0.028 | 0.06 | No |

The exposure analysis suggests that incidental exposure to irrigation water at the 5 private irrigation wells presents **no public health hazard**.

## Child Health Issues

All exposure dose estimates were calculated assuming childhood exposure, thus incorporating exposure assumptions that reflect a child's greater intake of water relative to body weight. All conclusions and recommendations about using water from these wells were based on the characteristics of this sensitive population.

## Conclusions

There are 5 private irrigation wells down-gradient of the Motorola 56$^{th}$ Street facility that have elevated levels of arsenic or fluoride in the water. All the wells are used solely for flood irrigation, and none are plumbed into the dwellings. Use of the private wells for flood irrigation poses **no public health hazard**.

## Recommendations

No recommendations

## Public Health Action Plan

The Arizona Department of Health Services will notify the well owners of the results of this health consultation.

## PREPARERS OF THE REPORT

**Arizona Department of Health Services, Office of Environmental Health**

Brian Hasty, MT
Will Humble, MPH

**ATSDR Regional Representative**

William Nelson
Office of Regional Operations, Region 9
Office of the Assistant Administrator

**ATSDR Technical Project Officer**

Gail Godfrey
Division of Health Assessment and Consultation
Superfund Site Assessment Branch
State Programs Section

## References

1.Kary Ray.. 1985. Chemical disposal methods report of Motorola Inc. 56th Street Facility, Phoenix, Arizona.

2..Arizona Department of Environmental Quality Site and Hazard Evaluation Unit. 1991. Site inspection of the Motorola 56th Street Facility.

3. Dames and Moore, Inc. 1993. Dry well abandonment report Motorola 56th Street Facility. Phoenix, Arizona.

## 3. Certification

This Motorola 56th Street Facility Health Consultation was conducted by the Arizona Department of Health Services in cooperation with the Agency for Toxic Substances and Disease Registry. The health consultation was conducted in accordance to policy and guidance at the time the health consultation was begun.

Technical Project Officer
ATSDR, DHAC, SSAB, SPS

This health consultation was reviewed by ATSDR. ATSDR concurs with the findings.

Chief, SPS