



MEMORANDUM

Date: February 13, 2008

To: The Honorable Chairman and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator 

Re: Agency for Toxic Substance and Disease Registry Response Regarding Beryllium

As the Board recalls, the County requested, in September of 2007, that the Agency for Toxic Substance and Disease Registry conduct an onsite scientific review of the level of beryllium in the local environment, and to determine whether or not if, to any degree, it poses a threat to the health and safety of Pima County residents. This action was taken as a result of an area resident testing sensitive to beryllium exposure.

In response to our inquiry, the Agency does not plan to conduct any new public health assessment. Attached is a staff response to the Agency correspondence and the comments to this response. It would appear from all responses related to this matter that no further action is warranted at this time.

CHH/jj

Attachment

c: Dennis Douglas, Deputy County Administrator for Medical and Health Services
John Bernal, Deputy County Administrator - Public Works
Ursula Kramer, Environmental Quality Director



MEMORANDUM

Date: February 1, 2008

To: C.H. Huckelberry
County Administrator

From: Dennis W. Douglas 
Deputy County Administrator
Medical and Health Services

Re: Agency for Toxic Substance and Disease Registry (ATSDR) Letter Dated December 28, 2007
Pima County Response

As you recall, in September 2007, Pima County requested that the Agency for Toxic Substance and Disease Registry (ATSDR) conduct an on-site scientific review of the levels of beryllium in the local environment to assess whether those levels exceed federally established limits. The request further asked them to determine the degree, if any, to which its presence may pose a threat to the health and safety of residents of Pima County. Attached please find a copy of correspondence between Pima County and ATSDR regarding this issue.

The purpose of this Memorandum is to provide you with recommendations for action based on the determination made by ATSDR.

Background

In 2006 El Pueblo Health Center, in response to concerns articulated by public advocacy groups, offered beryllium sensitivity (BeS) testing to certain residents and workers in the community near Brush Ceramics Products (BCP), a manufacturer that uses the mineral beryllium in its production. The testing program was performed under a contract with Pima County. Of nine individuals who agreed to be tested, one tested positive for beryllium sensitivity. Because this individual had an occupational history that included potential exposure to beryllium, no causal relation to environmental exposure to beryllium emissions from BCP could be established. In light of this positive test result, Pima County submitted the request to ATSDR.

It may be useful to recall that the Arizona Department of Health Services (ADHS), under a cooperative agreement with ATSDR, performed a Health Consultation in 2005, in which the extent of beryllium exposure from BCP emissions was evaluated. As a result of that Consultation, the BCP site was classified as "No Apparent Public Health Hazard" based on the conclusions that (a) beryllium was present in the environment; (b) exposures to both site related and naturally occurring beryllium were not at levels likely to cause adverse health effects (even to children and sensitive populations) and, therefore, (c) in light of the low exposures, the site did not pose a public health hazard.

ATSDR Response

ATSDR responded to Pima County's September 2007 request on December 28, 2007. ATSDR has determined that "additional evaluation of ... county sponsored beryllium sensitivity testing is unlikely to provide additional, useful information." ATSDR "does not plan to conduct any new public health

assessment activities at this time.” ATSDR provided three recommendations: a) explore the potential for occupational beryllium exposure for the individual who tested positive for beryllium sensitivity; b) if Pima County continues to offer BeS testing, it should shorten the 20-year residency requirement for inclusion in the testing program; and c) ADHS and ATSDR should be contacted if any cases of beryllium sensitization not associated to occupational exposure are identified. With respect to the first recommendation, ATSDR offered to assist to identify pulmonologists with expertise in beryllium disease to perform the evaluation.

Staff Response to ATSDR Correspondence and Staff Recommendations

- Staff agrees that additional review of the positive BeS sensitivity case should be done to attempt to determine whether the test subject’s possible occupational exposure explains the positive test results. Accordingly:
 - Pima County will contact El Pueblo Clinic, the entity that performed the testing and that has an established relationship with the test patient, to advise them of ATSDR’s recommendations and encourage El Pueblo to perform an occupational disease evaluation of this patient;
 - Pima County will encourage El Pueblo to contact ATSDR to obtain referral information for a pulmonologist with expertise in beryllium disease; and
 - Pima County will ask El Pueblo to contact both ADHS and ATSDR if any case of beryllium sensitization is identified that is the result of environmental, not occupational, beryllium exposure.
- The original testing program was performed by El Pueblo Health Center, not Pima County. That testing program has concluded, and no additional testing is provided for at this time. Beryllium sensitization is a relatively esoteric area of public health practice. Pima County does not have the requisite expertise on staff to undertake further investigation of beryllium sensitization. Further, ATSDR determined that the data from the testing done by El Pueblo was “unlikely to provide additional, useful information.” Accordingly:
 - In light of this opinion from ATSDR, which appears to confirm that there is insufficient data indicating beryllium is a threat to public health or safety sufficient to justify further testing, Pima County should not perform or arrange for the performance of additional BeS testing at this time.
- Pima County Department of Environmental Quality (DEQ) monitors emissions from BCP and ambient levels of beryllium on a regular basis.
 - DEQ and the Pima County Health Department should continue to coordinate on this issue; and
 - DEQ and the Health Department should make additional recommendations in the event of changes in the scientific knowledge on this topic or the levels of beryllium detected through monitoring.
- BCP remains interested in this issue. As a courtesy, Pima County should inform BCP of ATSDR’s decision and any actions that Pima County may take.

Should you have questions or wish to provide direction, please call me at 740-8977.

DWD:slg



Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

DEC 28 2007

Mr. Dennis W. Douglas
Deputy County Administrator for Medical and Health Services
Pima County
Pima County Government Center
130 W. Congress
Tucson, Arizona 85701

Dear Mr. Douglas:

Thank you for your September 18, 2007, letter to the Agency for Toxic Substances and Disease Registry (ATSDR) regarding your concerns for the community surrounding the Brush Ceramic Products facility in Tucson, Arizona. ATSDR considers your letter to be a petition for public health assessment activities. This letter describes ATSDR's response to your petition.

ATSDR worked closely with the Arizona Department of Health Services (ADHS) to evaluate this request for assistance. Together, with ATSDR technical staff who have considerable experience addressing concerns about environmental beryllium exposure, we carefully reviewed the documents provided with the request. These documents described the beryllium concentrations measured at this site and the methodology and results of beryllium sensitivity testing performed for the local community. We concluded that additional evaluation of the data presented in the 2005 Health Consultation or the county sponsored beryllium sensitivity testing is unlikely to provide additional, useful information; and ATSDR does not plan to conduct any new public health assessment activities at this time.

Although ATSDR did not identify any specific recommendations necessary to protect public health, the following items are noted as prudent public health actions related to this facility that may prove to be useful.

1. The potential for occupational beryllium exposure should be evaluated for the one individual with a positive BeS test. A pulmonary physician with expertise in beryllium disease should perform this evaluation. ATSDR can assist with identifying such specialists if needed.
2. If Pima County Department of Health chooses to continue offering BeS testing to residents near the Brush Wellman facility, it may be helpful to shorten the current 20-year residency requirement, to allow for greater participation.

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3. Please contact ADHS and ATSDR if one or more cases of beryllium sensitization are identified that are not linked to occupational beryllium exposure.

Thank you for forwarding your concerns to ATSDR. If you have additional questions, please contact CDR Susan Neurath, ATSDR Petition Coordinator, at (404) 498-0374 or email SNeurath@cdc.gov.

Sincerely,

A handwritten signature in black ink that reads "Kenneth Orbell, for". The signature is written in a cursive style.

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

cc:
Mr. Alan Croft, ADHS

Health Consultation

Brush Ceramic Products Evaluation of Beryllium Exposure

Tucson, Pima County, Arizona

EPA Facility ID: AZD037612702

August 8, 2005

Prepared by

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

Under a Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Purpose

The officials of Sunnyside High School District and a United States Representative have expressed great concerns regarding the potential adverse health effects due to beryllium exposure in the vicinity of Brush Ceramic Products. Thus, the Pima County Department of Environmental Quality (PDEQ) and the Arizona Department of Environmental Quality (ADEQ) requested the Arizona Department of Health Services to determine whether beryllium released from Brush Ceramic's plant poses a health threat to school children and employees, and residents in the vicinity of the facility.

Background and Statement of Issues

Brush Ceramic Products facility, located at 6100 South Tucson Boulevard, Tucson, Arizona, has produced beryllium oxide ceramic components since 1980. Beryllium is a hard, grayish metal naturally found in mineral rocks, coal, soil, and volcanic dust. Beryllium oxide is made from beryllium ores and is used to make specialty ceramics for electrical and high technology applications (ATSDR 2002; Kolanz 2001).

Some people exposed to beryllium may develop a sensitization to the metal, which may lead to an allergic response. Some sensitized individuals may develop an inflammatory reaction in the respiratory system. That is called chronic beryllium disease (CBD). Long-term inhalation of beryllium can increase the risk of developing lung cancer in people.

There are six schools (about 5,612 students) within a half-mile from the Brush Ceramic Products facility. As a result of development, the land directly north of the Brush Ceramic Products is now a residential area, which will have over 600 homes as shown in Figure 1.

Discussion

The Arizona Department of Health Services assessed the potential health effects due to beryllium exposure by comparing the average concentrations to various health-based reference values developed by the Agency for Toxic Substances and Disease Registry (ATSDR), the Arizona Department of Health Services, and the U.S. EPA (United States Environmental Protection Agency). These health-based reference values are conservatively developed based on the most sensitive receptors (e.g., children). They are screening values used in the public health assessment process to determine if the contaminants are present in the environment at levels that warrant future evaluation. The conclusion that a contaminant exceeds a health-based reference value does not mean that the contaminant will cause adverse health effects, but rather there is a need for a more thorough, contaminant-specific investigation. Environmental concentration below a health-based reference value is unlikely to cause adverse health effects regardless of exposure duration.

The Arizona Department of Health Services used average concentrations to evaluate the potential health effects because they are most representative of the concentration that would be contacted at a site, over time. For example, if we assume that an exposed individual moves randomly across an exposure area, the spatially averaged soil

Products. The sampling locations include children's playgrounds, busy sidewalks and soils adjacent to roof drains. Table 1 shows the average beryllium concentrations in soil samples collected in 1999 and 2000. The measured beryllium concentrations in soils ranged from 0.31 to 0.94 milligrams per kilogram (mg/kg) for 1999 samples and from 0.17 to 1.2 mg/kg for 2000 samples.

The average beryllium soil concentrations were compared to ATSDR's chronic (long-term) Comparison Values (CVs) for beryllium in soil, Arizona Soil Remediation Levels (SRLs) for beryllium in residential areas, and U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) for beryllium in residential areas. Arizona SRLs are developed by the Arizona Department of Health Services. These values are developed to provide health protection of human exposure, over a lifetime. Table 1 indicates that the average beryllium concentrations in soils sampled at various locations are lower than ATSDR's soil CV, Arizona's SRL and U.S. EPA Region 9's PRG for beryllium.

In 1999, two beryllium soil measurements exceeded the Arizona residential SRL for beryllium of 1.4 mg/kg. These samples were collected within a circle centered at Brush Ceramic Products (radius = 530 ft) and the measured concentrations were 1.9 and 3.0 mg/kg. Many years ago, the U.S. EPA listed beryllium as a carcinogen through the ingestion pathway. However, more studies showed that animals do not get cancer from ingestion of beryllium. Because of these findings, the U.S. EPA reevaluated its past classification and amended this classification in 1998. The Arizona SRLs were published in 1997 and have not been updated since then. The Arizona SRL for beryllium was developed based on the past classification of U.S. EPA (i.e., beryllium is a carcinogen through ingestion). As a result, the Arizona SRL overestimates the health risk posed by beryllium through ingestion. The Arizona Department of Health Services determined that these two soil measurements do not need further evaluation since they are far lower than the ATSDR's soil CV and the U.S. EPA Region 9 PRG for beryllium.

The representatives of the Sunnyside School District would like to know (1) a method to differentiate industrial beryllium sources from the naturally occurring beryllium sources and (2) the background beryllium concentration in soil within this area. The Arizona Department Health Services spoke with Mr. Jason Mihalic (Public Health Scientist III, Office of Environmental and Analytical Chemistry, Arizona Department of Health Services, Phoenix, AZ). He indicated that sometimes one can identify and compare isotopic ratios of an element to differentiate source A (industrial) from source B (natural). Unfortunately, beryllium has only one naturally occurring isotope, Be9. This means that Beryllium emissions from Brush Ceramic will contain only Be9, just as the natural soil contains only Be9, thus making it impossible to distinguish between possible industrial sources and natural background sources by isotopic ratio analysis. Dr. Eric Betterton (Professor, Department of Atmospheric Sciences, University of Arizona, Tucson, AZ) agreed with above statement at the Brush Ceramics Meeting on May 16, 2005.

Isotopes are different forms of a single element, which cannot be broken down into simpler components by any non-nuclear chemical reaction. For example, carbon 12 and carbon 14 are both isotopes of carbon. The ratio of carbon 12 and carbon 14 (C12/C14) is called isotopic ratio.

Air Monitoring Data

To measure the levels of beryllium in outdoor air, or in the air that people breathe, the Sunnyside School District conducted an ambient air-monitoring program from November 19, 2002 to March 31, 2005. The Sunnyside School District personnel determined the sampling locations and schedule, and conducted the onsite monitoring. Chester LabNet performed the gravimetric and beryllium filter analyses.

The monitoring system consists of four Tisch Critical Flow High-Volume PM₁₀ samplers, which are U.S. EPA Reference Method samplers, installed at four locations surrounding the Brush Ceramic Products. Figure 2 shows the locations of the Sunnyside Air Monitoring Sites No.1, No.2, No.3 and No. 4. Two of the sampler inlets were located 2 meters above the ground and two sampler inlets were located approximately 10 meters above the ground. Monitoring was conducted on an every 6-day schedule for all four sites.

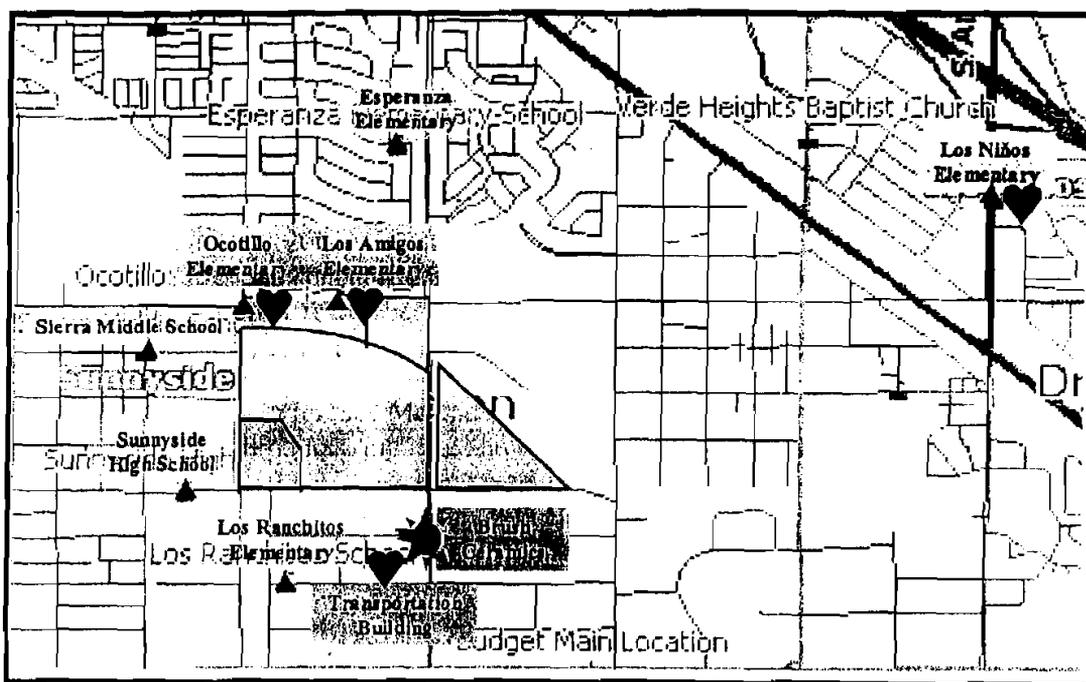


Figure 2. Air monitoring stations and the surrounding area.

The four air monitoring locations are Site No. 1: Transportation Building; Site No. 2: Los Niños Elementary School; Site No. 3: Los Amigo Elementary School; and Site No. 4: Ocotillo Elementary School. Blue hearts indicate the air monitoring stations; Red triangles indicate schools; Pink sun indicates Brush Ceramic Products.

Table 2 summarizes the average beryllium concentration in ambient air from November 19, 2002, to March 31, 2005. The measured beryllium concentrations in ambient air ranged from 0.0000038 to 0.0003087 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The Arizona

Stack Emission Data

Brush Ceramic Products performed stack emission tests quarterly. The stack tests were conducted by an independent company with a protocol developed by Brush Ceramic Products and approved by the PDEQ. Table 3 summarizes the stack emissions test results from May 23, 2001 to December 16, 2004.

To protect the community from chronic beryllium disease, the U.S. EPA National Emission Standards for Hazardous Air Pollutants (NESHAPs) regulation limits the amount of beryllium that plants can emit into the environment to either less than 10 grams in a 24-hour period, or to an amount that would give air levels of 0.01 micrograms beryllium per cubic meter of air ($\mu\text{g Be}/\text{m}^3$ air) near the source, averaged over a 30-day period (40 CFR 61.32). Brush Ceramic Products is regulated under this limit. Results in Table 3 indicate that the amount of beryllium released from stacks from 2001 to 2004 did not exceed the regulatory permit. That is, the stack emissions were an order of magnitude lower than the NESHAP standard.

Table 3. The amount of beryllium released from emission stacks to the ambient air per day compared to the National Emission Standard for Hazardous Air Pollutants (NESHAP).

Date	Location	Number of samples	$\mu\text{g Be}/\text{m}^3$	Do all exceed NESHAP?
05/23/01	Vent # 1	3	< 0.037	No
05/23/01	Vent # 3	3	< 0.038	No
05/23/01	Vent # 7	3	< 0.023	No
05/23/01	Exhaust Duct # 8	3	< 0.040	No
05/23/01	Vent # 12	3	< 0.005	No
05/29/01	Baghouse Stack	3	< 0.240	No
01/14/02	Baghouse Stack	3	< 0.251	No
04/18/02	Baghouse Stack	3	< 0.253	No
08/12/02	Baghouse Stack	3	< 0.245	No
11/18/02	Baghouse Stack	3	< 0.012	No
03/20/03	Baghouse Stack	3	< 1.588	No
06/30/03	Baghouse Stack	3	< 0.099	No
09/29/03	Baghouse Stack	3	< 0.094	No
12/18/03	Baghouse Stack	3	< 0.100	No
03/16/04	Baghouse Stack	3	< 0.100	No
06/10/04	Baghouse Stack	3	< 0.100	No
09/09/04	Baghouse Stack	3	< 0.100	No
12/16/04	Baghouse Stack	3	< 0.100	No

a. Be: Beryllium

b. NESHAP = National Emission Standard for Hazardous Air Pollutants
The current NESHAP for beryllium is 10 gram per day (g/day).

recovery from different surfaces. After an extensive review of the literature and survey of industrial hygienists, Caplan (1993) made the assertion that "the wipe sample procedure seems to be increasingly misused as an indicator of health hazard from particulate aerosols." He concluded "there is no general quantitative relationship between surface contamination and air concentration that is adequate for estimating inhalation dose with sufficient accuracy for use in Industrial Hygiene."

Since the surface wipe data alone cannot be used to measure exposure or demonstrate regulatory compliance (Herr 1997), the Arizona Department of Health Services combined the soil, ambient air and stack emission results to evaluate the potential health risk posed by the surface wipe samples. Based on the beryllium concentrations in soil, ambient air, stack emission and wipe samples; the Arizona Department of Health Services determined that the school students and employees are unlikely to inhale beryllium particles that may be re-suspended from surfaces because their access to these locations are limited.

Limitations

There are many sources of uncertainty of risk analysis. The objective of this health consultation is to determine whether beryllium released from Brush Ceramic Products are present at levels that may cause adverse health effects. This health consultation is a screening level analysis of health risks, meaning that the report uses a conservative (or upper-bound) analysis.

The average air concentrations used in this health consultation are from the air monitoring stations located at Transportation Building, Los Niño's Elementary School, Los Amigo Elementary School, and Ocotillo Elementary School. Thus, the average air concentrations used in this health consultation may not fully represent the environmental conditions directly north of the Brush Ceramic Products facility, which will be a subdivision with more than 600 houses. In addition, it cannot be used to predict potential health risk due to emergency situations, such as accidental release of beryllium from the facility.

ATSDR Child Health Initiative

ATSDR recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contaminants in environmental media. Children's developing body systems can sustain permanent damage if toxic exposures occur during critical growth stages. Children breathe a greater volume of air and ingest a larger amount of soil relative to body weight, resulting in higher burden of pollutants. Furthermore, children, even those without pre-existing illness or chronic conditions, are susceptible to air pollution because their lungs are still developing, and they often engage in vigorous outdoor activities, making them more sensitive to pollution than healthy adults. All health analyses in this report take into consideration the unique vulnerability of children. Children will not be adversely affected by the levels of beryllium found at the Brush Ceramic Products site or adjacent area.

McArthur, B. Dermal measurement and wipe sampling methods: a review. *Applied Occupational and Environmental Hygiene*. 1992 Vol. 7: 599-606

Klingner, T.D., McCorkle, T. The application and significance of Wipe Samples. *American Industrial Hygiene Association Journal*. 1994 Vol. 55: 251-254

Lichtenwalner, C.P. Evaluation of wipe sampling procedures and elemental surface contamination. *American Industrial Hygiene Association Journal*. 1992 Vol. 53: 657-659

Caplan, K.J. The significance of Wipe Samples. *American Industrial Hygiene Association Journal*. 1993 Vol. 54: 70-75

Herr, M. Defense Programs: Beryllium Good Practice Guide. United States Department of Energy and Lawrence Livermore National Laboratory. 1997 July.

Certification

The Brush Ceramics Facility Health Consultation was prepared by the Arizona Department of Health Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

Charisse J. Walcott
Technical Project Officer
Superfund and Program Assessment Branch
Division of Health Assessment and Consultation

The Division of Health Assessment and Consultation, Agency for Toxic Substance and Disease Registry, has reviewed this health consultation and concurs with its findings.

Alan Yarbrough
Team Leader, Cooperative Agreement Team
Superfund and Program Assessment Branch
Division of Health Assessment and Consultation
Agency for Toxic Substance and Disease Registry