

**PIMA COUNTY
DEPARTMENT OF ENVIRONMENTAL QUALITY**



**RESPONSE TO COMMENTS
FOR
THE AIR QUALITY OPERATING PERMIT
FOR
BRUSH CERAMIC PRODUCTS, INC.
6100 SOUTH TUCSON BOULEVARD
TUCSON, ARIZONA 85706**

November 7, 2006

INTRODUCTION

In 1979, Brush Ceramic Products (BCP), Inc., formerly known as Brush Wellman, Inc., notified the U.S. Environmental Protection Agency (EPA) and Pima County of its planned start-up of manufacturing operations in Tucson, Arizona. Brush Ceramic Products Inc. (BCP) utilizes beryllium oxide in producing ceramic components used in integrated circuits in the electronics industry. Since Brush Ceramic began its operations in 1980, it has been permitted by Pima County for its emissions of beryllium. Brush Ceramic is subject to the federal National Emission Standards for Hazardous Air Pollutants (NESHAP) for beryllium. The federal NESHAP for beryllium of 10 grams per 24-hour period is codified in 40 CFR Part 61 Subpart C. To meet the NESHAP, Brush Ceramic has installed a dust collection system with cartridge filters. Brush Ceramic relies upon the dust collection system and cartridge filters to collect airborne beryllium dust within its facility. In 1994, the Pima County Department of Environmental Quality (PDEQ) received an application for the renewal of Brush Ceramic's air quality permit. The application was in response to a permit call issued by PDEQ as PDEQ began to transition facilities from one-year operating permits to five-year unitary permits. The five-year unitary permit requirements were included in the Pima County Code to comply with state law. While the permit application is pending, the existing permit remains in effect by operation of law. PDEQ has required Brush Ceramic to continuously comply with all applicable standards.

The final five-year unitary permit that has been developed for Brush Ceramic includes the federal NESHAP standard of 10 grams per 24-hour period and additional monitoring and record keeping requirements regarding the dust collection system.

PUBLIC PARTICIPATION

PDEQ initially published notice of its intention to issue an air quality permit renewal to Brush Ceramic on November 29, 1999. During the subsequent 30-day public comment period, PDEQ received neither comments nor requests to hold a public hearing. Prior to issuing the permit, PDEQ became aware of a letter sent to the Pima County Health Department (PCHD) requesting information regarding the public hearing on Brush Ceramic's proposed permit. As a result of that letter and subsequent discussions with citizen groups and Brush Ceramic representatives, the final permit was re-noticed. The re-noticing commenced on May 1, 2000, and initiated another 30-day public comment period. During the second comment period, PDEQ received written comments and a request for PDEQ to conduct a public hearing for the purpose of accepting further written and/or oral comments regarding the Brush Ceramic final permit. The public hearing was conducted on Wednesday, August 9, 2000, at the Sunnyside High School Auditorium, 1725 East Bilby Road. Another draft of the permit containing significant changes prompted PDEQ to initiate a third public comment period of 60 days that began on September 15, 2003. A public meeting on October 7, 2003, provided an opportunity for the public to ask questions of PDEQ regarding the proposed permit. A formal public hearing on October 22, 2003, provided the public a third period to make written and/or oral comments regarding the proposed final permit. The public hearing was conducted at the Sunnyside High School Auditorium, 1725 East Bilby Road. Translation services were available at both of the public hearings for Spanish-speaking members of the community.

Public notices were prepared and submitted to local newspapers for publication. In addition to the *Arizona Daily Star* and the *Daily Territorial* (the two newspapers PDEQ typically uses to publish notices), the notices were also advertised in the *Arizona Hispana* and *El Imparcial* newspapers. A mailing was also sent to all the individuals who had expressed concerns regarding the permit renewal. Approximately 100 public notices were sent to schools, libraries and neighborhood groups in the area. Public notices were also mailed to over 5,000 residents in the surrounding area.

SUMMARY OF CHANGES MADE TO THE FINAL PERMIT

Changes made to Brush Ceramic's final permit, based upon information and comments received during the second and third public comment periods, are summarized below as follows:

Part "B" Section I. Applicability

1. Part "B" Section I. Applicability: Revises definitions per 40 CFR Part 61 Subpart C, National Emissions Standard for beryllium.

Part "B" Section II. Emission Limitations and Other Requirements

2. Part "B" Section II. B.5.: Deletes reference to the particulate control system.
3. Part "B" Section II. D.: Requires Permittee to follow final safety filter and drum change procedures.
4. Part "B" Section II. F.: Requires Permittee to operate the air pollution control equipment whenever there is the potential to emit beryllium.
5. Part "B" Section II. K.—O.: Identifies fuel-burning equipment standards.

Part "B" Section III. Monitoring and Record keeping

6. Part "B" Section III. B.: Requires weekly inspection of the powered exhaust vents, doorways and outside ductwork, including all collection and filtering systems.
7. Part "B" Section III. C.: Requires Permittee to submit an emissions detection and prevention plan.
8. Part "B" Section III. D.: Requires Permittee to install and operate photohelic gauges to continuously monitor pressure drops across the primary and final filters of the pollution control systems.
9. Part "B" Section III.G.: Requires Permittee to record each instance when the dust collector drums are changed out.

10. Part "B" Section III. I.: Requires Permittee to record each instance when a powered exhaust fan is shut down in response to a beryllium spill.
11. Part "B" Section III. .J.: Requires testing of the four powered exhaust vents before the expiration of the current Permit.
12. Part "B" Section III. .K.: Requires Permittee to observe the fuel-fired equipment exhaust stack.

Part "B" Section IV. Reporting Requirements

13. Part "B" Section IV. A. 4.: Requires Permittee to report when the air pollution control system is automatically shutdown.
14. Part "B" Section IV. A. 5.: Requires Permittee to report any event of a beryllium spill in the production area.
15. Part "B" Section IV. .C.: Requires Permittee to submit an Annual Beryllium Technology Assessment.

Part "B," Section V.

16. Part "B" Section V. B.1. & B. 2: Requires annual testing, independent company testing and independent analyses of test samples by a certified laboratory.

RESPONSE TO COMMENTS

This summary presents PDEQ responses to written and/or oral comments received during the third 60-day public comment period and the October 22, 2003 public hearing.

I. Jake Elkins/Pat Malchow – Sustainable Borderlands Planning

1. **Our objections can be said to center around the ability of Brush Ceramic to control legal and illegal beryllium emissions into our community. Are there no peculiar and unique circumstances around Brush Ceramic and its beryllium emissions that cause PDEQ to stop this company from emitting beryllium legally into the community? How about the illegal emissions? What has PDEQ done about them over the last twenty years?**

Pima County Response: Arizona Revised Statutes section 49-112 allows a county to adopt a rule more stringent than a rule adopted by ADEQ if the county shows the rule is necessary to address a peculiar local condition and there is credible evidence that the rule is either necessary to prevent a significant threat to public health or the environment or is required for conformity to federal regulation. The statute does not authorize PDEQ to change the NESHAP on a facility-by-facility basis. If a local beryllium standard more stringent than the federal NESHAP is desired, a rulemaking change to Title 17 of the

Pima County Code would be necessary. Only after the rulemaking change, could PDEQ incorporate the more stringent standard into the Brush Ceramic permit. At present, there is no proposed rulemaking change to determine whether the statute would authorize PDEQ to adopt a standard more stringent than the NESHAP adopted at the federal level.

With regards to enforcement, PDEQ has issued two notices of violation to BCP since 2000. In August 2001, PDEQ entered into a settlement agreement with BCP to resolve a violation concerning the bypass of the air pollution control device that occurred in 2000. BCP paid a \$145,000 fine. In April 2002, PDEQ issued a violation to BCP for failure to use good air pollution control practices. While no penalty was levied against BCP, they are required to perform weekly checks of their air handling system. This requirement has been incorporated into the final permit.

- 2. Exhaust vents operating on the roof of this facility emit beryllium into the atmosphere. The Brush Ceramic air quality permit states that there will be no unfiltered air leaving the facility.**

Pima County Response: In 2001, PDEQ evaluated the potential for emissions from facility roof vents. As part of this evaluation PDEQ required Brush Ceramic to perform sampling at five specific powered vents that occur in areas with beryllium operations. Test results were below the detection levels of the EPA Method 103. During normal operations, Brush Ceramic asserts that there is no potential for emissions from the roof vents based upon the design of the facility including its air pollution control devices. The facility is in a negative air pressure state (all air is being pulled into the air pollution system). To ensure that there are no releases, PDEQ has modified the permit to include the following:

- 1) Beryllium emissions from any roof vent are prohibited.
- 2) Place an identifying sign at the interior location of the power switch for each of the powered exhaust vents located in production areas.
- 3) The sign shall state that, in the event of a beryllium powder spill, the exhaust fan(s) in the vent(s) affected by the spill shall immediately be shut off.
- 4) Record each instance when a powered exhaust fan in a vent is shut down in response to a beryllium powder spill.
- 5) Not more than two years nor less than one year prior to the expiration of this permit, the Permittee shall perform emission testing of the four (4) powered exhaust vents.

- 3. Brush Ceramic should provide an updated, current equipment list of production and safety equipment used in this facility. The list should be available at PDEQ and at the Fire Department.**

Pima County Response: A current equipment list of all production and air quality control equipment is included in the final permit. The list, including information pertaining to Brush Ceramic's permit, is on file with PDEQ and is available upon written request.

- 4. The matter of the Brush Ceramic plant being located in the middle of an international airport runway approach-takeoff zone.**

Pima County Response: The City of Tucson Department of Urban Planning and Design reports that only the extreme southeast corner of the Brush Ceramic property is in the Compatibility Use Zone. This Compatibility Use Zone is part of the crosswind runway and is only used when crosswinds occur and the main runway cannot be used. Brush Ceramic is not in the approach or departure zone. Copy of the Airport Environs Zone is attached. (Attachment 4)

- 5. We ask that PDEQ set up a monitoring program to insure that beryllium that Brush Ceramic dumps in the sewage system does not accumulate via reclaimed water onto our public facilities.**

Pima County Response: The Pima County Wastewater Management Department (PCWWM) reported that Brush Ceramic currently has a wastewater permit. The permit requires monthly monitoring of the facility's wastewater. PCWWM reports that results from the monthly monitoring are non-detect for beryllium.

- 6. The Brush Ceramic soils study performed by PCHD is a bogus test, that it cannot be used as a valid indicator of airborne beryllium dust traveling through the community, nor can it be used to defend the policies of PDEQ, or the conclusion of ATSDR.**

Pima County Response: Testing procedures followed the Arizona Department of Environmental Quality (ADEQ) and the Arizona Department of Health Services (ADHS) guidelines. The review by ATSDR found the procedures to be adequate and met sampling protocols.

- 7. Research indicating that as many as approximately 25% of all people exposed to beryllium will turn out to be sensitized to the material and that once sensitized, each year about 10 to 20% of those people will develop berylliosis and die.**

Pima County Response: PCHD states that national studies indicate that 1-15% of employees who work with beryllium will become sensitized and that approximately half of these will develop chronic beryllium disease. Chronic beryllium disease is not always fatal.

- 8. Request for a community testing program that addresses the possible effects on the children exposed in the past, and the vulnerable elderly who have used the parks and golf courses.**

Pima County Response: PCHD reports that there is no evidence of chronic beryllium disease developing in Pima County community residents not employed in the beryllium industry since 1950. Since this population does not appear to be at risk and no exposures have been documented, testing for sensitivity is not warranted.

- 9. We demand comprehensive soils tests all through the community, and this time observers will ensure that topsoil is not scrapped off the samples.**

Pima County Response: PCHD reports that samples taken consisted of the first 1-2 inches of soil, including the surface, and that sampling procedures were consistent with ADEQ protocols. ATSDR also found procedures were correct and appropriate. Beryllium levels found in the school grounds were below control (background) levels indicating no contamination from Brush Ceramic. Testing by the Sunnyside School District also supports this finding. As a result of these findings, additional soils tests are not warranted.

- 10. We demand an as-built plan for Brush Ceramic be constantly updated and on file with the Tucson Fire Department (TFD) and the Pima County Emergency Services office.**

Pima County Response: PDEQ does not have the authority to demand as-built plans be submitted to TFD and the Pima County Emergency Services Office.

Brush Ceramic must comply with Title III of the Superfund Amendments and Reauthorization Act of 1986, Section 312. To comply, Brush Ceramic must submit an annual Emergency and Hazardous Chemical Inventory Report and an emergency response plan to the Arizona Emergency Response Commission and a copy to the Tucson/Pima County Emergency Services and TFD.

- 11. We demand flight operations over Brush Ceramic be suspended until either Brush Ceramic moves the plant, or Brush Ceramic stops using beryllium oxide in its daily operations and removes all beryllium from its site.**

Pima County Response: PDEQ does not have the authority to suspend flight operations.

- 12. We demand schools that have abnormally high soil beryllium levels be closed immediately until absolute safety can be assured.**

Pima County Response: Beryllium levels found in the school grounds were below control (background) levels signifying no contamination from Brush Ceramic. Ambient air quality testing by the Sunnyside School District also supports this finding.

- 13. We want a Citizen Representative in all significant EPA/PDEQ/Brush Ceramic negotiations and interactions.**

Pima County Response: PDEQ encourages public participation and welcomes citizen representatives.

- 14. We demand that PDEQ either become a conservatively responsible guardian of our community welfare or step out of the way and let a federally assigned Master administer regulation of hazardous wastes in Pima County.**

Pima County Response: PDEQ staff believes that we are a responsible guardian of the community by complying with all regulations put in place to protect the public. Air toxic regulations are established by EPA. Any new applicable regulatory requirements that are adopted by EPA during the term of the permit will be incorporated into the Brush Ceramic permit.

II. Arlene R. Hernandez

- 1. I would like flyers to be mailed out to any community members who are at high risk in the area of the facility.**

Pima County Response: Over 5,000 post cards advising area residents of public meetings and hearings have been mailed. PDEQ developed and distributed a newsletter the "*Brush Ceramic Update*" providing community members with information regarding beryllium and the status of the final permit. The newsletter was mailed to over 5,000 area residents near the facility and was printed in both English and Spanish.

- 2. Flyers at all surrounding schools should be sent home with the students to make their parents aware of this situation.**

Pima County Response: PDEQ coordinates with the Sunnyside School District when scheduling meetings or hearings. Mailings to the surrounding residents are sent out. Flyers are sent to nearby churches and libraries requesting the information be posted.

III. Tucson City Councilperson Steve Leal

We should make control systems that will work in the worst of conditions, not only in the best of conditions. These complex systems need to be effective during emergencies.

Pima County Response: The final permit requires Brush Ceramic to operate the air pollution control equipment at all times when there is the potential to emit beryllium.

Also, the final permit requires Brush Ceramic to conduct weekly inspections of the powered exhaust vents, doorways, and outside ductwork, including all collection and filtering systems. Brush Ceramic will also have to install and operate photohelic gauges to continuously monitor pressure drops across the primary and final filters of pollution control systems. Emergencies during any upset conditions are handled by the Tucson Fire Department as first responders and the Pima County Department of Emergency Services.

IV. Gretchen Nielsen

Please either close the plant or make sure there are no longer any emissions of beryllium allowed.

Pima County Response: Under state law, PDEQ cannot deny the permit, close the plant or force Brush Ceramic to move unless PDEQ has evidence showing Brush Ceramic cannot operate in compliance with the requirements of state statute and county code. PDEQ has no such evidence. PDEQ's final permit requires Brush Ceramic to comply with the NESHAP for beryllium. The final permit contains sufficient monitoring, record keeping, and reporting provisions to ensure that the NESHAP is met. The ATSDR review of the PCHD study concluded that levels of beryllium in the soil near Brush Ceramic represent no public health hazard to the community and that the estimated maximum levels of beryllium in the air represent no apparent health hazard to the community (ATSDR Reports, Attachments 2 and 3).

V. Cristin Catterton

Priority however, is that Brush Ceramic replace beryllium with a non-toxic product ASAP.

Pima County Response: PDEQ does not have the authority to force Brush Ceramic to find another product to take the place of beryllium; however, PDEQ will suggest that Brush Ceramic look into an alternative base mineral.

VI. Mary MacEwan, Chair, Women's International League for Peace and Freedom

We have learned that beryllium is one of the most deadly toxins, and rarely encountered in the natural environment, or at least, not in its dangerous form. We have read accounts in the *Arizona Daily Star* about the suffering of victims of chronic beryllium disease. Those were employees of Brush Ceramic. How many community people suffer from this disease?

Pima County Response: PCHD states that there are numerous sources for beryllium both in naturally occurring and human-derived forms. It is commonly found in volcanic soils and even cigarette smoke. Over 25 individuals have been diagnosed with chronic beryllium disease from the Brush Ceramic facility in Tucson. All of these individuals have worked within the Brush Ceramic facility.

VII. M. Wilder

- 1. There needs to be safety features to make sure there is no escape of beryllium and if there is, an effective warning system needs to be in place.**

Pima County Response: Brush Ceramic is required by permit to shut down the powered exhaust fans in the event of a beryllium release. Prompt reporting of deviations from permit requirements is required under the final permit. Brush Ceramic must report to PDEQ within 24 hours of the occurrence of any beryllium spill, upset condition, excess emission, or permit deviation. Brush Ceramic must also submit detailed written excess emission reports within 72 hours of the time Brush Ceramic first notified PDEQ. The Tucson Fire Department is the first responder during these situations.

- 2. I advise you to put pressure on Brush Ceramic to find another product to take the place of beryllium ASAP.**

Pima County Response: PDEQ does not have the authority to force Brush Ceramic to find another product to take the place of beryllium; however, PDEQ will suggest that Brush Ceramic look into an alternative base mineral.

VIII. David Martin

Brush Ceramic has already violated its current permit and there is no level of safe exposure to beryllium dust. Therefore, I want PDEQ to close Brush Ceramic.

Pima County Response: PDEQ's final permit requires Brush Ceramic to comply with the NESHAP for beryllium. The final permit contains sufficient monitoring, record keeping, and reporting provisions to ensure the standard is met. The ATSDR review of the PCHD study concluded that levels of beryllium in the soil near Brush Ceramic pose no public health hazard to the community and that the estimated maximum levels of beryllium in the air represent no apparent health hazard to the community (ATSDR Report, Attachment 2). Under state law, PDEQ cannot deny the permit, close the plant, or force Brush Ceramic to move unless it has evidence to show Brush Ceramic cannot operate in compliance with the requirements of state statute and county code. PDEQ has no such evidence.

IX. Dalton McClelland, MD

- 1. As a physician I am concerned about the hazards associated with industries requiring beryllium to manufacture their products – where exposure to beryllium can lead to severe pulmonary disease.**

Pima County Response: Beryllium can lead to severe and chronic lung disease. Although safety measures implemented over 50 years ago have prevented the public from developing beryllium-associated conditions, chronic beryllium disease still appears in employees working with beryllium, although at a smaller rate.

- 2. I urge you to deny the permit requested by Brush Ceramic, because of the risk to children and to all citizens residing in the area close to the area of Brush Ceramic.**

Pima County Response: Arizona Revised Statutes Section 49-481.A establishes the conditions under which PDEQ must deny a permit. PDEQ shall deny a permit if the applicant does not show that every source is so designed, controlled, or equipped with such air pollution control equipment that it may be expected to operate without emitting air contaminants in violation of the provisions of Article 3 of the Arizona Revised Statutes and rules adopted by the Board of Supervisors. Only where PDEQ determines that the source cannot comply with air pollution limits can an application be denied.

PDEQ recognizes that members of the community have serious concerns regarding the impact of emissions from Brush Ceramic. In October 1999, PCHD conducted an investigation into potential health impacts from Brush Ceramic (Attachment 1). The PCHD report concluded "stack emissions have been small and pose negligible risk to workers, residents, and students in the surrounding community." As a result of community concerns regarding the PCHD report and emissions from Brush Ceramic, the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), conducted two health consultations (ATSDR Reports, Attachments 2 and 3) for the site on May 3, 2000 and again on August 8, 2005. ATSDR concluded that air emissions "represent no apparent public health hazard to the community, based upon the reported current rate of stack emissions and conservative air modeling methods." As part of the health consultations, ATSDR may recommend "additional 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." ATSDR has not recommended any of these actions and has concluded the soil concentrations and air emissions do not represent a public health hazard to the community.

X. Ann Embury-Lewis

- 1. A rulemaking change to Title 17 of the Pima County Code is necessary, due to the peculiar local conditions in the area surrounding Brush Ceramic. In addition to subdivisions with single-family dwellings, there is a huge multi-story apartment complex. Even the vacant property directly across from Brush Ceramic is zoned residential. A change would allow PDEQ to deny the permit to Brush Ceramic.**

Pima County Response: Arizona Revised Statutes section 49-112 allows a county to adopt a rule more stringent than a rule adopted by ADEQ if the county shows the rule is necessary to address a peculiar local condition and there is credible evidence that the rule is either necessary to prevent a significant threat to public health or the environment or is required for conformity to federal regulation. The statute does not authorize PDEQ to change the NESHAP on a facility-by-facility basis. If a local beryllium standard more stringent than the federal NESHAP is desired, a rulemaking change to Title 17 of the Pima County Code would be necessary. Only after the rulemaking change, could PDEQ incorporate the more stringent standard into the Brush Ceramic permit. At present, there is no proposed rulemaking change to determine whether the statute would authorize PDEQ to adopt a standard more stringent than the NESHAP adopted at the federal level.

2. **Why hasn't the Pima County Office of Emergency Services insisted on Brush Ceramic constructing and operating a neighborhood emergency alert system, especially considering its poor safety record?**

Pima County Response: Brush Ceramic must comply with Title III of the Superfund Amendments and Reauthorization Act of 1986, Section 312. Brush Ceramic must submit an annual Emergency and Hazardous Chemical Inventory Report and an emergency response plan that addresses potential problems at its facility, to the Arizona Emergency Response Commission with a copy to the Tucson/Pima County Emergency Services and TFD.

3. **How much beryllium for how long was released into the community during the period the clothes dryer was deliberately disconnected from the air filter?**

Pima County Response: Brush Ceramic's response to PDEQ Notice of Violation number PC0010-058, indicates the dryer's exhaust to ambient air was 68 months. Brush Ceramic conducted dryer volume and beryllium emissions calculations. The sampling was conducted on May 20 and 21, 1999. The results were Non Detect for Sample #1 and 0.057 $\mu\text{g}/\text{m}^3$ for Sample #2. Using the Sample #2 emission rate and operation parameters (502 ft^3/min dryer exhaust, 3 dryer cycles/day, and 45 min/dryer cycle) the calculated average emissions of beryllium exhausted were 0.0001 g/day.

4. **Why are the schools i.e., the taxpayers, having to pay for air monitoring equipment when Brush Ceramic is a \$28 million per year operation?**

Pima County Response: PDEQ understands that the Sunnyside School District approved the air quality monitoring expenditure. PDEQ cannot require Brush Ceramic to pay the cost of the Sunnyside School District expenses. However, PDEQ entered into an agreement with Brush Ceramic Products and the Sunnyside School District and will establish an ambient air quality monitoring network around the facility.

5. **What taxes does Brush Ceramic pay?**

Pima County Response: Information regarding taxes paid by Brush Ceramic is not required for PDEQ permitting purposes.

6. **Why is there little or no data about wastewater quality in the discharge from Brush Ceramic?**

Pima County Response: PCWWM distributes an Annual Report containing data from permitted facilities. The report is available to the public, together with any other data collected by PCWWM, and is available upon request.

7. **How much beryllium is added to the soil (and then air) when water tainted with it irrigates school playgrounds and fields and is used for residential irrigation?**

Pima County Response: Beryllium levels found in the school grounds were below control (background) levels signifying no contamination from Brush Ceramic. Testing by the Sunnyside School District also supports this finding.

8. **I am not satisfied with the controversy surrounding how the ATSDR derived soil-testing conclusions. How much beryllium dust settles/has settled in the soil of the school properties and the neighborhood surrounding Brush Ceramic, to be stirred up with winds, traffic and business activity, and ongoing development and construction?**

Pima County Response: Beryllium levels found in the school grounds were below control (background) levels signifying no contamination from Brush Ceramic. Testing by the Sunnyside School District also supports this finding.

9. **I am concerned about the amount of beryllium in the groundwater and how much is added to the groundwater daily, and what are the possible health effects from ingestion of it?**

Pima County Response: PCHD reports that no levels of beryllium have been found in the groundwater and that there are no health effects from ingestion.

XI. Betty Schroeder, Arizona Safe Energy Coalition

We believe the EPA should ban the further uses of beryllium, and that the toxic materials should be isolated from the environment, much the same as plutonium.

Pima County Response: In EPA's April 21, 2003 letter to Pat Birnie of the Environmental Justice Action Group, EPA stated, "we want to be clear that we are committed to actions which reduce emissions at the BCP Tucson facility to the greatest extent supported by science and the regulatory frameworks, but this may not mean that BCP Tucson will become a (zero emissions facility)." PDEQ has consulted with EPA and confirmed that its position has not changed on this matter. Interested parties may request a copy of EPA's April 21, 2003 letter from PDEQ or EPA.

XII. Linda Tepper, Co-Chair, Rincon Group of Sierra Club

We ask that PDEQ revoke the air permit for Brush Ceramic. If PDEQ won't revoke the permit, we insist on the following conditions:

1. **Four unannounced inspections per year, three of which are to be within the 7 days before a quarterly stack test.**

Pima County Response: PDEQ inspections are unannounced and will continue to be unannounced. At a minimum, PDEQ conducts one inspection per year at a facility. PDEQ conducts additional inspections in response to complaints, compliance issues or as a matter of source surveillance.

2. **Off-site air monitoring at Sunnyside School District property run by Sunnyside, but paid for by Brush Ceramic.**

Pima County Response: PDEQ is entering into an agreement with Brush Ceramic Products to locate, install, operate and maintain an ambient air quality monitoring network around their facility. The network shall consist of a minimum of six (6) monitors. Information from the monitors will be posted on PDEQ's website (www.deq.pima.gov) and made available to the public.

3. **Brush Ceramic should carry out thorough daily inspections of the complete air monitoring system and provide immediate reporting of any upsets or malfunctions to PDEQ.**

Pima County Response: The final permit contains weekly checks, monitoring, record keeping and reporting provisions. Brush Ceramic is required by permit to shut down the powered exhaust fans in the event of any possible beryllium release. Prompt reporting of deviations, including malfunctions from permit requirements, is required under the final permit.

Due to the size of the air pollution controls and all its associated ductwork, PDEQ did not think it is practical to inspect it on a daily basis. PDEQ is requiring Brush Ceramic to inspect the system on a weekly basis and it is expected that Brush Ceramic will be doing the inspection over several days. Additionally PDEQ is requiring Brush Ceramic to propose a method to identify beryllium emissions and requiring record keeping all findings.

PDEQ has included permit conditions in the final permit to address monitoring of beryllium emissions. Current continuous monitoring technology is not applicable to beryllium emissions. PDEQ has required Brush Ceramic to comply with the following:

- a. Submit an emissions detection and prevention plan within 90 days of permit approval.
- b. Operate a monitoring and automatic shutdown system whenever there is the potential to emit beryllium or a beryllium-containing compound. This is a system of photohelic gauges to continuously monitor the pressure drops across the air pollution control systems' filters. The system monitors operating pressure levels for mechanical efficiency but not beryllium emission levels.
- c. Report to PDEQ within 72 hours of the occurrence of any beryllium spill, upset condition, excess emission, or permit deviation.
- d. Submit an annual Beryllium Technology Assessment Report evaluating:

1. new technologies and techniques regarding continuous emissions monitoring for beryllium;
 2. new technologies or techniques field assessment or real time beryllium detection; and
 3. applicability of technologies and their associated cost.
4. **Employees should not be allowed outside the building when in work clothes or other contaminated garb.**

Pima County Response: PDEQ has contacted the Arizona Occupational Safety and Health Administration (AOSHA) regarding worker concerns. In May 1999, AOSHA conducted an inspection of Brush Ceramic and determined that Brush Ceramic was in compliance with worker safety regulations (a copy of this report can be obtained from AOSHA). Currently, the National Institute of Occupational Safety and Health (NIOSH) is conducting an evaluation of the current worker safety regulations for beryllium. PDEQ will request a copy of the NIOSH evaluation when it is completed.

XIII. Rob Kulakofsky, Executive Director, Center for Environmental Connections

1. **Additional comments regarding the soil testing by PCHD and the report from ATSDR showing that beryllium contamination on a residentially zoned vacant lot across from Brush Ceramic Products. Methods employed in the soil tested were also highly suspect. Sampling for particulate pollution should be taken from the surface, not from samples taken from below the surface, as was done in the PCHD/ATSDR testing.**

Pima County Response: PCHD reports that samples taken consisted of the first 1-2 inches of soil, including the surface, and sampling procedures were consistent with ADEQ protocols. ATSDR also found procedures were correct and appropriate.

2. **We are concerned that the drums under the filter house that fill with beryllium dust are outside and have the potential to leak beryllium dust into the community when changed. Emissions from changing the drums are not monitored, or included in the quarterly stack testing. Therefore, it is imperative that off-site air monitoring be a requirement for any permit issued to Brush Ceramic. Because air monitors are already in place at Sunnyside School District, Brush Ceramic should be required to reimburse Sunnyside for the cost of its air monitoring.**

Pima County Response: PDEQ has reviewed Brush Ceramic's procedures for drum change out and has incorporated the procedures into the permit. Also, PDEQ requires Brush Ceramic to keep records of each change out and report any incidents of spills.

PDEQ is entering into an agreement with Brush Ceramic Products to locate, install, operate and maintain an ambient air quality monitoring network around their facility. The network shall consist of a minimum of six (6) monitors. Information from the

monitors will be posted on PDEQ's website (www.deq.pima.gov) and made available to the public.

- 3. We believe it is the job of PDEQ to protect people and not polluters. We also believe there is no way to make beryllium operations at Brush Ceramic completely safe for the public, especially considering its track record and the fact that there is no safe exposure to beryllium. Therefore, we want PDEQ to shut down beryllium operations at Brush Ceramic, revoke its air permit, demand it decontaminate the facility and suggest Brush Ceramic move on to making products that are safe to manufacture.**

Pima County Response: The final permit requires Brush Ceramic to comply with the NESHAP for beryllium. The final permit contains sufficient monitoring, record keeping and reporting provisions to ensure the standard is met. The ATSDR review of the PCHD study concluded that levels of beryllium in the soil near Brush Ceramic represent no public health hazard to the community and that the estimated maximum levels of beryllium in the air represent no apparent health hazard to the community (ATSDR Report, Attachments 2). Under state law, PDEQ cannot deny the permit, close the plant, or force Brush Ceramic to move unless it has evidence showing that Brush Ceramic cannot operate its facility in compliance with the requirements of state statute and county code. PDEQ has no such evidence.

- 4. Beryllium is dangerous, but not all of us know that scientists believe the 0.1 microgram is all it takes to give a person beryllium disease. And some scientists say there is absolutely no safe exposure level to beryllium.**

Pima County Response: PCHD reports that no one knows the level of beryllium exposure needed to cause sensitization, but current stack emission standards appear to be effective in protecting surrounding residents since no cases of the chronic beryllium disease have been documented in non-employees since 1950.

XIV. Ms. Lucia Navarro

I have concerns regarding the symptoms of asthma and being treated as an asthmatic. I feel I am being treated as an asthmatic and am constantly in the hospital with chronic asthma.

Pima County Response: There is no evidence that exposure to beryllium causes asthma. Chronic beryllium disease is clinically very different from chronic asthma. Asthmatics do not have greater susceptibility to berylliosis.

XV. Pat Bernie, Environmental Justice Action Group (EJAG)

- 1. I want to restate my comment submitted on May 26, 2000, concerning members of the community surrounding Brush Ceramic suffering from a higher incidence of**

asthma than the Tucson population at large. This may be a reflection of effects from other toxic releases from other businesses in the area.

Pima County Response: Responding to a PDEQ inquiry regarding this matter, PCHD reported that having asthma does not make a person more susceptible to chronic beryllium disease. Other toxic exposures do not increase susceptibility. PCHD reported that no significant airborne releases have been documented.

- 2. The soil sampling on the property across the street from Brush Ceramic already shows beryllium levels are higher than allowed for residential use.**

Pima County Response: PCHD soil sampling reports that one soil sample result was higher than guidelines allow, but was not corroborated with other samples from that area.

- 3. Brush Ceramic should be required to provide continuous monitoring of beryllium emissions that read out at PDEQ offices, 24 hours each day, 365 days of the year.**

Pima County Response: PDEQ has included permit conditions in the final permit to address monitoring of beryllium emissions. Current continuous monitoring technology is not applicable to beryllium emissions. PDEQ has required Brush Ceramic to comply with the following:

- a. Submit an emissions detection and prevention plan within 90 days of permit approval.
- b. Operate a monitoring and automatic shutdown system whenever there is the potential to emit beryllium or a beryllium-containing compound. This is a system of photohelic gauges to continuously monitor the pressure drops across the air pollution control systems' filters. The system monitors operating pressure levels for mechanical efficiency but not beryllium emission levels.
- c. Report to PDEQ within 72 hours of the occurrence of any beryllium spill, upset condition, excess emission, or permit deviation.
- d. Submit an annual Beryllium Technology Assessment Report evaluating:
 1. new technologies and techniques regarding continuous emissions monitoring for beryllium;
 2. new technologies or techniques, field assessment or real time beryllium detection; and
 3. applicability of technologies and their associated cost.

4. **Until continuous monitoring is available, PDEQ should require Brush Ceramic to conduct WEEKLY stack tests that involve stack filters to be replaced and tested, giving a result that shows the cumulative releases for each week.**

Pima County Response: The final permit requires annual stack testing. In order to conduct the stack test, Brush Ceramic must submit a test protocol for PDEQ review. The protocol must be approved by PDEQ. Brush Ceramic must make arrangements with an independent testing company to perform the test. Brush Ceramic must select a test date and notify PDEQ. PDEQ must make arrangements to have an observer present during the test to ensure that the test is conducted according to the approved protocol. It is not realistic to require weekly stack tests when considering the amount of planning, coordination and expense necessary to prepare for the test.

PDEQ is entering into an agreement with Brush Ceramic Products to locate, install, operate and maintain an ambient air quality monitoring network around their facility. The network shall consist of a minimum of six (6) monitors. Information from the monitors will be posted on PDEQ's website (www.deq.pima.gov) and made available to the public.

5. **Brush Ceramic should be required to reimburse the Sunnyside School District for all the costs of air monitoring that the District has incurred.**

Pima County Response: PDEQ does not have the authority to require Brush Ceramic to reimburse the Sunnyside School District. PDEQ understands that the Sunnyside School District has approved the air quality monitoring expenditure.

6. **Have there been studies that show the health impact of those volatile organic compounds (VOCs) and possible synergistic effects among themselves or in combination with beryllium?**

Pima County Response: Synergistic adverse effects from exposure to air contaminants in metropolitan areas is a question the EPA has recognized as one needing intense investigation. Currently, EPA has developed a "National Air Toxics Program: The Integrated Urban Strategy" which was published in the July 19, 1999, Federal Register. The report was developed pursuant to Section 112 of the Clean Air Act, which requires EPA to address potentially significant health risks from hazardous air pollutants from sources in urban areas. As part of its strategy, EPA has identified 33 hazardous air pollutants "posing the greatest potential public health concern in the largest number of urban areas." Listed as one of the 33 hazardous air pollutants for urban areas is beryllium. Currently, EPA is in the process of assessing exposure and characterizing risks of the 33 pollutants before developing control strategies to reduce air toxics in urban areas. For purposes of the Brush Ceramic permit, however, PDEQ is constrained by existing regulations. As EPA develops air toxics information and regulations, PDEQ will assess them with respect to the Brush Ceramic permit. New regulatory requirements that are adopted during the term of the permit must be incorporated into the permit. PDEQ will

continue to work with PCHD regarding community health impacts associated with emissions from Brush Ceramic.

- 7. A concern for potential fugitive dust emanating from contaminated work clothes. Workers have access to their vehicles from the outside of the break area. Potential beryllium contamination of the automobile puts any member of the public who has contact with the car at risk.**

Pima County Response: PDEQ has contacted AOSHA regarding worker concerns. In May 1999, AOSHA conducted an inspection of Brush Ceramic and determined that Brush Ceramic was in compliance with worker safety regulations (a copy of this report can be obtained from AOSHA). Currently, NIOSH is conducting an evaluation of the current worker safety regulations for beryllium. PDEQ will request a copy of the NIOSH evaluation when the evaluation is completed.

- 8. EJAG is also concerned about the release of other VOCs and hydrocarbons from Brush Ceramic. The air permit must include strict curbs on these releases, as well as unannounced inspections to effectively monitor these releases.**

Pima County Response: PDEQ inspections are unannounced and will continue to be unannounced. At a minimum, PDEQ conducts one inspection per year at a facility. However, PDEQ does conduct additional inspections in response to complaints, compliance issues, or as a matter of source surveillance.

- 9. The air permit should proscribe Brush Ceramic from plant expansion or modifications. If physical plant changes are contemplated, a separate permit complete with a public comment period and public hearing must be required. This permit would prohibit any dust and debris from contact with the community or with workers involved in the modifications.**

Pima County Response: Pima County Code, Title 17 (Air Quality Control 17.12.340) rules require all permitted sources to notify PDEQ of plant expansions or modifications if their air quality permit is affected.

Permittees submit an application requesting permit revisions. Revisions include: facility change without permit revision, minor permit revision, or significant permit revision. PDEQ posts a list, available for public viewing on its website (www.deq.pima.gov), of sources requesting a facility change, or minor permit revision. PDEQ publishes 30-day notices for public review in several newspaper publications when a Permittee is requesting a significant permit revision. PDEQ is not authorized to prohibit a source from plant expansion or modification if the source is complying with the required air quality regulations.

- 10. Brush Ceramic should do DAILY, not weekly inspections of the complete Hunt Air Handling System. These daily inspections must include powered exhaust vents,**

outside duct work, and all other collection and filtering systems that might carry beryllium contaminated air.

Pima County Response: The final permit requires Brush Ceramic to comply with the NESHAP for beryllium. The final permit contains sufficient monitoring, record keeping, and reporting provisions to ensure that the standard is met.

Due to the size of the air pollution controls and all its associated ductwork, PDEQ did not think it is practical to inspect it on a daily basis. PDEQ is requiring Brush Ceramic to inspect the system on a weekly basis and it is expected that Brush Ceramic will be doing the inspection over several days. Additionally PDEQ is requiring Brush Ceramic to propose a method to identify beryllium emissions and requiring record keeping all findings.

PDEQ has included permit conditions in the final permit to address monitoring of beryllium emissions. Current continuous monitoring technology is not applicable to beryllium emissions. PDEQ has required Brush Ceramic to comply with the following:

- a. Submit an emissions detection and prevention plan within 90 days of permit approval.
 - b. Operate a monitoring and automatic shutdown system whenever there is the potential to emit beryllium or a beryllium-containing compound. This is a system of photohelic gauges to continuously monitor the pressure drops across the air pollution control systems' filters. The system monitors operating pressure levels for mechanical efficiency but not beryllium emission levels.
 - c. Report to PDEQ within 72 hours of the occurrence of any beryllium spill, upset condition, excess emission, or permit deviation.
 - d. Submit an annual Beryllium Technology Assessment Report evaluating:
 1. new technologies and techniques regarding continuous emissions monitoring for beryllium;
 2. new technologies or techniques field assessment or real time beryllium detection; and
 3. applicability of technologies and their associated cost.
- 11. All of the air handling system ducting should be painted in a color that contrasts to the beryllium dust, so that if any leaks occur, they can be easily noticed.**

Pima County Response: PDEQ will suggest that Brush Ceramic change the exterior air pollution ductwork's color. Due to ambient particulate matter that may accumulate on the ductwork, changing the color of the ductwork may not be a clear indicator that a leak has occurred. PDEQ has included the following conditions in Brush Ceramic's final permit to address possible spills and leaks:

- a. Perform and document weekly visual checks of all air pollution control devices.
- b. Submit an emissions detection and prevention plan that will: 1) identify all exhaust vents, doorways and outside ductwork that required monitoring; 2) establish procedures to identify beryllium emissions at each point; 3) establish procedures to immediately determine if a beryllium powder spill takes place.
- c. Report to PDEQ within 72 hours of the occurrence of any beryllium spill, upset condition, excess emission, or permit deviation.

12. Any new air permit for Brush Ceramic should require a minimum of four stack tests per year using the best available technology.

Pima County Response: Given the community concern and comments regarding the stack testing frequency, PDEQ did modify the Brush Ceramic final permit to include four stack tests a year. However, PDEQ has reduced the stack testing to once per year and will be conducting ambient air monitoring. PDEQ is entering into an agreement with Brush Ceramic Products to locate, install, operate and maintain an ambient air quality monitoring network around their facility. The network shall consist of a minimum of six (6) monitors. Information from the monitors will be posted on PDEQ's website (www.deq.pima.gov) and made available to the public.

- a. Stack testing shall be conducted by an independent testing company not affiliated with Brush Ceramic; and
- b. Stack testing results shall be analyzed by a laboratory not affiliated with Brush Ceramic.

13. Four unannounced inspections per year, three of which are to be within the 7 days before a quarterly stack test.

Pima County Response: PDEQ inspections are unannounced and will continue to be unannounced. At a minimum, PDEQ conducts one inspection per year at a facility. However, PDEQ does conduct additional inspections in response to complaints, compliance issues or as a matter of source surveillance.

XVI. Margarita Meneses

I think that there are a lot of desert areas where they could take Brush Ceramic. I work for Intuit down the street from Brush Ceramic and I also have grandkids that attend nearby schools, so please for the sake of others before we all get sick, do something.

Pima County Response: PDEQ recognizes that members of the community have serious concerns regarding the impact of emissions from Brush Ceramic. In October 1999, PCHD conducted an investigation of potential health impacts from the Brush Ceramic

facility (Attachment 1). The PCHD report concluded "stack emissions have been small and pose a negligible risk to workers, residents, and students in the surrounding community." As a result of community concerns regarding the PCHD report and emissions from Brush Ceramic, the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), conducted two health consultations (ATSDR Reports, Attachments 2 and 3) for the site on May 3, 2000 and again on August 8, 2005. ATSDR concluded that air emissions "represent no apparent public health hazard to the community, based upon the reported current rate of stack emissions and conservative air modeling methods." As part of the health consultations, ATSDR may recommend "additional 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." ATSDR has not recommended any of these actions and has concluded the soil concentrations and air emissions do not represent a public health hazard to the community.

XVII. Brian Blank

I reviewed the soil sample report distributed by PCHD. I believe that this company should be shut down in the interest of public safety.

Pima County Response: The PCHD soil sampling study was done in response to community concerns regarding health impacts from beryllium emissions. After reviewing the report, several community members questioned the PCHD methodology and results. In response to these concerns, EPA requested that ATSDR conduct a Health Consultation (Attachment 2) regarding community exposure to beryllium. ATSDR agreed with the findings of the study done by PCHD. Both the PCHD and ATSDR have spoken to concerned parties regarding the methodologies and data in their studies.

XVIII. Patsy Gonzalez

- 1. I strongly urge PDEQ to conduct random inspections of Brush Ceramic to ensure Brush Ceramic's compliance with the requirements of its permit.**

Pima County Response: PDEQ inspections are unannounced and will continue to be unannounced. At a minimum, PDEQ conducts one inspection per year at a facility. However, PDEQ does conduct additional inspections in response to complaints, compliance issues, or as a matter of source surveillance.

- 2. I strongly urge PDEQ to require continuous air monitoring, which should be carried out by an independent laboratory.**

Pima County Response: PDEQ is entering into an agreement with Brush Ceramic Products to locate, install, operate and maintain an ambient air quality monitoring network around their facility. The network shall consist of a minimum of six (6) monitors. Information from the monitors will be posted on PDEQ's website

(www.deq.pima.gov) and made available to the public. The final permit contains sufficient monitoring, record keeping, and reporting provisions to ensure that Brush Ceramic meets the NESHAP for beryllium.

3. **To require Brush Ceramic to provide a hot line for employees to report any violations of the air quality permit.**

Pima County Response: Brush Ceramic employees are encouraged to call PDEQ at any time to report violations of the air quality permit.

- XIX. Pat Bernie, Environmental Justice Action Group**
Linda Tepper, Co-Chair, Rincon Group of the Sierra Club
Betty Schroeder, Arizona Safe Energy Coalition
Yolanda D. Herrera, President, Sunnyside Neighborhood Association
Mary MacEwan, Chair, Women's International League for Peace and Freedom
Jake Elkins; Pat Malchow; Richard Boren; Cristin Catterton; M. Wilder; Christine Lee Oler; Tony Silvain; Ms. Stoecker; David Martin

We demand a zero emissions standard for this air quality permit.

Pima County Response: The NESHAP established by EPA was based upon a health study that concluded the lowest concentration of beryllium that produced disease was greater than 0.01 micrograms per cubic meter (38 FR 8823, April 6, 1973). The EPA Administrator determined that, in order to provide an ample margin of safety to protect public health, beryllium dust, fume, or mist emissions should be controlled to insure that ambient concentrations of beryllium do not exceed the 0.01 microgram per cubic meter concentration averaged over a 30-day period. Using conservative air dispersion modeling, EPA concluded that emissions of no more than 10 grams per 24-hour period would provide an ample margin of safety to insure the 0.01 microgram per cubic meter standard would not be violated. EPA has also established a reference concentration (RfC) of 0.02 micrograms per cubic meter based upon a Lowest Observed Adverse Effect Level (LOAEL) of 0.55 micrograms per cubic meter for an 8-hour per day exposure in the workplace (ATSDR Report, Attachment 2).

EPA has not changed the NESHAP for beryllium. The final permit requires Brush Ceramic to comply with the NESHAP. PDEQ has no authority to deny the permit on the basis that the NESHAP is inadequate.

- XX. Christine Ronquillo; Tucson City Councilperson Steve Leal; Andres Cano**

1. **Brush Ceramic needs to be moved to a location where it won't harm people.**
2. **I don't think that this facility should be in an urban area by homes and schools. I do not have confidence in the standards, and monitoring. This plant should be moved.**

Pima County Response: The final permit requires Brush Ceramic to comply with the NESHAP for beryllium. The final permit contains sufficient monitoring, record keeping and reporting provisions to ensure that the standard is met. The ATSDR review of the PCHD study concluded that levels of beryllium in the soil near the Brush Ceramic plant represent no public health hazard to the community and that the estimated maximum levels of beryllium in the air represent no apparent health hazard to the community (ATSDR Reports, Attachments 2 and 3). According to state law, PDEQ cannot deny the permit or force Brush Ceramic to move unless it has evidence to suggest Brush Ceramic cannot operate in compliance with the requirements of state statute and county code. PDEQ has no such evidence.

**XXI. Pat Bernie, Environmental Justice Action Group
Linda Tepper, Co-Chair, Rincon Group of the Sierra Club
Patsy Gonzalez**

Brush Ceramic should be required to install and maintain an alarm system or systematic way to notify nearby schools, businesses and residents, IMMEDIATELY, of accidental releases of beryllium to the community.

Pima County Response: Brush Ceramic is located within the limits of the City of Tucson. TFD would be the first responder to arrive at the facility in the case of an emergency. TFD has a Hazardous Material Response Unit to address releases of toxic or hazardous materials into the environment. TFD, in conjunction with the Tucson Police Department, and Tucson-Pima County Office of Emergency Services, have specific emergency authority to require evacuation of the surrounding area if it is warranted. Pursuant to federal law (Emergency Planning and Community Right-to-Know Act of 1986), Brush Ceramic must also file an emergency plan for addressing potential problems at its facility. PDEQ staff contacted TFD and an emergency plan is on file with TFD. The Pima County Code and state law does not provide PDEQ with the legal authority to require the construction and operation of an emergency alert system for the community. PDEQ has forwarded this request to the Tucson-Pima County Office of Emergency Services and TFD for their consideration. Brush Ceramic is required by permit to shut down the powered exhaust fans in the event of any possible beryllium release.

ATTACHMENT 1

**PIMA COUNTY HEALTH DEPARTMENT
BERYLLIUM/BRUSH WELLMAN INVESTIGATION
1999**



Pima County Health Department
Beryllium/Brush Wellman Investigation, 1999

Background

Brush Wellman, located at 6100 S. Tucson Boulevard, has been manufacturing items out of beryllium since 1980. Brush Wellman operates with a permit regulating the amount of beryllium that can be released from the facility. Current EPA standards require no more than 10 grams in a 24-hour period or to an amount that would give air levels of 0.01 μg beryllium per cubic meter of air. Review of Brush Wellman's airborne emission indicates the maximum average emission from the stack over the last 20 years was 4.28 grams per day in 1985. In 1998, average daily emissions were 0.15 grams. Using the highest emission level of 4.28 grams per day, Arizona Department of Environmental Quality (ADEQ) estimated that this would produce airborne beryllium concentrations in the surrounding neighborhoods of 0.008 $\mu\text{g}/\text{m}^3$. This is well under the 24-hour Ambient Air Quality Guideline of 0.016 $\mu\text{g}/\text{m}^3$.

However, after media reports of illness among Brush Wellman employees, concern was raised about the reliability of stack emission testing, and the potential health risks to other workers and residents in the area around Brush Wellman, including two elementary schools (Los Amigos and Los Ranchitos) approximately 1/4 mile away.

Methods

To investigate airborne emissions from Brush Wellman, the Pima County Health Department (PCHD) and ADEQ sought to test surrounding soil for beryllium. Although beryllium in soil is not dangerous by itself, it would serve as a measure of stack emissions. As beryllium is released into the air, it will fall to the ground and show up in soil tests. Taking into account prevailing wind patterns, particle size and stack height, modeling performed by ADEQ determined the largest amount of beryllium would fall within 150-170 yards of the stack. PCHD decided to concentrate testing within this boundary. No residences were found within this boundary. Some testing was also done further than 170 yards, along prevailing wind directions northwest and southeast of Brush Wellman. Sunnyside School District gave permission to have soil samples from Los Amigos and Los Ranchitos Elementary Schools. Other samples were taken in the vicinity of Sunnyside High School and Ocotillo Middle School. A total of 34 soil samples was collected in October 1999, including four specimens from Pima County, several miles away from Brush Wellman, to serve as controls. Testing was initially performed by Arizona State Laboratory using ICP screening method, which detects levels of 10 mg/kg or greater. The soil samples were then retested using an atomic absorption graphite furnace method, sensitive to lower levels.

Results

Split specimens were collected simultaneously by Brush Wellman for testing by DelMar Analytical Laboratory by ICP and atomic absorption methods. DelMar Analytical is an EPA-certified lab. The results by ICP testing were all non-detectable indicating beryllium levels less than 10 mg/kg. Test results using the more sensitive atomic absorption showed background levels ranging from 0.50 mg/kg - 1.1 mg/kg, with an average of .69 mg/kg. As beryllium is known to occur naturally, especially in volcanic soils, this was not unexpected. Soil from Brush Wellman neighborhoods ranged from .31 mg/kg - 3.0 mg/kg, with an average of .91 mg/kg. Highest levels were found within 150-170

yards of the stack (average of .97 mg/kg), with lower levels found immediately adjacent to Brush Wellman (average .77 mg/kg), and still lower for soil collected approximately .25 miles away (average .69 mg/kg). Soil samples collected at Los Amigos and Los Ranchitos tested 0.31 mg/kg and 0.43 mg/kg, respectively.

Soil remediation levels, established by ADEQ, are 1.4 mg/kg for residential and 11 mg/kg for non-residential soil. Only two samples, both taken from vacant land approximately 150-170 yards northwest of Brush Wellman, exceeded the residential soil sample. No sample exceeded the non-residential standard.

Three sample locations had duplicate or split samples sent for testing to evaluate variance in test results. These duplicates varied by 31-58%. However, as the amount of beryllium detected is very small, small changes would appear as a large percentage. Test variability might also have been affected by dilution of specimen and non-homogeneity of beryllium in the soil samples submitted and the portions selected for testing.

Results from DelMar Analytical Laboratory differed somewhat from Arizona State Laboratory results. These were generally lower except for six samples collected approximately 1/4 mile from Brush Wellman, which were higher.

Test results excluding background, ranged from non-detectable (or <.25 mg/kg) to 1.5 mg/kg, with an average of .72 mg/kg. Background levels ranged from .4-1.4 mg/kg (average 0.7 mg/kg). Perimeter samples ranged from .28-.73 mg/kg (average .52). Samples collected at 15-170 yards ranged from 0.28-1.2 mg/kg (average .67 mg/kg). Soil collected 1/4 mile away had a range of .68-1.5 mg/kg (average 1.2 mg/kg). Soil collected at Los Amigos and Los Ranchitos Elementary Schools gave results of non-detectable (or <.25 mg/kg) and 0.25 mg/kg, respectively. Duplicate specimens varied by 12-22%.

Differences between DelMar and State Laboratory results may also be explained by non-homogeneity of beryllium in the soil samples and that "duplicate" soil samples were not identified; the first specimen collected may have had a higher beryllium content.

Other surveys of background beryllium levels in Pima County soil (National Uranium Resource Evaluation, 1976-1980) showed 1,283 out of 4,348 samples with detectable levels of beryllium, approximate average of 2.03 ppm; 18% of these were 1 ppm; 62% showed 2 ppm; 15% had 3 ppm; and 4% were 4 ppm or higher. Average beryllium content for all Arizona soil samples that had detectable beryllium was 2.608 ppm.

Conclusion

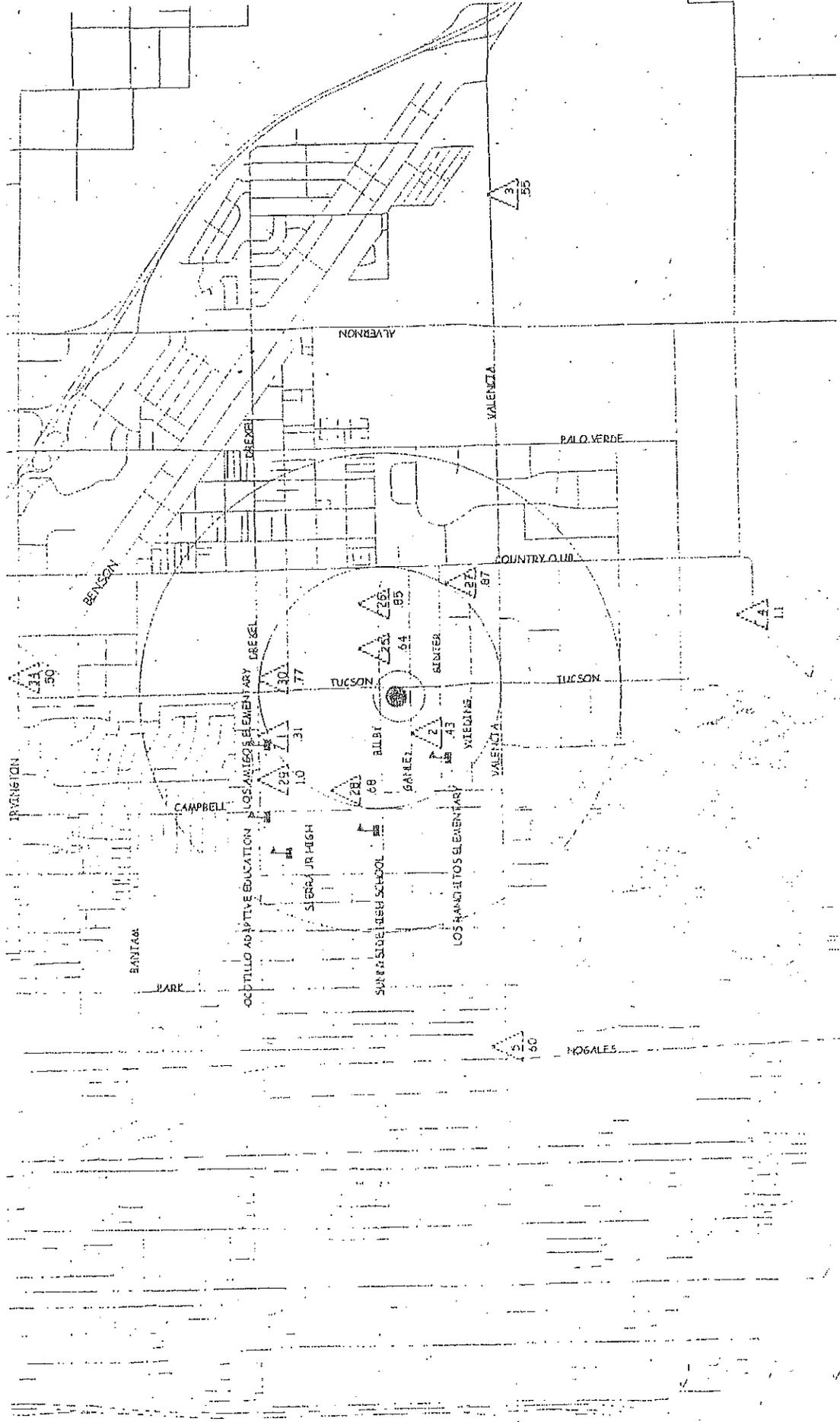
Beryllium is found naturally in Pima County soil. Beryllium, possibly exhausted through the smoke stack at Brush Wellman, appears to be small in quantity and concentrated at 150-170 yards from the facility. This area is primarily industrial or vacant, without residences. Tests for beryllium, from samples taken farther away from the stack, gave results consistent with background measurements. Although soil measurements cannot be used to calculate daily air emissions, the test results appear to support the low reported stack emissions. Soil test results from DelMar Analytical Laboratory, also

support the conclusion that stack emissions have been small and pose negligible risk to workers, residents and students in the surrounding community. Further testing, including air monitoring outside of the worksite, is not justified by these results. The Pima County Health Department recommends that Pima County Department of Environmental Quality continue to monitor Brush Wellman as is currently taking place.

Addendum

A public meeting was held 11/30/99, 6:30 pm, at Los Amigos Elementary School, to present soil testing results to residents and to answer any questions. Representatives of Brush Wellman, ADEQ, PCDEQ and ADHS were also present. Approximately 6-8 individuals attended, two from the Brush Wellman area and the rest from other areas of Pima County. Additional questions were received from the Environmental Justice Action Group. Those questions and responses are attached.

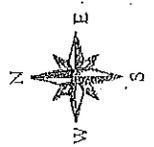
Test Sites and Results for Beryllium in Soil Sampling of the Neighborhood Surrounding Brush Wellman Inc. Pima County 1999



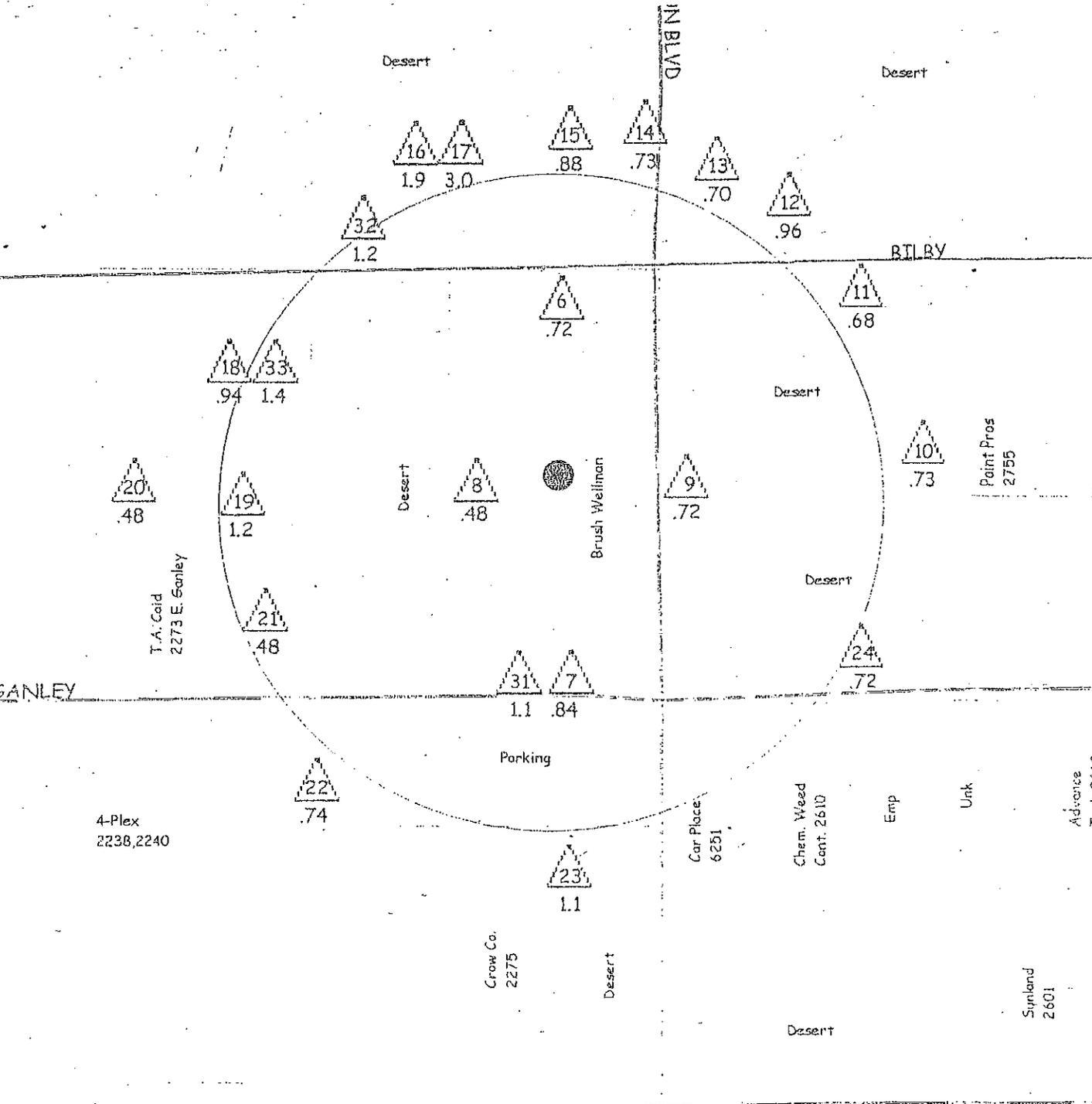
Soil Sampling Sites (samples reported in parts per million)

- ▲ Schools
- ▬ Streets
- ✈ Airports

Normal Wind Patterns:
Out of SE Mornings and Evenings
Out of WNW in the Afternoons

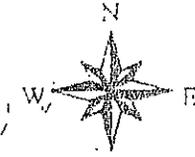


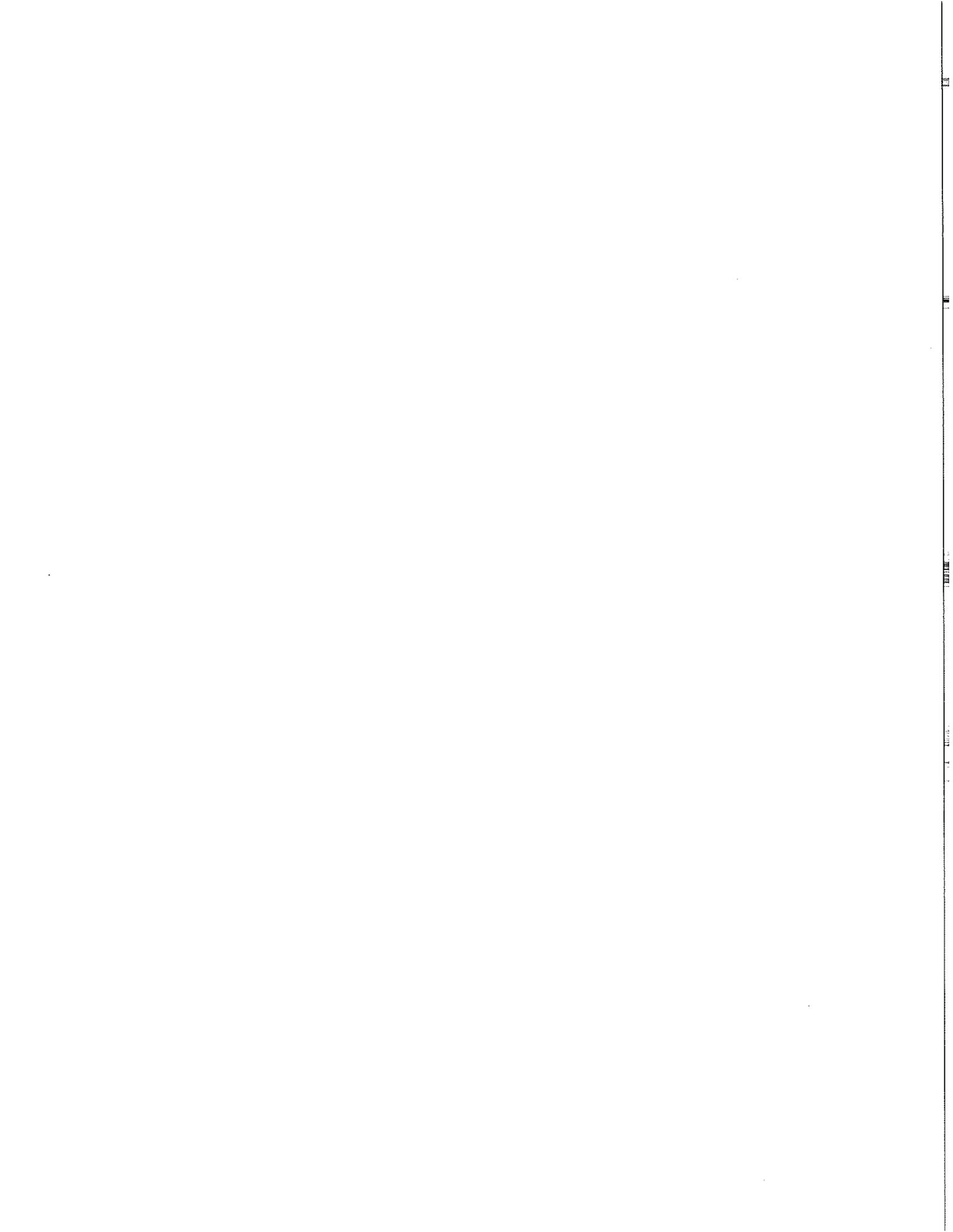
Test Sites and Results for Beryllium in Soil Sampling of the Neighborhood Surrounding Brush Wellman Inc. Pima County 1999



- Radius of Circle 530 feet
- Streets
- Soil Sampling Sites (parts per million)

Normal Wind Patterns:
 Out of SE Mornings and Evenings
 Out of WNW in the Afternoons





ATTACHMENT 2

**HEALTH CONSULTATION
BRUSH WELLMAN INCORPORATED
TUCSON, PIMA COUNTY, ARIZONA
CERCLIS NO. AZD037612702
MAY 3, 2000**

Prepared by:

**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

BRUSH WELLMAN INCORPORATED

TUCSON, PIMA COUNTY, ARIZONA

CERCLIS NO. AZD037612702

MAY 3, 2000

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
1-888-42ATSDR

or

Visit our Home Page at: <http://atsdr1.atsdr.cdc.gov:8080/>

HEALTH CONSULTATION

BRUSH WELLMAN INCORPORATED

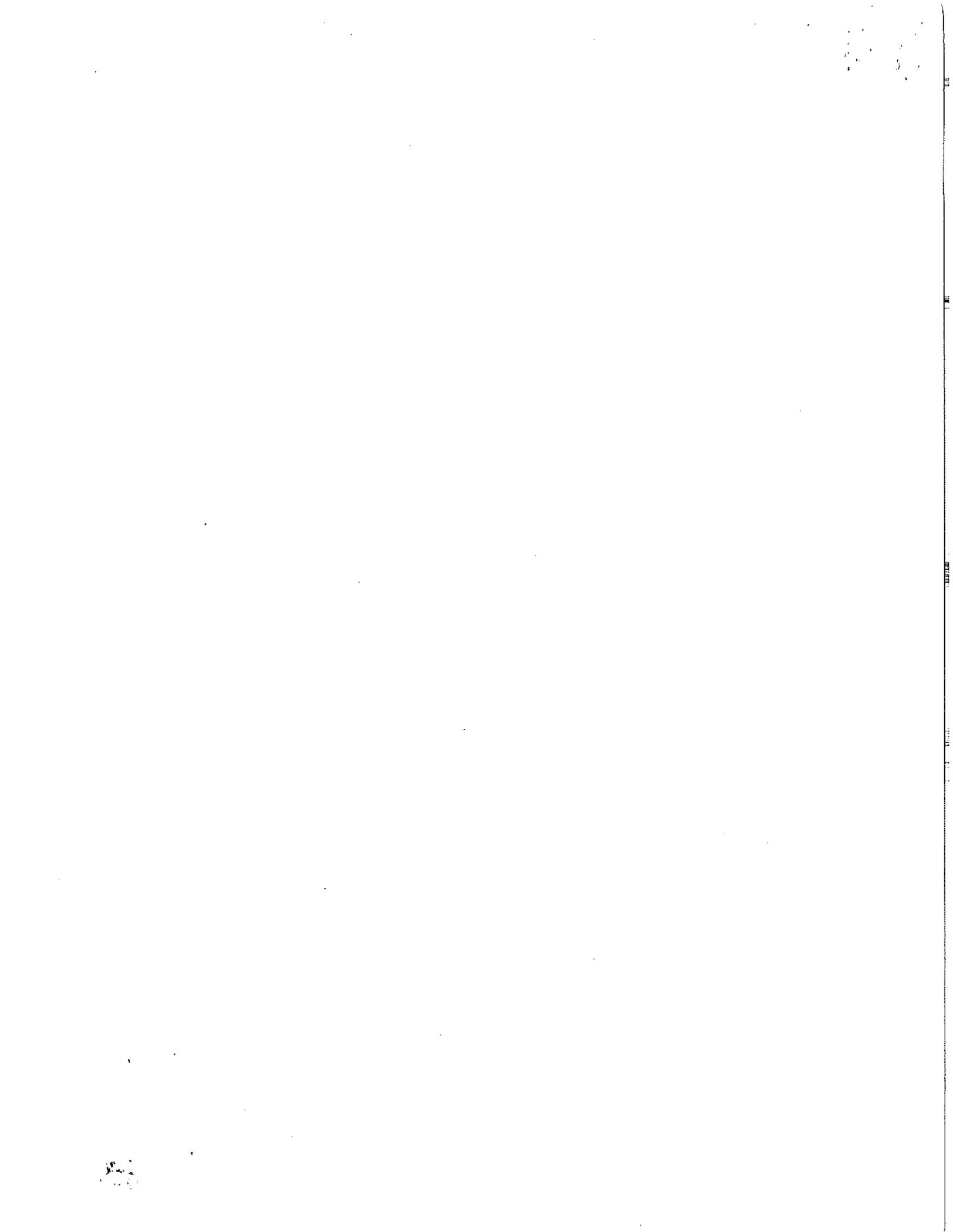
TUCSON, PIMA COUNTY, ARIZONA

CERCLIS NO. AZD037612702

Prepared by:

Exposure Investigation and Consultation Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

0418



Background and Statement of Issues

The Environmental Protection Agency (EPA) Region 9 requested the Agency for Toxic Substance and Disease Registry (ATSDR) review the methodology and findings of the draft Pima County Health Department document entitled Beryllium/Brush Wellman Investigation, dated November 23, 1999. The purpose of the Pima County Health Department report was to evaluate airborne emissions from the Brush Wellman facility in Tucson Arizona. Brush Wellman has manufactured ceramic beryllium products at its Tucson facility since 1981.

The facility is located in an urban area of Tucson at 6100 South Tucson Boulevard. Vacant lots border the facility to the west, north, and east. Four public schools are located within a one kilometer of the Brush Wellman plant.

Using air modeling, the Arizona Department of Environmental Quality (ADEQ) estimated that average annual ambient beryllium levels adjacent to the plant would be 0.008 micrograms per cubic meter ($\mu\text{g}/\text{M}^3$) [1]. ADEQ also estimated a maximum one hour level of 0.014 $\mu\text{g}/\text{M}^3$. These estimates are based on an emission rate of 4.28 grams per day which is the maximum emissions rate measured during the past 20 years of stack testing and represents a worst case scenario. (The average emission rates for 1998 and 1999 were 0.86 and 0.10 grams per day, respectively. [2, 3]) ADEQ also estimated that maximum deposition of beryllium would occur between 137 to 155 meters distance from the facility, based on particle size, stack height, and local meteorologic conditions. The prevailing wind directions are from the northwest (during the days) and from the southeast (at nights).

In October 1999, the Pima County Health Department and ADEQ collected 30 samples surrounding the Brush Wellman facility to measure the impact of deposition from stack emissions. Four background surface soil samples were collected several miles from the plant. The highest concentrations were found northwest of the facility at the approximate distance predicted by the air models. Beryllium levels ranged from 0.3 to 3.0 milligrams per kilogram of soil (mg/kg) in samples collected near the Brush Wellman plant. The levels of beryllium in background soil samples ranged from 0.4 to 1.4 mg/kg. Samples were collected from within the top two inches of soil [1].

From review of the soil sampling results, the Pima County Health Department concluded that "although soil measurements cannot be used to calculate daily air emissions, the tests results appear to support reported low stack emissions." The Pima County Health Department also stated that ambient air monitoring was not warranted based on these results [1].

Discussion

Breathing beryllium dust causes a serious chronic lung disease called Chronic Beryllium Disease (CBD) for sensitive persons. CBD symptoms include cough, chest pain, shortness of breath, weight loss, weakness, and fatigue. Long-term effects may include loss of lung function, fibrosis, or subsequent secondary effects on the heart with eventual permanent impairment. Chronic beryllium disease is a hypersensitivity or allergic condition in which the tissues of the lungs become inflamed from a cellular nodular reaction [4]. This inflammation restricts the exchange of oxygen between the lungs and the bloodstream. Genetic susceptibility plays a role in the development of CBD. In occupationally exposed workers, the overall prevalence of CBD is two to five percent [5].

EPA has established a reference concentration (RfC) of $0.02 \mu\text{g}/\text{M}^3$. This is based on a lowest observed adverse effect level (LOAEL) of $0.55 \mu\text{g}/\text{M}^3$ for eight hour per day exposures in workers [6]. A study by Essenbud in 1949 estimated a no observed adverse effect level (NOAEL) of 0.01 to $0.1 \mu\text{g}/\text{M}^3$ in air. Essenbud observed cases of CBD in community residents as far as one kilometer from the emission source [6].

CBD continues to occur from exposure in the workplace, including ceramic manufacturing plants, even though the exposures are below the Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (PEL) of $2 \mu\text{g}/\text{M}^3$ [7]. Researchers are now suggesting that chronic beryllium disease may be associated more with the form and size of beryllium dust, rather than the total mass of beryllium in air [7]. Beryllium oxide, which is used at the Brush Wellman Tucson plant, appears to be the most hazardous form of beryllium because of its insolubility and small particle size. Potential contaminant pathways for the Brush Wellman site are listed in Table 2.

Table 2. Potential exposure pathways for the Brush Wellman site

Media	Exposure Route	Receptor Population
surface soil	ingestion, skin contact	public
air	inhalation	workers/public

Beryllium metal does not cause disease by ingestion, because it is unable to pass through the gastrointestinal tract lining [8]. Some beryllium salts are more soluble, but are still not absorbed well. The maximum level of beryllium detected in surface soil ($3.0 \text{ mg}/\text{kg}$) is lower than the ATSDR screening values of 4, 100, and 700 mg/kg for pica child, child, and adult, respectively. Because beryllium does not readily cause disease by ingestion, the concentrations of beryllium detected in soil are not expected to pose any hazard to public health.

ATSDR believes the methods used by Pima County Health Department were appropriate for determining the existence of an air emission pathway and validating the air dispersion models. To further evaluate the beryllium air emissions, ATSDR obtained additional background information from the Pima County Department of Environmental Quality (PCDEQ) and the Arizona Department of Environmental Quality (ADEQ). PCDEQ administers the air pollution control program for affected industries within the county. According PCDEQ, Brush Wellman performs annual stack testing to measure its beryllium emissions. The testing is performed using EPA Method 103 for beryllium dust. Pima County environmental engineers have observed the past two stack testings and they report no deficiencies in Brush Wellman's testing methods [6]. Additionally, Pima County environmental officials report that the Brush Wellman facility has not been issued any Notices of Violations (NOV) pertaining to its air permit [6].

ADEQ used two EPA screening models to predict concentrations of beryllium in ambient air. These models used each possible meteorologic condition to select the conditions that gave the highest predicted concentration for each incremental distance from the source. Therefore, the predicted beryllium levels in ambient air near the facility are conservative because they represent the worst-case conditions for both emission rates and meteorologic conditions. The estimated average annual ambient concentration of beryllium ($0.008 \mu\text{g}/\text{M}^3$) and the maximum one hour concentration ($0.014 \mu\text{g}/\text{M}^3$) are below the EPA's reference concentration of $0.02 \mu\text{g}/\text{M}^3$ result of this information, ATSDR concurs with Pima County Health Department's conclusion that air monitoring is not warranted.

ATSDR's Child Health Initiative

ATSDR recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of environmental media. As part of the ATSDR child health initiative, ATSDR health consultations must indicate whether any site-related exposures are of particular concern for children. This site is a particular concern for children because four schools are located close to site. The modeled concentrations represent no apparent health hazard to children.

Conclusions

The levels of beryllium in surface soil near the Brush Wellman Plant represent no public health hazard to the community.

The estimated maximum levels of beryllium in air represent no apparent public health hazard to the community, based on the reported current rate of stack emissions and conservative air modeling methods.

Methods used by the Pima County Health Department were appropriate for determining the existence of an air emission pathway and validating the air dispersion models. ATSDR concurs with the conclusions of the Pima County Health Department report. Soil sampling results support low reported emissions from the Brush Wellman facility and air monitoring is not warranted. ATSDR's conclusions are based on the information contained in the Pima County Health Department report as well as additional background information.

Recommendations

None

Prepared by

Peter Kowalski, MPH, CIH
Exposure Investigations and Consultations Branch
Division of Health Assessment and Consultation

Reviewed by

Greg Zarus
Atmospheric Scientist
Exposure Investigation Section
Exposure Investigations and Consultations Branch
Division of Health Assessment and Consultation

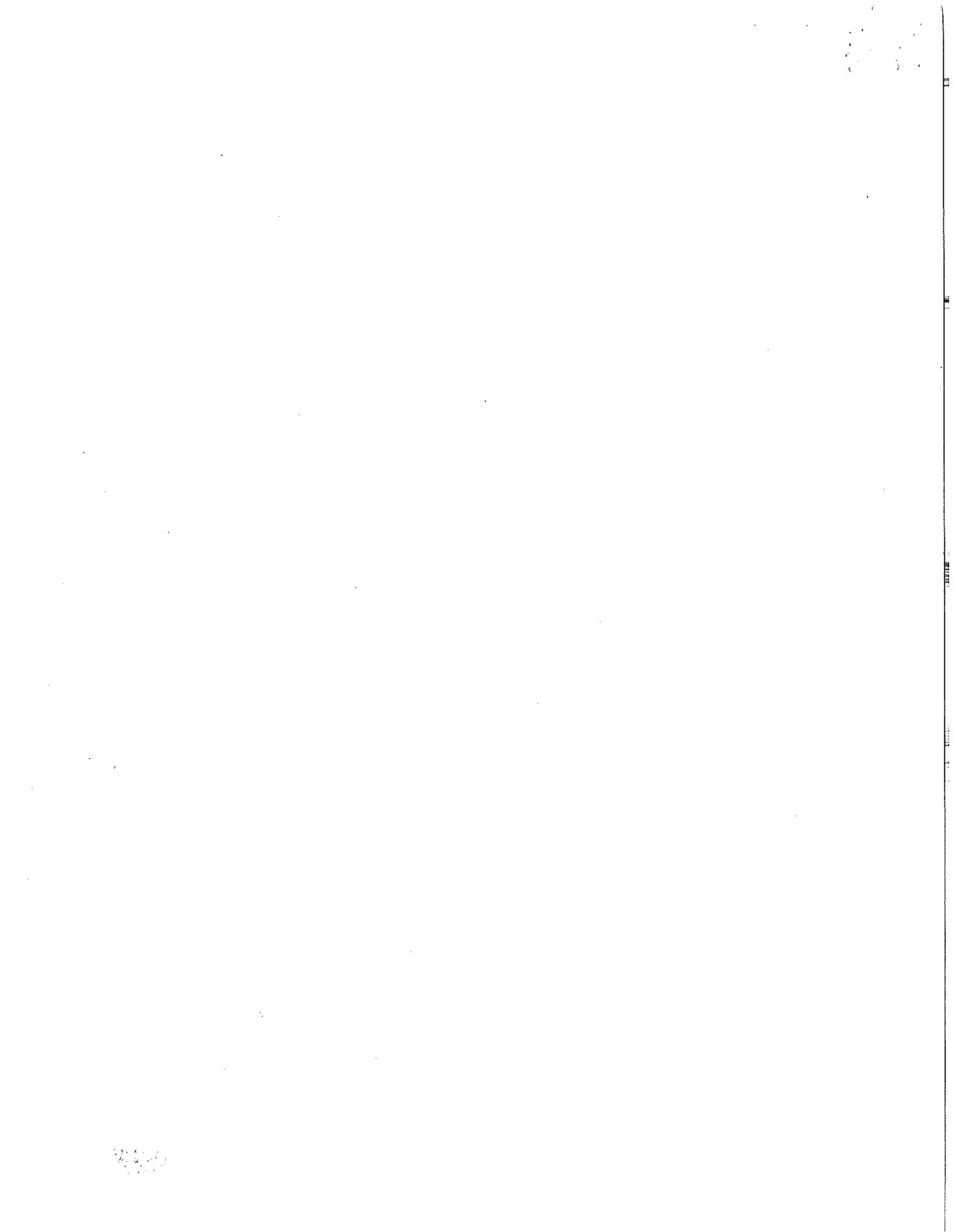
Susan Moore
Chief, Consultations Section
Exposure Investigations and Consultations Branch
Division of Health Assessment and Consultation

Ken Orloff PhD, DABT
Toxicologist
Exposure Investigations and Consultations Branch
Division of Health Assessment and Consultation

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Bureau of Epidemiology and Disease Control Services
Office of Environmental Health

3815 North Black Canyon Highway
Phoenix, Arizona 85015-5351
(602) 230-5830
(602) 230-5933 FAX

JANE DEE HULL, GOVERNOR
JAMES R. ALLEN, M.D., M.P.H., DIRECTOR

*Rec'd
5.27.99*

May 25, 1999

Babs Johnson
Pima County Health Department
150 West Congress Street
Tucson, Arizona 85701

*Judy
C. Johnson
5.27.99*

Dear Ms. Johnson: *Babs*

RE: ENVIRONMENTAL SAMPLING

This letter documents our meeting today regarding environmental sampling in the neighborhood surrounding the Brush Wellman Inc. facility in Tucson. We reviewed the Pima County Department of Environmental Quality file regarding the facility, and discussed ways to address potential community concerns about beryllium emissions from the facility.

Upon review of the file, it appears that airborne emissions of beryllium from the facility are unlikely to have been deposited on soils surrounding the facility. The stack testing indicates that the maximum average emission from the stack over the last 20 years was 4.28 grams per day in 1985. The average daily emission from the plant in 1998 was 0.15 grams per day. Emissions of this magnitude are unlikely to have resulted in significant deposition.

I also ran a simple screening model, called a "box model" using the stack emission data in order to estimate airborne beryllium concentrations in the neighborhoods surrounding the facility. The 1985 (maximum) estimated average ambient concentration was estimated to be 0.008 ug/m³. Our 24 hour Ambient Air Quality Guideline for beryllium is 0.016 ug/m³. The model suggests that the concentration of beryllium in ambient air surrounding the facility would be less than our health based guidelines.

However, we also discussed the possibility that Pima County may wish to confirm these conclusions by conducting environmental sampling of soils in the area around the facility. I had the following suggestions if you decide to conduct environmental sampling in the area:

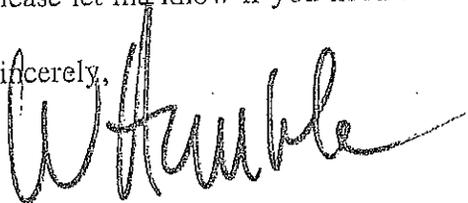
Babs Johnson
May 25, 1999
Page 2

- Soil samples could be collected at nearby schools including Los Ranchitos, Los Amigos, Sunnyside, Sierra, and Ocotillo. There are also a few residences that are within 1 mile of the facility that you may want to sample.
- Use a licensed laboratory, and use containers from the laboratory.
- Conduct the sampling as instructed by the lab, and fill out all of the necessary forms.

Once the data returns from the lab, you can compare the levels that you find to background levels and Soil Remediation Levels (SRLs) established by the Arizona Department of Environmental Quality. Regional background levels for beryllium are between 1 and 2 mg/kg. The residential SRL for beryllium is 1.4 mg/kg, and the nonresidential SRL is 11 mg/kg.

Please let me know if you need additional assistance. You can reach me at 602.230.5941.

Sincerely,



Will Humble, M.P.H.
Office Chief,
Office of Environmental Health

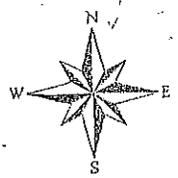
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Test Sites and Results for Beryllium in Soil Sampling of the Neighborhood Surrounding Brush Wellman Inc. Pima County 1999

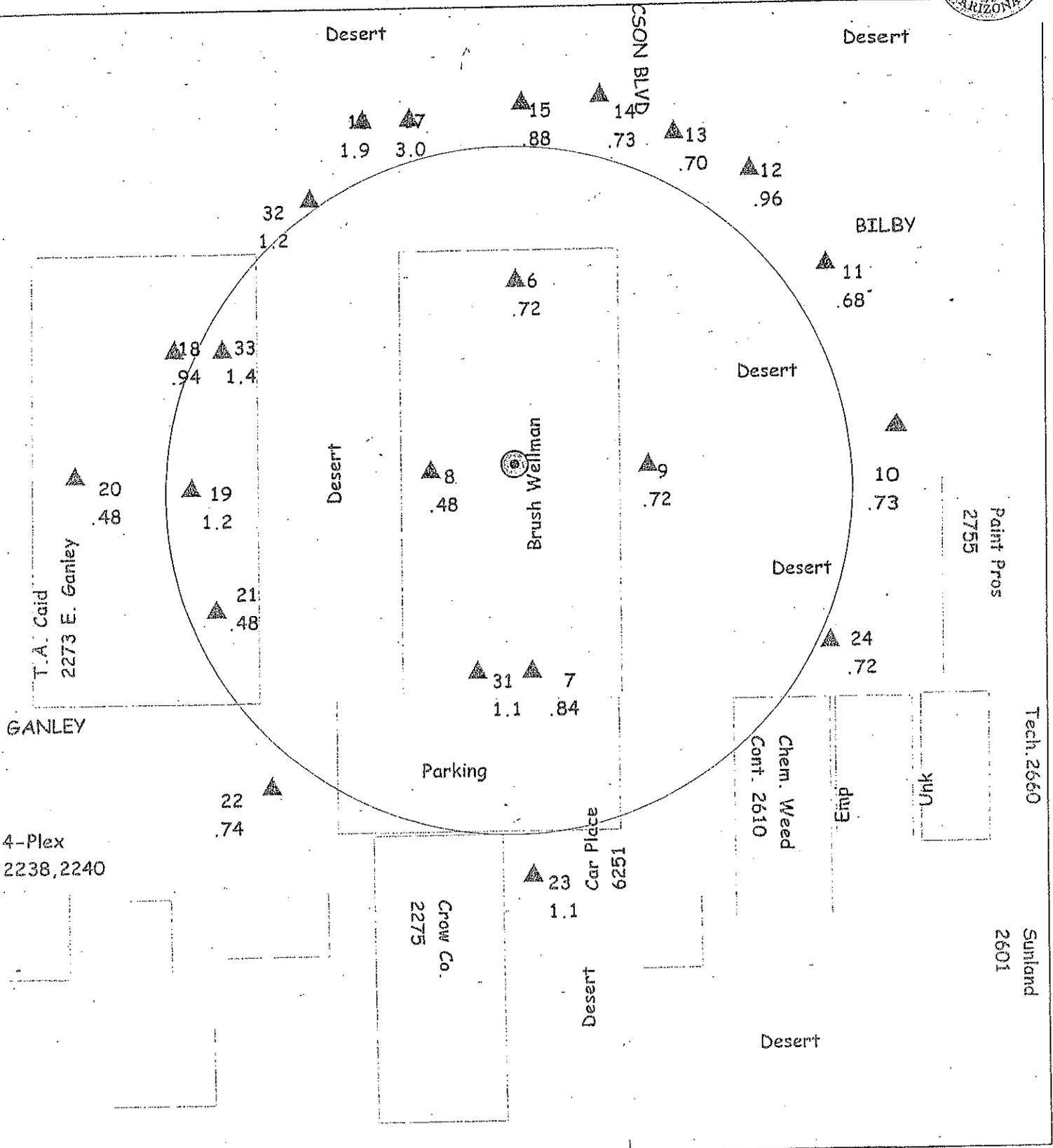


- ▲ Soil Sampling Sites (samples reported in parts per million)
- ✈ Schools
- Airports

Normal Wind Patterns:
 Out of SE Mornings and Evenings
 Out of WNW in Afternoons



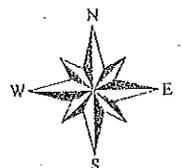
Test Sites and Results for Beryllium in Soil Sampling of the Neighborhood Surrounding Brush Wellman Inc. Pima County 1999



⊙ Radius of Circle 530 feet

▲ Soil Sampling Sites (parts per million)

Normal Wind Patterns:
 Out of SE Mornings and Evenings
 Out of WNW in the Afternoons

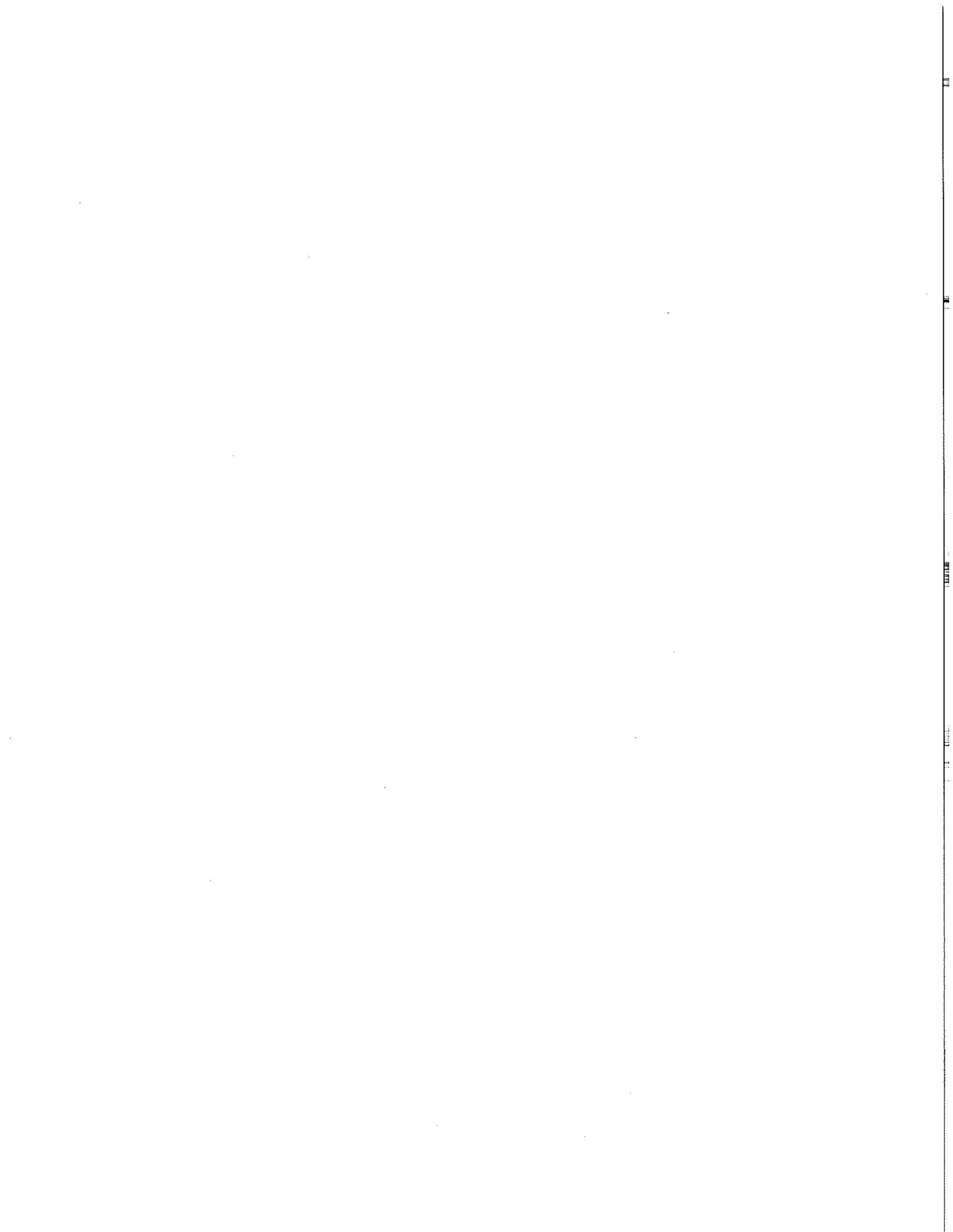


ATTACHMENT 3

**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**

**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

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

concentration can be used to estimate the true average concentration contacted over time. In this example, the average concentration contacted over time would equal the spatially averaged concentration over the exposure area. While an individual may not actually exhibit a truly random pattern of movement across an exposure area, the assumption of equal time spent in different parts of the area is a reasonable approach.

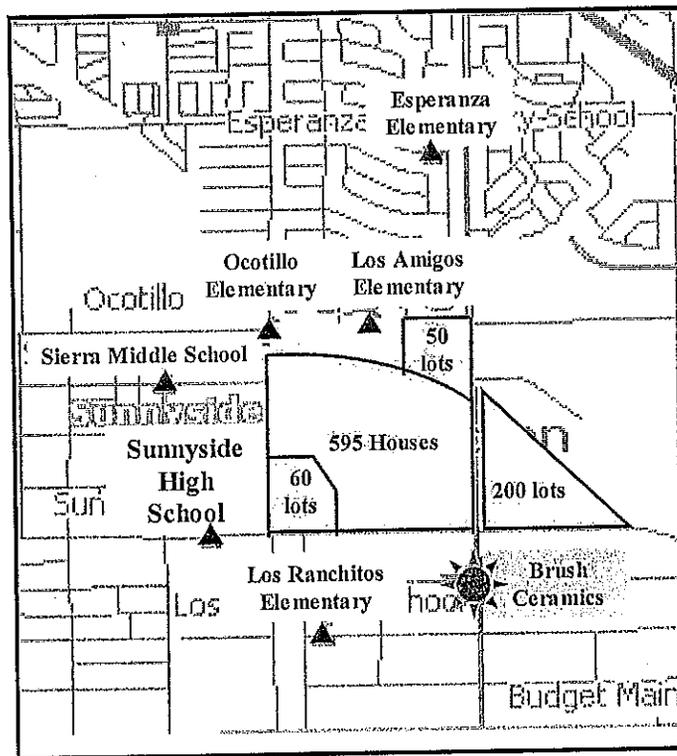


Figure 1. Brush Ceramic Products and surrounding area.

Brush Ceramic Products is located at 6100 S. Tucson Boulevard, Tucson, AZ. There are six schools within a half-mile from Brush Ceramic Products. Pink Sun indicates Brush Ceramic Products; Red triangles indicate schools; Green area is the location of future subdivisions.

Soil Data

In 1999, the Pima County Health Department (PCHD) investigated the beryllium concentrations in soil around Brush Ceramic Products facility. This sampling event was concentrated within a boundary (radius = 0.25 mile = 1320 feet, centered at Brush Ceramic Products) based on the air quality modeling results performed by the ADEQ. The air quality modeling results indicated that the largest amount of beryllium would fall within 450 – 510 feet of the emissions stack at the facility.

In 2000, the Sunnyside High School District conducted another investigation. The selected soil sampling locations could have increased beryllium concentrations based on the occurrence of a prevailing morning northwest wind pattern over the Brush Ceramic

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.

The ADEQ and the United States Geological Survey (USGS) investigated the background concentrations of metals in Arizona soils. Their report indicated that the beryllium concentrations in Arizona soil ranged from 5 mg/kg to non-detected, and the average beryllium concentration in soil is 0.52 mg/kg (ADEQ 1991). Three soil samples were taken from Pima County. They were located at 1 mile east of Ajo (non-detected), 2 miles west of Quijotoa (non-detected), and Robles Junction (1.5 mg/kg). The average beryllium concentration of these three locations was 0.5 mg/kg. That is similar to the average background beryllium concentrations in soil around the Brush Ceramic Products. The average background beryllium concentration in soil was 0.69 mg/kg for 1999 soil samples and 0.61 mg/kg for 2000 soil samples.

Table 1. Measured beryllium concentrations in soils in milligrams per kilogram (mg/kg) compared to reference or screening values.

Sampling Location	Year	Average beryllium concentration in soil (mg/kg)	Number of samples	Does it exceed ATSDR Comparison Values (CVs)?		Does it exceed Arizona Soil Remediation Levels (SRLs)?	Does it exceed USEPA Region 9 Preliminary Remediation Goals (PRGs)?
				Child (mg/kg)	Adult (mg/kg)	Residential (mg/kg)	Residential (mg/kg)
Immediately adjacent to Brush Ceramics Products	1999	0.77	5	No	No	No	No
Within a circle centered at Brush Ceramics Products (radius = 530 ft)	1999	1.05	17	No	No	No	No
Within a circle centered at Brush Ceramics Products (radius = 0.25 mile)	1999	0.69	8	No	No	No	No
Sunnyside High School	2000	0.40	4	No	No	No	No
Los Amingo Elementray School	2000	0.44	4	No	No	No	No
Los Ranchitos Elementary School	2000	0.54	4	No	No	No	No
Fred Bull Asminstration Building	2000	0.72	4	No	No	No	No
Esperanza Elementary School	2000	0.83	4	No	No	No	No

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.

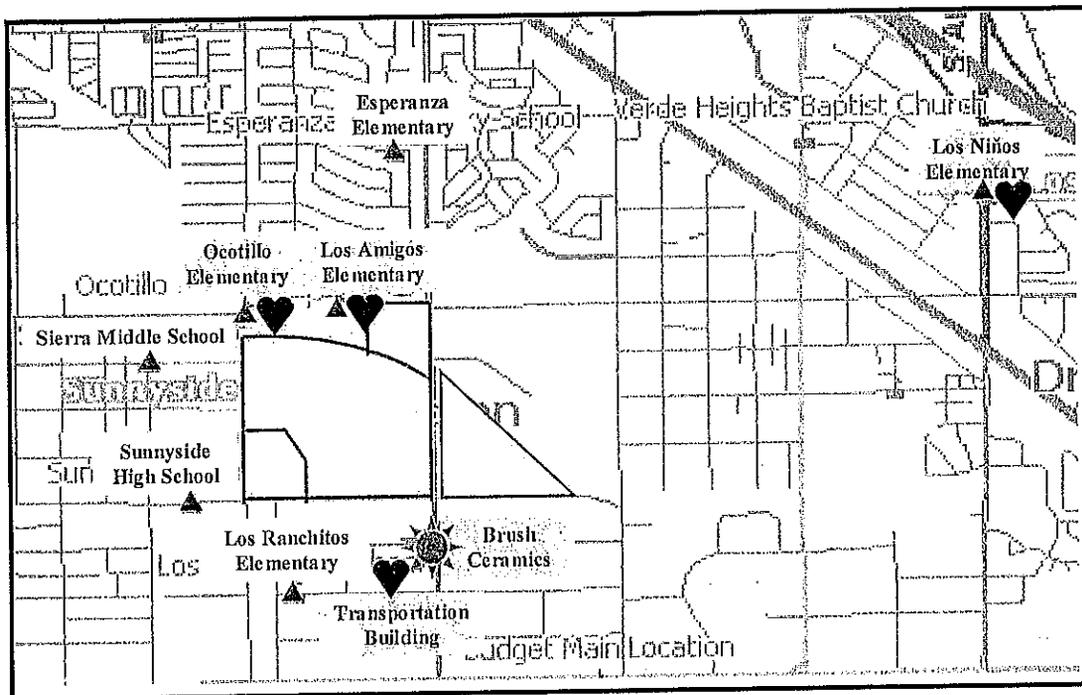


Figure 2. Air monitoring stations and the surrounding area.

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

Department of Health Services compared the average beryllium concentrations in ambient air to ATSDR's Cancer Risk Evaluation Guides (CREGs), Arizona Ambient Air Quality Guidelines (AAAQGs) and National Emission Standard for beryllium. The ATSDR developed CREGs, which are used to identify concentrations of cancer-causing substances in specific media are unlikely to result in an increase of cancer rates in an exposed population. Arizona Ambient Air Quality Guidelines (AAAQGs) are developed by the Arizona Department of Health Services. AAAQGs are screening values that are protective of human health, including children, over a lifetime. The results in Table 2 indicate that the average beryllium concentrations in ambient air at various locations are far lower than the reference or screening values.

Table 2. Measured beryllium concentrations in ambient air in microgram per cubic meter ($\mu\text{g}/\text{m}^3$) compared to reference or screening values.

Sampling Location	Site ID	Year	Number of samples	Average beryllium concentration in ambient air	Does it exceed ATSDR cancer risk evaluation guide (CREG)?	Does it exceed Arizona Ambient Air Quality Guidelines (AAAQG)?			Does it exceed National Emission Standards?
						1-hour	24-hour	Annual	30-day
Standards				($\mu\text{g}/\text{m}^3$)	0.0004 ($\mu\text{g}/\text{m}^3$)	0.06 ($\mu\text{g}/\text{m}^3$)	0.16 ($\mu\text{g}/\text{m}^3$)	0.00042 ($\mu\text{g}/\text{m}^3$)	0.01 ($\mu\text{g}/\text{m}^3$)
Transporation Building	1	2002	7	0.000013	No	No	No	No	No
		2003	54	0.000028	No	No	No	No	No
		2004	49	0.000020	No	No	No	No	No
		2005	13	0.000008	No	No	No	No	No
Los Niños Elementary School	2	2002	7	0.000013	No	No	No	No	No
		2003	51	0.000028	No	No	No	No	No
		2004	45	0.000018	No	No	No	No	No
		2005	11	0.000008	No	No	No	No	No
Los Amingo Elementray School	3	2002	7	0.000014	No	No	No	No	No
		2003	53	0.000027	No	No	No	No	No
		2004	42	0.000024	No	No	No	No	No
		2005	11	0.000008	No	No	No	No	No
Ocotillo Elementary School	4	2002	7	0.000015	No	No	No	No	No
		2003	55	0.000031	No	No	No	No	No
		2004	48	0.000026	No	No	No	No	No
		2005	11	0.000009	No	No	No	No	No
Sample Blanks		2002	NA	NA					
		2003	14	0.000005					
		2004	9	0.000008					
		2005	1	0.000008					

NA: Not Available

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	g Be/day	Does it exceed NESHAP ^b ?
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).

Surface Wipe Data

The Sunnyside High School District personnel took numerous surface wipe samples from various locations from December 2004 to April 2005. The results show that the amount of beryllium at different surfaces ranged from 0.00002 to 0.01052 micrograms beryllium per square centimeter (μg beryllium/ cm^2). Three surface wipe measurements exceeded the house keeping contamination limits established by the United States Department of Energy (DOE) (10 CFR 850.31). The Sunnyside High School District representatives have expressed their concern about the surface wipe results, and the probability for school students and employees to breathe in the beryllium particles that may be re-suspended from the surfaces.

In response to cases of chronic beryllium disease occurring at DOE facilities, DOE promulgated a Chronic Beryllium Disease Prevention regulation (10 CFR Part 850). As part of this program, DOE established surface contamination limits. Removable, i.e. loose, beryllium contamination must not exceed 3 micrograms beryllium per hundred-square centimeter (μg beryllium/ 100 cm^2) during non-operation periods. The requirement is intended to limit the spread of beryllium contamination and to assess the adequacy of housekeeping measures. Prior to releasing any equipment from designated beryllium work areas, the levels of removable beryllium must be below $0.1\ \mu\text{g}$ beryllium/ 100 cm^2 .

To obtain specific background information of these three wipe samples, the Arizona Department of Health Services contacted the Sunnyside High School District representative, Mr. Gene Repola. The information listed below indicates that the dusts are accumulations over 15 years, and the students and employees only have limited access to these locations.

"The SSSH/ADM sample was taken in the attic space above the hallway, no student access only employees if they need to work on air handlers.

Warehouse ductwork sample was taken from the dirt and grime that was vacuumed from within the ductwork that has built up in the ductwork for about 17 years, no access by employees.

Custodial supply closet sample was taken from above a lighting fixture that does not receive cleaning in a room that is 19 years old. Only employees have access to area maybe a child once in a while if they walked thru with an employee." (Mr. Gene Repola, personal communication via e-mail, May 26, 2005)

In addition to stack emissions, background level of beryllium in soil could account for some of the beryllium detected in wipe samples. The average background beryllium concentration in soil was 0.69 milligrams per kilogram (mg/kg) for 1999 soil samples and 0.61 milligrams per kilogram (mg/kg) for 2000 soil samples.

A number of authors (McArthur 1992, Klingner 1994, Lichtenwalner 1992) have found that surface wipe sampling lacks the precision required for regulatory purposes. It is not highly reproducible, not completely efficient in removing material, and shows variable

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.

Conclusions

The Arizona Department of Health Services has classified the Brush Ceramic Products site as "No Apparent Public Health Hazard." This classification is based upon the following conclusions:

- Some beryllium present in the environment, including soil and ambient air.
- Exposures to both site related and naturally occurring beryllium are not at levels likely to cause adverse health effects, even to children and sensitive populations.
- Because exposures are very low, the site does not pose a public health hazard.

If further information becomes available, the Arizona Department of Health Services will evaluate it and update conclusions as necessary.

Recommendations

- If additional wipe samples are taken, they should be taken at locations where people frequent on a regular basis, such as classrooms and the lunchrooms.
- All duct works should be professionally cleaned regularly.
- Inform school students and employees, and residents, including the new housing subdivision, what is known about the relationship between exposure and chronic beryllium disease.
- Educate school students and employees, and residents, including the new housing subdivision, how to respond during emergency situations.

Public Health Action Plan

The Arizona Department of Health Services staff will attend community meetings to communicate the results of this consultation. The Arizona Department of Health Services will gather community concerns and answer any additional questions that community members have.

The Arizona Department of Health Services staff will help the PDEQ and the PCHD to develop health education materials for school student, employees and residents.

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Prepared by

Hsin-I Lin, ScD
Program Manager, Office of Environmental Health
Bureau of Epidemiology and Disease Control
Arizona Department of Health Services

Don Herrington, Principle Investigator
Chief, Office of Environmental Health
Bureau of Epidemiology and Disease Control
Arizona Department of Health Services

ATSDR Regional Representative

Gwen Eng
Office of Regional Operations, Region IX
Office of the Assistant Administrator

ATSDR Technical Project Officer

Charisse J. Walcott
Division of Health Assessment and Consultation
Superfund Site Assessment Branch
State Programs Section

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.

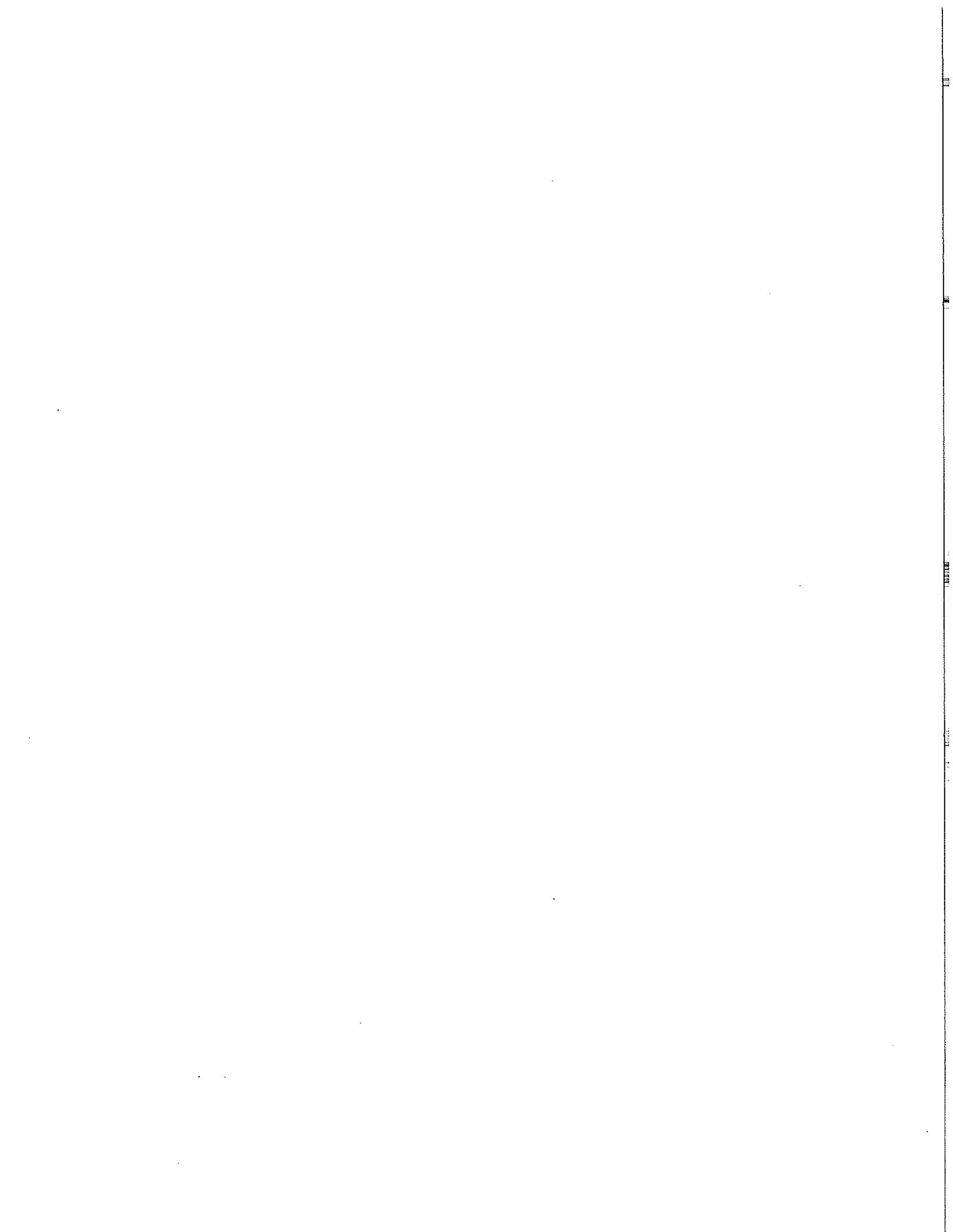
Charisse J. Walcott
Technical Project Officer
Superfund and Program Assessment Branch
Division of Health Assessment and Consultation

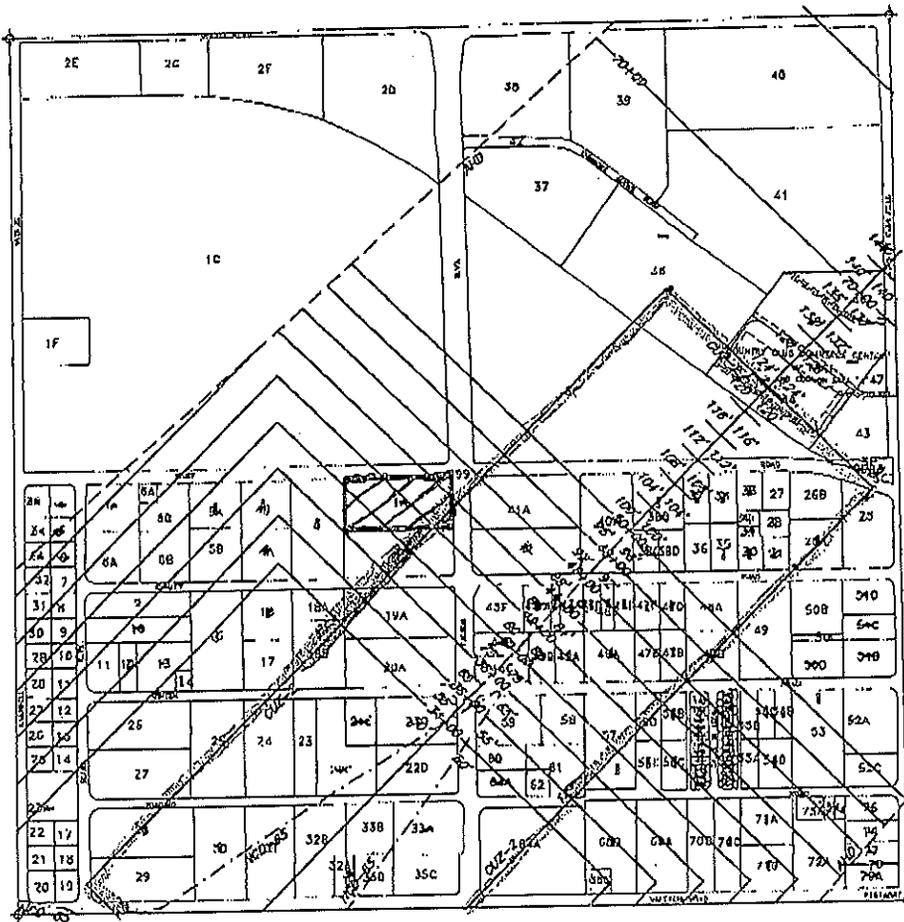
The Division of Health Assessment and Consultation, Agency for Toxic Substance and Disease Registry, has reviewed this health consultation and concurs with its findings.

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

ATTACHMENT 4

**MAP
AIRPORT ENVIRONS ZONE**

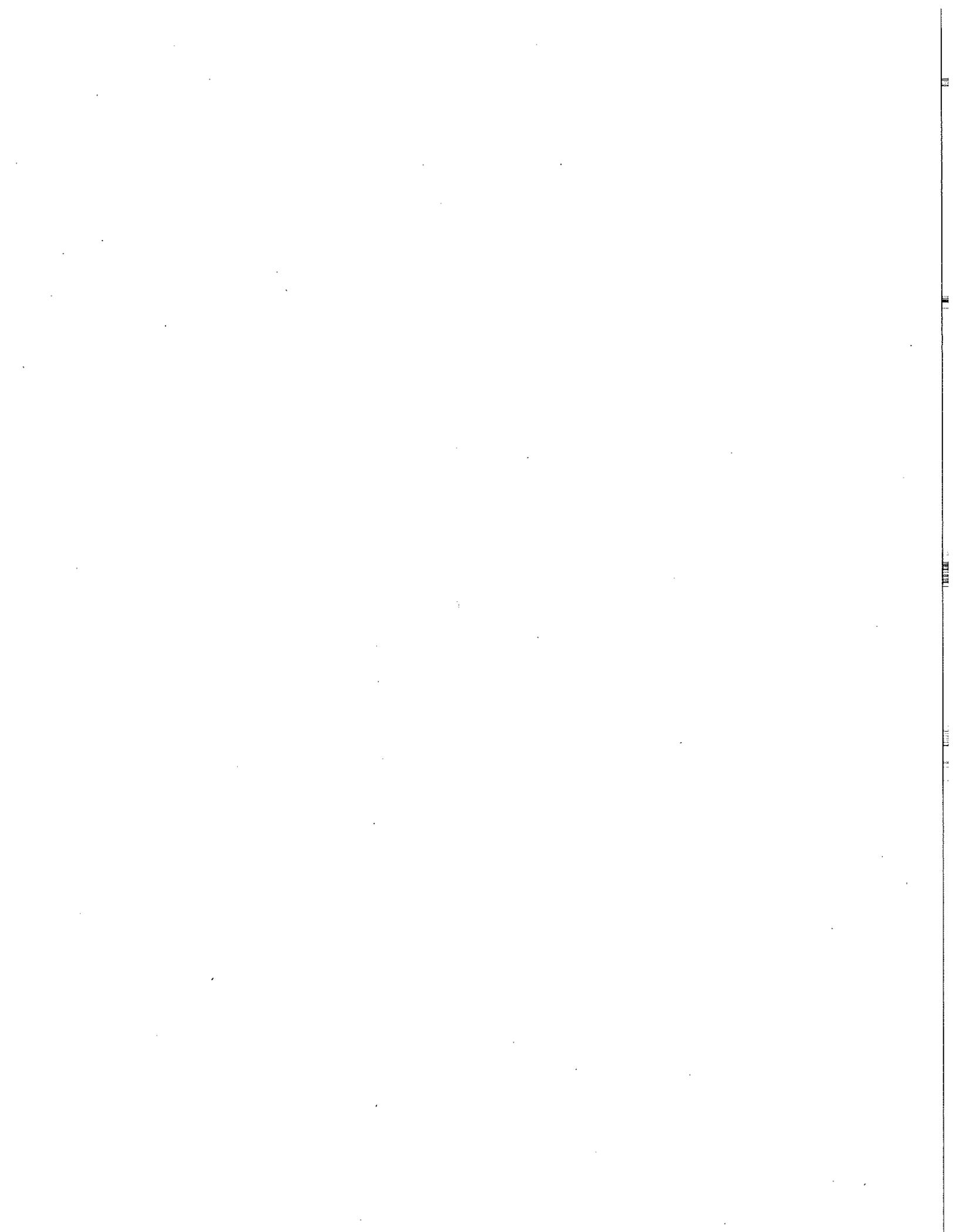




AIRPORT ENVIRONS ZONE A.E.Z

-  COMPATIBLE USE ZONES
-  NOISE CONTROL DISTRICT - 65 Ldn
-  AIRPORT HAZARD DISTRICT
-  70+00 DISTANCE IN FEET FROM END OF RUNWAY
-  198' MAXIMUM HEIGHT IN FEET ABOVE ELEVATION AT END OF RUNWAY

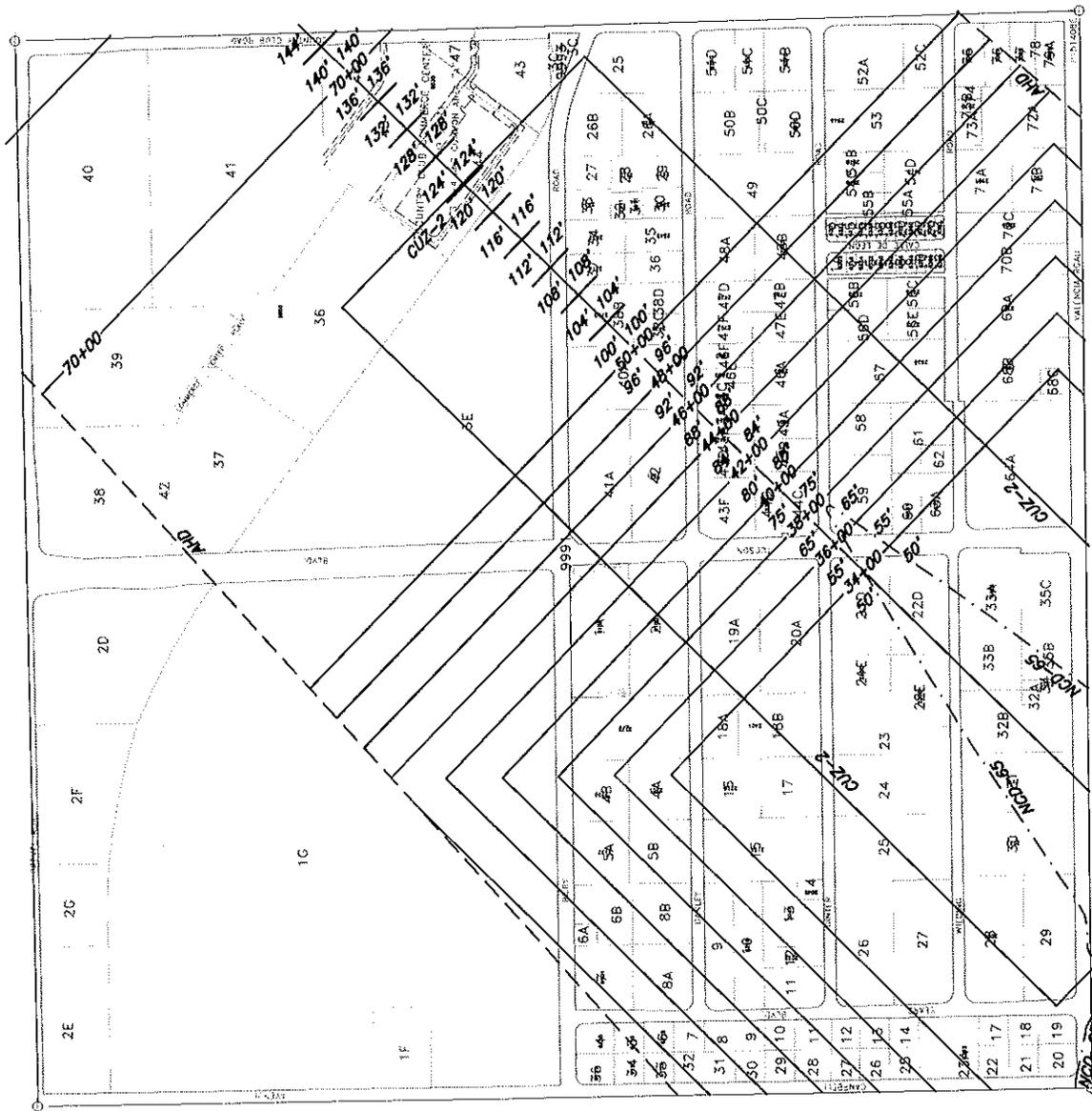
 Brush Ceramics
Property



AIRPORT ENVIRONS ZONE A.E.Z

- COMPATIBLE USE ZONES
- NOISE CONTROL DISTRICT - 65 Ldn
- AIRPORT HAZARD DISTRICT
- 70+00 DISTANCE IN FEET FROM END OF RUNWAY
- 196' MAXIMUM HEIGHT IN FEET ABOVE ELEVATION AT END OF RUNWAY

Brush Facility



11-6841