Mirant Corporation
601 13th Street, N.W., Suite 850N
Washington, DC 20005
T 202 585 3800 **F** 202 585 3806

June 20, 2008

Thomas Sinks, Ph.D.
Deputy Director
Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
4770 Buford Highway, NE (MS F-61)
Building 106, Room 108A
Chamblee GA 30341

Dear Tom:

I wanted to thank you again for taking the time to meet with Jeff Holmstead and me regarding the work that ATSDR is doing to assess Mirant's Potomac River Generating Station (PRGS) in Alexandria, Virginia. As we discussed, Mirant supports your efforts to ensure that the health assessment is scientifically and technically valid and based on the best available data. We very much appreciate the opportunity to meet with you and the ATSDR team, along with the EPA staff that has been working on these same issues. Thanks very much for pulling together all the right people for the meeting.

We came away feeling confident that our technical issues will be properly addressed in your report. As you know, we were primarily concerned about how the report would characterize the effects of short-term exposures to sulfur dioxide (SO_2). We were reassured to hear that ATSDR and EPA will be coordinating on this issue to ensure that the report is consistent with EPA's Integrated Science Assessment on SO_2.

We were also pleased to talk with your technical staff about the need to distinguish between ambient levels of SO_2, which are properly attributable to emissions from PRGS, and ambient levels of particulate matter and selected metals, which have very little or nothing to do with the Plant. It was apparent that they understand these issues, and we are confident that the report will make it clear that PRGS does not contribute significantly to ambient concentrations of PM or metals.

Based on our meeting, we also assume that the report will rely primarily, if not exclusively, on monitoring data rather than air dispersion modeling. As we discussed (and I think all the

modeling experts from both EPA and ATSDR agreed), the configuration of PRGS and the surrounding buildings makes air dispersion modeling very unreliable. Moreover, given the extensive monitoring network around PRGS (with monitors at locations where the greatest impacts are predicted to occur), there is no reason to base a health assessment on modeling data.

I also want to make sure that you have several things that we discussed in the meeting. Enclosed please find:

- A table summarizing all the SO_2 monitoring data from the six monitoring locations around PRGS. As you can see from the table, we now have almost 650,000 five-minute samples (more than a year of continuous monitoring) with over 90 percent of them below 10 ppb and over 99.9 percent below 100 ppb.

- Several graphs showing monitored $PM_{2.5}$ concentrations from all the monitoring stations in the Washington D.C. area (including the monitor immediately adjacent to PRGS, where the Plant is predicted to have the highest impact). These graphs make it clear that $PM_{2.5}$ is a regional issue and that PRGS does not cause elevated concentrations of $PM_{2.5}$

- The letter from Dr. Lester Grant (the EPA scientist responsible for studying the health effects of SO_2) objecting to the discussion of the short-term health effects of SO_2 in ATSDR's toxicological profile.

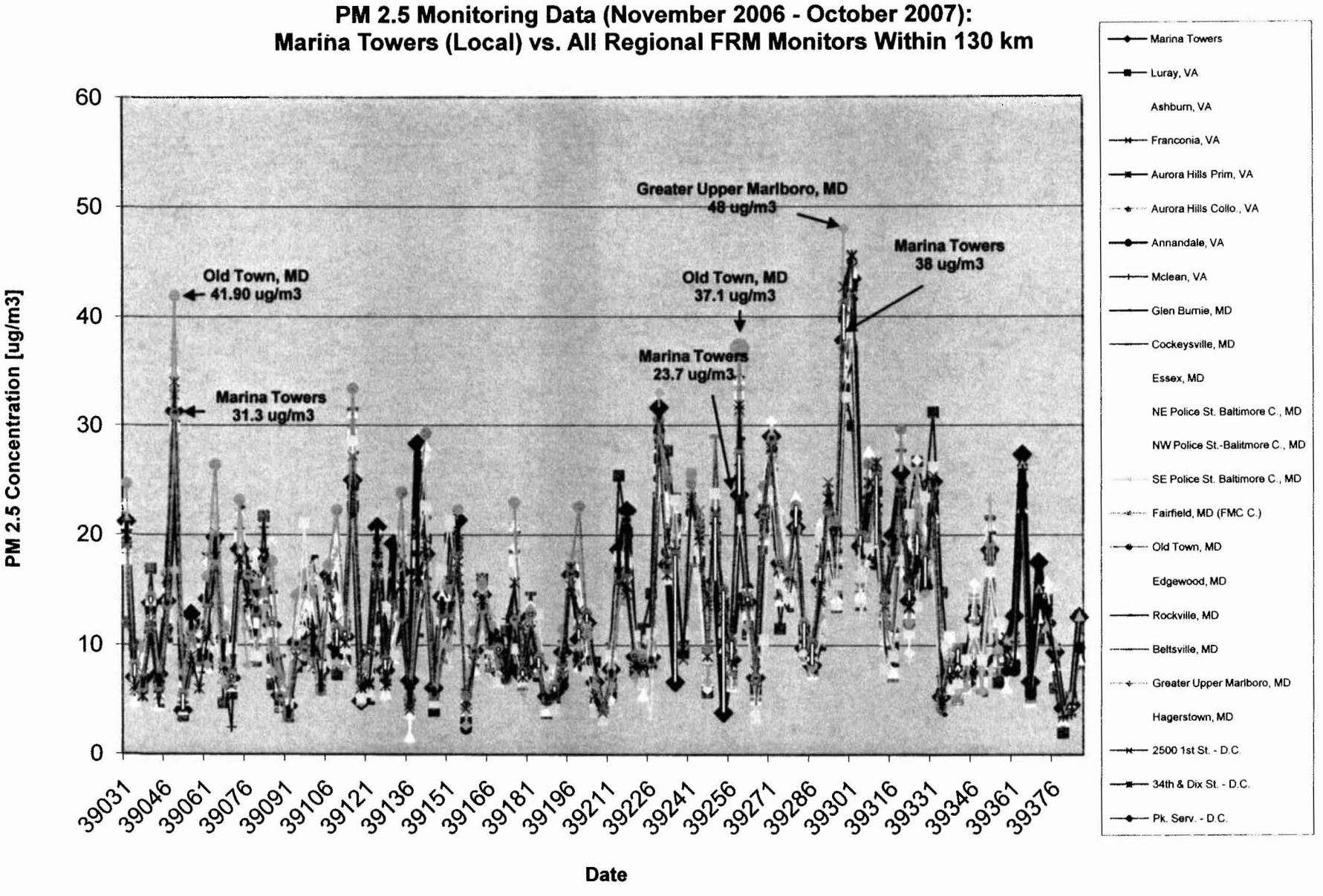
- The 2002 ATSDR health assessment of the Herculaneum Lead Smelter, which deals primarily with SO_2. This report is interesting because, in discussing the health effects of SO_2, it refers only to the EPA standards. It does not even mention the tox profile for SO_2, even though the tox profile had been issued just a few years earlier.

If you have questions about any of these documents, or if you would like additional information, please let me know. We look forward to reviewing the draft report when it is released for public comment. And thanks again for pulling together such a productive meeting.

Sincerely,

Debra L. Raggio
Vice President and Assistant General Counsel

cc: Lora Siegmann Werner, MPH
Enclosures


PM 2.5 Monitoring Data (November 2006 - October 2007):
Marina Towers (Local) vs. All Regional FRM Monitors Within 130 km
PM 2.5 Concentration [ug/m3]
Date
Old Town, MD
41.90 ug/m3
Marina Towers
31.3 ug/m3
Greater Upper Marlboro, MD
48 ug/m3
Old Town, MD
37.1 ug/m3
Marina Towers
23.7 ug/m3
Marina Towers
38 ug/m3
Marina Towers
Luray, VA
Ashburn, VA
Franconia, VA
Aurora Hills Prim, VA
Aurora Hills Collo., VA
Annandale, VA
Mclean, VA
Glen Burnie, MD
Cockeysville, MD
Essex, MD
NE Police St. Baltimore C., MD
NW Police St.-Balitmore C., MD
SE Police St. Baltimore C., MD
Fairfield, MD (FMC C.)
Old Town, MD
Edgewood, MD
Rockville, MD
Beltsville, MD
Greater Upper Marlboro, MD
Hagerstown, MD
2500 1st St. - D.C.
34th & Dix St. - D.C.
Pk. Serv. - D.C.

AMBIENT AIR CONCENTRATIONS OF SULFUR DIOXIDE, 5-MINUTE AVERAGES, AT ANY OF SIX MONITORS NEAR/AT THE POTOMAC RIVER GENERATING STATION, ALEXANDRIA, VA

APRIL 13, 2007 – MAY 16, 2008

Range of Detected Concentrations, in parts per billion [ppb]	Number of 5-Minute Samples	Percentage of Samples
Not detected – 10 ppb	583,104	90.22%
>10 – <100 ppb	62,374	9.65%
100 – 200 ppb	727	0.11%
>200 – 300 ppb	60	0.0093%
>300 – 400 ppb	16	0.0025%
>400 – 500 ppb	2	0.00031%
>500 – 600 ppb	1	0.00015%
>600 ppb	0	0%
Totals	646,284	100%

As shown, the majority (90%) of 5-minute samples of ambient air contain no more than 10 ppb of SO_2, and the vast majority (99.9%) contain less than 100 ppb.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL CENTER FOR ENVIRONMENTAL ASSESSMENT
RESEARCH TRIANGLE PARK, NC 27711

March 23, 1998

OFFICE OF
RESEARCH AND DEVELOPMENT

Dr. Selene Chou
Division of Toxicology
Agency for Toxic Substances and Disease Registry
1600 Clifton Road, Mailstop E29
Atlanta, GA 30333

Dear Dr. Chou:

We have enclosed comments on ATSDR's Toxicological Profile for Sulfur Dioxide. As discussed in a previous letter to you, we did not have time to provide comments to you prior to the stated deadline but have now completed our comments. Our main concern is with the calculation of the MRL and the selection of the LOAEL. As you can see from the attached comments, we do not think that the responses observed at the purported LOAEL actually constitute adverse health effects nor do we think that the use of uncertainty factors is appropriate for use with the extensive data on inhalation exposure to SO_2 in asthmatic subjects. We are also concerned with the inconsistencies between the Appendix worksheet and the main text of the document.

To support our comments, we have also enclosed copies of the two EPA documents which provide extensive discussion of the effects of SO_2 exposure in asthmatics. As you know, SO_2 is a "criteria" air pollutant and we at EPA have an important mandate to protect public health through the establish of air quality standards that have a strong scientific basis. However, we do not believe that the public interest is served by the calculation of a Minimal Risk Level, well below the ambient air quality standard, that ignores much of the scientific guidance provided to EPA. We hope that you will reconsider the calculation in light of these comments and the attached documentation.

Sincerely,

L. D. Grant

Lester D. Grant, Ph.D.
Director
National Center for Environmental
Assessment - RTP (MD-52)

Enclosure

U.S. EPA (NCEA/RTP) Comments on External Review Draft of ATSDR Toxicological Profile for Sulfur Dioxide

Major Concern: There is inappropriate use of uncertainty factors in the derivation of the Minimal Risk Level (MRL) and there are internal inconsistencies (within the draft document) in the manner in which this MRL is derived. The purpose of uncertainty factors is to provide a means of estimating a safe level when the data base is insufficient. Thus there are uncertainty factors for animal to human extrapolation, human variability and so on. In the study which was selected for the MRL estimation on Page 47 of the draft document, there are a number of important factors to consider. First, the study was conducted on asthmatics, who have been well established to be the most sensitive members (by a factor of 10) of the human population to SO_2. There is an extensive data base for this information which is reviewed in EPA's Air Quality Criteria Document (AQCD) for Particulate Matter and Sulfur Oxides (1982) and its addenda and supplements (USEPA, 1986, 1994). Some of these references are also include in the present Toxicological Profile draft.

The following issues should be considered in relation to the MRL derivation:

1. Adversity of health effect: Is a small increase in airway resistance an adverse health effect? Increases of airway resistance of less than 4-5 $cmH_2O/l/s$ are trivial, probably imperceptible to the typical individual with asthma, and would not require any treatment. At a higher concentration of 0.25 ppm, also tested in the study cited as the basis for the MRL calculations (Sheppard et al., 1981), none of the seven subjects had any respiratory symptoms. To consider these small changes in response to exposure to 0.10 ppm (about 2.5 cm H_2O / l/ s estimated by graphic interpolation) as adverse is inappropriate. These changes are well within the range of changes in SR_{aw} that asthmatics routinely experience on an everyday basis. These effects only occurred in the two most sensitive individuals selected from an already known sensitive population. The validity of the statistical technique for determining statistical significance for individuals is also open to question. Although 0.1 ppm may be the lowest detectable trivial health response, it should not be considered the LOAEL because it is not "adverse" and it does not deal with a group statistical effect such as Horstman et al (1988) where a more appropriate LOAEL for a group of asthmatics might be determined (the most sensitive subject responded at an estimated concentration of 0.28 ppm). EPA's Clean Air Scientific Advisory Committee, in a review of the 1994 supplement to the EPA PM/SO_x Air Quality Criteria Document (AQCD), concluded that the small physiological changes observed in Sheppard's 1981 study and several other studies with similar physiological findings at higher concentrations did not constitute adverse health effects.

Another important factor should be considered in the determination of adversity. Each subject in the Sheppard et al. (1980, 1981, 1983, 1984, etc.) studies breathed through a mouthpiece. This unnatural mode of breathing enhances the effect of SO_2 above and beyond that which occurs during normal oronasal breathing and artificially lowers the concentration at which responses are first measurable.

2. Use of uncertainty factors: In the description of the MRL within the body of the document (page 47), it is stated: "*The available data indicate that 0.1 ppm sulfur dioxide may be close to the threshold for bronchoconstriction and can be considered a minimal LOAEL. This concentration was divided by an uncertainty factor of 10 (3 for the use of a minimal LOAEL and 3 for human variability) to yield a calculated MRL of 0.01 ppm. The uncertainty factor of 3 for human variability was used since severe asthmatics are not examined in typical controlled human studies ... Severe asthmatics may be more responsive* ..." However, in the MRL worksheet (Appendix A), a minimal LOAEL of 0.25 ppm was selected and an uncertainty factor (UF) of 10 for human variability was applied, using the same rationale as above for the UF of 3. The review group chose to ignore several studies of asthmatics exposed to SO_2 without mouthpiece breathing, that showed no effect of SO_2, at 0.2 to 0.3 ppm. The apparent rationale was that in these studies, "subjects may have been preselected for sensitivity to sulfur dioxide." This, of course, would lower the LOEL rather than increase it and thus is an inappropriate basis to ignore these studies.

   In the selected study, subjects were drawn from a highly sensitive population. Asthmatics constitute approximately 5% of the population of the U.S. The MRL focuses on 2 of 7 individuals who were the most sensitive of this sensitive group. Thus the study is already dealing with the most sensitive members of the population and no further use of uncertainty factors is necessary. Additional research (Linn et al., 1990) which is cited in the Draft document bibliography but not in the text, and is discussed at length in EPA's 1994 Criteria Document Supplement indicates that severity of asthma is not a major uncertainty factor. Asthmatics with more severe disease have similar responses to SO_2 as do mild asthmatics. Thus it is our contention that no uncertainty factor should be applied for human variability. The statement that "0.1 ppm sulfur dioxide may be close to the threshold for bronchoconstriction" implies that there is some uncertainty that there may actually be effects at lower levels. There are several studies showing a NOEL with concentrations of 0.25 ppm and higher (Linn et al., 1983, 1984; Schachter et al., 1984; Roger et al., 1985; Sheppard et al., 1984). Thus to infer that a further uncertainty factor needs to be applied to this questionable "LOAEL" is wholly inappropriate.

In appendix A, Page A-5, the final paragraph concludes, "available data on asthmatics indicate that 0.25 ppm sulfur dioxide may be close to the threshold for changes in lung function in sensitive asthmatics. Therefore, 0.25 ppm can be considered a minimal LOAEL." Why, if this is the conclusion reached by the workgroup, was 0.1 ppm selected in the body of the document? The inconsistency of these two calculations and the questionable approach by which uncertainty factors are applied suggests that, in the main text of the document, the outcome of the workgroup deliberations is not accurately reflected. The recommendation of the workgroup for a minimal LOAEL of 0.25 ppm, although still not meeting criteria for adversity, is somewhat more reasonable.

3. Significance of health effect

The responses observed by Sheppard et al. 1981 at 0.10 ppm, using (artificial) mouthpiece breathing are trivial. The changes in resistance are physiologically insignificant, are statistically insignificant for the group of subjects, and involve no symptoms (and are thus imperceptible to the individual). Thus they represent a measurable but trivial effect which is most certainly not adverse by any reasonable definition of the term.

Other Comments

***Page 106: Table 7-1 indicates that the State of Florida has an 8-h standard for SO_2 of 50 $\mu g/m^3$. This is in error. There is no 8-h standard. The 3-h standard in Florida (as per 62-204.240 Ambient Air Quality Standards, FL Dept. of Environ. Protection) is 1300 $\mu g/m^3$ or 0.5 ppm. The 24-h standard is 260 $\mu g/m^3$ or 0.10 ppm.

References

1. Second addendum to air quality criteria for particulate matter and sulfur oxides (1982): assessment of newly available health effects information. Research Triangle Park. NC: Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office; EPA report no. EPA-600/8-86-020F, 1986.

2. Supplement to the Second Addendum (1986) to air quality criteria for particulate matter and sulfur oxides (1982); assessment of new findings on sulfur dioxide acute exposure health effects in asthmatic individuals. Research Triangle Park, NC: National Center for Environmental Assessment; EPA report no. EPA-600/FP-93/002, 1994.

Health Consultation

HERCULANEUM LEAD SMELTER (DOE RUN COMPANY)
(a/k/a HERCULANEUM LEAD SMELTER SITE)

HERCULANEUM, JEFFERSON COUNTY, MISSOURI

EPA FACILITY ID: MOD006266373

OCTOBER 22, 2002

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://www.atsdr.cdc.gov

HEALTH CONSULTATION

HERCULANEUM LEAD SMELTER (DOE RUN COMPANY)
(a/k/a HERCULANEUM LEAD SMELTER SITE)

HERCULANEUM, JEFFERSON COUNTY MISSOURI

EPA FACILITY ID: MOD006266373

Prepared by:

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

Background

The Herculaneum lead smelter is an active facility that has been operating since 1892. The Doe Run Company currently owns and operates the smelter. The facility is located along the Mississippi River at 881 Main Street in Herculaneum, Missouri. A lead ore concentrate, consisting of 80 percent lead sulfide, is processed at the smelter [1].

The first step in the smelting process is to mix the ore with fluxes and recycled lead-containing materials, such as baghouse fume, to form the sinter feed mix. This mixture is then tumbled to form pellets that are fed into the sinter machine. The pellets are heated by gas burners to form lead sinter. Hot gaseous combustion products released during this process include sulfur dioxide, which is collected and used to produce sulfuric acid at the facility.

Residents living near the smelter have reported that they occasionally smell sulfur in the air, and that air emissions from the smelter have damaged paint on their cars [1]. In response to these complaints, the Missouri Department of Health and Senior Services (MDHSS) asked ATSDR to review the available data and information and determine if sulfur dioxide emissions from the facility pose a public health hazard. In addition, MDHSS asked ATSDR if current ambient air monitoring for sulfur dioxide is adequate to characterize sulfur dioxide emissions from the facility.

Ambient Air Monitoring

Ambient air monitoring stations

The Missouri Department of Natural Resources (MDNR) provided ATSDR with air monitoring data for sulfur dioxide from three ambient air monitoring stations in the Herculaneum area. The monitoring station at Dunklin High School is located less than ½-mile north of the smelter. This station monitored sulfur dioxide from at least 1993 to 2001. A second sulfur dioxide monitoring station was located on Crystal Road in the town of Festus, about ½-mile southwest of Herculaneum. A third air monitoring station is located near Joachim Creek about ½ -mile northwest of the smelter. This station has been monitoring for sulfur dioxide since the summer of 2001.

MDNR chose the location for the Joachim Creek station based on the results of air modeling of sulfur dioxide emissions from the stack at the Doe Run smelter. The station is located near areas where the air dispersion model predicted that high 3-hour and 24-hour concentrations of sulfur dioxide might occur. MDNR could not obtain access to the optimal sampling location on a bluff, so the station was sited on private property below the bluff. When the Joachim Creek station began operating in 2001, monitoring for sulfur dioxide at the other two stations was stopped.

ATSDR also reviewed air sulfur dioxide monitoring data for 2000-2001 provided by the Doe Run Company. Doe Run monitors ambient air sulfur dioxide concentrations at five monitoring stations in Herculaneum. (A sixth air monitoring station next to the MDNR Joachim Creek station was added in May 2001.)

Ambient air standards for sulfur dioxide

The U.S. Environmental Protection Agency (EPA) promulgated the National Ambient Air Quality Standards (NAAQS) to protect human health and welfare from hazardous air pollutants. For sulfur dioxide, the EPA has established a primary NAAQS of 0.14 parts per million (ppm) for a 24-hour average air concentration and 0.03 ppm for a 1-year average air concentration. These standards, which were established to protect human health, are not to be exceeded more than once per year.

The EPA has also promulgated a secondary NAAQS for sulfur dioxide to protect human welfare. The secondary NAAQS for sulfur dioxide is 0.5 ppm over a 3-hour period. This standard was established to prevent impacts on welfare such as "damage to vegetation by sulfur dioxide resulting in economic losses in commercial crops, aesthetic damage to cultivated trees, shrubs, and other ornamentals, and reductions in productivity, species richness, and diversity in natural ecosystems" [2].

People with asthma are particularly susceptible to adverse health effects from acute inhalation exposures to sulfur dioxide. The populations most likely to be affected by ambient air pollution with sulfur dioxide are mild and moderate asthmatic children, adolescents, and adults who are physically active outdoors. To protect asthmatics against such effects, the EPA has considered establishing a short-term (e.g., 5-minute) ambient air standard for sulfur dioxide [3]. However, no such standard is currently in effect.

Discussion

Compliance with NAAQS

The MDNR provided ATSDR with summary air monitoring data for sulfur dioxide from the air monitoring stations at Dunklin High School (1997 - 2001), Joachim Creek (2001), and Festus (1998-2001). MDNR also provided ATSDR with comprehensive hourly air monitoring data for the three stations for 2001. Additional air monitoring data for these stations on the MDNR internet site were also examined [4].

The MDNR monitoring station closest to the Doe Run smelter is the station at Dunklin High School. An examination of the hourly monitoring data for Dunklin High School indicated that the sulfur dioxide concentrations tended to be higher in the afternoon than during the rest of the day, particularly in the summer months. This trend may be related to changes in the direction of wind flow as the ground heats up during the day.

The historical MDNR data for the monitoring station at Dunklin High School indicate that the concentrations of sulfur dioxide in ambient air decreased over the time period 1993-2001. In 1997, Doe Run built a 550-foot stack to replace an older, 350-foot stack. In addition, Doe Run reported that in the past five years they have upgraded and repaired their sulfur dioxide collection system and control equipment. These improvements have likely contributed to the observed decrease in sulfur dioxide concentrations that have been detected at the ambient air monitoring stations.

None of the reported air concentrations of sulfur dioxide from MDNR monitoring stations from 1993-2001 exceeded the applicable NAAQS. In addition, none of the monitoring data from the six Doe Run monitoring stations exceeded the NAAQS. Therefore, the ambient air monitoring data do not provide evidence that residents of Herculaneum have been exposed to sulfur dioxide at concentrations in excess of existing regulatory standards.

Shorter-term ambient air sulfur dioxide concentrations

The NAAQS apply to time-weighted average intervals of 3-hours, 24-hours and 1 year. It is possible that short-term peaks of higher sulfur dioxide concentrations could occur, even though regulatory standards for longer time intervals are not exceeded. Such excursions could result from fugitive emissions from the facility or from smelter stack emissions.

ATSDR reviewed the hourly air monitoring data for the MDNR monitoring stations closest to the Doe Run Smelter for 2001, the most recent year for which data were available. Monitoring data for time intervals shorter than 1-hour were not available. The summary data for these stations are as follows:

	Sulfur Dioxide Concentration (ppm)		
MDNR Station	Annual Average 1-hour	Maximum 1-hour	Maximum 3-hour
Herculaneum High School	0.002	0.097	0.047
Joachim	0.004	0.226	0.108
Festus (Crystal Road)	0.004	0.233	0.170

Monitoring data from the Doe Run monitoring stations for 2001 are summarized in the following table.

	Sulfur Dioxide Concentration (ppm)		
Doe Run Station	Annual Average 1-hour	Maximum 1-hour	Maximum 3-hour
Herculaneum High School	0.011	0.152	0.101
Crystal Heights	0.007	0.135	0.099
Joachim	0.010	0.368*	0.278*
Ursuline	0.008	0.198	0.136
Golf Course	0.012	0.210	0.106
North	0.009	0.178	0.110

(*) These values are suspect because the MDNR monitor at the same location measured 0.001 ppm sulfur dioxide for the same time interval.

There is currently no NAAQS for 1-hour concentrations of sulfur dioxide. However, the sensitivity of asthmatics has prompted the EPA to consider establishing an Intervention Level Program (ILP), which would allow States, tribes, and local governments to address short-term elevations in sulfur dioxide levels [5]. Included in the ILP is a proposal to establish a concern level of 0.6 ppm for a 5-minute average sulfur dioxide concentration, and an endangerment level of 2.0 ppm for a 5-minute average [3, 5]. To date, this program has not been enacted. All of the hourly sulfur dioxide air concentrations detected at the MDNR and Doe Run monitoring stations in 2001 were less than ambient air standards that have been proposed by the EPA.

Odors and damage reports

Residents of Herculaneum occasionally report smelling sulfur odors. The odor threshold for sulfur dioxide varies among people from 0.1 to 4.8 ppm [6]. Sulfur dioxide concentrations within this range have been detected at monitoring stations operated by MDNR and Doe Run. Therefore, reports of sulfur or sulfur dioxide odors can be corroborated by air monitoring data.

Residents of Herculaneum have reported damage to the paint on their cars and to rain gutters that they attribute to "acid emissions" from the plant. These reports of damage might have been related to spills of sulfuric acid during acid loading operations, leaks in sulfur dioxide transfer lines within the facility, or stack emissions. No monitoring data are available to document such "acid emission" events.

ATSDR reviewed Missouri's Environmental Emergency Response complaints for Herculaneum for the time period 1994-2002. No specific reports of "acid" damage were reported during this time period, although there continue to be reports of nuisance odors and sulfur-like odors from the facility.

Health impact of sulfur dioxide exposures

In healthy individuals, exposures to sulfur dioxide concentrations of 1-5 ppm have been associated with increases in airway resistance. Asthmatic individuals are more sensitive to sulfur dioxide and may experience symptoms after being exposed to sulfur dioxide at concentrations that have no effect on normal individuals.

Experimental studies have shown that some asthmatics who are briefly exposed (2 to 10 minutes) to sulfur dioxide at concentrations of 0.5 to 1.0 ppm while exercising may experience bronchoconstriction, wheezing, chest tightness, and shortness of breath. These symptoms are relatively transient, and lung function typically returns to normal within an hour of exposure [7]. In very sensitive asthmatic subjects, slight increases in airway resistance have been observed after inhalation of even lower concentrations of sulfur dioxide.

The maximum 1-hour ambient air concentration of sulfur dioxide detected during recent monitoring (2001) were generally 0.2 ppm or less. These concentrations are less than existing or proposed ambient air standards and would not be expected to cause significant adverse health effects in residents.

Doe Run reported that they continuously monitor sulfur dioxide at five ambient air monitoring stations around the town. If ambient air sulfur dioxide concentrations in excess of 0.25 ppm are detected, they evaluate the situation and determine if a reduction in the production rate is indicated. However, the existing air monitoring stations are sited to monitor emissions from the smelter stack. Fugitive sulfur dioxide emissions, if they occur, may not be detected at these stations. Therefore, it cannot be determined if fugitive emissions are a source of elevated sulfur dioxide exposures in the immediate vicinity of the facility.

Conclusions

(1) Ambient air monitoring data have not indicated any violations of the National Ambient Air Quality Standards (NAAQS) for sulfur dioxide in Herculaneum (1993-2001).

(2) Based on recent monitoring data, the concentrations of sulfur dioxide detected in ambient air pose no apparent public health hazard. This characterization is subject to change if future monitoring in the immediate vicinity of the facility detects sulfur dioxide in potential fugitive emissions at concentrations of health concern.

(3) Sulfur dioxide monitoring stations currently being operated by MDNR and Doe Run are sited in locations to monitor stack emissions. Monitors at these locations may not detect fugitive sulfur dioxide emissions from the plant, if they occur.

Recommendations

(1) The Doe Run Company should continue to upgrade and maintain in good repair its sulfur dioxide control equipment. Regulatory agencies should continue to work with the Doe Run Company to ensure that sulfur dioxide emissions from the plant are minimized and in compliance with all regulatory standards.

(2) Regulatory agencies should consider siting a sulfur dioxide monitor near the plant to monitor for potential fugitive emissions.

Report prepared by:

Kenneth G. Orloff, Ph.D, DABT
Senior Toxicologist

References

(1) Missouri Department of Natural Resources; Preliminary Assessment Report: Herculaneum Lead Smelter Site; March 30, 1999.

(2) U. S. Environmental Protection Agency; Review of the National Ambient Air Quality Standards for Sulfur Oxides: Assessment of Scientific and Technical Information; page 126; EPA-450/5-82-007; November 1982.

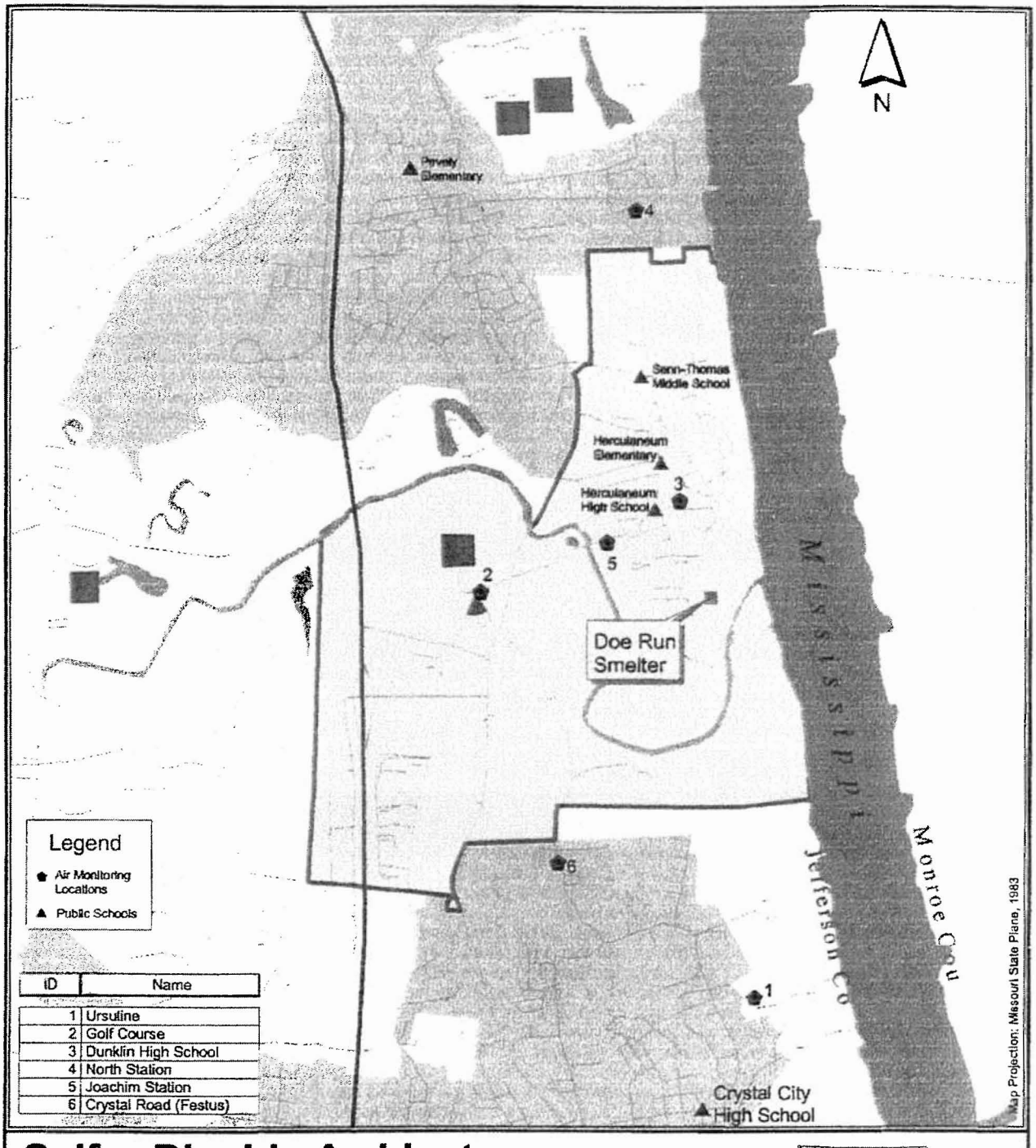
(3) U. S. Environmental Protection Agency; National Ambient Air Quality Standards for Sulfur Oxides (Sulfur Dioxide); Availability of Information; Federal Register Vol. 66, No. 6; pages 1665-1668; January 9, 2001.

(4) Missouri Department of Natural Resources; Environmental Services Program; http://www.dnr.state.mo.us/alpd/esp/aqm/herc.htm

(5) U. S. Environmental Protection Agency; Proposed Implementation Requirements for Reduction of Sulfur Oxide (Sulfur Dioxide) Emissions; Proposed Rule. Federal Register Vol. 62, No. 1; pages 210-222; January 2, 1997.

(6) Hazardous Substances Data Base (on-line data base); National Library of Medicine http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB 2002.

(7) U. S. Environmental Protection Agency; National Ambient Air Quality Standards for Sulfur Oxides (Sulfur Dioxide); Final Decision; Federal Register Vol. 61, No. 100; pages 25566-25580; May 22, 1996.



Sulfur Dioxide Ambient Air Monitoring Stations

Herculaneum, Missouri

CERCLIS NO MOD006266373

VICINITY MAP

ksf041602