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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

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MEMORANDUM

SUBJECT: Apache Powder Reproposal

FROM: Scott Parrish, Chief
Hazard Ranking and Listing Branch

TO: The File

Issue

CERCLA Section 105(a), as amended, requires that the National Contingency Plan establish procedures and standards for responding to releases of hazardous substances, pollutants, and contaminants. EPA is proposing to list the Apache Powder site based on releases of nitrates, a pollutant or contaminant.

Discussion

"Pollutant or contaminant" is defined in Section 101(33) of CERCLA as including, but not limited to "any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physical malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring."

According to the attached discussion of the effects of nitrates, prepared by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR), nitrates meet the CERCLA definition of pollutant or contaminant. ATSDR lists the primary health hazard caused by drinking water containing elevated levels of nitrates as methemoglobinemia. This can lead to anoxia and death and occurs in infants who, for the first several months of life, are deficient in the enzyme needed to reverse the oxidation of hemoglobin iron. Fetal retardation and death from excess nitrate ingestion has also been medically observed.

EPA's Maximum Contaminant Level (MCL) of 10 mg/L nitrate (as nitrogen) is intended to prevent these health problems, but the standard is set with little margin of safety.

The Apache Powder Co. facility has been producing explosives and fertilizers since the 1920's, and has also been producing nitric acid and ammonium nitrate for the past 50 years. Plant waste water was discharged to unlined washes draining the site until 1971 and now is contained in unlined on-site disposal ponds. The waste water has included non-contact cooling water from the nitric acid oxidation and other chemical processes, condensate from nitric acid neutralization, process blowdown from the ammonia plant, washdown water from explosives manufacturing houses, and nitration and nitroglycerin handling contact waters.

Ten private wells in the upper aquifer within three miles of the Apache Powder site have had concentrations exceeding the nitrate MCL. The concentrations ranged from 11.7 to 470 mg/L. Eight of the ten wells have been used as a source of drinking water; because of the elevated nitrate levels, the users are now treating their water or using alternative sources. In addition to these ten upper aquifer wells, one private well in the deeper aquifer has exceeded the nitrate standard.

Conclusion

ATSDR has concluded that for infants, drinking water or formulas made from the area wells exceeding the nitrate MCL pose an "imminent and substantial threat to health." This meets the CERCLA definition of a pollutant or contaminant.

Evidence has been provided that Apache Powder is a point source of nitrate contamination. Nitrates are associated with Apache Powder production and waste generation, and no other industrial sources are in the area. Nitrate contamination of the ground water at levels exceeding the MCL has been documented from drinking water wells bordering the Apache Powder facility.

Since Apache Powder through its industrial operations has caused the release of the pollutant nitrates and has received a score above 28.5, it meets the listing criteria and is being proposed to the National Priorities List.

Attachment

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Sub
and Disease Registry

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Date . June 19, 1987

From Chemist
Health Assessment Coordination Activity, OHA

Subject Health Consultation: Apache Powder Company Proposed NPL Site (SI-87-096)
St. David, Arizona

To Mr. Donald Hawkins
Public Health Advisor
EPA Region IX
Through: Director, OHA SVA for MB
Assistant Director for Health Assessment Coordination, OHA

BACKGROUND

The Environmental Protection Agency (EPA), Region IX Office, has asked the Agency for Toxic Substances and Disease Registry (ATSDR) to comment on the health significance of elevated nitrate concentrations in 10 domestic wells in the vicinity of the Apache Powder Company in St. David, Arizona.

Since 1980, State and local agencies have investigated nitrate contamination in the St. David area. Both surface and groundwater samples have been collected. The only groundwater data supplied to ATSDR were nitrate analyses for 10 private wells with concentrations of nitrate-nitrogen (NO_3-N) ranging from 11.7 to 470 mg/L . Some of these wells were sampled in 1980 and others in 1984. Four of the wells are still used as drinking water sources. These had nitrate levels of 11.7, 13.4, 14.7 and 31 mg/L.

In addition to the private wells in the area, two wells of the St. David Water Association are within 3 miles of the Apache Powder site and supply water to approximately 740 people. These wells "are not believed to be contaminated," but no analytical results were provided.

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The Apache Powder Company facility in St. David manufactures explosives and fertilizers. It is located on a hill overlooking the San Pedro River. Prior to 1971, its wastewaters were discharged to dry washes tributary to the river. Since 1971, they have been stored on-site in unlined lagoons.

DOCUMENTS REVIEWED

1. Memorandum. Keith Takata, EPA-IX, to Don Hawkins, ATSDR-IX. January 6, 1987. Apache Powder Company.

2. Memorandum. Claire Tiedeman, EPA-IX, to Don Hawkins, ATSDR-IX. April 27, 1987. Apache Powder Company Superfund site.

3. Memorandum. Claire Tiedeman, EPA-IX, to Don Hawkins, ATSDR-IX. April 29, 1987. Apache Powder Superfund site.

DISCUSSION

The primary health hazard caused by drinking water containing elevated levels of nitrate and nitrite is methemoglobinemia, which can lead to anoxia and death. This acute toxicity occurs in infants, who are particularly susceptible to methemoglobinemia, and is very rarely found in adults. Infants' intestinal pH is often high enough to allow bacteria to convert nitrate to nitrite and the iron in fetal hemoglobin is readily oxidized by nitrite. For the first 3 or 4 months of life, infants are deficient in an enzyme that will reverse the oxidation of hemoglobin iron. EPA's Maximum Contaminant Level (MCL) of 10 mg/L nitrate-nitrogen is intended to prevent this health problem. This particular MCL is not based on a large margin of safety; that is to say, nitrate levels above the MCL are of immediate concern if infants are exposed.

Potential sources of nitrate in groundwater include industrial and municipal wastewater, waste disposal sites, septic tanks, and manured or fertilized agricultural land. From the limited information provided, we are unable to determine whether Apache Powder is the source of the nitrate contamination of the wells in the St. David area.

The Apache Powder site was scored by the Hazardous Ranking System (HRS) in 1985. Based on the analysis of a wastewater lagoon sample taken by EPA in 1980, heavy metals were used for toxicity and persistence scores. No heavy metals have been detected in any on- or off-site wells.

Apache Powder Company representatives assert that the heavy metal analysis was erroneous because most of the metals detected are not used in its processes. They also claim that the nitrate contamination is not caused by its facility and that nitrate is not a hazardous substance.

CONCLUSIONS

1. For infants, drinking water or formula or juice made from water from St. David area wells with 10 mg/L or more of nitrate- (and/or nitrite-) nitrogen poses an imminent and substantial threat to health.

RECOMMENDATIONS

1. Water containing more than 10 mg/L nitrate-nitrogen should not be consumed by infants. Boiling the water will not eliminate the problem.

2. If any infants are drinking water containing more than 10 mg/L nitrate-nitrogen, their parents or guardians should be advised to inform their physician of this fact.

3. Nitrate/nitrite analyses should be obtained for other potable public and private wells in the area to ensure that others are not drinking high nitrate water.

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