

**Memorandum**

Date September 27, 1993

From Senior Toxicologist, TSS, ERCB, DHAC (E57)

Subject Health Consultation: Shield Alloy Corporation (20B7)
Newfield, New Jersey

To Arthur Block
ATSDR Regional Representative
U.S. EPA Region II
Through: Director, DHAC (E32)
Chief, ERCB, DHAC (E57)
Acting Chief, TSS, ERCB, DHAC (E57)

[Handwritten initials: JF, HE, efb]

BACKGROUND AND STATEMENT OF ISSUES

In a previous health consultation, the Agency for Toxic Substances and Disease Registry (ATSDR) evaluated clinical laboratory data for members of two families who lived near the Shield Alloy Metallurgical Corporation [1]. The data consisted of urine concentrations of metals, cyanide, and thiocyanate for 10 residents. ATSDR concluded that the reported concentrations of cyanide and thiocyanate in urine substantially exceeded levels found in the general population. ATSDR recommended that additional tests be conducted to confirm the findings [1]. In response to ATSDR's recommendation, the Vineland Health Department collected blood samples from the same 10 residents and delivered them to the New Jersey Public Health and Environmental Laboratories for analysis. The New Jersey Department of Health (NJDOH) provided these new data to ATSDR for evaluation.

One of the families lives across the road from the Shield Alloy Corporation, and the other family lives less than 1/2 mile east of the plant. The Site Review and Update prepared by ATSDR in 1992 [2] did not list cyanide as a contaminant of concern, and the source or exposure pathway for the potential cyanide exposure is not known.

The initial urinalyses studies were conducted by a private clinical laboratory. They reported that urine concentrations of cyanide ranged from 0.5 - 1.5 parts per million (ppm). Cyanide concentrations in blood were not determined. Cyanide concentrations in blood are better correlated with toxicity than urine concentrations [3]. Therefore, in the NJDOH study, whole blood samples were analyzed for cyanide. Urine samples were also analyzed for cyanide in an attempt to confirm the initial findings.

Cyanide levels in blood from the 10 family members ranged from 0.011 - 0.023 ppm; cyanide levels in urine ranged from 0.047 - 0.067 ppm [4].

DISCUSSION

Potential, non-environmental sources of cyanide exposure in the general public include smoking, pharmaceuticals (nitroprusside), and dietary intake (almonds, sorghum, soybeans, spinach, lima beans, sweet potatoes, bamboo shoots, etc.) [5].

The maximum concentration of cyanide in urine detected in the NJDOH study (0.067 ppm) was substantially less than what was reported in the initial study (1.5 ppm). Furthermore, the cyanide levels in blood and urine reported in the NJDOH study were within the normal range for cyanide in blood (≤ 0.16 ppm) and urine (≤ 0.62 ppm) as reported by the Director of the NJDOH laboratory [6]. Other published studies have reported cyanide levels in blood from control populations to be 0 - 0.140 ppm [5].

Blood cyanide levels less than 0.2 ppm usually do not cause symptoms, and blood cyanide levels in smokers may reach 0.4 ppm without causing symptoms [7]. At blood cyanide concentrations of 0.5 - 1.0 ppm, erythema and tachycardia can occur. Stupor and agitation can occur at blood cyanide concentrations greater than 1 ppm, and concentrations greater than 2.5 ppm can cause coma and death [7].

CONCLUSIONS

Based on the information reviewed, ATSDR concludes the following:

1. The concentrations of cyanide detected in whole blood samples during the most recent sampling by NJDOH were within the range reported for the general population. These concentrations do not pose a human health threat.
2. Further biomonitoring for cyanide is not indicated unless data become available which indicate that residents are being exposed to environmental cyanide contamination.

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RECOMMENDATIONS

None

If further clarification is necessary or if additional data become available, please contact this office at (404) 639-6360.

Kenneth G. Orloff

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REFERENCES

1. Kenneth Orloff, ATSDR; Health Consultation: Shield Alloy Corporation; August 31, 1993.
2. ATSDR; Site Review and Update: Shield Alloy Corporation; September 28, 1992.
3. ATSDR; Case Studies in Environmental Medicine: Cyanide Toxicity; November 1991.
4. New Jersey Department of Health; laboratory analytical data; provided by James Pasqualo, NJDOH.
5. ATSDR; Draft Toxicological Profile for Cyanide; February 18, 1992.
6. James Pasqualo, NJDOH; personal communication; Kenneth Orloff, ATSDR; September 23, 1993.
7. Matthew Ellenhard and Donald Barceloux; Medical Toxicology; Elsevier, 1988, pages 829-835.