



Memorandum

Date July 22, 1994

From Arthur Block *L. Myers*
for Sr. Regional Representative

Subject Shieldalloy Metallurgical Corporation Site, Newfield,
Gloucester County, NJ

To SEE DISTRIBUTION BELOW

At the request of the County of Gloucester, the Agency for Toxic Substances and Disease Registry (ATSDR) has completed a radiological review of the "slag Pile" conditions located on site. The attached public health consultation is final and releasable to the public.

Should you have any questions or concerns, please contact myself or Steve Jones at (212) 264-7662/9250.

Attachment

Distribution:

ATSDR
George Buynoski
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Morris Maslia

EPA
John Frisco
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Ray Basso/w. attach.
Kim O'Connell/w. attach.
Dennis Santella/w. attach.
Joe Gowers/w. attach.

NJDOH
Jim Pasqualo/w. attach.

NJDEP
Donna Gaffican/w. attach.
Bruce Venner/w. attach.

Fuel Cycle Licensing Branch/Wash.
Gary Comfort/w. attach.

Vineland Dept. of Health
Louis Cresci/w. attach.

Gloucester State Dept. of Health
Donald Schneider/w. attach.

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**Memorandum**

Date July 8, 1994

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

Subject Health Consultation: Shieldalloy Metallurgical Corporation (20B7)
Newfield, New Jersey

To Arthur Block
ATSDR Regional Representative
US EPA Region 2
Through: Director, DHAC, ATSDR (E32) *AW*
Acting Chief, EICB, DHAC (E57) *EJd*

BACKGROUND AND STATEMENT OF ISSUES

A representative of the County of Gloucester asked the Agency for Toxic Substances and Disease Registry (ATSDR) to evaluate potential health hazards related to environmental contamination at the Shieldalloy Metallurgical Corporation site in Newfield, New Jersey [1]. This facility is on the Environmental Protection Agency's (EPA) Superfund list and has been the subject of two previous health consultations and a Site Review and Update prepared by ATSDR. This health consultation will focus on potential health hazards related to environmental contamination with radionuclides at the Shieldalloy site.

Since 1955, the Shieldalloy Metallurgical Corporation has operated a manufacturing facility that processes ores and metals to produce primary metals, specialty metals, and ferroalloys. The raw material for one of the products, known as ferro-columbium, is an ore that contains naturally-occurring thorium and uranium at concentrations as high as 2 percent and 0.4 percent by weight, respectively. The thorium and uranium from the ores is not incorporated into the finished alloy product, but remains in slag waste from the operation. This slag is stored in two uncovered piles on the eastern end of the Shieldalloy property. A contractor (Teledyne Isotopes, Inc.) for Shieldalloy conducted a leachability test on the slag and determined that the radionuclides were in a non-leachable form [2]. Dust from the baghouse is also stored in uncovered piles on-site. Access to the facility and the waste piles is controlled by a chain-link fence topped with barbed wire.

In 1987, staff from the Oak Ridge Associated Universities conducted a radiological survey of the facility [3]. In their study, they reported that thorium-232 was the primary

radionuclide detected in the slag piles. The highest concentrations of radionuclides detected in the slag piles were: thorium-232 - 1500 picocuries/gram (pCi/g), radium-226 - 318 pCi/g, and uranium-238 - 700 pCi/g.

Additional radiological monitoring was conducted along the fence that surrounds the facility. Gamma radiation was measured at 20-meter intervals along the fence line. The gamma exposure rates at a height of 1 meter above ground surface were reported to range from 4-175 microroentgens/hour (μ R/hr). The highest readings occurred along the fence near the slag piles.

Surface soil samples (0-15 cm) were also collected from 20-meter grid intervals along the perimeter fence line. The radionuclide concentrations detected in these soil samples were as follows: thorium-232 - 0.2-52.3 pCi/g, radium-226 - 0.2-29.3 pCi/g, and uranium-238 - 0.3-13.4 pCi/g.

Soil collected near the slag piles and sediment from the settling ponds and drainage pathways inside the fence line contained elevated concentrations of radionuclides. A sediment sample collected at Drain Exit B, south of the fence line, also contained elevated concentrations of radionuclides (thorium-232 - 33.6 pCi/g, radium-226 - 15.5 pCi/g, and uranium-238 - 20 pCi/g). It was reported that sediment and water samples from drainage pathways off Shieldalloy property did not contain radionuclides at levels above typical baseline concentrations [3].

DISCUSSION

Radionuclides at concentrations in excess of background levels were detected in soil samples collected from outside the fence perimeter. Since these areas are outside the fence, they are accessible to children and other residents of the area. Incidental ingestion of contaminated soil could result in exposures to the radionuclides. Of the contaminants detected, thorium-232 was present at the highest concentration and poses the greatest risk. However, under a conservative exposure scenario (i.e., 200 mg soil ingested for 100 days per year), the estimated doses from the three radionuclides ingested by children would be more than two orders of magnitude less than the exposure limit recommended by the International Commission on Radiological Protection (ICRP) as being protective of the general population.

The chemical form and the bioavailability of the radionuclides in the soil samples is not known. In slag, the radionuclides were reported to be non-leachable, which would suggest a low bioavailability. If the radionuclides in the soil were also in a low bioavailable form, it would further reduce their potential risk.

Gamma radiation outside the fence line near the slag piles was as high as 175 μ R/hr. Children and other residents who access this area would be exposed to this radiation. Under a conservative exposure scenario (e.g., 1 hr/day for 100 days/year) the total gamma radiation dose would be 17.5 mRem/year. This dose is less than the 100 mRem/year dose that the ICRP has recommended as an acceptable exposure for the general public.

CONCLUSIONS


Based on the information reviewed, ATSDR concludes the following:

1. Surface soil from localized areas outside the fence perimeter contains thorium-232, radium-226, and uranium-238 at concentrations above background levels.
2. Gamma radiation outside the fence perimeter (especially near the slag piles) exceeds background levels.
3. Radiation and radionuclide contamination outside the fenced area does not currently pose a public health hazard.

RECOMMENDATIONS

1. Implement measures to prevent further migration of radionuclide contamination outside the fence perimeter.

If further clarification is necessary or if additional data become available, please contact this office at 404-639-0616.


Kenneth G. Orloff, Ph.D., DABT

REFERENCES

- (1) Donald C. Schneider, County of Gloucester; letter to Arthur Block, ATSDR; February 1. 1994.
- (2) Teledyne Isotopes, Inc.; Ferrocolumbium Slag Leachability Report; January 1992.
- (3) J.D. Berger and A.D. Luck, Oak Ridge Associated Universities; Radiological Survey of the Shieldalloy Corporation; July 1988.