U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 99990001/89-005

Docket No. 99990001

License No. none Priority ___ Category ___ Program Code ___

Licensee: American Minerals, Inc.
Hickory Hills Plaza #328
151 South Warner Road
Wayne, Pennsylvania 19087

Facility Name: American Minerals, Inc.

Inspection At: Foot of Jefferson Avenue, Camden City, New Jersey

Inspection Conducted: February 7, 1989

Inspector: Laurence F. Friedman 5/25/89
Laurence F. Friedman, Ph.D., C.H.P. date
Senior Health Physicist

Approved by: John D. Kinneman 5/26/89
John D. Kinneman, Chief date
Nuclear Materials Safety Section B

Inspection Summary: Special Safety Inspection Conducted February 7, 1989 (Report No. 99990001/89-005)

Areas Inspected: Location and organization; facility operations; history of site; tour of facility; licensee audits; analysis of samples.

Results: One violation was identified: Possession of source material without an NRC license.

DETAILS

1. Persons Contacted

American Minerals, Inc.

*Ernie Tartaglia, Plant Manager
*Jim Murphy, Purchasing and Safety Manager

State of New Jersey, Department of Environmental Protection

*Karl W. Muessig, Geologist, N. J. Geological Survey, Division of Water Resources

*indicates those present at Exit Interview

2. Location and Organization

The American Minerals facility is located in Camden City, New Jersey, an industrial area, and borders on the Delaware River. The Plant Manager stated that American Minerals is a closely held corporation (stock not publicly traded), and is not a subsidiary of any other corporation.

3. Facility Operations

The Plant Manager stated that American Minerals buys various naturally-occurring sands from domestic and foreign sources, and sells them to customers. Some of the material is sold as received, except for sieving to remove unwanted material. Other sands are ground in either a ball mill or Williams roller mill, air-swept into a mechanical separator which sorts the material by particle size, and then sold. The separator operates at pressures below atmospheric. Fines from the separation process are collected in seven bag houses, and the fines are eventually recombined with the product. No waste is produced. The product is stored in bulk in bins in the facility until it is needed, and is moved with a front-end loader.

Product is sold in bulk, bags, or sling bins, depending on the customer's needs.

The Plant Manager stated that some material is stored at the South Jersey Port (Broadway Terminal), in a pier also located in Camden. The Jefferson Avenue facility occupies one story of approximately one city block, with offices in a second story.

The Plant Manager stated that the facility possessed a total of 4061 short tons of zircon on January 18, 1989, of which 3594 short tons was of Australian origin. Using the consultant's value of 0.045% source

material (see below), this would contain 3234 pounds of source material. The Plant Manager stated that this inventory was typical.

The plant employes 31 production employees and five supervisors. It operates 24 hours a day, and three weekends a month. Only the production of zircon operates around the clock; the other materials are processed two shifts a day, five days a week.

The Plant Manager stated that surveys for dust in the facility showed that dust levels were well below OSHA regulatory limits. Some employees working with bulk materials were observed to be wearing disposable dust masks.

4. History of Site

According to the Plant Manager, the site was initially used by Southwork Manufacturing to process chalk whiting (talc) from the 1900's to the 1960's. From the 1960's to the present the plant has been used for the same type of operation currently conducted. The plant was owned by Howmet from the 1960's to the 1970's, by the Frank Samuel Company for a time in the 1970's, by Combustion Engineering from the 1970's to 1984, and by American Minerals, Inc., from 1984 to the present.

5. Tour of the Facility

The inspector toured the facility and measured radiation levels next to some of the products with a Ludlum Measurements, Inc., micro-R meter, Model 19, calibrated against cesium-137. Radiation levels in the plant ranged from background [approximately 10 microroentgen per hour (uR/hr)] to the following levels measured in contact with product. Radiation levels in contact with zircon sand from Australia ranged up to 200 uR/hr. Levels were measured in contact with domestic zircon flour (sand ground in a ball mill) of 160 uR/hr. Levels of approximately 100 uR/hr were measured in contact with bags of bauxite.

6. Licensee Audits

The inspector reviewed the report of a survey of the facility performed by a consultant on April 1, 1987. The consultant reported background radiation levels ranging from 10-20 uR/hr and up to 400 uR/hr in contact with some the of the imported zircon. The consultant's analysis of this material for uranium and thorium showed total source material content of 0.047%. The consultant's report stated that this concentration is close to the limit where an NRC license is required, and recommended that the company consider setting up a program to analyze all new sources of material, and to analyze samples of all incoming material periodically to assure that the company does not violate NRC licensing regulations. The Plant Manager stated that no action had been taken on this recommendation.

7. Analysis of Samples

Eight samples of incoming and finished material were collected. The solid samples ranged in mass from 841 to 1628 grams. Each sample was analyzed by gamma spectroscopy using an intrinsic germanium detector calibrated for the geometry of the sample (Marinelli beaker) with NBS-traceable standards. No attempt was made to dry the solid samples, which were of sandy consistency and already quite dry. The activity of actinium-228 was taken as the activity of thorium in the sample, and the activity of protactinium-234m was taken as the activity of uranium. These nuclides were assumed to be in equilibrium with the thorium-232 and uranium-238 parents, respectively. Activities were converted to masses using specific activities of 1.09E-1 uCi/g for thorium-232 and 3.33E-1 uCi/g for uranium-238. The weight-per cent of thorium, uranium, and total source material is reported in Table 1.

The incoming Australian zircon had a source material concentration of 0.302%, the finished Australian zircon product had a source-material concentration of 0.057%, and the Lakehurst zircon flour product had a source-material concentration of 0.088%.

"Source material" is defined [10 CFR 40.4(h)] as (1) uranium or thorium, or any combination thereof, in any physical or chemical form, or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of (i) uranium, (ii) thorium, or (iii) any combination thereof. 10 CFR 40.13, "Unimportant quantities of source material," provides an exemption for any person who receives, possesses, uses, transfers, or delivers source material in any chemical mixture, compound, solution, or alloy in which the source material is by weight less than one-twentieth of one percent (0.05%) of the mixture, compound, solution, or alloy. Except for this exemption, 10 CFR 40.3 provides "that no person . . . shall receive title to, own, receive, possess, use, transfer, or deliver . . . any source material after removal from its place of deposit in nature, except as authorized in a specific or general license issued by the Commission pursuant to the regulations in [10 CFR Part 40]."

The finding that American Minerals, Inc., possessed and used zircon sand and flour in which the concentrations of source material were greater than or equal to 0.05% by weight without being authorized to do so by an NRC license is an apparent violation of 10 CFR 40.3.

8. Exit Interview

The inspector discussed the results of the inspection with the individuals indicated in Section 1. The inspector explained the provisions of 10 CFR Part 40, and that whether American Minerals, Inc., would have to apply for a license would depend of the results of the analysis of the samples. The inspector recommended that, if a NRC license were not required, the company establish a sampling program to assure that the

source material concentration of incoming shipments is below the limit where an NRC license would be required. The Plant Manager stated that it would be possible to obtain samples of sands in advance of shipment.

TABLE 1

SOURCE MATERIAL CONCENTRATION IN SAMPLES

Sample No.	Description	% Th	% U	% Source Mat.
1	Australian zircon finished product	0.045	0.012	0.057
2	Lakehurst zircon flour	0.078	0.009	0.088
3	Australian zircon raw material	0.285	0.017	0.302
4	Bauxite - crushed and sized	<0.018	0.01001	<0.028
5	Lakehurst zircon sand	0.029	0.008	0.037
6	Chromite product South Africa	<0.018	<0.001	<0.019
7	Pyrite product - Greece	<0.018	<0.001	<0.019
8	Magnesite product - Greece	<0.018	<0.001	<0.019