STATE OF MICHIGAN

JOHN ENGLER, Governor

DEPARTMENT OF PUBLIC HEALTH

3423 N. MARTIN L. KING JR. BLVD.
P.O. BOX 30195, LANSING, MICHIGAN 48909

[redacted]

James K. Haverman, Jr., Acting Director

February 1, 1996

John Madera, Chief
Nuclear Materials Licensing Branch
U.S. Nuclear Regulatory Commission, Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

Dear Mr. Madera:

As suggested during a January 30, 1996 telephone discussion between Tom Kozak of the U.S. Nuclear Regulatory Commission (NRC) and David Minnaar of my staff, we are hereby requesting your assistance in determining the applicable requirements of the NRC concerning the receipt, handling, and disposition of certain products containing source material recently discovered in Michigan.

As a result of a radiation alarm trip event in Pennsylvania, a load of scrap waste was recently returned to a Michigan shipper, Cannon-Muskegon Corporation, 2875 Lincoln Street, Muskegon. (Incidentally, according to our records, Cannon-Muskegon is an NRC licensee, NRC license #21-17674-03, authorized to possess and use certain sealed sources unrelated to the subject of this letter.) The waste material contained fragments of zircon-based ceramic products containing source material at 0.07% by weight of combined uranium and thorium (see enclosed sample analysis results). The waste material consisted of the ceramic fragments embedded in a concrete-like, radioactive material. As an aggregate, the waste material contained source material at far less than 0.05% by weight.

The ceramic fragments result from a routine process used by Cannon-Muskegon that involves the use of commercially supplied zirconia spacer rings. We understand that the stock supply of rings at Cannon-Muskegon typically, at maximum inventory, amounts to about 2,000, one-pound rings retained and used onsite. The rings were from a commercial supplier, Amtec Industries of Cleveland, Ohio.

The stock supply of zirconia rings at Cannon-Muskegon can include a total source material content at maximum inventory of about 1.4 pounds at any one time, which, we believe, can be construed to be authorized by the general license provisions of NRC regulations in

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REGION III

10 CFR 40.22. These particular regulations also appear to not prohibit either the transfer of the zirconia rings to any other person or the transfer of the rings (or waste fragments) to a typical, nonhazardous, solid waste landfill for disposal. From a radiological health perspective, we believe the attendant radiation risks for transfers or for landfill disposal of these items, limited to quantities specified in 10 CFR 40.22(a), to be insignificant. Because the zirconia spacer ring supplier may possess total source material amounts in excess of 10 CFR 40.22(a) limits, we believe that the 10 CFR 40 specific license requirements may prevail for the Ohio site. We are currently unaware whether the Ohio supplier is licensed by NRC.

We are requesting that NRC review the appropriate regulations and determine whether the following assessments by my staff are consistent with current NRC regulatory requirements:

1. The scrap waste material at Cannon-Muskegon containing fragments of zirconia spacer rings can be considered, as an aggregate, exempt from the NRC regulations due to a source material content over the aggregate waste of less than 0.05% by weight pursuant to 10 CFR 40.13(a), despite the fact that individual ceramic fragments may contain source material at greater than 0.05% by weight. As a result, there would be no NRC regulatory restriction concerning the receipt, handling or disposal of the aggregate scrap waste.

2. The supply of intact rings possessed at any one time by Cannon-Muskegon contain a total quantity of source material limited to less than 15 pounds (nominally estimated at a maximum of 1.4 pounds). Since the concentration of source material is not exempt (i.e. greater than 0.05% by weight), the ceramic molds can be considered regulated pursuant to the general license provisions of 10 CFR 40.22. Further, these requirements do not prohibit disposal, if desired, at a nonhazardous, solid waste landfill without regard to its radioactivity pursuant to 10 CFR 40.22(b).

3. The receipt, possession, commercial distribution, and disposal of large quantities of zirconia spacer rings that would contain source material in excess of 0.05 % by weight would require a specific license if the receipt and possession limits of 10 CFR 40.22(a) were exceeded, such as could occur during the operations of a commerical supplier similar to that of Amtec Industries.

These issues exemplify a growing number of source material incidents encountered by my staff on an ongoing basis, especially since the advent of radiation alarm systems within the scrap recycling and waste disposal industries. Because most entities are not licensed by NRC in these cases, additional NRC guidance would help our agency staff more efficiently resolve the potential regulatory issues and recommend appropriate followup and disposition actions.

Your prompt consideration and response to this request would be appreciated.

Should you need any additional information, please contact me or David Minnaar of my staff at (517) 335-8200.

Sincerely,

BUREAU OF ENVIRONMENTAL
AND OCCUPATIONAL HEALTH

George W. Bruchmann, Chief
Division of Radiological Health

GWB:DWM:rt

Enclosure

cc: Jim Kiely
Cannon-Muskegon

Roland Lickus
NRC, Region III

Roger Suppes ✓
Ohio Department of Health

DIVISION OF RADIOLOGICAL HEALTH
NUCLEAR COUNTING FACILITY
SPECIAL SAMPLE FORM

LOCATION COLLECTED Cannon - Muskegon, 2875 Lincoln Blvd

DATE COLLECTED 1/4/96 COLLECTED BY RBR NCF RECEIPT DATE 1/9/96

ANALYSIS REQUESTED: GROSS ALPHA ___ GROSS BETA ___ GAMMA SCAN ✓ OTHER ___
ISOTOPE(S) OF INTEREST: Uranium - Thorium
REQUESTED DISPOSITION: TRASH OTHER: ___

Sample #	NCF #	Description
#1	SS-96-2	On Bag 700 cpm β-γ Chunks of ceramic material pulled from metal & ceramic matrix ~176 g wt.
#2	SS-96-1	Front Surface 350 cpm α Front Surface 700 cpm β-γ Unused ceramic material ~432 g

* * * * * * * * * * * SAMPLE RESULTS * * * ^{238}U * * ^{228}Ac * * * * *

SAMPLE #	GROSS ALPHA dCi/	GROSS BETA dCi/	^{226}Ra dCi/gram	^{238}U dCi/gram	^{228}Ac dCi/gram	dCi/
SS-96-1			130±20	160±50	24±4	
SS-96-2			160±20	160±60	29±5	

Over for explanation of results.

REMARKS:
ANALYSIS BY: James Kelley Hartigan RESULTS ISSUED 1/17/96
SAMPLE DISPOSITION: Returned to RMSU DATE ___/___/___

RH-935 7/82

^{228}Ra is reported and can be used to infer the presence of ^{232}Th. However, proof of the presence of ^{232}Th by gamma spectroscopy requires an ingrowth study lasting several months.

This sample contains ^{238}U and also the daughter products of ^{226}Ra. However, unlike previous samples assumed to have natural uranium present, all of the counts at the 186 keV peak can be attributed to ^{226}Ra, based upon the measured ^{226}Ra daughters. A ^{235}U component may be present in the sample, but I cannot account for it with the data available.

FAX TRANSMISSION

TECHNOLOGY DEVELOPMENT/DECONTAMINATION & DECOMMISSIONING
ARGONNE NATIONAL LABORATORY
9700 SOUTH CASS AVENUE
BUILDING 207
ARGONNE, IL 60439
FAX #: (708) 252-1885

TO:	Kevin Null	DATE:	2-20-96
FAX #:	515-1259	PAGES:	(Including this cover sheet)
FROM:	Larry Boing		1
SUBJECT:	DOE Ext. Reg. Internet Home Page		

COMMENTS:

Look at:

http://www.em.doe.gov/acd/index.html

L Boing 2/20/96

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IF YOU DO NOT RECEIVE ALL THE PAGES - PLEASE CALL: (708) 252-6729.

amtec

INDUSTRIES, INC.

TELEPHONE NO. 216-333-2260
FACSIMILE NO. 216-333-0056

TO: RUSS ROTTA DATE: Feb. 6, 1996

COMPANY: Michigan Radiological Health No. of pages 4

FROM: Al Buchta

FAX NO.

MESSAGE

ENCLOSED IS RAMI CERAMIC LTD.'S MSDS FOR ZIRCONIUM OXIDE NOZZLES.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL ME.

Al Buchta

STATE OF MICHIGAN TRANSMITTAL

TO:

1 John Madera

2

3

4

FOR ACTION AS INDICATED

☐ SIGNATURE	☐ REPLY-MY SIGNATURE	☐ NOTE AND FORWARD
☐ APPROVAL	☐ REPLY-COPY TO ME	☐ NOTE AND FILE
☐ ACTION	☐ PLEASE SUMMARIZE	☐ NOTE AND RETURN
☐ COMMENTS	☐ PLEASE INVESTIGATE	☐ PLEASE PHONE ME
☒ INFORMATION	☒ FORWARDED PER REQUEST	☐ PLEASE SEE ME

REMARKS:

Hopefully, this copy is easier to read than our previously transmitted faxed version.

JUN 3 1996

FROM	Date
Dave Minnaar, MDEQ	5-30-96

RAMI CERAMIC INDUSTRIES (1991) LTD.
Member of I.C.L. Group

AKKO PLANT
Industrial Zone Akko
P.O.Box. 2413 Akko 24103, Israel
Tel: 972-4-9914404, 9911977 Fax: 972-4-9910246

MATERIAL SAFETY DATA SHEET- Effective Date: Jan. 1996

I. IDENTIFICATION

PRODUCT NAME	Zirconia Tundish Nozzle (Z95/S, Z95 RD)
CHEMICAL NAME	Mixture of zirconium oxide, magnesium oxide and hafnium oxide
CHEMICAL FAMILY	Inorganic Oxide
SYNONYMS	Magnesia partially stabilized zirconia
DEPARTMENT OF	TRANSPORTATION
HAZARD CLASSIFICATION	NONE
SHIPPING NAME	NONE

II. PHYSICAL DATA

BOILING POINT (at 760 mm Hg)	Above 4000° C	MELTING POINT	Approx. 2700° C
BULK DENSITY (H_2O = 1)	4.70 - 4.95	VAPOR PRESSURE (at 20 C°)	N/A
VAPOR DENSITY (air = 1)	N/A	SOLUBILITY IN WATER (% by weight)	Insoluble
PERCENT VOLATILES BY VOLUME	Nil	EVAPORATION RATE (Butyl Acetate=1)	N/A
APPEARANCE	Sintered Ceramic, Beige	ODOR	None

III. INGREDIENTS

COMPONENT	ZIRCONIUM OXIDE	HAFNIUM OXIDE	MAGNESIUM OXIDE
CHEMICAL FORMULA	ZrO_2	HfO_2	M_gO
SYNONYMS	Zirconia Baddeleyite	Hafnia	Magnesia Periclase
MOLECULAR WEIGHT	123.22	210.49	40.31
C.A.S. NUMBER	1314-23-4	12055-23-1	1309-48-4
PERCENTAGE RANGE	92-95	1-2	2-3
ACGIH TLV	5mg/M³	0.5mg/M³	10mg/M³
OSHA PEL	5mg/M³	0.5mg/M³	10mg/M³

The product contains less than 0.8% chemically combined non-crystalline silica (13808-60-7), less than 0.5% calcium oxide (1314-56-3), less than 0.3% titanium dioxide (13463-67-7), and less than 0.1% each of oxides of aluminum (1344-28-1), copper (1317-38-0), phosphorus (1314-56-3), thorium (1314-20-1), and uranium (1344-59-8).

In normal storage or use, exposure limits are not expected to be exceeded. However, if dust is generated in processing or use, exposures should be maintained below 5 mg/M³, measured as total particulate matter. This should ensure that the exposure limits for zirconium, hafnium, magnesium, silicon and trace metal oxides are not exceeded (see Section VIII).

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IV. FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT	N/A, NON-VOLATILE SOLID
FLAMMABLE LIMITS IN AIR, % BY VOLUME	N/A
EXTINQUISHING MEDIA	WATER
SPECIAL FIREFIGHTING PROCEDURES	NONE
UNUSUAL FIRE AND EXPLOSION HAZARDS	NONE

V. HEALTH HAZARD DATA

ACUTE EFFECTS OF OVEREXPOSURE	Stabilized Zirconia
SWALLOWING	None, possible nausea
SKIN ABSORPTION	Irritant
INHALATION	Irritant
SKIN CONTACT	Irritant
EYE CONTACT	Irritant
CHRONIC EFFECTS OF OVEREXPOSURE	None currently known
EMERGENCY AND FIRST AID PROCEDURES	
SWALLOWING	No harmful effects expected
SKIN	Wash with soap and water
INHALATION	No emergency care anticipated
EYES	Flush with water

Inhalation or ingestion of high concentrations of hafnium oxide over prolonged periods of time may cause liver and lung damage.
The above hazards are only expected if product is pulverized or ground, and contact is made with resulting dust. This is not expected to occur during normal storage or use.

VI. REACTIVITY DATA

STABILITY	Stable
CONDITIONS TO AVOID	None
INCOMPATIBILITY (MATERIALS TO AVOID)	None
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS	None
HAZARDOUS POLYMERIZATION	Will not occur

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Collect for disposal
WASTE DISPOSAL METHOD	May be removed to non-toxic waste disposal site or used as landfill where permitted under appropriate Federal, State and Local regulations (see Section IX).

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VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)	None require. in normal use, otherwise as a minimum a NIOSH approved half face piece respirator with cartridges approved for particulate matter with an exposure limit of 0.05 mg/M^3.
VENTILATION	General room ventilation is satisfactory. If use generates dust, exhaust ventilation should be provided.
PROTECTIVE GLOVES	Abrasion resistant
EYE PROTECTION	Approved safety glasses for normal use. Chemical protective goggles where eye contact with dust is likely.
OTHER PROTECTIVE EQUIPMENT	None

IX. REGULATORY INFORMATION

The product contains more than 0.05% (500ppm) of the naturally occurring radioactive materials (NORM) uranium and thorium, and is potentially regulated by the Nuclear Regulatory Commission (NRC) as a nuclear source material. A specific license must be obtained from the NRC if more than 17,800 pounds (8,090 kilograms) of the product is stored and /or used on site at any time. Tundish nozzle shipments are generally significantly less, however, NRC regulations should be consulted for specific conditions. Although the norm concentrations vary, analyses show 0.045-0.085% uranium oxide, U_3O_8, and 0.01-0.03% thorium oxide, ThO_2.

The product contains the radium isotopes Ra^{226} and Ra^{228} which are formed as part of the natural decay scheme of uranium and thorium and can have an activity in excess of 30 pico Curies per gram, pCi/g. Several states have enacted, and others have proposed regulations, that restrict the disposal of such materials if the activity exceeds either 5 or 30 pCi/g (depending on state and radon factor) after disposal. Generally, at disposal, tundish nozzles form a very minor part of all refractory scrap and the total radium activity is not expected to exceed regulatory limits. However, users of the product should consult their particular state regulations, especially if the scrap consists largely of zirconia products. Disposal of the product may also be regulated by the NRC because of its designation as a potential nuclear source material.

The components of the product are not reportable under section 313 of the Superfund Amendments and Reauthorization Act of 1986.

X. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE	NORMAL PRECAUTIONS COMMON TO GOOD MANUFACTURING PRACTICE SHOULD BE FOLLOWED IN HANDLING AND STORAGE.

EMERGENCY TELEPHONE NUMBERS: 972-4-991-1977/ 991-9416
(Fax No.: 972-4-991647)

Rami believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding those results of the tests conducted. The data are not to be taken as a Warranty or representation for which "Rami Ceramic Industries (1991) Ltd." assumes legal responsibility. Any use of this information must be determined by the user to be in accordance with applicable federal, state, and local law

ISO 9002
Certificate No. FM 27874

Michigan Department of Public Health

3423 Martin L. King, Jr., Blvd.
Lansing, Michigan 48906
517/335-8200
Fax: 517/335-9526

FAX TRANSMISSION COVER SHEET

Date: *February 8, 1996*

To: *John Madera, U.S.N.R.C., RIII*

Fax: *708-515-1259*

Re: *"Source Material in Michigan"*

Sender: *David W. Minnaar*

YOU SHOULD RECEIVE FIVE PAGES, INCLUDING THIS COVER SHEET. IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL 517/335-8200.

Remarks: "This information supplements our request for assistance dated 02-01-96 relative to source material use and disposal in Michigan. The attached MSDS sheets are especially informative in Section III and IX. Amtec has indicated to us that the Israeli supplier ships directly to Amtec customers."