



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

RLB2
PHL
SCD
HAB

April 14, 1997

MEMORANDUM TO: Paul H. Lohaus, Deputy Director
Office of State Programs

FROM: Donald A. Cool, Director
Division of Industrial and
Medical Nuclear Safety, NMSS

SUBJECT: SUPPLEMENTAL INFORMATION TO ARIZONA ON THORIA-ALLOY

The Division of Industrial and Medical Nuclear Safety concurs on the draft response subject to the modifications identified below.

1. In the second paragraph, modify the first line to state that scrap processors and **dealers** can handle **and process** nickel thoria alloys covered by the 10 CFR 40.13(c)(8) exemption. ✓
2. In the third paragraph, modify the second sentence to include "or parts" after "...the finished products." ✓
3. The third paragraph should make it clear that scrap dealers and processors are allowed to possess finished products or parts containing thoria alloy as described in 10 CFR 40.13(c)(4), but they are not allowed to process these finished parts or products. It should also be made clear that the exemption of 10 CFR 40.13(c)(4) does not apply to scrap metal (by definition not finished products or parts) containing magnesium or tungsten-thorium alloys. ✓

Also, we provide the following suggestions for your consideration.

1. Change the first word of the third sentence, third paragraph from "Handling" to "Processing" because the term handling can be misleading. ✓
2. In the last paragraph, replace "handle" with "accept" since scrap dealers and processors are not even to be in possession of magnesium or tungsten-thorium alloys in scrap metal without a specific license. ✓

Contact: Mark A. Sitek, NMSS
(301) 415-6155

970418 00 75 XA

Aubrey V. Godwin, Director
Arizona Radiation Regulatory Agency
4814 South 40th Street
Phoenix, Arizona 85040

Dear Mr. Godwin:

This is to supplement information provided to you in our December 17, 1996 letter on the handling of finished aircraft engine parts containing nickel-thoria alloy as well as questions on smelting of thorium contaminated scrap. Our response to you has resulted in questions relative to nickel-thoria alloys covered by §40.13(c)(8) and other thorium alloys containing tungsten and magnesium covered under §40.13(c)(4). Further information follows:

Scrap processors can handle nickel-thoria alloys covered by the 10 CFR 40.13(c)(8) exemption which specifies that the thorium is dispersed in the nickel-thoria alloy in the form of finely divided thorium (thorium dioxide); and the thorium content in the nickel thoria alloy does not exceed 4% by weight.

It should be noted that no similar exemption exists for other thorium alloys containing tungsten or magnesium covered under §40.13(c)(4). These alloys may not be chemically, physically or metallurgically treated or processed after the finished products are manufactured. Handling these alloys without a specific license, will place scrap processors in violation of §40.13(c)(4) or the equivalent Agreement State regulation.

We suggest that as specific cases are identified, you advise scrap processors not to handle any thorium alloy scrap unless they know the scrap's content and origin.

Sincerely,

Paul H. Lohaus, Deputy Director
Office of State Programs

Distribution:

DIR RF
SDroggitis
Arizona file

DCD (SP03)
PDR (YES_✓)

DOCUMENT NAME: G:\LAB\ALLOYSUP.LAB

To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure "N" = No copy

OFFICE	OSP	C	OSP:DP	C	IMNS:D	C	OGC	C	OSP:D	C
NAME	LBolling:gd		PHLohaus		DCool		FXCameron		RBangart	
DATE	03/1/97		03/1/97		1/197		4/18/97		1/197	

OSP FILE CODE: SP-AG-2

9704300246 1P.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

Aubrey V. Godwin, Director
Arizona Radiation Regulatory Agency
4814 South 40th Street
Phoenix, Arizona 85040

Dear Mr. Godwin:

This is to supplement information provided to you in our December 17, 1996 letter on the handling of finished aircraft engine parts containing nickel-thoria alloy as well as questions on smelting of thorium contaminated scrap. Our response to you has resulted in questions relative to nickel-thoria alloys covered by §40.13(c)(8) and ~~other thorium alloys containing tungsten and magnesium covered under §40.13(c)(4)~~. Further information follows:

Scrap processors can handle nickel-thoria alloys covered by the 10 CFR 40.13(c)(8) exemption which specifies that the thorium is dispersed in the nickel-thoria alloy in the form of finely divided thorium (thorium dioxide); and the thorium content in the nickel thoria alloy does not exceed 4% by weight.

It should be noted that no similar exemption exists for ~~other thorium alloys containing tungsten or magnesium covered under §40.13(c)(4)~~. These alloys may not be chemically, physically or metallurgically treated or processed after the finished products are manufactured. Handling these alloys without a specific license, will place scrap processors in violation of §40.13(c)(4) or the equivalent Agreement State regulation.

We suggest that as specific cases are identified, you advise scrap processors not to handle any thorium alloy scrap unless they know the scrap's content and origin.

Sincerely,

Paul H. Lohaus, Deputy Director
Office of State Programs

9909300246 1p.

perhaps this goes to for? why cannot
scrap dealers sort out this scrap
from other scrap and find an
acceptable market for it?

Note -
thorium is
not the principal
metal

Substantive organizing of

ROUTING AND TRANSMITTAL SLIP

DATE: APRIL 2, 1997

PARALLEL CONCURRENCE REQUESTED

INITIALS

DATE

F. CAMERON, OGC



4/ 8 /97

D. COOL, NMSS/IMNS

4/ /97

LETTER TO: AUBREY V. GODWIN, DIRECTOR
ARIZONA RADIATION REGULATORY AGENCY

FROM: PAUL H. LOHAUS, DEPUTY DIRECTOR
OFFICE OF STATE PROGRAMS

SUBJECT: HANDLING OF FINISHED AIRCRAFT ENGINE PARTS CONTAINING
NICKEL-THORIA ALLOY AS WELL AS QUESTIONS ON SMELTING OF
THORIUM CONTAMINATED SCRAP

YOUR CONCURRENCE IS REQUESTED BY C.O.B. APRIL 16, 1997.

OSP CONTACT: LLOYD BOLLING (415-2327)

9704180075
XA

OGC-97- 001521

DEC 17 1996

Aubrey V. Godwin, Director
Arizona Radiation Regulatory Agency
4814 South 40th Street
Phoenix, Arizona 85040

Dear Mr. Godwin:

I am responding to your e-mail questions on the handling of finished aircraft engine parts containing nickel-thoria alloy. Your e-mail stated that your investigation of the material indicates that it is exempt pursuant to 10 CFR 40.13 (c)(8). Our response assumes that: (1) the thorium is dispersed in the nickel-thoria alloy in the form of finely divided thorium (thorium dioxide); and (2) the thorium content in the nickel-thoria alloy does not exceed 4 per cent by weight.

A review of the original notice (32 FR 15872) published on November 18, 1967 and effective on December 18, 1967 regarding this exemption, indicates that there are no restrictions on the receipt, possession, use or transfer of this material (see Enclosure 1). This exemption remains in effect and includes the receipt of aircraft engines by the rework company, and transfer to the recycler for melting and/or other modifications. As noted, in the document referenced above, an analysis of the potential health hazards showed that it is highly unlikely that the small number of workers carrying out such operations will be exposed to radiation in excess of the limits recommended (at that time) by the International Commission on Radiological Protection for individuals in the general public when averaged over a period of 1 year.

Responses to your specific questions are provided in Enclosure 2.

Sincerely,
Original Signed By:
PAUL H. LOHAUS
Paul H. Lohaus, Deputy Director
Office of State Programs

Enclosures:
As stated

Distribution:

DIR RF (6S-139)
RBangart
PLohaus
HNewsome, OGC
Arizona File
DCD (SP03)

BMorris, RES
DCool, IMNS/NMSS
FCameron, OGC
SDroggitis
LBolling
PDR YES X NO

DOCUMENT NAME: G:\LAB\THALLOY.#3

*See previous concurrence.

To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure
"N" = No copy

OFFICE	OSP	OSP:DD	D:IMNS	OGC	RES	OSP:PH
NAME	LBolling:kk	PHLohaus	DCool	FCameron	BMorris	RLBangart
DATE	11/08/96*	11/12/96*	10/17/96*	11/20/96*	11/18/96*	12/17/96

96-22-6045-4pp.

OSP FILE CODE: SP-AG-2

PART 40 • STATEMENTS OF CONSIDERATION

Written indicates a need for a shorter license period.

All interested persons were invited to submit written comments and suggestions for consideration in connection with the proposed amendment within 30 days after publication of the notice of proposed rule making in the *Federal Register*. After consideration of the comments received and other factors involved, the Commission has adopted the proposed amendment. The text of the amendment set forth below is identical with the text of the proposed amendment published on December 22, 1966.

Since the amendment is intended to provide relief from, rather than to impose, restrictions under regulations currently in effect, it will become effective without the customary 30-day notice. Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and the Administrative Procedure Act of 1946, as amended, the following amendment of 10 CFR Part 40 is published as a document subject to codification to be effective upon publication in the *Federal Register*.

32 FR 15872

Published 11/18/67

Effective 12/18/67

Exemption of Certain Aircraft Engine Parts Containing Nickel-Thoria Alloy

On August 7, 1963, the Atomic Energy Commission published in the *Federal Register* (28 FR 8043) a proposed amendment of § 40.13(c)(4), 10 CFR Part 40, which would have exempted finished products or parts fabricated of, or containing any thorium-metal alloy in which the thorium content of the alloy does not exceed 4 percent by weight. The notice of proposed rule making was published in response to a petition filed by E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., requesting an exemption from licensing requirements for nickel-thorium alloys containing up to 4 percent thorium by weight. Interested persons were invited to submit written comments or suggestions for consideration in connection with the proposed amendment within 30 days after publication of the notice of proposed rule making in the *Federal Register*.

Subsequent to publication of the proposed exemption for comment, the Com-

mission considered whether this exemption could ultimately result in contamination by thorium of materials used in construction of nuclear reactors, as a result of discarded nickel-thoria parts being incorporated as scrap in the melting of alloys containing nickel. If significant thorium impurities were to be present in materials used in constructing nuclear reactor plants, such impurities could result in additional radioactive fission products in the reactor coolant and potentially in the atmosphere surrounding the reactor plant and in discharged wastes. Among the information considered was the experimental evidence provided by the petitioner on the removal of thorium in slag during metal processing. The petitioner has reported the results of a laboratory experiment that followed commercial melt practices for scrap and fluxing agent additions. These results have shown that essentially all of the thorium introduced into stainless steel and Inconel melting furnaces is separated with the slag. The petitioner also has reported the results of a full-scale melt of Hastelloy alloy X to which a large quantity of nickel-thoria scrap was added. These results also have shown that more than 99 percent of the thorium was removed in the slag and the thorium content in the finished Hastelloy alloy X was substantially below the limits of concern with respect to reactor construction material contamination.

On the basis of currently available data, the Commission has concluded that the thorium (thorium dioxide) covered by this exemption would normally be removed with slag in melting steel and nickel base alloys. Therefore, the Commission considers it unlikely that carry-over of thorium during melting of metal scrap, generated in the use of nickel-thoria alloys in jet aircraft engine parts, will contaminate nuclear reactor construction materials to a level which would increase reactor plant radioactivity levels. It is noted, however, that the data on removal of thorium in the metal processing are directly applicable only to thorium dispersed in nickel-thoria alloys in the form of finely divided thorium (thorium dioxide) and the exemption has been limited accordingly.

In order to continue verification that contamination of reactor construction materials by thorium or other similar impurities does not occur or build up over an extended period of time, the Commission will arrange periodically to sample reactor construction materials for thorium and other contaminants. If this periodic sampling shows an increasing thorium level in such materials, the regulation set forth below may be amended from time to time to effect licensing controls to prevent the thorium contained in discarded nickel-thoria aircraft engine parts from contaminating materials used for construction of nuclear reactors.

The Commission will also apply, if determined necessary, specification limits on the amount of thorium and other similar materials allowed as trace contaminants in materials used for construction of nuclear reactors. These limits would differ for different contaminants and for varying reactor uses.

The amendment published below differs from the proposed rule published in the *Federal Register* (28 FR 8043) in the following respects:

1. The exemption has been restricted to thorium contained in any finished aircraft engine part containing nickel-thoria alloy. Provided, That: (a) The thorium is dispersed in the nickel-thoria alloy in the form of finely divided thorium (thorium dioxide); and (b) the thorium content in the nickel-thoria alloy does not exceed 4 percent by weight.

2. The exemption is in the form of a new § 40.13(c)(8) rather than an amendment of § 40.13(c)(4) as proposed. No change is being made at this time in the exemption for thorium in tungsten-thorium and magnesium-thorium alloys presently provided in § 40.13(c)(4).

3. The exemption adopted permits the conduct of activities such as repair of finished aircraft engine parts containing nickel-thoria alloy and the handling and processing of nickel-thoria scrap by scrap dealers and processors. An analysis of the potential health hazards shows that it is highly unlikely that the small number of workers carrying out such operations involving nickel-thoria alloys will be exposed to radiation or airborne concentrations of radioactive material in excess of limits recommended by the International Commission on Radiological Protection for individuals in the general public when averaged over a period of 1 year.

¹ States to which the Commission has transferred certain regulatory authority over radioactive material by formal agreement pursuant to section 274 of the Atomic Energy Act of 1954, as amended.

PART 40 • STATEMENTS OF CONSIDERATION

4. Present subparagraph (b) of § 40.13 (e) has been redesignated subparagraph (g).

5. Present paragraph (d) of § 40.23 has been redesignated paragraph (e) and a new paragraph (d) has been added to § 40.23 to provide a general license for the export to countries or destinations other than those listed in § 40.90, Southern Rhodesia and Cuba, of thorium contained in finished aircraft engine parts containing nickel-thoria alloy, provided that: (a) The thorium is dispersed in the nickel-thoria alloy in the form of finely divided thorium (thorium dioxide); and (b) the thorium content in the nickel-thoria alloy does not exceed 4 percent by weight.

The foregoing revisions reflect further Commission consideration of the proposed amendment, including additional information and data received after the notice of proposed rule making was published on August 7, 1963.

The Commission has found that the receipt, possession, use, transfer, and import into the United States of thorium contained in any finished aircraft engine part containing nickel-thoria alloy pursuant to the exemption in § 40.13(c)(8) published below involve unimportant quantities of source material within the meaning of section 82 of the Atomic Energy Act of 1954, as amended, which are not of significance to the common defense and security, and that such activities can be conducted without unreasonable hazard to life or property. The Commission has also found that the export of thorium in finished aircraft engine parts pursuant to the general license in § 40.23(d) published below will not be inimical to the interests of the United States.

The Commission considers that finished aircraft engine parts containing nickel-thoria alloy are not products intended for use by the general public within the meaning of § 150.15(a)(6) of 10 CFR Part 40, "Exemptions and Continued Regulatory Authority in Agreement States Under Section 274." Accordingly, the transfer of possession or control of such finished aircraft engine parts in agreement States by the manufacturer, processor, or producer would not be regulated by the Commission.

Pursuant to the Atomic Energy Act of 1954, as amended, and the Administrative Procedure Act of 1946, as amended, the following amendments of 10 CFR Part 40 are published as a document subject to codification, to be effective thirty (30) days after publication in the *Federal Register*.

34 FR 14067
Published 9/5/69
Effective 8/5/69

Uranium Contained in Counterweights

On July 18, 1969, the Commission published in the *Federal Register* (34 F.R. 12107) proposed amendments to its regulation "Licensing of Source Material", 10 CFR Part 40, pertaining to the exemption from licensing requirements of uranium contained in counterweights installed in aircraft, rockets, projectiles, and missiles, or stored or handled in connection with installation or removal of such counterweights, and the gen-

eral license for the export of such counterweights.

The amendments would:

a. Revise § 40.13(c)(8)(ii) to substitute, for the words "Caution—Radioactive Material—Uranium" in the existing legend required to be impressed on each exempt counterweight containing uranium, the words "Depleted Uranium";

b. Delete the existing provision in § 40.13(c)(8)(iii) that the counterweight plating or other covering must not be removed or penetrated;

c. Add a new § 40.13(c)(8)(iii) to require each exempt counterweight to be labeled or marked durably and legibly with the identification of the manufacturer, and the statement: "Unauthorized Alterations Prohibited";

d. Add a new § 40.13(c)(8)(iv) stating that the exemption contained in § 40.13(c)(8) shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of exempt counterweights other than repair or restoration of any plating or other covering; and

e. Revise § 40.23(e) to reflect the new legend requirements in § 40.13(c)(8).

All interested persons were invited to submit written comments and suggestions for consideration in connection with the proposed amendment within thirty (30) days after publication of the notice in the *Federal Register*. No comments suggesting changes were received. The text of the amendments set out below is identical with the text of the proposed amendments published July 18, 1969.

The amendments of § 40.13(c)(8) eliminate the provision in the exemption for uranium in counterweights that the plating or other covering not be removed or penetrated and, although prohibiting the chemical, physical or metallurgical treatment or processing of exempt counterweights, permit the repair or restoration of any plating or other covering of counterweights. The present limitation in the exemption to counterweights on which the plating or covering has not been removed or penetrated is no longer necessary, since (1) experience to date with thousands of counterweights in use over the past several years indicates that present manufacturing techniques provide adequate protection against oxidation of uranium, and (2) activities which would involve processing of uranium are expressly prohibited, except for processes which do not involve exposure hazards significantly different from those involved in handling an undamaged counterweight. The Commission considers that the provisions in the amendments adequately control the low radiation exposure that may result from discarded counterweights.

Since the following amendments relieve from, rather than impose restrictions under regulations currently in effect, they will become effective without the customary 30-day notice. Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and sections 552 and 553 of title 5 of the United States Code, the following amendments to Title 10, Chapter I, Code of Federal Regulations, Part 40 are published as a document subject to codification effective upon publication in the *Federal Register*.

34 FR 15548
Published 12/11/69
Effective 12/11/69

Miscellaneous Amendments

See Part 20 Statements of Consideration.

35 FR 6313
Published 4/18/70
Effective 5/18/70

On December 18, 1969, the Commission published in the *Federal Register* (34 F.R. 19611) proposed amendments to its regulation "Licensing of Source Material", 10 CFR Part 40, to exempt from licensing requirements piezoelectric ceramic containing not more than 2 percent by weight source material.

All interested persons were invited to submit written comments and suggestions for consideration in connection with the proposed amendments within sixty (60) days after publication of the notice in the *Federal Register*. After consideration of the comments and other factors involved, the Commission has adopted the proposed amendments. The text of the amendments set out below is identical with the text of the proposed amendments published December 18, 1969.

The Commission has found the receipt, possession, use, transfer, and import into the United States of piezoelectric ceramic containing not more than 2 percent by weight source material involve unimportant quantities of source material within the meaning of section 82 of the Atomic Energy Act of 1954, as amended, which are not of significance to the common defense and security, and that such activities can be conducted without any unreasonable hazard to life or property.

Under the provisions of § 150.15(a)(6) of 10 CFR Part 150, "Exemptions and Continued Regulatory Authority in Agreement States Under Section 274," the transfer of possession or control by the manufacturer, processor, or producer of piezoelectric ceramic distributed for use under the exemption would be subject to the Commission's licensing and regulatory requirements even if the product is manufactured pursuant to an Agreement State license. By the terms of the exemption, the Commission would exercise such regulatory authority by exempting, under new § 40.13(c)(2)(ii), any person (including a manufacturer, processor, or producer in an Agreement State of piezoelectric ceramic) to the extent that such person transfers piezoelectric ceramic containing not more than 2 percent by weight source material.

Pursuant to the Atomic Energy Act of 1954, as amended, and sections 552 and 553 of title 5 of the United States Code, the following amendments to Title 10, Chapter I, Code of Federal Regulations, Part 40 are published as a document subject to codification effective thirty (30) days after publication in the *Federal Register*.

35 FR 12186
Published 7/30/70
Effective 8/26/70

Response To Questions On Nickel-Thoria Alloy

1. Can the aircraft reworking company remove the parts from an aircraft engine and then sell it to a recycler?

Answer - Yes, this activity is authorized under the current regulation, 10 CFR Part 40, Section 40.13(c)(8).

2. Can the recycler melt or otherwise modify the engine part?

Answer - Yes, this activity is also authorized under the current regulation, 10 CFR Part 40, Section 40.13(c)(8).

3. Has an assessment been made of the public exposure if these parts are melted and their products enter the public steel supply?

Answer - We are not aware of any studies which specifically address public exposure to nickel-thoria alloy which has been melted and incorporated into products entering the public steel supply.

4. If an enforcement action should be taken, should it be against the aircraft reworker, the scrap yard, or who ever melts the parts? Should we establish a program to detect any possible diversion to melting companies?

Answer - Given the information you have provided, we are not aware of any basis for enforcement action. There are no requirements which dictate that you establish a program to detect the transfer of material containing nickel-thoria alloy to metal melting companies.

ENCLOSURE 2