McDONNELL Aircraft Corporation

Lambert-Saint Louis MUNICIPAL AIRPORT • BOX 516 ST. LOUIS 66, MO.

28 OCT 1964

Ref: USAEC-220-2348

United States Atomic Energy Commission
Division of Compliance
Region III
Oakbrook Professional Bldg.
Oak Brook, Illinois

Attention: Roy C. Hageman, Director
Region III

Subject: Correction of Noncompliance of AEC Requirements

Reference: Roy C. Hageman's Letter Dated 8 October 1964

Enclosure: Procedure for Machining Thorium-Containing Ceramics

Gentlemen:

1. With reference to your letter dated 8 October 1964 listing items of noncompliance with requirements of our license, the following corrections are being or have been made.

2. STB-49, Item A

A standard procedure is being written for control of waste materials generated in machining operations involving thorium - containing ceramics. An outline of this procedure is enclosed (Attachment No. 1). Since this is to be the basis of a Safe Practice Procedure, we would appreciate any comment you may have regarding it.

3. STB-49, Item B

This item has been corrected as noted in original letter.

4. STB-49, Item C

The radiation area referenced has been tagged (1 Oct. 1964) with signs bearing the radiation caution symbols and the words

Caution
Radiation Area.

A/265

5. 24-2261-3, Item A

Bucking bars are being subjected to a continuing or "revolving" inspection. Any worn or missing labels will be replaced as they are discovered.

6. 24-2261-3, Item B

Lead containers in file cabinet in Tooling Inspection office of Building No. 1 and which are used for storage of Cesium 137 sealed sources have been labeled with the standard radiation symbol and the words

Caution
Radioactive Material

7. Should you require further information concerning these corrections, please communicate directly with me.

Sincerely yours,

MCDONNELL AIRCRAFT CORPORATION

W. L. Kester
Scientist
Research Division

WLK:emc

McDONNELL Aircraft Corporation
Lambert-Saint Louis MUNICIPAL AIRPORT • BOX 516, ST. LOUIS 66, MO.

8 NOV 1964
Ref: USAEC-220-2365

To: United States Atomic Energy Commission
Region III, Division of Compliance
Oakbrook Professional Bldg.
Oak Brook, Illinois

Attention: Edgar C. Ashley
AEC Compliance Inspector

Subject: Correction of Noncompliance of AEC Requirements

Reference: Roy C. Hageman's Letter Dated 8 October 1964

Enclosure: Procedure for Machining Thorium-Containing Ceramics

Gentlemen:

1. In response to our telephone conversation 3 November 1964, I am sending you a revision of our Safe Practice Procedure relating to the machining of thorium-containing ceramics.

2. You will notice that provisions are made for keeping records of waste disposal in accordance with the requirements of 10 CFR 20.401(b).

3. Should other information be required concerning these corrections, please communicate directly with me.

Sincerely yours,

MCDONNELL AIRCRAFT CORPORATION

W. L. Kester
Scientist
Research Division

WLK:emc

Procudure for Machining Thorium-Containing Ceramics

Where possible, operations involving grinding and cutting of thorium - containing ceramics will be carried out wet; that is, use will be made of a constant flow of liquid coolant designed to minimize contamination by dust and to provide a vehicle to carry chips and cuttings to a waste reservoir.

In those instances where liquids cannot be used, dry grinding will be accomplished in a well ventilated (hood) area. Air from the venting system will be filtered sufficiently to reduce dust levels to less than those specified in 10 CFR 20, paragraph 20.103 (a) and (b).

Each machining operation involving thorium - containing ceramics will be monitored by Health Physics personnel until such time as procedures and techniques are evolved which will permit these operations to be accomplished without contamination of nearby areas by dust, spray and/or chips.

At the completion of operations involving thorium - containing ceramics, all equipment and nearby work space will be surveyed by wipe test.

1. Machines and work areas will be cleaned until activity levels are below those set forth in 10 CFR 20. Here, activity levels are interpreted to mean both radiation and loose material as determined by wipe tests and air samples.

2. All liquids containing soluble and/or dispersible solids will be assayed and disposed of by mixing with water in the sanitary sewerage system as provided for in 10 CFR 20, paragraph 20.303.

3. All solid waste will be collected in sealable waste cans bearing the legend

   Caution
   Radioactive Material

   The container will be stored in a restricted - access area posted with the sign

   Caution
   Radioactive Material

4. Each waste can, when filled, will be transferred to a company owned burial site and disposed of by burial in accordance with regulations set forth in 10 CFR 20, paragraph 20.304. In instances where total quantity of waste exceeds the limits allowed in paragraph 20.304, the container and contents will be transferred to a licensed agency for disposal.

Ref: USAEC-220-2365

Procedure for Machining Thorium-Containing Ceramics

Where possible, operations involving grinding and cutting of thorium-containing ceramics will be carried out wet; that is, use will be made of a constant flow of liquid coolant designed to minimize contamination by dust and to provide a vehicle to carry chips and cuttings to a waste reservoir.

In those instances where liquids cannot be used, dry grinding will be accomplished in a well ventilated (hood) area. Air from the venting system will be filtered sufficiently to reduce dust levels to less than those specified in 10 CFR 20, paragraph 20.103 (a) and (b).

Each machining operation involving thorium-containing ceramics will be monitored by Health Physics personnel until such time as procedures and techniques are evolved which will permit these operations to be accomplished without contamination of nearby areas by dust, spray and/or chips.

At the completion of operations involving thorium-containing ceramics, all equipment and nearby work space will be surveyed by wipe test.

1. Machine tools and work areas will be cleaned until alpha activity when assayed by wipe tests has been reduced to background as determined by an RCL Model 10200 2π flow counter.

2. All liquids containing soluble and/or dispersible solids will be assayed and disposed of by mixing with water in the sanitary sewerage system as provided by 10 CFR 20, paragraph 20.303. A dated record will be kept of the type, quantity and form of the material and of the method of disposal.

3. All solid waste, including filters from special ventilation systems, will be collected and stored in sealable waste cans bearing the legend

   Caution
   Radioactive Material

   The container will be stored in a restricted - access area posted with the sign

   Caution
   Radioactive Material

4. Each waste can, when filled, will be transferred to a company owned burial site and disposed of by burial in accordance with regulations set forth in 10 CFR 20, paragraph 20.304. In instances where total quantity of waste exceeds the limits allowed in paragraph 20.304, the container and contents will be transferred to a licensed agency for disposal. A dated record will be kept of the type, quantity and form of the material and of the method of disposal.

EB.'SLR

UNITED STATES
ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
REGION III
OAKBROOK PROFESSIONAL BLDG.
SUITE 410
OAK BROOK, ILLINOIS 60523

October 8, 1964

McDonnell Aircraft Corporation
Lambert - St. Louis Airport
St. Louis, Missouri

Attention: Dr. W. L. Lester, Director
Research Division

Gentlemen:

This letter relates to the discussion Mr. Ashley and Mr. Finn of this office held with you at the conclusion of the recent inspection of your AEC licensed program.

You will recall that no items of noncompliance were noted with respect to Byproduct Material License No. 24-2261-4. Accordingly, Form AEC-591, Inspection Findings and Licensee Acknowledgement, was issued for this license. It is not necessary that you sign, or acknowledge receipt of this form.

However, certain of your activities under Byproduct Material License No. 24-2264-3 and Source Material License No. STB-49 appear to be in noncompliance with AEC requirements. The items and reference to the pertinent AEC requirements are listed in paragraph 5 on the Forms AEC-591, attached.

The purpose of this letter is to give you an opportunity to advise us in writing of your position concerning these items and any corrective steps you have taken or plan to take with respect to each item listed on the attached forms. This should include the date all corrective action was or will be completed.

- continued -

RECEIVED
1964 OCT 12 AM 10 5
U.S. ATOMIC ENERGY COMM.
REGION III
MAIL SECTION

8604062270

Your reply should be sent to us within 30 days of the date of this letter to assure that it will receive proper attention in our further evaluation of this matter.

Should you have any questions concerning this matter, you may communicate directly with this office.

Sincerely yours,

Roy C. Ingerman, Director
Region III

Enclosure:
Form AEC-591 (2)

bc: Division of State & Licensee Relations, HQ - w/encl.
Division of Compliance, HQ - w/encl.

Form AEC-592
(5-63)

UNITED STATES ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE

II-B III Rec. #5

1. LICENSEE	2. REGIONAL OFFICE
McDonnell Aircraft Corporation Lambert - St. Louis Airport St. Louis, Missouri	REGION III, DIV. OF COMPLIANCE OAKBROOK PROFESSIONAL BLDG. OAK BROOK, ILLINOIS
3. LICENSE NUMBER STB-49 40-29	4. DATE(S) OF INSPECTION September 21 and 22, 1964

5. The following activities under your license (identified in Item No. 3 above) appear to be in noncompliance with AEC regulations or license requirements, as indicated.

A. No record of your liquid and sludge waste disposal to the sanitary sewer system and solid waste burial, respectively, was maintained by you contrary to 10 CFR 20.401(b).

B. Your inventory of August 11, 1964 included 144.6 pounds of thorium, as thorium oxide powder, contrary to License Condition No. 8 which permits only thorium as thorium-magnesium alloy sheets, castings, and parts containing not more than 4 per cent thorium to be possessed and used.

It is noted that this deficiency was corrected on September 9, 1964 by the issuance of amended License No. STB-49 which authorizes possession and use of thorium, as thorium oxide, as well as thorium, as thorium-magnesium alloy.

C. The radiation area existing in the ceramic thoria storage area located in the refrigeration room adjacent to the machine shop in Building 32 was not posted as required by 10 CFR 20.203(b).

Supplementary page None attached. Edgar C. Ashley Edgar C. Ashley 10-8-64
AEC Compliance Inspector Date

ORIGINAL: LICENSEE. COPIES: ☐ CO REGION ☐ CO HEADQUARTERS ☑ L&R HEADQUARTERS.

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-665311

9608060270

REPORT COMPILED SHEET

Type report 591 (592) (circle)

Indentifying Information

✓1. Licensee McDonnell Aircraft Corporation

✓2. Address Lambert - St. Louis Airport
St. Louis, Missouri

✓3. License No(s) 24-2261-3 and STB-49

✓4. Date of Inspection September 21 and 22, 1964

✓5. Inspector E.G. Ashley and J.A. Finn.

✓6. Status of Compliance Noncompliance

Items of Noncompliance

✓7.

	Section of Regulation or License Condition	Details Paragraph
(-3) A	License Condition No. 17	A 24
(-3) B	10 CFR 20.203 (f)(1)	B 25
(STB-49) C	10 CFR 20.401(b)	C 41
(STB-49) D	License Condition No. 8.	D 42
(STB-49) E	10 CFR 20.203 (b)	E 45
F		F
G		G

Classified Information

✓8. This report contains classified or business confidential information. Yes (No)

E.G. Ashley 10-5-64
Inspector Date

[signature] 10-7-64
Reviewer Date

HEALTH PHYSICS ANALYSIS

Although several items of noncompliance were noted during the course of this inspection, the inspector is of the opinion that no significant health and safety hazards exist from the use of materials under these licenses. The thorium oxide is used by the licensee only for research purposes and only a small quantity is [redacted] used at any one time. It was noted that the amount of thorium oxide used in any one place was less than 15 pounds per week.

McDONNELL AIRCRAFT CO[illegible]ATION
ST. LOUIS, MISSOURI

INFORMATION GENERAL TO ENTIRE PROGRAM

GENERAL INFORMATION

9. This was an announced inspection conducted on September 21 and 22, 1964 by E. C. Ashley and J. A. Finn. Dr. W. L. Kester of McDonnell Aircraft Corp. was telephonically notified of this inspection on September 17, 1964.

10. Mr. Ken Miller of the Missouri State Department of Health was telephoncially notified on September 17, 1964 of this forth coming inspection. Mr. E. J. Hilkemeyer of that organization accompanied the inspectors during this inspection.

11. The following persons were interviewed and gave information concerning the entire program at McDonnell Aircraft. They were:

Dr. W. L. Kester, Scientist, Head of Nuclear Science Laboratories

Mr. T. C. Linck, Chief Industrial Hygienest and RSO

(see attached list)

INSPECTION HISTORY

12. The last previous inspection of the licensee's Licenses No. 24-2261-3, 24-2261-4, and STB-49 were conducted on October 15 and 18, 1963. No items of noncompliance were found during the inspection of 24-2261-3 and STB-49 during that time. During this last previous inspection, however, 2 items of noncompliance were found for License No. 24-2261-4.

13. These two items of noncompliance were as follows:

1. The Notre Dame Irradiator in Building 33 was not labeled in accordance with 10 CFR 20.203(f)(1). This item had been corrected by proper labeling.
2. Records were not maintained for leak test results as stipulated by License Condition No. 13.B. This item of noncompliance was corrected by proper maintenance of records of these leak tests and all future leak tests from that time until the present inspection date.

ORGANIZATION

14. The licensed material programs are the responsibility of the Research Department of McDonnell Aircraft Corporation. Dr. W. L. Kester, a Physical Chemist and a

GENERAL INFORMATION, Cont'd.

11. The following persons were interviewed during the course of this inspection

Dr. W. O. Kaster, Scie[illegible] Head of Nuclear Science Laboratories. (all licenses)

Mr. T. C. Linck, Chief [illegible]ustrial Hygienest and RSO. - (all licenses)

Mr. Dave Lum, Material and Process Development Department (STB-49).

Mr. J. J. Rosenthal, Material and Process Development Department (STB-49).

Mr. E. Malakelis, Material and Process Development Department (STB-49).

Dr. C. J. Wolf, Associate Scientist - (24-226144).

Mr. I. M. Swenning, Tooling Inspection Foreman - (24-2261-3).

Mr. F. C. Mc Callister, Quality Control Department - (24-2261-3).

Mr. H. A. Fahrenholz, Development Technician - (STB-49).

Mr. Ken Baker, Development Technician - (STB-49).

14. (continued)

Scientist with the corporation has the responsibility for the overall use of materials procured and used by the licensee. Dr. Kester stated that he constitutes the highest level of management that is connected with the licensed material programs.

15. At the present time the licensee's Radioisotope Committee is being reorganized. The last meeting of this committee was held on May 21, 1964. Those present at that time were H. K. Webber, Department 112; Mr. B. Goe, Department 764; Mr. C. J. Wolf, Department 220; Mr. H. E. Winn, Department 766; Mr. N. A. Lamb, Department 855; Mr. W. G. Knutra, Department 764; Mr. B. J. Stralser, Department 944; Mr. F. McCallister, Department 853; Mr. T. C. Linck, Department 64; Mr. J. A. Bello, Department 752; Mr. R. S. Hodel, Department 780. When it is ascertained which persons are going to be permanent members of the committee, a new listing will be made. Dr. Kester stated that persons to be named to the committee will be those who are directly concerned with the use of licensed material at McDonnell. These persons will represent the various departments using the material. The function of the committee will be as an advisory group to rule on qualifications and requirements of safety for persons using material in addition to the general problems involved.

16. Mr. T. C. Linck is Chief Industrial Hygienist with the licensee and Radiological Safety Officer. Mr. Linck serves as the RSO only on a part time basis. Mr. Linck stated that he works closely with Dr. W. L. Kester with the licensed material uses. Mr. Linck's responsibilities in so far as the licensed material is concerned is that of keeping personnel monitoring records, making radiation surveys, keeping other pertinent records and the general overseeing of the use of licensed material insofar as safety aspects are concerned. Dr. Kester and Mr. Linck both stated that the licensee plans to hire a full-time health physics technician to keep on top of the material uses; that is, making surveys, proper signs, labeling and other general duties. The new health physics technician would report either to Mr. Linck and/or Dr. Kester.

ADMINISTRATIVE CONTROL

17. As stated previously the highest level of management in direct control of the licensed programs is Dr. W. L. Kester. Dr. Kester stated that McDonnell

35. The primary area of use of the thorium-magnesium alloys is Building No. 27. All magnesium-thorium scrap is kept in red barrels in this facility. These red barrels are marked "Radioactive Magnesium Only."

36. In addition to possessing thorium-magnesium alloy, as mentioned previously, the licensee also possesses thorium oxide in the form of powders and ceramics. Dr. Kester stated that McDonnell Aircraft Corp. began using thorium oxide approximately 15 months ago. Dr. Kester stated that he believes that they have received approximately 300 pounds of thorium oxide during that period.

37. The thorium oxide as powders are mixed wet, molded into various ceramic forms, cured in ovens and then tested. The thorium oxide as ceramics are wet machined and then tested. These tests consist of ~~sonored~~ shocks, vibrations, oxyacetylene and other tests.

38. The licensee also stated that the powder and cast ceramics are 100% thorium oxide by assay. Among the suppliers of this material is the Zirconium Corporation of America and Norton Refractories of Massachusetts.

39. Thorium oxide powders are processed in the Material and Process Development Department Laboratories in Building 102. Mr. Don Kurmer is the Senior Technical Specialist of that department. Mr. Linck said that he took an air sample on August 1, 1963 in the thorium oxide work area of Building 102. He further stated that the Instrument Department, ~~of Irradiation and~~ under the supervision of Mr. Flammang, analyzed the filter paper. ~~He~~ Quantities Mr. Flammang ~~estimated~~, no activity was found on the sample. ~~However, no records were maintained on this analysis. The licensee was advised that [illegible] constituted compliance with 10 C.F.R. 20.401(b).~~

40. The licensee also stated that the thorium oxide as powders have been used in the process at the rate of approximately 8 to 10 pounds per week at different times.

41. Thorium oxide as ceramics are machined in what is known as Siegel's Machine Shop in Building No. 12. This was formerly a missile machine shop and is now used for general precision machining. Machines which are utilized for the ceramics are drill presses and various types of grinders. The licensee stated that the machine cooling water is changed once every month. The liquid portion is dumped

41. (continued)

down the drain while the solid sludge is put into scrap barrels. These scrap barrels also contain paper cups and other paper waste and other general machine shop waste. These barrels are 50 gallon drums. The licensee stated that these waste drums were taken out with the regular trash and disposed of by burial in the land fill area in the northern section of St. Louis County, approved by the St. Louis County Health Department. The wet grinding waste is produced at the rate of approximately one pound per week. No records have been maintained pertinent to the disposal of these liquid and sludge wastes. The licensee was advised that failure to keep records of waste disposals constituted noncompliance with 10 CFR 20.401(b).

42. A review of the licensee procurement record for thorium oxide shows that between September 20, 1963 and May 15, 1964 the licensee has procured 110.4 pounds as powder (ThO_2); and of the Thorium ceramics, for the period of March, 1964 through September, 1964 he has procured 46.4 pounds. In addition, a periodic inventory maintained by the licensee shows that thorium oxide possessed by him totalled 144.6 pounds as of August 11, 1964. (Please see Exhibit A of this report.) The licensee was advised that he possessed source material contrary to License Condition No. 8 which authorizes thorium only as magnesium-thorium alloy containing not more than 4% thorium. Dr. Kester was quite embarassed when it was explained to him that McDonnell Aircraft Corporation had procured and used source material which was not authorized by his license. Dr. Kester stated that he and his associates had interpreted the Regulations as saying that they could procure and use up to 150 pounds of source material at any time in a year without a specific license. He pointed to the August 11, 1964 inventory which showed that they were approaching the 150 pound limit. This is why they applied for an amendment to the Part 40 license, STB-49, to include thorium oxide above this level. The licensee now has in his possession an amendment to his license to authorize possession of thorium as thorium oxide. This new amendment was issued to the licensee on September 9, 1964, and was available for inspection at the time of this inspection.

OTHER INFORMATION PERTINENT TO ENTIRE PROGRAM

43. The licensee's radiation detection instruments, which he had on hand, include the following: one-Tracerlab Model SU-14, 0 to 25 mr portable survey meter

43. (continued)

with an alpha probe; two-Thyac Model 389-C, 0 to 20 mr/hr; seven-CDV Model 700 0 to 50 mr per hour; one-ion chamber, Victoreen Model 740A, 0 to 5 r per hour; two-NRD Model CS-40, 0 to 20 r per hour; 4-CDV-710, 0 to 50 r per hour; 4-CDV Model 720, 0 to 500 r per hour; 35-Keleket and Victoreen 0 to 200 mr dosimeters; and 4-CDV Bendix dosimeters, range of up to 20 r.

INDEPENDENT MEASUREMENTS

44. A beta-gamma survey of the Notre Dame irradiator in Building 33 showed the following results: 4 readings were taken above the one inch tubes. These readings are as follows: 15 mr per hour at the surface, 10 mr per hour at 6 inches, 3 mr per hour at 12 inches and 1 mr per hour at 18 inches. Directly over number 13 hole with the 36 inch stainless steel shield removed, read 110 mr per hour at the surface, a reading of background was observed at the operator position with the shield out of this number 13 hole. The storage file cabinet containing the Cesium 137 bucking bar sources located in Mr. Swanson's office in Building No. 1 first level showed a surface reading of .05 mr per hour at the surface. The lead storage containers in this file cabinet showed a surface reading of .15 mr per hour. XXXX Various bucking bars were surveyed and showed a maximum reading of 1 mr per hour at the surface. The 4 vaults in the Isotope Laboratory of Building 102 showed a surface reading at the floor level of .04 mr per hour.

45. The following surveys were made in Siegel's Machine Shop which is used for the machining of the thorium oxide ceramics. The grinding machine showed .3 mr per hour in the grinding bed, which was made by using a thin window tube. This same machine showed .2 mr per hour on the grinding wheel. A cylindrical grinder showed less than 2 mr per hour in the coolant drain pan. Fifty gallon drums in the machine shop used for various scrap showed less than .05 mr per hour. The general floor area of the machine shop also showed less than .05 mr per hour. Boxes of new these ceramic material and also boxes of these ceramic scrap are kept in a refrigeration room located in part of the machine shop main area. Dr. Kester stated that this refrigeration room is restricted by surveillance and only those people that have any direct business in their are allowed to enter this room. The only one person that spends any time at all in this room is a maintenance man. The boxes of material are located in a corner of this room where a person would not have any business to spend any time. They (badges) are away from the regular work area of the refrigeration

45. (continued)

unit. The box containing thorium ceramic scrap read 50 mr per hour at the surfac using the end of the thin window tube. The same box read 7 mr per hour at the surface as detected through the side wall of the probe. Boxes containing new material, also stored back in this corner, read 5 mr/hour at one foot using the side wall of the probe and 2 mr/hr at 3 feet (this was also 3 feet above the floor). Based on the above independent measurements made in the ceramic thoria storage area located in the refrigeration room, Dr. Kester was advised that these radiation levels were such that they created a "Radiation Area" in that area. He was advised that failure to post the area as a radiation area constituted noncompliance with 10 CFR 20.203(b).

46. All the above surveys were made with an Eberline survey instrument Model E-500B using a thin end window probe.

47. Two smears were taken in the ThO_2 work areas in Building 102. Analyses by Argonne National Laboratory showed results of "background" on these samples.

MANAGEMENT DISCUSSION

48. The results of this inspection were discussed with Dr. Kester and Mr. Linck, the Radiation Safety Officer. Concerning the disposal of sludge from the machine shop Building 32, Dr. Kester stated that in the future this sludge will be treated as contaminated waste and would be disposed of through proper vendors. Concerning the various noncompliance items mentioned throughout this report, including improper labeling and posting, both Dr. Kester and Mr. Linck stated that they hope to have a full-time health physics technician, as mentioned previously, who would be able to conduct frequent surveys and make the rounds to see that all of the areas and containers where material is used, and stored to see that proper posting and labeling is in effect and that complete records are kept in all cases.

Enclosure:
Exhibit A

pertains strictly to isotopes