

November 15, 1966

Sinclair Research, Incorporated
400 East Sibley Boulevard
Harvey, Illinois

Attention: Dr. A. I. Snow, Director
Radiation & Instrumentation Division

Gentlemen:

This letter relates to the discussion Mr. Mapp of this office held with you at the conclusion of the recent inspection of your AEC licensed programs.

You will recall that no items of noncompliance were noted with respect to License No. 12-140-6. Accordingly, Form AEC-591, INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGMENT, is hereby issued for that license. It is not necessary that you sign, or acknowledge receipt of this form.

However, certain of your activities under Licenses No. 12-140-4 and 12-140-5 appear to be in noncompliance with AEC requirements. The items and references to the pertinent AEC requirements are listed in paragraph 5 on the Forms AEC-592, 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 -

B/3

OFFICE ▶	CO: III	CO: III	CO: III		
SURNAME ▶	Mapp	Moretti	Hageman		
DATE ▶	11-15-66	11-15-66	11-15-66		

Sinclair Research,
Incorporated

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November 15, 1966

Your reply should be sent to us within 20 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. Hagenan, Director
Region III

Enclosures:

1. Form AEC-591
2. Forms AEC-592 (2)

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

OFFICE ▶						
SURNAME ▶						
DATE ▶						

UNITED STATES ATOMIC ENERGY COMMISSION

DIVISION OF COMPLIANCE

1. LICENSEE Sinclair Research, Incorporated 400 East Sibley Boulevard Harvey, Illinois	2. REGIONAL OFFICE Region III, Division of Compliance Oakbrook Professional Building Oak Brook, Illinois
3. LICENSE NUMBER 12-140-4	4. DATE(S) OF INSPECTION October 28, 1966

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.

The various sealed sources on hand under this license had not been leak tested at intervals of six months or less, as required by License Condition 14(C).

Supplementary page None attached. Eugene T. Mapp E. J. Mapp 11-15-66
AEC Compliance Inspector Date

UNITED STATES ATOMIC ENERGY COMMISSION

DIVISION OF COMPLIANCE

1. LICENSEE Sinclair Research, Incorporated Radiation Division 400 East Sibley Boulevard Harvey, Illinois	2. REGIONAL OFFICE Region III, Division of Compliance Oakbrook Professional Building Oak Brook, Illinois
3. LICENSE NUMBER 12-140-5	4. DATE(S) OF INSPECTION October 28, 1966

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.

The approximately 7000 curies of Cobalt 60 on hand as sealed sources had not been leak tested at intervals of six months or less, as required by License Condition 15(A).

Supplementary page None attached. Eugene T. Mapp *E. T. Mapp* 11-15-66
AEC Compliance Inspector Date

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

UNITED STATES ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE

INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGMENT

1. LICENSEE	2. REGIONAL OFFICE
3. LICENSE NUMBER(S)	4. DATE OF INSPECTION

5. INSPECTION FINDINGS

- A. No item of noncompliance was found.
- B. Rooms or areas were not properly posted to indicate the presence of a RADIATION AREA.
10 CFR 20.203(b) or 34.42
- C. Rooms or areas were not properly posted to indicate the presence of a HIGH RADIATION AREA.
10 CFR 20.203(c) (1) or 34.42
- D. Rooms or areas were not properly posted to indicate the presence of an AIRBORNE RADIOACTIVITY AREA.
10 CFR 20.203(d)
- E. Rooms or areas were not properly posted to indicate the presence of RADIOACTIVE MATERIAL.
10 CFR 20.203(e)
- F. Containers were not properly labeled to indicate the presence of RADIOACTIVE MATERIAL.
10 CFR 20.203(f) (1) or (f) (2)
- G. Storage containers were not properly labeled to show the quantity, date of measurement, or kind of radioactive material in the containers. 10 CFR 20.203(f) (4)
- H. A current copy of 10 CFR 20, a copy of the license, or a copy of the operating procedures was not properly posted or made available. 10 CFR 20.206(b)
- I. Form AEC-3 was not properly posted. 10 CFR 20.206(c)
- J. Records of the radiation exposure of individuals were not properly maintained. 10 CFR 20.401(a) or 34.33(b)
- K. Records of surveys or disposals were not properly maintained. 10 CFR 20.401(b) or 34.43(d)
- L. Records of receipt, transfer, disposal, export or inventory of licensed material were not properly maintained.
10 CFR 30.51, 40.61 or 70.51
- M. Records of leak tests were not maintained as prescribed in your license, or 10 CFR 34.25(c)
- N. Records of inventories were not maintained. 10 CFR 34.26
- O. Utilization logs were not maintained. 10 CFR 34.27

(AEC Compliance Inspector)

6. LICENSEE'S ACKNOWLEDGMENT

The AEC Compliance Inspector has explained and I understand the items of noncompliance listed above. The items of noncompliance will be corrected within the next 30 days.

(Date)

(Licensee Representative — Title or Position)

REPORT COMPILED SHEET

Identifying Information

Type Report

(circle)
591 592
-6 -4, -5

- ✓ 1. Licensee Sinclair Research, Incorporated
- ✓ 2. Address 400 East Sibley Blvd.
Harvey, Illinois
- ✓ 3. License No(s) 12-140-4, -5, -6
- ✓ 4. Date of Inspection October 28, 1966
- ✓ 5. Inspector E. T. Mapp
- ✓ 6. Status of Compliance -4, -5 noncompliance; -6 clear

Items of Noncompliance

- ✓ 7. Section of Regulation or License Condition 12-140-4, -5 Details Paragraph:
 - A. -4, Cond. 14C A. Paragraph 41 a
 - B. -5, Cond. 15A B. Paragraph 41 b
 - C. _____ C. _____
 - D. _____ D. _____
 - E. _____ E. _____
 - F. _____ F. _____
 - G. _____ G. _____

Classified Information

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

E. T. Mapp 10-31-66
Inspector Date
[Signature] 11-14-66
Reviewer Date

Sinclair Research, Incorporated
Harvey, Illinois

~~November 7, 1966~~

October 28, 1966

HEALTH PHYSICS ANALYSIS

✓ The licensee has a satisfactory over-all radiation health-safety program.

Use of licensed material is controlled by the Radioisotope Committee and its chairman, the Radiological Safety Officer, who has had extensive training and experience with radiation and radioisotopes.

The licensee has specially designed and constructed facilities and extensive equipment for the use of licensed material and for the radiation safety program.

The licensee has satisfactory programs of personnel monitoring, radiation surveys, and record keeping.

In a given work area, printed regulations pertaining to radiological safety procedures in that area are posted.

D E T A I L S

GENERAL INFORMATION

- ✓ 9. Type of inspection - announced. The licensee was notified by telephone on October 24, 1966 of the proposed inspection.
- ✓ 10. The Illinois Department of Public Health was notified by telephone on October 24, 1966 of the scheduled inspection. However, no one accompanied the AEC inspector.
- ✓ 11. The following licensee personnel were interviewed, and they furnished the information given herein: Dr. A. I. Snow, Chairman, Radioisotope Committee; L. A. Baillie and G. A. Uhl, users in the Radiation Division; H. L. Skonecke and Stanley Suliss, users in the Engine Laboratory; R. H. King, Plant Safety Supervisor and Director of Research Personnel; C. A. Stisser, First Aid Attendant.

INSPECTION HISTORY

- ✓ 12. The last previous inspection under License No. 12-140-4 was made on May 25, 1965; no item of noncompliance was found. The last previous inspection under Licenses No. 12-140-5 and 12-140-6 was made on October 16, 1963; no item of noncompliance was found.

PROGRAM

- ✓ 13. The licensed materials are used for the purposes authorized in the licenses, as detailed in Paragraph 14 herein.
- ✓ 14. Physical inventory of isotopes, quantities, forms:
- a. License No. 12-140-4 provides for:
- A. 100 curies of H-3 in any form; on hand were 44.022 curies of H-3 at the time of inspection.
- B. 1 curie of each byproduct material with Atomic numbers between 3 and 83, inclusive, except 25 curies Co-60, 25 curies Ir 192, 100 mc Sr-90, 20 curies Kr-85, total 150 curies, all in any form; on hand at the time of the inspection were 31.965 mc C-14, 0.9 curie Cs-137, 20 mc Ni-63, 50 μ c Cl-36, 125 mc Co-60, 30 mc Sr-90, 0.9 curie Kr-85, 0.25 mc Fe-59, and the following irradiated piston rings: nine containing 300 mc Fe-59 when received

July 22, 1966, nine containing 8 mc Fe-59 when received February 9, 1966, ten containing 170 mc Fe-59 when received August 3, 1965; all used for research and development, as specified.

- b. License No. 12-140-5 provides for 15,000 curies Co-60 as sealed sources (AECL stainless steel welded pencils) for investigation of the effects of gamma radiation on petroleum processes and products; 7000 curies Co-60 were on hand.
- c. License No. 12-140-6 provides for 100 mc Co-60 as cobalt naphthenate for testing of refinery vacuum stills; 10 mc Co-60 cobalt naphthenate were on hand.

- ✓ 15. The licensee was in compliance with the terms of his license regarding possession limits, forms, and specific radioisotopes.

ORGANIZATION AND ADMINISTRATIVE CONTROL

- ✓ 16. The licensed programs are located mainly in the Radiation Division and in the Engine Laboratory of Sinclair Research, Inc.
- Mr. E. J. Martin is Vice President and General Manager of Sinclair Research, Inc. Dr. A. I. Snow is Director of the Radiation and Instrumentation Division. Mr. H. L. Skonecke, Research Engineer, supervises installation and monitoring of equipment using radioactive materials in the Engine Laboratory. Mr. R. H. King is Plant Safety Supervisor and Director of Research Personnel.

- ✓ 17. Radioisotope Committee

The present members of the Committee are:

A. I. Snow, Chairman
R. H. King
R. L. Pontious
L. A. Baillie
L. V. Beckberger
H. L. Skonecke

- ✓ 18. Radiological Safety Officer (R.S.O.)

Dr. A. I. Snow is the R.S.O. He received a Ph. D. in Physical Chemistry from Iowa State College and had seven years' training and experience with radiation and radioisotopes at the Ames Laboratory of the A.E.C.

- ✓19. The individual user's competence to utilize licensed materials is determined on the basis of his training and experience with radiation and radioisotopes.
- ✓20. Control of procurement of licensed material is exercised by the Radioisotope Committee. All users must obtain approval for any specific use by a quorum of at least four members of the Radioisotope Committee. The quorum must always include the R.S.O.

RADIOLOGICAL SAFETY PROCEDURES

- ✓21. The plant radiological safety procedures are as given in the document "Radioisotope Committee Control over Radioisotope Procurement and Record Keeping" submitted with the licensee's application for ^{License No.} 12-140-4, dated May 16, 1957. This includes a description of the responsibilities of the Radioisotope Committee and the duties of the R.S.O.
- ✓22. In a given work area, printed regulations pertaining to radiological safety procedures in that area are posted. This includes the Operating Instructions posted in the Engine Laboratory and the Posted Operating Procedure for ~~O~~pening or ~~C~~losing Radiation Cave Door submitted with the licensee's application for ^{License No.} 12-140-5, dated January 2, 1959, and posted at the cave.

FACILITIES AND EQUIPMENT

- ✓23. The facilities of Sinclair Research, Inc. are located at 400 East Sibley Blvd. (147th Street) in Harvey, Illinois and comprise the compound of buildings shown in the Plot Plan submitted with the licensee's letter of September 8, 1960.
- ✓24. The licensee exercises complete control over the facilities, which are used exclusively by the licensee. The area is fenced in and is guarded.
- ✓25. The Radiation Laboratory Building, which was specially designed, is described in detail in the material submitted with the licensee's application for ^{License No.} 12-140-4, dated May 16, 1957. This specially constructed building is divided into two sections for research involving radioactive materials: a radioactive tracer section comprising a tracer laboratory, a counting room, and a dark room; and a radiation section comprising a radiation laboratory and the radiation cave. A general area consists of an office, shower room, washroom, and locker room. Three plan views of the Radiation Laboratory Building were enclosed with the licensee's letter, dated November 17, 1961.

- ✓26. The facilities in the Engine Laboratory Building involved in the use of radioactive materials include: Room E-18, in which there is a 1964 Ford engine with 8 radioactive piston rings installed, waste oil drum and cans, and a Tracerlab recording analyzer; Room E-9, in which there are concrete lined storage holes in the floor stoppered by 16 inch long concrete plugs and also special lead storage containers for radioactive piston rings; and a counting room.
- ✓27. The instrumentation possessed is comparable to that listed on the licensee's applications.

PERSONNEL MONITORING

- ✓28. Film badges (see also Records, Paragraph 39).
- a. A total of 43 film badges are used.
 - b. About 35 badges are permanently assigned to:
 1. anyone working in the Radiation Laboratory Building
 2. personnel in the Engine Laboratory working near isotopes
 3. personnel working with x-rays
 4. storehouse personnel who receive incoming shipments.
 - c. Badges are supplied by R. S. Landauer, Jr. and Company
 - d. Separate films are worn for a period of two weeks and for a period of thirteen weeks.
 - e. The film supplier's reports are reviewed by the R.S.O., who is Director of the Radiation Division, and by the supervisor in the Engine Laboratory and are then sent to the Plant Safety Supervisor for permanent filing.
 - f. Any reported exposures above the licensee's normal film badge readings are investigated to determine the cause and any corrective action necessary to prevent a recurrence.
- ✓29. Pocket dosimeters
- Pocket dosimeters are used occasionally at the Radiation Laboratory and at the Engine Laboratory for new jobs.

RADIATION SURVEYS

- ✓30. Types of surveys (see also Records, Paragraph 38)
- a. Surveys are made in the Tracer Laboratory of areas wherever gamma emitters are used. These surveys are made by Baillie using a Nuclear-Chicago G-M

Beta, Gamma survey meter and a Juno Alpha, Beta, Gamma ionization chamber meter.

- b. Surveys of Waste Drum Area #8, where the drums of radioactive waste are stored on the plant site, are made by C. A. Stisser, First Aid Attendant in the Plant Safety Department.
- c. In the Engine Laboratory, the shipping container of irradiated piston rings is surveyed at the surface on the top and all sides when received; then the rings are removed from the lead container, and the radiation level is measured at one meter or one yard from the rings. Radiation levels are also measured all around the engine after the radioactive piston rings have been installed in it.
- d. The vendor's invoice sent with a shipment of irradiated piston rings shows the radiation level at 12 inches from the surface of the container.

POSTING AND LABELING

- ✓31. Areas and/or rooms in which licensed materials are used or stored were posted with signs bearing the radiation caution symbol and the words "Caution" (in some instances, "Danger") "Radioactive Materials," and where appropriate, "Radiation Area."
- ✓32. The radiation cave door is posted with signs bearing the radiation caution symbol and the words "Caution High Radiation Area." Three separate interlock systems have been provided to prevent opening of the cave door while the source is out of the well and to prevent raising the source while the cave door is open or closing the cave door while personnel are present in the radiation cave. These systems are described in detail in the papers "Posted Operating Procedure for Opening or Closing Radiation Cave Door" and "Operation of Radiation Cave Interlock System in the Event of a Power Failure" submitted with the licensee's application dated January 2, 1959 for License No. 12-140-5.
- ✓33. Containers in which licensed materials are used, stored or transported bore labels bearing the radiation caution symbol and the words "Caution Radioactive Material," and also stating the isotope, amount, and date of measurement.
- ✓34. Copies of the operating procedures and the AEC licenses and regulations were posted or were kept available for employees' examination on request.

- ✓ 35. Form AEC-3 was posted in the Radiation Laboratory Building, in the Administration Building, and in the Clock House Building.

LEAK TESTS

- ✓ See License Conditions, Paragraph 41, (a) & (b)

WASTE DISPOSAL

- ✓ 36. No radioactive waste has been disposed by burial. There have been no shipments of radioactive waste for disposal since the last inspection. No licensed material has been disposed by incineration since the last inspection. The retention tank for the tracer laboratory is not yet full and has not yet been emptied.
- All disposal of licensed material has been by on-site storage since the last inspection.

RECORDS

- ✓ 37. Receipt and transfer of licensed material
- a. A logbook of all isotopes received, with entries in chronological order and showing isotope, chemical form, amount, date, and from whom received, is kept by Baillie in the Radiation Division.
 - b. A logbook is kept in the Engine Laboratory with entries in chronological order, showing data on shipments of irradiated piston rings received. The vendor's shipping invoices showing isotope, amount, and date are also kept on file.
 - c. The Plant Safety Supervisor has a permanent file of radioisotopes received by the Engine Laboratory and the Radiation Division.
 - d. Records of dates, isotopes, and amounts used and disposed are kept in the employees' laboratory notebooks.
- ✓ 38. Radiation survey records (see also Paragraph 30)
- a. The results of surveys made in the Tracer Laboratory of areas wherever gamma emitters are used, are recorded by Baillie in his daily logbook.
 - b. The results of the surveys of Waste Drum Area #8, where the drums of radioactive waste are stored on the plant site, are recorded by C. A. Stisser in reports to Dr. Snow, the R.S.O.

- ✓ c. In the Engine Laboratory, the record of results of the radiation survey on October 27, 1966 of the 1964 Ford Engine with 8 piston rings received July 22, 1966 in the engine, showed the following radiation levels around the engine:

Top	12" above	5.0 mr/hr
Bottom	12" below	8.0 mr/hr
Right side	12", 6.5 mr/hr	36", 1.5 mr/hr
Left side	12", 6.2 mr/hr	36", 1.3 mr/hr
Front	12", 2.2 mr/hr	36", 0.8 mr/hr
Rear	12", 4.0 mr/hr	36", 1.0 mr/hr

- ✓ 39. Film badge records (see also Paragraph 28)

- a. The Landauer reports of quarterly film badge exposures showed all readings M (less than 10 mrems x or Gamma, 40 mrems hard β , 20 mrems fast n, 10 mrems thermal n) since the last inspection, except as follows:

<u>QUARTER BEGINNING</u>	<u>EXPOSURE</u>	<u>EMPLOYEE</u>	<u>LOCATION (BUILDING)</u>
4-1-65	30 mrems	[REDACTED]	[REDACTED]
7-1-65	30 mrems	[REDACTED]	[REDACTED]
	30 mrems	[REDACTED]	[REDACTED]
	90 mrems	[REDACTED]	[REDACTED] Exemption 6
	40 mrems	[REDACTED]	[REDACTED]
10-1-65	(All readings M)		
1-1-66	80 mrems	[REDACTED]	[REDACTED]
4-1-66	30 mrems	[REDACTED]	[REDACTED]
7-1-66	10 mrems	[REDACTED]	[REDACTED]
	10 mrems	[REDACTED]	[REDACTED]
	40 mrems	[REDACTED]	[REDACTED]
	50 mrems	[REDACTED]	[REDACTED]
	330 mrems	[REDACTED]	[REDACTED]

- b. Investigation of the 330-mrem exposure for [REDACTED] showed that he had been standing near the engine containing radioactive piston rings during repair work on the instrumentation. Corrective action necessary to prevent a recurrence was taken.

- ✓ 40. Personnel exposure records
- Form AEC-5 is kept for each employee using a film badge; entries are made from the Landauer reports of quarterly film badge exposures.
 - The readings on the Landauer reports of two-week film badge exposures are transcribed to logbook sheets kept for each employee using a film badge.

LICENSE CONDITIONS

- ✓ 41. Status of compliance with license conditions

a. 12-140-4

License Conditions 10 thru 19 were reviewed with the licensee representatives during the inspection. The only item of noncompliance was as follows:

The latest leak tests had been done on October 19, 1966 and the last previous leak tests on February 18, 1966 and April 27, 1965. The licensee was thus in noncompliance with Condition 14C of License No. 12-140-4, which requires leak tests, ^{of sealed sources} to be done at intervals not to exceed six months.

b. 12-140-5

Conditions 10 thru 15 were reviewed with the licensee representatives during the inspection. The only item of noncompliance was as follows:

The latest leak tests had been done on October 19, 1966 and the last previous leak test^s on February 18, 1966, April 27, 1965, December 11, 1964, July 28, 1964, February 10, 1964, and September 25, 1963. The licensee was thus in noncompliance with Condition 15A of License No. 12-140-5, which requires that leak tests, ^{of sealed sources} be done at intervals not to exceed six months.

c. 12-140-6

Conditions 10 thru 15 were reviewed with licensee personnel during the inspection; no item of noncompliance was found.

MANAGEMENT DISCUSSION

- ✓ 42. The results of the inspection were discussed with Dr. A. I. Snow, R.S.O., Chairman of the Radioisotope Committee, and Director of the Radiation and Instrumentation Division. He stated that in the future all sealed sources held under Licenses No. 12-140-4 and -5 will be leak tested every January and every July, beginning in January 1967, at intervals not to exceed six months.