

KOPPERS

September 20, 1985

Mr. Thomas T. Martin
Division of Radiation Safety and Safeguards
Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

Dear Mr. Martin:

Subsequent to your August 28, 1985 correspondence and in accordance with 10 CFR 2.201, a response to violations identified following an inspection conducted by Mrs. Teresa Hall Darden in February, 1985 (Inspection No. 85-01) is hereby submitted.

In general, identified violations appear to involve the period between 1982-1984. In this vein, it is important to note that personnel changes and shifts in job responsibilities made in mid-1984 have resulted in increased emphasis on and closer scrutiny of NRC licensed activities. See attached correspondence issued August 7, 1985 (Appendix I).

Following the identified changes, a series of new and/or revised policies and procedures were initiated to upgrade the Radiation Health Physics Program. These are assembled and attached as Appendix II.

Be assured that the Koppers Occupational Health & Product Safety Department has instituted these policies and procedures, in most cases prior to the Region I audit, to prevent any incidents involving sealed source material. Currently, and in the future, every precaution will be taken to ensure all potential hazards are minimized.

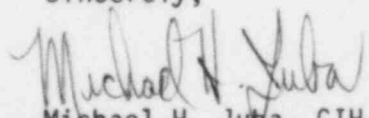
Each violation will be identified by and addressed in the order indicated in the attached Notice of Violation.

8510210141 851017
REG1 LIC30 PDR
37-03400-02

Mr. Thomas T. Martin
September 20, 1985
Page 2.

Please contact this office at 412/327-3000, Extension 5138 for additional information or follow-up.

Sincerely,

A handwritten signature in dark ink, appearing to read "Michael H. Juba". The signature is fluid and cursive, with the first name "Michael" being more prominent.

Michael H. Juba, CIH
Senior Industrial Hygienist

/mad

attachments

cc: C. W. Flickinger
G. G. Kenney
D. J. McGraw, M.D.
R. J. O'Gara
J. Veri

RESPONSE TO NOTICE OF VIOLATION

Page 1.

ITEM A - SEVERITY LEVEL IV

Following the discovered absence of a gas chromatograph electron capture detector housing containing a 15 millicuries Nickel 63 source, the NRC was immediately notified by telephone, and registered mail in accordance with 10 CFR 20.402. Subsequent investigation indicated that the detector housing was most likely transported to the Chamber Dump in Monroeville, PA, a non-hazardous waste site, by the Queen Reduction Company. The detector housing would have been intact with the identification and radiation labels attached.

Corrective actions taken to prevent further violations include:

- A certified industrial hygienist from the Corporate Industrial Hygiene Section has been assigned direct responsibility for all licensing requirements pertaining to NRC activities at the Monroeville Science and Technology Center - effective 8/7/84.
- All detector housings including back-up units in storage are leak tested/surveyed every six (6) months - effective 2/19/85. (See attached leak test reports in Appendix IV).
- At least annually, as part of the monthly Science and Technology Center Safety Agenda/Newsletter, pertinent NRC regulations are reviewed and section heads are required to compare source inventory records with existing conditions - effective 4/85.

RESPONSE TO NOTICE OF VIOLATION

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ITEM B - SEVERITY LEVEL IV

License No. 37-10845-01 - Leak test/survey records indicate licensed sources were tested on the following occasions:

May 24, 1979
November 30, 1979
May 9, 1980
November 3, 1980
May 29, 1981
November 24, 1981
June 29, 1984

Corrective actions cited in Item A apply as the involved license is issued to the Monroeville Science and Technology Center.

License No. 37-17897-01 - Leak test/survey records indicate licensed sources were tested on the following occasions:

January 12, 1979 - Source Installations - Serial Nos. 7515 A&B,
and 7516 A&B

February 6, 1980 - Required Survey - Serial Nos. 7515 A&B

May 5, 1980 - Required Survey - Serial Nos. 7516 A&B

May 7, 1981 - New Source Installation - Serial No. 2714

November 5, 1984 - All Sources

Given the fact that testing is required every three (3) years, the following corrective actions have or will be taken:

- Personnel changes and shifts in job responsibilities made in August, 1984 and previously cited in Appendix I - effective August 7, 1984.
- Planned implementation of a survey scheduling enhancement to an existing DEHealth Occupational Health and Safety Computer System. The DEHealth system is currently in place and implementation of the survey scheduling feature is planned for mid-1986. Additional details on the scheduling system can be forwarded upon request.

RESPONSE TO NOTICE OF VIOLATION

Page 3.

License No. 37-03138-06 - Leak test/survey records indicate licensed sources were tested on the following occasions:

December 17, 1981
December 16, 1983
July 31, 1984

Given the fact that the subject license as issued to the Verona, PA facility requires leak testing on a three (3) year frequency, it is not felt this location is in violation. Therefore no specific corrective actions aside from those general changes previously cited are planned at this time. Copies of the involved leak test logbook entries are attached as Appendix V.

License No. 37-19376-01 - Leak test/survey records indicate licensed sources were tested on the following occasions:

May 27, 1981
February 22, 1983
January 27, 1984
September 17, 1985

Given the fact that the subject license as issued to the Morgan, PA facility requires leak testing on a three (3) year frequency, it is not felt this location is in violation. Therefore no specific corrective actions aside from those general changes previously cited are planned at this time. Copies of the involved leak test logbook entries are attached as Appendix VI.

RESPONSE TO NOTICE OF VIOLATION

Page 4.

ITEM C - SEVERITY LEVEL IV

License No. 37-10845-01 - Because Condition 13 of the subject license requires semiannual leak testing and coupled with the decision to leak test/survey all sources including those in storage (see ITEM A Corrective Actions), physical inventory requirements will be complied with by default.

License Nos. 37-17897-01, 37-03138-06, and 37-19376-01 - The subject Licenses require leak tests/surveys to be conducted every three (3) years. This being the case, the plant radiation safety contact will be required to complete a physical inventory form on a semiannual basis, maintain a copy for local records and forward the signed original to the Corporate Industrial Hygiene Group for retention in the Central Radiation Files. A copy of the instructional letter and inventory form are enclosed as Appendix VII - effective date immediately with full implementation by January, 1986.

RESPONSE TO NOTICE OF VIOLATION

Page 5.

ITEM D - SEVERITY LEVEL IV

Following the previously-mentioned personnel changes and responsibility assignments (Appendix I), an equipment service/calibration agreement was consummated with RAD Services, Inc., 2045 Route 286, Pittsburgh, PA 15239.

The RAD Services office is approximately three miles from the Science and Technology Center which facilitates hand delivery and rapid turnaround. In addition, RAD Services mails a reminder notice approximately 2-3 weeks prior to calibration expiration.

Copies of August 1984, February 1985, and August 1985 calibration data are attached along with an example of the RAD Services Reminder Notice (Appendix VIII) - effective date 8/20/84.

APPENDIX I

KOPPERS

Interoffice Correspondence

To See Below

From C. W. Flickinger

Location Various

Location QH&PS-IH-Monroeville

Subject Koppers Radiation
Protection Program
(814-2477)

Date August 7, 1984

Effective immediately, Michael H. Juba, certified industrial hygienist, Industrial Hygiene Section, Occupational Health and Product Safety Department, will be responsible (Radiation Protection Officer) for the Radiation Protection Programs at all of Koppers so licensed plants. Mr. Juba has had prior experience in the field of ionizing radiation protection with his former employer. Thus, Mike will be making plant visits (audits), wipe tests, source inventories, and radiation intensity measurements, as well as, presenting radiation protection training programs.

I have asked Mike to formalize the current program by preparing formal procedures/guidelines for the plants as well as the Corporation. These will include:

- Accountability and Inventory Procedures
- Duties and Responsibilities for Plant Radiation Protection Officers
- Emergency Procedures for incidents involving ionizing radiation
- Entry of Vessels equipped with ionizing radiation sources
- Receiving and Opening Packages containing ionizing radiation material

Thus, our efforts in these areas will be comparatively intensive within the next six months, in order to establish this corporate-wide program.

Your continued cooperation, this time with Mr. Juba, will be greatly appreciated.


C. W. Flickinger

CWF/mm

DISTRIBUTION - All Koppers Plants Maintaining NRC or State Licenses for Possession and Use of Sealed Ionizing Radiation Producing Sources (see attached list)

APPENDIX II

- Attachment 1: Radiation Health Program Audit Protocol and Outline
- Attachment 2: Procedures for Purchasing, Receiving and Opening Packages Containing Radioactive Material(s)
- Attachment 3: Entry of Vessels Equipped with Radioactive Sources
- Attachment 4: Density/Level Gauge Survey and Leak Test Data Sheet
- Attachment 5: Leak Test Survey Result Form

Attachment 1

RADIATION HEALTH PROGRAM AUDIT

Objective: Ascertain whether activities involving ionizing and non-ionizing radiation are being conducted according to current rules and regulations of the Appropriate Regulatory Bodies.

Scope: All licensed Koppers Company, Inc., locations in conjunction with a Leak Test/Radiation Survey.

Frequency: Annually or at least every three years depending on the required frequency for Leak Testing/Radiation Survey.

Audit Protocol: Opening conference - with the plant manager local radiation protection officer and other plant staff determined by plant management.

Records Review - (See Attached Checklist)

Leak Testing/Radiation Survey (See Attached Forms)

Exit Briefing - with the plant manager, local radiation protection officer and other plant staff determined by plant management.

Final Report - Addressed to the Plant Radiation protection officer with carbon copy to the plant manager.

APPENDIX I
RADIATION HEALTH PROGRAM AUDIT OUTLINE

I. POSTING OF NOTICES TO WORKERS

	<u>POSTED</u>	<u>NOT POSTED</u>	<u>N/A</u>
A. Copies of the following documents or a statement describing the document and where it may be examined should be posted.			
1. Regulations of Parts 19 & 20 of 10 CFR or the compatible state regulations.	_____	_____	_____
2. Application for license, license amendments, and any stipulations incorporated into license.	_____	_____	_____
3. Operating procedures applicable to licensed activities.	_____	_____	_____
4. Form NRC-3 or appropriate state form, "Notice to Workers."	_____	_____	_____
5. The above-mentioned documents should be posted conspicuously in a sufficient number of places such that individuals engaged in licensed activities will observe them.	_____	_____	_____

COMMENTS: _____

II. CAUTION SIGNS, LABELS, SIGNALS, AND CONTROLS

A. Appropriate radiation sign posted and, if needed, additional information or instructions incident to the use of the restricted area.	_____	_____	_____
B. Manufacturers' labels are affixed at time of receipt and remain permanently attached and legible.	_____	_____	_____
C. Each container or storage site bears a durable, clearly visible label identifying the contents and a label stating - "CAUTION - RADIOACTIVE MATERIAL."	_____	_____	_____

COMMENTS: _____

III. TRAINING AND INSTRUCTIONS TO WORKERS

	<u>YES</u>	<u>NO</u>	<u>N/A</u>
A. Individuals working in or frequenting any portion of a restricted area are informed of the storage, transfer, or use of radioactive materials.	_____	_____	_____
B. Individuals are instructed in the health protection problems associated with exposure to such radioactive materials.	_____	_____	_____
C. Individuals are instructed in the precautions and/or procedures to minimize exposure.	_____	_____	_____
D. Individuals are instructed about the biological effects associated with exposure to radiation.	_____	_____	_____
E. Specific instruction is given to the fertile female as well as her co-workers and supervisor about the hazards of radiation to the fetus.	_____	_____	_____
F. Individuals are trained in the function and use of protective equipment.	_____	_____	_____
G. Individuals know and understand the rules and regulations that apply to persons working in or around a restricted area.	_____	_____	_____
H. Individuals are instructed in their responsibility to report any conditions or violations that would lead to any unnecessary exposure.	_____	_____	_____
I. Individuals are instructed in emergency procedures in case of a radiation accident.	_____	_____	_____
J. Individuals are made aware of the exposure reports which workers may request.	_____	_____	_____

COMMENTS: _____

IV. PERSONNEL MONITORING**YES** **NO** **N/A**

- A. Does the licensed activity have areas that require personnel monitoring? _____
- B. Is personnel monitoring provided in areas where the individual receives, or is likely to receive, exposures in excess of the following limits: _____

Rems per Calendar Quarter

Whole body (head, trunk, active blood-forming organs, lens of eye or gonad).....	1.25
Hands and forearms, feet and ankles.....	18.75
Skin of whole body.....	7.5

- C. If not, are enough surveys taken and records made of these surveys to justify that monitoring is unnecessary? _____
- D. Are personnel dosimeters used by individuals working with x-ray producing equipment? _____

COMMENTS: _____**V. NOTIFICATION AND REPORTS TO INDIVIDUALS**

- A. Are radiation exposure histories, if required, maintained showing results and are they available to the employee on request? _____

COMMENTS: _____**VI. LEAK TESTS AND SURVEYS**

- A. Are leak tests conducted on required devices and at appropriate intervals as well as tests of the proper operation of the **OPEN-CLOSED** shutter mechanism. _____
- B. Are surveys made of packages received, picked up, or opened for removable surface contamination or external exposure? _____
- C. Are surveys made as a means of evaluation of the use, release, production, or disposal of radioactive material and any other surveys as may be necessary to comply with the regulations? _____

COMMENTS: _____**VII. RECORDS OF REPORTS AND SURVEYS**

- A. Are records kept of individuals for whom personnel monitoring is required? _____
- B. Are records maintained for any surveys that were used as a means of evaluation of the use, release, production, or disposal of radioactive material? _____
- C. Records of leak tests and proper operation of the **OPEN-CLOSED** shutter mechanism of certain measuring, gauging or controlling devices. _____
- D. Records of any other surveys as are necessary to comply with the regulations. _____
- E. Records of required training and results of tests, if any, for individuals who work in or around a restricted area. _____
- F. Records of tests for calibration of instruments and other equipment used in connection with the utilization or storage of by-product material. _____
- G. Records are kept of the receipt, transfer, and disposal of by-product material. _____

COMMENTS: _____

VIII. PICKING UP, RECEIVING, AND OPENING PACKAGES**YES****NO****N/A**

- A. Procedures are established for receiving, surveying, and opening packages containing radioactive material.
- B. Monitoring is performed as soon as possible after receipt, but no later than three hours after arrival or 18 hours, if received after normal working hours.
- C. If surface contamination is in excess of 0.01 microcuries/cm² or a direct reading greater than 200 mR/hr at contact, or 10 mR/hr at 3 feet are observed, the carrier and state agency are notified.

_____	_____	_____
_____	_____	_____
_____	_____	_____

COMMENTS _____**IX. EMERGENCY PROCEDURES**

- A. Procedures are established and responsible individuals have been designated to handle a radiation incident.
- B. Protective equipment and monitoring instruments are available in case of emergency.

_____	_____	_____
_____	_____	_____

COMMENTS _____**X. MICROWAVE OVENS**

- A. Microwave ovens are in good working order and proper signs are posted.
- B. Periodic surveys are made and records maintained indicating there is no potential radiation hazard.

_____	_____	_____
_____	_____	_____

COMMENTS _____**XI. MEDICAL X-RAY UNITS**

- A. The x-ray equipment has an adjustable collimator that defines the entire exposure field.
- B. The x-ray equipment can be operated by a timer which automatically starts and terminates the exposure.
- C. The control panel has an indicator light or switch indicating that the unit is energized and a sign stating that x-rays are being produced.
- D. The control panel has gauges indicating the KVP and the MA.
- E. If assistance to the patient is required during the exposure, the operator wears a personal dosimeter.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

COMMENTS _____**XII. INDUSTRIAL X-RAY EQUIPMENT**

- A. Procedures and practices are written and available for use with the x-ray unit.

_____	_____	_____
-------	-------	-------

COMMENTS _____**XIII. INSTRUMENTS**

- A. Model:
- B. Calibration due date:

COMMENTS _____

REFERENCES

References cited are from the Nuclear Regulatory Commission (NRC). Agreement states have compatible regulations that are either the same or similarly worded. In the absence of an NRC Regulation, reference is from Title 29, Title 21, Bureau of Radiological Health or the National Council on Radiation Protection.

- I.A.1. Title 10, Code of Federal Regulations, Part 19, Section 19.11(a).
- I.A.2. Ibid.
- I.A.3. Ibid.
- I.A.4. Title 10, Code of Federal Regulations, Part 19, Section 19.11(c).
- I.A.5. Title 10, Code of Federal Regulations, Part 19, Section 19.11(d).
- II.A. Title 10, Code of Federal Regulations, Part 20, Section 20.203.
- II.B. Title 10, Code of Federal Regulations, Part 31, Section 31.5(c)1.
- II.C. Title 10, Code of Federal Regulations, Part 32, Section 32.51(a)3(ii).
- III.A. Title 10, Code of Federal Regulations, Part 10, Section 19.12.
- III.B. Ibid.
- III.C. Ibid.
- III.D. Ibid.
- III.E. Nuclear Regulatory Guide 8.13.
- III.F. Title 10, Code of Federal Regulations, Part 19, Section 19.12.
- III.G. Ibid.
- III.H. Ibid.
- III.I. Ibid.
- III.J. Ibid.
- IV.A. Title 10, Code of Federal Regulations, Part 20, Section 20.202.
- IV.B. Ibid.
- IV.C. Title 10, Code of Federal Regulations, Part 20, Section 20.201(b).
- IV.D. If required by Title 29, Code of Federal Regulations, Section 1910.96(d). Texas Regulations for Control of Radiation, Part 34, Section 34.6(b). Pennsylvania Department of Environmental Resources, Part I, Chapter 233, Section 233.43. Title 10, Code of Federal Regulations, Part 34, Section 34.33(a).
- V.A. Title 10, Code of Federal Regulations, Part 19, Section 19.13.
- VI.A. Title 10, Code of Federal Regulations, Part 20, Section 20.205.
- VI.C. Title 10, Code of Federal Regulations, Part 20, Sections 20.201, 20.401(b).
- VII.A. Title 10, Code of Federal Regulations, Part 20, Section 20.401(a).
- VII.B. Title 10, Code of Federal Regulations, Part 20, Section 20.401(b).
- VII.C. Title 10, Code of Federal Regulations, Part 31, Section 31.5(c)4.
- VII.D. Ibid.
- VII.E. Nuclear Regulatory Guide 8.13.
- VII.F. Title 10, Code of Federal Regulations, Part 30, Section 30.53.
- VII.G. Title 10, Code of Federal Regulations, Part 30, Section 30.51(a).
- VIII.A. Title 10, Code of Federal Regulations, Part 20, Section 20.205(d).
- VIII.B. Title 10, Code of Federal Regulations, Part 20, Section 20.205(b)1.
- VIII.C. Title 10, Code of Federal Regulations, Part 20, Section 20.205(b)2.
- IX.A. If required, Title 10, Code of Federal Regulations, Part 34, Section 34.32.
- X.A. Title 29, Code of Federal Regulations, Part 1910, Section 1910.97(3).
- X.B. At the discretion of the Radiation Safety Officer.
- XI.A. National Council on Radiation Protection, Report No. 33, Section 3.2.1(c).
- XI.B. National Council on Radiation Protection, Report No. 33, Section 3.2.1(e).
- XI.C. National Council on Radiation Protection, Report No. 33, Section 3.2.1(g).
- XI.D. National Council on Radiation Protection, Report No. 33, Section 3.2.1(h).
- XI.E. If required, Texas Regulations for Control of Radiation, Section 32.5(c)4).
- XII.A. Texas Regulations for Control of Radiation, Section 34.5(a).
- XII.B. Texas Regulations for Control of Radiation, Section 34.3(f).
- XII.C. Texas Regulations for Control of Radiation, Section 34.3(a).
- XII.D. Texas Regulations for Control of Radiation, Section 34.6(b).
- XII.E. Texas Regulations for Control of Radiation, Section 34.4.

ATTACHMENT 2

Procedures for Purchasing, Receiving and Opening Packages Containing Radioactive Material(s)

POLICY

To ensure that exposure to ionizing radiation is maintained as low as reasonably achievable (ALARA) and to comply with Title 10, CFR Part 20.205, all packages containing radioactive material, unless exempted under the preceding regulation, must be surveyed as soon as possible following receipt.

KOPPERS NOTIFICATION REQUIREMENTS

Prior to the purchase of any radiation source, the Plant Radiation Protection Officer (RPO) or local individual responsible for proper and safe use must notify the Occupational Health and Product Safety Department - Industrial Hygiene Section (OH&PS-IH) as indicated below:

		<u>OFFICE</u>	<u>HOME</u>
PRIMARY:	M. H. Juba	412/327-3000, Ext. 5138	412/731-4977
ALTERNATE:	C. W. Flickinger	412/327-3000, Ext. 5135	412/793-0143

As soon as a timetable for shipment has been established, the RPO shall immediately notify OH&PS-IH. As much lead time as possible is requested and a minimum of one week advance notice is necessary to ensure availability of equipment and/or personnel, should leak testing/radiation level surveying be required.

PROCEDURES

- Notify OH&PS-IH as previously described to ensure the following:
 - Appropriate license application or license amendments have been initiated
 - Operating procedures are available
 - Training and instruction to workers is in process or completed
 - Compliance with Title 10, CFR Parts 19, 20, 30, and 31
 - Determine if external surfaces of the package must be surveyed for leakage and high radiation level

- Upon receipt, the Plant individual accepting the package will:

- Visually inspect package for any sign of damage (e.g., wetness, crushed). **If damage is noted, notify the Plant RPO and OH&PS-IH.**
- Check for the presence of warning labels as required by NRC regulations.

NOTE: Each package of radioactive material must be labeled on two opposite sides with the appropriate warning label as described in Attachment 2A.

NOTE: The package label should identify the following:

CONTENTS

- Radionuclide and shipping name "Radioactive Materials, N.O.S."

OF CURIES

- Maximum activity within the package

TRANSPORT INDEX

- Maximum mR/hr at 3 feet from the package center rounded off to next highest tenth, e.g., 1.02 mR/hr has a transport index of 1.1

- If it has been previously determined that the external surfaces of the package must be surveyed based on the radioactivity and transport group of the radiation source (as described in 10 CFR, Part 20.205, paragraph B), the following testing is required:

- Measure and record the exposure rate at 3 feet from the package center using the Victoreen Thyac III survey meter (or comparable instrument). **If >10 mR/hr - stop procedure and notify OH&PS-IH.**
- Measure and record the surface exposure rate using the Victoreen Thyac III survey meter (or comparable instrument). **If >200 mR/hr - stop procedure and notify OH&PS-IH contact.**
- Put on gloves and open the outer package (following manufacturer's directions, if supplied) and remove packing slip. Open inner package to verify contents (compare requisition, packing slips, and label on bottle, source holder, etc.), check integrity of final source container (inspect for breakage of seals or vials, loss of liquid, discoloration of packing material, etc.). Check also that the shipment does not exceed possession limits as specified in license.
- Wipe external surface of final source container with moistened cotton swab, according to leak test procedures and forward to OH&PS-IH for assay.
- Monitor the packing material and shipping container(s) for contamination using the Victoreen Thyac III survey meter (or comparable instrument) before discarding. If contaminated, treat as radioactive waste, if not, obliterate radiation labels before discarding in regular trash. (Radioactive contamination is defined as packing material survey meter readings greater than 5 mR/hr after the source material has been removed.)

NOTE: See the enclosed Survey Form to record survey data (Attachment 2B).

ATTACHMENT 2A



WHITE 1 (one red stripe)
package surface <0.5 mR/hr;
0 mR/hr @ 3 feet



YELLOW II (two red stripes)
package surface <10 mR/hr;
0 mR/hr @ 3 feet



YELLOW III (three red stripes)
package surface <200 mR/hr;
10 mR/hr @ 3 feet

ATTACHMENT 2B

SURVEY FORM1. PACKAGE CONDITION

Punctured () YES () NO
 Crushed () YES () NO
 Wet or stained () YES () NO
 Other _____

2. EXPOSURE LEVEL

a. At 3 feet from center of package = _____ mR/hr.

Transportation index on label = _____ units.

b. At package surface = _____ mR/hr.

3. CONTENTS

a. Does description of packing slip agree with label on source holder?

() YES () NO comments:

b. Integrity of source holder:

Breakage () YES () NO
 Leakage () YES () NO
 Other _____

c. Wipe-test of source holder:

SAMPLE	DESCRIPTION

4. FINAL DISPOSAL OF PACKING MATERIAL

a. Survey of packing material = _____ mR/hr

b. Disposal of material and empty box:

() CONTAMINATED ... handled as radioactive waste
 () NO CONTAMINATION ... labels defaced and package discarded in regular trash.

ENTRY OF VESSELS
EQUIPPED WITH RADIOACTIVE SOURCES

POLICY

To ensure that exposure to ionizing radiation is maintained as far below the applicable radiation protection guidelines as reasonably achievable. Entry of a vessel equipped with a radioactive source should be permitted only after all reasonable steps have been taken to ensure that no potential for radiation exists.

DEFINITIONS

Vessel

Any enclosure where employees may have to enter.

Entry

Placing any part of the body inside the vessel. The placing of hands and arms into a vessel constitutes entry.

Radiation Source

Any source of radiation, either ionizing or nonionizing - usually a sealed source of ionizing radiation.

Radiation Survey

Survey of all areas which might be occupied by personnel.

PROCEDURES

- All vessels containing a radioactive source shall be posted with a sign near, but not on, the entry port. The sign shall give notice that a radioactive source is present and what approvals are necessary prior to entry. No area shall be entered if the radiation exposure rate is greater than 2.5 mrad/hr.
- Prior to entry into a vessel equipped with a radioactive source, the source shall be locked or tagged out and written approval obtained utilizing a form similar to Attachment 1, or a standardized vessel entry permit having a separate section and sign-off for radiation clearance. All radiation checks should be approved by a person who has principal responsibility for employee safety and/or **radiation protection**.
- The above items would be mandatory, in addition to all other requirements and procedures for vessel entry.

ATTACHMENT 1

RADIATION PROTECTION
VESSEL ENTRY PERMIT

Location of Vessel:*

Identity of Vessel:*

Purpose of Entry:*

Potential Health Hazards:*

Source Locked (tagged) out by:

Time:

Date:

Vessel Surveyed for Radiation by:

Instrument Used:

Survey Readings (mR/hr):

NOTE: Entry is prohibited if radiation exposure rate is greater than 2.5 mR/hr.

Name of Employees Entering Vessel/Estimated Duration:

Source Returned to Service by:

Time:

Date:

Approved by: _____

- * Not required if already part of a vessel entry permit being modified to include Radiation Protection Items.

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE: _____ SURVEYED BY: _____

GROUP/DIVISION: _____ PLANT: _____

LOCATION OF UNIT: _____ ISOTOPE: _____

SERIAL/IDENTIFICATION #: _____ LICENSE #: _____

ASSAY DATE: _____ HALF LIFE: _____ ACTIVITY: _____

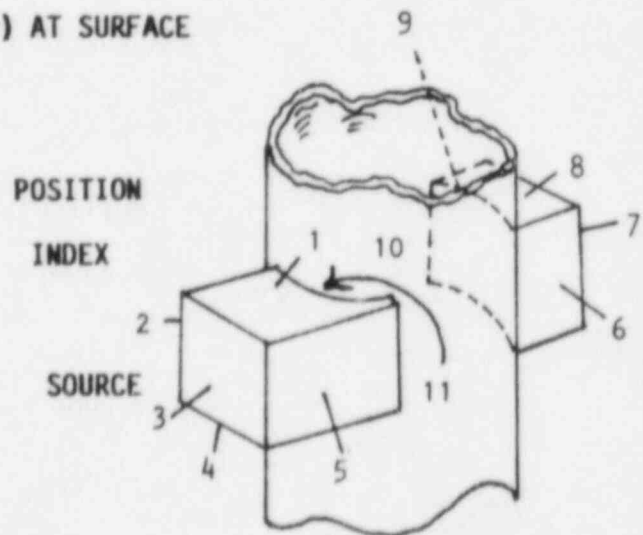
SURVEY INSTRUMENT: _____

CALIBRATION DATE: _____

INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).			
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.			
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.			
4. Unit in operation; shutter check not possible.			

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

Shutter Open		Shutter Closed	
1. _____	6. _____	6. _____	
2. _____	7. _____	7. _____	
3. _____	8. _____	8. _____	
4. _____	9. _____	9. _____	
5. _____	10. _____	10. _____	
	11. _____	11. _____	



OVER

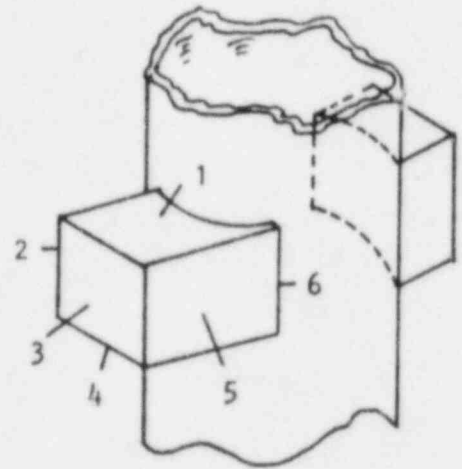
LEAK TESTS

Sample ID Number

1. _____
2. _____
3. _____
4. _____
5. _____

POSITION
INDEX

SOURCE



COMMENTS:

Attachment 5
LEAK TEST RESULTS

DATE _____ ANALYST _____

GROUP/DIVISION _____

PLANT _____

LICENSE NUMBER _____

EQUIPMENT _____

GIEGER PLATEAU _____

SOURCE TO DETECTOR DISTANCE _____

CALIBRATION SOURCE

NUCLIDE	MAJOR RADIATIONS/ ENERGIES	INITIAL ACTIVITY (μCi)	DATE	$T_{1/2}$ (1)	n (2)	CURRENT (3) ACTIVITY (μCi)
---------	----------------------------------	---	------	---------------	---------	---

- (1) $T_{1/2}$ = half-life of the radionuclide
- (2) n = number of half-lives = $t/T_{1/2}$
- where: t = elapsed time
- (3) Current Activity = $I_0 e^{-0.693t/T_{1/2}}$
- where: I_0 = original activity of radionuclide
- e = base of natural logarithms (2.718)
- t = elapsed time
- $T_{1/2}$ = half-life of the radionuclide

COUNTING EFFICIENCY

Observed Counts
(average of three readings)

5 min count (calibration source) _____ cpm

$\frac{\text{_____}}{5 \text{ min}}$

5 min blank count _____ cpm

$\frac{\text{_____}}{5 \text{ min}}$

Net Efficiency (E_n) = $\frac{C_o - B}{C_k}$ = _____ cpm/dpm

where: C_o = observed count (cpm)

B = blank (cpm)

C_k = known emission rate (dpm) (2.22×10^6 dpm/ μCi)

OVER

LEAK TEST DATA

[illegible]

- (1) See Leak Test Data Sheet (page 2) for Sample ID/position index correlation.
(2) Count represents the average of three 5-minute readings.

$$(3) \text{ Approximate Activity (uCi)} = \frac{C_0 - B}{\epsilon n} \times 4.505 \times 10^{-7} \text{ uCi/dpm}$$

```

where: C      = observed count (wipe sample) (cpm)
      B0     = blank count (cpm)
      En      = net counting efficiency (cpm/dpm)

```

NOTE: - Regulated limit for surface contamination is 0.005 μCi or 5.0×10^{-3} μCi removable radioactive material as specified in Title 10, part 31.5c.

- Raw data available in OH&PS-IH Logbook No. _____, page(s) _____

APPENDIX III



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

AUG 28 1985

Docket Nos. 30-06244
30-06101
30-06100
30-18965
30-20031
30-13619
30-17529

License Nos. 37-10845-01
37-03400-03
37-03400-02
37-03138-06
37-03138-07
37-17897-01
37-19376-01

RECEIVED

SEP 3 1985

OCCUPATIONAL HEALTH AND
PRODUCT SAFETY DEPARTMENT
INDUSTRIAL HYGIENE SECTION

Koppers Company, Incorporated
ATTN: Dr. Donald McGraw
Manager, Occupational Health
and Product Safety
400 College Park Drive
Monroeville, Pennsylvania 15146

Gentlemen:

Subject: Inspection No. 85-01

This refers to the routine safety inspection conducted by Mrs. Teresa Hall Darden of this office on February 12 and 15, 1985 of activities authorized by NRC License Nos. 37-10845-01, 37-03400-03, 37-03400-02, 37-03138-06, 37-03138-07, 37-17897-01, and 37-19376-01 and to the discussions of our findings held by Mrs. Darden with Mr. Michael Juba of your staff at the conclusion of the inspection.

The inspection was an examination of activities conducted under your license as they relate to radiation safety and to compliance with the Commission's rules and regulations and the conditions of your licenses. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, measurements made by the inspector, and observations by the inspector.

In addition, our inspector examined those activities conducted under your licenses relating to the subject covered in your letter to this office dated July 28, 1984. We have no further questions regarding these matters.

Based on the results of this inspection, it appears that certain of your activities were not conducted in full compliance with NRC requirements, as set forth in the Notice of Violation, enclosed herewith as Appendix A. These violations have been categorized by severity level in accordance with the revised NRC Enforcement Policy (10 CFR 2, Appendix C) published in the Federal Register Notice (49 FR 8583) dated March 8, 1984. You are required to respond to this letter and in preparing your response, you should follow the instructions in Appendix A.

Item A described in the enclosed Notice of Violation, involving unauthorized disposal of licensed material, is classified as a Severity Level IV violation. As indicated in Supplement IV of the NRC Enforcement Policy, significant violations of this type are normally classified as Severity Level III. However, after careful consideration of the factors involved in this

AUG 28 1985

Koppers Company, Incorporated

2

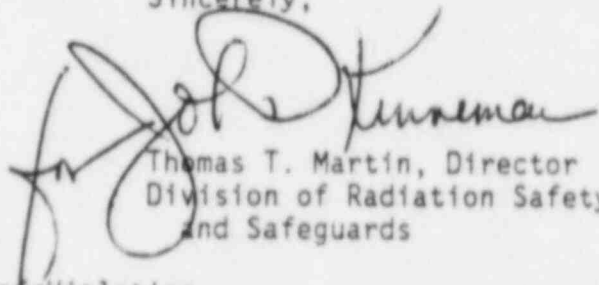
specific instance, including the fact that the impact on the health and safety of the public was minimal and remote since exposure of persons to the disposed material is unlikely, we have exercised our judgement under the NRC Enforcement Policy and have classified this violation as a Severity Level IV. Similar violations of this type in the future may result in additional enforcement action.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and your reply will be placed in the Public Document Room.

The responses directed by this letter and the accompanying Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

Your cooperation with us in this matter is appreciated.

Sincerely,



Thomas T. Martin, Director
Division of Radiation Safety
and Safeguards

Enclosure: Appendix A, Notice of Violation

cc w/encl:

Charles Flinkinger, Manager Safety and Health
Michael Juba, Industrial Hygienist
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Commonwealth of Pennsylvania

APPENDIX A

NOTICE OF VIOLATION

Koppers Company, Incorporated
Monroeville, Pennsylvania

Docket Nos. 30-06244

30-06101

30-06100

30-18965

30-20031

30-13619

30-17529

License Nos. 37-10845-01

37-03400-03

37-03400-02

37-03138-06

37-03138-07

37-17897-01

37-19376-01

As a result of the inspection conducted on February 12 and 15, 1985, and in accordance with the NRC Enforcement Policy (10 CFR 2, Appendix C), the following violations were identified:

- A. 10 CFR 20.301 requires that no licensee dispose of licensed material except by certain specified procedures.

Contrary to the above, prior to July 1984, a detector cell containing licensed material was disposed of to the normal trash, a method not authorized by 10 CFR 20.301.

This is a Severity Level IV violation (Supplement IV).

- B. Condition 13 of License Nos. 37-10845-01 and 37-17897-01 and Condition 14 of License Nos. 37-03138-06 and 37-19376-01 require that sealed sources containing byproduct material be tested for leakage and/or contamination at intervals dependent upon the specific source involved, but not to exceed either six months or three years.

Contrary to the above, as of February 15, 1985, two sealed sources containing 15 millicuries of nickel-63, which are required to be tested for contamination or leakage at six month intervals, had been tested only in June of 1984 since 1982. Also contrary to the above, sealed sources containing from 10 to 300 millicuries of cesium-137, which are required to be tested at six month or three year intervals, had not been tested for contamination or leakage at the required interval on at least five occasions since 1982.

This is a Severity Level IV violation (Supplement VI).

- C. Condition 15 of License Nos. 37-10845-01, 37-17897-01, and 37-03138-06 and Condition 16 of License No. 37-19376-01 require that a physical inventory be conducted every six months to account for all sealed sources possessed under the license and that records of the inventories be maintained.

Contrary to the above, as of February 15, 1985, the required inventories were not conducted during 1982, 1983 and 1984.

This is a Severity Level IV violation (Supplement VI).

- D. Condition 16 of License No. 37-10845-01 requires that licensed material be possessed and used in accordance with statements, representations and procedures contained in an application dated June 28, 1984, and a letter dated October 9, 1984.

Item 11.A of this application requires that survey meters be calibrated semi-annually. A previous application dated March 27, 1979 and referenced in the license contained the same requirement.

Contrary to the above, as of February 15, 1985, survey meters were calibrated in August 1981, May 1983 and on July 17, 1984, periods in excess of six months.

This is a Severity Level IV violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, Koppers Company, Incorporated is hereby required to submit to this office within thirty days of the date of the letter which transmitted this Notice, a written statement or explanation in reply, including; (1) the corrective steps which have been taken and the results achieved; (2) corrective steps which will be taken to avoid further violations; and (3) the date when full compliance will be achieved. Where good cause is shown, consideration will be given to extending this response time.

APPENDIX IV

LEAK TEST RESULTS

DATE 2/19/85 ANALYST B. A. Knicely
 GROUP/DIVISION Koppers General
 PLANT Monroeville
 LICENSE NUMBER 37-10845-01
 EQUIPMENT Nuclear Chicago Decade Scaler Model 181A with GM detector tube
 GIEGER PLATEAU 1025 volts
 SOURCE TO DETECTOR DISTANCE 0.4 millimeters

CALIBRATION SOURCE

NUCLIDE	MAJOR RADIATIONS/ ENERGIES	INITIAL ACTIVITY (uCi)	DATE	$T_{1/2}$ (1)	n (2)	CURRENT (3) ACTIVITY (uCi)
Carbon-14	β^- 0.156 MeV	0.1	5/58	5730	0.005	0.0997

- (1) $T_{1/2}$ = half-life of the radionuclide
 (2) n = number of half-lives = $t/T_{1/2}$
 where: t = elapsed time
 (3) Current Activity = $I_0 e^{-0.693t/T_{1/2}}$
 where: I_0 = original activity of radionuclide
 e = base of natural logarithms (2.718)
 t = elapsed time
 $T_{1/2}$ = half-life of the radionuclide

COUNTING EFFICIENCY

Observed Counts
(average of three readings)

5 min count (calibration source) 24090 * 4818 cpm
5 min

5 min blank count 39 * 8 cpm
5 min

Net Efficiency (En) = $\frac{C_o - B}{C_k} = \frac{4810}{2.2 \times 10^5} \text{ cpm/dpm} = 2.2\% \text{ or } 0.022$

where: C_o = observed count (cpm)
 B = blank (cpm)
 C_k = known emission rate (dpm) (2.22×10^6 dpm/uCi)

LEAK TEST DATA

[illegible]

- (1) See Leak Test Data Sheet (page 2) for Sample ID/position index correlation.
(2) Count represents the average of three 5-minute readings.

$$(3) \text{ Approximate Activity (uCi)} = \frac{C_0 - B}{T_n} \times 4.505 \times 10^{-7} \text{ uCi/dpm}$$

where: C ₀	* observed count (wipe sample) (cpm)
B	* blank count (cpm)
En	* net counting efficiency (cpm/dpm)

NOTE: - Regulated limit for surface contamination is 0.005 uCi or 5.0×10^{-3} uCi removable radioactive material as specified in Title 10, part 31.5c.

* Raw data available in OHAP5-JH Logbook No. 4182, page(s) 213.

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE: 2/19/85 SURVEYED BY: T. Dickey/M. H. Juba
 GROUP/DIVISION: Koppers General PLANT: Monroeville
 LOCATION OF UNIT: Gas Chromatography C-200 ISOTOPE: Nickel-63
 SERIAL/IDENTIFICATION #: L0375 LICENSE #: 37-10845-01
 ASSAY DATE: 8/84 HALF LIFE: 92 yrs ACTIVITY: 15 millicuries
 SURVEY INSTRUMENT: Victoreen Thyac III, serial #2668 with GM detector tube 1B85
 CALIBRATION DATE: 2/12/85

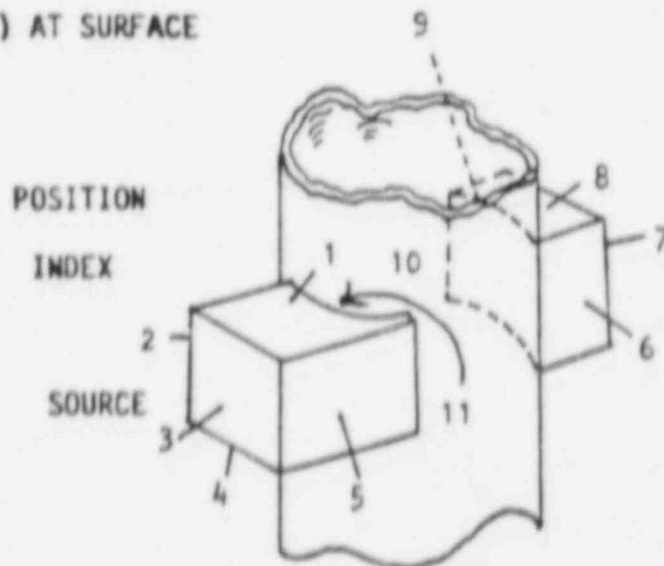
INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.	✓		
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.			✓
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

Shutter Open		Shutter Closed	
1. <u>0.01</u>	6. <u></u>	6. <u>N/A</u>	
2. <u>0.01</u>	7. <u></u>	7. <u></u>	
3. <u>0.02</u>	8. <u></u>	8. <u></u>	
4. <u></u>	9. <u></u>	9. <u></u>	
5. <u></u>	10. <u></u>	10. <u></u>	
	11. <u></u>	11. <u></u>	

where

- (1) column inlet
- (2) detector exhaust outlet
- (3) detector housing



LEAK TESTS

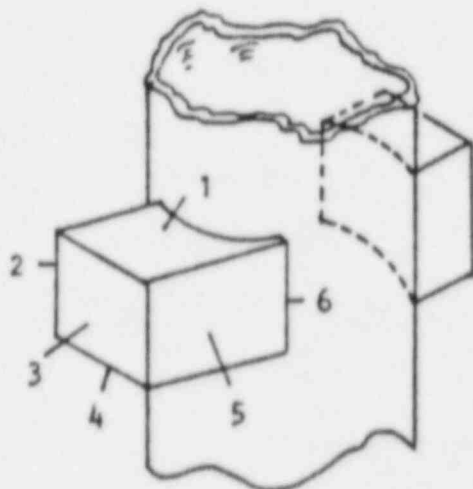
Sample ID Number

1. 4182-213-2 - column inlet to detector
2. 4182-213-3 - detector exhaust outlet
3. 4182-213-4 - detector housing
4. _____
5. _____

POSITION

INDEX

SOURCE



COMMENTS: Position index schematic is not applicable in this case.

Hewlett Packard Electron Capture Detector Cell Model 19235,

Hewlett Packard Gas Chromatograph Model 5890

Currently in service.

MHJ/mad

10/January/1985

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE: 2/19/85 SURVEYED BY: T. Dickey/M. H. Juba
 GROUP/DIVISION: Koppers General PLANT: Monroeville
 LOCATION OF UNIT: Gas Chromatography C-200 ISOTOPE: Nickel-63
 SERIAL/IDENTIFICATION #: H2369 LICENSE #: 37-10845-01
 ASSAY DATE: 2/82 HALF LIFE: 92 yrs ACTIVITY: 15 millicuries
 SURVEY INSTRUMENT: Victoreen Thyac III, serial #2668 with GM detector tube 1885
 CALIBRATION DATE: 2/12/85

INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.	✓		
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.			✓
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

Shutter Open

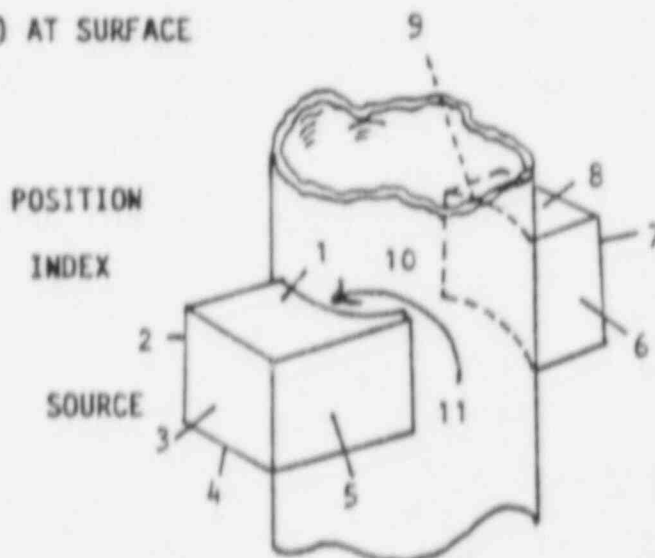
1. 0.03 6. _____
 2. 0.02 7. _____
 3. 0.02 8. _____
 4. _____ 9. _____
 5. _____ 10. _____
 11. _____

Shutter Closed

6. N/A
 7. _____
 8. _____
 9. _____
 10. _____
 11. _____

where

- (1) column inlet
- (2) detector exhaust outlet
- (3) detector housing



OVER

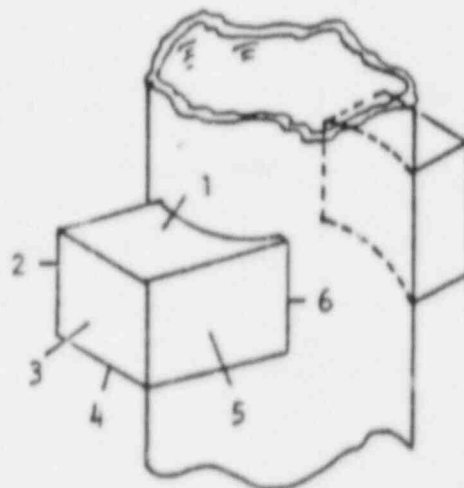
LEAK TESTS

Sample ID Number

1. 4182-213-5 - column inlet to detector
2. 4182-213-6 - detector exhaust outlet
3. 4182-213-7 - detector housing
4. _____
5. _____

POSITION
INDEX

SOURCE



COMMENTS: Position index schematic is not applicable in this case.

Hewlett Packard Electron Capture Detector Cell Model 18713A.

Currently in service.

MHJ/mad

10/January/1985

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE: 2/19/85 SURVEYED BY: T. Dickey/M. H. Juba
 GROUP/DIVISION: Koppers General PLANT: Monroeville
 LOCATION OF UNIT: Gas Chromatography C-200 ISOTOPE: Nickel-63
 SERIAL/IDENTIFICATION #: H2612 LICENSE #: 37-10845-01
 ASSAY DATE: 5/82 HALF LIFE: 92 yrs ACTIVITY: 15 millicuries
 SURVEY INSTRUMENT: Victoreen Thyac III, serial #2669 with GM detector tube 1B85
 CALIBRATION DATE: 2/12/85

INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.	✓		
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.			✓
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

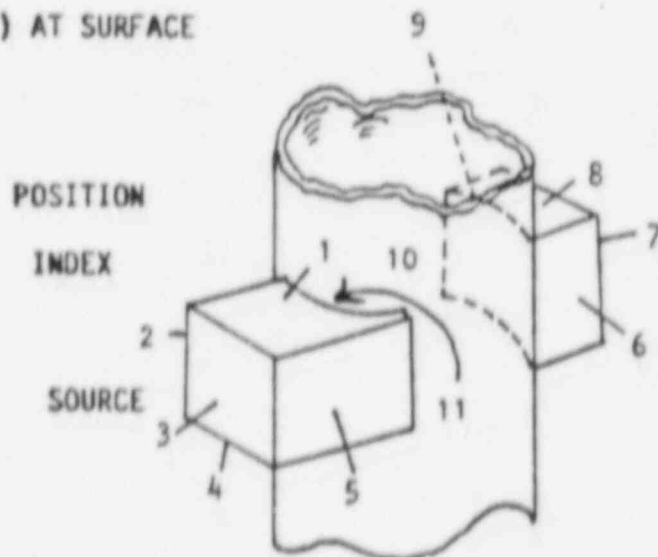
Shutter Open

1. <u>0.01</u>	6. _____
2. <u>0.01</u>	7. _____
3. <u>0.02</u>	8. _____
4. _____	9. _____
5. _____	10. _____
where	11. _____

Shutter Closed

6. <u>N/A</u>
7. _____
8. _____
9. _____
10. _____
11. _____

(1) column inlet
 (2) detector exhaust outlet
 (3) detector housing



OVER

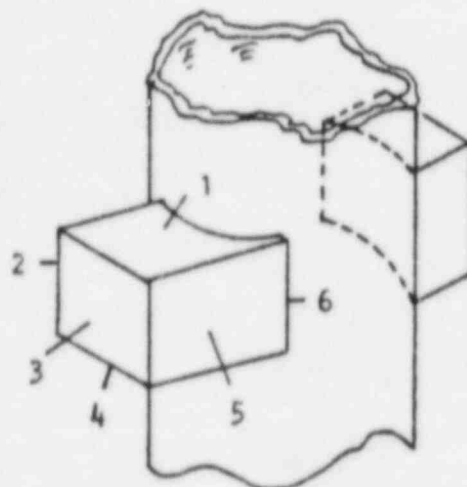
LEAK TESTS

Sample ID Number

1. 4182-213-8 - column inlet to detector
2. 4182-213-9 - detector exhaust outlet
3. 4182-213-10 - detector housing
4. _____
5. _____

POSITION
INDEX

SOURCE



COMMENTS: Position index schematic is not applicable in this case.

Hewlett Packard Electron Capture Detector Cell Model 18713A.

Replacement unit currently in storage.

MHJ/mad

10/January/1985

LEAK TEST RESULTS

DATE 7/23/85 ANALYST B. A. Knicely
 GROUP/DIVISION Koppers General
 PLANT Monroeville
 LICENSE NUMBER 37-10845-01
 EQUIPMENT Nuclear-Chicago Decade Scaler Model 181A, SN 457; Nuclear Chicago GM Detector Model 000108, SN 13592
 GIEGER PLATEAU 1025 volts
 SOURCE TO DETECTOR DISTANCE 0.4 millimeters

CALIBRATION SOURCE

NUCLIDE	MAJOR RADIATIONS/ ENERGIES	INITIAL ACTIVITY (uCi)	DATE	$T_{1/2}$ ⁽¹⁾	n ⁽²⁾	CURRENT ⁽³⁾ ACTIVITY (uCi)
Carbon 14	β^- 0.156 MeV	0.10	5/58	5730 yrs	0.005	0.0997

- (1) $T_{1/2}$ = half-life of the radionuclide
 (2) n = number of half-lives = $t/T_{1/2}$
 where: t = elapsed time
 (3) Current Activity = $I_0 e^{-0.693t/T_{1/2}}$
 where: I_0 = original activity of radionuclide
 e = base of natural logarithms (2.718)
 t = elapsed time
 $T_{1/2}$ = half-life of the radionuclide

COUNTING EFFICIENCY

Observed Counts
(average of three readings)

5 min count (calibration source) 22,643 = 4529 cpm
5 min

5 min blank count 35 = 7 cpm
5 min

Net Efficiency (ϵ_n) = $\frac{C_0 - B}{C_k}$ = 0.02 cpm/dpm

where: C_0 = observed count (cpm)
 B = blank (cpm)
 C_k = known emission rate (dpm) (2.22×10^6 dpm/uCi)

OVER

LEAK TEST DATA

[illegible]

- (1) See Leak Test Data Sheet (page 2) for Sample ID/position index correlation.
(2) Count represents the average of three 5-minute readings.

$$(3) \text{ Approximate Activity (uCi)} = \frac{C_{O-B}}{E_n} \times 4.505 \times 10^{-7} \text{ uCi/dpm}$$

where: C = observed count (wipe sample) (cpm)
 B^0 = blank count (cpm)
 ϵ_n = net counting efficiency (cpm/dpm)

NOTE: - Regulated limit for surface contamination is 0.005 uCi or 5.0×10^{-3} uCi removable radioactive material as specified in Title 10, part 31.5c.

- Raw data available in OH&PS-1H Logbook No. 4182, page(s) 232-233

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

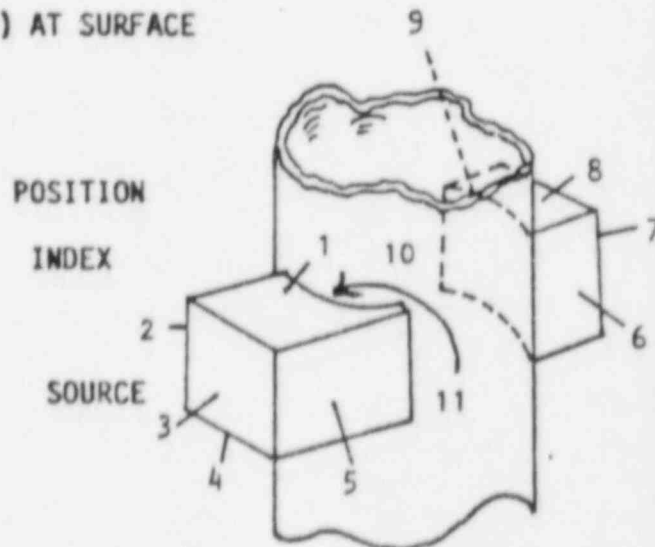
DATE: 7/22/85 SURVEYED BY: M. H. Juba
 GROUP/DIVISION: Koppers General PLANT: Monroeville
 LOCATION OF UNIT: Gas Chromatography C-200 ISOTOPE: Nickel-63
 SERIAL/IDENTIFICATION #: L0375 LICENSE #: 37-10845-01
 ASSAY DATE: 8/84 HALF LIFE: 92 yrs ACTIVITY: 15 millicuries
 SURVEY INSTRUMENT: Victoreen Thyac III, Serial #2668 with GM Detector Tube 1B85
 CALIBRATION DATE: 2/27/85

INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.	✓		
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.			✓
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

Shutter Open		Shutter Closed	
1. <u>0.01</u>	6. <u> </u>	6. <u>N/A</u>	
2. <u>0.01</u>	7. <u> </u>	7. <u> </u>	
3. <u>0.03</u>	8. <u> </u>	8. <u> </u>	
4. <u> </u>	9. <u> </u>	9. <u> </u>	
5. <u> </u>	10. <u> </u>	10. <u> </u>	
	11. <u> </u>	11. <u> </u>	

Where: (1) column inlet
 (2) detector exhaust outlet
 (3) detector housing



OVER

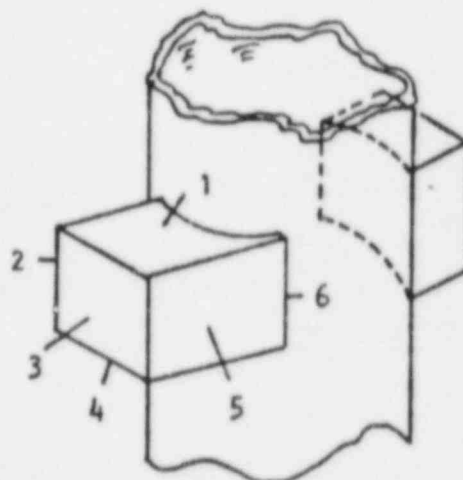
LEAK TESTS

Sample ID Number

1. L0375-1 - column inlet to detector
2. L0375-2 - detector exhaust outlet
3. L0375-3 - detector housing
4. _____
5. _____

POSITION
INDEX

SOURCE



COMMENTS: • Position index schematic is not applicable in this case.

• Hewlett Packard Electron Capture Detector Cell Model
Hewlett Packard Gas Chromatograph Model 5890

• Currently in service.

MHJ/mad

10/January/1985

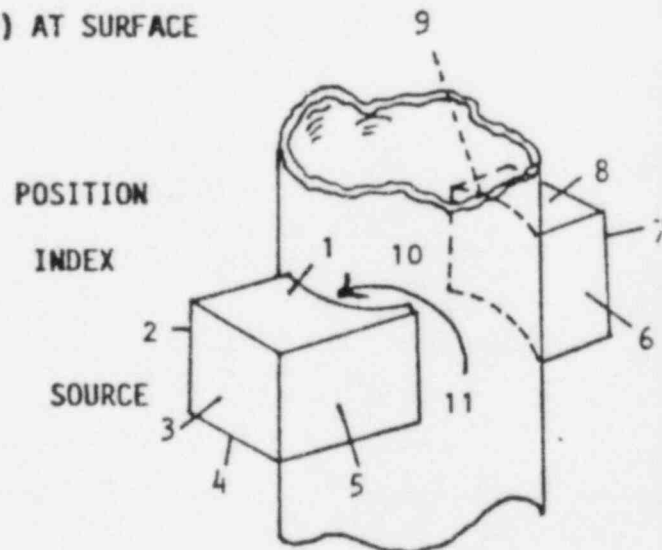
DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE: 7/22/85 SURVEYED BY: M. H. Juba
 GROUP/DIVISION: Koppers General PLANT: Monroeville
 LOCATION OF UNIT: Gas Chromatography C-200 ISOTOPE: Nickel-63
 SERIAL/IDENTIFICATION #: H2369 LICENSE #: 37-10845-01
 ASSAY DATE: 2/82 HALF LIFE: 92 yrs ACTIVITY: 15 millicuries
 SURVEY INSTRUMENT: Victoreen Thyac III, Serial #2668 with GM Detector Tube 1B85
 CALIBRATION DATE: 2/27/85

INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.	✓		
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.			✓
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

Shutter Open		Shutter Closed	
1. <u>0.03</u>	6. <u></u>	6. <u>N/A</u>	
2. <u>0.02</u>	7. <u></u>	7. <u></u>	
3. <u>0.02</u>	8. <u></u>	8. <u></u>	
4. <u></u>	9. <u></u>	9. <u></u>	
5. <u></u>	10. <u></u>	10. <u></u>	
	11. <u></u>	11. <u></u>	



Where: (1) column inlet
 (2) detector exhaust outlet
 (3) detector housing

OVER

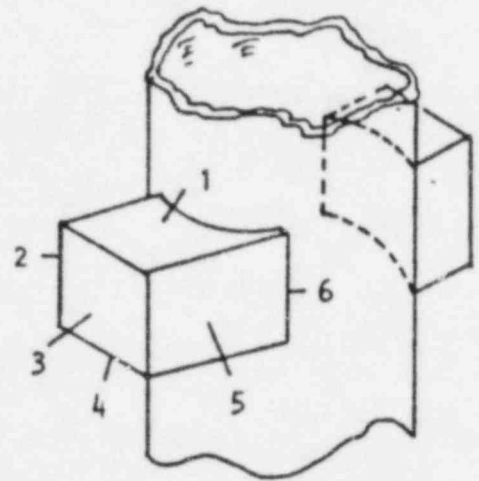
LEAK TESTS

Sample ID Number

1. H2369-1 - column inlet to detector
2. H2369-2 - detector exhaust outlet
3. H2369-3 - detector housing
4. _____
5. _____

POSITION
INDEX

SOURCE



COMMENTS: • Position index schematic is not applicable in this case.

• Hewlett Packard Electron Capture Detector Cell Model 18713A.

• Currently in service.

MHJ/mad

10/January/1985

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

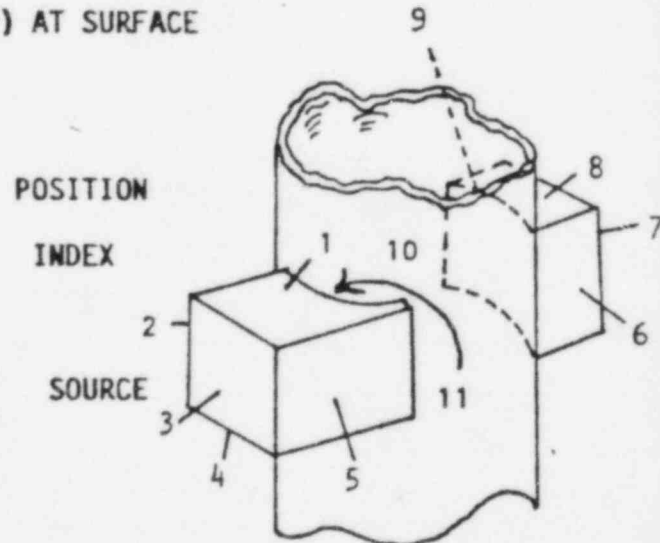
DATE: 7/22/85 SURVEYED BY: M. H. Juba
 GROUP/DIVISION: Koppers General PLANT: Monroeville
 LOCATION OF UNIT: Gas Chromatography C-200 ISOTOPE: Nickel-63
 SERIAL/IDENTIFICATION #: H2612 LICENSE #: 37-10845-01
 ASSAY DATE: 5/82 HALF LIFE: 92 yrs ACTIVITY: 15 millicuries
 SURVEY INSTRUMENT: Victoreen Thyac III, Serial #2668 with GM Detector Tube 1B85
 CALIBRATION DATE: 2/27/85

INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.	✓		
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.			✓
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

Shutter Open		Shutter Closed	
1. <u><0.01</u>	6. <u></u>	6. <u>N/A</u>	
2. <u><0.01</u>	7. <u></u>	7. <u></u>	
3. <u><0.01</u>	8. <u></u>	8. <u></u>	
4. <u></u>	9. <u></u>	9. <u></u>	
5. <u></u>	10. <u></u>	10. <u></u>	
	11. <u></u>	11. <u></u>	

Where: (1) column inlet
 (2) detector exhaust outlet
 (3) detector housing



OVER

LEAK TESTS

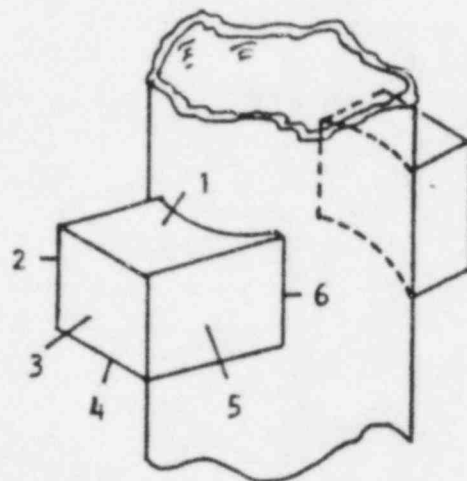
Sample ID Number

1. H2612-1 - column inlet to detector
2. H2612-2 - detector exhaust outlet
3. H2612-3 - detector housing
4. _____
5. _____

POSITION

INDEX

SOURCE



COMMENTS: • Position index schematic is not applicable in this case.

• Hewlett Packard Electron Capture Detector Cell Model 18713A.

• Replacement unit currently in storage.

MHJ/mad

10/January/1985

APPENDIX V

KOPPERS

Interoffice Correspondence

To J. E. Marcinowski
Location S&T Center-Monroeville
Subject NRC Licensed Radiation
Sources; Leak Tests

From D. R. Williams
Location OH&PS-IH-Monroeville
Date January 12, 1982

NRC licensed radiation sources assigned to the Verona facility were inventoried and leak tested on December 19, 1981. No source leakage was detected. Results and inventory records are documented in Logbook 4182, pages 111-112. (See copy attached.)

D. R. Williams
D. R. Williams

DRW/mm

Attachment to All

cc: C. W. Flickinger
Radiation File
Research File
Day File

12-21-81 VERONA RESEARCH CENTER

RADIATION SOURCE LEAK TEST AND INTENSITY
MEASUREMENT FROM VERONA RESEARCH CENTER.
MEASUREMENTS CONDUCTED BY D. R. WILLIAMS,
ACCOMPANIED BY J. MARCINOWSKI. ON 12-17-81.

COTTON SWAB RADIATION LEVELS (SOURCE LEAK TEST) WERE
MEASURED WITH A NUCLEAR CHICAGO DECADE SCALER
(MODEL NO. 151, SERIAL NO. 457), AND A NUCLEAR
CHICAGO GM DETECTOR (MODEL 109, S.N. 13592).
REFER TO LOGBOOK 968 P. 55.

TEST: 60 CYCLE/SECOND
975 VOLTS

15012 COUNTS/5 MIN
3602 COUNTS/MIN

SPECIMEN NUMBER	DESCRIPTION / LOCATION	WIDE SWAB COUNT		I MAX ^(A) MR/HR
		COUNTS/5 MIN	COUNTS/MIN	
-	BACKGROUND	37	7	-
-	BLANK A	26	5	1.7 0.9
1	KAY RAY MODEL 7062 P, S.N. 8920 100 mCi Cs 137 PPI DBPC CRYSTALLIZER DENSITY MONITOR	34	7	1.7
2	KAY RAY MODEL 7062 HOLDER KAY RAY MODEL 7700A SOURCE Cs DPII CREOSOTE HEAT TREATER REACTOR LEVEL MONITOR	32	6	0.2
-	BLANK B	37	7	-

^(A) MAXIMUM RADIATION INTENSITY (MR/HR) IN IMMEDIATE AREA
SURROUNDING SOURCE HOLDER. MEASURED WITH A VICTOREEN THYAC III
SURVEY METER (SFA NO 2885 MODEL NO. 440-24) CALIBRATED
12-81 BY APPLIED HEALTH PHYSICS, INC. 2980 INDUSTRIAL
BLVD. BETHEL PARK PA 15162

VRC C-14

REFERENCE SOURCE = TL 204

ACTIVITY $(A_0) = 0.0089 \mu\text{Ci}$ as of May 1951

PRESENT ACTIVITY

$$A = A_0 e^{-\lambda t}$$

$$A = A_0 e^{-.693 t / T_{1/2}}$$

$$A = 0.0089 \mu\text{Ci} e^{-(.693)(23 \frac{1}{2} \text{ yr})}$$

$$A = 0.00012$$

$$A = \frac{A_0}{e^{\lambda t}}$$

$$T_{1/2} = 23.6 \text{ yr}$$

TL 204 count = 148 counts/5min, 30 c/min

0.005 μCi would produce a count of 1233 c/minANY SPECIMEN BELOW THIS LEVEL IS WITHIN
ACCEPTABLE LIMITS.

NO LEAKAGE WAS DETECTED

B. Anthony

12-21-81

KOPPERS

Interoffice Correspondence

To J. E. Marcinowski
Location F&S-Monroeville
Subject Relocation of 10 mCi Sealed
Radiation Source at VS&TC
(814-2579)

From D. R. Williams
Location OH&PS-IH-Monroeville
Date December 21, 1983

The subject licensed radiation source was removed from use location to locked storage on December 16, 1983.

Radiation exposures to personnel involved with the transfer were well within acceptable limits; see attached summary.

A leak test performed on the source unit indicated no detectable source leakage. Results are documented in Logbook No. 4182, page 155 (copy attached).

The sealed source unit will remain in PPI locked storage, with the beam window shutter control arm padlocked in the closed position, until further need for the gauging system arises.

D. R. Williams
D. R. Williams

DRW/mm

Attachment to All (2)

cc: B. K. Ahn
C. W. Flickinger
D. J. McGraw, M.D.
W. A. Sudekum
A. S. Whiteford
Radiation File
Research File
Day File

Ionizing (gamma) Radiation Exposure Measurements

Date: December 16, 1983

Location: Koppers Company, Inc., Verona Science & Technology Center (VS&TC)

Operation: Transfer sealed source unit from PP III Creosote Heat Treatment Pilot Unit to PPI locked storage.

- Beam window shutter padlocked in closed position
- Remove mounting bolts; hand-carry unit from PP III to PPI area.
- Store unit in PPI locked storage, adjacent to Allen Whiteford's office

Source Unit: Kay Ray Model No. 7062, Serial No. 11568, Tag No. 2331-8-201A

Isotope: Cs 137, 10 mCi (Date measured: 12/78)

Exposure Monitoring Instrument: Quartz filament dosimeter

Dosimeter Number	Employee/ Soc. Sec. No.	Time			Dosimeter Rdg. (mR)		
		Start	Stop	Increment	Start	Stop	Increment
		(am)	(am)	(min.)			
L50-47777	W. A. Sudekum/ 175-30-2937	10:15	10:33	18	8	9	1
L50-47778	J. E. Marcinowski/ 198-40-2347	10:15	10:33	18	8	9	1
V541F 15495	D. R. Williams/ 204-28-5407	10:15	10:33	18	9	11	2

DRW/mm
12-21-83

12-14-83 Verona Science and Technology Center

Radiation source leak test conducted on 12-14-83 by D.R. Williams, upon removal of source unit from Creosote Heat Treater (PP III area) to locked storage.

Source unit is Kay Ray model 7062, serial no. 11568, Tag no. 2331-8-201A, 10 mCi, Cs 137 (measured 12-78). Source shutter is padlocked in closed position.

Unit is stored in PFI locked storage area adjacent to Allen S. Whiteford's office. Keys to storage are in the possession of Mr. Whiteford.

Test was performed with a Nuclear-Chicago Decade Scaler, model 161, S/N. 457, and a Nuclear-Chicago GM detector, model 108, S/N 13592 (Refer to Logbook no. 966, p. 55)

Test: 60 cycles/second
975 Volts

Max ct. = 18014 / 5 min.
3603 / min.

OH-FS-24 Specimen no.	Plant no.	Description / Location	sl. pe. source count ct/5 min.	ct/min.
		Background	35	7.0
4182-155-A		Blank A	33	6.6
4182-155-1	1	Kay Ray model 7062, S/N 11568, Tag no. 2331-8-201A, 10 mCi, Cs 137	30	6.0
4182-155-B1		Blank B	36	7.2
		TL ²⁰⁴ reference source	106	21.2

Reference source TL²⁰⁴ = 0.0089 μ Ci as of May, 1958

Present activity: $I_0 = 0.0089 \mu\text{Ci} \cdot e^{(-.693) \cdot \frac{25.58}{5.2}}$

$= 0.000084 \mu\text{Ci}$

0.005 is maximum, $\frac{0.000084 \mu\text{Ci}}{0.005 \mu\text{Ci}} \cdot \frac{0.0089 \mu\text{Ci}}{0.0089 \mu\text{Ci}} = 1262 \frac{\text{cts}}{\text{min}}$

The safety limit of 0.005 μ Ci, would produce a count of 1262/min.
Any specimen below is acceptable. No leakage detected.

A. Aricely, 12-19-85

KOPPERS

Interoffice Correspondence

To E. D. Brennan

From M. H. Juba

Location Verona

Location OH&PS-IH-Monroeville

Subject Radiation Leak Test/Survey
Sealed Sources of Ionizing
Radiation
(814-2579)

Date August 23, 1984

SUMMARY

Leak Tests and Radiation Level Surveys of licensed sealed sources at Verona conducted July 31, 1984, in accordance with NRC requirements revealed the following:

- All leak test results show removable radioactive material to be less than 0.005 microcuries as specified in Title 10, Part 31.5.
- Radiation level measurements taken at the surface of the source holder indicate the radiation field would be less than 5 millirems per hour at a distance of 12 inches. Exposure potential is well below 2 millirems per hour or 100 millirems in any seven consecutive days as specified in Title 10, Part 20.105.
- A Radiation Program Audit, conducted simultaneous to Source Leak Tests/Radiation Level Surveys, shows Verona to be in compliance with applicable NRC regulations.

RESULTS

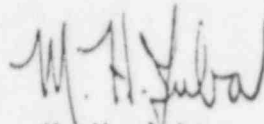
Leak Test Data and Radiation Levels are attached as Appendices I and II, respectively. Leak test raw data are available in OH&PS-IH Logbook #4182, pages 174-176. The completed Radiation Program Audit outline is enclosed as Attachment III.

RECOMMENDATIONS

Although not specifically mandated by regulation, it is recommended that a warning sign be posted in the vicinity of the 100 millicurie Cesium-137 source located on PPI. Because an additional metal box installed over the source holder conceals the manufacturer's label, it is further recommended that a radiation label and source identification information be located on the exterior of the protective closure.

Despite the fact that all Records/Procedures pertaining to radioactive material located at Verona are maintained at Monroeville, it is felt that copies should also be available on site. These will be forwarded under separate cover.

Please contact me at Monroeville 5138 with any questions/comments or for additional assistance. Feedback on actions taken in response to recommendations is requested.



M. H. Juba

MHJ/mm

Attachments (3) to A11

cc: B. K. Ahn
C. W. Flickinger
A. S. Whiteford
Research File
Day File

APPENDIX I
(Attachment 1)
LEAK TEST RESULTS

DATE 8/9/84 ANALYST M.H. Juba
 GROUP/DIVISION Koppers General - Science And Technology
 PLANT VERONA
 LICENSE NUMBER 37-03138-06 And Kay-Ray Inc general License
 EQUIPMENT Ludlum Model 2900 Scaler F.B.I. Model HP-210 GM detector
 GIEGER PLATEAU HV setting = 3.3, 0.91 kilovolts
 SOURCE TO DETECTOR DISTANCE 3/16 inches

CALIBRATION SOURCE

NUCLIDE	MAJOR RADIATIONS/ ENERGIES	INITIAL ACTIVITY μCi	DATE	$T_{1/2}$ (1)	n (2)	CURRENT (3) ACTIVITY μCi
Chlorine-36	0.714 MeV β	0.0227	10/11/79	3.08×10^6 yrs	1.6×10^{-5}	0.0227

- (1) $T_{1/2}$ = half-life of the radionuclide
 (2) n = number of half-lives = $t/T_{1/2}$
 where: t = elapsed time
 (3) Current Activity = $I_0 e^{-0.693t/T_{1/2}}$
 where: I_0 = original activity of the radionuclide
 e = base of natural logarithms (2.718)
 t = elapsed time
 $T_{1/2}$ = half-life of the radionuclide

COUNTING EFFICIENCY

	observed counts (average of three readings)
5 min. count (calibration source ³⁶ CL)	$\frac{64910}{5 \text{ min.}} = 12982 \text{ cpm}$
5 min. background count	$\frac{247}{5 \text{ min.}} = 49 \text{ cpm}$
5 min. blank count	$\frac{313}{5 \text{ min.}} = 63 \text{ cpm}$

Net Efficiency (En) = $\frac{C_o - B}{C_k} = 0.28 \text{ cpm/dpm}$

where:
 C_o = observed count (cpm)
 B = blank (cpm)
 C_k = known emission rate (dpm)
 ($2.22 \times 10^6 \text{ dpm}/\mu\text{Ci}$)

LEAK TEST DATA

ISOTOPE	SERIAL/ SOURCE NO.	SAMPLE ID ⁽¹⁾	OBSERVED COUNT ⁽²⁾		APPROXIMATE ⁽³⁾ ACTIVITY μCi
			5 min.	1 min.	
¹³⁷ Cs	Serial # 11568 Tag # 2331-8-201A	S-1	327	66	1.1×10^{-5}
		S-2	313	63	6.4×10^{-6}
		S-3	321	64	8.0×10^{-6}
		S-4	310	62	4.8×10^{-6}
		S-5	314	63	6.4×10^{-6}
¹³⁷ Cs	Head # 8420 capsule # 7620-V	FW-1	331	66	1.1×10^{-5}
		FW-2	332	67	1.3×10^{-5}
		FW-3	328	66	1.1×10^{-5}
		FW-4	319	64	8.0×10^{-6}

- (1) See Leak Test Data Sheet (page 2) for sample ID/position index correlation.

- (2) Count represents the average of three readings.

- (3) Approximate Activity (μCi) $= \frac{C_{O-18}}{E_n} \times 4.505 \times 10^{-7} \mu\text{Ci/dpm}$

where C_o = observed count (wipe sample) (cpm)

* blank count (cpm)

En * net counting efficiency (cpm/dpm)

NOTE: - Regulated limit for surface contamination is 0.005 μCi or $5.0 \times 10^{-3} \mu\text{Ci}$ removable radioactive material as specified in Title 10, part 31.5c.

- Raw data available in OH&PS-1H Logbook No. 4182, page(s) 174-176.

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE 7/31/81 SURVEYED BY M.H. Juba
 GROUP/DIVISION Science & Technology PLANT VERONA
 LOCATION OF UNIT PPI - locked storage ISOTOPE CESIUM-137
 SERIAL/IDENTIFICATION NO. SERIAL # - 11508 TAG # -0331-B-201A LICENSE NO. 31-03138-06
 ASSAY DATE ~ 12/80 HALF LIFE 30 yrs ACTIVITY 10 mCi
 SURVEY INSTRUMENT Victoreen Thyac III model 490 serial # 2668
 CALIBRATION DATE 7/7/84 - Applied Health Physics Inc.

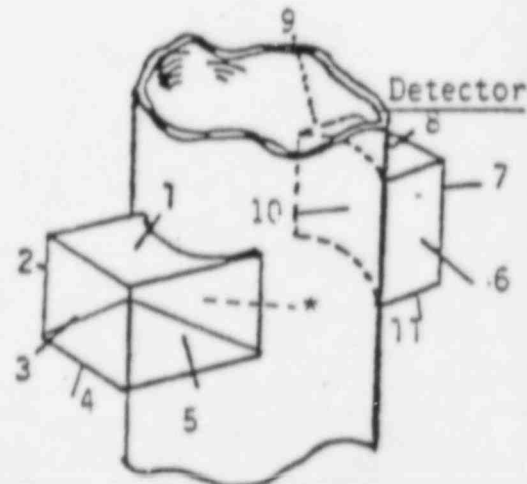
INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE: MATERIAL" is posted in the proximity of the gauge.			✓
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.			✓
4. Unit in operation; shutter check not possible. (unit in storage shutter locked closed)		✓	

SURVEY/MEASUREMENTS (mR/hr.) AT SURFACE

<u>Shutter Open</u>		<u>Shutter Closed</u>	
<u>Not Applicable</u>			
1. _____	6. _____	1. <u>1.6</u>	
2. _____	7. _____	2. <u>1.8</u>	
3. _____	8. _____	3. <u>0.4</u>	
4. _____	9. _____	4. <u>1.5</u>	
5. _____	10. _____	5. <u>1.5</u>	
	11. _____	*. <u>2.0 - Beam shield</u>	

POSITION
INDEX

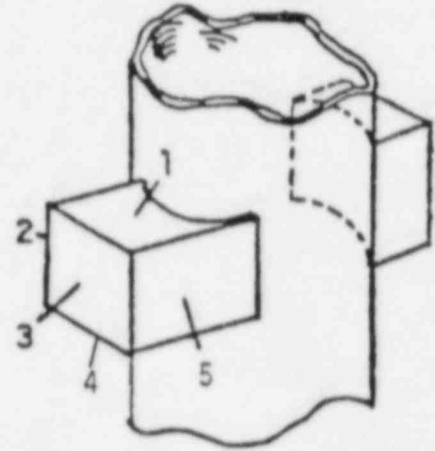
Source



LEAK TESTSSample ID Number

1. S-1
2. S-2
3. S-3
4. S-4
5. S-5

POSITION
INDEX

Source

COMMENTS: The subject source is in Pilot Plant I locked storage (Since 12/16/83). One Key is Available For Authorized Access only And The shutter mechanism is locked in The closed position.

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE 7/31/84 SURVEYED BY M.H. Juba
 GROUP/DIVISION Science & Technology PLANT VERONA
 LOCATION OF UNIT PPI Filter Wash Unit ISOTOPE CESIUM-137
 SERIAL/IDENTIFICATION NO. HAD # 8920
capsule # 7620-V LICENSE NO. General-Ray Ray, Inc.
 ASSAY DATE Approx. 10/78 HALF LIFE 30 yrs ACTIVITY 100 mCi
 SURVEY INSTRUMENT Victoreen ThyAc III model 490 serial # 2668
 CALIBRATION DATE 7/7/84 - Applied Health Physics Inc.

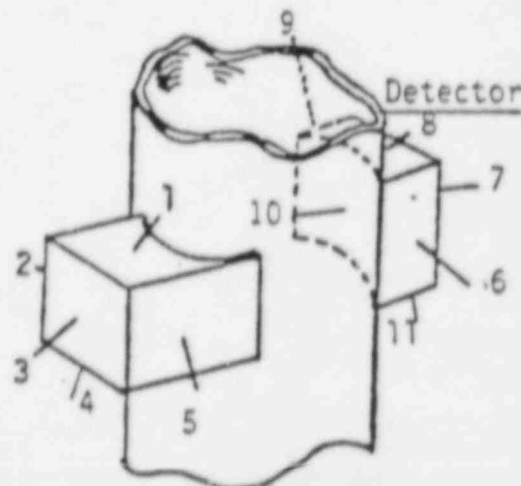
INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s). (concealed by additional protective housing)	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.		✓	
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.	✓		
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr.) AT SURFACEShutter OpenShutter Closed

1. <u>4.0</u>	6. <u>1.0</u>	6. <u>0.11</u>
2. <u>5.0</u>	7. <u>0.4</u>	7. <u>0.01</u>
3. <u>6.0</u>	8. <u>0.7</u>	8. <u>0.10</u>
4. <u>6.0</u>	9. <u>0.6</u>	9. <u>0.30</u>
5. <u>15</u>	10. <u>not possible</u>	10. <u>not possible</u>
	11. <u>0.9</u>	11. <u>0.09</u>

POSITION
INDEX

Source



LEAK TESTS

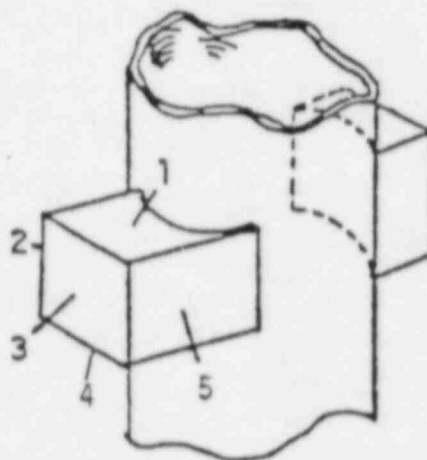
Sample ID Number

1. FW-1
2. FW-2
3. FW-3
4.
5. FW-4

POSITION

INDEX

Source

[illegible]

APPENDIX III
(Attachment III)
RADIATION HEALTH PROGRAM AUDIT OUTLINE

I. POSTING OF NOTICES TO WORKERS

	<u>POSTED</u>	<u>NOT POSTED</u>	<u>N/A</u>
A. Copies of the following documents or a statement describing the document and where it may be examined should be posted.			
1. Regulations of Parts 19 & 20 of 10 CFR or the compatible state regulations.	_____	_____	✓
2. Application for license, license, amendments and any stipulations incorporated into license.	_____	_____	✓
3. Operating procedures applicable to licensed activities.	_____	_____	✓
4. Form NRC-3 or appropriate state form, "Notice to Workers".	_____	_____	✓
5. The above mentioned documents should be posted conspicuously in a sufficient number of places such that individuals engaged in licensed activities will observe them.	✓	_____	_____

COMMENTS: A general document is posted describing where the above information is available

II. CAUTION SIGNS, LABELS, SIGNALS AND CONTROLS

A. Appropriate radiation sign posted and, if needed, additional information or instructions incident to the use of the restricted area.	✓	_____	_____
B. Manufacturers' labels are affixed at time of receipt and remain permanently attached and legible.	✓	_____	_____
C. Each container or storage site bears a durable, clearly visible label identifying the contents and a label stating - "CAUTION - RADIOACTIVE MATERIAL".	✓	_____	_____

COMMENTS: _____

III. TRAINING AND INSTRUCTIONS TO WORKERS

	<u>YES</u>	<u>NO</u>	<u>N/A</u>
A. Individuals working in or frequenting any portion of a restricted area are informed of the storage, transfer or use of radioactive materials.	✓	_____	_____
B. Individuals are instructed in the health protection problems associated with exposure to such radioactive materials.	✓	_____	_____
C. Individuals are instructed in the precautions and/or procedures to minimize exposure.	✓	_____	_____
D. Individuals are instructed about the biological effects associated with exposure to radiation.	✓	_____	_____
E. Specific instruction is given to the fertile female as well as her co-workers and supervisor about the hazards of radiation to the fetus.	_____	_____	✓
F. Individuals are trained in the function and use of protective equipment.	✓	_____	_____
G. Individuals know and understand the rules and regulations that apply to persons working in or around a restricted area.	_____	_____	✓
H. Individuals are instructed in their responsibility to report any conditions or violations that would lead to any unnecessary exposure.	✓	_____	_____

- | | <u>YES</u> | <u>NO</u> | <u>N/A</u> |
|--|-------------------------------------|--------------------------|-------------------------------------|
| C. Records of leak tests and proper operation of the open-closed shutter mechanism of certain measuring, gauging or controlling devices. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| D. Records of any other surveys as are necessary to comply with the regulations. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| E. Records of required training and results of tests, if any, for individuals who work in or around a restricted area. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Records of tests for calibration of instruments and other equipment used in connection with the utilization or storage of byproduct material. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| G. Records are kept of the receipt, transfer, and disposal of byproduct material. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

COMMENTS: SURVEY EQUIPMENT IS LOCATED AND MAINTAINED AT MONROEVILLE

VIII. PICKING UP, RECEIVING AND OPENING PACKAGES

- | | | | |
|---|--------------------------|-------------------------------------|--------------------------|
| A. Procedures are established for receiving, surveying and opening packages containing radioactive material. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Monitoring is performed as soon as possible after receipt, but no later than three hours after arrival or 18 hours, if received after normal working hours. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| C. If surface contamination is in excess of .01 micro-curies/cm ² or a direct reading greater than 200 mR/hr. at contact, or 10 mR/hr at 3 feet are observed, the carrier and state agency are notified. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

COMMENTS: NO FORMAL PROCEDURES AT THIS TIME, WILL BE DEVELOPED SHORTLY

IX. EMERGENCY PROCEDURES

- | | | | |
|--|-------------------------------------|-------------------------------------|--------------------------|
| A. Procedures are established and responsible individuals have been designated to handle a radiation incident. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Protective equipment and monitoring instruments are available in case of emergency. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

COMMENTS: EQUIPMENT IS AVAILABLE AT MONROEVILLE

X. MICROWAVE OVENS

- | | | | |
|--|--------------------------|--------------------------|-------------------------------------|
| A. Microwave ovens are in good working order and proper signs are posted. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| B. Periodic surveys are made and records maintained indicating there is no potential radiation hazard. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

COMMENTS: _____

XI. MEDICAL X-RAY UNITS

- | | <u>YES</u> | <u>NO</u> | <u>N/A</u> |
|--|------------|-----------|------------|
| A. The x-ray equipment has an adjustable collimator that defines the entire exposure field. | _____ | _____ | ✓
_____ |
| B. The x-ray equipment can be operated by a timer which automatically starts and terminates the exposure. | _____ | _____ | ✓
_____ |
| C. The control panel has an indicator light or switch indicating that the unit is energized and a sign stating that x-rays are being produced. | _____ | _____ | ✓
_____ |
| D. The control panel has gauges indicating the KVP and the MA. | _____ | _____ | ✓
_____ |
| E. If assistance to the patient is required during the exposure, the operator wears a personal dosimeter. | _____ | _____ | ✓
_____ |

COMMENTS: _____

XII. INDUSTRIAL X-RAY EQUIPMENT

- | | | | |
|--|-------|-------|------------|
| A. Procedures and practices are written and available for use with the x-ray unit. | _____ | _____ | ✓
_____ |
|--|-------|-------|------------|

COMMENTS: _____

XV. INSTRUMENTS

- A. Model Victorcen Thyac III
- B. Calibration due date. 10/17/84

COMMENTS: MAINTAINED AT MONROEVILLE OH+PS-1H.

REFERENCES

References cited are from the Nuclear Regulatory Commission (NRC). Agreement states have compatible regulations that are either the same or similarly worded. In the absence of an NRC Regulation, reference is from Title 29, Title 21, Bureau of Radiological Health or the National Council on Radiation Protection.

- I.A.1. Title 20, Code of Federal Regulations, Part 19, Section 19.11(a)
- I.A.2. Ibid.
- I.A.3. Ibid.
- I.A.4. Title 10, Code of Federal Regulations, Part 19, Section 19.11(c)
- I.A.5. Title 10, Code of Federal Regulations, Part 19, Section 19.11(d)
- II.A. Title 10, Code of Federal Regulations, Part 20, Section 20.203
- II.B. Title 10, Code of Federal Regulations, Part 31, Section 31.5(c)1
- II.C. Title 10, Code of Federal Regulations, Part 32, Section 32.51(a)3(ii)
- III.A. Title 10, Code of Federal Regulations, Part 19, Section 19.12
- III.B. Ibid.
- III.C. Ibid.
- III.D. Ibid.
- III.E. Nuclear Regulatory Guide 8.13
- III.F. Title 10, Code of Federal Regulations, Part 19, Section 19.12
- III.G. Ibid.
- III.H. Ibid.
- III.I. Ibid.
- III.J. Ibid.
- IV.A. Title 10, Code of Federal Regulations, Part 20, Section 20.202
- IV.B. Ibid.
- IV.C. Title 10, Code of Federal Regulations, Part 20, Section 20.201(b)
- IV.D. If required by Title 29, Code of Federal Regulations, Section 1910.96(d).
Texas Regulations for Control of Radiation, Part 34, Section 34.6(b).
Pennsylvania Department of Environmental Resources, Part I, Chapter 233,
Section 233.43.
Title 10, Code of Federal Regulations, Part 34, Section 34.33(a).
- V.A. Title 10, Code of Federal Regulations, Part 19, Section 19.13
- VI.A. Title 10, Code of Federal Regulations, Part 20, Section 20.205
- VI.C. Title 10, Code of Federal Regulations, Part 20, Sections 20.201, 20.401(b)
- VII.A. Title 10, Code of Federal Regulations, Part 20, Section 20.401(a)
- VII.B. Title 10, Code of Federal Regulations, Part 20, Section 20.401(b)
- VII.C. Title 10, Code of Federal Regulations, Part 31, Section 31.5(c)4
- VII.D. Ibid.
- VII.E. Nuclear Regulatory Guide 8.13
- VII.F. Title 10, Code of Federal Regulations, Part 30, Section 30.53
- VII.G. Title 10, Code of Federal Regulations, Part 30, Section 30.51(a)

- VIII.A. Title 10, Code of Federal Regulations, Part 20, Section 20.205(d)
- VIII.B. Title 10, Code of Federal Regulations, Part 20, Section 205(b)1
- VIII.C. Title 10, Code of Federal Regulations, Part 20, Section 20.205(b)2
- IX.A. If required, Title 10, Code of Federal Regulations, Part 34, Section 34.32
- X.A. Title 29, Code of Federal Regulations, Part 1910, Section 1910.97(3)
- X.B. At the discretion of the Radiation Safety Officer
- XI.A. National Council on Radiation Protection, Report No. 33, Section 5.2.1.(c)
- XI.B. National Council on Radiation Protection, Report No. 33, Section 3.2.1(e)
- XI.C. National Council on Radiation Protection, Report No. 33, Section 3.2.1.(g)
- XI.D. National Council on Radiation Protection, Report No. 33, Section 3.2.1(h)
- XI.E. If required, Texas Regulations for Control of Radiation, Section 32.5(c)(4)
- XII.A. Texas Regulations for Control of Radiation, Section 34.5(a)
- XII.B. Texas Regulations for Control of Radiation, Section 34.3(f)
- XII.C. Texas Regulations for Control of Radiation, Section 34.3(a)
- XII.D. Texas Regulations for Control of Radiation, Section 34.6(b)
- XII.E. Texas Regulations for Control of Radiation, Section 34.4

Verona 7/31/84

8/9/84

Link Test Results For wipe samples collected at Verona
7/31/84 by M.H. Juba were determined using a Ludlum
Scintec model 8900 with electronic GM detector (pancake)
model HF-210 and electronic detector/sample holder
model 5H-4A.

Note: The plume equip was Rented from RAD services
while Nuclear Chicago Probe Scintec was being
repaired. (See RAD Service calib data page 169 logbook # 4182)

Grigic Plateau was determined using Reference
Source (³⁰CL) chlorine-36 see pgs 170-173
logbook # 4182.

Grigic Plateau - HV setting 3.3
Approx Voltage = 910 volts

5 min counts

Avg.
cpm

calibration source - ³⁰CL 79,091, 70,270, 69,268
0.0027 uc as of 12/11/77

13,982

Blank count
Bkg count

291, 306, 294

59 cpm

323, 303, 314
avg

63 cpm

$$\text{counting efficiency } (E_{\text{eff}}) = \frac{C_0 - B}{C_K} = \frac{13,982 - 59}{2.22 \times 10^6 (0.0027)} = .28$$

28% eff for β^- 0.714 MeV

where C_0 = ref source count (³⁰CL)

B = BLANK

C_K = Known quantity put
for ref source (³⁰CL)

Leak Test data

Serial/ Source #	Sample ID	Observed counts			Approx Activity Bq/g
		5 min	1 min	Avg (cpm)	
Serial # 11568 Tag # 2331-S-201A ¹³⁷ Cs 10 mCi	S-1	363	73	66	1.1×10^{-5}
		247	54		
		323	65		
	S-2	358	72	63	6.4×10^{-6}
		573	55		
		307	62		
	S-3	353	71	64	8.0×10^{-6}
		325	65		
		287	57		
	S-4	284	57	62	4.8×10^{-6}
		335	67		
		310	62		
	S-5	314	63	63	6.4×10^{-6}
		327	65		
		301	60		
Serial # 8920 Serial # 7012 ¹³⁷ Cs 10 mCi	FW-1	331	66	66	1.1×10^{-5}
		347	64		
		314	63		
	FW-2	354	71	67	1.3×10^{-5}
		313	63		
		328	66		
	FW-3	313	63	66	1.1×10^{-5}
		325	65		
		346	69		

Link Test DATA cont.

Serial # Source ID	Sample ID	Observed counts			Approx Activity, uCi
		5 min	1 min	Avg., (cpm)	
Serial # 8420	FW-4	326	65		
Model # 7012		328	66	64	8.0×10^{-6}
¹³⁷ Cs 100 uCi		304	61		

where activity is
determined by

$$\frac{C_0 - B}{E_n} \times 4.505 \times 10^{-7} \text{ uCi/dpm}$$

C_0 = observed count (upper sample) (cpm)

B = ~~Blank~~ count (cpm)

E_n = net counting eff (cpa/dpm)

all removable radioactivity is well below
0.005 uCi. The highest amount of
Activity detected was 1.3×10^{-5} uCi

M. H. Juba 8/9/84

Final Report - M. H. Juba to E. D. BERNMAN 8/23/84

M. H.

APPENDIX VI

5-29-81 Morgan Plant

Radiation Source From Morgan Plant - 5/27/81
(Foam Board installation plant) Radiation source
installation measurement. Test conducted
by Dave Williams.

The Following test was conducted with a Nuclear-
Chicago, (model no. 181, serial no. 457) Decade
Scaler, and a Nuclear-Chicago GM, (Model #
108 serial # 13592 detector. (Refer to notebook
no. 968, pg. 55,)

* I max is the maximum intensity in mrem/hr
as detected by a Thyac III Victoreen
radiation survey meter (model no. 490-24, serial no. 2668)
(calibration date 1-8-81)

Nuclear Chicago detector:

Test 60 cycle/second

18016 counts/5 min

975 Volts

3603 counts/min

Source Description	Wire Swab Count		I max
	c/5min	c/min	
Background	31	6	
Blank A	32	6	
K-ray Model 4800F Ser no. 2428 Housing Model 7062F Cs ¹³⁷ 10 mCi	44	9	0.5
Blank B	36	7	
Source Activity T ₁ 204	150	30	

Source Description	I. max
Holder surface	1.8 mR/hr.
One foot from surface	0.14 mR/hr.

As long as any samp is < 1134 c/min
it is Below the $0.005 \mu\text{Ci}$ reportable
level. (As shown Below)

$$A = A_0 e^{-\lambda t} \rightarrow I = I_0 e^{[-.693 \lambda / T_{1/2}]}$$

$T_{1/2}^{204}$ May 1958 - $0.0089 \mu\text{Ci}$
Present level - $0.000134 \mu\text{Ci}$

$$\frac{I}{I_0} = 0.0089 \times e^{(-.693)(23\frac{1}{2}/3.84)}$$

$$I = 0.000134 \mu\text{Ci}$$

$$\frac{0.000134}{30 \text{ c/min}} = \frac{* 0.005 \mu\text{Ci}}{x} = 1134.3 \text{ c/min}$$

* $0.005 \mu\text{Ci}$ - reportable level

Barbara Anthony
5-29-81

3-1-83

Morgan

The following radiation source leak test was performed at the Morgan Phenolic Insulation Board Plant by D.R. Williams on Feb. 22, 1983. Analysis was done with a Nuclear-Chicago Decade Scaler, model 181, S/N 457 and a Nuclear-Chicago GM detector model 109, S/N 13592. Refer to logbook 968, pg. 56

Test: 60 cycles/second
975 volts

18012 cts/5min
3602.4 cts/min

OHIO-IH Specimen No.	Plant Specimen No.	Description/Location	Wps cts/5min	Count cts/min	Imax ^H
4182-139-1		Background	34	6.8	
4182-139-2	1	Blank A	31	6.2	
4182-139-2		Resin Run Tank - High Level	39	7.8	8.06
		Indicator, Kay Ray model 7062F, Serial no. 10799, 10mCi, Cs ¹³⁷ (12-71)			
4182-139-3		Blank B	27	5.4	
		TL ²⁰⁴ reference source	120	24	

Maximum radiation intensity in immediate area measured with a Thyac III survey meter, model 490-24, S/N 2668, calibrated on 12-10-82, by Applied Health Physics, Bethel Park, Pa.

Calculations

Reference source TL²⁰⁴ = 0.0029 μ Ci (Ao) as of May, 1958.

Present activity:

$$I = I_0 \cdot 2^{(-t \cdot \lambda)}$$

$$= 0.0029 \cdot 2^{(-43)}$$

$$= 0.0029 \cdot 0.011$$

$$= 0.000098 \mu\text{Ci}$$

$$\frac{0.000098 \mu\text{Ci}}{34} = \frac{0.005 \mu\text{Ci}}{\lambda \text{ cts/min}}$$

$$= 1224.5$$

The safety limit of 0.005 μ Ci would produce a count of 1224.5 cts/min.
Any specimen below is acceptable.

No leakage was detected.

D. Grucely, 3-1-83

2-1-84 Morgan

Radiation source wipe test conducted on 1-27-84 by D.R. Williams.
 Test performed with Nuclear-Chicago Decade Scaler model 181,
 S.N. 457, and Nuclear-Chicago GM Detector model 108, S.N. 13592.
 Refer to logbook no. 968, pg. 55.

Test: 60 cycles/second, 975 volts, Max Ct. = 18002/5min, 3600/min

CH-RS-24 Specimen No.	Plant no.	Description / Location	Wipe Swab Count Ct/5min	Count Ct/min	I _{max} (Ct)
		Background	35	7.0	
4182-161-A		Blank A	30	6.0	
4182-161-1	M-1	Cs ¹³⁷ , 10 mCi, Kay Ray model 4800F, ser.no. 2828, Housing model 7062P	32	6.4	0.2
4182-161-B		Blank B	39	7.8	
		Tl ²⁰⁴ Reference source	114	22.8	

I_{max} measured with a Thyac III Victoreen, model 440-24,
 S.N. 2668, calibrated 12-20-83 by Applied Health Physics, Inc.,
 of Bethel Park, Pa.

Calculations

Reference source Tl²⁰⁴ = 0.0089 μ Ci as of May, 1958

Present activity, $I = I_0 \cdot e^{(-0.693 \cdot t/T_{1/2})}$

$$= 0.0089 \mu\text{Ci} \cdot 0.0093 \mu\text{Ci}$$

$$= 0.000082 \mu\text{Ci}$$

$$0.005 \text{ is maximum } , \frac{0.000082 \mu\text{Ci}}{\text{Tl}^{204} \text{ ct/min}} = \frac{0.005 \mu\text{Ci}}{X \text{ ct/min}}$$

$$\frac{0.000082 \mu\text{Ci}}{22.8 \text{ ct/min}} = \frac{0.005 \mu\text{Ci}}{X \text{ ct/min}}$$

$$X = 1390 \text{ ct/min.}$$

The safety limit of 0.005 would produce a count of 1390/min.
 Any below is acceptable. No leakage detected.

B Krucly, 2-1-84

KOPPERS

Interoffice Correspondence

To T. J. Izaj

From M. H. Juba

Location Morgan

Location OH&PS-IH-Monroeville

Subject Resin Day Tank Level Gauge -
Removal to Locked Storage
(814-4440)

Date September 19, 1985

SUMMARY

Leak test and radiation level surveys conducted prior to and following removal of a Kay-Ray Model 7062P radioactive level gauge (Serial No. 10799) on 9/17/85 revealed the following:

- Leak test results show removable radioactive material to be less than 0.005 microcuries as specified in Title 10, Part 31.5.
- Radiation intensity measurements indicate the radiation field would be less than 5 millirems per hour at a distance of 12 inches. As a result, exposure potential would be well below the 0.5 REM per year limit specified for unrestricted areas in Title 10, Part 20.105(a).
- Radiation levels at the surface of the source housing ranged between 0.6 and 2.5 millirems per hour. Given the brief source contact during retrieval (less than 30 minutes), potential exposure was well below radiation dose levels specific for restricted areas in Title 10, Part 20.101(a).
- Personnel dosimetry collected during source removal showed radiation exposure doses to be less than 1 REM and well below dose levels permissible under Title 10, Part 20.101(a).

BACKGROUND

The following activities were undertaken during source retrieval:

- Radiation level survey of the source housing prior to and following removal.
- Collection of personal dosimetry data during source handling.
- Source housing leak testing prior to and following source removal.

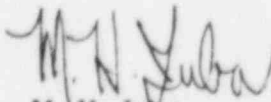
RESULTS

Leak test data and radiation levels are attached as Appendices I and II, respectively. Leak test raw data are available in OH&PS-IH Logbook #4182, page 235. Whole body exposure data were collected using direct reading Quartz Fiber Pocket Dosimeters. Dosimetry data are tabulated in Appendix III.

DISCUSSION/RECOMMENDATIONS

- In all cases, removable radioactivity was less than the limit of detection (4.1×10^{-6} microcuries) compared with the acceptable limit of 5×10^{-3} microcuries).
- **"CAUTION - RADIOACTIVE MATERIAL"** labels provided to J. R. Hoffman on 9/17/85 should be placed on the top and sides of the 10-gallon pail currently containing the gauge.
- Ensure that the storage trailer where the subject source is currently housed is padlocked and access restricted.
- Please notify this office as soon as possible following a decision on the future status of the gauge. Be advised that logistics and necessary NRC paperwork will require several weeks lead time.
- Mr. Chaney should be notified of his monitoring results.

Please contact this office at 412/327-3000, Ext. 5138 with any questions or comments. Feedback on actions taken in response to recommendations is requested.


M. H. Juba

/mad
attachments
cc: J. R. Hoffman
G. G. Kenney

APPENDIX I

DATE 9/18/85 ANALYST B. A. Knicely
GROUP/DIVISION Building Products/Building Materials
PLANT Morgan, PA
LICENSE NUMBER 37-19376-C
EQUIPMENT Nuclear-Chicago Decade Scaler Model 181A, SN 457; Nuclear-Chicago GM Detector Model 000108, SN 135
GIEGER PLATEAU 1025 volts
SOURCE TO DETECTOR DISTANCE 0.4 mm

CALIBRATION SOURCE

NUCLIDE	MAJOR RADIATIONS/ ENERGIES	INITIAL ACTIVITY (μCi)	DATE	$T_{1/2}$ ⁽¹⁾	n ⁽²⁾	CURRENT ⁽³⁾ ACTIVITY (μCi)
Cesium ¹³⁷	β^- 1.176 MeV γ 0.062 MeV	0.036	6/83	30 years	0.075	0.034

- (1) $T_{1/2}$ = half-life of the radionuclide
 (2) n = number of half-lives = $t/T_{1/2}$
 where: t = elapsed time **2.25 yrs**
 (3) Current Activity = $I_0 e^{-0.693t/T_{1/2}}$
 where: I_0 = original activity of radionuclide
 e = base of natural logarithms (2.718)
 t = elapsed time
 $T_{1/2}$ = half-life of the radionuclide

COUNTING EFFICIENCY

		Observed Counts (average of three readings)	
5 min count (calibration source)		$\frac{40,548}{5 \text{ min}}$	$= \frac{8110}{\text{cpm}}$
5 min blank count		$\frac{41}{5 \text{ min}}$	$= \frac{8}{\text{cpm}}$
Net Efficiency (En)	$= \frac{C_o - B}{C_k}$	$= \frac{0.11}{\text{cpm/dpm}}$	
where: C_o = observed count (cpm) B_o = blank (cpm) C_k = known emission rate (dpm) (2.22×10^6 dpm/uCi)			

OVER

LEAK TEST DATA

[illegible]

(1) See Leak Test Data Sheet (page 2) for Sample ID/position index correlation.

(2) Count represents the average of three 5-minute readings.

$$(3) \text{ Approximate Activity (uCi)} = \frac{C_0 - B}{En} \times 4.505 \times 10^{-7} \text{ uCi/dpm}$$

where: C = observed count (wipe sample) (cpm)
B⁰ = blank count (cpm)
En = net counting efficiency (cpm/dpm)

NOTE: - Regulated limit for surface contamination is 0.005 uCi or 5.0×10^{-3} uCi removable radioactive material as specified in Title 10, part 31.5c.

- Raw data available in OH&PS-IH Logbook No. 4182, page(s) 235.

APPENDIX II

DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE: 9/17/85 SURVEYED BY: M. H. Juba

GROUP/DIVISION: Building Products/Building Materials PLANT: Morgan

LOCATION OF UNIT: Resin Day Tank ISOTOPE: Cesium¹³⁷

SERIAL/IDENTIFICATION #: Serial #10799; Kay -Ray Model 7062P LICENSE #: 37-19376-01

ASSAY DATE: 12/79 HALF LIFE: 30 years ACTIVITY: 10 millicuries

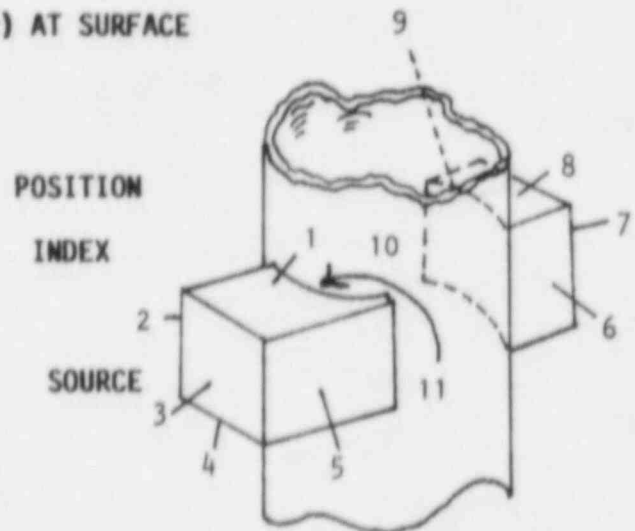
SURVEY INSTRUMENT: Victoreen Thyac III, Serial No. 2668

CALIBRATION DATE: 8/19/85

INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.	✓		
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.	✓		
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

Shutter Open		Shutter Closed	
1. <u>1.4-1.5</u>	6. <u> </u>	6. <u> </u>	
2. <u>1.3-1.4</u>	7. <u> </u>	7. <u> </u>	
3. <u>0.6-0.7</u>	8. <u> </u>	8. <u> </u>	
4. <u>1.0</u>	9. <u> </u>	9. <u> </u>	
5. <u>1.5</u>	10. <u> </u>	10. <u> </u>	
	11. <u>35</u>	11. <u>2.5</u>	



NOTE: Survey measurements obtained prior to source removal/handling.

OVER

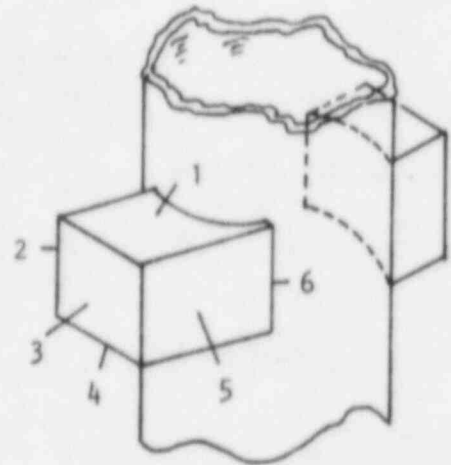
LEAK TESTS

Sample ID Number

1. 10799-1 (position indices 2-5)
2. 10799-2 (position index 6)
3. 10799-3 (face of shutter mechanism)
4. _____
5. _____

POSITION
INDEX

SOURCE



COMMENTS: • Leak tests/survey measurements obtained prior to source handling/
removal.

• Shutter mechanism was padlocked in the closed position prior to
source removal.

MHJ/mad

10/January/1985

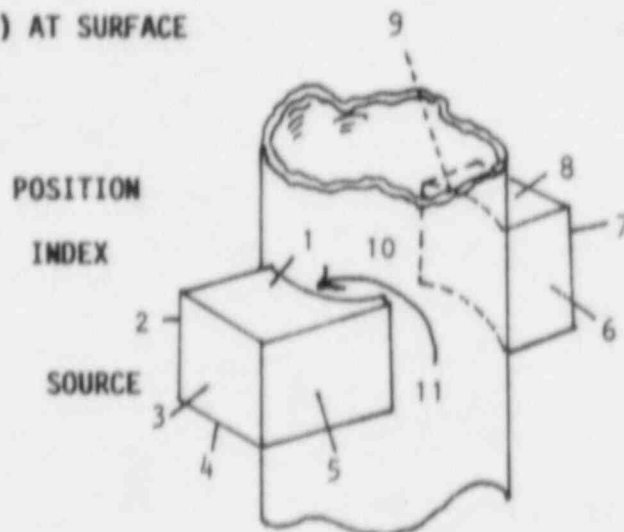
DENSITY/LEVEL GAUGE SURVEY AND LEAK TEST DATA SHEET

DATE: 9/17/85 SURVEYED BY: M. H. Juba
 GROUP/DIVISION: Building Products/Building Materials PLANT: Morgan
 LOCATION OF UNIT: Resin Day Tank ISOTOPE: Cesium¹³⁷
 SERIAL/IDENTIFICATION #: Serial #10799; Kay -Ray Model 7062P LICENSE #: 37-19376-01
 ASSAY DATE: 12/79 HALF LIFE: 30 years ACTIVITY: 10 millicuries
 SURVEY INSTRUMENT: Victoreen Thyac III, Serial No. 2668
 CALIBRATION DATE: 8/19/85

INSPECTION CHECKLIST	YES	NO	N/A
1. The device has affixed the required manufacturer's label(s).	✓		
2. A sign bearing the statement "CAUTION - RADIOACTIVE MATERIAL" is posted in the proximity of the gauge.	✓		
3. A reading taken with the survey instrument indicates open-closed shutter mechanism is operational.	✓		
4. Unit in operation; shutter check not possible.			✓

SURVEY/MEASUREMENTS (mR/hr) AT SURFACE

Shutter Open		Shutter Closed	
1. <u>1.2-1.3</u>	6. _____	6. _____	
2. <u>1.3</u>	7. _____	7. _____	
3. <u>0.7</u>	8. _____	8. _____	
4. <u>1.5</u>	9. _____	9. _____	
5. <u>1.3</u>	10. _____	10. _____	
	11. _____	11. <u>2.0</u>	



NOTE: Survey measurements obtained following source removal/handling.

OVER

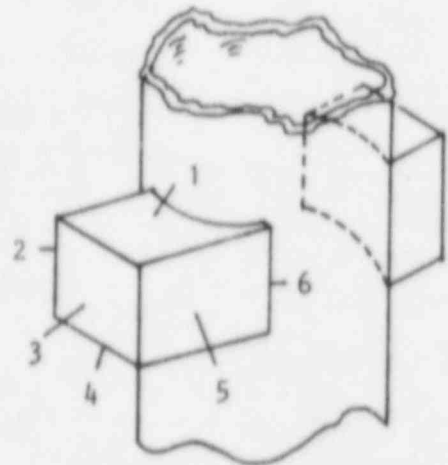
LEAK TESTS

Sample ID Number

1. 10799-4 (position indices 2-5)
2. 10799-5 (position index 6)
3. 10799-6 (face of shutter mechanism)
4. _____
5. _____

POSITION
INDEX

SOURCE



COMMENTS: ● Following removal, the source was placed in a 5-gallon pail
and locked in a storage trailer.

- Several "CAUTION - RADIOACTIVE MATERIAL" labels
were provided for placement on the top and sides of the
pail.

MHJ/mad

10/January/1985

APPENDIX III

<u>Employee/Soc. Sec. No.</u>	<u>Sampling Time (hours)</u>	<u>Serial Number</u>	<u>QUARTZ FIBER DOSIMETRY</u>		
			<u>SCALE READING (milliroentgen)</u>		<u>Exposure (milliroentgen)</u>
			<u>Initial</u>	<u>Final</u>	
C. Chaney/233-42-4499	0.25	47778 ⁽¹⁾	0	0	<1
		48421 ⁽²⁾	0	0	<1

NOTE: Landsverk, Model L50 gamma and X-ray 20 mR pocket dosimeters were used. Dosimeters were read using a Dosimeter Corp. of America Charger Model 909.

(1) Left shirt lapel.

(2) Right shirt lapel.

Morgan

9-18-85

Samples collected 9-17-85 by M. H. Juba. Analysis done using a Nuclear Chicago Decade Scaler mdl. 181A, serial #457, and 6M Detector mdl. 000108, serial #13592. Calibration data in logbook 4182, pgs. 183-186, and 188-189.

Geiger plateau determined using Cesium 137 reference source NES-255. Certificate of radioactivity calibration in log book 4182, pg. 186.

Geiger plateau = 1025 volts

Cs^{137} , observed $\frac{cts}{5min} = 40755, 40460, 40428$ Avg $\frac{cts}{5min} = 40548$ Avg CPM = 8110

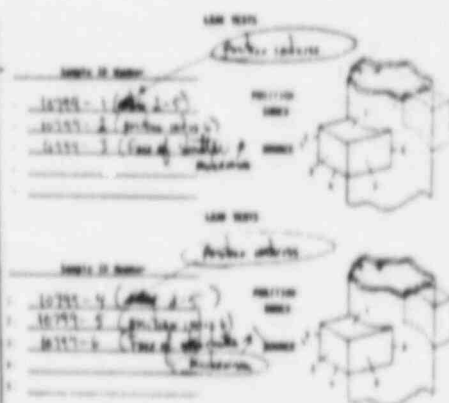
Initial blank $\frac{cts}{5min} = 46, 45, 43$

Final blank $\frac{cts}{5min} = 33, 35, 45$

Avg blank $\frac{cts}{5min} = 41$ Avg blank CPM = 8

Source description - Resin Dry Tank, Ray-Ray model 7062 P, serial # 10799, license # 37-19376-01, activity = 10 mCi.

OHF-14 Reference no.	Plant no.	Position Indicated	Observed Counts 5 min. 2 min.	Approximate Activity, μCi	
4182-235-1	10799-1	2-5	40, 39, 37	8	$< 4.1 \times 10^{-6}$
4182-235-2	10799-2	6	40, 31, 37	7	$< 4.1 \times 10^{-6}$
4182-235-3	10799-3	face of shutter mod	43, 41, 32	8	$< 4.1 \times 10^{-6}$
4182-235-4	10799-4	2-5	35, 41, 34	7	$< 4.1 \times 10^{-6}$
4182-235-5	10799-5	6	38, 35, 40	8	$< 4.1 \times 10^{-6}$
4182-235-6	10799-6	face of shutter modifier/DM	34, 38, 32	7	$< 4.1 \times 10^{-6}$



$$Cs^{137} \text{ current activity} = I_0 e^{(-0.693 \frac{t}{T_{1/2}})} \text{ where; } I_0 = \text{original activity, } 0.036 \mu Ci \text{ as of 6-85}$$

$$= 0.036 \mu Ci \cdot e^{(-0.693 \frac{2.25}{20})}$$

$$= 0.036 \mu Ci \cdot 0.94$$

$$= 0.034 \mu Ci$$

$t = \text{elapsed time, } 2.25 \text{ yrs.}$
 $T_{1/2} = \text{half life of } Cs^{137}, 20 \text{ yrs.}$

$$\text{Counting efficiency, } \epsilon_n = \frac{C_s - B}{C_n}$$

$$= \frac{8110 - 8}{7.5 \times 10^4}$$

$$= 0.11$$

where: $C_s = \text{Observed source CPM}$
 $B = \text{Avg. blank CPM}$
 $C_n = \text{Known emission rate, } 2.22 \times 10^4 \text{ dpm}/\mu Ci$
 $\times \text{source activity, } 0.034 \mu Ci$

$$\text{Approximate Activity} = \frac{C_s - B}{\epsilon_n} = 42505 \times 10^{-7} \text{ where: } C_s = \text{Observed sample CPM}$$

$$\epsilon_n = \text{Counting efficiency}$$

Report date
and author

B. A. Wicely, 9-18-85

APPENDIX VII

KOPPERS

Interoffice Correspondence

To See Attached Distribution

From M. H. Juba

Location _____

Location OH&PS-IH-Monroeville

Subject Semiannual Physical Inventory
of Sealed Radioactive Material
(814-2477)

Date September 19, 1985

Following an NRC Region I audit, a deficiency relative to the semiannual physical inventorying of licensed sealed sources was discovered. The problem occurred where leak tests/surveys of sealed source material are required on a three (3) year basis. Where licensed material must be leak tested/surveyed on a semiannual frequency, the physical inventory requirements have been met more or less by default. Those facilities falling into the three (3) year leak test category will be required to complete the attached form in January and June of each year.

A form indicating the licensed source(s) present at your facility will be issued and as the Plant Radiation Safety Contact, you will be required to verify the following:

- Number and types of sources present
- Location of individual sources
- Operating status of sources

After completing/verifying the above, signature the form, retain a copy for your files, and return the ORIGINAL to:

Michael H. Juba
Koppers Company, Inc.
Occupational Health & Product Safety
440 College Park Drive
Monroeville, PA 15146

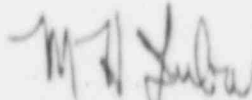
While the NRC audit involved only Region I facilities, the issue of physical inventorying applies to all Koppers facilities licensed to possess radioactive material(s). Therefore, this procedure will be employed for the following locations:

Semiannual Physical Inventory of
Sealed Radioactive Material

Page 2.

Conley, GA	General License issued to Kay-Ray, Incorporated
Follansbee, WV	License No. 47-16933-01
Fontana, CA	License No. CA 2650-36
Houston, TX	License No. TX 8-2226
Morgan, PA	License No. 37-19376-01
Oil City, PA	License No. 37-17897-01
Oroville, CA	License No. CA 4390-04
Petrolia, PA	License No. 37-03138-07
Verona, PA	License No. 37-03138-06
Woodward Coke, AL	License No. AL-640
Woodward Tar, AL	License No. AL-733
Youngstown, OH	License No. 34-18535-01

Your cooperation in this matter is greatly appreciated. Please contact this office at 412/327-3000, Ext. 5138 with any questions or comments.



M. H. Juba

/mad
attachment

Distribution: All Koppers Plants maintaining NRC or State Licenses for possession and use of sealed ionizing radiation sources requiring a leak test frequency of three (3) years (see attached distribution list).

cc: B. L. Allison
C. W. Flickinger
G. G. Kenney
D. J. McGraw, M.D.

**Semiannual Physical Inventory of
Sealed Radioactive Material**

DISTRIBUTION

Conley, GA	F. M. Klasnick C. Smith
Follansbee, WV	A. I. Domanico R. P. Olivetti
Fontana, CA	R. E. Stinnett
Houston, TX	J. A. Carnes, III
Morgan, PA	T. N. Izaj
Oil City, PA	T. L. Duespohl E. Stets
Oroville, CA (Feather River)	W. N. Morris Stephen Smith
Petrolia, PA	G. Thomas J. W. Wagoner
Verona, PA	E. D. Brennan A. S. Whiteford
Woodward Coke, AL	H. J. Browning S. H. Tuggle
Woodward Tar, AL	R. J. Morris
Youngstown, OH	T. A. Golubic J. J. Murray

APPENDIX VIII



CALIBRATION CERTIFICATE

"This Certificate will be accompanied by Calibration Charts or Readings where applicable"

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name:	Koppers Company, Inc.	Instrument Manufacturer:	Victoreen
Customer Address:	Research Dept. 440 College Park Drive Monroeville, PA 15146	Model:	Thyac 111
Customer P.O.#:	L4-2178 R4-2548	Serial Number:	2736
Service W.O.#:	1-84-09-223	External Probe(s):	489-4 Serial # 1640
		Calibration Method:	137 Cs s/n 107

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response		Comment
		Before Calib.	After Calib.	
1 X1	0.05 mR/hr		0.05 mR/hr	All Calibrations Btn. + & - 10%
2	0.1		0.1	
3	0.2		0.19	
4 X10	0.5		0.5	
5	1		1	
6	2		1.8	
7				
8 X100	5		5	
9	10		10	
10	15		14.5	
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Bureau of Standards (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by: *[Signature]*

Calibration Date: 8-20-84

Next Calibration Due: 2-20-85

I certify that the above information is correct

Authorized Agent: *[Signature]*

Title: Admin. Coordinator Date: 8-20-84



CALIBRATION CERTIFICATE

"This Certificate will be accompanied by Calibration Charts or Readings where applicable"

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name	Koppers Company, Inc.	Instrument Manufacturer	Victoreen
Customer Address	440 College Park Drive	Model	THYAC III
	Research Department	Serial Number	2668
	Monroeville, PA 15146	External Probe(s)	Serial #
Customer P.O. #	R5-805	Calibration Method	¹³⁷ Cs s/n 107
Service W.O. #	I-85-03-217		

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response		Comment
		Before Calib.	After Calib.	
1 X1	0.05 mR/hr		0.05 mR/hr	All Calibrations Btn. + & - 10%
2	0.1		0.1	
3	0.15		0.15	
4 X10	0.5		0.5	
5	1		1	
6	1.5		1.4	
7				
8 X100	5		4.5	
9	10		9.5	
10	15		13.5	
11				
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23				

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Bureau of Standards (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by M. C. Laible
(Signed)
Calibration Date 02-27-85
Next Calibration Due 08-27-85

I certify that the above information is correct
Authorized Agent Theresa M. Spina
Title Admin. Coordinator Date 02-27-85

SWO Date 02-20-85

SWO Number 1-85-03-217

CSR Date 02-20-85

Customer P.O. Number R5-805Requested Service Date ASAP

CUSTOMER INFORMATION

Billing Koppers Company, Inc.
Address 440 College Park Drive
Research Dept.
Monroeville, PA 15146

Shipping

Address

Contact

Contact

Telephone

Telephone

INSTRUMENT INFORMATION

Maintenance & Repair Performed: See BelowInstrument Manufacturer Victoreen

Model THYAC 111 Serial Number 2668

External Probe(s) _____ Serial # _____

Calibration Method

OTHER TESTS & CHECKS

Description (Leak Test, Etc.) n/a

ACCOUNTING & BILLING INFORMATION

SWO Accounting		Item	Quantity	Description	Rate/Unit Price	Extension
Name	Date					
Received	02-20-85	Labor				
Repaired	n/a	Travel				
		Time				
Calibrated	02-27-85	Shipping Charges				
Next Calibration Due	08-27-85	Parts				
Shipped	02-27-85					
Billed						
Certificate				Calibration		35.00
Shipping Method						
Hand Carry						
Customer Received						
see shipped						
		Taxes				
		Total				



CALIBRATION CERTIFICATE

"This Certificate will be accompanied by Calibration Charts or Readings where applicable"

CUSTOMER INFORMATION	INSTRUMENT INFORMATION
Customer Name: <u>Koppers Company, Inc.</u>	Instrument Manufacturer: <u>Victoreen</u>
Customer Address: <u>440 College Park Drive</u>	Model: <u>Thyac 111</u> Serial Number: <u>2668</u>
<u>Research Dept.</u>	External Probe(s): _____ Serial #: _____
<u>Monroeville, PA 15146</u>	Calibration Method: <u>¹³⁷Cs s/n 107</u>
Customer P.O.#: <u>R5-2721</u>	
Service W.O.#: <u>I-85-09-225</u>	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response		Comment
		Before Calib.	After Calib.	
1 X1	0.05 mR/hr		0.05 mR/hr	All Calibrations Btn. + & - 10%
2	0.1		0.1	
3	0.15		0.15	
4 X10	0.5		0.5	
5	1		1	
6	1.5		1.5	
7				
8 X100	5		5	
9	10		9	
10	15		13.5	
11				
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STATEMENT OF CERTIFICATION

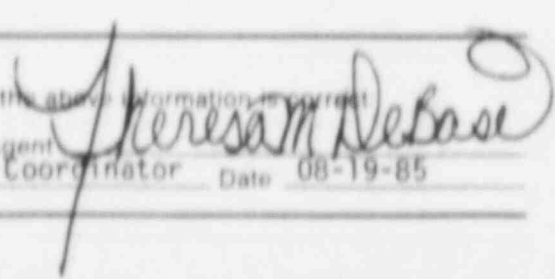
We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Bureau of Standards (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by


(Signed)Calibration Date: 08-19-85Next Calibration Due: 02-19-86

I certify that the above information is correct

Authorized Agent

Title: Admin. Coordinator Date: 08-19-85



RAD SERVICES, INC.
INSTRUMENT SERVICE WORK ORDER

Form RS-35
FD Rev. 5/83

SWO Number I-85-09-225
Customer P.O. Number L5-2412 R5-2721

SWO Date 08-14-85
CSR Date 08-14-85
Requested Service Date ASAP

CUSTOMER INFORMATION

Billing Koppers Company, Inc.
Address 440 College Park Drive
Research Dept.
Monroeville, PA 15146
Contact _____
Telephone _____

Shipping _____
Address _____
Contact _____
Telephone _____

INSTRUMENT INFORMATION

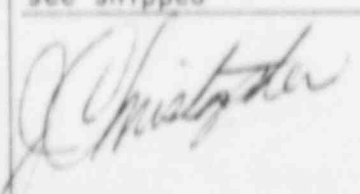
Maintenance & Repair Performed: See Below

Instrument Manufacturer Victoreen
Model Thyac 111 Serial Number 2668
External Probe(s) _____ Serial # _____
Calibration Method _____

OTHER TESTS & CHECKS

Description (Leak Test, Etc.) n/a

ACCOUNTING & BILLING INFORMATION

SWO Accounting		Item	Quantity	Description	Rate/Unit Price	Extension
Name	Date					
Received	<u>08-14-85</u>	Labor				
Repaired	<u>n/a</u>	Travel				
Calibrated	<u>08-19-85</u>	Time				
Next Calibration Due	<u>02-19-86</u>	Shipping Charges				
Shipped	<u>08-19-85</u>	Parts	<u>2 ea</u>	<u>"D" Cell Batteries</u>	<u>1.50</u>	<u>3.00</u>
Billed						
Certificate				<u>Calibration</u>		<u>35.00</u>
Shipping Method	<u>Hand Carry</u>					
Customer Received	<u>see shipped</u>					
		Taxes				
		Total				

Form RS-85

Just A Reminder ...

Your instrument _____ Model _____

Serial _____ is due for calibration on _____

We look forward to being of service in this matter.

CUSTOMER:

Thank You For Your Business



2045 Route 286
Pittsburgh, PA 15239
Phone: 412/733-1900