

Inspection Notes/Record Copy

William P. Ellis  
William P. Ellis/djd

*Olefins*  
Union Carbide ~~Chemicals~~ Company  
Division of Union Carbide Corporation  
South Charleston 3, West Virginia

License No. 45-260-2 (thru Amendment #12 dated December 17, 1962)

I. General Information

1. The Union Carbide Olefins Company's program involving the use of cesium-137 sources for density gauges and level indicators was originally inspected on May 23, 1957. Two items of noncompliance were noted which involved the possession of a 200 mc cobalt-60 source which was not licensed and the licensee's failure to post a radiation area. The cobalt-60 source was returned to ORNL on September 18, 1957, and the radiation area was subsequently posted.
2. This unannounced reinspection (1) was conducted on April 23-25, 1963, by W. P. Ellis of Region II, accompanied by Mr. Jim Ellison of the West Virginia State Health Department. No items of noncompliance were noted.
3. Union Carbide's programs under Licenses #47-260-3, -4, -6, -7, and 47-4373-1 were inspected simultaneously and the results are reported separately. Mr. W. J. Skraba, Chairman of the Isotopes Committee; Mr. N. H. Ketcham, and Fred Williams, Radiological Safety Officers; and Mr. H. T. Sessions, Instrument Engineer and designated user, were interviewed and the substance of the information supplied by them and the observations of the inspection are contained in this report.

II. Organization

4. As noted in Annex A, the Union Carbide Corporation is composed of several companies, and its Technical Center at South Charleston performs research for several groups. The Technical Center consists of seven major departments as follows: Chemical Department, Development Department, Olefins Research Department, Olefins Engineering Department, Chemical Engineering Department, Textile Fiber Department and the Design and Construction Department. The administration of the Technical Center is primarily under the Chemicals and Olefins Companies.

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5. Mr. Sessions is in the Special Instrument Development group and reports to the Head of the department, Mr. L. J. Rogers. Mr. N. H. Ketcham and Fred Williams report through the Medical Department and the Director of Special Projects. Mr. Ketcham had four years experience in the AEC plants at Oak Ridge, Tennessee, and Mr. Fred Williams had 12 years experience in the same installations before they were employed as Radiological Safety Officers at the Technical Center.

### III. Procedures

6. All requests for radioactive materials at the Technical Center must be forwarded to the Radiological Materials Committee for approval. Such requests state the operation planned, the amount of material to be used, handling techniques, storage, and instrumentation. Only when these requests are approved will the Purchasing Department submit the order to a vendor.
7. When material arrives at the Receiving Department, it is set aside and the user is notified immediately. The user is required to inspect the shipment to ascertain its condition. A radiation survey is made and recorded. When the material is accepted, the Safety Division and Fire Department are notified. The notification states the type of material, amount received, location, and the name of the user (See Annex B). When the user receives a sealed source and makes the installation, a survey and a leak test are performed and the results are recorded in the form attached as Annex C. In many instances additional lead shielding is placed around the source container in order to ~~minimize~~ minimize the radiation levels.
8. The chief of the local fire department had a formal course in radiological safety which included the use of instruments, personnel monitoring, and techniques for confining radioactive materials. He is a local Civil Defense Director. Emergency instructions to the fire department provide that sealed sources which may be involved in a fire should be roped off and the designated user should be notified. A hazardous work permit as shown in Annex D is used when maintenance employees must work on a system where a sealed source is located. The permit states that the source container has been closed, and provides special instructions as needed.

### IV. Equipment and Facilities

9. The Union Carbide Corporation has a Technical Center constructed on a tract of land which contains several ~~hnd~~ hundred acres and is located on a mountain above the city of South Charleston, West Virginia. This area is enclosed by a chain link fence and the portals are manned by guards on all shifts. The research complex contains six major multi-story structures which are about 500 yards apart. These facilities house administrative, medical and cafeteria service groups as well as laboratory and pilot plant operations. The site also has numerous auxiliary buildings.

10. The licensee maintains the following instruments in the Technical Center:

- 1 RCL, Model 1, scaler with GM tube detector and counting well
- 1 RCL, Model 10400, End Window GM Tube monitor
- 2 Tracerlab, Laboratory monitor, Model SU3-D with GM tube detector, range 0 to 20,000 c/m
- 1 Instrument Calibration Assembly with 1 mc cobalt-60 source (License No. 47-260-4) sliding carrier to position instrument
- 1 Curtiss-Wright, Model 305 F, with GM tube detector, range 0-50 mr/hr
- 4 Jordon Cutie Pies, Model AGB-10K, Range 0-10,000  $\mu$ /hr
- 3 Tracerlab GM Tube Survey Meters, Model SU-14, Range 0-25 mr/hr
- 1 Universal Atomics GM Survey Meter, Model CDV-700, range 0-50 mr/hr
- 1 Keleket Scaler, Model K-281, with counting well and GM Tube Detector
- 1 Victoreen CDV-720 Ion Chamber Survey Meter, Range 0-500 r/hr
- 30 Direct Reading Pocket Dosimeters, Range 0-200 mr/
- 1 Nuclear-Chicago, Single Channel Analyzer, Model 132 B Scaler

#### V. Material Receipt, Inventory and Disposal

11. The licensee maintains records of material received showing the type of material, amount, date of receipt, and the supplier. A review of the records showed that the following materials have been received and were in his inventory at the time of the inspection:

#### Cesium-137 Sources

<u>Activity</u>	<u>Building and Location</u>	<u>Plant</u>
200 mc	745 Storage	Technical Center
200 mc	745 Storage	" "
200 mc	745 Storage	" "
200 mc	Bldg. 421	South Charleston
150 mc	Bldg. 414 #2 unit	" "
150 mc	Bldg. 421 Lab	" "
500 mc	745 Storage	Technical Center
20 mc	Bldg. 421	South Charleston
20mc	Bldg. 414 #1 unit	" "
20 mc	745 Storage	Technical Center
20 mc	414 #1 Unit	South Charleston
20 mc	414 #1 Unit	" "
50 mc	745 Storage	Technical Center
50 mc	414 #1 Unit	South Charleston
50 mc	414 #1 Unit	" "
100 mc	745 Storage	Technical Center

<u>Activity</u>	<u>Building and Location</u>	<u>Plant</u>
150 mc	414 #2 Unit	South Charleston
150 mc	745 Storage	Technical Center
150 mc	" "	" "
1000 mc	414 #7 Unit	South Charleston
450mc	745 Storage	Technical Center
1750 mc	" "	
500 mc	Cellosize Unit	Institute
500 mc	Cellosize Unit	"
1000 mc	Bldg. 771 #5 Cell	Technical Center
150 mc	Bldg. 414 #2 Cell	South Charleston
150 mc	" " " "	" "

12. One 200 mc cobalt-60 source was returned to the Oak Ridge National Laboratory on September 18, 1957, as a result of the last inspection and no other disposals have been made.

#### VI. Personnel Monitoring

13. The licensee maintains a personnel monitoring program utilizing film badges which are supplied by Nuclear-Chicago on a monthly basis. The licensee maintains all the information necessary to satisfy the requirements of AEC Forms 4 and 5. A review of these records showed that the maximum monthly exposure was 20 mrem and the maximum quarterly exposure was 44 mrems. Mr. Sessions stated that all employees who work with the sealed sources wear direct reading dosimeters and these results are recorded daily. A quarterly report of the dosimeter readings is forwarded to the Medical Department for inclusion in ~~their~~ <sup>each employee's</sup> records. The maximum monthly dosimeter reading was 41 mrem. All employees are more than 18 years of age.
14. Employees wear direct reading dosimeters while installing sealed sources or when making repairs or leak tests of this equipment. The maximum value recorded for one job was 5 mrem.
15. The licensee has a clinical urinalysis and blood test <sup>program which is</sup> performed semi-annually. Mr. Williams stated, however, that these tests were not performed primarily for the detection of personnel exposure to radioactive materials.

VII. Leak Tests

16. The licensee performs leak tests on all sealed sources at the time they are received. A record is made of each source at this time and a routine leak tests schedule is established. Subsequent leak tests are made on a six month basis or a three year basis as required for each particular source. A review of the leak test records showed that tests were made within the required schedule and the results were less than .005  $\mu$ c.

VIII. Surveys

17. The licensee records surveys of sealed sources which are made at the time of installation and subsequent surveys are made at the time leak tests are made or when a source is relocated. A review of these records showed that all <sup>radiation levels</sup> ~~survey values~~ were less than 5 mr at one foot from the container.

IX. Posting and Labeling

18. All source containers were labeled with a sign containing the conventional radiation symbol of magenta on yellow and the words "Caution - Radioactive Materials" in accordance with 10 CFR 20.203(f)(1). The label also showed the type of material, amount, and date of measurement in accordance with 20.203(f)(4) of the regulations. All areas in which radioactive materials were stored were posted with a sign containing the conventional radiation symbol in magenta on yellow and the words "Caution Radioactive Materials" in accordance with 20.203(e)(1).
19. Form AEC-3, "Notice to Employees", were posted in the Special Instrument shop where all employees may observe a copy.

UNION CARBIDE CORPORATION  
NEW YORK

Nuclear Company

Plastics Company

Chemicals Company

Olefins Company

Alkyl Company

...

N. H. Ketcham  
Indust'l Hygiene

Institute Plant  
L. N. Dickinson, Mgr.

S. Charleston Plant  
R. C. Hieronymous  
Gen. Plant Mgr.

Technical Center

Asst. Plant Mgr.  
B. F. King

Medical  
Dept.

W. W. Ten Eyck  
Plant Manager

Spec. Instru. Dept.  
L. J. Rogers

Medical  
Dept.

Chemicals R&D

Chief Engineer  
R. P. Little

A. W. Cole, Asst.  
Mgr. for Mainten.  
& Engineering

Acoustics & Vi-  
brators Nucle-  
onics Instru't'n  
E. C. Harry

Organ. Chem Div  
Dr. B. Phillips

Dir. of Spec.  
Projects Div.  
Dr. F. Johnson

Astronaut Eng.  
P. A. Laine, User  
of Isotopes

RSO  
R. E. Peele  
47-4373-1

J. D. Robey, Instru't  
& Elec. Eng. Dept.

Medical  
Dept.

Instru. Eng.  
H. T. Sessions  
User of Isotopes

RSO  
N. H. Ketcham  
47-260-4  
47-260-6

Asst. Dir.  
Dr. J. W. Lynn

Asst. Dir.  
R. M. Berg

E. E. Buxton, Instu.  
Eng., User of Isotopes

RSO  
B. L. Murray  
47-260-7

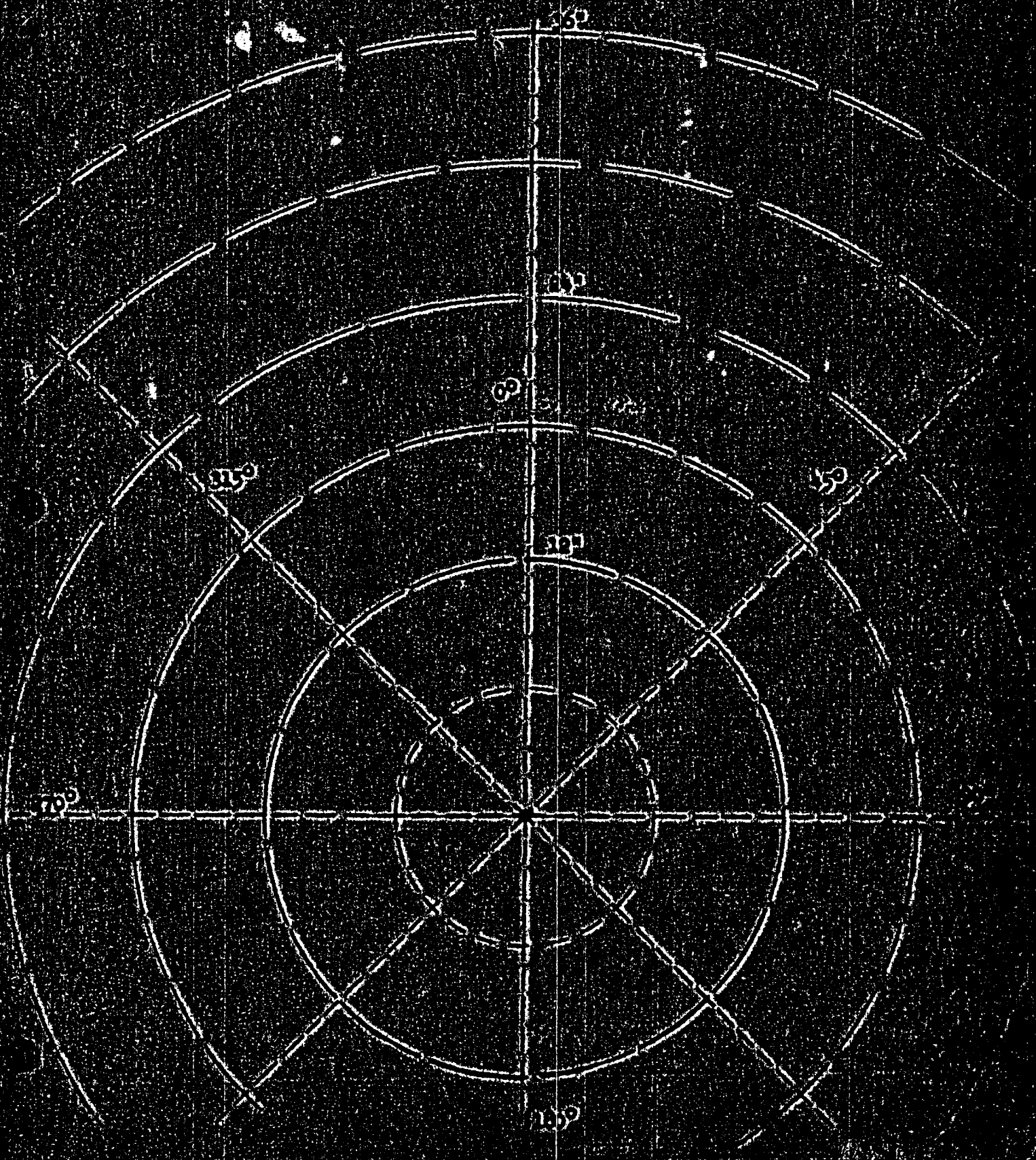
Chairman of  
Isot. Com.  
Dr. W. J. Skrabala

Supr. Ind. Lab  
& RSO  
N. H. Ketcham  
47-260-3

RSO  
Fred Williams  
47-260-2

5/17/77 11:00 AM

Location \_\_\_\_\_ Date \_\_\_\_\_  
ID# \_\_\_\_\_ Activity \_\_\_\_\_  
Source type \_\_\_\_\_ Plot type \_\_\_\_\_





# RADIATION SURVEY - PLANT 5

### Location

**Sample Date**

**Supervisor**

Sampled by

## Radiation

### Type of Test

### Location of Source

### Required Survey Frequency

### Meters Used

## Work Hazard Permit

## Gas Test

Degree	Distance From Source To Meter	Mr/hr Readings	Mr/hr
Background			
0°-Recv'r			
45°			
90°			
135°			
180°-Back			
225°			
270°			
315°			
Top			
Bottom			
Wire Test	Counts/5 in		
Background			
Top of Source Holder			

### Remarks:

ARMSTRONG  
Page 1



NEW LOCATION

OLD LOCATION

PERSON (NAME) TRANSFER

TYPE OF SOURCE

IDENTIFICATION NUMBER

REF. NUMBER

ALIAS (If applicable)

TYPE TEST CONDUCTED

PHYSICAL DESCRIPTION

RESPONSIBLE SUPERVISOR

FROM

USE

PERSON RESPONSIBLE FOR TESTING

FROM

REQ. TEST. FREQ.

PERSON RESPONSIBLE FOR INCUR

FROM

REQUISITION NUMBER

VENDOR

DATE RECEIVED

DATE PLACED IN STORAGE

DATE TRANSFERRED

RECORD OF TESTS:

TYPE TEST DUE

TYPE TEST

REMARKS

RESPONSE

DATE

COMMENTS

Copies to

South Charleston

Institute

E. E. Burton 82-701

E. G. Murray 48-31

E. H. [unclear] 100-206

P. Williams 201

P. A. [unclear]

P. H. [unclear]

31

100-206

**SURVEY DATA**

**SOURCE TYPE**

## ACTIVITY

## TYPE HOLDER

### REQUIRED SURVEY FREQUENCY

### PLANT LOCATION

**BUILDING NUMBER**

**ROOM NUMBER**

PERSON RESPONSIBLE

## HAZARDOUS WORK PERMIT

## GAS TEST

**TYPE 80045**

## SURVEY INFORMATION

### TYPE METER USED

## COUNCIL POSITION

## PIPE TEST

**INTERVIEWED BY**

FROM OFF

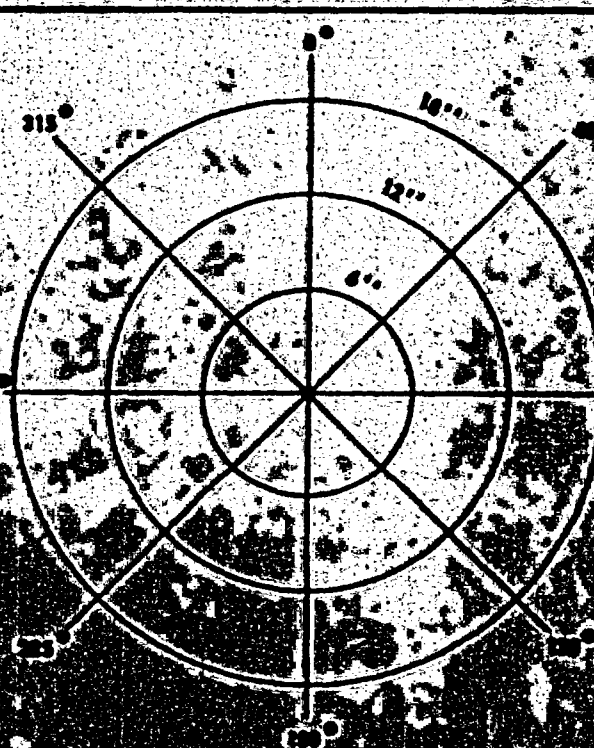
## METER READINGS

### EXPOSURE CURVE

### REPORTING LOCATION

**DISTANCE FROM SOURCE**

1. **Introduction**  
 2. **Background**  
 3. **Methodology**  
 4. **Results**  
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**MARKS**

# ANNEX

# HAZARDOUS WORK PERMIT

Must be properly filled out and approved, and responsible supervision provided by operating and craft personnel when flame or other possible ignition source is to be used in a restricted area or where entry is to be made into equipment for any reason (and in some instances where piping is opened), except: (1) cleaning "Vinylite" autoclaves by "Vinylite" Department personnel, (2) tank car cleaning by Shipping Department personnel, or (3) barge cleaning by Refinery Department personnel, all three of which are covered by normal operating procedures.

See front cover of form pad for complete instruction.

Location: Describe work: .....

Between the hours of: ..... a.m. to ..... a.m. Date: ..... Charge or W. O. No. ....

Requested by: ..... Dept.: .....

## CLASS "A" HAZARDS

- ☐ Entry of operating equipment for any reason except: (1) cleaning "Vinylite" autoclaves, (2) tank cars by Shipping Department personnel, or (3) barges by Refinery personnel.
- ☐ Entry of sewers.
- ☐ Blowpipe or welding torch (any kind).
- ☐ Electrical or electronic equipment — not vapor-proof or explosion-proof — saw, drill, welding machine, or otherwise.
- ☐ Radiation Monitor — nonexplosion-proof electronic equipment
- ☐ Lead, soldering, or tar pot.
- ☐ Sandblasting.
- ☐ Power operated grinder.
- ☐ Jack hammer or chipping hammer.
- ☐ To open vapor globe or any electrical device (except by electrician).

## CLASS "B" HAZARDS

- ☐ Movement of internal combustion engine into or through "restricted area."
- ☐ Hand drill, saw, or other hand tool work.
- ☐ Roofing tar (pouring hot).
- ☐ Power tools not listed under Class "A" that may be used for heat exchanger tube cleaning.

## OTHER CLASS "A" OR "B" HAZARDS

- ☐ Explain .....

## RECOMMENDED PREPARATIONS AND PRECAUTIONS (to be checked and signed by operating foreman).

- ☐ Blank or disconnect all connecting lines .....
- ☐ Lock out electrical switches .....
- ☐ Clean or wash with .....
- ☐ Keep wet .....
- ☐ Steam for ..... hrs. or to ..... °F. ....
- ☐ with .....
- ☐ Turn Radioactive source in "safe position," or remove (to be signed by Plant Instrument Foreman) .....
- ☐ Test for Flammable Gases: ☐ Continuous Results: —Neg. —Pos. by .....
- ☐ ☐ Spot Check Results: —Neg. —Pos. by .....
- ☐ Test for Copper Acetylide Results: —Neg. —Pos. by .....
- ☐ Test for Toxic Gases Results: —Neg. —Pos. by .....
- ☐ Contamination test for Radioactive Materials (SPECIFY GAS) Results: —Neg. —Pos. (to be signed by Radiation Licensee representative or Radiation Protection Officer) .....
- ☐ Ventilate Results: —Neg. —Pos. by .....

## SAFETY EQUIPMENT TO BE USED

- ☐ Fresh Air Masks
- ☐ Full Face Gas Masks
- ☐ Fresh Air Blower
- ☐ Special Goggles
- ☐ Spark-Resistant Tools
- ☐ Portable Fire Extinguisher
- ☐ Life Lines
- ☐ Protective Clothing
- ☐ Water or Fire Hose (Chg'd .....
- ☐ Personal Dosimeters
- ☐ Other .....

Approval is granted for the above operation, subject to the following conditions: .....

Operating supervision ..... must be present while Class "A" work is in progress.

(NAME)

Countersigned: ..... (AREA SHIFT FOREMAN OR GEN. FOREMAN)

Signed: ..... Countersigned: ..... (AREA MAINT. FOREMAN, SENIOR INSPECTOR, OR CONSTRUCTION SAFETY INSPECTOR)

(CLASS "A" - DEPT. HEAD) (SEE INSTRUCTIONS)  
(CLASS "B" ONLY - CHIEF OPERATOR)

COMPLETED: Time ..... a.m. Date ..... 19..... Signed: ..... (JOB FOREMAN)

Signed: ..... (AREA SHIFT FOREMAN ON DUTY)

Following proper filling out and approval, distribution of permit shall be as follows:

- (1) Original (white) copy must be in hands of job foreman before work is started and during its progress. This original copy must be signed and returned to the Fire Station at the completion of the work, or when permit expires.
- (2) Duplicate (yellow) copy shall be retained by shift personnel approving permit, and passed on to relief at shift change so that oncoming shift relief may be familiar with work in progress and assign the necessary supervision.
- (3) Triplicate (pink) copy is for the information and use of Operating supervision.