DOW CHEMICAL U.S.A.

MIDLAND, MICHIGAN 48640

OPERATING PROCEDURE FOR TECH/OPS MODEL 525 INDUSTRIAL GAMMA RAY PROJECTOR, SERIAL NUMBER 1041 (5 CURIE COBALT-60 SOURCE, MODEL NUMBER 424-5)

ANY MALFUNCTION OF, OR DAMAGE TO, THE SOURCE, PROJECTOR AND ASSOCIATED EQUIPMENT, OR THE RADIATION SURVEY METER, DOSIMETERS AND FILM BADGES, MUST BE REPORTED IMMEDIATELY TO WELDING ENGINEERING SUPERVISION AND INDUSTRIAL HYGIENE. SOURCE IS NOT TO BE USED UNTIL MALFUNCTION OR DAMAGE IS CORRECTED.

A. Normal procedure for gamma ray usage. Note: circled numbers refer to steps described in Radiation Survey Form in back of log book.

1. Preparation to be made before going to the job site should be as follows.

a. Obtain gamma source log book.

b. Check dosimeter reading and record under appropriate column in log book. If reading is more than 20, rezero using the Victoreen dosimeter charger Model 2000A.

c. Check calibration date marked on Eberline Model E-120G survey meter. If "Calibration Date" has expired, take meter to Industrial Hygiene for calibration.

d. Place dosimeter in your pocket along with your film badge.

e. Check the travel van for all types of radiation signs, ropes (750 ft. "Radiation Area" rope and 1200 ft. "Restricted Area" rope), red flasher, survey meter and timer.

2. Obtain the key to the source storage cabinet from Supervisor's desk.

3. Open cabinet, perform survey meter check (1), wheel out Tech/Ops projector and make following checks.

   NOTE: IF ANY DAMAGE OR MALFUNCTION IS FOUND, DO NOT USE PROJECTOR. NOTIFY SUPERVISOR AND INDUSTRIAL HYGIENE IMMEDIATELY.

   a. Source indicator light is working.

   b. Lock on bottom of projector is working.

   c. Crank cable is clean and working, connectors work, no visible wear or damage.

   d. Source guide tube and connectors are clean and working, no visible wear or damage.

   e. No other damage or wear that would affect its safe use.

   f. Identity, safety and shipping labels are all in place and legible.

4. Fill out inspection form (pages 26 and 27 in log book) and record in the log book the date and time the projector was removed from the cabinet.

5. Make sure all the connecting cables and the 360° head are in the van.

6. Place the projector in the rear of the van and tie it down securely.

   NOTE: THE PROJECTOR IS HEAVY. BOTH MEN SHOULD LIFT, KEEPING THE BACK ERECT AND USING THE LEGS TO LIFT PROPERLY.

7. Place "Dangerous - Radioactive Materials" sign on van.

8. Perform survey checks (2), (3) and (4), and record measurements. Maximum reading at contact with exterior of van must be 2 mrem/hr or less. If it is higher, lead shielding shall be placed and secured around projector until proper reading is obtained.

9. Drive vehicle to the job site. DRIVE CAREFULLY. In case of an accident, immediately initiate emergency plan (located inside back cover in log book).

10. After arriving at the job site, one man will stay with the vehicle while the other seeks out the supervisor of the job and looks over the site. This man shall instruct the supervisor of the hazards involved and what precautions are required for the operation. He shall also discuss how the personnel on the job will be informed and what is required to clear the area. He shall also inquire about the evacuation or alert procedure for the area, location of safety and eye showers, telephone, and the presence of any hazards that may endanger the radiographers or projector.

11. The van shall then be moved as close as practical to the job.

12. Place "Caution - High Radiation Area" signs and red flasher at appropriate locations to identify the area bounded by the 100 mrem/hr isodose line (26.4 ft. from an unshielded 5 curie cobalt-60 source).

    Place the rope barrier at the 4 mrem/hr isodose line and attach "Caution - Radiation Area" signs (118 ft. from unshielded 5 curie cobalt-60 source).

If warranted by the required number of exposures and exposure time at a given site, place a rope barrier at the 2 mrem/hr isodose line and attach "Caution - Restricted Area" signs (187 ft. from unshielded 5 curie cobalt-60 source).

The 2 mrem/hr isodose barrier is not required by AEC regulations, but is recommended, especially when the job requires prolonged exposure times at one location.

13. The film shall then be prepared and attached to the job.

14. Turn on the survey meter to warm up.

15. Move the projector to the job site and turn on the red flasher.

16. Connect the cable assembly to the projector.

17. Position the head and secure in place ready for the exposure.

18. Each man shall recheck his dosimeter reading and make sure he has his film badge on his person.

19. One man shall take the survey meter and patrol the roped area. If the area is clear of all personnel, he shall signal the other man who will crank out the source.

20. The source shall be cranked out as fast as possible until the "ON" light starts to blink.

21. The man shall then move quickly to the farthest rope barricade and set timer for desired exposure time. The other man shall patrol the ropes with the survey meter to determine the radiation levels, which must be no greater than 5 mrem/hr at "Radiation Area" rope and no greater than 2 mrem/hr at "Restricted Area" rope. Record the maximum readings at (5) a and b on Survey Form.

22. During the exposure, both radiographers must patrol the farthest rope barrier to prevent unauthorized persons from entering the exclusion area. The job must be arranged so that the projector and guide tube are in the sight of the radiographers and there are no hidden means of approach to the source by unauthorized persons.

23. After the predetermined exposure time has elapsed, one man will enter the roped area and quickly approach the projector. He shall crank in the source as fast as possible until the "Stored" light flashes. The other man shall take readings with the survey meter at the projector and also along guide tube to assure the source is in its shielding. Survey readings shall be recorded at (6) a and b on the Survey Form.

    Note: AEC regulations require that a physical survey be made after each exposure to make sure that the source has been returned to its shielded condition. Use a separate box opposite (6) on the Survey Form for each exposure.

24. Lock the projector after each exposure, before moving it or preparing for next exposure.

25. The exposure time shall be recorded in the log book along with a reading of each man's dosimeter.

26. Steps 11 through 25 should be repeated for each exposure required on the job.

27. Make sure lock is secure, perform survey check (7), then remove cables from projector.

28. The projector shall be returned to the vehicle and secured. Survey meter checks of projector (8), van (9), and seats (10) shall be made and recorded on Survey Check Form.

29. The rope and signs shall be gathered in as well as the film and flasher.

30. The projector shall be returned to the lead lined cabinet, survey check (11) performed and recorded, and the cabinet locked securely.

31. The survey meter shall be used to monitor the cabinet after it is secured and measurement recorded as survey check (12). A reading of 2 mrem/hr or less is required.

32. The time the source is returned shall be recorded in the log book.

33. Return keys to supervisor.

34. Any known or suspected damage or malfunction of projector, survey meter, dosimeters or other equipment shall be reported promptly to supervision.

B. Special Conditions (Other than Emergency)

1. Overnight stops away from home.

a. Source shall be stored in the vehicle. The vehicle shall be locked securely. "Caution - Radioactive Materials" signs shall be placed in a window on each side of the vehicle. Vehicle and source keys shall be kept on your person or in locked room.

b. The outside of the vehicle shall be monitored with the survey meter to assure a reading of 2 mrem/hr or less. If the reading is too high, lead shielding shall be installed around the projector until the proper reading is obtained. Record maximum reading at (13) on Survey Form.

c. The film shall be stored in the lead lined container on the vehicle.

2. Storage at job site.

   If it is necessary or desirable to store source on-site:

   a. Find a secure room or container that can be locked.

   b. Notify and secure approval of supervision and Industrial Hygiene.

   c. Survey source, as stored, to assure levels are 2 mrem/hr or less. Record maximum reading at (14) on Survey Form.

   d. Place "Caution - Radioactive Materials" signs on locked container or doors to locked room.

   e. Keep key to storage on your person or in your locked room.

3. All procedures starting with inspections in 3. a. through f., will be performed at the beginning of each day while working away from home. At no time will the projector be used if damaged or malfunctioning. Do not attempt repairs in the field. Notify supervision and Industrial Hygiene.

H. R. Field/L. G. Silverstein
REVISED 5/3/72

RADIATION SURVEY CHECK FORM FOR TECH/OPS MODEL 525 PROJECTOR*

DESCRIPTION OF MEASUREMENT			DATE												
1. Check meter response at top of projector.															
2. Top of projector after placing in van.															
3. Sides and rear of van At contact, maximum At 6 feet, maximum															
4. Driver's seat & other rider's seats in van (must be less than 2 mrem/hr).															
5. At rope or barricade Radiation Area (5 mrem/hr maximum) Restricted Area (2 mrem/hr maximum)															
6. Must be measured after EACH exposure: a. Top of projector after exposure. b. Along guide tube after exposure.	1	a.													
		b.													
	2	a.													
		b.													
	3	a.													
		b.													
	4	a.													
		b.													
	5	a.													
		b.													
7. Top of projector after locking it for day.															
8. Top of projector after securing in van.															
9. Sides & rear of van At contact, maximum At 6 feet, maximum															
10. All seats in van (must be <2 mrem/hr).															
11. Top of projector after moving it to storage.															
12. Storage cabinet, at contact, maximum (must be <2 mrem/hr).															
13. Locked van, overnight stop.															
14. Storage at job site.															

*Make sure survey meter "Calibration Date" date has not expired.
Record date at top of column, record mrem/hr meter reading in appropriate boxes under the date.

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1. Preparation to be made before going to the job site should be as follows.

   a. Obtain gamma source log book.

   b. Check dosimeter reading and record under appropriate column in log book. If reading is more than 20, re-zero using the Victoreen dosimeter charger Model 2000A.

   c. Check calibration date marked on Eberline Model E-120G survey meter. If "Calibration Date" has expired, take meter to Industrial Hygiene for calibration.

   d. Place dosimeter in your pocket along with your film badge.

   e. Check the travel van for radiation signs, rope, red flasher, survey meter and timer.

2. Obtain the key to the source storage cabinet from Supervisor's desk.

3. Open the cabinet, perform survey meter check (1) then wheel out the Tech/Ops projector and make the following checks.

   a. See that blinker light marked "Stored" is working.

   b. See that the lock on the bottom of the projector is secure.

c. Record in the log book the date and time the projector was removed from the cabinet.

d. Place the projector in the rear of the van and tie it down securely.

e. Make sure all the connecting cables and the 360° head are in the van.

f. Perform survey checks (2), (3) and (4), and record measurements.

4. Drive vehicle to the job site. DRIVE CAREFULLY. In case of an accident, immediately initiate emergency plan (located inside back cover in log book).

5. After arriving at the job site, one man will stay with the vehicle while the other seeks out the supervisor of the job and looks over the site. This man shall instruct the supervisor of the hazards involved and what precautions are required for the operation. He shall also discuss how the personnel on the job will be informed and what is required to clear the area. He shall also inquire about the evacuation or alert procedure for the production area.

6. The van shall then be moved as close as practical to the job.

7. An appropriate area shall be roped off and the "High Radiation" signs distributed at intervals along the line.

8. The film shall then be prepared and attached to the job.

9. Turn on the survey meter to warm up.

10. Move the projector to the job site and turn on the red flasher.

11. Connect the cable assembly to the projector.

12. Position the head and secure in place ready for the slot.

13. Each man shall re-check his dosimeter reading.

14. One man shall take the survey meter and patrol the roped area. If the area is clear of all personnel, he shall signal the other man who will crank out the source.

15. The source shall be cranked out as fast as possible until the "ON" light starts to blink.

16. The man shall then move quickly to the rope and set timer for desired exposure time. The other man shall patrol the rope with the survey meter to determine the radiation level which should be 2 mrem/hr or less. Record maximum reading at (5) on Survey Form.

17. After the predetermined exposure time has elapsed, one man will enter the roped area and quickly approach the projector. He shall crank in the source as fast as possible until the "Stored" light flashes. The other man shall take readings with the survey meter to assure the source is in its shielding. Survey readings shall be recorded (6) on Survey Check Form.

18. Note: AEC regulations require that a physical survey be made after each exposure to make sure that the source has been returned to its shielded condition. Use a separate box opposite (6) on Survey Form for each exposure.

19. The exposure time shall be recorded in the log book along with a reading of each man's dosimeter.

20. Steps 6 through 16 should be repeated for each exposure required on the job.

21. The cable shall be removed from the projector and the lock secured on the projector.

22. The projector shall be returned to the vehicle and secured. Survey meter checks of projector (8), van (9), and seats (10) shall be made and recorded on Survey Check Form.

23. The rope and signs shall be gathered in as well as the film and flasher.

24. The projector shall be returned to the lead lined cabinet, survey check (11) performed and recorded, and the cabinet locked securely.

25. The survey meter shall be used to monitor the cabinet after it is secured and measurement recorded as survey check (12). A reading of 2 mrem/hr or less is required.

26. The time the source is returned shall be recorded in the log book.

27. Return keys to supervisor.

28. Any known or suspected damage or malfunction of projector, survey meter, dosimeters or other equipment shall be reported promptly to supervision.