



# TRIO-TECH

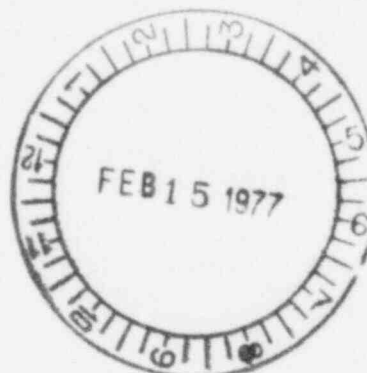
INTERNATIONAL

0507

February 9, 1977

Originating from:  
☐ BURBANK  
☐ MOUNTAIN VIEW  
☒ FRAMINGHAM

Mr. Jack Bell  
Radioisotopes Licensing Branch  
Division of Materials and Fuel  
Cycle  
Facility Licensing  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555



Dear Mr. Bell:

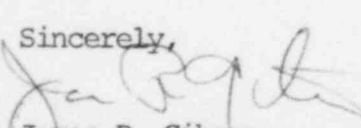
Thank you for taking the time to talk with me regarding our proposed amendment for our license, dated December 30, 1976.

Enclosed please find the outline for our maintenance training course, along with a copy of the exam individuals are required to pass at its completion.

After our conversation, I understand the tremendous work load you currently have and would appreciate any help you could give us in obtaining this amendment at your earliest convenience.

We thank you again for your consideration and it was indeed a pleasure talking with you.

Sincerely,

  
James R. Gibson  
Eastern Regional Manager

JRG/bs  
enclosures

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TRACER-FLO MAINTENANCE COURSE TEST

1. WHAT ARE THE ATOMIC ENERGY COMMISSIONS'S ALLOWABLE QUARTERLY DOSAGES TO?
  - A. THE WHOLE BODY:
  - B. THE SKIN OF WHOLE BODY:
  - C. ARMS AND FEET:
2. WHO IS AUTHORIZED BY THE ATOMIC ENERGY COMMISSION TO OPERATE THE TRACER-FLO UNIT WHEN THE TEST MODE OF OPERATION IS USED?
3. WHAT ARE THREE (3) WAYS A PERSON CAN PROTECT HIMSELF FROM RADIATION EXPOSURE?
  - 1.
  - 2.
  - 3.
4. HOW MAY AN EMPLOYEE DETERMINE WHAT HIS YEARLY EXPOSURE TO RADIATION HAS BEEN?
5. WHAT PORTION OF THE TRACER-FLO UNIT CAN BE REPAIRED WITHOUT REMOVING THE TEST GAS FROM THE TRANSFER LINES?

6. PRIOR TO DOING REPAIR TO THE TRACER-FLO TRANSFER LINES THAT CONTAIN TEST GAS, DESCRIBE BRIEFLY WHAT STEPS HAVE TO BE TAKEN.
7. NAME TWO METHOD OF LEAK TESTING THE TRACER-FLO UNIT AFTER THE PLUMBING HAS BEEN REPAIRED.
  - 1.
  - 2.
8. NAME TWO SAFETY DEVICES THAT MUST BE OPERATING CONTINUOUSLY DURING REPAIR TO THE UNIT.
  - 1.
  - 2.
9. WHAT PURPOSE DO THE L.E.D.'S ON THE RIGHT HAND SIDE OF THE LOGIC BOARD SERVE?
10. WHAT PRECAUTIONS SHOULD BE TAKEN AFTER THE OIL IS DRAINED FROM THE PUMPS OF THE TRACER-FLO UNIT?
11. WHAT IS THE MAXIMUM PRESSURE THAT SHOULD BE ALLOWED ON THE OUTLET SIDE OF VACUUM PUMP

12. WHAT CAUSES THE UNIT TO GO FROM THE FIRST TO THE SECOND PORTION OF THE STORE CYCLE?
13. IN THE MANUAL MODE OF OPERATION WHAT CAUSES THE UNIT TO GO FROM THE STORE TO THE VENT CYCLE?
14. WHAT IS ALLOWABLE CONCENTRATION IN AIR OF kr-85 IM:
  - A. A RESTRICTED AREA:
  - B. A NON RESTRICTED AREA:
15. HOW MUCH OIL IS ADDED TO THE VACUUM PUMPS DURING AN OIL CHANGE AND HOW IS THE LEVEL CHECKED?
16. WHEN A PERSON WHO IS NOT AUTHORIZED BY THE CONDITION OF NRC BYPRODUCT MATERIAL LICENSE REPAIRS THE UNIT WHO MUST BE IN THE MACHINE ROOM TO OPERATE THE UNIT?
17. DRAW THE PLUMBING SCHEMATIC SHOWING THE HOLDING DIRECTION OF EACH VALVE ON THE BACK OF THIS SHEET.
18. DESCRIBE THE WORKINGS OF THE SMALL ASCO VALVE.

19. IF A DROP IN STORAGE PRESSURE OCCURS WHEN THE SYSTEM IS SITTING IDLE, WHAT AND WHERE WOULD YOU SUSPECT THE PROBLEM TO BE?
20. WHEN AND WHY MUST THE INITIALIZE PROCEDURE BE USED?

APPENDIX D

TRACER-flo TRAINING COURSE OUTLINE

## TRACER-flo MAINTENANCE COURSE OUTLINE

### Day 1      Lecture

(Review unit operation and safety regulations.)

### Day 2      Lecture

AM: Review maintenance procedures  
Compressor Oil change, and  
Valve maintenance.

### Day 3      Laboratory

Remove radioactive gas from transfer lines and perform  
TRACER-flo maintenance on valves, compressor, etc.

### Day 4      Laboratory

Leak test the unit and final check out.

### Day 5      Lecture

Quiz, review TRACER-flo electronics and Krypton 85 transfer procedure.

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APPENDIX B

EMERGENCY PROCEDURE  
for an  
UNCONTROLLED RELEASE OF BY-PRODUCT MATERIAL  
into a  
TRACER-flo ROOM



1. Whenever it is suspected that Krypton 85 may have been discharged from the TRACER-flo Unit, evacuate the room as soon as possible and lock the door. DO NOT RE-ENTER the TRACER-flo room without a properly operating G-M Survey Meter.
2. Make a radiation survey of all possible areas inside and outside the building until the radiation level has returned to normal.
3. The Radiation Safety Officer, or his alternate, should be notified as soon as possible if he is not already present.
4. An evaluation of the uncontrolled release shall be made by the Radiation Safety Officer and notification of cognizant authority shall be made if warranted.
5. DO NOT ATTEMPT TO OPERATE THE TRACER-flo UNIT AFTER A RELEASE OF ACTIVITY, IF THE CAUSE IS UNKNOWN. IF THE CAUSE OF THE RELEASE IS KNOWN AND IN THE JUDGMENT OF THE RADIATION SAFETY OFFICER, THE KRYPTON 85 CAN BE RETURNED TO THE STORAGE CHAMBER WITHOUT A FURTHER RELEASE OF ACTIVITY, THIS SHOULD BE DONE, AND HAND VALVE "A" CLOSED.
6. For assistance in cases of suspected personnel exposure or loss of By-product Material in excess of the limits specified by the Commission contact:

Trio-Tech, Inc. of California	(213) 846-9200
Edward G. Harrington	(213) 790-6947

### CALIBRATION OF PRESSURE METERS

Prior to performing this procedure, insure activation chamber pressure meter is set at atmospheric pressure by adjustment screw on meter face.

**CAUTION:** TRACER-flo meter is calibrated in PSIA. Be certain calibration meter reads in PSIA or add 14.7 lbs. to the reading on a gauge that indicates PSIG.

- Step 1 ... Place the main key in manual position.
- Step 2 ... Connect a test pressure gauge to hand valve C.
- Step 3 ... Turn the fill key switch to the **ON** position.
- Step 4 ... Turn the fill toggle switch to the **ON** position.
- Step 5 ... Open hand valve C.
- Step 6 ... Set activation chamber vacuum gauge to .5 torr.
- Step 7 ... Set activation chamber pressure meter to 200 PSI.
- Step 8 ... Depress the evacuate push button. Allow system to reach .7 torr.
- Step 9 ... Depress the **OFF** push button. Turn off fill toggle switch.
- Step 10 ... Observe Supervisor's vacuum meters for stable reading.
- Step 11 ... If upward deflection of the meter is noted, check connection on test gauge.  
REPEAT STEPS 8 THROUGH 10 until stable reading is achieved. When stable reading is achieved, leave fill toggle in **ON** position.
- Step 12 ... Push evacuate push button. When .5 torr is reached and **EVACUATE COMPLETE** light is on, close hand valve A, turn on switches 4, 7, 12 and 19. Turn off triac switch. Turn on power switch, adjust storage pressure meter by screw on front of meter to read the same as activation pressure meter.
- Step 13 ... Close hand valve B.
- Step 14 ... Open hand valve A. Adjust activation and storage transducers by turning red screw on top of transducer until both gauges read the same as test gauge.
- Step 15 ... Turn off power toggle switch and also turn off switches 4, 7, 12 and 19. Open hand valve B. Turn on triac switch.
- Step 16 ... Push **ACTIVATE** push button
- Step 17 ... Push **STORE** push button.
- Step 18 ... When unit reaches **STORE COMPLETE**, at .5 torr, turn off fill toggle switch,

turn off sample key switch, push **VENT** push button.

Step 19 ... Close hand valve C, remove test gauge.

Step 20 ... Pressure meters are now calibrated and unit is ready to run.

CALIBRATION OF VACUUM METERS

- Step 1 ... Insure system is in vent complete.
- Step 2 ... Attach test vacuum gauge to hand valve C.
- Step 3 ... Turn Mode switch to manual.
- Step 4 ... Turn sample key switch on. Allow Supervisor's vacuum gauge to warm up for ten minutes.
- IF TEST GAUGE IS ELECTRIC, before proceeding, allow it to warm up for ten minutes, also.
- Step 5 ... Turn on sample toggle.
- Step 6 ... Adjust vacuum gauges to read atmosphere by turning screw on front of meter.

NOTE: Set as close as possible to test gauge.

- Step 7 ... Adjust set point on activation vacuum meter to .1 torr.
- Step 8 ... Push evacuate push button.
- Step 9 ... When .7 torr is achieved, push off push button.
- Step 10 ... Turn off fill toggle switch.
- Observe all vacuum gauges for stable reading. if upward deflection is noted, check test gauge connection to hand valve C.
- Step 11 ... REPEAT STEPS 8 THROUGH 10 until no upward deflection of meters is observed. When no upward deflection is observed, leave sample toggle switch on.
- Step 12 ... Push **EVACUATE** push button.
- Step 13 ... When test gauge registers 1 torr, push **OFF** push button.
- Step 14 ... When meter needle has stabilized, using adjustment screw on barrel of Supervisor's vacuum gauge, adjust indication to coincide with test gauge.
- Step 15 ... Push **EVACUATE** push button. Allow system to pump to .3 torr. Depress **OFF** push button.
- Step 16 ... Using adjustment screw on barrel of activation chamber vacuum meter, set needle indication to correspond with test gauge indication.
- Step 17 ... Activation chamber vacuum gauge is now calibrated.
- Step 18 ... Turn off fill toggle switch. Turn off fill key switch. Depress the **VENT** push button. Remove test gauge. System is now ready for operation.

### OIL CHANGE PROCEDURE FOR VACUUM PUMP 1

**CAUTION:** Insure system is in vent complete prior to performing this procedure.

- Step 1 ... Remove fill plug from oil mist eliminator (See Figure 5 in installation and operation manual).
- Step 2 ... Remove fill plug from high vacuum side of pump.
- Step 3 ... Position drain container under oil drains on rear of pump.
- Step 4 ... Open oil drain. Allow oil to drain from pump.

**NOTE:** To clear all oil from pump, turn pulley on pump by hand clockwise a few revolutions.

- Step 5 ... Close drain plugs on pump.
- Step 6 ... Measure seven (7) fluid ounces of vacuum pump oil into beaker.
- Step 7 ... Pour the measured amount of oil into high vacuum side of pump.
- Step 8 ... Measure 14 fluid ounces of vacuum pump oil into beaker and pour into fill plug on oil mist eliminator.
- Step 9 ... Replace fill plug in oil mist eliminator.
- Step 10 ... Replace the fill plug on high vacuum side of pump.

**NOTE:** O-ring seal on fill plug should be lightly greased with vacuum grease.

- Step 11 ... **NOTE:** For additional information refer to installation and operation manual 3151.8 Kinney KC5 only.

System is now ready for operation.

## OIL CHANGE PROCEDURE FOR VACUUM PUMP 2

**CAUTION:** Remove all fillers from Activation Chamber before beginning with this procedure.

**CAUTION:** When performing VAC 2 maintenance, it is conceivable that you will receive radiation alarms. If so, reset system alarm.

**CAUTION:** Insure system is in vent complete prior to performing this procedure.

**CAUTION:** Vacuum Pump 2 is a closed system. Do not remove or loosen any fittings or fill plug. It is essential that no leaks are induced in the system.

- Step 1 ... Turn main key control to manual position, and triac key off.
- Step 2 ... Close hand valve A, insure hand valve B is open.
- Step 3 ... Using the supervisor's panel, turn on valves 15, 16, 17, 7 and vacuum pump 1.
- Step 4 ... Turn on power switch.
- Step 5 ... When vacuum in activation chamber reaches .5 torr turn off power switch.
- Step 6 ... Turn off all toggle switches.
- Step 7 ... Turn on valves 2, 3 and 7.
- Step 8 ... Turn on power switch for 10 seconds and then turn it off.
- Step 9 ... Close hand valve B.
- Step 10 ... Turn off all toggle switches.
- Step 11 ... Using the Supervisor's panel, turn on valves 5, 6, 15, 16, 18, 9, 3 and 7.
- Step 12 ... Turn on power toggle switch. Allow pump to come to atm. pressure.
- Step 13 ... Open drain plugs on vacuum pump 2, allow pump to drain. Using the pulley on the pump, turn clockwise a few revolutions to remove all oil from pump.
- Step 14 ... Turn off power toggle switch.
- Step 15 ... Turn off all valve toggle switches.
- Step 16 ... Measure 7 fluid ounces of oil into beaker.
- Step 17 ... Connect tygon tube to drain plug on high vacuum side of pump. Close stop-cock on discharge side of pump.
- Step 18 ... On Supervisor's panel, turn on valves 3, 5, 6, 9, 7, 15, 16, 17 and vacuum pump 1.

- Step 19 ... Place end of tygon tube in oil, then turn power toggle switch on.
- Step 20 ... Draw measured amount of oil into pump.
- Step 21 ... Turn off power toggle switch.
- Step 22 ... Close stopcock on high vacuum side of pump.
- Step 23 ... Connect tygon tube to discharge side of pump at drain valve. Measure 14 fluid ounces of oil into beaker.
- Step 24 ... Place end of tube in measured beaker of oil.
- Step 25 ... Turn on power toggle switch.
- Step 26 ... Open stopcock on discharge side of pump.
- Step 27 ... Allow all oil to be drawn into pump. When all the oil is in pump, close the stopcock on pump, and remove tygon fill tube from pump.
- Step 28 ... Allow block gauge to reach 20" of vacuum, then turn off power toggle switch.
- Step 29 ... Turn off all valve toggle switches and vacuum pump 1.
- Step 30 ... Insure that triac switch is off.
- Step 31 ... Push **EVACUATE** push button on the front panel.
- Step 32 ... Turn set point on front panel vacuum gauge to right of indicator needle so that **EVACUATE COMPLETE** light comes on.
- Step 33 ... Reset front panel vacuum gauge set point to .5 torr.
- Step 34 ... Push **ACTIVATION** button.
- Step 35 ... Push **STORE** button.
- Step 36 ... Push **OFF** button.
- Step 37 ... Open hand valve A and hand valve B.
- Step 38 ... Turn triac key on.
- Step 39 ... Push **STORE** button and allow gas in activation chamber to be returned to storage chamber.
- Step 40 ... When **STORE COMPLETE** is reached, push **VENT** button to vent activation tank. When vent complete is reached system is ready for operation.

## 7.5 Krypton 85 Gas Transfer Procedure Prior to Maintenance on Valves

### (1) Procedure

- 1.1 Activation tank empty.
- 1.2 Close HV-A.
- 1.3 Evacuate activation tank to 0.4 torr, manual mode (off).
- 1.4 Triacs off (test mode).
- 1.5 V-7, V-4, V-12 and V-19 open; observe store pressure meter drop, activation pressure meter rise.
- 1.6 Close V-7, V-4 and V-12, leaving V-19 open for a minimum of three (3) minutes.  
Note: If storage tank pressure meter rises, HV-A is not holding.
- 1.7 Close V-19.
- 1.8 Open V-7, V-3 and V-2. Place GM survey meter near compressor. Observe mr/hr reading.
- 1.9 Close V-7, V-3 and V-2.
- 1.10 Open V-7, V-4, V-10 and V-11. (Observe GM survey meter reading taken in Step 1.8.) Reading should fall. Log activation tank pressure.  
Note: If the above reading does not fall, this indicates V-10 is not open.
- 1.11 Close HV-B.
- 1.12 Proceed with valve maintenance.



### TRACER-flo INITIALIZE PROCEDURE

Initialization of the TRACER-flo solid state control circuit should be performed if there is ever a malfunction of the control circuit such that more than one sequence push button is illuminated simultaneously, or if any abnormal condition necessitates transfer of gas manually using the supervisor's panel, ending with the desired storage pressure and evacuation of the activation chamber.

Initialize the control circuit as follows (NOTE: initialization **MUST** terminate with evacuation of the activation chamber):

1. Turn Triac Key off.
2. Set Mode Selector to **MANUAL**.
3. Set activation chamber vacuum gauge on control panel to 0.5 torr.
4. Set Initialize switch to **ON**.
5. Set valve and motor switches as desired, referring to system valve diagram.
6. Turn on Power switch.
7. When set vacuum is reached, the circuit will initialize to the **STORE COMPLETE** state. At this point the Power switch on the supervisor's panel may be turned off.
8. Turn off all toggle switches on the supervisor's panel, including **INITIALIZE**.
9. Set the Mode Selector to **MANUAL** or **AUTO**, as desired.
10. Turn on the Triac Key.
11. Depress the **VENT** push button and proceed with normal operation.

## COMPRESSOR OIL CHANGE PROCEDURE

NOTE: Prior to performing this procedure, insure system is in vent complete.

- Step 1 ... Place main key toggle in the manual position. When performing compressor oil change or maintenance, it is conceivable that you will receive a radiation alarm. If so, reset system alarm push button.
- Step 2 ... Insure that both hand valve A and B are open.
- Step 3 ... Using Supervisor's panel, turn triac key switch off.
- Step 4 ... Turn on switches 15, 16, 17 and vacuum pump 1.
- Step 5 ... Turn on power switch.
- Step 6 ... When activation chamber vacuum gauge reaches .5 torr turn off power switch.
- Step 7 ... Turn off all other toggle switches.
- Step 8 ... Turn on valves 2, 3 and 7.
- Step 9 ... Turn on power switch for 10 seconds and then turn it off.
- Step 10 ... Close hand valve B.
- Step 11 ... Leave on toggle switches 2, 3, 7 and turn on toggle switches 15, 16 and 18.
- Step 12 ... Turn on power toggle switch.

NOTE: This will allow all pressure in lines to come to atmospheric pressure.

- Step 13 ... Place drain container at compressor drain.
- Step 14 ... Remove compressor drain plug, allow oil to drain from compressor.
- Step 15 ... Turn off power toggle switch.
- Step 16 ... Turn off all valve toggle switches.
- Step 17 ... Turn on valves 2, 5, 6, 9, 15, 16 and 18.

CAUTION: This procedure requires a great deal of care so not to damage the seal in vacuum pump 2.

- Step 18 ... Turn on power toggle switches.

CAUTION: Observe block gauge on vacuum pump 2. At no time to allow this gauge to reach more than 5 PSI.

Step 19 ... Turn on toggle switch for vacuum pump 2.

**CAUTION:** This will control pressure at block gauge. Must be turned "on" and "off" rapidly. DO NOT leave toggle switch on for longer than two (2) seconds.

Step 20 ... If the block gauge reaches 5 PSI or greater, turn off vacuum pump 2 toggle switch. Continue this procedure until all oil has drained from compressor.

Step 21 ... Turn off power toggle switch and all valve toggle switches.

Step 22 ... Measure 30 fluid ounces of vacuum pump oil into beaker.

Step 23 ... Connect a tygon tube or copper tube to drain line of compressor.

Step 24 ... Turn on valves 1, 10, 11, 12, 19, compressor, insure that hand valve A is open.

Step 25 ... Place free end of tube in oil.

Step 26 ... Turn on power toggle switch; oil will be pulled into compressor until full.

**CAUTION:** DO NOT allow air to be sucked into compressor.

Step 27 ... When measured amount of oil is in compressor, turn power toggle switch off and immediately replace plug on drain line.

Step 28 ... Turn off all toggle switches.

Step 29 ... After plug has been replaced in oil, drain line. Turn on valves 2, 3, 7, 15, 16 and 18.

Step 30 ... Turn on power toggle switch for 5 seconds.

Step 31 ... Turn off power toggle switch and all other toggle switches.

Step 32 ... Turn on switches 2, 3, 7, 9, 15, 16, 17 and vacuum pump 1.

Step 33 ... Turn on power toggle switch; observe block gauge on vacuum pump 2 until it reaches 20 inches of vacuum.

Step 34 ... When vacuum is achieved, turn off valves 2, 3, 7 and 9. Allow vacuum pump 1 to pump until activation vacuum meter reaches .5 torr.

Step 35 ... Turn off power switch and valves 15, 16, 17 and vacuum pump 1.

Step 36 ... Insure that triac key is off.

Step 37 ... Push **EVACUATE** button.

Step 38 ... Turn set point on vacuum gauge to right of indicator needle so that **EVACUATE COMPLETE** light comes on.

Step 39 ... Reset vacuum gauge set point to .5 torr.

- Step 40 ... Push **ACTIVATE** button.
- Step 41 ... Push **STORE** button.
- Step 42 ... Push **OFF** button.
- Step 43 ... Open hand valve B on activation chamber.
- Step 44 ... Turn triac key on.
- Step 45 ... Push **STORE** button and allow gas in activation chamber to be returned to storage chamber.
- Step 46 ... When **STORE COMPLETE** light comes on, push **VENT** button. When **VENT COMPLETE** is reached, system is ready for operation.