THREE MILE ISLAND NUCLEAR STATION
STATION HEALTH PHYSICS PROCEDURE 1622
RELEASING RADIOACTIVE GAS WASTE

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Unit 1 Staff Recommends Approval

Approval N/A Date —

Cognizant Dept. Head

Unit 2 Staff Recommends Approval

Approval N/A Date —

Cognizant Dept. Head

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Unit 2 Superintendent Approval

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Manager Generation Quality Assurance Approval 195 024 N/A Date —

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THREE MILE ISLAND NUCLEAR STATION

UNIT #1 HEALTH PHYSICS PROCEDURES

1622 - Relasing Radioactive Gaseous Waste

1.0 PURPOSE

This procedure describes the regulations applicable to radioactive gaseous discharges t, unrestricted areas and the monitoring programs designed to ensure compliance with these regulations.

2.0 DISCUSSION

2.1 Radioactive gases result primarily from the escape of gaseous fission products from the fuel, and by neutron activation of constituents in the water and air in the immediate vicinity of the core. Those radioactive gases that are produced in or released to the reactor coolant should ultimately be collected in the low pressure vent header system and compressed in the waste gas decay tanks for decay and re-use or release to the atmosphere. Normal hold-up time in the waste gas dacay tanks will be at least 45 days. Shorter hold-up times can be employed provided the appropriate environmental tech. specs. are satisfied.

2.2 The other source of gaseous waste comes from purging the atmosphere of the reactor building. Radioactive gases in the reactor building come from neutron activation of the atmosphere or from gaseous leaks from the reactor coolant system.

2.3 Radioactive gases could also be relased through the main condenser vacuum pump exhaust vent (due to leaking steam generator tubes) and auxiliary and fuel handling building ventilation exhaust vent (due to the escape of radioactive gases to the atmosphere of these

buildings). Although these releases are not anticipated to be a significant problem, the vent gases pass through HEPA filters and charcoal filters. The gases are continuously monitored and recorded. This is a continuous release and is sampled periodically as per Table 2 requirements in the Tech. Specs.

2.4 Analysis of gaseous effluent is necessary to ensure adherence to the "as low as practicable" philosophy to assure compliance to Environmental Technical Specifications. Environmental Technical Specifications limit the release rates for noble gases, radioactive iodine and particulates.

2.4.1 The Technical Specifications contain two types of limits (instantaneous release rates, and quarterly average release rates) for two classes of radioactive materials (Halogens and particulates with half-lives greater than 8 days, and gross gaseous activity except Halogens and particulates with half-lives greater than 8 days). Under unusual conditions, the quarterly average limit used in this report may be increased, but this requires notification of the NRC.

2.4.2 The values used for instantaneous releases are as follows:

Gross Gaseous: $\sum \frac{Qi}{MPCi} < 1.2 \times 10^5$ M^3/sec.

Where Qi = μCi/sec release rate

MPCI = 10CFR20, Appendix B, Table 11, Col. 1

I - 131 + Particulates: $\leq$ 0.3μCi/sec.

The release flow rates are adjusted to insure that these limits are not exceeded. The above limits are applicable if the gas decay tanks are held for greater than 45 days and for Reactor Building Purge. If the waste gas decay tank is to be held for less than 45 days the following limits apply:

Gross Gaseous: $\sum \frac{Qi}{MPCI} = \leq 2.4 \times 10^3 \ M^3/sec$

I-131 + Particulates: $\leq 0.003 \mu Ci/Sec$

2.4.3 The working quarterly average limits are as follows:

Gross Gaseous: $\sum \frac{Qi}{MPCI} = \leq 4.8 \times 10^3 \ M^3/sec$

I-131 + Particulates: $\leq 0.006 \mu Ci/Sec$

If these limits are exceeded, then the commission must be notified within 30 days.

2.4.4 Under unusual conditions, the following maximum quarterly average limits shall not be exceeded.

Gross Gaseous: $\sum \frac{Qi}{MPCI} = \leq 1.9 \times 10^4 \ M^3/sec$

I-131 + Particulates: $\leq 0.024 \mu Ci/Sec$

2.5 The release of radioactive gaseous effluents is continuously monitored by RM-A5 (Condenser Vacuum Pump Discharge), RM-A7 (Waste Gas Decay Tanks), RM-A8 (Auxiliary and Fuel Building Purge Exhaust) and RM-A9 (Reactor Building Purge Exhaust). Monitors RM-A8 and RM-A9 detect radioactive noble gases, iodine and particulates. RM-A5 and RM-A7 detect only gaseous radionuclides.

2.5.1 In the event one of the above monitors becomes inoperable, grab samples will be taken as required in the Technical Specifications.

2.5.2 Analysis performed will be as designated in the lates Environmental Technical Specifications.

3.0 REFERENCES

3.1 FSAR, Vol. 5, Technical Specifications

3.2 Environmental Technical Specifications

3.3 H.P.P. 1606, Air Sampling for Radioactive Iodine, and H.P.P. 1608, Air Sampling for Tritium.

3.4 PCP 1951, Determination of Tritium, and PCP 1958, Gamma Spectrometers.

3.5 OP 1104-43, Nuclear Plant Sampling.

3.6 10 CFR 50

3.7 H.P.P. 1631, Sampling of Waste Gas Decay Tanks and Reactor Building, and H.P.P. 1675, Radioactive Waste Release Records.

4.0 EQUIPMENT

4.1 Charcoal Cartridges

4.2 2" G-5 air filters or equivalent

4.3 Geli Detection System

4.4 Sampling container

4.5 Liquid Scintillation Detection System

5.0 OPERATING INSTRUCTIONS

Prior to releasing gaseous effluents to the environment from the Waste Decay Tanks (WDG-T-1A, WDG-T-1B, or WDG-T-1C) or the Reactor Building, a Gaseous Release Permit must be obtained.

NOTE: In these operating instructions, the item number of

section 5 will refer to the identically numbered sections of the Permit.

5.1 The shift supervisor initiates the request for release, and is responsible to provide items ① through ③

5.2 The appropriate box is checked to indicate whether the Reactor Building or a specific decay tank is to be sampled, analyzed and released.

5.3 Prior to purging the reactor building, the Kidney Filter System must be operated a minimum of 4 hours. The Shift Supervisor indicates the time and date which the System was placed in operation. In order that no additional gas is added to the waste gas decay tanks before the release is complete, the tank is isolated and conspicuously labeled with a DO NOT OPERATE tag. The date and time of tagging is recorded. The pressure in psig is recorded. This is obtained from the Waste Gas Control panel for the Waste Gas Decay Tanks; and from the control room for the Reactor Building Pressure. The Estimated Volume to be released is calculated as indicated and converted to cc. The form is then turned over to the Radiation Protection Department for completion of items (4) through (37).

5.4 The next sequential release number is assigned and recorded in the RECORD OF GASEOUS RELEASES LOG (see HPP 1675).

5.5 The appropriate box is checked.

5.6 The radiation/chemistry technician will then sample the designated tank or reactor building in accordance with HPP 1631, Health Physics Procedure for Sampling of Waste Gas Decay Tanks and Reactor Building. The sample collector will record the date and time of sampling; and tag with the appropriate radiation label.

5.7 The radiation/chemistry technician responsible for performing analyses, and the Radiation Protection Supervisor/Chemist responsible for approving the data in sections (4) through (25), both sign in the appropriate location after completion of the analysis.

5.8 The date and time of each analysis is recorded.

5.9 The estimated volume to be released in cc is obtained from (3.)

5.10 The Plant Chemistry Procedure Number followed in performing the required analyses is recorded. The Tech. Spec. limits are divided into limits for two classes of radioactive materials: Iodines and Particulates with half-lives of greater than 8 days, and gross gaseous activity exclusive of Iodine and Particulate with half-lives greater than 8 days. Therefore, the two classes of material are calculated separately. The sampling consists of drawing a known volume of air through a sampling train consisting of a Particulate Filter, and Iodine Filter (charcoal), and then taking a gas sample of the effluent of the sample train. The three samples are analyzed separately, therefore, there are three sections of columns on the form.

The nuclides listed are those expected to be found, or those required to be tabulated in the HPP 1675. All peaks must be quantified. If additional nuclides are found, add them to the form.

5.11 The volume of sample counted is recorded.

5.12 The sample counting time is recorded.

5.13 The gross number of counts, including background, are recorded.

5.14 The background counting time is recorded.

5.15 The total background counts are recorded.

5.16 The net sample count-rate is calculated.

$$\frac{[\text{GROSS COUNTS } (13)]}{[\text{SAMPLE COUNT TIME } (12)]} \quad \frac{[\text{BACKGROUND COUNTS } (15)]}{[\text{BACKGROUND COUNT TIME } (14)]}$$

5.17 The % counting error (2 δ) is calculated.

$$2 \times 100 \times \sqrt{\frac{[\text{GROSS COUNTS } (13)]}{[\text{SAMPLE COUNT TIME } (12)]^2} + \frac{[\text{BACKGROUND COUNTS } (15)]}{[\text{BACKGROUND COUNT TIME } (14)]^2}}$$

$$\text{NET SAMPLE COUNT RATE } (16)$$

NOTE: If the Gamma Analysis is not performed in accordance with Chemistry Procedure 1958.3, Perform Steps 11 through 19.

5.18 The gamma abundance for the energy listed is tabulated for the nuclides expected to be of importance. All significant peaks must be identified. If other nuclides are found, or if gamma's other than those tabulated are used for the isotopic quantification, the appropriate gamma abundance shall be obtained from TABLE OF THE ISOTOPES, Lederer.

5.19 The Specific Acvity (SA) is calculated. Refer to the appropriate P.C.P. for further information. The efficiency of the counter is obtained from charts in the counting room.

$$\text{S.A.} = \frac{[\text{NET SAMPLE COUNT RATE } (16)]}{[\text{SAMPLE VOLUME USED } (11)]\,[\text{GAMMA ABUNDANCE } (18)]\,[2.22\times10^6]\,[\text{EFFICIENCY OF COUNTER}]}$$

5.20 The sample is taken before the absolute filters and charcoal filters which are in the release path of the gaseous release. Therefore, to calculate the concentration released to the environment, the concentration in the sample is multiplied by the FILTER FACTOR. This term is the fraction passing the filter, and is calculated by (1 minus the Filter Retention Efficiency). The methods of measurement are not exacting, and

the efficiency will vary with the time, chemical composition, and particulate size. A conservative factor of 0.1 (90% filter retention) is used for particulates and iodine, and 1.0 for gases. Should these values prove to be too restrictive, they may be refined as a later revision of this procedure.

5.21 The MPC's for gases identified are tabulated. If other nuclides are identified, enter the appropriate value from 10 CFR 20, Appendix B, Table 11, Column 1.

5.22 Enter the result of Specific Acitivity from (19) multiplied by Filter Fraction from (20) divided by MPC from (21) , for Iodines and Particulates found.

5.23 Enter the product of Specific Activity from (19) and Filter Fraction from (20), for Iodines and Particulates found.

5.24 Enter the sum of all nuclides on the particulate and charcoal filters.

5.25 Enter the sum of all nuclides on the gas sample. This is a dimensionless quantity.

5.25A For waste gas decay tanks with hold up time <45 days sum the total of all gaseous Isotopes with half lives of greater than 8 days. All Isotopes with half lives of less than 8 days will be labeled with an asterick.

5.26 Transfer the value from (24) to the top line and the value from (25) to the bottom line.

5.27 Transfer the estimated volume to be released from (3.)

5.28 Enter the estimated quantity to be released (product of each line of (26) and (27)) in the corresponding line. The next unnumbered column, (the quarterly release allotment) is the product of the applicable quarterly average limit (see 2.4.3) and the number of seconds in a quarter of a year. This is the quarterly Release Allotment. The units for gaseous releases have been converted from M^3 to cc.

5.29 Enter result of 100 x the estimated quantity in this release from (28) divided by the quarterly release allotment.

5.30 Complete the upper section if this is a waste gas decay tank with a hold-up time greater than 45 days, or if this is a Reactor Building sample. Two flows are calculated. Transfer the lowest value to the box to the right (lowest F_m). This is the maximum flow rate (F_m) that can be allowed in order not to exceed the instantaneous release limits. Complete the lower section in an identical manner only if this is a waste decay tank that has been isolated for <45 days.

NOTE: If the flow rate in block (30) is too restrictive for release go to block (30A) ; complete block 30A as per step 5.30 above, with concurrence of the Shift Supervisor.

5.31 Fill in the left side of the form for waste decay tank releases. If F_m is <1.1 CFM, then this tank cannot be released under normal conditions; return form at this point to the Shift Supervisor. If F_m is greater than 1.1 CFM but less than 10 CFM, then the FR-123 alarm set point is the value of F_m. The actual release rate, WDG-V-47 set point will be adjusted to 90% of F_m. F_m is obtained from (30) . If F_m is

>10 CFM, check the box. The maximum value the alarm can be set is 10 CFM, therefore, this value will be used. WDG-V-47 will be adjusted to 9 CFM. Caution: Insure NOTT limits are not exceeded on purge valves.

5.32 Fill in this side of the form for reactor building releases. If F_m as calculated in (30) is <5,550 CFM, the reactor building air is too radioactive to be released under normal conditions; return form to the shift supervisor. If F_m is > 5,550 CFM but less than 50,000 CFM; then FR-148 alarm setpoint is the value F_m from (30). The reactor building purge rate gradual switch is adjusted to 90% of F_m. This is the actual purge rate of the reactor building and is recorded with the red pen of FR-148.

If the F_m calculted in (30) is >50,000 CFM then check the last box. The maximum the alarm can be set is 50,000 CFM. The flow will be adjusted to 45,000 CFM.

NOTE: If F_m is <50,000 CFM due to particulate and iodine activity (from (30)) and a higher purge rate is desired. the shift supervisor may request a resampling of the containment atmosphere for particulates and iodine after 4 hours of Kidney Filter System operation. F_m may be recalculated based on the new particulate and iodine activities.

5.33 For gases, it is estimated that the dominant long lived activity will be Xe-133; therefore, this nuclide is used for the estimated reading. For RM-A7, multiply the sepcific activity of Xe-133 in µCi/cc from (19) by the calibration factor of RM-A7 in cpm/µCi/cc. Add to this the background of RM-A7. The calibration factor and background for this monitor and for all other monitors is obtainable from the control room remote readout or from the local meter on the monitor.

5.34.1 For RM-A8 gas channel, the Xe-133 specific activity in µCi/cc is obtained from (19). F_m is obtained from (30). The building purge flow is obtained from FR-151 recorder.

5.34.2 For RM-A9 gas channel, the Xe-133 specific activity in µCi/cc is obtained from (19). F_m is obtained from (30). The flow out the stack is obtained from the green pen of FR-148.

5.35.1 For RM-A8 iodine channel, I-131 is estimated to be the dominant activity, therefore the specific activity of I-131 is obtained from (19) on the charcoal filter, the filter factor is obtained from (20), and V is the estimated volume to be released in Ft^3 from (3).

5.35.2 For RM-A9 iodine channel, I-131 specific activity is obtained from (19), the filter factor is obtained from (20), V is the volume estimated to be released in $\underline{Ft^3}$ from (3). The flow out the stack is from the green pen of FR-148.

5.36.1 For RM-A8 particulate channel, Cs-137 specific activity from (19) is used, V is the estimated volume to be released in Ft^3 from (3).

5.36.2 For RM-A9 particulate channel, Cs-137 is estimated to be the dominant activity. Therefore, the specific activity of Cs-137 in µCi/cc is obtained from (19), the filter factor for particulate is obtained from (20). The flow out the reactor building stack is obtained from the green pen of FR-148. V is the volume in Ft^3 of the reactor building from (3).

5.37 The quarterly allotment used to date in this quarter for both I plus particulates and Noble gases is obtained from the RECORD OF GASEOUS RELEASES LOG (see HPP 1675). The estimated quarterly allotments of I-131 and Noble gases for this release are obtained from (29). If either of the sums are greater than 100%, then this release cannot be made without notifying the AEC. Radiation Protection responsibilities include filling in the information contained in the boses in parts (39) and (42).

(39) from (31) or (32)
(42) from (33), (34), (35), (36)

5.38 The Radiation Protection Supervisor/Chemist, Unit Supt or designated representative will evaluate the data, check the calculations and recommend the release be approved or disapproved. The final authority for approval of a gaseous release rests with the shift supervisor. Then, and only then will the tank be released.

NOTE: Just prior to release of a waste gas decay tank, RM-A7 must be proven operable by a test using the installed check source (1301-1 Step 6.2.1) or equivalent (1301-1 Step 6.2.2.2 & 6.2.3).

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5.39 Operations is responsible for completion of the remaining portions of sections (39) through (42). The alarms and valves are set as indicated.

NOTE: If this is a Reactor Building Purge Release, Operations will notify the Radiation Protection Department prior to release, to insure the changing of RM-A9 particulate and charcoal cartridge.

5.40 Time and Date are filled in when the release starts and ends.

NOTE: Insure that the Kidney Filter System has been operated a minimum of 4 hours prior to iniating the Reactor Building Purge.

5.41 Mark the records as indicated at the beginning and at the end of the release.

5.42 Record the appropriate instrument readings before, during and after the release.

5.42.1 Insure that a gas and tritium sample have been obtained from RM-A9 at approximately the 18 hour point of each reactor building purge.

5.43 The shift supervisor will verify that all data from (39) through (43) are complete and accurate. After signing the form, it is returned to the Radiation Protection Department for completion.

NOTE: Operations will notify the Radiation Protection Department after Termination of release, to insure the changing of RM-A9 particulate and charcoal cartridge.

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5.44 The actual release volume is calculated based upon readings taken during the release ΔP is obtained from (40). For reactor building purges, Fm is from (32) (R.B. Purge Rate gradual switch set point) and t is from (40) (total time of release).

5.45 The actual quantity released is calculated by multiplying the specific activity from (19) by the filter fraction from (20) by the actual release volume from (44) and entered in (45).

NOTE 1: For reactor building purges, the additional quantities of isotopes released due to primary system leakage must be accounted for. Therefore, complete steps 5.46 through 5.53 for reactor building purges only.

NOTE 2: For quantities of Iodines and particulates released, unit vent filters are counted in accordance with SC 1301-4.7.

5.46 Total in-leakage time is calculated. Record the time the purge stopped from (40) and the time the reactor building was sampled from (6). The in-leakage time is the total time in minutes between these two times.

5.47 Total in-leakage volume is calculated by multiplying the purge rate from (32) (R.B. Purge Rate gradual switch set point) by the total in-leakage time from 46 by 2.832×10^4.

5.48 List all gasses identified from gas and tritium samples taken from RM-A9 during the purge. (Several are already listed).

5.49 Record the specific activities of those isotopes identified in the gas and tritium samples taken during the purge.

5.50 Record the MPC values of those isotopes identified in the samples taken during the purge.

5.51 Divide the specific activities in (49) by the MPC values in (50).

5.52 Summarize all (51) entries.

5.53 The additional quantity due to in-leakage (in curies) is calculated by multiplying the specific activities in (49) by the total in-leakage volume from (47) by 10-6.

5.54 For those isotopes listed in (48) , the quantities released as listed in (45) are recorded.

5.55 The actual quantities released (including in-leakage) are calculated by adding columns (53) and (54) for each isotope.

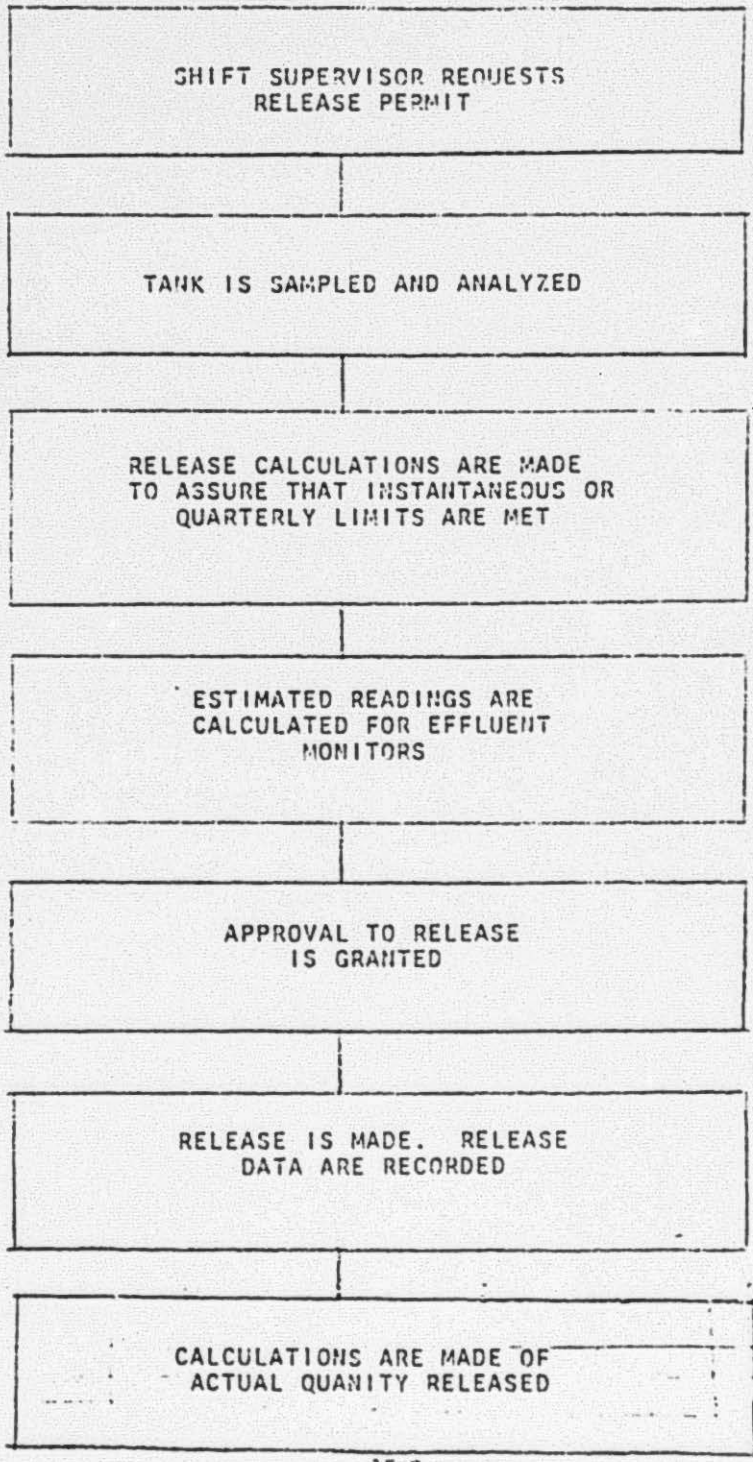
5.56 Enter total from (52).

5.57 Enter volume released from (47).

5.58 Quantity this release is calculated by multiplying (56) by (57).

5.59 Enter the result of 100 times the quantity this release, from (58), divided by the quarterly release allotment, $1.9X10^{16}$ cc.

5.60 Station Superintendent/Unit Superintendent's approval is required prior to extending purges beyond 48 hours with the reactor coolant system pressurized. Additional samples must be obtained at this time.


SHIFT SUPERVISOR REQUESTS RELEASE PERMIT
TANK IS SAMPLED AND ANALYZED
RELEASE CALCULATIONS ARE MADE TO ASSURE THAT INSTANTANEOUS OR QUARTERLY LIMITS ARE MET
ESTIMATED READINGS ARE CALCULATED FOR EFFLUENT MONITORS
APPROVAL TO RELEASE IS GRANTED
RELEASE IS MADE. RELEASE DATA ARE RECORDED
CALCULATIONS ARE MADE OF ACTUAL QUANITY RELEASED

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GASEOUS RELEASE PERMIT

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RELEASE NUMBER ③ _____

① DATE: _____ TIME: _____ REQUESTOR _____ (SHIFT SUPERVISOR)

② ☐ WDG-T-1A DECAY TANK A
☐ WDG-T-1B DECAY TANK B
☐ WDG-T-1C DECAY TANK C
☐ REACTOR BUILDING

③ Kidney Filter System Operation Initiated (RB Bldg Purge only) _____ DATE _____ TIME

☐ TANK ISOLATED AND "DO NOT OPERATE" tagged: DATE: _____ TIME _____

HOLD UP TIME _____ DAYS.

P=TANK OR REACTOR BLDG. PRESSURE= _____ psig

ESTIMATED VOLUME TO BE RELEASED = V

REACTOR BLDG. : $2.00 \times 10^6 \times \left[\frac{P+14.7}{14.7}\right]$ = _____ $ft^3 \times 2.83 \times 10^4$ = _____ cc

DECAY TANK : $\frac{1125\ (P+14.7)}{14.7}$ = _____ $ft^3 \times 2.83 \times 10^4$ = _____ cc

_____ SIGNATURE

㊲ % OF QUARTERLY ALLOTMENT USED TO DATE _____ I-131: _____ NOBLE GASSES

% OF QUARTERLY ALLOTMENT THIS DUMP _____ I-131: _____ NOBLE GASSES

_____ LAST RELEASE # INCLUDED. TOTAL _____ I-131: _____ NOBLE GASSES

㊳ ☐ RELEASE RECOMMENDED BY _____ RADIATION PROT. SUPER/FOREMAN

☐ RELEASE RECOMMENDED BY _____ SUPER. RAD. PROT. & CHEM/UNIT SUPT.

☐ RELEASE APPROVED BY _____ SHIFT SUPERVISOR

RELEASE DATA 39.1 Rad.Prot.Dept.notified to grab 18 hour RM-A9 sample (H_3, Gas) Who notified _____ Notified by _____ cro 42.1 Sample obtained by _____

㊴ FR-123 ALARM SET POINT AT _____ Init. O R WDG V-47 LOADED TO _____

㊵ FR-148 ALARM SET AT _____ ft^3/min

R. B. Purge Rate gradual switch set to _____ ft^3/min Init.

㊱ RELEASE STOPPED _____ TIME _____ DATE

RELEASE STARTED _____ TIME _____ DATE

TOTAL TIME OF RELEASE _____ MIN

㊱ Decay Tank or R.B.PRESSURE AT START _____ psi

Decay Tank or R.B. PRESSURE AT STOP _____ psi

ΔP= _____ psi

㊶ RM A8 Filter or 9 Change

BEGINNING _____

END _____

FLOW RECORDS MARKED ☐ BEGINNING ☐ END

RAD MONITOR RECORDS MARKED ☐ BEGINNING ☐ END

METEOROLOGY RECORDS MARKED ☐ BEGINNING ☐ END

RM-A7 Source Check Sat. ☐ Beginning _____ INITIALS

INSTRUMENT READINGS:

㊷

		MAXIMUM ESTIMATED READING cpm @ t	READING PRIOR TO RELEASE	READING AFTER ½ RELEASE	READING AFTER ¾ RELEASE	READING AFTER ¾ RELEASE	READING AFTER RELEASE COMPLETED	HIGHEST READING DURING RELEASE
REACTOR BUILDING	RM-A9P	@ t_∞						
	RM-A9I	@ t_∞						
	RM-A9G	@ t_0						
DECAY TANKS	RM-A7G	@ t_0						
	RM-A8P	@ t_∞						
	RM-A8I	@ t_∞						
	RM-A8G	@ t_0						

㊸ RELEASE DATA COMPLETED _____ ALL DATA REQUIRED ON THIS FORM HAS BEEN COMPLETED.

INITIALS

175 043

_____ SHIFT SUPERVISOR

195 044

☐ WDG-T-1A ⑤
☐ WDG-T-1B
☐ WDG-T-1C
☐ Reactor Building
☐ _____ OTHER

⑥ SAMPLE COLLECTED BY _____
DATE _____ TIME _____

⑦ RAD. ANAL. Perf. by: _____
APPROVED BY: _____

⑧ DATE & TIME OF ANALYSIS
ALPHA _____
BETA _____
GAMMA _____
TRITIUM _____

⑨ EST VOLUME TO BE RELEASED [ ] cc

㊹ ACTUAL VOLUME RELEASED

$$WDG = \frac{1125\,(\Delta P)(2.83 \times 10^4)}{14.7} = \text{[ ]} \text{ cc}$$

$$R.B. = 5.66 \times 10^{10}\left(1 - e^{-\frac{FM1}{2 \times 10^6}}\right)\left(\frac{\Delta P + 14.7}{14.7}\right)$$

		⑩ COUNT METHOD (Procedure Number)	⑪ VOLUME OF SAMPLE USED (ml)	⑫ SAMPLE COUNT TIME (min)	⑬ GROSS COUNTS	⑭ BKG COUNT TIME (min)	⑮ BKG COUNTS	⑯ NET SAMPLE COUNT RATE (cpm)	⑰ % ERROR 2σ	⑱ GAMMA ABUNDANCE @ KEV	⑲ SPECIFIC ACTIVITY μCi/ml	⑳ FILTER FRACTION	MPC ㉑ μCi/ml	(S.A.)(FF) / MPC ㉒	(S.A.)(FF) ㉓	㊺ ACTUAL QTY RELEASED (SA)(FF)(ACT. VOL)
PARTICULATE	GROSS α									N.A.						
	GROSS β									N.A.						
	I-131									.82@364		.1				
	Cs-134									.98@605		.1				
	Cs-137									.85@662		.1				
	Ba-140									.34@537		.1				
	La-140									.96@1596		.1				
CHARCOAL FILTER	I-131									.82@364		.1				
	I-133									.90@530		.1				
	I-135									.37@1140		.1				
													㉔ TOTAL=			
GASSES	^3H									N.A.		1	2E-7			
	Kr 85									.0041@514		1	3E-7			
★	Kr 87									.35@2570		1	2E-8			
★	Kr 88									.35@2400		1	2E-8			
★	Kr 85m									.74@150		1	1E-7			
★	Xe-133									.37@81		1	3E-7			
	Xe-135									.91@250		1	1E-7			
	Xe-135m									.80@527		1	3E-8			
	Xe-138									.17@1768		1	3E-8			
★	A-41									.99@1293		1	4E-8			

TOTAL: ㉕
TOTAL: ㉕A

85 3
T½ > 8 days (Kr-H)

1622

18.0

04/05/78
Revision 17

1662-3

195 045

	26 Total from 24 for I+part 25 for NG + trit	27 ESTIMATED VOLUME TO BE Released (from 3)	28 EST. QTY. THIS RELEASE	QTLY RELEASE ALLOTMENT	29 QTR. % ALLOTMENT THIS RELEASE
1.131 + PARTICULATES	$\mu \frac{Ci}{cc}$	cc	μc.	2.35×10^{4} μCi	%
NOBLE GASSES + H-3			cc	1.9×10^{15} cc	%

☐ COMPLETE THIS SECTION IF HOLD-UP TIME >45 DAYS OR IF REACTOR BLDG. PURGE

30 F_I = $\frac{(0.1 \mu Ci/Sec)\ (2.12 \times 10^{3}\ ft^3/min/cc/Sec)}{\mu Ci/cc \text{ TOTAL from 24 I + PARTICULATES}}$ = [ ] ft^3/min

F_G = $\frac{(6.0 \times 10^{4}\ M^3/Sec)\ (2.12 \times 10^{+3}\ ft^3/min/M^3/Sec)}{\text{TOTAL FROM 25 } \frac{NG + H3}{MPC}}$ = [ ] ft^3/min

} LOWEST = FM [ ]

☐ COMPLETE THIS SECTION IF HOLD-UP TIME <45 DAYS

F_I = $\frac{(1.5 \times 10^{-3} \mu)\ (2.12 \times 10^{3}\ ft^3/min/cc/Sec)}{\mu Ci/cc \text{ TOTAL COL 24 + PARTICULATES}}$ = [ ] ft^3/min

F_G = $\frac{(1.2 \times 10^{3}\ M^3/Sec)\ (2.12 \times 10^{+3}\ ft^3/min/M^3/Sec)}{\text{TOTAL COL 25 } \frac{NG + H3}{MPC}}$ = [ ] ft^3/min

} LOWEST = FM [ ]

FILL IN THIS SIDE FOR WASTE DECAY TANKS

31 ☐ IF FM < 1.1 $\frac{ft^3}{min}$ DO NOT RELEASE TANK RETURN TO SHIFT SUPERVISOR

☐ COMPLETE THIS SECTION IF 1.1 < FM < 10 $\frac{ft^3}{min}$

FR-123 ALARM SETPOINT = FM = [ ] ft^3/min

WDG-V47 SETPOINT = 0.9 x FM = [ ] ft^3/min

☐ FM > 10 Ft^3/MIN

FR-123 ALARM SETPOINT = [10] ft^3/min

WDG-V-47 SETPOINT = [9] ft^3/min

FILL IN THIS SIDE FOR REACTOR BLDG.

32 ☐ IF FM < 5500 FT^3/M DO NOT RELEASE TANK RETURN TO SHIFT SUPERVISOR

☐ COMPLETE THIS PART IF 5500 < FM < 50,000 ft^3/MIN

FR-148 ALARM SETPOINT = FM = [ ] ft^3/min

R.B. Purge Rate gradual switch setpoint = (0.9) (FM) = [ ] ft^3/min

☐ FM > 50,000 FT^3/MIN

FR-148 ALARM SETPOINT = [50,000] FT^3/min

R.B. Purge Rate gradual switch setpoint = [45,000] FT^3/min

ESTIMATED READINGS OF RM-A7 & RM-A8

33 RM-A7 (GAS CHANNEL)

[μ Ci/cc Xe-133] [CAL FACT Xe-133] + [BKG] = [ ] cpm RM-A7G

34 RM-A8 (GAS CHANNEL)

[μ Ci/cc Xe-133] [CAL FACT Xe-133] [FM / FR-151 FLOW CFM] + [BKG] = [ ] cpm RM-A8G

35 RM-A8 (IODINE CHANNEL)

[μ Ci/cc I-131] [CAL FACT I-131] [filt. fact.] [V / FR-151 FLOW CFM] + [BKG] = [ ] cpm RM-A8I

36 RM-A3 (PARTICULATE CHANNEL)

[μ Ci/cc Cs-137] [CAL FACT.] [filt. fact.] [V / FR-151 FLOW CFM] + [BKG] = [ ] cpm RM-A8P

ESTIMATED READINGS OF RM-A9

34 GAS CHANNEL

[μ Ci/cc Xe-133] [FM / FLOW out STACK] [CAL FACTOR Xe-133] + [BKG] = [ ] cpm RM-A9G

35 IODINE CHANNEL

[μ Ci/cc I-131] [FILT. FACT.] [V / FLOW out STACK] [CAL FACT. I-131] + [BKG] = [ ] cpm RM-A9I

36 PARTICULATE CHANNEL

[μ Ci/cc Cs-137] [FILT. FACT.] [V / FLOW out STACK] [CAL FACTOR Cs-137] + [BKG] = [ ] cpm RM-A9P

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CAL FACTORS ARE AVAILABLE IN CONTROL ROOM

* CAL FACTOR FOR CS-137 IS THE SAME AS SR-90 FOR THE PARTICULATE CHANNEL.

COMPLETE THESE CALCULATIONS IF UNIT #2 WILL NOT RELEASE UNTIL THIS RELEASE IS TERMINATED

☐ COMPLETE THIS SECTION IF HOLD-UP TIME >45 DAYS OR IF REACTOR BLDG. PURGE

(30A) $F_I = \frac{(0.3\ \mu Ci/Sec)\ (2.12 \times 10^{-3}\ Ft^3/min/cc/Sec)}{\_\_\_\_\_\ \mu Ci/cc\ Total\ from\ 24} =$ [ ] Ft^3/min

[ ] LOWEST=FM

$F_G = \frac{(1.2 \times 10^5 M^3/Sec)\ (2.12 \times 10^3\ Ft^3/min/M^3/Sec)}{\_\_\_\_\_\ Total\ From\ 25} =$ [ ] Ft^3/min

☐ COMPLETE THIS SECTION IF HOLD-UP TIME <45 DAYS

$F_I = \frac{(3.0 \times 10^{-3}\ \mu Ci/Sec)\ (2.12 \times 10^{-3}\ Ft^3/min/cc/Sec)}{\_\_\_\_\_\ \mu Ci/cc\ Total\ From\ 24} =$ [ ] Ft^3/min

[ ] LOWEST=FM

$F_G = \frac{(2.4 \times 10^3 M^3/Sec)\ (2.12 \times 10^3\ Ft^3/min/M^3/Sec)}{\_\_\_\_\_\ Total\ From\ 25} =$ [ ] Ft^3/min

NOTE: UNIT - 2 IS NOT RELEASING AND WILL NOT RELEASE UNTIL THIS RELEASE IS TERMINATED.

_____
Shift Supervisor

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The following sections will be filled out for reactor building purges only.

(46) Total in-leakage Time:

Time Purge Stopped _____ Time _____ Date

Time of Original Rx Sample _____ Time _____ Date

Total Time _____ Min.

(47) Total in-leakage Volume:

Volume = _____ CFM x _____ min x 2.832×10^4 = _____ cc

(48) Isotope	(49) Specific Activity ($\frac{\mu Ci}{cc}$)	(50) MPC	(51) $\frac{S.A}{MPC}$	(53) Additional Curies due to In-Leakage	(54) Qty. Released from (45)	(55) Actual Qty.. Released, including in-leakage

(52) Σ=

(56) Total From (52)	(57) Volume Released (47)	(58) Quantity this Release	Qrtrly. Release Allotment	(59) % Allotment this release
	cc	cc	1.9×10^{16} cc	

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TMI DOCUMENTS

DOCUMENT NO: TMI-088

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Wilda R. Mullinix, NRC