Sequoyah Nuclear Plant

SURVEILLANCE INSTRUCTION

SI-400

RADIOACTIVE LIQUID WASTE EFFLUENT - BATCH RELEASE

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Rev. No.	Date	Revised Pages	Rev. No.	Date	Revised Pages
0	7/19/76	All			
1	10/5/79	All			

The last page of this instruction is Number 12

PUNCHLIST

1. TI procedure for evaluating technical specification compliance when discharge acceptance criteria is not satisifed.

2. TI-16 sampling method for sampling CDWE Blowdown Tank.

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1.0 SCOPE

1.1 Description

1.1.1 Establish and document the radiochemical analyses required in the technical specifications for batch liquid effluents.

1.2 Objective

1.2.1 Satisfy surveillance requirements for batch releases from radwaste and condensate demineralizer systems as follows:

a. Determine the radioactivity of each batch of liquid waste prior to release (SR 4.11.1.1.1, Table 3.3-12 action 27).

b. Verify release concentrations (after dilution) of liquid wastes entering the unrestricted area meet 10CFR20, Appendix B, Table II, column 2 concentrations (SR 4.11.1.1.1, Table 4.11-1 Section A).

c. Verify release concentrations (after dilution) of dissolved and entrained noble gases meet limits stated in LCO 3.11.1.1.1.

d. Continuously monitoring liquid waste discharge by the use of radiation monitor setpoints (SR 4.3.3.9) (LCO 3.3.3.9).

e. Obtain representative sample by thoroughly mixing tank contents prior to sampling (Table 4.11-1 Note(d)).

1.3 Frequency

1.3.1 All Modes - Once/Batch

a. Verify gamma isotopic concentrations (after dilution) of liquid wastes entering the unrestricted area meet 10CFR20 limiting concentrations.

1.4 Logic Sequence - Batch Releases

1.4.1 Operations decides to release tank Operations recirculates tank contents for two volumes per SOI 77.1 (example: Cask Decontamination Tank - circulate for 500 minutes @ 60 GPM, or 600 minutes at 50 GPM, etc.).

1.4.2 When tank has been circulating for at least two volumes, operations notifies chemical laboratory to sample tank. Chemical laboratory initiates SI-400 by transmitting a conditional SI-400 package to the radwaste operator.

1.4.3 Chemical laboratory samples the tank contents according to the appropriate TI-16 method.

1.4.4 Chemical laboratory analyzes sample(s) according to appropriate TI-11 and 12 methods, and establishes monitor setpoint and the allowable release flowrate. The lead chemical analyst, SE5, submits SI-400 data package to the shift engineer to review and approve for release to the environment (cooling tower blowdown).

1.4.5 Operations submits MR to adjust monitor setpoint. Operations upon completion of MR releases tank according to SOI 77.1 or 14.1. Radwaste operator collects data during release as noted on SI data sheet 3.0.

1.4.6 Radwaste operator notifies chemical laboratory when release has been completed. Chemical laboratory performs post release calculations and adds to the monthly and quarterly composite sample bottles the amount of batch release sample in proportion to the quantity discharged according to TI-12, Method C.6.

2.0 INSTRUCTIONS

2.1 Prior to Release

2.1.1 Operations Responsibility

2.1.1.1 Operations shall establish circulation of the tank to be discharged for at least two complete volumes according to system operating instruction(s) 77.1 or 14.1 and then notify the chemical laboratory to sample the tank contents while circulating and completes appropriate blanks on SI-400 data sheet 2.0.

2.1.1.2 Insert monitor (RM-90-225 or RM-90-122) check source and verify the monitor response. Record the monitor identification (RM-90-225 or 122), check source response(CPM), monitor operable (yes or no) and operators initials. NOTE: If monitor does not respond, declare the monitor inoperable and immediately notify the shift engineer and initiate a maintenance request (instrumentation) to investigate and repair problem (restore monitor to operable status).

2.1.2 Chemical Laboratory Responsibility

NOTE: Prior to obtaining any sample(s), verify that the radiation monitor noted on data sheet 2.0, step 2.1.1.2 is operable. If monitor has been declared inoperable, obtain two independent samples and analyze each separately and attach both TI-12 evaluations to the SI data package.

2.1.2.1 Initiate a SI-400 data package and transmit to the radwaste operator.

2.1.2 Sample the tanks contents in accordance with the appropriate TI-16 method (B.73-Cask Decon. Tank; B.74-Chemical Drain Tank; B.77-Laundry Tank A or B; B.78 - Monitor Tank; B.82 - Waste Condensate Tank (A, B or C); B.99 - Non Reclaimable Waste Tank; B.100 - High Crud Tank (A or B); B.(Punchlist) - CDWE Blowdown Tank; B.101 - Distillate Tanks (A or B).

2.1.2.3 Analyze the sample(s) according to Technical Instruction No. 12, Method B.5 for total MPC fraction, individual isotopic concentrations and dissolved and entrained noble gas concentrations. Record the total MPC fraction (before dilution), total dissolved and entrained noble gas concentrations of sample(s) on data sheet 2.0.

2.1.2.4 Using the highest sample total MPC fraction and total (dissolved and entrained) noble gas concentrations, compute monitor response in CPM according to TI-18 section C using SI-400 computer program (TI-12). Record the calculated monitor response on SI-400 data sheet 2.0 and appropriate TI-37 Appendix B logsheet.

2.1.2.5 Compute monitor setpoint in CPM according to TI-18 section C.1 using SI-400 computer program. Record value on SI-400 data sheet 2.0 (must be $\geq$ CPM value calculated in step 2.1.2.4) and appropriate TI-37 appendix B logsheet.

2.1.2.6 Determine the allowable discharge flowrate (GPM) using total MPC (before dilution), after dilution MPC_4 (≤ 0.75), total dissolved noble gases ($\leq 1.6 \times 10^{-4}$ μ ci/ml-after dilution), and dilution flowrate (9000 GPM for radwaste tanks and 3000 GPM for condensate demineralizer tanks) in accordance with TI-12, Method B.5 SI-400 computer program and record on SI-400 data sheet 2.0. Attach TI-12 evaluation to SI-400 data package. Another independent chemical analyst verifies the release rate calculations and initials SI-400 data sheet 2.0.

2.1.2.7 Perform SI-466 (or 465) for NPDES compliance.

NOTE: If NPDES limits are not met, immediately notify the chemical engineering associate or cognizant chemical engineer prior to allowing release of the liquid waste. Recommend corrective action to the shift engineer using an SILC10 form, attachment F.

2.1.2.8 If tank is okay to be released assign a release permit number to SI-400 data package in accordance with TI-18 section I and record tank identification and release number on data coversheet, data sheet 2.0, and TI-18 logsheets, section D attachments A and B.

Example: 79-010-08-3
(Year (79) - total number of releases for year to date (010) - tank number (08) - third release for year from tank (08))

2.1.2.9 Transmit SI-400 package to the shift engineer for review and approval to release to the environment (cooling tower blowdown).

2.2 Release of Tank

2.2.1 Radwaste operator initiates maintenance request to have instrument mechanics set radiation monitor alarm/trip at CPM value computed in step 2.1.2.5. Record maintenance request number on data sheet 3.0 and attach a copy of the completed maintenance request to the SI data package.

2.2.2 Record tank level (% full) and radiation monitor reading (CPM) prior to the initiation of the batch release on data sheet 3.0.

2.2.3 After completion of the adjustment of the alarm/trip setpoint(2), discharge the tank contents according to SOI 77.1 or 14.1 at or below the allowable discharge flowrate(1) computed in step 2.1.2.6.

Notes: (1) flowrate will be monitored by appropriate flow indicators or pump curves (included in SOI 14.1 or 77.1).

(2) If monitor setpoint initiates a trip (isolation of discharge) the radwaste operator will reinitiate the discharge per SOI 77.1 or 14.1. If monitor setpoint initiates still another trip (isolation) then the operator will then notify the chemical laboratory who in turn will contact the cognizant chemical engineer for further guidance for processing the remaining tank contents (possible actions to be taken are as follows: (a) Verify monitor initiated system isolation (spurious trip), (b) evaluate the possibility of a contaminated radiation monitor (background readings prior to release-have monitor cleaned if background has consistently increased), (c) Reverify monitor setpoint calculations (sections 2.1.2.4 and 2.1.2.5) and 2.1.2.6 if value (recalculated) exceeds value in step 2.1.2.5 of SI-400 prior to initiating the release).

2.2.4 Record at approximately three hour intervals during the release and at termination (completion) of the release; the tank level (% full), the radiation monitor reading (CPM), the discharge flowrate (3) (GPM), the allowable release flowrate (gpm calculated in step 2.1.2.6) in acceptance criteria column, and the date and time on SI data sheet 3.0.

NOTE: (3) If pump curves are used to evaluate flow then note in remarks section what data was evaluated by this means.

2.2.5 Radwaste operator notifies the shift engineer that the release has been completed.

2.2.6 Radwaste operator notifies the chemical laboratory lead analyst (SE5) when tank discharge has been completed so the post release evaluation for SI-400 can be performed by the chemical laboratory personnel.

2.3 Chemical Laboratory - Post Release Evaluation

2.3.1 Determine the quantity of radioactivity released, amount of release time, total MPC fraction after dilution, dilution and release volumes, total dissolved and entrained noble gas (after dilution) concentration and weighted midpoint of release according to TI-12, method B.5 using SI-400 computer program. Record values (except midpoint of release) on SI-400 data sheet 4.0, TI-18 section D attachments A and B and the appropriate TI-37 appendix B logsheet. Attach TI-12 evaluation(s) (computer or manual) and TI-18 setpoint evaluation (if applicable) to the SI data package.

2.3.2 Add a portion of the sample collected (prior to release) to the monthly and quarterly composites proportionally to the volume release the from batch in accordance with TI-12 method C.6.

NOTE: Portions of the monthly composite will be used to evaluate P-32, gross alpha, and tritium released (SI-403). Portions of the quarterly composite will be used to evaluate strontium (89 and 90), and Fe 55 released (SI-409).

3.0 ACCEPTANCE CRITERIA

3.1 Acceptance criteria is noted on applicable data sheet for each parameter monitored.

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4.0 ACTION REQUIRED

4.1 Notify the shift engineer and cognizant chemical enginer or chemical engineering associate if total MPC fraction or dissolved and entrained noble gas concentration after dilution exceed the acceptance criteria using an SILC10, attachment F.

4.2 Add to the monthly and quarterly composites a volume of sample proportionate to the volume released in accordance with TI-12 method C.6.

4.3 If the total MPC fraction (after dilution at the cooling tower blowdown), dissolved and entrained noble gas concentration (total concentration after dilution) or allowable release flowrate are exceeded, the cognizant chemical engineer will prepare a written evaluation for evaluating compliance with technical specification limitations (per TI (punchlist)) and attach to the SI-400 data package.

SI DATA PACKAGE COVER SHEET

RADIOACTIVE LIQUID WASTE EFFLUENT - BATCH RELEASE

Unit _____

Batch Number ___-___-___-___
Tank Identification _____

Performed By _____ Date _____
Analyst(s)

List of data sheets attached.

Instruction No.	Data Sheet No.	Pages
SI-400	2.0	1,2
SI-400	3.0	1
SI-400	4.0	1
TI-12	evaluation	NA
TI (punchlist)	Evaluation (if required)	NA
SOI 14 or SOI 77	Working package (copy)	NA
MR Number _____	Copy	NA

Were technical specification criteria satisfied? _____ Yes _____ No
If criteria were not satisfied, notify the shift engineer who completes the following:

Was a limiting condition for operation violated?
_____ Yes (explain in remarks) _____ No (explain in remarks)
Verified By _____ Date _____
Shift Engineer Time _____

Reason for Test:

_____ Release of radioactive liquid (inoperable radiation monitor)
_____ Release of Radioactive Liquids (Operable Radiation Monitor)
_____ Other (explain) _____

Review of Test Results

Chemical Engineering Associate _____ Date _____

Review and Approval of Test Results

Lead Chemical Engineer _____ Date _____

Cognizant Chemical Engineer _____ Date _____

QA Review of Test Results

QA Staff _____

Remarks _____

_____

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RADIOACTIVE LIQUID WASTE EFFLUENT - BATCH RELEASE PRE RELEASE REQUIREMENTS

Data Sheet 2.0 Sections, 2.1.1.1, 2.1.1.2, 2.1.2.9 are operations responsibility.
Data Sheet 2.0 Sections 2.1.2.3, 2.1.2.4, 2.1.2.5, 2.1.2.6, 2.1.2.7, and 2.1.2.8 are chemical responsibility.

Procedure Step		Description	Data	Initials	Acceptance Criteria
2.1.1.1	a.	Estimated tank Volume	_____ gals	_____	NA
	b.	Recirculation of tank contents for 2 volumes per SOI 77.1 or SOI 14.1	_____/_____/_____ (start) Date Time GPM	_____	NA
			_____/_____/_____ (end) Date Time GPM	_____	NA
	c.	Recirculation flowrate-average	_____ GPM	_____	NA
	d.	Total recirculation time prior to sampling	_____ minutes	_____	NA
	e.	Multiply(value in 2.1.1.1.c) times (value in 2.1.1.1.d)	_____ gals	_____	Must be ≥ 2* (estimated tank volume)
2.1.1.2	a.	Source check response	_____ CPM	_____	----------
	b.	Monitor (225 or 122)	0-RM-90-____	_____	----------
	c.	Monitor is operable	YES/NO (Circle one)	_____	YES
2.1.2.3	a.	Total MPC Fraction before Dilution (2nd sample required if Step 2.1.1.2.C is no).	(1st sample) _____	_____	NA
			(2nd sample) _____	_____	NA
	b.	Total Noble Gas Conc. Before dilution (2nd sample is required if step 2.1.1.2C is no)	(1st sample) _____ µCi/ml	_____	NA
			(2nd sample) _____ µCi/ml	_____	NA
2.1.2.4		Computer monitor response	_____ CPM	_____	NA
2.1.2.5		Monitor setpoint	_____ CPM	_____	NA

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RADIOACTIVE LIQUID WASTE EFFLUENT - PRE-RELEASE REQUIREMENTS

Procedure Step	Description	Data	Initials	Acceptance Criteria
2.1.2.6	a. Dilution flowrate (3000 GPM for RM-90-225 or 9000 GPM for RM-90-122)	_____ GPM	_____	NA
	b. Allowable release rate	_____ GPM	_____	NA
	c. Calculated total MPC fraction after dilution	_____	_____	≤0.75
	d. Release rate calculations verified by second analyst	____/____ Date/Time	_____	NA
2.1.2.7	NPDES requirements fulfilled (If no - stop processing SI and notify the shift engineer (SILC10, attachment F) and the chemical engineering associate or cognizant chemical engineer	Yes / No (circle one)	_____	YES
		_____ (SIL C10 number)	_____	NA
2.1.2.8	Tank Identification (a)	_____	_____	NA
	Batch Release Number (a)	___-___-___-___	_____	NA
2.1.2.9	Shift Engineer review complete and approves the release to environment (cooling tower blowdown)	_____ Shift Engineer		NA
		_____ Date/Time		NA

NOTE: General - As soon as any parameter is found out of limits, immediately notify the shift engineer and/or chemical engineering associate and cognizant chemical engineer and note in the remarks section of the data sheet.
(a) Note on data cover sheet.

Remarks: _____

_____

_____

RADIOACTIVE LIQUID WASTE EFFLUENT - RELEASE REQUIREMENTS

Data Sheet 3.0 - All sections operations responsibility.

Procedure Step	Description	Data	Initials	Acceptance Criteria
2.2.1	Radiation Monitor (225 or 122) Setpoint adjustment complete	0-RM-90-_____ (Monitor)	_____ (Operator)	NA
		_____ (MR Number)(4)	_____	NA
		_____ Date/Time	_____	NA

2.2.3 and	Tank level (% full),	%	CPM(1)	GPM(2)	Date/Time		(3)	GPM
	Monitor reading (CPM),							
	release flowrate (GPM),							
	date and time							
	Release Complete -							

2.2.5	Shift Engineer notifed Release Complete	_____/_____ Date Time	_____ Operator	NA

NOTES: General: As soon as any paremter is found out of limits, immediately notify the shift engineer.

1. If radiation monitor is declared inoperable, immediately stop the release, notify the shift engineer and note in the remarks section. If radiation monitor trips (isolates) then the radwaste operator reinitiates the discharge per SOI 77.1 or 14.1. If monitor isolates still another time, immediately notify the shift engineer and the chemical laboratory to evaluate the actions required to continue processing of the tank contents and cause of the isolation. Under no circumstances increase the monitor setpoint prior to a thorough revaluation.

Remarks: _____

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RADIOACTIVE LIQUID WASTE EFFLUENT - RELEASE REQUIREMENTS

2. If allowable release flowrate is exceeded immediately reduce the release flowrate to less than or equal to the value stated in step 2.1.2.6b and notify the chemical laboratory who in turn will evaluate for technical specification compliance per TI (punchlist) upon completion of release and attach the evaluation to the SI data package.

3. Record allowable release flowrate from step 2.1.2.6 (data sheet 2.0).

4. Note on data cover sheet for list of data sheets attached.

Remarks: _____

_____

RADIOACTIVE LIQUID WASTE EFFLUENT - BATCH RELEASE POST RELEASE REQUIREMENTS

Data Sheet 4.0 - All sections are the chemical section responsiblity.

Procedure Step		Description	Data	Initials	Acceptance Criteria
2.3.1	1.	Total Volume Released	_____ gals	_____	NA
	2.	Total Dilution Volume	_____ gals	_____	NA
	3.	Total MPC fraction after dilution (cooling tower blowdown)	_____	_____	≤ 0.75
	4.	Average release flowrate	_____ GPM	_____	NA
	5.	Total Noble Gas concentration after dilution (cooling tower blowdown)	_____ µCi/ml	_____	$\leq 1.6 \times 10^{-4}$ µci/ml

NOTES: General - As soon as any parameter is found out of limits notify the shift engineer using an SILC10 form, attachment F. After completing the entire data sheet obtain shift engineer's signature on data coversheet to show acknowledgement of out of limit parameter(s). Notify the cognizant chemical engineer and note in the remarks section. Evaluate for technical specification compliance using TI (punchlist) and attach to the SI data package.

Remarks: _____

_____

_____