PROPOSED CHANGE RTS-115E

RADIOLOGICAL EFFLUENT AND ENVIRONMENTAL

TECHNICAL SPECIFICATIONS

APPENDIX A

ТO

OPERATING LICENSE DPR-49

DUANE ARNOLD ENERGY CENTER IOWA ELECTRIC LIGHT AND POWER COMPANY

DOCKET NO. 50-331

REGULATORY DOCKET FILE COPY

JULY, 1984

8408020009 840725 PDR ADDCK 05000331 PDR PDR

22. INSTRUMENTATION

- a. Instrument Calibration or Channel Calibration An Instrument Calibration means the verification or adjustment of an instrument signal output so that it corresponds, within acceptable range and accuracy, to a known value(s) of the parameter which the instrument monitors. The acceptable range and accuracy of an instrument and its setpoint are given in the system design control document and its setpoint is used in the Technical Specifications. Instrument calibration may be performed by any series of sequential, overlapping, or total channel steps such that the entire instrument is calibrated. Instrument calibration includes the Instrument or Channel Functional Test, as appropriate.
- b. Channel A channel is an arrangement of a sensor and associated components used to evaluate plant variables and produce discrete outputs used in logic. A channel terminates and loses its identity where individual channel outputs are combined in logic.
- c. Instrument or Channel Functional Test An Instrument or Channel Functional Test for
 - Analog channels means the injection of a simulated signal into the channel as close to the sensor as practicable to verify the proper response, alarm, and/or initiating action.
 - (2) Bistable channels means the injection of a simulated signal into the sensor to verify the proper response, alarm and/or initiating action.
- Instrument or Channel Check An instrument or channel check is a qualitative determination of acceptable operability by observation of instrument with other independent instruments measuring the same variable.
- e. Logic System Functional Test A logic system functional test means a test of all relays and contacts of a logic circuit to insure all components are operable per design intent. Where practicable, action will go to completion; i.e., pumps will be started and valves operated.
- f. Trip System A trip system means an arrangement of instrument channel trip signals and auxiliary equipment required to initiate action to accomplish a protective trip function. A trip system may require one or more instrument channel trip signals related to one or more plant parameters in order to initiate trip system action. Initiation of protective action may require the tripping of a single trip system or the coincident tripping of two trip systems.
- g. Protection Action An action initiated by the protection system when a limit is reached. A protective action can be at a channel or system level.

RTS-115E 7/84

22. Instrumentation - Continued

- h. Protective Function A system protective action which results from the protective action of the channels monitoring a particular plant condition.
- i. Simulated Automatic Actuation Simulated automatic actuation means applying a simulated signal to the sensor to actuate the circuit in question.
- j. Logic A logic is an arrangement of relays, contacts, and other components that produces a decision output.
 - 1) Initiating A logic that receives signals from channels and produces decision outputs to the actuation logic.
 - Actuation A logic that receives signals (either from initiating logic or channels) and produces decision outputs to accomplish a protective action.
- k. Primary Source Signal The first signal, which by plant design, should initiate a reactor scram for the subject abnormal occurrence (see FSAR Subsection 14.5).
- Source Check A Source Check is the assessment of channel response when the channel sensor is exposed to a source of radiation.

23. FUNCTIONAL TESTS

A functional test is the manual operation or initiation of a system, subsystem, or component to verify that it functions within design tolerances (e.g., the manual start of a core spray pump to verify that it runs and that it pumps the required volume of water).

24. SHUTDOWN

The reactor is in a shutdown condition when the reactor mode switch is in the shutdown mode position and no core alterations are being performed.

25. ENGINEERED SAFEGUARD

An engineered safeguard is a safety system, the actions of which are essential to a safety action required in response to accidents.

26. SURVEILLANCE FREQUENCY

Periodic surveillance tests, checks, calibrations and examinations shall be performed within the specified surveillance intervals. These intervals may be adjusted plus or minus 25%. The operating cycle interval as pertaining to instrument and electrical surveillance shall never exceed 15 months. In cases where the elapsed interval has exceeded 100% of the specified interval, the next surveillance interval shall commence at the end of the original specified interval.

RTS-115E 7/84

27. FREQUENCY NOTATION



28. FIRE SUPPRESSION WATER SYSTEMS

A fire suppression water system shall consist of a water source, pumps, and distribution piping with associated sectionalizing control or isolation valves. Such valves include yard hydrant curb valves, the first valve ahead of the water flow alarm device on each sprinkler, hose standpipe or deluge system riser.

29. REACTOR TRIP SYSTEM RESPONSE TIME

Reactor trip system response time is the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until deenergization of the scram pilot valve solenoids.

30. REPORTABLE EVENT

A REPORTABLE EVENT shall be any of those conditions specified in Section 50.73 to 10 CFR Part 50.

31. OFFSITE DOSE ASSESSMENT MANUAL

The Offsite Dose Assessment Manual (ODAM) is a manual containing the methodology and parameters to be used in the calculation of offsite doses due to radioactive gaseous and liquid effluents and in the calculation of radioactive gaseous and liquid effluent monitoring instrumentation alarm/trip setpoints.

32. GASEOUS RADWASTE TREATMENT SYSTEM

A Gaseous Radwaste Treatment System is any system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system offgases from the primary system and providing delay or holdup for the purpose of reducing radioactivity prior to release to the environment.

33. PURGE - PURGING

PURGE or PURGING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.

This page becomes Effective 10/1/85

34. VENTING

VENTING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is not provided or required during the process. Vent, used in system names, does not imply a VENTING process.

35. PROCESS CONTROL PROGRAM (PCP)

The PROCESS CONTROL PROGRAM shall generally describe the essential process controls and checks used to assure that a process for solidifying radioactive waste from a liquid system produces a product that is acceptable for burial according to 10 CFR Part 61.56.

36. MEMBER(S) OF THE PUBLIC

Member(s) of the Public are persons who are not occupationally associated with Iowa Electric Light and Power Company and who do not normally frequent the DAEC site. The category does not include contractors, contractor employees, vendors, or persons who enter the site to make deliveries or to service equipment.

37. SITE BOUNDARY

The Site Boundary is that line beyond which the land is neither owned, nor leased, nor otherwise controlled by IELP. UFSAR Figure 1.2-1 identifies the DAEC Site Boundary. For the purpose of implementing radiological effluent technical specifications, the Unrestricted Area is that land (offsite) beyond the Site Boundary.



This page becomes Effective 10/1/85

·

.

LIMI	TING CONDITIONS FOR OPERATION	SUR	VEILLANCE REQUIREMENT
C.	Control Rod Block Actuation	c.	Control Rod Block Actuation
1.	The limiting conditions of operation for the instrumentation that initiates control rod block are given in Table 3.2-C.		Instrumentation shall be functionally tested, calibrated and checked as indicated in Table 4.2-C.
2.	The minimum number of operable instrument channels specified in Table 3.2-C for the Rod Block Monitor may be reduced by one in one of the trip systems for maintenance and/or testing, provided that this condition does not last longer than 24 hours in any thirty day period.		functionally tested as indicated in Table 4.2-C.
D.	Radiation Monitoring Systems- Tsolation & Initiation Functions	D.	Radiation Monitoring Systems- Isolation & Initiation Functions
1.	Steam Air Ejector Offgas System	1.	Steam Air Ejector Offgas System
	a) At least one post treatment steam air ejector offgas system radiation monitor shall be operable during reactor power operation. The monitors shall be set to initiate immediate closure of the charcoal delay bed bypass valves if the monitor exceeds a trip setting equivalent to the dose rate specified in Specification 3.15.2.1.		Instrumentation shall be functionally tested, calibrated and checked as indicated in Table 4.2.D. System logic shall be functionally tested as indicated in Table 4.2-D.
	b) In the event no post- treatment monitor is operable, gases from the steam air ejector offgas system may be released to the environment for up to 72 hours provided (1) the charcoal bed of the offgas delay system is not bypassed, and (2) the offgas stack noble gas activity monitor is operable.		
	Otherwise, be in at least HOT STANDBY within the following 24 hours.		

RTS-115E 7/84

This page becomes Effective 1/1/86

,

LIMITING CONDIT	IONS FOR OPERATION	SUR	VEILLANCE	REQUIREMENT	
c) At leas steam a system shall b reactor The mor to init the mor setting Ci/sec after 3 the off	t one pre-treatment air ejector offgas radiation monitor be operable during power operation. itors shall be set iate an alarm if itor exceeds a trip equivalent to 1.0 of noble gases 0 minutes delay in gas holdup line.			·	
In the flow in offgas equival after 3 the off restore than th hours o hot sta next 12	event the noble gas the air ejector exceeds the ent of 1.0 Ci/sec 0 minutes delay in gas holdup line, the rate to less is limit within 72 or be in at least ndby within the hours.				
d) In the treatme operabl steam a system up to 3 the cha offgas bypasse are col weekly, stack n monitor least 1 monitor	event no pre- nt monitor is e, gases from the ir ejector offgas may be released for 0 days provided (1) rcoal bed of the delay system is not d, (2) Grab samples lected and analyzed and (3) the offgas oble gas activity is operable, or at post-treatment is operable.				
2. Reactor Bu and Standb System	ilding Isolation y Gas Treatment	2.	Reactor Bu and Standb System	uilding Isola oy Gas Treatm	tion ent
The limiti operation Specificat	ng conditions for are given in ion 3.7.B.		Instrument functional and checke Table 4.2-	tation shall lly tested, c ed as indicat -D.	be alibrated ed in
			System loc functional indicated	gic shall be lly tested as in Table 4.2	-D.

RTS-115E 7/84

,

This page becomes Effective 1/1/86

•

÷ .

<u></u> LI	MITING CONDITION FOR OPERATION		SURVEILLANCE REQUIREMENT
Ε.	Drywell Leak Detection The limiting conditions of operation for the instrumentation that monitors drywell leak detection are given in Table 3.2-E.	Ε.	Drywell Leak Detection Instrumentation shall be calibrated and checked as indicated in Table 4.2-E.
F.	Surveillance Information Readouts The limiting conditions for the instrumentation that provides surveillance information readouts are given in Table 3.2-F.	F.	Surveillance Information Readouts Instrumentation shall be calibrated and checked as indicated in Table 4.2-F.
G.	<pre>Recirculation Pump Trip (ATWS) The limiting conditions for operation for the instrumentation that trips the recirculation pumps as a means of limiting the consequences of a failure to scram during an anticipated transient are given in Table 3.2-G. (EOC) The limiting conditions for operation for the instrumentation that trips the recirculation pumps during turbine stop valve or control valve fast closure for transient margin improvement (especially for end of cycle) are given in Table 3.2-G.</pre>	G.	<pre>Recirculation Pump Trip Instrumentation and logic shall be functionally tested, calibrated, and response time tested as indicated on Table 4.2-G. Accident Monitoring Instrumentation Instrumentation shall be checked and calibrated as indicated in Table 4.2-H.</pre>
Η.	Accident Monitoring Instrumentation The limiting conditions for operation for the accident monitoring instrumentation are given in Table 3.2-H.		

RTS**-**115E 07/84

۰.

y

This page becomes Effective 1/1/86

€ 3.2-29

TABLE 4.2-D

MINIMUM TEST AND CALIBRATION FREQUENCY FOR RADIATION MONITORING SYSTEMS

-	Instrument Channels	Instrument Functional Test (9)	Calibration (9)	Source Check	Instrument Check
1)	Refuel Area Exhaust Monitors	Once/3 months	Once/Refueling	Once/month	Once/day
2)	Reactor Building Area Exhaust Monitors	Once/3 months	Once/Refueling	Once/month	Once/day
3)	Offgas Post-treatment Radiation Monitors	Once/3 months (10)	Once/Refueling	Once/month	Once/day
4)	Offgas Pre-treatment Radiation Monitors	Once/3 months (10)	Once/Refueling	Once/month	Once/day
Log	jic System Functional Test (4) (6)	Frequency (9)			
1)	Reactor Building Isolation	Once/Refueling			
2)	Standby Gas Treatment System Actuation	Once/Refueling			
3)	Steam Jet Air Ejector Offgas Line Isolation	Once/Refueling			

 $:= \{ e_i \}_{i \in I}$

These instrument channels will be calibrated using simulated electrical signals.

- 4. Simulated automatic actuation shall be performed once each operating cycle. Where possible, all logic system functional tests will be performed using the test jacks.
- 5. Reactor low water level, high drywell pressure and high radiation main steam line tunnel are also included on Table 4.1-2.
- 6. The logic system functional tests shall include a calibration of time delay relays and timers necessary for proper functioning of the trip systems.
- 7. These signals are not PCIS trip signals but isolate the Reactor Water Cleanup system only.
- 8. This instrumentation is excepted from the functional test definition. The functional test will consist of comparing the analog signal of the active thermocouple element feeding the isolation logic to a redundant thermocouple element.
- 9. Functional tests and calibrations are not required on the part of the system that is not required to be operable or is tripped. Functional tests shall be performed prior to returning the system to an operable status with a frequency not less than once per month. Calibrations shall be performed prior to returning the system to an operable status with a frequency not less than those defined in the applicable table. However, if maintenance has been performed on those components, functional tests and calibration shall be performed prior to returning the system to returning to service.
- 10. The Instrument Functional Test shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:
 - 1. Instrument indicates measured levels above the alarm/trip setpoint.
 - 2. Instrument indicates a downscale failure.
 - 3. Instrument controls not set in operate mode. (effective date for item 10, 10/1/85)



3.2-33

3.2.D.1 BASES

1. Main Condenser Offgas (effective date 1/1/86)

Restricting the gross radioactivity rate of noble gases from the main condenser provides reasonable assurance that the total body exposure to an individual at the exclusion area boundary will not exceed a small fraction of the limits of 10 CFR Part 100 in the event this effluent is inadvertently discharged directly to the environment without treatment. This specification implements the requirements of General Design Criteria 60 and 64 of Appendix A to 10 CFR Part 50.

RTS-115E 07/84

3.2-45b

LIMITING CONDITION FOR OPERATION	
F. Mechanical Vacuum Pump	F
 The mechanical vacuum pump shall be capable of being isolated and secured on a signal of high radioactivity in the steam lines whenever the main steam isolation valves are open. 	1
2. During mechanical vacuum pump operation the release rate of gross activity except for halogens and particulates with half lives longer than eight days shall not exceed 1 curie/sec.	
 If the limits of 3.7.F.2 are not met the vacuum pump shall be isolated. 	

SURVEILLANCE REQUIREMENT

F. Mechanical Vacuum Pump

 At least once during each operating cycle verify automatic securing and isolation of the mechanical vacuum pump.

3.7.F & 4.7.F <u>Bases</u>

Mechanical_Vacuum Pump

The purpose of isolating the mechanical vacuum pump line is to limit the release of activity from the main condenser. During an accident, fission products could be transported from the reactor through the main steam lines to the condenser. The fission product radioactivity would be sensed by the main steam line radioactivity monitors which initiate isolation.

3.7-48b

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.14 RADIOACTIVE LIQUID EFFLUENT	
3.14.1 The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.14-1 shall be OPERABLE with their alarm and trip setpoints set to ensure that the limits of Specification 3.14.2 are not exceeded. <u>APPLICABILITY</u> : As shown in Table 3.14-1. ACTION:	 4.14.1.1 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST operations during the modes and at the frequencies shown in Table 4.14-1. 4.14.1.2 The setpoints shall be determined in accordance with the method described in the ODAM.
 a. When a radioactive liquid effluent monitoring instrumentation channel alarm and trip setpoint is less conservative than a value which will ensure that the limits of 3.14.2 are met, adjust without delay to meet Specification 3.14.2, suspend the release of radioactive liquid effluents monitored by the affected channel, or declare the channel inoperable. b. When less than the minimum required liquid effluent monitoring instrument channel is OPERABLE, take the ACTION stated in Table 3.14-1 and make every reasonable effort to restore the instrument to operable status. In the event the minimum required instrument ation is not returned to OPERABLE status within 30 days, explain in the next Semiannual Radioactive Material Release Report, in lieu of any other report, why the instrument was not made OPERABLE in a timely manner. 	
RTS-115E 3.1	L4-1 Effective Date 10/1/85

7/84

. . .

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.14.2 The concentration of radioactive material in liquid effluent released from the site to the unrestricted area (see FSAR Figure 1.5-1) shall not exceed the concentrations specified in 10CFR Part 20, Appendix B, Table II, Colume 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall not exceed 2 x $10^{-4} \ \mu \text{Ci/ml}$ total activity.	4.14.2.1 Each radioactive liquid waste batch shall be sampled and analyzed in accordance with Table 4.14-2 before release. Alternatively, pre-release analysis of batch(es) of radioactive liquid waste may be by gross β or γ counting provided the maximum permissible concentration, 1 x 10 ⁻⁷ μ Ci/ml, is applied at the unrestricted area boundary.
<u>APPLICABILITY</u> : At all times. <u>ACTION</u> : a. With the concentration of radioactive material released from the site to unrestricted areas exceeding the limit, without delay restore the concentration within the limit.	 4.14.2.2 The results of pre-release analyses shall be used with the calculational methods in the ODAM to establish trip setpoints for batch releases to assure that the concentration at the restricted area boundary does not exceed the limit in Specification 3.14.2. 4.14.2.3 In any week during which Service Water is released to the unrestricted area, a grab sample of water shall be collected from that Service Water System and analyzed as specified in Table 4.14-2, Item B.1 and B.4.
	In the event the gross activity concentration in the service water exceeds 1 x 10 ⁻⁷ µCi/ml, the activity concentration shall be determined by sampling and post- release analyses specified in Table 4.14-2, Items B.2 through B.5.

. ...

Effective Date 10/1/85

....

ļ

 3.14.3 The dose or dose commitment to a member of the Public from radioactive materials in liquid effluents released to the unrestricted area (see FSAR Figure 1.2-1) shall not exceed: 1.5 mrem to the total body during any calendar quarter, 5.0 mrem to any organ during any calendar quarter, 3.0 mrem to the total body during any calendar year, or 10.0 mrem to any organ during any calendar year. APPLICABILITY: At all times. ACTION: a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding the above limit, prepare and submit to the Commission within 30 days from the end of the quarter during which the release occurred, pursuant to Specification 6.11.3, and in lieu of any other report, a Special Report which identifies the corrective actions to be taken. 	SURVEILLANCE REQUIREMENT
 1.5 mrem to the total body during any calendar quarter, 5.0 mrem to any organ during any calendar quarter, 3.0 mrem to the total body during any calendar year, or 10.0 mrem to any organ during any calendar year. APPLICABILITY: At all times. ACTION: a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding the above limit, prepare and submit to the Commission within 30 days from the end of the quarter during which the release occurred, pursuant to Specification 6.11.3, and in lieu of any other report, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken. 	4.14.3 <u>Dose Calculations</u> . In any quarter in which radioactive liquid effluent is discharged, an assessment shall be performed in accordance with the ODAM at least once per 30 days in order to verify that the cumulative dose commitment
 5.0 mrem to any organ during any calendar quarter, 3.0 mrem to the total body during any calendar year, or 10.0 mrem to any organ during any calendar year. <u>APPLICABILITY</u>: At all times. <u>ACTION</u>: a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding the above limit, prepare and submit to the Commission within 30 days from the end of the quarter during which the release occurred, pursuant to Specification 6.11.3, and in lieu of any other report, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken. 	does not exceed the limits in Specification 3.14.3.
 3.0 mrem to the total body during any calendar year, or 10.0 mrem to any organ during any calendar year. <u>APPLICABILITY</u>: At all times. <u>ACTION</u>: a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding the above limit, prepare and submit to the Commission within 30 days from the end of the quarter during which the release occurred, pursuant to Specification 6.11.3, and in lieu of any other report, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken. 	
 10.0 mrem to any organ during any calendar year. <u>APPLICABILITY</u>: At all times. <u>ACTION</u>: a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding the above limit, prepare and submit to the Commission within 30 days from the end of the quarter during which the release occurred, pursuant to Specification 6.11.3, and in lieu of any other report, a Special Report which identifies the cause(s) for exceeding the limit and defines the taken. 	
APPLICABILITY: At all times. ACTION: a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding the above limit, prepare and submit to the Commission within 30 days from the end of the quarter during which the release occurred, pursuant to Specification 6.11.3, and in lieu of any other report, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken.	
ACTION: a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding the above limit, prepare and submit to the Commission within 30 days from the end of the quarter during which the release occurred, pursuant to Specification 6.11.3, and in lieu of any other report, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken.	
 a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding the above limit, prepare and submit to the Commission within 30 days from the end of the quarter during which the release occurred, pursuant to Specification 6.11.3, and in lieu of any other report, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken. 	

|

, [.]

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.14.4 Appropriate liquid radwaste equipment shall be used to treat any untreated batch of liquid waste prior to discharge when a pre-	4.14.4 Each radioactive liquid waste batch shall be sampled and analyzed in accordance with Table 4.14-2 before release.
release analysis indicates a radioactivity concentration (exclusive of tritium and dissolved noble gases) of 0.01 µCi/ml or higher.	Alternatively, pre-release analysis of batch(es) of radioactive liquid waste may be by gross β or γ counting provided the maximum permissible concentration 1 x 10 ⁻⁷ μ Ci/ml, is
APPLICABILITY: At all times.	applied at the unrestricted area boundary.
ACTION:	
a. With radioactive liquid waste being discharged without treatment and in excess of the above limit, prepare and submit to the Commission within 30 days, pursuant to Specification 6.11.3, a Special Report, in lieu of any other report, which includes the following information:	
 Identification of equipment or subsystems not OPERABLE and the reason for inoperability. 	
2. Action(s) taken to restore the inoperable equipment to OPERABLE status.	
 Summary description of action(s) taken to prevent a recurrence. 	

.

-

TABLE 3.14-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

INS	STRU	MENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY#	ACTION
1.	Gr Pr of	oss Radioactivity Monitors oviding Automatic Termination Release			
	a.	Liquid Radwaste Effluent Line	(1)	During releases	18
2.	Gra Not Tei	oss Radioactivity Monitors t Providing Automatic rmination of Release			
	a.	RHR Service Water System Effluent Line	(1)	During releases	20
	b.	General Service Water System	(1)	During releases	20
	c.	RHR Rupture Disc Effluent Line	(1)	During releases	20
3.	F1c	w Rate Measurement Devices**		,	
	a. b.	Liquid Radwaste Effluent Line** Liquid Radwaste Dilution Line**	(1) (1)	At all times During releases	21 21
# CI	hann	el(s) shall be OPFRABLE and in sev	rvice excon	t that channels	

service are permitted for maintenance and required tests, checks, or calibrations.

**Pump curves may be utilized to estimate flow in lieu of flow measurement devices.

.

TABLE 3.14-1 (Continued)

TABLE NOTATION

ACTION 18 With no channel OPERABLE, effluent may be released provided that prior to initiating a release:

- 1. At least two samples are analyzed in accordance with Specification 4.14.2.1, and;
- 2. A technically qualified member of the Facility Staff verifies the release rate calculations and discharge valving determined by another technically gualified Facility Staff member.

Otherwise, suspend release of radioactive effluents via this pathway.

- ACTION 20 With no channel OPERABLE, effluent releases via the affected pathway may continue provided the effluent is sampled and analyzed for gross radioactivity at least once per eight hours during actual release. The analysis shall be capable of detecting $10^{-7} \mu \text{Ci/ml}$.
- ACTION 21 With no channel OPERABLE, effluent releases via this pathway may continue provided the flow rate is estimated with pump curves at least once per batch during actual releases.

RTS-115E 7/84

Effective Date 10/1/85

RTS-115E 7/84

TABLE 4.14-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INS	STRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1.	Gross Beta or Gamma Radioactivity Monitors Providing Alarm and Automatic Isolation				
	a. Liquid Radwaste Effluent Line	D*	D(6)	R(3)	Q(1)
2.	Gross Beta or Gamma Radioactivity Monitors Providing Alarm But Not Providing Automatic Isolation				
	a. RHR Service Water System Effluent Line	D*	M	R(3)	Q(2)
	b. General Service Water System Effluent Line	D*	M	R(3)	Q(2)
	c. RHR Rupture Disc Effluent Line	D*	Μ	R(3)	Q(2)
3.	Flow Rate Measurement Devices				
	a. Liquid Radwaste Effluent Line	D(5)*	N.A.	R	Q
	b. Liquid Radwaste Dilution Line	D(5)*	N.A.	R	. Q

TABLE 4.14-1 (Continued)

TABLE NOTATION

*During releases via this pathway. **During liquid additions to the tank.

- (1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if any of the following conditions exist:
 - 1. Instrument indicates measured levels above the alarm/trip setpoint.
 - 2. Circuit failure.
 - 3. Instrument indicates a downscale failure.
 - 4. Instrument controls not set in operate mode.
- (2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:
 - 1. Instrument indicates measured levels above the alarm/trip setpoint.
 - 2. Circuit failure.
 - 3. Instrument indicates a downscale failure.
 - 4. Instrument controls not set in operate mode.
- (3) The CHANNEL CALIBRATION shall include the use of a known radioactive source (traceable to the National Bureau of Standards radiation measurement system or acceptable non-NBS standards) positioned in a reproducible geometry with respect to the sensor and emitting beta or gamma radiation in the range measured by the channel. CHANNEL CALIBRATION may normally be done during refueling outages.
- (5) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK shall be made at least once daily on any day on which continuous, periodic, or batch releases are made.
- (6) On any day on which a release is made, a SOURCE CHECK shall be made at least once, prior to the first release.



RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) ^a (µCi/m1)
A. Batch Waste	P P Each Batch Each Batch		Principal Gamma Emitters ^e	5 x 10 ⁻⁷
Nelease Taiks			I-131 ^e	1 x 10 ⁻⁶
	P One Batch/M	Mf	Dissolved and Entrained Gases	1 x 10 ⁻⁵
	P Each Batch	мf	H-3	1 x 10 ⁻⁵
		Composite ^b	Gross alpha	1 x 10 ⁻⁷
	P Each Batch	Q ^f Composite ^b	Sr-89, Sr-90	5 x 10 ⁻⁸
			Fe-55	1×10^{-6}
B. Continuous Service_Water	1. W Grab Sample	Wf	Gross beta/gamma	1 x 10 ⁻⁷
Refease	2. W	Wf	Principal Gamma Emitters	5 x 10 ⁻⁷
	Grab Sampre	~	I-131	1×10^{-6}
	3. M Grab Sample	Mf	Dissolved and Entrained Gases	1 x 10 ⁻⁵
	4. W	Mf	H-3	1 x 10 ⁻⁵
	drab Sampre	composite	Gross alpha	1 x 10 ⁻⁷
	5. W Grab Sample	Q ^f Composite	Sr-89, Sr-90 Fe-55	5×10^{-8} 1 x 10- ⁶ -

RTS-115E 07/84

3.14-9

Effective Date 10/1/85

TABLE 4.14-2 (Continued)

TABLE NOTATION

a. The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a new count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement, which may include radiochemical separation:

 $LLD = \frac{4.66 \text{ S}_{b}}{\text{E} \bullet \text{V} \bullet 2.22 \bullet \text{Y} \bullet \exp(-\lambda \Delta t)}$

where

LLD is the lower limit of detection as defined above (picocuries per unit mass or volume)

 S_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute)

E is the counting efficiency (counts per disintegration)

V is the sample size (units of mass or volume)

2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

 λ is the radioactive decay constant for the particular radionuclide, and

 Δ t for effluents is the elapsed time between the midpoint of sample collection and the time of counting.

Alternatively, exp (- $\lambda \Delta t$) may be replaced by $\frac{\lambda t_1}{1 - \exp(-\lambda t_1)} x \exp(-\lambda t_2)$

Where:

 t_1 is the total sampling time or sample compositing time

 t_2 is the elapsed time between the end of sample collection and the time of counting.

Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions with typical valves of E, V, Y, and Δ t for the radionuclides Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. Occasionally background fluctuations, unavoidably small sample sizes, interfering radionuclides, or other uncontrollable circumstances may render these LLDs unachievable.

TABLE 4.14-2 (Continued)

TABLE NOTATION

When calculating the LLD for a radionuclide determined by gamma ray spectrometry, the background may include the typical contributions of other radionuclides normally present in the samples. The background count rate of a Ge(Li) detector is determined from background counts that are determined to be within the full width of the specific energy band used for the quantitative analysis for that radionuclide.

The principal gamma emitters for which the LLD specification will apply are exclusively the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported. Nuclides which are below the LLD for the analyses should not be reported as being present at the LLD level. When unusual circumstances result in LLD's higher than required, the reasons shall be documented in the Semiannual Radioactive Material Release Report.

- b. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.
- c. A batch release is the discharge of liquid wastes of a discrete volume. Before sampling for analysis, each batch should be thoroughly mixed.
- d. A continuous release is the discharge of liquid of a nondiscrete volume, e.g., from a volume of a system that has an input flow during the continuous release.
- e. In the event a gross β or γ analysis is performed in lieu of an isotopic analysis before a batch is discharged, a sample shall be analyzed for principal gamma emitters afterward.
- f. Analysis may be performed after release.

3.14.1 and 4.14.1 BASES

1. Radioactive Liquid Effluent Instrumentation

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the release of radioactive material in liquid effluents. The OPERABILITY and use of these instruments implements the requirements of 10CFR Part 50, Appendix A, General Design Criteria 60, 63, and 64. The alarm and/or trip setpoints for these instruments are calculated in the manner described in the ODAM to assure that the alarm and/or trip will occur before the limit specified in 10CFR Part 20.106 is exceeded.

Instrumentation is expected to be OPERABLE and in service when required by Specification. An instrument may be removed from service voluntarily for the purpose of tests, checks, calibration, or preventative maintenance without declaring the channel inoperable.

3.14.2 and 4.14.2 BASES

1. Liquid Effluent Concentration

Specification 3/4.14.2 is provided to satisfy the regulation governing the maximum concentration of radioactive material in liquid effluent that may be released to an unrestricted area as stated in 10CFR Part 20.106 and the regulation requiring surveys needed to determine compliance stated in Part 20.201.

Conformance to Specification 3.14.2, when applied to the activity concentration in the river at the site boundary due to liquid effluent, would assure that the average activity concentration in liquid effluent released to the unrestricted area is a small fraction of the limit specified in Part 20.106.

3.14.3 and 4.14.3 BASES

1. Dose Due to Radioactive Effluents

Specifications 3.14.3, 3.15.3, and 3.15.4 implement the requirements of 10CFR Part 50.36a and of 10 CFR Part 50, Appendix I, Section IV. These specifications state Limiting Conditions of Operation (LCO) to keep levels of radioactive materials in LWR effluents as low as is reasonably achievable. Compliance with these specifications will also keep average releases of radioactive material in effluents at small percentages of the limits specified in 10CFR Part 20.106. Surveillance requirements provide for the measurement of releases and calculation of doses to verify compliance with the Specifications. Action statements in these Specifications implement the requirements of 10CFR Part 50.36(c)(2) and 10CFR Part 50, Appendix I, Section IV.A in the event a LCO is not met.

2. Liquid Effluents

With the implementation of Specification 3.14.3, there is reasonable assurance that Station operation will not cause a radionuclide concentration in public drinking water taken from the River that exceeds the standard for anthropogenic radioactivity in community drinking water. The equations in the ODAM for calculating doses due to measured releases of radioactive material in liquid effluent will be consistent with the methodology in Regulatory Guide 1.109 and 1.113. The assessment of personal doses will examine potential exposure pathways including, as appropriate, consumption of fish and water taken from the River downstream of the discharge canal.

3.14.4 and 4.14.4 BASES

1. Liquid Waste Treatment

This specification implements the requirements of 10CFR Part 50.36a (a) (1) that operating procedures be established and followed and that equipment be maintained and used to keep releases to the environment as low as is reasonably achievable. The specification intends that appropriate portions of the system which were used to establish compliance with the design objectives in 10CFR Part 50, Appendix I, Section II be used when specified to provide reasonable assurance that releases of radioactive material in liquid effluent will be kept as low as is reasonably achievable. The components in the liquid radwaste system which are appropriate to process liquid waste in order to satisfy Specification 4.14.4 are the floor drain demineralizer and the radwaste demineralizer.

The activity concentration, 0.01^{μ} Ci/ml, below which liquid radwaste treatment would not be cost-beneficial, and therefore not required, is demonstrated below.

The quantity of radioactive material in liquid effluent released annually from the DAEC has been calculated to be¹

total iodines 0.11 curie total others (less H³) 0.25Total 0.36 curie

The population dose commitment resulting from the radioactive material in liquid effluent released annually has been calculated to be¹

thyroid0.164 man remtotal body0.114Total0.278 man rem

¹"Evaluation of the Duane Arnold Energy Center to demonstrate Conformance to the Design Objectives of 10 CFR 50, Appendix I, "Iowa Electric Light & Power Company, May 1976.

-

Therefore, population doses are about 1.5 man rem per curie of iodine released and about 0.5 man rem per curie of other radionuclides (less H^3) released in liquids. On the basis of gross activity, the population dose is about one man rem per curie released in liquids.

The volume of liquid waste processed and intended for discharge is estimated to be:

Low Purity Waste 5700 gal/day = 1.8×10^6 gal/yr Chemical Waste 600 gal/day = 1.9×10^5 gal/yr

Since the same DAEC equipment is used to process both streams, the total volume to be processed is about 2×10^6 gal/yr.

The annual cost to operate the radwaste processing equipemnt, based on Dirty Waste Ion Exchange operation, has been estimated² (neglecting credit for capital recovery) to be \$88000 per year. Thus the unit volume operating cost is about:

<u>\$88000/yr</u> = \$0.05/gal 2 x 10° gal/yr

Thus the operating cost to treat a 4000 gallon batch of chemical waste by ion exchange would be about \$200. The operating cost to treat a 10000 gallon batch of floor drain waste by ion exchange would be about \$500.

Assuming the cost-benefit balance is \$1000 expenditure per man rem reduced and assuming treatment removes all radioactivity from the liquid, then

(1) the activity concentration in a Chemical Waste batch below which treatment is not cost-beneficial is

$$C = \frac{\$200}{4000 \text{ gal x } 3785 \text{ ml}} \times \frac{1 \text{ curie x } 10^6}{\text{man rem}} \times \frac{10^6}{\text{curie x }} \times \frac{1 \text{ man rem}}{\$1000}$$

C = 0.013 µCi/m]

(2) the activity concentration in a batch of Floor Drain Waste below which treatment is not cost-beneficial is

²Ibid., based on Regulatory Guide 1.110

Effective Date 10/1/85

Liquid waste treatment with the evaporator at DAEC has been shown to be neither cost-beneficial nor necessary to comply with 10CFR50 Appendix I, Section II design objectives.

Consequently, liquid radwaste treatment to achieve an activity concentration below 0.01 μ Ci/ml in liquid effluent is not justified.

LIMITING CONDITIONS FOR OPERATIO	<u>N SI</u>	JRVEILLANCE REQUIREMENT
3.15.1 The radioactive gaseous effluent monitoring instrumentat channels shown in Table 3.15-1 shall be OPERABLE with noble gas alarm setpoints set to cause automatic alarm when the limits Specification 3.15.2.1 are exceeded. <u>APPLICABILITY</u> : As shown in Tabl	ion 4.1 chi OPE CH/ OF CAL TES at 4.1	15.1.1 Each radioactive gaseous fluent monitoring instrumentation annel shall be demonstrated ERABLE by performance of the ANNEL CHECK, SOURCE CHECK, CHANNEL IBRATION, AND CHANNEL FUNCTIONAL ST operations during the MODES and the frequencies shown in Table 15-1.
<u>ACTION</u> :	det det	termined according to the method scribed in the ODAM.
 a. With radioactive gaseous effluent monitoring instrumentation channel alarm setpoint less conservative than a valu which will ensure that the limits of 3.15.2 are met adjust without delay to meet Specification 3.15. declare the channel inoperable, or immediate suspend any release via instrumented pathway. b. When less than the minim required gaseous effluer monitoring instrument channels OPERABLE, take action stated in Table 3.15-1 and make every reasonable effort to restore the instrument to operable status. In the event the minimum required to OPERABLE status within 30 days, explain the next Semiannaul Radioactive Material Release Report, in lieu any other report, why the instrument was not made OPERABLE in a timely manner. 	e he , 1, 1y the um t the o ed tus in of e	
RTS-115E 7/84	3.15-1	Effective Date 1/1/86

.

,

۰.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT			
	4.15.2 Compliance with 3.15.2 shall be assessed on the basis of results of measurements specified in Table 4.15-2 and according to methodology stated in the ODAM.			
3.15.2.1 The dose rate in the unrestricted area (see FSAR Figure 1.5-1) due to radioactive noble gas released in effluents shall not exceed 500 mrem/year to the total body or 3000 mrem/year to skin.				
3.15.2.2 The dose rate in the unrestricted area due to I-131, I- 133, H-3, and to radioactive particulates having half-lives of 8 days or more that are released in effluents shall not exceed 1500 mrem/year to any organ.				
APPLICABILITY: Whenever monitoring or sampling is required.				
ACTION: When the dose rate exceeds a limit in 3.15.2, decrease the release rate without delay to comply with the limit.				
8 _4				

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.15.3 The air dose in the unrestricted area (see UFSAR Figure 1.2-1) due to noble gases released in gaseous effluents shall not exceed:	4.15.3.1 <u>Dose Assessment</u> An assessment shall be performed in accord with the ODAM at least once every 30 days to verify that the cumulative air dose during the
5.0 mrad from gamma radiation during any calendar quarter,	does not exceed the limits in Specification 3.15.3.
10.0 mrad from beta radiation during any calendar quarter,	
10.0 mrad from gamma radiation during any calendar year, or,	
20.0 mrad from beta radiation during any calendar year.	
APPLICABILITY: At all times when monitors are required.	
ACTION:	
 a. If the calculated air dose from radioactive noble gases in gaseous effluents exceeds either of the above limits prepare and submit a Special Report to the Commission within 30 days following the end of the calendar quarter during which the release occurred. The Special Report shall be pursuant to Specification 6.11.3, shall be in lieu of any other report, and shall identify the cause(s) for exceeding the limit and define the corrective actions taken. 	

RTS**-**115E 7/84

Effective Date 1/1/86

۰.

 3.15.4 The dose to a member of the public from iodine-131, I-133, H-3, and from radionuclides in particulate form having half-lives greater than eight days in gaseous effluents released from the store of the cumulative dose commitment due the unrestricted area (see FSAR Figure 1.5-1) shall not exceed: 7.5 mrem to any organ during any calendar year. APPLICABILITY: At all times when monitors are required. ACTION: a. With the calculated dose from the release of I-131, I-133, H-3, and radionuclides in particulate form having half-lives greater than eight days in gaseous effluents exceeding the above limit, prepare and submit a Special Report to the Commission within 30 days following the end of the calendar quarter during which the release occurred. The Special Report shall be made pursuant to Specification 6.11.3, shall be in lieu of any other report, and shall identify the cause(s) for exceeding the limit and define the corrective actions taken. 	LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
<pre>15.0 mrem to any organ during any calendar year. APPLICABILITY: At all times when monitors are required. ACTION: a. With the calculated dose from the release of I-131, I-133, H-3, and radionuclides in particulate form having half-lives greater than eight days in gaseous effluents exceeding the above limit, prepare and submit a Special Report to the Commission within 30 days following the end of the calendar quarter during which the release occurred. The Special Report shall be made pursuant to Specification 6.11.3, shall be in lieu of any other report, and shall identify the cause(s) for exceeding the limit and define the corrective actions taken.</pre>	3.15.4 The dose to a member of the public from iodine-131, I-133, H-3, and from radionuclides in particulate form having half-lives greater than eight days in gaseous effluents released from the site to the unrestricted area (see FSAR Figure 1.5-1) shall not exceed: 7.5 mrem to any organ during any calendar quarter, or,	4.15.4.1 <u>Dose Assessment</u> An assessment shall be performed in accordance with the ODAM at least once every 31 days to verify that the cumulative dose commitment due to I-131, I-133, H-3, and radioactive particulates having half-lives greater than eight days in gaseous effluents does not exceed the limits in Specification 3.15.4.
<pre>APPLICABILITY: At all times when monitors are required. ACTION: a. With the calculated dose from the release of I-131, I-133, H-3, and radionuclides in particulate form having half-lives greater than eight days in gaseous effluents exceeding the above limit, prepare and submit a Special Report to the Commission within 30 days following the end of the calendar quarter during which the release occurred. The Special Report shall be made pursuant to Specification 6.11.3, shall be in lieu of any other report, and shall identify the cause(s) for exceeding the limit and define the corrective actions taken.</pre>	15.0 mrem to any organ during any calendar year.	
ACTION: a. With the calculated dose from the release of I-131, I-133, H-3, and radionuclides in particulate form having half-lives greater than eight days in gaseous effluents exceeding the above limit, prepare and submit a Special Report to the Commission within 30 days following the end of the calendar quarter during which the release occurred. The Special Report shall be made pursuant to Specification 6.11.3, shall be in lieu of any other report, and shall identify the cause(s) for exceeding the limit and define the corrective actions taken.	APPLICABILITY: At all times when monitors are required.	
a. With the calculated dose from the release of I-131, I-133, H-3, and radionuclides in particulate form having half-lives greater than eight days in gaseous effluents exceeding the above limit, prepare and submit a Special Report to the Commission within 30 days following the end of the calendar quarter during which the release occurred. The Special Report shall be made pursuant to Specification 6.11.3, shall be in lieu of any other report, and shall identify the cause(s) for exceeding the limit and define the corrective actions taken.	ACTION:	
	 a. With the calculated dose from the release of I-131, I-133, H-3, and radionuclides in particulate form having half-lives greater than eight days in gaseous effluents exceeding the above limit, prepare and submit a Special Report to the Commission within 30 days following the end of the calendar quarter during which the release occurred. The Special Report shall be made pursuant to Specification 6.11.3, shall be in lieu of any other report, and shall identify the cause(s) for exceeding the limit and define the corrective actions taken. 	

RTS-115E 7/84

,

3.15-4 Effectivè Date 1/1/86

•

٠

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.15.5 Every reasonable effort shall be made to maintain at least one train of the Offgas System OPERABLE.	4.15.5 The gaseous effluent monitoring program of Specification 3.15.1 shall be used to verify the operation of the offgas system.
Within four hours after commencing operation of the main condenser air ejector, at least one train of charcoal beds in the Offgas System shall be placed in operation to treat radioactive gases from the main condenser air ejector. During continuing reactor operation, at least one train of charcoal beds in the Offgas System shall be used to treat the gases before discharge.	
APPLICABILITY: When the main condenser air ejector is operating.	
ACTION:	
a. If gaseous wastes are discharged for more than 7 days without treatment, prepare and submit a Special Report to the Commission within 30 days pursuant to Specification 6.11.3, in lieu of any other report, including the following information:	
 Identification of the inoperable equipment or subsystem and reason for inoperability. 	
2. Action(s) taken to restore the inoperable equipment to OPERABLE status.	
 Summary description of action(s) taken to prevent a recurrence. 	
· .	

RTS-115E

3.15-5

Effective Date 1/1/86

. -

•

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.15.6 The concentration of hydrogen in the offgas system downstream of the recombiners shall be limited to < 4% by volume. <u>APPLICABILITY</u> : During Offgas	4.15.6 The concentration of hydrogen in the Offgas System shall be determined by monitoring the offgases in the Offgas System downstream of the recombiners with the hydrogen monitors.
System operation.	
ACTION:	
a. With the concentration of hydrogen in the main condensor offgas treatment system downstream of the recombiners exceeding the limit, restore the concentration to within the limit within 48 hours.	
b. In the event the hydrogen concentration is not reduced to < 4% within 48 hours, be in at least HOT SHUTDOWN or within the limit within the following 24 hours.	
· ·	
,	
	· ·

•



RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

	Instrument@	Minimum Channels Operable	Applicability#	Function	Action
1.	Offgas Post-Treatment Noble Gas Activity Monitor (R1)	1	***	Monitor activity concentration, alarm	25
2.	Offgas Hydrogen Monitor (R2)	2	**	Monitor hydrogen . concentration	29
3.	Offgas Stack Monitoring System (R3)				
	a. Noble Gas Activity Monitor	1	*	Monitor activity	27
	b. Iodine Sampler Cartridge c. Particulate Sampler Filter	1 1	* *	Concentration, alarm Collect iodine sample Collect particulate	31 31
	d. Effluent Flow Measuring Device e. Sample Flow Measuring Device	1 1	*	Measure air flow Measure air flow	26 26
4.	Reactor Building Exhaust Vent Monitoring System (R4) a. Noble Gas Activity Monitor	1	*	Monitor activity	27
	b. Iodine Sampler Cartridge c. Particulate Sampler Filter	1 1	*	concentration, alarm Collect iodine sample Collect particulate	31 31
	d. Effluent Flow Measuring Device e. Sample Flow Measuring Device	1 1	*	Sample Measure air flow Measure air flow	26 26
5.	Turbine Building Exhaust Vent Monitoring System (R5)				
	a. Noble Gas Activity Monitor	1	*	Monitor radioactivity concentration, alarm	27
	b. Iodine Sampler Cartridge	1	*	Collect iodine sample	32
	C. Particulate Sampler Filter	1	*	Collect particulate sample	32
	e. Sample Flow Measuring Device	1	*	Measure air flow	26

RTS-115E 07/84

3.15-7

Effective Date 1/1/86

TABLE 3.15-1 (Continued)

TABLE NOTATION

@ Refer to ODAM Figure 3-1 for location of effluent monitoring points R1 thru R6.

Channels shall be OPERABLE and in service except that channels out of service are permitted for the purpose of required tests, checks, calibration, and preventative maintenance without declaring the channel to be inoperable.

* During releases via this pathway.

** During main condenser offgas treatment system operation.

***During operation of the main condenser air ejector.

- ACTION 25 With no channel OPERABLE, gases from the main condenser offgas treatment system may be released to the environment for up to 72 hours provided:
 - 1. The offgas delay system is not bypassed; and
 - 2. The offgas stack noble gas activity monitor is OPERABLE:

Otherwise, be in at least HOT STANDBY within 24 hours.

- ACTION 26 With no channel OPERABLE, effluent releases via this pathway may continue provided the flow rate is estimated whenever operation of a main exhaust fan combination is changed in the system.
- ACTION 27 With no channel OPERABLE, effluent releases via this pathway may continue if grab samples are taken at least once per eight hours and these samples are analyzed for gross activity within 24 hours or if an alternate monitoring system is utilized. Drywell purge is permitted whenever the offgas stack monitor or its alternate monitor is operating.
- ACTION 28 Deleted
- ACTION 29 With one channel OPERABLE, operation of the main condenser offgas treatment system may continue provided the recombiner temperature sensor is operable. When only one of the preceeding methods is operable, the offgas system may be operated provided gas samples are collected at least once per day and analyzed for hydrogen within the ensuing four hours.

ACTION 31 With the no channel OPERABLE, effluent releases via this pathway may continue, provided samples required in Table 4.15-2 are continuously collected with auxiliary sampling equipment.

ACTION 32 With no channel OPERABLE, effluent releases via this pathway may continue if grab samples are taken at least once per eight hours and these samples are analyzed for gross activity within 24 hours or if an alternate monitoring system is utilized.

кгS-115E 07/84

Effective Date 1/1/86


RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

	INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	REQUIRED MODE #
1.	Offgas Hydrogen Monitor	D * *	N.A.	Q(4)	М	**
2.	Offgas Stack Monitoring System a. Noble Gas Activity Monitor b. Iodine Sampler Cartridge c. Particulate Sampler Filter d. Effluent Flow Measuring Device e. Sample Flow Measuring Device	D* W* D* D*	M N.A. N.A. N.A. N.A.	R(3) N.A. N.A. R R	Q(2) N.A. N.A. Q Q	* * * * *
3.	Reactor Building Vent Monitoring System a. Noble Gas Activity Monitor b. Iodine Sampler Cartridge c. Particulate Sampler Filter d. Effluent Flow Measuring Device e. Sample Flow Measuring Device	D* W* D* D*	M N.A. N.A. N.A. N.A.	R(3) N.A. N.A. R R	Q(2) N.A. N.A. Q Q	* * * *
4.	Turbine Building Exhaust Ventilation Monitoring System a. Noble Gas Activity Monitor b. Iodine Sampler Cartridge c. Particulate Sampler Cartridge d. Effluent Flow Rate Monitor e. Sample Flow Measuring Device	D* W* D* D*	M N.A. N.A. N.A. N.A.	R(3) N.A. N.A. R R	Q(2) N.A. N.A. Q Q	* * * *

3.15-9

RTS-115E 7/84

Effective Date 1/1/86

TABLE 4.15-1 (Continued)

TABLE NOTATION

- # Instrumentation shall be OPERABLE and in service except that channels out of service are permitted for the purpose of required tests, checks, calibrations, and preventative maintenance without declaring the channel to be inoperable.
- * During releases via this pathway.

** During main condenser offgas treatment system operation.

***During operation of the steam jet air ejector.

(1) Not used.

- (2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:
 - 1. Instrument indicates measured levels above the alarm setpoint.
 - 2. Circuit failure.
 - 3. Instrument indicates a downscale failure.
 - 4. Instrument controls not set in operate mode.
- (3) The CHANNEL CALIBRATION shall include the use of a known radioactive source (traceable to the National Bureau of Standards radiation measurement system or other acceptable non-NBS standards) positioned in a reproducible geometry with respect to the sensor and emitting beta and/or gamma radiation in the range measured by the channel in accord with established station calibration procedures. Alternately, after the initial calibration, noble gas activity monitors may be calibrated by laboratory analyzed gas samples collected and analyzed per Table 4.15-2, item A.
- (4) The CHANNEL CALIBRATION shall include the use of at least two standard gas samples, each containing a known volume percent hydrogen in the range of the instrument, balance nitrogen.





TABLE 4.15-2

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Ga	seous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) ^a (µCi/ml)
Α.	Offgas Stack, and Reactor Building	M ^b Grab Sample	м ^b	Principal Gamma Emitters	1 x 10 ⁻⁴ e
	Vent	Q ^g Grab Sample	Q	H-3	1×10^{-6}
B. Offgas Stack, Reactor Building Vent, and Turbine Building Vent		Continuous ^d	W ^C Charcoal Sample	I-131	1 x 10 ⁻¹²
	burraing vent	Cont inuous ^d	W ^C Particulate Sample	Principal Gamma Emitters (I-131, Others)	1 x 10 ⁻¹¹ e
		Cont inuous ^d	Q Composite	Sr-89, Sr-90	1×10^{-11}
			Particulate Sample [†]	Gross Alpha	1 x 10 ⁻¹¹
с.	Offgas Stack, Reactor Building Vent, and Turbine Building Vent	Continuous	Continuous	Radioactive Noble Gas gamma activity	1 x 10 ⁻⁶

RTS-115E 07/84

TABLE 4.15-2 (Continued)

TABLE NOTATION

- a. Table 4.14-2, Note a is a definition of the lower limit of detection (LLD).
- b. Analyses shall be performed following an increase of more than 50% in the steady state releases as indicated by a noble gas activity monitor, after factoring out the effect due to a change in reactor power.
- c. Sample media shall be changed at least once per seven days and the analysis completed within 48 hours after changing (or after removal from the sampler). Analyses shall also be performed within 48 hours following an increase of more than 50% in the steady state release as indicated by a noble gas activity monitor, after factoring out the effect due to a change in reactor power. When samples collected for 24 hours or less are analyzed, the corresponding LLD may be increased by a factor of 10.
- d. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 3.15.2, 3.15.3 and 3.15.4.
- The principal gamma emitters for which the LLD specification will apply e. are exclusively the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported. Nuclides which are below the LLD may be reported as "less than" their respective LLD and should not be reported as being present at the LLD of the nuclide. Each measured radionuclide concentration is used in a required concentration or dose calculation only if it is detected at or above the LLD. When unusual circumstances persist more than 30 days and cause LLD higher than required, the reasons shall be documented in the Semiannual Radioactive Material Release Report.
- f. A quarterly composite sample shall include an equal fraction of each weekly particulate sample collected during the quarter.
- g. An H-3 grab sample will also be taken from the Offgas Stack or Reactor Building Vent when the reactor head is removed.



3.15.1 and 4.15.1 BASES

1. Radioactive Gaseous Effluent Instrumentation

The radioactive gaseous effluent instrumentation is provided to monitor the release of radioactive materials in gaseous effluents and, as appropriate, to control potential releases. Instrumentation for monitoring the concentration of potentially explosive gas mixtures in the main condenser offgas treatment system is also provided. The presence of instruments for monitoring both radioactive and explosive gaseous effluents is depicted in ODAM Figure 3-1. The OPERABILITY and use of these instruments implements the requirements of 10CFR Part 50, Appendix A, General Design Criteria 60, 63, and 64.

Offgas post-treatment monitors are operable during reactor power operation with their trip setting at a value not exceeding a limit computed by a method described in the Offsite Dose Assessment Manual. If both instruments reach their high trip point or if one reaches the high trip point and the other reaches a downscale trip point, the charcoal delay bed bypass valves close immediately.

Reactor building exhaust ventilation shaft radiation monitors initiate isolation of the reactor building normal ventilation and start standby gas treatment when a high trip point is reached.

DAEC is equipped with a radioactive gaseous effluent monitoring system which includes detectors at the offgas stack (R3), the reactor building vent (R4), and the turbine building vent (R5). A remote indication and control unit (RIC) located near each detector displays the detector reading and, whenever the setpoint is exceeded, an indicator light. The data are also routed to a control computer and a control room display but do not cause a trip to isolate the ventilated area. In the event the control computer and/or control room display fail to function or are voluntarily taken out of service, it is intended that each affected RIC display be observed at least once per hour (in which case the affected channel remains OPERABLE). In the event the detector reading and the indication of exceeding the monitor setpoint are not provided at either the control room or the RIC, then the affected channel is not OPERABLE and DAEC will either perform the appropriate ACTION or will provide an alternate monitoring system. This permits DAEC to retain the GE gaseous monitoring system as an alternate system for normal effluent monitoring when the Kaman system is temporarily inoperable. When used as an alternate monitoring system, the GE system is subject to the requirements stated in Specifications 3.15.1 and 4.15.1 and to LLD requirements stated in Table 4.15-2, Item C.

3. Gaseous Effluents

Assessments of dose required by Specifications 4.15.3 and 4.15.4 to verify compliance with Appendix I, Section IV are based on measured radioactivity in gaseous effluent and on calculational methods stated in the ODAM. Pathways of exposure and location of individuals are selected such that the dose to a nearby resident is unlikely to be

RTS-115E 07/84 Effective Date 1/1/86

underestimated. Dose assessment methodology described in the ODAM for gaseous effluent will be consistent with the methodology in Regulatory Guides 1.109 and 1.111. Cumulative and projected assessments of dose made during a quarter are based on historical average, i.e., quarterly averaged conditions measured at DAEC. Assessment made for the annual radiological environmental report will be based on annual averages of atmospheric conditions during the period of release.

3.15.2 and 4.15.2 BASES

Gaseous Effluent Concentration

This specification is intended to ensure that the concentration of radioactive material in the unrestricted area beyond the site boundary due to gaseous effluents from DAEC will maintain doses within the annual dose limits to unrestricted area provided in 10 CFR Part 20. Compliance with these limits also reasonably assures that radioactive material in gaseous effluents will not result in exposure of a member of the public in an unrestricted area to annual averaged concentrations exceeding the limit in 10 CFR Part 20.106. The occupancy time of members of the public who may occasionally be on the site is expected to be low enough to compensate for any less atmospheric dispersion on site than to the environs offsite.

Assessment of compliance is based upon an effluents measurement program defined in Table 4.15-2 and methodology stated in the ODAM. The resolving time of the measurements, ie., the sample integration time, bounds the minimum averaging time of the effluent measurements. waste streams. The Standby Gas Treatment System is considered an Engineered Safety Feature and not an exhaust ventilation treatment system. Thus the exhaust ventilation system discharges via the reactor building vent.

3.15.3 and 4.15.3 BASES

Doses due to Noble Gases

These specifications implement the requirements of 10 CFR Part 50, Appendix I.

3.15.4 and 4.15.4 BASES

Doses due to Iodine and Particulates in Air

These specifications implement 10 CFR Part 50, Appendix I. The dose calculation methods in the ODAM depend on existing pathways of exposure to a member of the public or more conservative conditions assumed (yielding a higher calculated dose). Calculations and methods are such that an estimate of the dose to a member of the public is not likely to be underestimated substantially.

RTS-115E 07/84 Effective Date 1/1/86



3.15.5 and 4.15.5 BASES

1. Gaseous Radwaste Treatment

This specification implements the requirement of 10 CFR Part 50.36a (a)(1) that operating procedures be established and followed and that equipment be maintained and used to keep releases to the environment as low as is reasonably achievable. In order to satisfy Technical Specification 3.15.5, every reasonable effort shall be made to maintain and operate at least one train of the Offgas System charcoal adsorbers with pre-and aft-particulate filters to process radioactive gaseous effluent prior to release. The specification that the Offgas System which was used to establish compliance with the design objectives in 10CFR Part 50, Appendix I, Section II be used when specified provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept as low as is reasonably achievable.

ODAM Figure 3-1 is a flow diagram depicting gaseous radioactive waste streams. The Standby Gas Treatment System is considered an Engineered Safety Feature and not an exhaust ventilation treatment system.

3.15.6 and 4.15.6 BASES

1. Explosive Gas Mixture

Specification 3/4.15.6 is provided to ensure that the concentration of potentially explosive gas in the offgas treatment sytem downsteam of the recombiners is maintained below the flammability limit of a hydrogen and oxygen mixture in the system. Keeping the mixture below its flammability limit will provide assurance that offgas treatment system integrity and operability is maintained and that the radioactive material concentration is the offgas will be controlled in conformance with 10CFRPart 50, Appendix A, Criterion 60. Calibration gas concentrations will be within the range of interest for hydrogen concentration and will not include 0% or 100% hydrogen concentrations.

RTS-115E 07/84

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.16.1 The annual dose or dose commitment to any member of the public due to radiation and radioactive material in effluents from DAEC shall not exceed 75 mrem to his thyroid or 25 mrem to his total body or any other organ.	4.16.1 <u>Dose Calculations</u> . Cumulative dose contributions from liquid and gaseous effluents to a member of the public offsite shall be evaluated at least once every year as described in the ODAM.
APPLICABILITY: At all times.	
ACTION:	
a. If the calculated dose from radioactive material released in liquid or gaseous effluents exceeds twice the limits of Specifications 3.14.3, 3.15.3, or 3.15.4, perform an assessment of compliance with 10 CFR 190 and limit subsequent releases such that the dose or dose commitment to a member of the public is ≤ 75 mrem to his thyroid and ≤ 25 mrem to his total body or any other organ over 12 consecutive months including the period of elevated release.	
b. If the estimated dose exceeds either limit in Specification 3.16.1, prepare and submit a Special Report to the NRC within 30 days in lieu of any other report; it shall include the cause of the release of exposure, an estimate of the dose to the likely most exposed member(s) of the public, corrective actions taken or planned to prevent a recurrence, and a schedule for achieving compliance. If the condition causing the limit(s) to be exceeded has not been corrected, the Special Report may also state a request for a variance in accordance with the provisions of 40 CFR Part 190. In that event, the request is timely and a variance is granted until NRC action on the request is complete.	
	Effective Date 1/1/86

RTS-115E 7/84

.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
 3.16.2 A radiological environmental monitoring program shall be conducted as specified in Table 3.16-1. <u>APPLICABILITY</u>: At all times. <u>ACTION</u>: a. In the event the radiological environmental monitoring program is not conducted as specified in the Table 3.16-1, prepare and submit to the Commission in the Annual Radiological Environmental Report the reasons for not conducting the program in accord with the Table 3.16-1 1 and the plans for preventing a recurrence. b. In the event radioactivity in a sampled environmental medium, averaged over a calendar quarter, is attributable to DAEC and exceeds an appropriate value listed in Table 3.16- 3 or, if not listed, causes a potential annual dose exceeding two times the quarterly dose limit in Specification 3.14.3 or 3.15.4, prepare and submit to the Commission within 30 after discovery a Special Report which includes an evaluation of any release conditions, environmental factors or other conditions which caused the value(s) of Table 3.16-3 or two times the quarterly dose limit to be exceeded and which defines the corrective actions to be taken. If the radioactivity in environmental sample(s) is not attributable to releases from the Station, the Special Report is not 	 4.16.2.1 Sampling and analyses required in Table 3.16-1 shall be performed such that the detection capabilities specified in Table 3.16-2 are achieved under routine conditions. If a sample analysis does not meet the LLD specified, report the reason attributed in the next Annual Radiological Environmental Report. 4.16.2.2 Land Use Census DAEC shall conduct annually a land use census within three miles of the Station to identify radiologically important changes in land use.

RTS-115E 7/84

|

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
required. Instead, the sample(s) result(s) shall be reported and explained in the Annual Radiological Environmental Report. c. When environmental sampling medium is not available from a sampling location or the location is no longer appropriate, the cause and	
the location where replacement samples were obtained and/or will be obtained shall be reported in the Annual Radiological Environmental Report.	х, · · ·
 d. In the event a location is identified at which the calculated personal dose associated with one or more exposure pathways exceeds by 20% the maximum calculated dose associated with like pathway(s) at a location where sampling is conducted as specified by Table 3.16-1, then the pathway(s) having maximum exposure potential at the newly identified location will be added to the radiological monitoring program at a subsequent Operations Committee meeting, if samples are reasonably attainable at the new location. Like pathway(s) monitored (sampled) at a location, excluding the control station location(s), having a lesser associated calculated personal dose may be deleted from the program at the time the new pathway(s) and location are added. 	
RTS-115E 3.1	6-3 Effective Date 1/1/86

.

•

RTS-115E 7/84

/ ..<u>.</u>

· · ·

•••

LIMITING CONDITIONS FOR OPERAT		SURVEILLANCE		ENT	
3.16.3 Analyses shall be perf on radioactive materials supp in an Interlaboratory Comparis Program which has been approve the NRC.	formed lied son ed by	· ·			
APPLICABILITY: Applicable to Radiological Environmental Monitoring Program at all time	the .				
ACTION: In the event analyses not performed as required in Specification 3.16.3, report to corrective actions taken to put a recurrence in the Annual Radiological Environmental Monitoring Report.	s were the revent		·		·
· .			,		
·					
					·
RTS-115E 7/84	3.16-	4	Effective	Date 1/1/	'86

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.16.4 Appropriate equipment shal be operated in accordance with a Process Control Program to process wet radioactive waste solids destined for disposal to a form that meets appropriate requirement of 10 CFR Part 61.56 before the waste is shipped from the DAEC site. <u>APPLICABILITY</u> : During Processing of radioactive waste solids for disposal.	 4.16.4.1 The Process Control Program shall state the essential operating parameters of the process(es), the essential characteristics of the waste form to be shipped, and the essential product verification requirements. 4.16.4.2 Before a Contractor processes radioactive waste, DAEC shall verify that he has an NRC approved Process Control Program.
ACTION:	
 Suspend delivery to a transpor carrier of any container of radioactive waste not complying with 10 CFR Part 61.56. 	t
RTS-115E 7/84	3.16-5 Effective Date 1/1/86



TABLE 3.16-1

TABLE 3.10-1

RTS- 7/8/	RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM							
-115E	Exposure Pathway and/or Sample Type	Minimum Number of Sampling Stations	Sampling and Collection Frequency	Type and Frequency of Analysis				
	Airborne Particulates	five	Continuous operation of sampler with sample collection at least once per week or as required by dust loading	 Analyze for gross beta activity > 24 hours after filter change. Perform gamma isotopic analysis on each sample having gross beta activity > 10 times the yearly mean of control samples. Perform gamma isotopic analysis on composite (by sampling location) of samples collected during each quarter 				
3.16-6	Airborne Radioiodine	five	Continuous operation of sampler with sample collection at least once per week.	Analyze each cartridge for I-131.				
	Ambient Radiation	thirty-eight	Two dosimeters at each point continuously. Change at least once per quarter.	Read gamma radiation dose quarterly.				
Effect	Surface Water	. two	At least once per month.	 Gamma isotopic analysis of each sample or monthly composite (by location). Tritium analysis of a composite (by location) at least once per quarter. 				
ive Date 1/	Ground Water (potable)	four	At least once per quarter. (May be composited if collected more frequently.)	Analyze quarterly for tritium and gross beta activity; if gross beta > 10 times the yearly mean of control samples , analyze for SR-89, SR-90, and gamma isotopic.				
1/86	River Sediment	one	At least once every six months	Gamma isotopic analysis of each sample.				

ġ,

TABLE 3.16-1

Exposure Pathway and/or Sample Type	Minimum Number of Sampling Stations	Sampling and Collection Frequency	Type and Frequency of Analysis
Milk	four	At least once per two weeks (biweekly) during the grazing season. At least once per month during non-grazing season.	Gamma isotpic and I-131 analysis of each sample.
Fish	two	Two times per year. (Once during January through July and once during August thru December.)	Gamma isotopic analysis on edible portion.
Vegetation	three	Annually at harvest time. One sample of each: grain green leafy vegetation forage.	Gamma isotopic analysis of edible portion.
	one	One sample of broadleaf vegetation at time of harvest	I-131 analysis

Required sample station locations are described in the Offsite Dose Assessment Manual.

RTS-115E 07/84



MAXIMUM VALUES OF THE LOWER LIMIT OF DETECTION FOR ENVIRONMENTAL SAMPLE ANALYSIS^a

			Medium			
Analysis	Water (pCi/1)	Airborne Partic or Gas (pCi/m ³)	culate Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
gross beta	4	1×10^{-2}				
³ Н	2000 ^b 3000 ^c	· .				
⁵⁴ Mn	15		130			
⁵⁹ Fe	30		260			
⁵⁸ Co, ⁶⁰ Co	15		130			
⁶⁵ Zn	30		260			
⁹⁵ Zr	30					
⁹⁵ Nb	15					~
¹³¹ I	500 ^C	7 x 10 ⁻²		1	60	
¹³⁴ Cs	15	5×10^{-2}	130	15	60	150
¹³⁷ Cs	18	6×10^{-2}	150	18	80	180
¹⁴⁰ Ba	60			60		
¹⁴⁰ La	15			15		

RTS-115E 7/84

TABLE 3.16-2 (Continued)

TABLE NOTATION

a. The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a new count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement, which may include radiochemical separation:

$$LLD = \frac{4.66 \text{ S}_{b}}{\text{E } \bullet \text{ V} \bullet 2.22 \bullet \text{ Y} \bullet \exp(-\lambda \Delta t)}$$

where

LLD is the lower limit of detection as defined above (picocuries per unit mass or volume)

 S_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute)

E is the counting efficiency (counts per disintegration)

V is the sample size (units of mass or volume)

2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

 λ is the radioactive decay constant for the particular radionuclide, and

 Δ t for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting

Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. With typical values of E, V, Y, and Δt for the radionuclides named in the Table. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report.

When a radionuclide attributable to DAEC but not listed in this table is measured (more than the LLD) it shall be reported. Any nuclide that is below the LLD for the analysis should not be reported as being present at the LLD level.

b. For Drinking Water.

c. For samples of water not used as a source of drinking water.

RTS-115E 7/84 Effective Date 1/1/86



TABLE 3.16-3

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Water (pCi/l)	Airborne Particu]ate or Gases (pCi/m³)	Fish (pCi/Kg, wet)	Milk (pCi/l)	Food Products (pCi/Kg, wet)				
H-3	$2 \times 10^{4} {b} 3 \times 10^{4} {c}$								
Mn-54	1×10^{3}		3×10^4						
Fe-59	4×10^2		1×10^{4}						
Co-58	1×10^{3}		3 x 10 ⁴						
Co-60	3×10^2		1×10^{4}						
Zn-65	3×10^2		2×10^{4}						
Zr-Nb-95	4 x 10 ² (c)								
I-131	2(c)	0.9		3,	1×10^2				
Cs-134	30	10	1×10^{3}	60	1×10^{3}				
Cs-137	50	20	2×10^{3}	70	2×10^{3}				
Ba-La-140	2×10^{2} (d)			3 x 10 ^{2(d)}					

Reporting Levels^(a)

(a) - The reporting level is exceeded when one or more radionuclides is detected in a sample and

 $\frac{\text{concentration (1)}}{\text{reporting level (1)}} + \frac{\text{concentration (2)}}{\text{reporting level (2)}} + \dots \geq 1.$

(b) - For drinking water samples. This is 40CFR Part 141 value.

(c) - For samples of water not used as a source of drinking water.

(d) - Concentration of parent or daughter.

3.16-10

Effective

Date 1/1/86

RTS-7/84

115E

3.16.1 and 4.16.1 BASES

1. Dose

Specification 3.16.1 is provided to comply with the dose limitation requirement of 40CFR190. This specification requires the assessment of dose to demonstrate that a person (a nearby resident) has not received a radiation dose exceeding that specified in 40CFR190 including doses from direct radiation. There is no other licensed nuclear fuel cycle facility within 50 miles of DAEC, thus it is assumed that the dose from other uranium fuel cycle facilities is negligible. In the event a report is required to satisfy Specification 3.16.1, Action b, it shall be deemed adequate to satisfy the reporting requirement in Specification 6.11.1.e.(5).

3.16.2 and 4.16.2 BASES

1. Radiological Environmental Monitoring

The radiological environmental monitoring program, including the land use census, is conducted to satisfy the requirements of 10CFR Part 50, Appendix I, Section IV.B.2 and .3. The minimum radiological monitoring program required by this specification provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures of individuals resulting from the station operation. This monitoring program thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways.

The land use census is conducted annually to identify changes in use of the unrestricted area in order to recommend modifications in monitoring programs for evaluating individual doses from principal exposure pathways. It may be conducted by door-to-door survey, by aerial survey, or by consulting with local agricultural or governmental authorities.

In order that radiological environmental monitoring stations may be relocated to reflect current conditions, the locations of stations required by Table 3.16-1 are described in a section of the Offsite Dose Assessment Manual. Revisions thereto are administered in accordance with Specification 6.15. IELP may conduct additional environmental monitoring exclusive of the requirements of Specifications 3.16.2 and 6.11.1.e.

3.16.3 BASES

1. Interlaboratory Comparison Program

The requirement for participation in an Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in

RTS-115E 7/84 environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are reasonably valid.

3.16.4 and 4.16.4 BASES

1. Radioactive Waste Solids

This specification implements the requirements of 10 CFR Part 50.36a(a), the General Design Criterion 60 of 10 CFR Part 50 Appendix A, and of 10 CFR Part 61.56 on characteristics of low-level radioactive wastes destined for disposal by burial. Applicable requirements on packaging and delivery of packages of radioactive material to a carrier for transport stated in 10 CFR Part 71 and on transportation of hazardous materials in 49 CFR 171-179 are not restated in the technical specifications.

Processing waste to meet characteristics permitted under 10 CFR Part 61.56 may include solidification, preparation for deposit in a high integrity container, or any form acceptable under Part 61 for shipment to and receipt by a licensed disposal facility or licensed radioactive waste processor.

It is intended that a Contractor may perform the waste processing provided he operates according to an NRC approved Process Control Program.

- e. Investigation of all violations of the Technical Specifications including the preparation and forwarding of reports covering evaluation and recommendations to prevent recurrence to the Director-Nuclear Generation and to the Chairman of the Safety Committee.
- f. Review of all Reportable Events.
- g. Review of facility operations to detect potential safety hazards.
- h. Performance of special reviews, investigations or analyses and reports thereon as requested by the Chairman of the Safety Committee.
- i. Review of the Plant Security Plan and implementing procedures.
- j. Review of the Emergency Plan and implementing procedures.
- k. Review of every unplanned release of radioactivity to the environs for which a report to the NRC is required.
- 1. Review of changes to the Offsite Dose Assessment Manual and changes to the Process Control Program. (effective date 1/1/85)
- 6.5.1.7 Authority

The Operations Committee shall:

a. Recommend to the Plant Superintendent-Nuclear written approval or disapproval of items considered under Specification 6.5.1.6 (a) through (d) above.



6.5-3

- g. Any other area of facility operation considered appropriate by the Safety Committee or the President.
- h. Design change request safety evaluations at least once per 24 months.
- i. The DAEC Fire Protection Program and implementing procedures at least once per 24 months.
- j. The Process Control Program and implementing procedures at least once per 24 months.
- k. The Offsite Dose Assessment Manual and implementing procedures at least once per 24 months.
- 1. The radiological environmental monitoring program and the results thereof at least once per 12 months.
- m. Performance of activities required by the QC Program for effluent and the vendors QA Program for radiological environmental monitoring.

6.5.2.9 Authority

The Safety Committee shall report to and advise the President on those areas of responsibility specified in Specifications 6.5.2.7 and 6.5.2.8.

6.5.2.10 Records

Records of Safety Committee activities shall be prepared, approved and distributed as indicated below:

a. Minutes of each Safety Committee meeting shall be prepared, approved and forwarded to the President within 14 days following each meeting.

6.5-9

RTS-115E 7/84

- b. Reports of reviews encompassed by Specification 6.5.2.7 above,
 shall be prepared, approved and forwarded to the President within
 14 days following completion of the review.
- c. Audit reports encompassed by Specification 6.5.2.8 above, shall be forwarded to the President and to the management positions responsible for the areas audited within 30 days after completion of the audit.
- 6.5.3 Other Review and Audit
- 6.5.3.1 Fire Protection Inspection
- 6.5.3.1.1 An independent fire protection and loss prevention inspection and audit shall be performed annually utilizing either qualified offsite licensee personnel or an outside fire protection firm.
- 6.5.3.1.2 An inspection and audit by an outside qualified fire consultant shall be performed at intervals no greater than three years.

RTS-115E 7/84 6.5-10

6.8 PLANT OPERATING PROCEDURES

- 6.8.1 Written procedures involving nuclear safety, including applicable check-off lists and instructions, covering areas listed below shall be prepared, and approved as specified in Subsection 6.8.2. All procedures shall be implemented and maintained.
 - Normal startup, operation, and shutdown of systems and components of the facility.
 - 2. Refueling operation.
 - 3. Actions to be taken to correct specific and foreseen potential malfunctions of systems or components, including responses to alarms, suspected primary system leaks, and abnormal reactivity changes.
 - 4. Emergency and off-normal condition procedures.
 - 5. Preventive and corrective maintenance operations which could have an effect on the nuclear safety of the facility.
 - 6. Surveillance and testing requirements of equipment that could have an effect on the nuclear safety of the facility.
 - 7. Procedures required by the Emergency Plan.

RTS-115E 7/84 6.8-1

- 8. Procedures required by the plant Security Plan.
- 9. Operation of radioactive waste systems.
- 10. Fire Protection Program implementation.
- 11. A preventive maintenance and periodic visual examination program to reduce leakage from systems outside containment that would or could contain highly radioactive fluids during a serious transient to as low as practical levels. This program shall also include provisions for performance of periodic systems leak tests of each system no less frequently than at refueling cycle intervals.
- 12. Program to ensure the capability to accurately determine the airborne iodine concentration in vital areas under accident conditions, including training of personnel, procedures for monitoring and provisions for maintenance of sampling and analysis equipment.

13. Offsite Dose Assessment Manual. (effective date 1/1/85)

14. Process Control Plan.

15. Quality Control Program for effluents.

- 6.8.2 Procedures described in 6.8.1 above, and changes thereto, shall be reviewed by the Operations Committee and approved by the Plant Superintendent-Nuclear prior to implementation, except as provided in 6.8.3 below.
- 6.8.3 Temporary minor changes to procedures described in 6.8.1 above which do not change the intent of the original procedure may be made with the concurrence of two members of the plant management staff, at least one of whom shall hold a senior operator license. Such changes shall be documented and promptly reviewed by the Operations Committee and by the Plant Superintendent-Nuclear. Subsequent incorporation, if necessary, as a permanent change, shall be in accord with 6.8.2 above.

- 6.10.2 The following records shall be retained for the duration of the Facility Operating License.
 - Record and drawing changes reflecting facility design modifications made to systems and equipment described in the Final Safety Analysis Report.
 - 2. Records of new and irradiated fuel inventory, fuel transfers and assembly burnup histories.
 - 3. Records of facility radiation and contamination surveys.
 - 4. Records of radiation exposure for all individuals entering radiation control areas.
 - 5. Records of gaseous and liquid radioactive material released to the environment.
 - Records of transient or operational cycles for those facility components designed for a limited number of transients or cycles.

RTS-115E 7/84 6.10-2

- 7. Records of training and qualification for current members of the plant staff.
- 8. Records of in-service inspections performed pursuant to these Technical Specifications.
- 9. Records of Quality Assurance activities required by the QA Manual.
- 10. Records of reviews performed for changes made to procedures or equipment or reviews of tests and experiments pursuant to 10 CFR 50.59.
- 11. Records of meetings of the Operations Committee and the Safety Committee.
- 12. Records for Environmental Qualification which are covered under the provisions of paragraph 6.13.
- 13. Records of the service lives of all hydraulic and mechanical snubbers listed on Tables 4.6-3, 4.6-4 and 4.6-5 including the date at which the service life commences and associated installation and maintenance records.
- Records of results of analyses required by the radiological environmental monitoring program.

6.10-3

c. Monthly Operating Report

Routine reports of operating statistics and shutdown experience shall be submitted on a monthly basis to the NRC to arrive no later than the 15th of each month following the calendar month covered by the report.

d. Other Reports

Table 6.11-1 lists some of the routine reports required by 10 CFR Parts 20, 40, 50 and 70, including those listed in Specification 6.11.1.

- e. <u>Annual Safety/Relief Valve Challenge</u> A report documenting safety/relief valve challenges shall be submitted within 60 days of January 1 each year.
- f. Semiannual Radioactive Material Release Report (effective date 1/1/86)
 - (1) A report of radioactive materials released from the Station shall be submitted to the NRC within 60 days after January 1 and July 1 of each year. Each report shall include the information specified in item (2) below covering the preceeding six months.
 - (2) A Semiannual Radioactive Material Release Report shall include a summary by calendar quarter of the quantities of radioactive liquid and gaseous effluents and radioactive solid waste released from the Station. The data on radioactive liquid and gaseous effluents should be reported in the format in Tables 6.11-3a and 6.11-3b. The data on radioactive solid waste should include:
 - 1. classification of the waste (per 10 CFR part 61).
 - 2. total volume shipped
 - 3. total radioactive material shipped (curies)
 - 4. identify of principal radionuclides
 - 5. solidification agent
 - 6. physical description of the waste
 - (3) A summary description of any changes to the PCP or ODAM.
 - (4) A summary of meteorological data collected during the year will be submitted in the semi-annual report following January 1. Alternatively, summary meteorological data may be retained by Iowa Electric Light and Power Company and made available to the NRC upon request.

....

g. <u>Annual Radiological Environmental Report</u> (effective date 1/1/86)

An annual report of radiological environmental surveillance activities required by Specification 3.16.2 shall be submitted to the NRC before May 1 of the following year. Each report shall include the following information:

- (1) A summary description of the radiological environmental monitoring program required by Specification 3.16.2.
- (2) A map and a table of distances and directions of locations of sampling stations required in Table 3.16-1.
- (3) A summary of the land use census required in Specification4.16.2.2.
- (4) Results of analyses of samples required by the radiological environmental monitoring program, Table 3.16-1. In the event some results are not available, the reasons shall be explained in the report. In the event the missing results are obtained, they shall be submitted in a supplementary report as soon as is reasonable.
- (5) An assessment of radiation doses to a member of the public likely to be the most exposed due to radioactive liquid and gaseous effluents released from DAEC during the year. The assessment shall be performed as described in the ODAM.

(6) Deleted

RTS-115E 7/84 6.11-4

- g. (Continued) (effective date 1/1/86)
 - (7) Results of participation in the Interlaboratory Comparison Program.
 - (8) Deviation from environmental sampling schedule.
 - (9) A report of all analyses in which the LLD, required by Table 3.16-2, was not achieved.
 - (10) A report of any changes in sample locations.

6.11.2 Deleted

RTS-115E 7/84



6.11.3 UNIQUE REPORTING REQUIREMENTS

Special reports shall be submitted to the Director of Inspection and Enforcement Regional Office within the time period specified for each report. These reports shall be sumitted covering the activities identified below pursuant to the requirements of the applicable reference specification.

a. Reactor vessel base, weld and heat affected zone metal test specimens (Specification 4.6.A.2).

 b. I-131 dose equivalent exceeding 50% of equilibrium value (Specification 4.6.B.1.h).

c. Inservice inspection (Specification 4.6.G).

d. Reactor Containment Integrated Leakage Rate Test (Specification 4.7.A.2.f).

e. deleted

- f. Fire Protection Systems (Specifications 3.13.A.3, 3.13.B.2, 3.13.B.2, 3.13.B.3, 3.13.C.3, and 3.13.D.3).
- g. Containment Vent/Purge valves (Specification 3.7.A.10)

RTS-115E 7/84 6.11-6

- h. Radioactive Liquid or Gaseous Effluent calculated dose exceeding specified limit (Specifications 3.14.3, 3.15.3 and 3.15.4). (effective date 1/1/86)
- Off-Gas System (AOG) inoperable (Specification 3.15.5).
 (effective date 1/1/86)
- j. Measured levels of radioactivity in an environmental sampling medium determined to exceed the reporting level values of Table
 3.16-3 when averaged over any calendar quarter sampling period, (specification 3.16.2.b). (effective date 1/1/86)
- k. Annual dose to a member of the public determined to exceed 40 CFR Part 190 dose limit, (specification 3.16.1.b). (effective date 1/1/86)
- Radioactive liquid waste released without treatment when activity concentration exceeds 0.01 µCi/ml, (specification 3.14.4.a). (effective date 1/1/86)

RTS-115E 7/84 6.11-7

DAEC-1

TABLE 6-11-1

REPORTING SUMMARY - ROUTINE REPORTS

<u>Requirement</u>	Report	Timing of Submittal
TS	Annual Exposure	Within 60 days after January 1.
§20.407	Personnel Exposure and Monitoring	Within first quarter of each calendar <i>y</i> ear.
§20.408	Personnel Exposure on Termination of Employment or Work	Within 30 days after the exposure of the individual has been determined or 90 days after date of termination of employment or work assignment, whichever is earlier.
§40.64(a)	Transfer of Source Material	Promptly upon transfer.
§40.64(a)	Receipt of Source Material	Within 10 days after material is received.
§40.64(b)	Source Material Inventory	Within 30 days after September 30 of each year.

TABLE 6-11-1 (cont)

DAEC-1

REPORTING SUMMARY - ROUTINE REPORTS

<u>Requirement</u>	Report	Timing of Submittal
§50.59(b)	Changes, Tests, and Experiments	Within 60 days after January 1.
§70 . 53	Special Nuclear Material Status	Within 30 days after March 31 and September 30 of each year.
§70.54	Transfer of Special Nuclear Material	Promptly upon transfer
§70 . 54	Receipt of Special Nuclear Material	Within 10 days after material is received
Appendix G to 10 CFR Part 50	Fracture Toughness	On an individual-case basis at least 3 years prior to the date when the predicted fracture toughness levels will no longer satisfy section V.B. of Appendix G to 10 CFR Part 50.
Appendix H to 10 CFR Part 50	Reactor Vessel Material Surveillance	Completion of tests after each capsule withdrawal.
Appendix J to 10 CFR Part 50	Reactor Containment Building Integrated Leak Rate Test	Approximately 3 months following conduct of test.

1_{Technical} Specifications

RTS-115E 7/84 6.11-9

TABLE 6.11-3a

••

SEMIANNUAL RADIOACTIVE MATERIAL RELEASE REPORT (YEAR)

LIQUID EFFLUENTS

Nuclides Released	Unit	Quarter	Quarter
strontium-89	Ci	. E	• E
strontium-90	Ci	• E	. E
cesium-134	Ci	• E	. E
cesium-137	Ci	• E	. E
iodine-131	Ci	• E	• E
cobalt-58	Ci	. E	. E
cobalt-60	Ci	• E	. E
iron-55	Ci	. E	. Е
iron-59	Ci	. E	. E
zinc-65	Ci	. E	. Е
manganese-54	Ci	• E	. E
chromium-51	Ci	• E	. E
zinconium_niohium_05	Ci	F	E E
molybdonum=99	Ci	• E	F
tochootium 00m	Ci	F	F
basium lanthanum 140		• C F	• 2 F
			- C
cerium-141		• •	• •
Other (specify)	Ci	• E	• E
	Ci	. E	. E
	Ci	. E	. E
	Ci	. E	• E
	Ci	. E	• E
Total for period (above)	Ci	. E	. E
xenon-133	Ci	. E	. E
xenon-135	Ci	. E	. E

RTS-115E 7/84

TABLE 6.11-3b

·~ .

SEMIANNUAL RADIOACTIVE MATERIAL RELEASE REPORT (YEAR)

GASEOUS EFFLUENTS

			-
Nuclides Released	Unit	Quarter	Quarter
1. Fission gases	+	<u>, , , , , , , , , , , , , , , , , , , </u>	-+
krypton-85	Ci	• E	. E
krypton-85m	Ci	• E	. E
krypton-87	Ci	• E	• E
krypton-88	Ci	• E	• E
xenon-133	Ci	. E	. E
xenon-135	Ci	• E	. E
xenon-135m	Ci	• E	• E
xenon-138	Ci	• E	. E
Others (specify)	Ci	• E	• E
	Ci	• E	• E
<u>,</u>	Ci	• E	• E
Total for period	Ci	• E ·	. E
2. Iodines			
iodine-131	Ci	• E	. E
iodine-133	Ci	• E	• E
iodine-135	Ci	• E	. E
Total for period	Ci	• E	• E
3. Particulates	<u> </u>	·····	-
strontium-89	Ci	• E	. E
strontium-90	Ci	• E	• E
cesium-134	Ci	• E	• E
cesium-137	Ci	• E	• E
barium-lanthanum-140	Ci	• E	• E
Others (specify)	Ci	• E	• E
	Ci	• E	• E
	Ci	• E	. E

RTS-115E 7/84

.....



6.14 OFFSITE DOSE ASSESSMENT MANUAL (ODAM) (effective date 1/1/86)

- 6.14.1 Changes to the ODAM may be made by IELP provided:
 - Change(s) shall be submitted to the Commission by inclusion in the next Semiannual Radioactive Material Release Report after the change(s) was made effective and shall contain:
 - a. sufficiently detailed information to support the rationale for the change. Information submitted should consist of a package of those pages of the ODAM to be changed with each page numbered and provided with an approval and date, together with appropriate bases or evaluations justifying the change(s);
 - a determination that the change(s) will not reduce the reliability of dose calculations or setpoint determinations to facilitate or assess compliance with Specifications; and
 - c. documentation of the fact that the change has been reviewed by the Operations Committee.

6.14-1
6.14.1 (continued) (effective date 1/1/86)

- 2. Change(s) to radiological environmental monitoring program required sampling station locations, ODAM Table 5-1, shall be submitted to the Commission by inclusion in the next Annual Radiological Environmental Report.
- 3. Changes shall become effective as reviewed by the Operations Committee and approval by the Plant Superintendent-Nuclear.

DAEC-1



6.15 PROCESS CONTROL PROGRAM (PCP) (effective date 1/1/86)

6.15.1 IELP may change the Process Control Program provided:

- Change(s) shall be submitted to the Commission by inclusion in the next Semiannual Radioactive Material Release Report after the change(s) were made effective and shall contain:
 - a. sufficiently detailed information to support the rationale for the change.
 - b. a determination that the product waste form will conform to the requirements of 10 CFR Part 61.56.
 - c. documentation of the fact that the change has been reviewed by the Operations Committee.
- Change(s) shall be come effective as reviewed by the Operations
 Committee and approval by the Plant Superintendent-Nuclear.

6.15-1

1.0 DELETED

RTS-115E

į,

2.0	ENVIRONMENTAL	PROTECTION
	CONDITIONS	

2.3 Radiological (Deleted after 1/1/86)

2.3.1 Radioactive Effluents

Applicability

Applies to the controlled release of radioactive liquids and gases from the facility.

Objective

To define the limits and conditions for the controlled release of radioactive effluents to the environs to ensure that these releases are as low as practicable. These releases should not result in radiation exposures in unrestricted areas greater than a few percent of natural background exposure. The release rate for all effluent discharges should be within the limits specified in 10 CFR 20.

Specification

A. General

(Deleted after 1/1/86)

It is expected that releases of radioactive material in effluents will be kept at small fractions of the limits specified in section 20.106 of 10 CFR Part 20 and as further specified in these Technical Specifications. At the same time the licensee is permitted the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power even under unusual operating conditions which may temporarily result in releases higher than such small fractions, but still within the limits specified in Specifications 2.3.1.B and 2.3.1.C, and in Section 20.106 of

3.0 MONITORING REQUIREMENTS

3.3 Radiological (Deleted after 1/1/86)
3.3.1 Radioactive Effluents

<u>Applicability</u>

Applies to the periodic monitoring and recording of radioactive effluents.

Objectives

To ascertain that radioactive releases are as low as practicable and within allowable values.

Specification

A. General

(Deleted after 1/1/86)

Operating procedures shall be developed and used, and equipment which has been installed to maintain control over radioactive materials in gaseous and liquid effluents produced during normal reactor operations, including expected operational occurrences, shall be maintained and used, to keep levels of radioactive material in effluents released to unrestricted areas as low as practicable.

A report shall be submitted to the Commission at the end of each sixmonths' period of operation specifying total quantities of radioactive material released to unrestricted

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.3.1 Radioactive Effluents

<u>Specification</u> (Cont'd.) (Deleted after 1/1/86) 10 CFR Part 20. It is expected that by using this operational flexibility under unusual operating conditions and exerting every effort to keep levels of radioactive material in effluents as low as practicable, the annual releases will not exceed a small fraction of the concentration limits specified in 10 CFR Part 20.

- B. <u>Liquid Effluents</u> (Deleted after 10/1/85)
- The radioactivity release concentrations in liquid effluents from the station shall not exceed the values specified in 10 CFR Part 20, Appendix B, Table II, Column 2, for unrestricted areas.
- The release rate of radioactive liquid effluents, excluding tritium and noble gases, shall not exceed 10 curies during any calendar quarter.

3.0 MONITORING REQUIREMENTS

3.3.1 Radioactive Effluents

<u>Specification</u> (Cont'd.) (Deleted after 1/1/86) areas in liquid and gaseous effluents during the previous six months and such other information on releases as may be required to estimate exposures to the public resulting from effluent releases. If quantities of radioactive material released during the reporting period are unusual for normal reactor operations, including expected operational occurrences, the report shall cover this specifically.

On the basis of such reports and any additional information the Commission may obtain from the licensees or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.

- B. Liquid Effluents (Deleted after 10/1/85)
- Facility records shall be maintained of the radioactive concentrations and volume before dilution of each batch of liquid effluent released, and of the average dilution flow and length of time over which each discharge occurred.
- 2. Prior to release of each batch of liquid effluent, a sample shall be taken from that batch and analyzed for gross radioactivity (β , γ) and the concentration of each significant gamma energy peak to demonstrate compliance with 2.3.1.B using the circulating water flow rate at the time of discharge.



2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.3.1 Radioacțive Effluents (Deleted after 10/1/85) Specification (Cont'd.)

- 3. During release of radioactive wastes, the following conditions shall be met:
 - a. The minimum dilution water required to satisfy
 2.3.1.B.1 shall be met.
 - b. The effluent control monitor shall be set to alarm and automatically close the waste discharge valve prior to exceeding the limits specified in 2.3.1.B.1 above.
 - c. Liquid waste activity and flow rate shall be continuously monitored and recorded during release. If this requirement cannot be met, continued release of liquid effluents shall be permitted only during the succeeding 48 hours provided that during this 48 hour period, two independent samples of each tank shall be analyzed and two station personnel shall independently check valving prior to discharge.
- 4. The equipment installed in the liquid radioactive waste system shall be maintained and shall be operated to process radioactive liquid wastes prior to their discharge when it appears that the projected cumulative discharge rate will exceed 1.25 curies during any calendar quarter.

- 3.0 MONITORING REQUIREMENTS
- 3.3.1 Radioactive Effluents (Deleted after 10/1/85) Specification (Cont'd.)

Radioactive liquid waste sampling and activity analysis shall be performed in accordance with Table 3.3-1.

3. The liquid effluent radiation monitor shall be calibrated at least quarterly by means of a check source and annually with a known radioactive source. Additionally, an instrument channel test shall be performed monthly and a sensor check shall be performed daily.

 The performance of the automatic isolation valves and discharge tank selection valves shall be checked annually.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

- 2.3.1 Radioactive Effluents (Deleted after 10/1/85) Specification (Cont'd.)
- 5. The maximum activity to be contained in either liquid radwaste sample tank shall not exceed 10 curies.
- 6. When the release rate of radioactive effluents, excluding tritium and noble gases, exceeds 2.5 curies during any calendar quarter, the licensee shall notify the Director, Directorate of Licensing, within 30 days, identifying the causes and describing the proposed program of action to reduce such release rates.
- C. <u>Airborne Effluents</u> (Deleted after 1/1/86)
 1. The release rate of gaseous activity except for halogens and particulates with half lives longer than eight days and except for mechanical vacuum pump operation as described in 2.3.1.D.1 when integrated over a period of one hour shall not exceed:

$$\frac{0s E}{0.21} + \frac{0v}{(1.4 \times 10^5) (MPC_{1})} \le 1.0$$

where:

- Qs = stack release rate in Ci/sec
- E = average Υ energy of release in Mev
- Qv = ventilation system release rate in Ci/sec.
- MPC_i = maximum permissible concentration for isotope i as defined in 10 CFR Part 20, Appendix B, Table II, Column 1.

- 3.0 MONITORING REQUIREMENTS
- 3.3.1 Radioactive Effluents
- Specification (Cont'd.)

- C. <u>Airborne Effluents</u> (Deleted after 1/1/86)
- 1. The gaseous activity released from the reactor building ventilation stacks and the off gas stack shall be monitored and recorded continuously. The particulate filters and iodine cartridges monitoring the activity released from the reactor building ventilation stacks, the off gas stack and the turbine building exhaust fans shall be collected and analyzed in accordance with Table 3.3-2.
 - a. For effluent streams having continuous monitoring capability, the activity and flow rate shall be monitored and recorded.
 - b. For effluent streams without continuous monitoring capability, the activity and release volume shall be monitored and recorded and the release rate shall be controlled to within the limits specified in 2.3.1.C.1.

- 2.0 ENVIRONMENTAL PROTECTION CONDITIONS
- 2.3.1 Radioactive Effluents (Deleted after 1/1/86) Specification (Cont'd.)
- The release rate of I-131 or radioactive material in particulate form with a halflife greater than 8 days when measured over any twnety-four hour period shall not exceed:

$$\frac{0s}{1.3x10^{-6}} + \frac{0v}{1.8x10^{-7}} \le 1.0$$

where:

- Qs = stack release rate in Ci/sec.
- Qv = ventilation release rate in Ci/sec.
- 3.a The release rate of gaseous activity shall not exceed 16 percent of 2.3.1.C.1 or 8 percent of 2.3.1.C.2 averaged over any calendar guarter.
- 3.b When the release rate exceeds 4 percent of the above 2.3.1.C.1 or 2 percent of the above 2.3.1.C.2 when averaged over a calendar quarter notify the director, DOL, in writing within 30 days, identifying the cause of activity and describing the proposed program of action to bring the releases within the limit.
- 4. If the limits of 2.3.1.C.1, 2.3.1.C.2 or 2.3.1.C.3 are exceeded, appropriate corrective action such as an orderly reduction of power, shall be initiated to bring the releases within the limit.

- 3.0 MONITORING REQUIREMENTS
- 3.3.1 Radioactive Effluents (Deleted after 1/1/86) Specification (Cont'd.)
- Radioactive gaseous waste sampling and activity analysis shall be performed in accordance with Table 3.3-2.

- 3. An isotopic analysis shall be made of a representative sample of gaseous activity, excluding tritium, at the discharge of the Steam Jet Air Ejectors:
- a. Within one month of initial criticality,
- b. At least monthly thereafter,
- c. Following each refueling outage, and
- d. If the gaseous wast monitors indicate an increase of greater than 50% in the steady state fission gas release after factoring out increases due to power change.
- 4. When the average daily radioactive gas release rate equals or exceeds that given in 2.3.1.C.1 or increases by 50% over the previous day, after correcting for the expected change with power, the iodine and particulate cartridge shall be analyzed to determine the release rate increase for iodines and particulates.

- 2.0 ENVIRONMENTAL PROTECTION CONDITIONS
 - 2.3.1 Radioactive Effluents (Deleted after 1/1/86) Specification (Cont'd.)
 - 5. When the release rate exceeds 4% of 2.3.1.C.1 for a period of 48 hours notify the Director, Directorate of Licensing, in writing within 10 days, identifying the causes of activity. The report should include the flow rate of the off-gas system, and the activity measured downstream of the condenser prior to holdup, and at a point upstream of the point of release.
 - Radioactive gases released from all environmental release points shall be monitored and recorded as specified in 3.3.1.C.1.
 - 7. During release of gaseous wastes through the off-gas stack, the following conditions shall be met:
 - a. The gross (β, γ) activity monitor, the iodine collection device and the particulate monitor shall be operating.
 - b. Automatic isolation devices capable of limiting gaseous release rate to within the values specified in 2.3.1.C.1 above shall be operating.
 - 8. One reactor building exhaust vent and one plant stack monitoring system shall be operable, and the off-gas radiation monitors shall be operable or operating whenever steam pressure is available to the air ejectors. If these requirements are not satisfied, a normal orderly shutdown shall be initiated and the reactor shall be in the hot shutdown condition within 10 hours in the case of the stack monitor or 10 days in the case of the building vent monitor.

- 3.0 MONITORING REQUIREMENTS
- 3.3.1 Radioactive Effluents (Deleted after 1/1/86) Specification (Cont'd.)
- 5. All effluent gas monitors shall be calibrated at least quarterly by means of a builtin check source and annually with a known radioactive source. Each monitor shall have an instrument channel test at least monthly and sensor check at least daily.

I

6. At least annually, automatic initiation and closure of waste gas system shall be verified.

RTS-115E

- 2.0 ENVIRONMENTAL PROTECTION CONDITIONS
- 2.3.1 Radioactive Effluents (Deleted after 1/1/86) Specification (Cont'd.)
- 9. The containment shall not be purged except through the standby gas treatment system except that following a Type "A" containment leakage rate test, the containment may be depressurized directly to the reactor building and subsequently released via the reactor building ventilation system, within the limits of Specification 2.3.1.C.2.
- D. DELETED

3.0 MONITORING REQUIREMENTS

3.3.1 Radioactive Effluents (Deleted after 1/1/86) Specification (Cont'd.)

D. DELETED

2.3-8

TABLE 3.3-1 (Deleted after 10/1/85)

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS

Sample Type	Sample Frequency	Sample Analysis	Sample (5) <u>Detectable Limit</u> (2)
Waste Tank to be released	Each Batch	Gamma Scan (3)	5 x 10 ⁻⁷ µCi/ml
Proportional Composite of Batches	Monthly	Tritium Gross alpha	1 x 10 ⁻⁵ µCi/ml 5 x 10 ⁻⁷ µCi/ml(4)
Proportional Composite of Batches	Quarterly	Sr ⁹⁰ , Sr ⁸⁹	5 x 10 ⁻⁸ µCi/ml
One Batch	Monthly	Dissolved noble gases	1 x 10 ⁻⁵ µCi/ml

Notes:

- Certain mixtures of radionuclides may cause interference in the measurement of individual radionuclides at their detectable limit especially if other radionuclides are at much higher concentrations. Under these circumstances use of known ratios of radionuclides will be appropriate to calculate the levels of such radionuclides.
- 2. The above sample detectable limits are applicable to grab samples used to determine liquid waste release levels. Reported data shall reflect any improvement in detectable limits as such improvements are achieved.
- 3. Significant radionuclides are to be identified and where possible, quantitative values obtained.
- 4. Self absorption will result in a higher detectable limit for alpha counting.
- 5. Sample detectable limits are subject to revision. The values listed are believed to be attainable.

TABLE 3.3-2
(Deleted after 1/1/86)RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS

Sample Type	Sample Frequency	Sample Analysis	Sample Detectable Limit
Gas	Monthly(1)	Quantitative Analysis of Iden- tifiable Gamma Emitters	1 x 10 ⁻⁴ µCi/cc(2)
Charcoal	Continuous Quarterly Weekly(3)	Gross Activity Tritium I-131	1 x $10^{-4} \ \mu \text{Ci/cc}$ 1 x $10^{-6} \ \mu \text{Ci/cc}$ 1 x $10^{-12} \ \mu \text{Ci/cc}(2)(5)$
Filters	Quarterly	I-131 I-133 I-135	$\frac{1 \times 10^{-12} \ \mu \text{Ci/cc}^{(2)}}{3 \times 10^{-12} \ \mu \text{Ci/cc}^{(2)}}$
Particulate Filters	Weekly ⁽³⁾ Weekly ⁽³⁾	Gross beta Gamma scan(2)(4)	1 x 10 ⁻¹¹ µCi/cc 1 x 10 ⁻¹⁰ µCi/cc(2)
		I-131	1 x 10 ⁻¹¹ µCi/cc
Particulate Filters	Monthly	Gross alpha	1 x 10 ⁻¹¹ µCi/cc
Particulate Filters (composite of weekly filters)	Quarterly	Sr ⁸⁹ Sr ⁹⁰	1 x 10 ⁻¹¹ µCi/cc 1 x 10 ⁻¹¹ µCi/cc

Notes:

- 1. Analysis shall also be made within one month of the initial criticality and following each refueling outage.
- Certain mixtures of radionuclides may cause interference in the measurement of individual radionuclides at their detectable limit especially if other radionuclides are at much higher concentrations. Under these circumstances use of known ratios of radionuclides will be appropriate to calculate the levels of such radionuclides.
- 3. When the iodine or particulate release rate is greater than the release rate given in 2.3.1.C.3 above, the sample shall be analyzed daily until a steady release level has been established or until the release rate decrease below the release rate given in 2.3.1.C.3 above.
- 4. Significant radionuclides are to be identified and, where possible, quantitative values obtained.
- 5. Based on the design sample flow rate for one week.

l

2.3.1.A & 3.3.1.A Bases (Deleted after 1/1/86)

General

It is expected that releases of radioactive material in effluents will be kept at small fractions of the limits specified in Section 20.106 of 10 CFR, Part 20. At the same time the licensee is permitted the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power even under unusual operation conditions which may temporarily result in releases higher than such small fractions, but still within the limits specified in Section 20.106 of 10 CFR, Part 20. It is expected that in using this operational flexibility under unusual operating conditions the licensee will exert his best efforts to keep levels of radioactive material in effluents as low as practicable.

2.3.1.B & 3.3.1.B Bases (Deleted after 10/1/85)

Liquid radioactive waste release levels to unrestricted areas should be kept "as low as practicable" and are not to exceed the concentration limits specified in 10 CFR Part 20. These levels provide reasonable assurance that the resulting annual exposure to the whole body or any organ of an individual will not exceed 5 millirems per year. At the same time, these specifications permit the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power under unusual operating conditions which may temporarily result in releases higher than the design objective levels but still within the concentration limits specified in 10 CFR Part 20. It is expected that by using this operational flexibility under unusual operating conditions, and exerting every effort to keep levels of radioactive material in liquid wastes as low as practicable, the annual releases will not exceed as small fraction of the annual average concentration limits specified in 10 CFR Part 20.

The design objectives have been developed based on operating experience taking into account a combination of variables including fuel failures, primary system leakage, and the performance of the various waste treatment systems.

Specification 2.3.1.B.1 requires the licensee to limit the concentration of radioactive materials in liquid effluents from the station to levels specified in 10 CFR Part 20, Appendix B, for unrestricted areas. This specification provides assurance that no member of the general public can be exposed to liquids containing radioactive materials in excess of limits considered permissible under the Commision's Rules and Regulations.

RTS-115E

7/84

I

Bases (Cont'd.) (Deleted after 10/1/85)

Specification 2.3.1.B.2 establishes an upper limit for the release of radioactive liquid effluents, excluding tritium and noble gases, of 10 curies during any calendar quarter. The intent of this specification is to permit the licensee the flexibility of operation to assure that the public is provided a dependable source of power under unusual operating conditions which may temporarily result in releases higher than the levels normally achievable when the station and the liquid radwaste equipment are functioning as designed. The licensee has shown that releases of up to 10 curies during any calendar quarter will result in concentrations of radioactive material in liquid effluents within the limits specified in 10 CFR Part 20.

Specification 2.3.1.B.3 requires that suitable equipment to dilute and monitor the releases of radioactive materials in liquid effluents is operating during any period these releases are taking place.

Specification 2.3.1.B.4 requires that the licensee shall maintain and operate the equipment installed in the radwaste system to reduce the release of radioactive materials in liquid effluents to as low as practicable consistent with the requirements of 10 CFR Part 50.36a. Normal use and maintenance of installed equipment in the liquid radioactive system are expected to result in releases of not more than about 5 curies per unit per year during normal operations. In order to keep releases of radioactive materials as low as practicable, the specification requires, as a minimum, operation of equipment whenever the rate of release will exceed 1.25 curies during any calendar quarter.

Specification 2.3.1.B.5 limits the amount of radioactivity that may be inadvertently released to the environment to an amount that will not exceed the design objective.

The reporting requirements of Specification 2.3.1.B.6 as dictated by the AEC delineate that the licensee shall identify the cause whenever the release rate of radioactive efflulents, excluding tritium and noble gases, exceeds 2.5 curies during any calendar quarter and describe the proposed program of action to reduce such release rate. This report must be filed within 30 days following the calendar quarter in which the 2.5 curie per unit release occurred.

2.3.1.C & 3.3.1.C Bases (Deleted after 1/1/86)

The specified levels provide reasonable assurance that the resulting annual exposure rate from noble gases at any location at the site boundary will not exceed 10 mrem per year. At the same time these specifications permit the flexibility of operation, compatible with considerations of health and

RTS-115E

Bases (Cont'd.) (Deleted after 1/1/86)

safety, to assure that the public is provided with a dependable source of power under unusual operating conditions which may temporarily result in releases higher than the design objective levels but still within the limits specified in 10 CFR Part 20. It is expected that using this operational flexibility under unusual operating conditions, and by exerting every effort to keep levels of radioactive material in gaseous wastes as low as practicable, the annual releases will not exceed a small fraction of the annual limits specified in 10 CFR Part 20.

The design objectives have been developed taking into account a combination of system variables including fuel defects, primary system leakage, and the performance of radioisotope removal mechanisms.

Specification 2.3.1.C.1 provides a method to be used in summing the airborne effluent release rate from the main stack and vents which will assure that the release rate will result in a dose rate at the site boundary to the total body that is less than 500 mrem/yr. The radioactive composition of the gaseous releases shall be that of the off-gas after 10 minutes delay. The stack release rate expression is based upon the General Electric model for calculating annual gamma dose at ground level resulting from a continuous elevated release of radioactive materials as described in Section E.1 of the DAEC FSAR.

The ventilation system release rate expression is based upon the building ventilation release model described in FSAR Section E.3.2.1 namely, for wind speeds greater than 3m/second aerodynamic downwash of the effluent plume was considered with a building dilution factor of 1.4 applied for downwash conditions for distances out to 1500 meters. For wind speeds less than 3 mps a release height of 40 meters was assumed with no downwash or building wake effect.

The release rate in curies/sec and the average gamma energy per disintegration used in the equation of this specification will be based on the average composition of gases determined from the average of the previous month's isotopic analyses. The gamma energy per disintegration for those radioisotopes determined to be present from the isotopic analyses shall be given in "Table of Isotopes," C.M. Lederer, J.M. Hollander, and I. Perlman, Sixth Edition, 1967. Other documents may be used for the average energy, provided such documents reference the above works. For example, for Kr-89 and Xe-138, the gamma energy per disintegration shall be as given in "Energy Release from the Decay of Fission Products," Nuclear Science and Engineering: 3, 726-746 (1958) until values are published in "Table of Isotopes."

Specification 2.3.1.C.2 provides a method to be used in summing airborne I-131 and particulates with half lives greater than eight days released

RTS-115E

7/84

1

Bases (Cont'd.) (Deleted after 1/1/86)

from the main stack and vents which will assure that the release rate does not exceed 10 CFR 20 concentration limits for unrestricted areas at the DAEC site boundary. The constants are based upon the most restrictive annual average X/Q values for the main stack and building ventilation releases as found in the "On-Site Meteorological Data Supplement" Section 12.0 and 13.0.

Specification 2.3.1.C.3a establishes an upper limit for the continuous releases of noble gases at 16 percent and I-131 and particulate at 8 percent of the release limit averaged over any calendar quarter.

Specification 2.3.1.C.4 is to require the licensee to take such actions, including reducing station power or other appropriate measures, as may be necessary to keep the radioactive gaseous releases within specified limits.

In addition to the limiting conditions for operation of Specification 2.3.1.C.3a the reporting requirements of 2.3.1.C.3b delineate that the licensee shall identify the cause whenever the release rate of gaseous effluents exceed 4 percent of 2.3.1.C.1 and 2 percent of 2.3.1.C.2 averaged over a calendar quarter and describe the proposed program of action to reduce such release rates.

Specification 2.3.1.C.3b is to monitor the performance of the core. A sudden increase in the activity levels of gaseous releases may be the result of the fuel cladding losing its integrity. Since core performance is of utmost importance in the resulting doses from accidents, a report must be filed within 30 days following the specified increase in gaseous radioactive releases.

Specifiation 2.3.1.C.6 assures that effluent discharge paths are adequately monitored.

Specification 2.3.1.C.8 requires that these gaseous monitoring devices be available whenever radioactive gases are generated in the plant.

Specification 2.3.1.C.9 requires that the primary containment atmosphere receive treatment for the removal of gaseous iodine and particulates prior to its release.

2.3.1.D & 3.3.1.D Bases

Ę,

DELETED

RTS-115E

7/84

1.

2.3-13

4.0 ENVIRONMENTAL SURVEILLANCE AND SPECIAL STUDIES

4.2 DELETED

RTS-115E

4.0 ENVIRONMENTAL SURVEILLANCE AND SPECIAL STUDIES

4.3 Radiological

4.3.1 Monitoring Requirements (Deleted after 1/1/86)

Objective

An environmental radiological monitoring program shall be conducted to verify that radioactive releases are within allowable limits and that plant operations have no detrimental effects on the environment.

Specification

- A. Environmental samples shall be collected and analyzed according to Table 4.3-1 at the locations shown in Figure 4.3-1.
- B. Reports shall be submitted in accordance with the requirements of Section 5.4 (Plant Reporting Requirements).
- C. During the seasons that animals producing milk for human consumption are on pasture, samples of fresh milk will be obtained weekly from these animals at locations shown in Table 4.3-1, and analyzed for their radioiodine content, calculated as iodine-131. Analysis will be carried out within eight days (one I-131 half life) of sampling. Suitable analytical procedures will be used to determine the radioiodine concentration to a sensitivity of 0.5 picocuries per liter of milk at the time of sampling. For activity levels at or above 0.5 picocuries per liter the overall error (one sigma confidence level) of the analysis will be within ± 25%. Results will be reported, with associated calculated error, as picocuries of I-131 per liter of milk at the time of sampling, in accordance with Reporting Requirements for Environmental Radiological Monitoring.

Special attention will be paid to those locations where milk is produced for direct consumption by humans - e.g., the family farm.

- D. A census of milch animals shall be conducted at the beginning and at the middle of the grazing season to determine their location and number with respect to the site. The census shall be conducted in May and July under the following conditions:
 - Within a 1 mile radius from the plant site or the 15 mrem/yr isodose line - whichever is larger: A door to door or equivalent counting technique shall be utilized.
 - 2. Within 5 miles: Enumeration by using referenced information from such as county agricultural agents or other reliable sources.

RTS-115E

7/84

1

4.0 ENVIRONMENTAL SURVEILLANCE AND SPECIAL STUDIES

4.3.1 Specification (Cont'd.) (Deleted after 1/1/86)

If it is learned from this census that milch animals are present at a location which yields a calculated infant thyroid dose greater than from previously sampled animals, the new location shall be added to the surveillance program as soon as practicable. The sampling location having the lowest calculated dose may then be dropped from the surveillance program at the end of the grazing season during which the census was conducted. Also, any location from which milk can no longer be obtained may be dropped from the surveillance program after notifying the NRC in writing that milch animals are no longer present at that location.

E. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability or to malfunction of automatic sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be described in the annual report.

Bases (Deleted after 1/1/86)

The number and distribution of sampling locations and the various types of measurements described in Table 4.3-1 together with the preoperational background data, will provide verification of the effectiveness of plant effluent control and indication of measurable changes in the activity of the environment.

A concentration of I-131 in milk of 2.4 picocuries per liter will result in a dose to the thyroid of a O-2 year old child of 15 mrem/year, based upon consumption of one liter per day for the year. To assure that no child will receive a dose of greater than 15 mrem/year to the thyroid, it is necessary to know the radioiodine concentration in the milk to the sensitivity given above, 0.5 pCi/liter.



TABLE 4.3-1 (Deleted after 1/1/86) ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

ť

SAMPLING DESCRIPTION		SAMPLE FREQUENCY	ANALYSIS	REMARKS	
Type of Sample	Sample Point	Sampling Point Description	. Operational Program		
Airborne	1	Cedar Rapids	Weekly Analysis		Analyzed for Gross
Particu-	2	Marion		Gross beta	beta after a minimum
lates	3	Hiawatha			of 24 hr. decay.
	4	Morris			Gamma spectrum
	5	Palo	Continuous		analysis will be
	6	Center Point	Collection		performed on each
	7	Shellsburg			sample showing
	8	Urbana			measurable gross
	9	Route W26			beta activity
	10	Atkins			i.e. 10 pCi/m ³
	11	Toddville			• • •
	12	Iowa City			
	13	Alburnett			
	14	Alice			
	15	On-site			
	16	On-site	Ouarterlv	Composite	Gamma isotopic and
			Analysis	Sr-89,90	Sr-89, 90 analyses
			Ouarterly		will be performed
			Composit	Gamma isotopic	guarterly on a
			·	analysis	composite of each
1			、 、		sample station.



ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

SA	MPLING DE	SCRIPTION	SAMPLE FREQUENCY	ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program	······································	
Air Iodine	4 5 7 8 11 12 14 15	Morris Palo Shellsburg Urbana Toddville Iowa City Alice On-site	Weekly Analysis Continuous Collection	Radioiodine	Analyzed weekly as two composite samples unless absence of radioiodine can be demonstrated. If radioiodine is detected, each charcoal cartridge will be analyzed individually.
Ambient Radiation	1-16	Same as Airborne Particulates	Monthly and Annual Analysis	Radiation Dose	Each dosimeter will consist of 5 hot
			Continuous Collection		Two badges at each location changed annually.

7/84

.

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

S	AMPLING DE	SCRIPTION SAM	PLE FREQUENCY	ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program	•	
Ambient Radiation	17-32	At centerline of each 22-1/2° sector intersecting the site boundary	Monthly and Annua Analysis	1 Radiation Dose	Two badges at each location, one changed monthly and one changed annually
Ambient Radiation	33-48	At centerline of each 22-1/2° sector at a distance of 1 to 3 miles from the plant stack	Monthly and Annua Analysis	1 Radiation Dose	Two badges at each location, one changed monthly and one changed annually
Surface Water	49 50 51 52 73 75	Lewis Access Plant Intake Plant Discharge* Cedar Rapids City Park Hansen Farm Pond Krewson Farm Pond	Monthly	Gross beta Gamma isotopic Analysis	Routine gross alpha during preoperational phase. Gamma isotopic analysis will be performed on each sample
		*In addition to the rout monthly sample, sampling also to be performed duri liquid radioactive waste discharge operation.	ine is ing	Tritium	Monthly samples will be composited quarterly for tritium analysis

RTS-115E

.



ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

SAMPLING DESCRIPTION		DESCRIPTION SAMPLE FREQUENCY		ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program		
Surface Water (Cont'd.)	49-52		· .	89 _{Sr} , 90 _{Sr}	Performed if gross beta activity exceeds 10 pCi/l and on a quarterly basis.
Ground Water	53 54 57-60	Treated Municipal Water Inlet to Municipal Water Treatment Sys 4 off-site wells (in vicinity of site)	Monthly	Gross beta Gamma isotopic analysis	Gamma isotopic analysis will be performed on each sample in which the gross beta activity exceeds 10 pCi/l. Daily grab sample of untreated municipal water is composited for monthly analysis. Two hour grab sample of treated municipal water is composited for monthly analysis.

RTS-115E

4.3-6



ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

1

4.3-7

S	AMPLING DE	SCRIPTION	SAMPLE FREQUENCY	ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program		
Ground Water (Cont'd.)	· · · · · · · · · · · · · · · · · · ·		**********	Tritium	Monthly samples will be composited quarterly for tritium.
	,			⁸⁹ Sr, ⁹⁰ Sr	Performed if gross beta activity exceeds 10 pCi/l and on a quarterly basis.
			· · ·		
RTS-115E					7/84



ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

S	AMPLING DE	SCRIPTION	SAMPLE FREQUENCY	ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program		
Bottom Sediments	49 50 51 61	Lewis Access Plant intake Plant Discharge One-half mile below plant discharge	Semi-Annually	Gamma isotopic analysis 90 Sr	
Soil	15 16 62-63 66 72-73 93-96 74	On-site On-site Farms (within 10 mile of the site) that raise food crops Irrigated farm downstream of plant	Triannually during growing season s	Gamma isotopic analysis 90 Sr	Surface sample from undisturbed area.
Vegeta- tion	62-63 66 72-73 93-98	Farms that raise food crops	Annually at harvest time	Gamma isotopic analysis 90 Sr	Only the edible portion of crops will be analyzed.
Meat and Poultry		Farms (within 10 miles of the site) that raise poultry or animals for human consumption	Annually during or immediately following grazing season	Gamma isotopic analysis on edible portions	The specific location of these samples will vary with availability

RTS-115E

7/84

4.3-8



ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

SAMPLING DESCRIPTION			SAMPLE FREQUENCY	ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program		
Aquatic Biota (Periphyto	n)	Cedar River	Quarterly (as available)	Gamma isotopic analysis	
Aquatic Biota (Periphyto and Fish)	n)	Cedar River, control station at suitable Location upstream of plant	Semi-Annually	Gamma isotopic analysis	
Wildlife		Palo Marsh (or other areas as required to obtain representative samples)	Semi-Annually e	Gamma isotopic analysis	
Fish		Cedar River	Semi-Annually	Gamma isotopic analysis	



ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

	SAMPLING DESCRIPTION		SAMPLING DESCRIPTIONSAMPLE FREQUENCYANALYSIS		ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program			
Milk	62	Control Farm near Brendon, Iowa	Weekly	131 _I		
	63 66 72 73 94 93-98	Dairy farms within 10 mi. of site Dairy farms within 10 mi. of site Dairy farms within 10 mi. of site Control farm near Amana, Iowa Dairy farm within 10 mi. of site Dairy farm within 10 mi. of site			During the grazing season samples from locations 63, 94 and 93 will be analyzed individually. During the grazing season samples from locations 97, 66, 67, 68, 71 & 72 will be composited and analyzed. If the composite sample is greater than 2.4 pCi/1 the location will be resampled and samples	
			с		During the grazing season samples from locations 62 and 73 will be composited and analyzed. if the composite sample is greater than 2.4 pCi/l the location will be resampled and samples analyzed individually.	



ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

	SAMPLING DESCRIPTION		SAMPLE FREQUENCY	ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program		
Milk	62	Control farm near	Monthly	⁸⁹ Sr	During the grazing season
	C 2	brendon, Iowa		90 _{Sr}	sample from each location
	63	Dairy farms within 10 mi. of site		137 _{Cs}	will be composited for analysis.
	66	Dairy farms within 10 mi. of site		¹⁴⁰ Ba - ¹⁴⁰ La	
	72	Dairy farms within 10 mi. of site		Elemental Ca	
	73	Control farm near Amana, Iowa	Monthly	131 _I	During the non-grazing season a sample from
	94	Dairy farm within 10 mi. of site		locations except locations 62 and 73 will be composited and	
93-98	Dairy farm within			ana iyzed.	
		10 mi. of site			During the non-grazing season a sample from locations 62 and 73 will be composited and analyzed.

RTS-115E

7/84

4.3-11

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER

SAMPLING DESCRIPTION		SCRIPTION SAMPL	E FREQUENCY	ANALYSIS	REMARKS
Type of Sample	Sample Point	Sampling Point Description	Operational Program		· · ·
Ambient Radiation	17-32	At centerline of each 22-1/2° sector intersecting the site boundary	Monthly and Annual Analysis	Radiation Dose	Two badges at each location, one changed monthly and one changed annually
Ambient Radiation	33-48	At centerline of each 22-1/2° sector at a distance of 1 to 3 miles from the plant stack	Monthly and Annual Analysis	Radiation Dose	Two badges at each location, one changed monthly and one changed annually
Surface Water	49 50 51 52 73 75	Lewis Access Plant Intake Plant Discharge* Cedar Rapids City Park Hansen Farm Pond Krewson Farm Pond	Monthly	Gross beta Gamma isotopic Analysis	Routine gross alpha during preoperational phase. Gamma isotopic analysis will be performed on each sample
		*In addition to the routin monthly sample, sampling i also to be performed durin liquid radioactive waste discharge operation.	e s g	Tritium	Monthly samples will be composited quarterly for tritium analysis

RTS-115E



(Deleted after 1/1/86)

5.1 Deleted

5.1.1 Deleted

5.1.2 Deleted

.

5.2 Deleted

5.3 Operating Procedures (Deleted after 1/1/86)

A. Detailed written procedures or instructions, including applicable checkoff lists, will be prepared, approved and adhered to for operation of all on site DAEC systems and components involved in carrying out the plant environmental monitoring program of Section 2.0. Procedures will include sampling, instrument calibrations, analysis and actions to be taken when limits are approached or exceeded.

Calibration frequencies for instruments used in performing the measurements required by the ETS will be included. A Quality Control Program will be followed for the calibration of instruments and sensors and records will be maintained.

Testing frequency of alarms will be included. These frequencies will be determined from experience with similar instruments in similar environments and from manufacturers technical manuals.

- B. Appropriate written procedures or instructions will be prepared, approved and adhered to for collection of samples indicated in Section 4.0. Applicable analytical procedures will be prepared, approved and adhered to for performing analysis of these samples collected.
- C. All procedures described in 5.3.A above, and changes thereto, will be reviewed as specified in Section 5.1 and approved by the Chief Engineer prior to implementation. Temporary changes to procedures which do not change the intent of the original procedures may be made, provided such changes are approved by two members of the plant management staff. Such changes will be documented, subsequently reviewed and approved on a timely basis.
- D. The analytical procedures described in 5.3.B above and changes thereto will be reviewed by the management of the respective organization which is responsible or contracted to perform the work. All collection procedures described in 5.3.B above and changes thereto will be approved by the DAEC Chief Engineer and Radiation Protection Engineer. Temporary changes to procedures which do not change the intent of the original procedures may be made provided such changes are approved by a supervisory person other than the person making the change. Such changes will be documented, subsequently reviewed and approved on a timely basis.

¥ .__*

5.4 Plant Reporting Requirements

5.4.1 Semi-Annual Operating Reports (Deleted after 1/1/86)

Semi-annual operating reports covering the previous six months' operations shall be submitted within 60 days after January 1 and July 1 of each year. The first such period should begin with the date of initial criticality. These reports shall include the following:

A. Radioactive Effluent Releases

A statement of the quantities of radioactive effluents released from the plant, with data summarized on a monthly basis following the format of Appendix A of USAEC Safety Guide 21 of January 1972:

- 1. Gaseous Effluents
 - a. Gross Radioactivity Releases
 - i. Total gross radioactivity (in curies), primarily noble and activation gases.
 - ii. Maximum gross radioactivity release rate during any onehour period.
 - iii. Total gross radioactivity (in curies), by nuclide released, based on representative isotopic analyses performed.
 - iv. Percent of ETS limits.
 - b. Iodine Releases
 - i. Total iodine radioactivity (in curies) by nuclide released, based on representative isotopic analyses performed.
 - ii. Percent of ETS limit for I-131 released.
 - c. Particulate Releases
 - i. Total gross radioactivity (Beta, Gamma) released (in curies) excluding background radioactivity.
 - ii. Gross alpha radioactivity released (in curies) excluding background radioactivity.



RTS-115E

7/84

ł

5.4-2

5.0 ADMINISTRATIVE CONTROL

- 5.4.1 Semi-Annual Operating Reports (Cont'd.) (Deleted after 1/1/86)
 - iii. Total gross radioactivity released (in curies) of nuclides with half-lives greater than eight days.
 - iv. Percent of technical specification limit for particulate radioactivity with half-lives greater than eight days.
 - 2. Liquid Effluents
 - a. Total gross radioactivity (Beta, Gamma) released (in curies) excluding tritium and average concentration released to the unrestricted area.
 - b. The maximum concentration of gross radioactivity (Beta, Gamma) released to the unrestricted area (averaged over the period of release).
 - c. Total tritium and total alpha radioactivity (in curies) released and average concentration released to the unrestricted area.
 - d. Total dissolved noble gas radioactivity (in curies) and average concentration released to the unrestricted area.
 - e. Total volume (in liters) of liquid effluent released.
 - f. Total volume (in liters) of dilution water used prior to release from the restricted area.
 - g. Total radioactivity (in curies) by nuclide released, based on representative isotopic analyses performed.
 - h. Percent of ETS limit for total activity released.
 - B. Solid Radioactive Waste
 - 1. The total amount of solid radioactive waste packaged (in cubic feet).



- 5.4.1 Semi-Annual Operating Reports (Cont'd.) (Deleted after 1/1/86)
 - 2. The total estimated gross radioactivity (in curies) of packaged material.
 - 3. Disposition of material including date and destination if shipped offsite.
 - C. Annual Radiological Environmental Operating Report

A report on the radiological environmental surveillance programs for the previous 12 months of operation shall be submitted to the Director of the Regional Inspection and Enforcement Office (with a copy to Director of the Office of Nuclear Reactor Regulation) as a separate document within 90 days after January 1 each year. The period of the first report shall begin with the date of initial criticality. The reports shall include summaries, interpretations, and statistical evaluation of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, operational controls (as appropriate) and previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. If harmful effects or evidence of irreversible damage are detected by the monitoring, the licensee shall provide an analysis of the problem and a proposed course of action to alleviate the problem.

Results of all radiological environmental samples taken shall be summarized on an annual basis following the format of Table 5.4.1. In the event that some results are not available within the 90 day period, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

5.4.2 Non-Routine Reports

5.4.2.1 Deleted

RTS-115E

7/84

1


RTS-115E

7/84

5.4.2.2 Deleted

· . . ,

RTS-115E



TABLE 5.4-1(Deleted after 1/1/86)REPORTING OF RADIOACTIVITY IN THE ENVIRONS

1 -

, '

.

Facility		Docket No	Reporting	Reporting Period	
Sample Results Sample	Location ^{3/}	Average Quarterly Results ⁵⁷ Frequency and ⁶⁷ Type of Samples	Analysis Results ^{2/} (specify Radionuclide or entity)	Remarks ^{1/}	
External Radiation Filterable Airborne A. Particulate Filters 1) 2) etc. b. Charcoal Filters 1) 2) etc. Water ^{4/} a. b. etc. Food (Human) a. b. etc. Other Media a. Vegetation (include pasture and b. Soils c. Sediments d. Fish e. Molluscs f. Plankton g. Algae h. etc.	other animal feedstuffs)			

RTS-115E

5.4-6

7/84

ġ



TABLE 5.4-1 (Continued) (Deleted after 1/1/86)

5.4-7

7/84

- 1. Explain any unusual measurements or deviation from sampling schedule.
- Use the following units: external radiation, mrem/quarter; filterable airborne, water and milk, pCi/ml; soil pCi/m² (specify depth), precipitation, pCi/m²; stream sediments and terrestrial and aquatic vegetation, pCi/dry gm; other media, specify units.
- 3. Specify location and its distance and direction from the facility, and indicate which is used for background.
- 4. Indicate whether precipitation, surface, ground, lake, river, ocean, etc,; specify drinking water.
- 5. Use separate table for each quarter.
- 6. Type of sample means either grab, continuous, proportional, composite, etc.

5.0 ADMINISTRATIVE CONTROL

5.5 Deleted