PROPOSED CHANGE RTS-115C

RADIOLOGICAL EFFLUENT AND ENVIRONMENTAL

TECHNICAL SPECIFICATIONS

APPENDIX A

TO

OPERATING LICENSE DPR-49

DUANE ARNOLD ENERGY CENTER

IOWA ELECTRIC LIGHT AND POWER COMPANY

DOCKET NO. 50-331

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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

(1) 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.

d. 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.

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.

2) 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).

l. 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.

27. FREQUENCY NOTATION

NOTATION	FREQUENCY
S	At least once per 12 hours.
D	At least once per 24 hours.
W	At least once per 7 days.
M	At least once per 31 days.
Q	At least once per 92 days.
SA	At least once per 184 days.
A	At least once per year.
R	At least once per 18 months.
S/U	Prior to each reactor startup.
P	Prior to each release.
NA	Not applicable.

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. 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.

30. 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.

31. 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.

32. 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.

33. 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.

34. 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.

35. SITE BOUNDARY

The Site Boundary is that line beyond which the land is neither owned, nor leased, nor otherwise controlled by IELP. FSAR Figure 1.5-1 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.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE 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.	System logic shall be functionally tested as indicated in Table 4.2-C.
D. Radiation Monitoring Systems-Isolation & 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.
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.	System logic shall be functionally tested as indicated in Table 4.2-D.
Otherwise, be in at least HOT STANDBY within the following 24 hours.	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
c) At least one pre-treatment steam air ejector offgas system radiation monitor shall be operable during reactor power operation. The monitors shall be set to initiate an alarm if the monitor exceeds a trip setting equivalent to 1.0 Ci/sec.	
d) In the event no pre-treatment monitor is operable, gases from the steam air ejector offgas system may be released for up to 30 days provided (1) the charcoal bed of the offgas delay system is not bypassed, (2) the offgas stack noble gas activity monitor is operable, (3) at least 1 post-treatment monitor is operable, and (4) Grab samples are collected and analyzed weekly.	
2. Reactor Building Isolation and Standby Gas Treatment System The limiting conditions for operation are given in Specification 3.7.B.	2. Reactor Building Isolation and Standby Gas Treatment System 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.
E. Drywell Leak Detection The limiting conditions of operation for the instrumentation that monitors drywell leak detection are given in Table 3.2-E.	E. 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.

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	Once/Refueling	Once/month	Once/day
4) Offgas Pre-treatment Radiation Monitors	Once/3 months	Once/Refueling	Once/month	Once/day
Logic 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			

3.2.D.1 BASES

1. Main Condenser Offgas

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.

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. APPLICABILITY: As shown in Table 3.14-1. ACTION: 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 instrumentation 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.	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.

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 2×10^{-4} μCi/ml total activity. APPLICABILITY: At all times. ACTION: 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.	4.14.2.1 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, 1×10^{-7} μCi/ml, is applied at the unrestricted area boundary. 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 1×10^{-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.

LIMITING CONDITIONS FOR OPERATION

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 cause(s) for exceeding the limit and defines the corrective actions to be taken.

SURVEILLANCE REQUIREMENT

4.14.3 Dose Calculations. 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 does not exceed the limits in Specification 3.14.3.

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-release analysis indicates a radioactivity concentration (exclusive of tritium and dissolved noble gases) of 0.01 μCi/ml or higher. APPLICABILITY: At all times. 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: 1. Identification of equipment or subsystems not OPERABLE and the reason for inoperability. 2. Action(s) taken to restore the inoperable equipment to OPERABLE status. 3. Summary description of action(s) taken to prevent a recurrence.	4.14.4 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, 1×10^{-7} μCi/ml, is applied at the unrestricted area boundary.

TABLE 3.14-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY#	ACTION
1. Gross Radioactivity Monitors Providing Automatic Termination of Release			
a. Liquid Radwaste Effluent Line	(1)	During releases	18
2. Gross Radioactivity Monitors Not Providing Automatic Termination 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. Flow Rate Measurement Devices**			
a. Liquid Radwaste Effluent Line**	(1)	At all times	21
b. Liquid Radwaste Dilution Line**	(1)	During releases	21

Channel(s) shall be OPERABLE and in service except that channels out of 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 qualified 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} μCi/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.

TABLE 4.14-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	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*	M	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.

TABLE 4.14-2

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/ml)
A. Batch Waste Release Tanks[c]	P Each Batch	P Each Batch	Principal Gamma Emitters[e]	5×10^{-7}
			I-131[e]	1×10^{-6}
	P One Batch/M	M[f]	Dissolved and Entrained Gases	1×10^{-5}
	P Each Batch	M[f] Composite[b]	H-3	1×10^{-5}
			Gross alpha	1×10^{-7}
	P Each Batch	Q[f] Composite[b]	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}
B. Continuous Service Water Release[d]	1. W Grab Sample	W[f]	Gross beta/gamma	1×10^{-7}
	2. W Grab Sample	W[f]	Principal Gamma Emitters	5×10^{-7}
			I-131	1×10^{-6}
	3. M Grab Sample	M[f]	Dissolved and Entrained Gases	1×10^{-5}
	4. W Grab Sample	M[f] Composite	H-3	1×10^{-5}
			Gross alpha	1×10^{-7}
	5. W Grab Sample	Q[f] Composite	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}

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:

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

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

Δt 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 $\frac{\lambda t_1}{1 - \exp(-\lambda t_1)} \times \exp(-\lambda t_2)$

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 Δt 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 an isotopic analysis is not performed 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, 0.01μCi/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 be[1]

total iodines	0.11 curie
total others (less H^3)	0.25
Total	0.36 curie

The population dose commitment resulting from the radioactive material in liquid effluent released annually has been calculated to be[1]

thyroid	0.164 man rem
total body	0.114
Total	0.278 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	$= 1.8 \times 10^6$ gal/yr
Chemical Waste	600 gal/day	$= 1.9 \times 10^5$ 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 estimated[2] (neglecting credit for capital recovery) to be $88000 per year. Thus the unit volume operating cost is about:

$$\frac{\$88000/yr}{2 \times 10^6 \text{ gal/yr}} = \$0.05/\text{gal}$$

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

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

$$C = 0.013 \ \mu\text{Ci/ml}$$

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

$$C = \frac{\$500}{10000 \text{ gal} \times 3785 \frac{\text{ml}}{\text{gal}}} \times \frac{1 \text{ curie}}{\text{man rem}} \times 10^6 \frac{\mu\text{Ci}}{\text{curie}} \times \frac{1 \text{ man rem}}{\$1000}$$

$$C = 0.013 \ \mu\text{Ci/ml}$$

[2] Ibid., based on Regulatory Guide 1.110

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 μCi/ml in liquid effluent is not justified.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.15.1 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.15-1 shall be OPERABLE with their alarm setpoints set to cause automatic alarm when the limits of Specification 3.15.2 are exceeded. APPLICABILITY: As shown in Table 3.15-1. ACTION: a. With radioactive gaseous effluent monitoring instrumentation channel alarm setpoint less conservative than a value which will ensure that the limits of 3.15.2 are met, adjust without delay to meet Specification 3.15.1, declare the channel inoperable, or immediately suspend any release via the instrumented pathway. b. When less than the minimum required gaseous effluent monitoring instrument channels OPERABLE, take the 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 instrumentation is not returned to OPERABLE status within 30 days, explain in the next Semiannaul Radioactive Material Release Report, in lieu of any other report, why the instrument was not made OPERABLE in a timely manner.	4.15.1.1 Each radioactive gaseous 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 4.15-1. 4.15.1.2 The setpoints shall be determined according to the method described in the ODAM.

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.	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.15.3 The air dose in the unrestricted area (see FSAR Figure 1.5-1) due to noble gases released in gaseous effluents shall not exceed: 5.0 mrad from gamma radiation during any calendar quarter, 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.	4.15.3.1 Dose Assessment 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 quarter due to noble gases does not exceed the limits in Specification 3.15.3.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
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, 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.	4.15.4.1 Dose Assessment 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.

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. 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: 1. Identification of the inoperable equipment or subsystem and reason for inoperability. 2. Action(s) taken to restore the inoperable equipment to OPERABLE status. 3. Summary description of action(s) taken to prevent a recurrence.	4.14.5 The gaseous effluent monitoring program of Specification 3.15.1 shall be used to verify the operation of the offgas system.

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 $\leq$ 4% by volume. APPLICABILITY: During Offgas 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 $\leq$ 4% within 48 hours, be in at least HOT SHUTDOWN or within the limit within the following 24 hours.	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.

TABLE 3.15-1

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 concentration, alarm	27
b. Iodine Sampler Cartridge	1	*	Collect iodine sample	31
c. Particulate Sampler Filter	1	*	Collect particulate sample	31
d. Effluent Flow Measuring Device	1	*	Measure air flow	26
e. Sample Flow Measuring Device	1	*	Measure air flow	26
4. Reactor Building Exhaust Vent Monitoring System (R4)				
a. Noble Gas Activity Monitor	1	*	Monitor activity concentration, alarm	27
b. Iodine Sampler Cartridge	1	*	Collect iodine sample	31
c. Particulate Sampler Filter	1	*	Collect particulate sample	31
d. Effluent Flow Measuring Device	1	*	Measure air flow	26
e. Sample Flow Measuring Device	1	*	Measure air flow	26
5. Turbine Building Exhaust Vent Monitoring System (R5)				
a. Noble Gas Activity Monitor	1	*	Monitor radioactivity	27
b. Iodine Sampler Cartridge	1	*	Collect iodine sample	31
c. Particulate Sampler Filter	1	*	Collect particulate sample	31
d. Effluent Flow Measuring Device	1	*	Measure air flow	26
e. Sample Flow Measuring Device	1	*	Measure air flow	26

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.

TABLE 4.15-1

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)	M	**
2. Offgas Stack Monitoring System					
a. Noble Gas Activity Monitor	D*	M	R(3)	Q(2)	*
b. Iodine Sampler Cartridge	W*	N.A.	N.A.	N.A.	*
c. Particulate Sampler Filter	W*	N.A.	N.A.	N.A.	*
d. Effluent Flow Measuring Device	D*	N.A.	R	Q	*
e. Sample Flow Measuring Device	D*	N.A.	R	Q	*
3. Reactor Building Vent Monitoring System					
a. Noble Gas Activity Monitor	D*	M	R(3)	Q(2)	*
b. Iodine Sampler Cartridge	W*	N.A.	N.A.	N.A.	*
c. Particulate Sampler Filter	W*	N.A.	N.A.	N.A.	*
d. Effluent Flow Measuring Device	D*	N.A.	R	Q	*
e. Sample Flow Measuring Device	D*	N.A.	R	Q	*
4. Turbine Building Exhaust Ventilation Monitoring System					
a. Noble Gas Activity Monitor	D*	M	R(3)	Q(2)	*
b. Iodine Sampler Cartridge	W*	N.A.	N.A.	N.A.	*
c. Particulate Sampler Cartridge	W*	N.A.	N.A.	N.A.	*
d. Effluent Flow Rate Monitor	D*	N.A.	R	Q	*
e. Sample Flow Measuring Device	D*	N.A.	R	Q	*

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.

(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

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)[a] (μCi/ml)
A. Offgas Stack, and Reactor Building Vent	M[b] Grab Sample	M[b]	Principal Gamma Emitters	1×10^{-4} e
	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	1×10^{-12}
	Continuous[d]	W[c] Particulate Sample	Principal Gamma Emitters (I-131, Others)	1×10^{-11} e
	Continuous[d]	Q Composite Particulate Sample[f]	Sr-89, Sr-90	1×10^{-11}
			Gross Alpha	1×10^{-11}
C. Offgas Stack, Reactor Building Vent, and Turbine Building Vent	Continuous	Continuous	Radioactive Noble Gas gamma activity	1×10^{-6}

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.

e. The principal gamma emitters for which the LLD specification will apply 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

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.

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.

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. 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 $\leq$ 75 mrem to his thyroid and $\leq$ 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.	4.16.1 Dose Calculations. 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.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.16.2 A radiological environmental monitoring program shall be conducted as specified in Table 3.16-1. APPLICABILITY: At all times. ACTION: 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 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.

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.

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.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.16.3 Analyses shall be performed on radioactive materials supplied in an Interlaboratory Comparison Program which has been approved by the NRC. APPLICABILITY: Applicable to the Radiological Environmental Monitoring Program at all times. ACTION: In the event analyses were not performed as required in Specification 3.16.3, report the corrective actions taken to prevent a recurrence in the Annual Radiological Environmental Monitoring Report.	

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.16.4 Appropriate equipment shall be operated in accordance with a Process Control Program to process wet radioactive waste solids destined for disposal to a form that meets appropriate requirements of 10 CFR Part 61.56 before the waste is shipped from the DAEC site. APPLICABILITY: During Processing of radioactive waste solids for disposal. ACTION: 1. Suspend delivery to a transport carrier of any container of radioactive waste not complying with 10 CFR Part 61.56.	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.

TABLE 3.16-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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 $\geq$ 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
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.
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.
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.
River Sediment	one	At least once every six months	Gamma isotopic analysis of each sample.

TABLE 3.16-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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 Radiological Environmental Monitoring Manual.

TABLE 3.16-2

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

Analysis	Medium					
	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
gross beta	4	1×10^{-2}				
^{3}H	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]	7×10^{-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		

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:

$$LLD = \frac{4.66\ S_b}{E \cdot V \cdot 2.22 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

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

Δt 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.

TABLE 3.16-3

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Reporting Levels[a] Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/Kg, wet)	Milk (pCi/l)	Food Products (pCi/Kg, wet)
H-3	2×10^4 [b] 3×10^4 [c]				
Mn-54	1×10^3		3×10^4		
Fe-59	4×10^2		1×10^4		
Co-58	1×10^3		3×10^4		
Co-60	3×10^2		1×10^4		
Zn-65	3×10^2		2×10^4		
Zr-Nb-95	4×10^2 [c]				
I-131	2	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]			3×10^2 [d]	

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

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

(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.

3.16.1 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

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 those Reportable Occurrences requiring 24 hour notification to the Commission.

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 and shall submit recommended changes to the Chairman of the Safety Committee.

j. Review of the Emergency Plan and implementing procedures and shall submit recommended changes to the Chairman of the Safety Committee.

k. Review of every unplanned release of radioactivity to the environs for which a report to the NRC is required.

l. Review of changes to the Offsite Dose Assessment Manual and changes to the Process Control Program.

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.

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.

l. 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.

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.

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.

1. 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.

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.

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.

10. Records of radioactive effluent monitor setpoints and setpoint determinations.

6.10.2 The following records shall be retained for the duration of the Facility Operating License.

1. 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.

6. Records of transient or operational cycles for those facility components designed for a limited number of transients or cycles.

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

14. Records of results of analyses required by the radiological environmental monitoring program.

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. Semiannual Radioactive Material Release Report

(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.

e. Annual Radiological Environmental Report

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 Specification 4.16.2.2.

(4) Results of analyses of samples required by the radiological environmental monitoring program, Table 3.16-1, summarized in the format of Table 6.11-4. 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.

(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.

f. 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.

6.11.2 REPORTABLE OCCURRENCES

Reportable occurrences, including corrective actions and measures to prevent reoccurrence, shall be reported to the NRC. Supplemental reports may be required to fully describe final resolution of occurrence. In case of corrected or supplemental reports, a licensee event report shall be completed and reference shall be made to the original report date.

a. Prompt Notification With Written Followup. The types of events listed below shall be reported as expeditiously as possible, but within 24 hours by telephone and confirmed by telegraph, mailgram, or facsimile transmission to the Director of the appropriate Regional Office, or his designate no later than the first working day following the event, with a written followup report within two weeks. The written followup report shall include, as a minimum, a completed copy of a licensee event report form shall be supplemented, as needed, by additional narrative material to provide complete explanation of the circumstances surrounding the event.

(1) Failure of the reactor protection system or other systems subject to limiting safety system settings to initiate the required protective function by the time a monitored parameter reaches the setpoint specified as the limiting safety system setting in the technical specifications or failure to complete the required protective function.

Note: Instrument drift discovered as a result of testing need not be reported under this item but may be reportable under items 6.11.2.a(5), 6.11.2.a(6) or 6.11.2.b(1) below.

(2) Operation of the unit or affected systems when any parameter or operation subject to a limiting condition is less conservative than the least conservative aspect of the limiting condition for operation established in the technical specifications.

Note: If specified action is taken when a system is found to be operating between the most conservative and the least conservative aspects of a limiting condition for operation listed in the technical specifications, the limiting condition for operation is not considered to have been violated and need not be reported under this item, but it may be reportable under item 6.11.2.b(2) below.

(3) Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment.

Note: Leakage of valve packing or gaskets within the limits for identified leakage set forth in technical specifications need not be reported under this item.

(4) Reactivity anomalies, involving disagreement with the predicted value of reactivity balance under steady state conditions during power operation, greater than or equal to 1% $\Delta k/k$; a calculated reactivity balance indicating a shutdown margin less conservative than specified in the technical specifications; short-term, reactivity increases that correspond to a sustained reactor period of less than 5 seconds or, if sub-critical, an unplanned reactivity insertion of more than 0.5% $\Delta k/k$ or occurrence of any unplanned criticality.

(5) Failure or malfunction of one or more components which prevents or could prevent, by itself, the fulfillment of the functional requirements of system(s) used to cope with accidents analyzed in the SAR.

(6) Personnel error or procedural inadequacy which prevents or could prevent, by itself, the fulfillment of the functional requirements of systems required to cope with accidents analyzed in the SAR.

Note: For items 6.11.2.a(5) and 6.11.2.a(6) reduced redundancy that does not result in a loss of system function need not be reported under this section but may be reportable under items 6.11.2.b(2) and 6.11.2.b(3) below.

(7) Conditions arising from natural or man-made events that, as a direct result of the event require plant shutdown, operation of safety systems, or other protective measures required by technical specifications.

(8) Errors discovered in the transient or accident analyses or in the methods used for such analyses as described in the safety analysis report or in the bases for the technical specifications that have or could have permitted reactor operation in a manner less conservative than assumed in the analyses.

(9) Performance of structures, systems, or components that requires remedial action or corrective measures to prevent operation in a manner less conservative than assumed in the accident analyses in the safety analysis report or technical specifications bases; or discovery during plant life of conditions not specifically considered in the safety analysis report or technical specifications that require remedial action or corrective measures to prevent the existence or development of an unsafe condition.

Note: This item is intended to provide for reporting of potentially generic problems.

b. Thirty Day Written Reports. The reportable occurrences discussed below shall be the subject of written reports to the Director of

the appropriate Regional Office within thirty days of occurrence of the event. The written report shall include, as a minimum, a completed copy of a licensee event report form. Information provided on the licensee event report form shall be supplemented, as needed, by additional narrative material to provide complete explanation of the circumstances surrounding the event.

(1) Reactor protection system or engineered safety feature instrument settings which are found to be less conservative than those established by the technical specifications but which do not prevent the fulfillment of the functional requirements of affected systems.

(2) Conditions leading to operation in a degraded mode permitted by a limiting condition for operation or plant shutdown required by a limiting condition for operation.

Note: Routine surveillance testing, instrument calibration, or preventative maintenance which require system configurations as described in items 6.11.2.b(1) and 6.11.2.b(2) need not be reported except where test results themselves reveal a degraded mode as described above.

(3) Observed inadequacies in the implementation of administrative or procedural controls which threaten to cause reduction of degree of redundancy provided in reactor protection systems or engineered safety feature systems.

(4) Abnormal degradation of system other than those specified in Item 6.11.2.(a)(3) designed to contain radioactive material resulting from the fission process.

NOTE: Sealed sources or calibration sources are not included under this item. Leakage of valve packing or gaskets within the limits for identified leakage set forth in technical specification need not be reported under this item.

(5) An unplanned offsite release of 1) more than one curie of radioactive material in liquid effluents, 2) more than 150 curies of noble gas in gaseous effluents, or 3) more than 0.05 curies of radioiodine in gaseous effluents. The report of an unplanned offsite release of radioactive material shall be submitted within 30 days of the occurrence and shall include the following information:

1. A description of the event and equipment involved.
2. Cause(s) for the unplanned release.
3. Actions taken to prevent recurrence.
4. Consequences of the unplanned release.

This report shall also be deemed to satisfy the reporting requirement of 10 CFR Part 20.405 (a)(5).

6.11.3 UNIQUE REPORTING REQUIREMENTS

Special reports in lieu of any other report shall be submitted to the NRC Regional Administrator within the time period specified for each report. These reports shall be submitted 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. Auxiliary Electrical System - Operation with inoperable components (Specification 3.8.B.4).

f. Fire Protection Systems (Specification 3.13.A.3, 3.13.B.3, 3.13.C.3, and 3.13.D.3).

g. Radioactive Liquid or Gaseous Effluent - calculated dose exceeding specified limit (Specifications 3.14.3, 3.15.3 and 3.15.4).

h. Off-Gas System (AOG) inoperable (Specification 3.15.5).

i. 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.

j. Annual dose to a member of the public determined to exceed 40 CFR Part 190 dose limit.

TABLE 6-11-1

REPORTING SUMMARY - ROUTINE REPORTS

Requirement	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 year.
§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)

REPORTING SUMMARY - ROUTINE REPORTS

Requirement	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

TABLE 6.11-2

REPORTING SUMMARY - NONROUTINE REPORTS

Requirement	Report	Notification	Initial Written Report Within 14 days	15 days	30 days	3 mo
TS[1]	Reportable Occurrence	Within 24 hours	X			
TS	Reportable Occurrence				X	
§20.405	Overexposures and Excessive Levels of Radiation and Concentration of Radioactive Material				X	
§20.402	Theft or loss of Material	Immediately			X	
§20.403(a)	Severe Accident Involving Licensed Material	Immediately				
§20.403(b)	Accident Involving Licensed Material	Within 24 hours				
§40.64(c)	Theft or Unlawful Diversion of Source Material	Promptly		X		
§50.59(d)	Authorization of Changes, Tests, and Experiments	X[2]				
§70.52	Accidental Criticality or Loss of Special Nuclear Material	Promptly				
§73.42	Unaccounted for Shipments, Suspected Theft, or Unlawful Diversion of Special Nuclear Material	Immediately	X			
TS	Unique					X[3]

NOTES TO TABLE 6.11-2

[1] Technical Specifications.

[2] NRC authorization is requried prior to performing a change, test, or experiment in this category.

[3] Unique reports covering inspections, tests, and maintenance that are appropriate to assure safe operation of the facility. The frequency and content of these special reports are determined on an individual case basis and designated in the Technical Specifications. Such reports include in-service inspection, tendon surveillance program study, fuel inspection, and containment structural tests.

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	. E
iron-59	Ci	. E	. E
zinc-65	Ci	. E	. E
manganese-54	Ci	. E	. E
chromium-51	Ci	. E	. E
zirconium-niobium-95	Ci	. E	. E
molybdenum-99	Ci	. E	. E
technetium-99m	Ci	. E	. E
barium-lanthanum-140	Ci	. E	. E
cerium-141	Ci	. E	. E
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

TABLE 6.11-3b

SEMIANNUAL RADIOACTIVE MATERIAL RELEASE REPORT (YEAR)

GASEOUS EFFLUENTS

Nuclides Released	Unit	Quarter	Quarter
1. Fission gases			
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
	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			
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

6.14 OFFSITE DOSE ASSESSMENT MANUAL (ODAM)

6.14.1 Changes to the ODAM may be made by IELP provided:

1. 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);

   b. 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.

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.

6.15 PROCESS CONTROL PROGRAM (PCP)

6.15.1 IELP may change the Process Control Program provided:

1. 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.

2. Change(s) shall be come effective as reviewed by the Operations Committee and approval by the Plant Superintendent-Nuclear.