APPENDIX F

OFFSITE DOSE CALCULATION MANUAL (ODCM)

REVISION 5

9303030277 930225
PDR ADOCK 05000528
R PDR

CONTROLLED DOCUMENT

OFFSITE DOSE CALCULATION MANUAL
PALO VERDE NUCLEAR GENERATING STATION
UNITS 1, 2 AND 3

REVISION 5

Originator	K KUTNER	Date 11-12-91
Tech. Reviewer	Thomas W. Murphy	Date 11-22-91
General Manager, Site Chemistry		Date 11/25/91
PRB	Dick Cronse	Date 1-29-92
Unit 1 Plant Manager		Date 9-1-92
Unit 2 Plant Manager		Date 9/1/92
Unit 3 Plant Manager		Date 9/1/92

Effective Date 9-16-92

9-16-92
Effective Date

Table of Contents

CONTROLLED DOCUMENT

Table of Contents (Continued)

List of Tables

CONTROLLED DOCUMENT

List of Tables

List of Figures

1.0 INTRODUCTION

The Offsite Dose Calculation Manual (ODCM) implements the program elements which are required by the Administrative Controls section of the Technical Specifications, Section 6.8.4.g. Radioactive Effluent Controls Program, and Section 6.8.4.h. Radiological Environmental Monitoring Program at the Palo Verde Nuclear Generating Station (PVNGS) for Unit 1, Unit 2 and Unit 3. The ODCM is defined in Technical Specifications, Section 1.18 and in the Definitions in Appendix C of this manual. The ODCM contains the operational requirements, the surveillance requirements, and actions required if the operational requirements are not met for the Radioactive Effluent Controls Program and the Radiological Environmental Monitoring Program to assure compliance with 10 CFR 20.106, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR Part 50. It should be noted that the hot and cold shutdown and operability requirements in T.S. 3.0.3 and 4.0.3 do not apply to any of the requirements contained in this ODCM. The ODCM also contains descriptions of the information that should be included in the Annual Radiological Environmental Operating Report and the Semiannual Radioactive Effluent Release Report required by Technical Specifications Section 6.9.1.7 and 6.9.1.8.

The ODCM provides the parameters and methodology to be used in calculating offsite doses resulting from radioactive effluents, in the calculation of gaseous effluent monitor Alarm/Trip Setpoints, and in the conduct of the Radiological Environmental Monitoring Program. Included are methods for determining air, whole body, and organ dose at the controlling location due to plant effluents to assure compliance with the regulatory requirements detailed in the ODCM. Methods are included for performing dose projections to assure compliance with the gaseous treatment system operability sections of the ODCM. The ODCM utilizes information from NRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," October 1977, and NRC NUREG 0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," October 1978. NUREG 0133 utilizes some of the key information in Regulatory Guide 1.109 to provide methods which were used in the preparation of the radiological effluent Technical Specifications and which have now been transferred to the ODCM in accordance with NRC Generic Letter 89-01, "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose Calculation Manual or to the Process Control Program," January 31, 1989, and NUREG 1301,"Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors",Generic Letter 89-01, Supplement No. 1, April 1991.

1.1 Liquid Effluent Pathways

Dose calculation methodology for liquid effluents is not included in this manual due to the desert location of the plant, the hydrology of the area, and the fact that there are no liquid releases to areas at or beyond the SITE BOUNDARY during normal operation. All liquid discharges to the onsite evaporation ponds are controlled by Section 3.2. The impact of postulated accidental seepages on the groundwater system, and in particular on the existing wells located in the 5-mile zone around the site area has been calculated and analyzed in Section 2.4.13.3 of the PVNGS FSAR.

If plant operating conditions become such that the likelihood of a liquid effluent pathway is created, then dose calculation methodology for this pathway will be added to this manual.

1.2 Gaseous Effluent Pathways

All gaseous effluents are treated as ground level releases and are considered to be "long-term" as discussed in NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants". This includes the containment purge and Waste Gas Decay Tank releases as well as the normal ventilation system and condenser vacuum exhaust releases. All releases are either greater than 500 hours in duration or are made at random, not depending upon atmospheric conditions or time of day. The releases are lumped together and calculated as an entity. Historical annual average X/Q values are used throughout this manual for all gaseous effluent setpoint and dose calculations. Airborne releases are further subdivided into two subclasses:

1.2.1 Iodine - 131, Iodine - 133, Tritium and Radionuclides in Particulate Form with Half-lives Greater than Eight Days

In this model, a controlling location is identified for assessing the maximum exposure to a MEMBER OF THE PUBLIC for the various pathways and to critical organs. Infant exposure occurs through inhalation and any actual milk pathway. Child, teenager and adult exposure derives from inhalation, consumed vegetation pathways, and any actual milk and meat pathways. Dose to each of the seven organs listed in Regulatory Guide 1.109 (bone, liver, total body, thyroid, kidney, lung and GI-LLI) are computed from individual nuclide contributions in each sector. The largest of the organ doses in any sector is compared to 10 CFR 50, Appendix I design objectives. The release rates of these nuclides will be converted to instantaneous dose rates for comparison to the limits of 10 CFR 20.

1.2.2 Noble Gases

The air dose from both the beta and gamma radiation component of the noble gases will be assessed and compared to the 10 CFR 50, Appendix I design objectives. The noble gas release rate will be converted to instantaneous dose rates for comparison to the limits of 10 CFR 20.

Section 2.0 of this manual discusses the methodology to be used in determining effluent monitor alarm/trip setpoints to assure compliance with the 10 CFR Part 20 limits as implemented in Section 3.0. Section 4.0 discusses the methods to assure releases are As Low As Reasonably Achievable (ALARA) in accordance with Appendix I to 10 CFR Part 50. Methods are described in Section 5.0 for determining the annual cumulative dose to a MEMBER OF THE PUBLIC from gaseous effluents and direct radiation to assure compliance with 40 CFR Part 190.

The requirements for the Semiannual Radiological Effluent Release Report and the Radiological Environmental Monitoring Program, including the Annual Land Use Census and the Interlaboratory Comparison Program, and the Annual Environmental Report are described in Sections 6.0 and 7.0 of this manual.

1.3 Nuisance Pathways

This section addresses the potential release pathways which should not contribute more than 10% of the doses evaluated in this manual. Table 1-1 lists examples of potential release pathways. The ODCM methodology for calculation of doses will be applied to an applicable release pathway if a likely potential arises for contributing more than 10% of the doses evaluated in this manual.

TABLE 1-1

NUISANCE PATHWAYS
(EXAMPLES)

Evaporation Pond
Cooling Towers
Laundry/Decon Building Exhaust
Unmonitored Secondary System Steam Vents/Reliefs
Turbine Building Ventilation Exhaust
Unmonitored Tank Atmospheric Vents
Dry Active Waste Processing and Storage (DAWPS) Building
Respirator Cleaning Facility
Secondary Side Decontamination Equipment

1.4 Meteorology

Historical annual average atmospheric dispersion (X/Q) and deposition(D/Q) data, based on nine years of meteorological data, and given in Table 3-2 for each of the three nuclear generating units are used to demonstrate compliance with the ODCM Requirements. These Requirements include:

Section 2.0	Gaseous Effluent Monitor Setpoints;
Section 3.0	Gaseous and Liquid Effluent - Dose Rate
Section 4.0	Gaseous and Liquid Effluent - Dose
Section 5.0	Total Dose and Dose to Public Onsite

Sections 2.0 and 3.0 specify utilizing the highest X/Q or D/Q meteorological dispersion parameter at the Site Boundary for any of the three units as applicable. Using the highest dispersion parameter for any of the units provides a conservative assumption to assure compliance with the higher 10 CFR Part 20 limits.

Section 4.0 specifies utilizing the highest X/Q at the Site Boundary for the particular unit, from Table 3-2 for noble gases. The highest X/Q and D/Q are utilized for the particular unit's releases as applicable for gases other than noble gases (iodines, particulates, and tritium) for the controlling pathway's location (site boundary using Table 3-2 or other controlling locations using Table 4-16).

Section 5.0 specifies utilizing the highest X/Q for the particular unit's releases at the controlling location from Table 4-16 for noble gases. The highest X/Q and D/Q are utilized for the particular unit's releases as applicable for gases other than noble gases at the controlling pathway's location using Table 4-16.

Section 7.0 requires that the meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents, as determined by sampling frequency and measurement, shall be used for determining the gaseous pathway doses.

2.0 GASEOUS EFFLUENT MONITOR SETPOINTS

2.1 Requirements: Gaseous Monitors

The radioactive gaseous effluent monitoring instrumentation channels shown in Table 2-1 shall be OPERABLE with their alarm/trip setpoints set to ensure that the dose requirements in Section 3.0 are not exceeded. The alarm/trip setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in Section 2.1.2.

Applicability: As shown in Table 2-1 .

Action:

a. With the low range radioactive gaseous effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above Requirement, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel, or declare the channel inoperable, or change the setpoint so it is acceptably conservative.

b. With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 2-1. Restore the inoperable instrumentation to OPERABLE status within 30 days or, if unsuccessful, explain in the next Semiannual Radioactive Effluent Release Report why this inoperability was not corrected within the time specified.

2.1.1 Surveillance Requirements:

a. 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 at the frequencies shown in Table 2-2.

TABLE 2-1

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
1. GASEOUS RADWASTE SYSTEM			
a. Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release #RU-12	1	#	35
b. Flow Rate Monitor	1	#	36
2. NOT USED			
3. CONDENSER EVACUATION SYSTEM			
A. Low Range Monitors			
a. Noble Gas Activity Monitor #RU-141	1	1, 2, 3***, 4***	37
b. Iodine Sampler	1	1, 2, 3***, 4***	40
c. Particulate Sampler	1	1, 2, 3***, 4***	40
d. Flow Rate Monitor	1	1, 2, 3***, 4***	36
e. Sampler Flow Rate Measuring Device	1	1, 2, 3***, 4***	36
B. High Range Monitors			
a. Noble Gas Activity Monitor #RU-142	1	1, 2, 3***, 4***	42
b. Iodine Sampler	1	1, 2, 3***, 4***	42
c. Particulate Sampler	1	1, 2, 3***, 4***	42
d. Sampler Flow Rate Measuring Device	1	1, 2, 3***, 4***	42
4. PLANT VENT SYSTEM			
A. Low Range Monitors			
a. Noble Gas Activity Monitor #RU-143	1	*	37
b. Iodine Sampler	1	*	40
c. Particulate Sampler	1	*	40
d. Flow Rate Monitor	1	*	36
e. Sampler Flow Rate Measuring Device	1	*	36

TABLE 2-1 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
4. PLANT VENT SYSTEM (Continued)			
B. High Range Monitors			
a. Noble Gas Activity Monitor #RU-144	1	*	42
b. Iodine Sampler	1	*	42
c. Particulate Sampler	1		42
d. Sampler Flow Rate Measuring Device	1	*	42
5. FUEL BUILDING VENTILATION SYSTEM			
A. Low Range Monitors			
a. Noble Gas Activity Monitor #RU-145	1	##	37,41
b. Iodine Sampler	1	##	40
c. Particulate Sample	1	##	40
d. Flow Rate Monitor	1	##	36
e. Sampler Flow Rate Measuring Device	1	##	36
B. High Range Monitors			
a. Noble Gas Activity Monitor #RU-146	1	##	41,42
b. Iodine Sampler	1	##	42
c. Particulate Sample	1	##	42
d. Sampler Flow Rate Measuring Device	1	##	42

CONTROLLED DOCUMENT

Table 2-1 (Continued)

TABLE NOTATION

* At all times.
** During GASEOUS RADWASTE SYSTEM operation
*** Whenever the condenser air removal system is in operation, or whenever turbine glands are being supplied with steam from sources other than the auxiliary boiler(s).
# During waste gas release.
In MODES 1, 2, 3, and 4 or when irradiated fuel is in the fuel storage pool.

ACTION 35 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) may be released to the environment provided that prior to initiating the release:

a. At least two independent samples of the tanks contents are analyzed, and

b. At least two technically qualified members of the facility staff independently verify the release rate calculations and discharge valve lineup;

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 36 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours.

ACTION 37 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the actions of (a) or (b) or (c) are performed:

a. Initiate the Preplanned Alternate Sampling Program to monitor the appropriate parameter(s).

b. Place moveable air monitors in-line.

c. Take grab samples at least once per 12 hours.

ACTION 38 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, immediately suspend PURGING of radioactive effluents via this pathway.

ACTION 39 - NOT USED

Table 2-1 (Continued)

TABLE NOTATION

ACTION 40 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the effected pathway may continue provided samples are continuously collected with auxiliary sampling equipment as required in Table 3-1 within one hour after the channel has been declared inoperable.

ACTION 41 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirements, comply with the ACTION b of Technical Specification 3.9.12 or operate the fuel building essential ventilation system while moving irradiated fuel.

ACTION 42 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement restore the channel to OPERABLE status within 72 hours or:

a. Initiate the Preplanned Alternate Sampling Program to monitor the appropriate parameter(s) when it is needed.

b. Prepare and submit a Special Report to the Commission pursuant to Technical Specification 6.9.2 within 30 days following the event outlining the action(s) taken, the cause of the inoperability, and the plans and schedule for restoring the system to OPERABLE status.

Note:

Action item numbering and instrument numbering are the same as in the Technical Specifications from which this section was taken to avoid potential confusion. Thus not all action item numbers will be found in this ODCM.

TABLE 2-2

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODE IN WHICH SURVEILLANCE IS REQUIRED
1. GASEOUS RADWASTE SYSTEM					
a. Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release RU-12	P	P(7)	R(3)	Q(1),(2),P###	#
b. Flow Rate Monitor	P	N.A.	R	Q,P###	#
2. DELETED					
3. CONDENSER EVACUATION SYSTEM (RU-141 and RU-142)					
a. Noble Gas Activity Monitor	D(5)	M(7)	R(3)	Q(2)	1,2,3***, 4***
b. Iodine Sampler	N.A.	N.A.	N.A.	N.A.	1,2,3***, 4***
c. Particulate Sampler	N.A.	N.A.	N.A.	N.A.	1,2,3***, 4***
d. Flow Rate Monitor	D(6)	N.A.	R	Q	1,2,3***, 4***
e. Sampler Flow Rate Measuring Device	D(6)	N.A.	R	Q	1,2,3***, 4***
4. PLANT VENT SYSTEM (RU-143 and RU-144)					
a. Noble Gas Activity Monitor	D(5)	M(7)	R(3)	Q(2)	*
b. Iodine Sampler	N.A.	N.A.	N.A.	N.A.	*
c. Particulate Sampler	N.A.	N.A.	N.A.	N.A.	*
d. Flow Rate Monitor	D(6)	N.A.	R	Q	*
e. Sampler Flow Rate Measuring Device	D(6)	N.A.	R	Q	*
5. FUEL BUILDING VENTILATION SYSTEM (RU-145 and RU-146)					
a. Noble Gas Activity Monitor	D(5)	M(7)	R(3),	Q(2)	##
b. Iodine Sampler	N.A.	N.A.	N.A.	N.A.	##
c. Particulate Sampler	N.A.	N.A.	N.A.	N.A.	##
d. Flow Rate Monitor	D(6)	N.A.	R	Q	##
e. Sampler Flow Rate Measuring Device	D(6)	N.A.	R	Q	##

Table 2-2 (Continued)

TABLE NOTATION

* At all times.
** During GASEOUS RADWASTE SYSTEM operation
*** Whenever the condenser air removal system is in operation, or whenever turbine glands are being supplied with steam from sources other than the auxiliary boiler(s).
# During waste gas release.
In MODES 1, 2, 3, and 4 or when irradiated fuel is in the fuel storage pool.
Functional test should consist of, but not be limited to, a verification of system isolation capability by the insertion of a simulated alarm condition.

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway occurs if the instrument indicates measured levels above the alarm/trip setpoint.

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exists:

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 initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology(NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.

(4) NOT USED

(5) The channel check for channels in standby status shall consist of verification that the channel is on-line and reachable .

(6) Daily channel check not required for flow monitors in standby status.

(7) LED may be utilized as the check source in lieu of a source of increased activity.

Note: Action item numbering and instrument numbering are the same as in the Technical Specifications from which this section was taken to avoid potential confusion. Thus not all action item numbers will be found in this ODCM.

2.1.2 Implementation of the Requirements:

The general methodology for establishing low range gaseous effluent monitor setpoints is based upon a site release rate limit in μCi/sec derived from site specific meteorological dispersion conditions, radioisotopic distribution, and whole body and skin dose factors. The high alarm of the low range monitors will alarm/trip when the release rate from an individual vent will result in exceeding the limits in Section 3.1. 80% of Section 3.1 limits is considered to be the site release rate limit. The site release rate limit will be allocated among the licensed units' release points. The unit release rate limit will then be utilized for the determination of gaseous effluent monitor setpoints. A fraction of the unit release rate limit is then allotted to each release point and its monitor alert setpoint (μCi/cc) is derived using actual or fan design flow rates.

Administrative values are used to reduce each setpoint to account for the potential activity in other releases. These administrative values shall be reviewed based on actual release data.

For the purpose of implementation of Section 2.1, the alarm setpoint levels for low range effluent noble gas monitors are established to ensure that personnel are alerted when the noble gas releases are at a rate such that if the releases would continue for the year they would approach the total body dose rate of 500 mrem/yr and 3000 mrem/yr skin dose in Section 3.1. The equations in Section 3.1 of this manual provide the methodology for calculating the gaseous effluent dose rate.

The evaluation of doses due to releases of radioactive material can be simplified by the use of equivalent dose factors as defined in Section 2.2.1.

The equivalent dose factors will be evaluated periodically to assure that the best information on isotopic distribution is being used for the dose equivalent value.

2.1.2.1 Equivalent Dose Factor Determination

The equivalent whole body dose factor is calculated as follows:

$$K_{eq} = \sum [(K_i)(f_i)] \quad (2\text{-}1)$$

Where:

K_{eq} = the equivalent whole body dose factor weighted by historical radionuclide distribution in releases in mrem/yr per $\mu Ci/m^3$.

K_i = the whole body dose factor due to gamma emissions for each identified noble gas radionuclide i, in mrem/yr per $\mu Ci/m^3$ from Table 3-3.

f_i = the fraction of noble gas radionuclide i in the total noble gas radionuclide mix.

The equivalent skin dose factor is calculated as follows:

$$(L+1.1M)_{eq} = \sum[(L_i + 1.1M_i)(f_i)] \quad (2\text{-}2)$$

Where:

$(L+1.1M)_{eq}$ = the equivalent skin dose factor due to beta and gamma emissions from all noble gases released, weighted by the historical radionuclide distribution in releases in mrem/yr per $\mu Ci/m^3$.

L_i = the skin dose factor due to the beta emissions for each identified noble gas radionuclide i, in mrem/yr per $\mu Ci/m^3$ from Table 3-3.

M_i = the air dose factor due to gamma emissions for each identified noble gas radionuclide i, in mrad/yr per $\mu Ci/m^3$ from Table 3-3.

f_i = the fraction of noble gas radionuclide i in the total noble gas radionuclide mix.

1.1 = unit conversion constant of 1.1 mrem/mrad converts air dose to skin dose.

2.1.2.2 Site Release Rate Limit (Q_{SITE})

The release rates corresponding to 80% of the whole body (Q_{WB}) and skin (Q_{SK}) dose rate limits are calculated using the equivalent dose factors defined in Section 2.1.2.1. The site release rate limit (Q_{SITE}) is the lower of Q_{WB} or Q_{SK}, thus assuring that the more restrictive dose rate limit will not be exceeded.

The Q_{SITE} is established as follows:

$$Q_{SITE,WB} = \frac{(D_{WB})\ (0.8)}{(K_{eq})\ (X/Q)_{SITE}} \qquad (2\text{-}3)$$

Where:

$Q_{SITE,WB}$ = the site release rate, in μCi/sec, that would deliver a dose rate 80% of the whole body dose rate limit, D_{WB}.

D_{WB} = whole body dose rate limit of 500 mrem/yr.

K_{eq} = equivalent whole body dose factor, in mrem/yr per μCi/m^3 weighted by the historical radionuclide distribution.

$(X/Q)_{SITE}$ = 8.91E-06, the highest calculated annual average dispersion parameter, in sec/m^3, at the Site Boundary for any of the 3 units, from Table 3-2.

0.8 = administrative factor to compensate for any unexpected variability in the radionuclide mix and to ensure that Site Boundary dose rate limits will not be exceeded.

$$Q_{SITE,SK} = \frac{(D_{SK})\ (0.8)}{(L+1.1M)_{eq}\ (X/Q)_{SITE}} \qquad (2\text{-}4)$$

Where:

$Q_{SITE,SK}$ = the site release rate limit, in μCi/sec, that would deliver a dose rate 80% of the skin dose rate limit, D_{SK}.

D_{SK} = skin dose rate limit of 3000 mrem/yr.

$(L+1.1M)_{eq}$ = equivalent skin dose factor, in mrem/yr per μCi/m^3, weighted by the radionuclide distribution.

$(X/Q)_{SITE}$ = 8.91E-06, the highest calculated annual average dispersion parameter, in sec/m^3, at the Site Boundary for any of the three units, from Table 3-2.

0.8 = administrative factor to compensate for any unexpected variability in the radionuclide mix and to ensure that Site Boundary dose rate limits will not be exceeded.

After determination of the Q_{SITE} whole body and skin dose rates (equations 2-3 and 2-4, respectively), the most conservative result will be used as Q_{SITE}, the site release rate limit.

2.1.2.3 Unit Release Rate Limits (Q_{UNIT})

Typically Q_{SITE} will be divided equally among operating units. If operational history dictates a larger fraction of the Q_{SITE} be assigned to a specific unit then a weighted average of each unit's contribution to the Q_{SITE} will be utilized to determine the Q_{UNIT}.

$$Q_{UNIT} = (f_{UNIT})\ (Q_{SITE}) \qquad (2\text{-}5)$$

where:

Q_{UNIT} = unit release rate limit, in μCi/sec.

f_{UNIT} = the fraction (≤ 1) of noble gas historically released from a specific operating unit to the total of all noble gas released from the site.

Q_{SITE} = the site release rate limit, in μCi/sec determined in section 2.1.2.2.

2.1.2.4 Setpoint Determination

To comply with the requirements in Section 2.1, the alarm/trip setpoints can now be established using the unit release rate limit (Q_{UNIT}) to ensure that the noble gas releases do not exceed the dose rate limits.

To allow for multiple sources of releases from different or common release points, the effluent monitor setpoint includes an administrative factor which allocates a percentage of the unit release rate limit to each of the release sources. Monitor setpoints will also be adjusted in accordance with Station Manual Procedures to account for monitor-specific characteristics.

Monitors RU-141, RU-143, and RU-145

The alarm/trip setpoint for Monitors RU-141, RU-143, and RU-145 is calculated as follows:

$$\text{Monitor Setpoint} \leq \frac{(Q_{UNIT})\,(a)}{(472)\,(\text{Flow Rate})} \qquad (2\text{-}6)$$

Where:

Monitor Setpoint = the setpoint for the effluent monitor, in μCi/cc, which provides a safe margin of assurance that the allowable dose rate limits will not be exceeded.

Q_{UNIT} = unit release rate limit, in μCi/sec, as determined in Section 2.1.2.3.

Flow Rate = the flow rate, in cfm, from flow rate monitors or the fan design flow rate for the release source under consideration.

472 = conversion factor, cubic centimeter/second per cubic feet/minute.

a = fraction of Q_{UNIT} allocated for a specific release point. The sum of these administrative values shall be less than or equal to one.

Monitor RU-12

The alarm/trip setpoint for Monitor RU-12, the Waste Gas Decay Tank Monitor, is calculated as follows:

$$\text{Monitor setpoint} \leq \frac{[(Q_{UNIT})(a)(0.9)-(H)(PF)(472)]}{(\text{Flow Rate})(472)} \qquad (2\text{-}7)$$

Where:

Monitor Setpoint = the setpoint for the monitor, in μCi/cc at STP, which provides a safe margin of assurance that the allowable dose rate limits will not be exceeded.

Q_{UNIT} = unit release rate limit, in μCi/sec, as determined in Section 2.1.2.3.

Flow Rate = flow rate, in cfm at STP at which the tank will be released.

PF = the current process flow of the plant vent in CFM.

H = the current plant vent monitor concentration in μCi/cc.

a = fraction of Q_{UNIT} allocated for a specific release point. This administrative value should be equal to or less than the administrative value used for the Plant Vent.

0.9 = an administrative value to account for potential increases in activity from other contributors to the same release point.

472 = conversion factor, cubic centimeter/second per cubic feet/minute.

If there is no release associated with this monitor, the monitor setpoint should be established as close as practical to background to prevent spurious alarms, and yet assure an alarm should an inadvertent release occur.

2.1.2.5 Monitor Calibration

The Radiation Level Conversion Factor (RLF) for each monitor is entered into the Radiation Monitoring System Database and may change whenever the monitor is calibrated. Calibration is performed in accordance with Station Manual Procedures.

The typical calibration conversion factor for the Plant Vent Airborne Monitor (RU-143), Condenser Evacuation Monitor (RU-141), and Fuel Building Vent Exhaust (RU-145) is based on the detector energy response curve (Figure 2-1) and the FSAR source term.

The typical calibration conversion factor for the Waste Gas Decay Tank Monitor (RU-12) is based on the detector energy response curve (Figure 2-2) and the FSAR source term decayed for forty five (45) days.

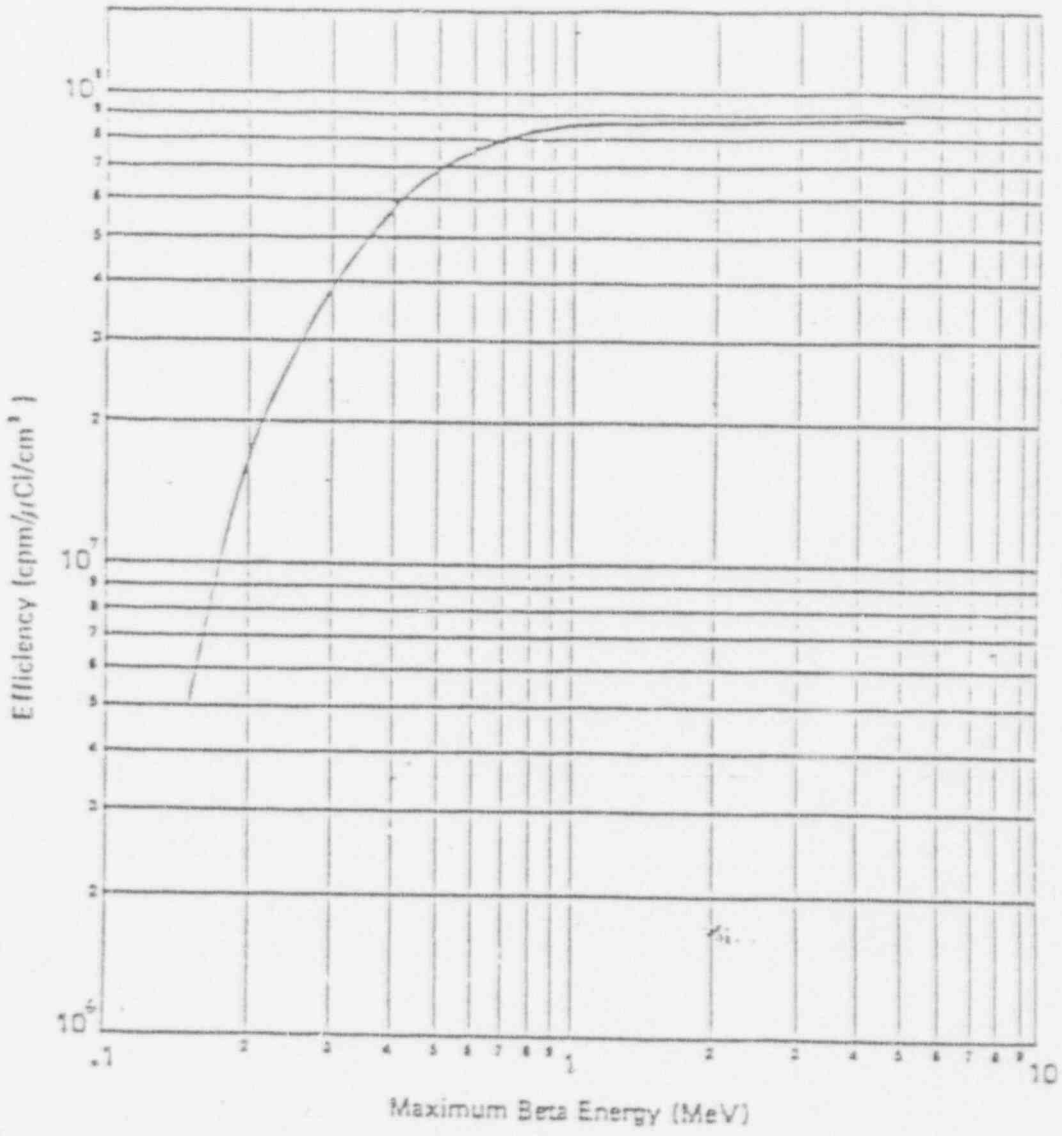


FIGURE 2-1

CALIBRATION CURVE FOR PVNGS EFFLUENT MONITORS RU-141, RU-143, AND RU-145. RESPONSE TO NOBLE GAS

Reference: Kaman Instrumentation Corporation Calibration Report K-82-50-U(R)

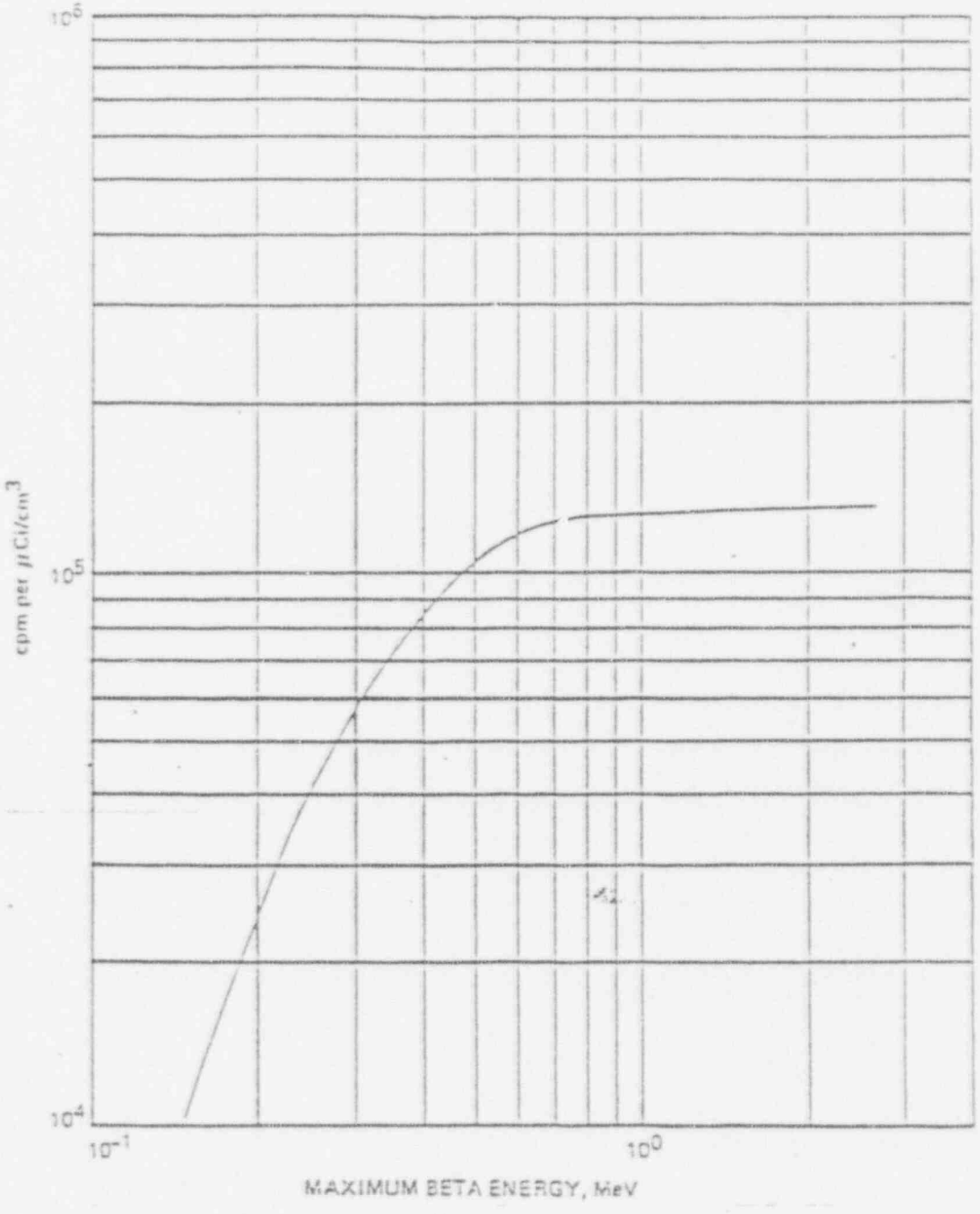


FIGURE 2-2

CALIBRATION CURVE FOR PVNGS MONITOR RU-12.
RESPONSE to NOBLE GAS

Reference: Kaman Instrumentation Corporation Calibration Report K-83-30-U(R)

3.0 Gaseous and Liquid Effluent Dose Rates

3.1 Requirements: Gaseous Effluents

The dose rate due to radioactive materials released in gaseous effluents from the site (see Figures 6-4 and 6-5) shall be limited to the following:

a. For noble gases: Less than or equal to 500 mrems/yr to the total body and less than or equal to 3000 mrems/yr to the skin, and

b. For I-131 and I-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to 1500 mrems/yr to any organ.

Applicability: At all times.

Action:

With the dose rate(s) exceeding the above limits, immediately decrease the release rate to within the above limits(s).

3.1.1 Surveillance Requirements:

a. The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methods contained in Section 3.1.2.

b. The dose rate due to I-131, I-133, tritium and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents shall be determined to be within the above limits in accordance with the methods contained in Section 3.1.2 by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 3-1.

3.1.2 Implementation of the Requirements:

Noble Gases

Noble gas activity monitor setpoints are established at release rates which permit corrective action to be taken before exceeding offsite dose rates corresponding to the 10 CFR 20 annual dose limits as described in Section 2.0. The requirements for sampling and analysis of continuous and batch effluent releases are given in Table 3-1. The methods for sampling and analysis of continuous and batch effluent releases are given in the Station Manual Procedures. The dose rate in unrestricted areas shall be determined using the following equations.

For whole body dose rate:

$$D_{WB} = \sum [(K_i)\ (X/Q)_{SITE}\ (Q_i)] \quad (3\text{-}1)$$

For skin dose rate:

$$D_{SK} = \sum [(L_i + 1.1M_i)\ (X/Q)_{SITE}\ (Q_i)] \quad (3\text{-}2)$$

Where:

K_i = the whole body dose factor due to gamma emissions for each identified noble gas radionuclide i, in mrem/yr per μCi/m^3 from Table 3-3.

Q_i = the release rate of radionuclide i, in μCi/sec.

$(X/Q)_{SITE}$ = 8.91E-06, the highest calculated annual average dispersion parameter, in sec/m^3, for any of the three units, from Table 3-2.

D_{WB} = the annual whole body dose rate (mrem/yr.).

L_i = the skin dose factor due to the beta emissions for each identified noble gas radionuclide i, in mrem/yr per μCi/m^3 from Table 3-3.

M_i = the air dose factor due to gamma emissions for each identified noble gas radionuclide i, in mrad/yr per μCi/m^3 from Table 3-3.

D_{SK} = the annual skin dose rate (mrem/yr).

1.1 = unit conversion constant of 1.1 mrem/mrad converts air dose to skin dose.

I-131, I-133, tritium and radionuclides in particulate form with half-lives greater than 8 days

The methods for sampling and analysis of continuous and batch releases for I-131, I-133, tritium and radionuclides in particulate form with half-lives greater than 8 days, are given in the applicable Station Manual procedures. Additional monthly and quarterly analyses shall be performed in accordance with Table 3-1. The total organ dose rate in unrestricted areas shall be determined by the following equation:

$$D_o = \sum [(P_i)(X/Q)_{SITE}(Q_i)] \quad (3\text{-}3)$$

Where:

P_i = the dose factor, in mrem/yr per $\mu Ci/m^3$, for radionuclide i, for the inhalation pathway, from Table 3-4.

$X/Q)_{SITE}$ = 8.91E-06, the highest calculated annual average dispersion parameter, in sec/m^3, at the Site Boundary, for any of the three units,

Q_i = the release rate of radionuclide i, in $\mu Ci/sec$

D_o = the total organ dose rate (mrem/yr).

CONTROLLED DOCUMENT

TABLE 3-1

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

GASEOUS RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD) (μCi/ml)[a]
A. Waste Gas Storage	P Each Tank Grab Sample	P Each Tank	Principal Gamma Emitters[g]	1.0E-04
B. Containment Purge	P Each Purge[b,c] Grab Sample	P Each Purge[b,c]	Principal Gamma Emitters[g]	1.0E-04
			H-3	1.0E-06
C. 1. Condenser Vacuum Pump Exhaust 2. Plant Vent 3. Fuel Bldg. Exhaust	M [b,c] Grab Sample	M[b]	Principal Gamma Emitters[g]	1.0E-04
			H-3	1.0E-06
	Continuous[f]	4/M[d] Charcoal Sample	I-131	1.0E-12
			I-133	1.0E-10
	Continuous[f]	4/M[d] Particulate Sample	Principal Gamma Emitters[g] (I-131, Others)	1.0E-11
	Continuous[f]	M Composite Particulate Sample	Gross Alpha	1.0E-11
	Continuous[f]	Q Composite Particulate Sample	Sr-89, Sr-90	1.0E-11
D. All Radwaste Types as listed in A., B., and C. above.	Continuous[f]	Noble Gas Monitor	Noble Gases Gross Beta or Gamma	1.0E-06

Table 3-1 (Continued)

TABLE NOTATION

a. The LLD is the smallest concentration of radioactive material in a sample that will yield a net 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 system (which may include radiochemical separation):

$$LLD = \frac{4.66\ s_b}{E * V * 2.22E6 * Y * \exp(-\lambda \Delta t)}$$

Where:

LLD is the a priori lower limit of detection as defined above (as μCi per unit mass or volume). Current literature defines the LLD as the detection capability for the instrumentation only and the MDC minimum detectable concentration, as the detection capability for a given instrument, procedure and type of sample.

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

E is the counting efficiency (as counts per transformation),

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

2.22E6 is the number of transformations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

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

Δt is the elapsed time between the midpoint of sample collection and time of counting (for plant effluents, not environmental samples).

The value of s_b used in the calculation of the LLD for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry the background should include the typical contributions of other radionuclides normally present in the samples. Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement*.

* For a more complete discussion of the LLD, and other detection limits, see the following:

(1) HASL Procedures Manual, HASL-300 (revised annually).

(2) Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination -Application to Radiochemistry" Anal. Chem. 40, 586-93 (1968).

(3) Hartwell, J. K., "Detection Limits for Radioisotopic Counting Techniques", Atlantic Richfield Hanford Company Reports ARH-2537 (June 22, 1972).

Table 3-1 (Continued)

TABLE NOTATION

b Analyses shall also be performed following SHUTDOWN, STARTUP, or a THERMAL POWER change exceeding 15% of the RATED THERMAL POWER within a 1-hour period if 1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the primary coolant has increased more than a factor of 3; and 2) the noble gas activity monitor on the plant vent shows that effluent activity has increased by more than a factor of 3. If the associated noble gas vent monitor is inoperable, samples must be obtained as soon as possible. Analyses shall be performed within a four-hour period. This requirement does not apply to the Fuel Building Exhaust.

c Sampling and analyses shall also be performed at least once per 31 days when purging time exceeds 30 days continuous.

d Samples shall be changed at least 4 times a month and analyses shall be completed within 48 hours after changing (or after removal from sampler). When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10.

e Tritium grab samples shall be taken at least monthly from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.

f 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 Requirements 3.1, 4.1 and 4.2 of the ODCM.

g The principal gamma emitters for which the LLD specification applies include 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 in the Semiannual Radioactive Effluent Release Report.

TABLE 3-2

DISPERSION AND DEPOSITION PARAMETERS FOR LONG TERM RELEASES
AT THE SITE BOUNDARY

	UNIT 1			UNIT 2			UNIT 3		
DIRECTION	DISTANCE (METERS)	X/Q (SEC/m^3)	D/Q (m^{-2})	DISTANCE (METERS)	X/Q (SEC/m^3)	D/Q (m^{-2})	DISTANCE (METERS)	X/Q (SEC/m^3)	D/Q (m^{-2})
N	1037	4.93E-06	9.24E-09	1318	3.85E-06	6.17E-09	1661	3.54E-06	4.86E-09
NNE	1057	4.14E-06	1.19E-08	1342	3.18E-06	7.93E-09	1693	2.86E-06	6.23E-09
NE	2206	2.84E-06	6.84E-09	2545	2.42E-06	5.34E-09	2756	2.21E-06	4.65E-09
ENE	1967	2.51E-06	4.43E-09	2206	2.22E-06	3.64E-09	2337	2.08E-06	3.30E-09
E	1927	2.56E-06	3.24E-09	2163	2.27E-06	2.66E-09	2290	2.14E-06	2.41E-09
ESE	1967	2.61E-06	2.46E-09	2067	2.32E-06	2.11E-09	2023	2.37E-06	2.10E-09
SE	2049	3.56E-06	2.36E-09	2101	3.47E-06	2.26E-09	2256	3.24E-06	2.00E-09
SSE	2730	3.80E-06	1.58E-09	3026	3.43E-06	1.32E-09	2786	3.72E-06	1.52E-09
S	3006	5.07E-06	1.78E-09	2699	5.16E-06	1.97E-09	2346	5.90E-06	2.51E-09
SSW	2258	6.52E-06	3.20E-09	1836	7.90E-06	4.56E-09	1607	8.91E-06	5.73E-09
SW	1487	7.47E-06	5.65E-09	1208	7.72E-06	6.88E-09	1057	8.68E-06	8.61E-09
WSW	1251	4.52E-06	5.93E-09	1014	5.55E-06	8.44E-09	889	5.34E-06	8.83E-09
W	1225	4.73E-06	9.49E-09	993	5.86E-06	1.34E-08	871	6.72E-06	1.67E-08
WNW	1244	3.76E-06	6.76E-09	1010	4.67E-06	9.60E-09	885	5.37E-06	1.19E-08
NW	1254	3.43E-06	5.87E-09	1191	3.62E-06	6.40E-09	1045	4.17E-06	7.98E-09
NNW	1069	3.70E-06	7.26E-09	1342	2.85E-06	4.87E-09	1561	2.93E-06	4.58E-09

Reference: Distances are from the PVNGS ER-OL, Table 2.3-33. Dispersion and Deposition parameters are from a September, 1985, calculation by NUS Corporation based on 9 years of meteorological data; NUS Corporation letter NUS-ANPP-1386, dated October 4, 1985.

TABLE 3-3

DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS

Radionuclide	Whole Body Dose Factor K_i mrem-m³/yr-μCi	Skin Dose Factor L_i mrem-m³/yr-μCi	Gamma Air Dose Factor M_i mrad-m³/yr-μCi	Beta Air Dose Factor N_i mrad-m³/yr-μCi
Kr-83m	7.56E-02	----------	1.93E+01	2.88E+02
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.97E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01	1.95E+03
Kr-87	5.92E+03	9.73E+03	6.17E+03	1.03E+04
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.93E+03
Kr-89	1.66E+04	1.01E+04	1.73E+04	1.06E+04
Kr-90	1.56E+04	7.29E+03	1.63E+04	7.83E+03
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.11E+03
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.48E+03
Xe-133	2.94E+02	3.06E+02	3.53E+02	1.05E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03	7.39E+02
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.46E+03
Xe-137	1.42E+03	1.22E+04	1.51E+03	1.27E+04
Xe-138	8.83E+03	4.13E+03	9.21E+03	4.75E+03
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.28E+03

Reference: Regulatory Guide 1.109, Table B-1.

Table 3-4

P_i Values for the Inhalation Pathway (mrem/yr/μCi/m^3)

NUCLIDE	Age Group	Organ	P_i
H-3	TEEN	LIVER	1.27E+03
CR-51	TEEN	LUNG	2.10E+04
MN-54	TEEN	LUNG	1.98E+06
FE-59	TEEN	LUNG	1.53E+06
CO-58	TEEN	LUNG	1.34E+06
CO-60	TEEN	LUNG	8.72E+06
ZN-65	TEEN	LUNG	1.24E+06
SR-89	TEEN	LUNG	2.42E+06
SR-90	TEEN	BONE	1.08E+08
ZR-95	TEEN	LUNG	2.69E+06
SB-124	TEEN	LUNG	3.85E+06
I-131	CHILD	THYROID	1.62E+07
I-133	CHILD	THYROID	3.85E+06
CS-134	TEEN	LIVER	1.13E+06
CS-137	CHILD	BONE	9.07E+05
BA-140	TEEN	LUNG	2.03E+06
CE-141	TEEN	LUNG	6.14E+05
CE-144	TEEN	LUNG	1.34E+07

3.2 Requirements: Secondary System Liquid Waste Discharges To Onsite Evaporation Ponds - Concentration

The concentration of radioactive material discharged from secondary system liquid waste to the onsite evaporation ponds shall be limited to the lower limit of detectability (LLD) defined as 5.0E-07 μCi/ml for the principal gamma emitters or 1.0E-06 μCi/ml for I-131.

Applicability: MODES 1, 2, 3, and 4.

Action:

When any secondary system liquid waste discharge pathway concentration determined in accordance with the surveillance requirements given below exceeds the specified LLD, divert that discharge pathway to the liquid radwaste system without delay.

3.2.1 Surveillance Requirements:

a. Radioactive liquid wastes collected in the chemical waste neutralizer tank shall be sampled and analyzed prior to their batchwise discharge to the onsite evaporation pond in accordance with the sampling and analysis program specified in Table 3-5.

b. With the concentration of radioactive material in the chemical waste neutralizer tank exceeding the specified LLD, sample and analyze other secondary system discharge pathways in accordance with the sampling and analysis program specified in Table 3-5.

3.2.2 Implementation of the Requirements:

This requirement is implemented by station manual procedures.

TABLE 3-5

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

SECONDARY SYSTEM LIQUID RELEASE PATHWAY	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD)* (μCi/ml)
A. Batch discharges[b]				
1. Chemical Waste Neutralizer Tank	P Each Batch	P Each Batch	Principal Gamma Emitters[c]	5.0E-07
			I-131	1.0E-06
2. Steam Generator Blowdown Low TDS Sump*	P Each Batch	P Each Batch	Principal Gamma Emitters[c]	5.0E-07
			I-131	1.0E-06
3. Condensate Polishing Low TDS Sump*	P Each Batch	P Each Batch	Principal Gamma Emitters[c]	5.0E-07
			I-131	1.0E-06
B. Continuous Releases[d]				
1. Turbine Building Sump*	D Grab Sample	D Grab Sample	Principal Gamma Emitters[c]	5.0E-07
			I-131	1.0E-06
2. Condenser Area Sumps*	D Grab Sample	D Grab Sample	Principal Gamma Emitters[c]	5.0E-07
			I-131	1.0E-06

* Sampling and analysis for pathways 2 and 3 under batch discharges and 1 and 2 under continuous releases are required only when concentration for chemical waste neutralizer tank pathway exceeds the LLD.

Table 3-5 (Continued)

TABLE NOTATION

a. The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net 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 system which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E * V * 2.22E6 * Y * \exp(-\lambda \Delta t)}$$

Where:

LLD is the "a priori" lower limit of detection as defined above as microcuries 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 as counts per minute,

E is the counting efficiency as counts per disintegration,

V is the sample size in units of mass or volume,

2.22E6 is the number of disintegrations per minute per microcurie

Y is the fractional radiochemical yield when applicable,

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

Δt is the elapsed time between midpoint of sample collection and time of counting.

Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

b. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed to assure representative sampling.

c. The principal gamma emitters for which the LLD specification applies include the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, and Ce-141. Ce-144, shall also be measured, but with an LLD of 5.0E-06. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.1.8.

d. A continuous release is the discharge of liquid wastes of a nondiscrete volume, e.g., from a volume of a system that has an input flow during the continuous release.

4.0 Gaseous & Liquid Effluents - Dose

4.1 Requirements: Noble Gases

The air dose due to noble gases released in gaseous effluents, from each reactor unit to areas at and beyond the SITE BOUNDARY (see Figure 6-4 and 6-5) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation and,

b. During any calendar year: Less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.

Applicability: At all times.

Action:

With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

4.1.1 Surveillance Requirements:

a. Cumulative dose contributions for the current calendar quarter and current calendar year for noble gases shall be determined in accordance with the methodology contained in Section 4.1.2 at least once per 31 days.

4.1.2 Implementation of the Requirement: Noble Gas

The air dose in unrestricted areas beyond the site boundary due to noble gases released in gaseous effluents from each unit during any specified time period shall be determined by the following equations:

For gamma radiation:

$$D\,\gamma_u = (3.17E\text{-}08)\ \sum\ [(M_i)\ (X/Q)_{UNIT}(Q_i)] \qquad (4\text{-}1)$$

For beta radiation:

$$D\,\beta_u = (3.17E\text{-}08)\ \sum\ [(N_i)\ (X/Q)_{UNIT}(Q_i)] \qquad (4\text{-}2)$$

Where:

M_i = the air dose factor due to gamma emissions for each identified noble gas radionuclide i, in mrad/yr per μCi/m^3 from Table 3-1.

N_i = the air dose factor due to beta emissions for each identified noble gas radionuclide i, in mrad/yr per μCi/m^3 from Table 3-1.

$(X/Q)_{UNIT}$ = the highest calculated annual average dispersion parameter, in sec/m^3, at the site boundary for the particular unit, from Table 3-2.

= 7.47E-06 from Unit 1
= 7.90E-06 from Unit 2
= 8.91E-06 from Unit 3

$D\,\gamma_u$ = the total gamma air dose, for the particular unit, in mrad, due to noble gases released in gaseous effluents for a specified time period at the SITE BOUNDARY.

$D\,\beta_u$ = the total beta air dose, for the particular unit, in mrad, due to noble gases released in gaseous effluents for a specified time period at the SITE BOUNDARY.

Q_i = the integrated release, from the particular unit, in μCi, of each identified noble gas radionuclide i, in gaseous effluents for a specified time period.

3.17E-08 = the inverse of seconds in a year (yr/sec).

The cumulative gamma air dose and beta air dose for a quarterly or annual evaluation shall be based on the calculated dose contribution from each specified time period occurring during the reporting time period.

4.2 Requirement: Iodine - 131, Iodine-133, Tritium, and All Radionuclides in Particulate Form With Half-Lives Greater Than 8 Days

The dose to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY (see Figures 6-4 and 6-5) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 7.5 mrems to any organ and,

b. During any calendar year: Less than or equal to 15 mrems to any organ.

Applicability: At all times.

Action:

With the calculated dose from the release of iodine-131, iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

4.2.1 Surveillance Requirements:

a. Cumulative dose contributions for the current calendar quarter and current calendar year for iodine-131, iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with the methodology and parameters contained in Section 4.2.2 at least once per 31 days.

4.2.2 Implementation of the Requirement

The organ dose to an individual from I-131, I-133, tritium, and all radionuclides in particulate form, with half-lives greater than eight days, in gaseous effluents released to unrestricted areas from each reactor unit is calculated using the following expressions:

$$D_{\alpha\omega} = (3.17E\text{-}08) \sum [\sum_i (R_{ik} W_i) (Q_i)] \quad (4\text{-}3)$$

Where:

$D_{\alpha\omega}$ = the total accumulated organ dose from gaseous effluents for a particular unit, to a MEMBER OF THE PUBLIC, in mrem, at the SITE BOUNDARY or at the controlling location.

Q_i = the quantity of radionuclide i, in μCi, released in gaseous effluents from a particular unit.

R_{ik} = the dose factor for each identified radionuclide i, for pathway k (for the inhalation pathway in mrem/yr per $\mu Ci/m^3$ and for the food and ground plane pathways in m^2 - mrem/yr per μCi/sec, except H-3, which has units of mrem/yr per $\mu Ci/m^3$) at the controlling location. The R_{ik}'s for each age group are given in Tables 4-1 through 4-15.

3.17E-08 = the inverse of seconds per year (yr/sec).

W_i = the highest annual average dispersion or deposition parameter for the particular unit, used for estimating the dose at the site boundary or to a MEMBER OF THE PUBLIC at the controlling location for the particular unit.

= $(X/Q)_{UNIT}$, in sec/m^3 for the inhalation pathway and for all tritium calculations, for organ dose at the site boundary, from Table 3-2.

= 7.47E-06 from Unit 1
= 7.90E-06 from Unit 2
= 8.91E-06 from Unit 3

= $(X/Q)_{UNIT}$, in sec/m^3 for the inhalation pathway and for all tritium calculations, for organ dose at the controlling location, from Table 4-16.

= 2.92E-06 from Unit 1
= 2.19E-06 from Unit 2
= 2.31E-06 from Unit 3

= $(D/Q)_{UNIT}$, in m^{-2}, for the food and ground plane pathways, for organ dose at the site boundary, from Table 3-2.

= 1.19E-08 from Unit 1
= 1.34E-08 from Unit 2
= 1.67E-08 from Unit 3

= $(D/Q)_{UNIT}$, in m^{-2}, for the food and ground plane pathways, for organ dose at the controlling location, from Table 4-16.

= 3.25E-09 from Unit 1
= 3.88E-10 from Unit 2
= 4.21E-10 from Unit 3

Residences, vegetable gardens and milk animals located within 5 miles of the site will be identified during the annual land use census. The controlling pathway and location will be identified and will be used for all MEMBER OF THE PUBLIC dose evaluations.

The R_i values were calculated in accordance with the methodologies in NUREG-0133. The following site specific information was used to calculate R_i:

	Value
The length of the grazing season for milk animals (f_s). Ref. ER-OL, Section 2.1.3.4.3	0.75
The length of the grazing season for meat animals (f_s). Ref. ER-OL, Section 2.1.3.4.4	0.25
The fraction of daily feed derived from pasture while on pasture for milk animals (f_p). Ref. ER-OL, Section 2.1.3.4.3	0.35
The fraction of daily feed derived from pasture while on pasture for meat animals (f_p). Ref. ER-OL, Section 2.1.3.4.3	0.05
The fraction of year vegetables are grown, (f_l) approximation. Ref. ER-OL, Section 2.1.3.4, Table 2.1-8.	0.667
The annual absolute humidity (g/m^3), H, Ref. UFSAR, Table 2.3-16	6

4.3 Requirements: Gaseous Radwaste Treatment

The GASEOUS RADWASTE SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent air doses due to gaseous effluent releases, from each reactor unit, from the site (see Figures 6-4 and 6-5) when averaged over 31 days, would exceed 0.2 mrad for gamma radiation and 0.4 mrad for beta radiation. The VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected doses due to gaseous effluent releases, from each reactor unit, to areas at and beyond the SITE BOUNDARY (see Figures 6-4 and 6-5) when averaged over 31 days would exceed 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

Applicability: At all times:

Action:

With radioactive gaseous waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report which includes the following information:

a. Identification of the inoperable equipment or subsystems and the reason for inoperability,

b. Action(s) taken to restore the inoperable equipment to OPERABLE status, and

c. Summary description of action(s) taken to prevent a recurrence.

4.3.1 **Surveillance Requirements:**

a. Doses due to gaseous releases from the site shall be projected at least once per 31 days, in accordance with the methodology and parameters in Section 4.3.2.

4.3.2 **Implementation of the Requirement**

Where possible, consideration for expected operational evolutions (i.e., outages, etc.) should be taken in the dose projections.

Dose Projection- Noble Gases

The air dose, in mrads for the current quarter is determined using the methodology described in Section 4.1.2. This information is used to determine an air dose projection for the next 31 days using the following equations:

For gamma radiation:

$$31 \text{ day } \gamma = (D\gamma \text{ qtr}/T\text{qtr})\ 31 + CD\gamma \quad (4\text{-}4)$$

For beta radiation:

$$31 \text{ day } \beta = (D\beta \text{ qtr}/T\text{qtr})\ 31 + CD\beta \quad (4\text{-}5)$$

Where:

$D\gamma$ qtr = the total gamma air dose due to noble gases released in gaseous effluents for the current quarter, in mrads, at the site boundary.

$D\beta$ qtr = the total beta air dose due to noble gases released in gaseous effluents for the current quarter, in mrads, at the site boundary.

Tqtr = the time period, in days, over which $D\gamma$ qtr and $D\beta$ qtr were integrated.

31 = the number of days over which the dose projections are made.

31 day γ = the 31 day projected gamma air dose due to noble gases released in gaseous effluents, in mrads, at the site boundary.

31 day β = the 31 day projected beta air dose due to noble gases released in gaseous effluents, in mrads, at the site boundary.

$CD\gamma$ = any current or projected gamma air dose, in mrads, due to noble gases released in gaseous effluents, which could have a significant impact on 31 day γ.

$CD\beta$ = any current or projected beta air dose, in mrads, due to noble gases released in gaseous effluents, which could have a significant impact on 31 day β.

Dose Projection - I-131, I-133, tritium, and all radionuclides in particulate form with half-lives greater than eight days

The organ dose, in mrem, for a particular unit, for the current quarter is determined using the methodology described in Section 4.2.2 of this manual. This information is used to determine an organ dose projection for the next 31 days using the following equation:

$$31day_o = (D_o\ qtr/Tqtr)31 + CD_o \qquad (4\text{-}6)$$

where:

D_o qtr = the total organ dose from a particular unit due to I-131, I-133, tritium, and all radionuclides in particulate form with half-lives greater than eight days, released in gaseous effluents for the current quarter, in mrem.

Tqtr = the time period, in days, over which $D_o$qtr was integrated.

31 = the number of days over which the dose projections are made.

31 day_o = the 31 day projected organ dose, in mrem, from a particular unit.

CD_o = any current or projected organ dose for a particular unit, in mrem, which could have a significant impact on 31 day_o.

TABLE 4-1

Ri DOSE CONVERSION FACTORS FOR THE GROUND PLANE PATHWAY

NUCLIDE	T. BODY	SKIN
H-3	0.00E+00	0.00E+00
CR-51	4.66E+06	5.51E+06
MN-54	1.39E+09	1.63E+09
FE-59	2.73E+08	3.21E+08
CO-58	3.79E+08	4.44E+08
CO-60	2.15E+10	2.53E+10
ZN-65	7.47E+08	8.59E+08
SR-89	2.16E+04	2.51E+04
SR-90	0.00E+00	0.00E+00
ZR-95	2.45E+08	2.84E+08
SB-124	5.98E+08	6.90E+08
I-131	1.72E+07	2.09E+07
I-133	2.45E+06	2.98E+06
CS-134	6.86E+09	8.00E+09
CS-137	1.03E+10	1.20E+10
BA-140	2.05E+07	2.35E+07
CE-141	1.37E+07	1.54E+07
CE-144	6.95E+07	8.04E+07

TABLE 4-2

Ri DOSE CONVERSION FACTORS FOR THE VEGETATION PATHWAY - ADULT RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	2.87E+03	2.87E+03	2.87E+03	2.87E+03	2.87E+03	2.87E+03
CR-51	0.00E+00	0.00E+00	4.00E+04	2.39E+04	8.82E+03	5.31E+04	1.01E+07
MN-54	0.00E+00	2.97E+08	5.66E+07	0.00E+00	8.83E+07	0.00E+00	9.09E+08
FE-59	1.14E+08	2.68E+08	1.03E+08	0.00E+00	0.00E+00	7.49E+07	8.93E+08
CO-58	0.00E+00	2.84E+07	6.38E+07	0.00E+00	0.00E+00	0.00E+00	5.76E+08
CO-60	0.00E+00	1.59E+08	3.51E+08	0.00E+00	0.00E+00	0.00E+00	2.99E+09
ZN-65	3.00E+08	9.56E+08	4.32E+08	0.00E+00	6.39E+08	0.00E+00	6.02E+08
SR-89	9.08E+09	0.00E+00	2.61E+08	0.00E+00	0.00E+00	0.00E+00	1.46E+09
SR-90	5.76E+11	0.00E+00	1.41E+11	0.00E+00	0.00E+00	0.00E+00	1.67E+10
ZR-95	1.08E+06	3.47E+05	2.35E+05	0.00E+00	5.45E+05	0.00E+00	1.10E+09
SB-124	9.53E+07	1.80E+06	3.78E+07	2.31E+05	0.00E+00	7.42E+07	2.71E+09
I-131	5.49E+07	7.85E+07	4.50E+07	2.57E+10	1.35E+08	0.00E+00	2.07E+07
I-133	1.39E+06	2.42E+06	7.38E+05	3.56E+08	4.22E+06	0.00E+00	2.17E+06
CS-134	4.44E+09	1.06E+10	8.64E+09	0.00E+00	3.42E+09	1.13E+09	1.85E+08
CS-137	6.06E+09	8.29E+09	5.43E+09	0.00E+00	2.81E+09	9.36E+08	1.60E+08
BA-140	9.43E+07	1.19E+05	6.18E+06	0.00E+00	4.03E+04	6.78E+04	1.94E+08
CE-141	1.73E+05	1.17E+05	1.33E+04	0.00E+00	5.44E+04	0.00E+00	4.48E+08
CE-144	3.12E+07	1.30E+07	1.67E+06	0.00E+00	7.73E+06	0.00E+00	1.05E+10

TABLE 4-3

Ri DOSE CONVERSION FACTORS FOR THE VEGETATION PATHWAY - TEEN RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	3.36E+03	3.36E+03	3.36E+03	3.36E+03	3.36E+03	3.36E+03
CR-51	0.00E+00	0.00E+00	5.60E+04	3.11E+04	1.23E+04	7.99E+04	9.41E+06
MN-54	0.00E+00	4.41E+08	8.74E+07	0.00E+00	1.31E+08	0.00E+00	9.04E+08
FE-59	1.69E+08	3.94E+08	1.52E+08	0.00E+00	0.00E+00	1.24E+08	9.31E+08
CO-58	0.00E+00	4.16E+07	9.59E+07	0.00E+00	0.00E+00	0.00E+00	5.74E+08
CO-60	0.00E+00	2.42E+08	5.45E+08	0.00E+00	0.00E+00	0.00E+00	3.15E+09
ZN-65	4.11E+08	1.43E+09	6.65E+08	0.00E+00	9.12E+08	0.00E+00	6.04E+08
SR-89	1.43E+10	0.00E+00	4.10E+08	0.00E+00	0.00E+00	0.00E+00	1.70E+09
SR-90	7.30E+11	0.00E+00	1.80E+11	0.00E+00	0.00E+00	0.00E+00	2.05E+10
ZR-95	1.64E+06	5.17E+05	3.56E+05	0.00E+00	7.60E+05	0.00E+00	1.19E+09
SB-124	1.47E+08	2.70E+06	5.73E+07	3.33E+05	0.00E+00	1.28E+08	2.96E+09
I-131	5.29E+07	7.41E+07	3.98E+07	2.16E+10	1.28E+08	0.00E+00	1.47E+07
I-133	1.29E+06	2.19E+06	6.68E+05	3.06E+08	3.84E+06	0.00E+00	1.66E+06
CS-134	6.90E+09	1.62E+10	7.53E+09	0.00E+00	5.16E+09	1.97E+09	2.02E+08
CS-137	9.86E+09	1.31E+10	4.57E+09	0.00E+00	4.46E+09	1.73E+09	1.87E+08
BA-140	1.07E+08	1.31E+05	6.88E+06	0.00E+00	4.44E+04	8.80E+04	1.65E+08
CE-141	2.61E+05	1.74E+05	2.00E+04	0.00E+00	8.19E+04	0.00E+00	4.98E+08
CE-144	5.11E+07	2.12E+07	2.75E+06	0.00E+00	1.26E+07	0.00E+00	1.29E+10

TABLE 4-4

Ri DOSE CONVERSION FACTORS FOR THE VEGETATION PATHWAY - CHILD RECEPTOR

NUCLIDES	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	5.23E+03	5.23E+03	5.23E+03	5.23E+03	5.23E+03	5.23E+03
CR-51	0.00E+00	0.00E+00	1.08E+05	6.02E+04	1.64E+04	1.10E+05	5.75E+06
MN-54	0.00E+00	6.49E+08	1.73E+08	0.00E+00	1.82E+08	0.00E+00	5.45E+08
FE-59	3.79E+08	6.13E+08	3.05E+08	0.00E+00	0.00E+00	1.78E+08	6.38E+08
CO-58	0.00E+00	6.21E+07	1.90E+08	0.00E+00	0.00E+00	0.00E+00	3.62E+08
CO-60	0.00E+00	3.70E+08	1.09E+09	0.00E+00	0.00E+00	0.00E+00	2.05E+09
ZN-65	7.93E+08	2.11E+09	1.31E+09	0.00E+00	1.33E+09	0.00E+00	3.71E+08
SR-89	3.44E+10	0.00E+00	9.83E+08	0.00E+00	0.00E+00	0.00E+00	1.33E+09
SR-90	1.22E+12	0.00E+00	3.09E+11	0.00E+00	0.00E+00	0.00E+00	1.64E+10
ZR-95	3.72E+06	8.17E+05	7.27E+05	0.00E+00	1.17E+06	0.00E+00	8.52E+08
SB-124	3.38E+08	4.39E+06	1.19E+08	7.47E+05	0.00E+00	1.88E+08	2.12E+09
I-131	9.95E+07	1.00E+08	5.68E+07	3.31E+10	1.64E+08	0.00E+00	8.90E+06
I-133	2.36E+06	2.91E+06	1.10E+06	5.41E+08	4.85E+06	0.00E+00	1.17E+06
CS-134	1.57E+10	2.57E+10	5.43E+09	0.00E+00	7.98E+09	2.86E+09	1.39E+08
CS-137	2.34E+10	2.24E+10	3.31E+09	0.00E+00	7.31E+09	2.63E+09	1.40E+08
BA-140	2.20E+08	1.93E+05	1.28E+07	0.00E+00	6.27E+04	1.15E+05	1.11E+08
CE-141	6.15E+05	3.07E+05	4.55E+04	0.00E+00	1.34E+05	0.00E+00	3.83E+08
CE-144	1.24E+08	3.89E+07	6.62E+06	0.00E+00	2.15E+07	0.00E+00	1.01E+10

TABLE 4-5

Ri DOSE CONVERSION FACTORS FOR THE GRASS-COW-MEAT PATHWAY - ADULT RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	4.33E+02	4.33E+02	4.33E+02	4.33E+02	4.33E+02	4.33E+02
CR-51	0.00E+00	0.00E+00	3.44E+02	2.06E+02	7.58E+01	4.57E+02	8.65E+04
MN-54	0.00E+00	2.71E+06	5.18E+05	0.00E+00	8.08E+05	0.00E+00	8.31E+06
FE-59	2.60E+07	6.11E+07	2.34E+07	0.00E+00	0.00E+00	1.71E+07	2.04E+08
CO-58	0.00E+00	2.84E+06	6.36E+06	0.00E+00	0.00E+00	0.00E+00	5.75E+07
CO-60	0.00E+00	2.61E+07	5.76E+07	0.00E+00	0.00E+00	0.00E+00	4.90E+08
ZN-65	9.97E+07	3.17E+08	1.43E+08	0.00E+00	2.12E+08	0.00E+00	2.00E+08
SR-89	3.41E+07	0.00E+00	9.79E+05	0.00E+00	0.00E+00	0.00E+00	5.47E+06
SR-90	4.43E+09	0.00E+00	1.09E+09	0.00E+00	0.00E+00	0.00E+00	1.28E+08
ZR-95	2.68E+05	8.58E+04	5.81E+04	0.00E+00	1.35E+05	0.00E+00	2.72E+08
SB-124	2.67E+06	5.05E+04	1.06E+06	6.48E+03	0.00E+00	2.08E+06	7.59E+07
I-131	1.36E+05	1.94E+05	1.11E+05	6.37E+07	3.33E+05	0.00E+00	5.13E+04
I-133	4.56E-03	7.94E-03	2.42E-03	1.17E+00	1.39E-02	0.00E+00	7.14E-03
CS-134	2.17E+08	5.17E+08	4.23E+08	0.00E+00	1.67E+08	5.56E+07	9.05E+06
CS-137	3.11E+08	4.25E+08	2.78E+08	0.00E+00	1.44E+08	4.79E+07	8.22E+06
BA-140	4.35E+05	5.46E+02	2.85E+04	0.00E+00	1.86E+02	3.13E+02	8.95E+05
CE-141	8.87E+02	6.00E+02	6.80E+01	0.00E+00	2.79E+02	0.00E+00	2.29E+06
CE-144	4.23E+05	1.77E+05	2.27E+04	0.00E+00	1.05E+05	0.00E+00	1.43E+08

TABLE 4-6

Ri DOSE CONVERSION FACTORS FOR THE GRASS-COW-MEAT PATHWAY - TEEN RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	2.58E+02	2.58E+02	2.58E+02	2.58E+02	2.58E+02	2.58E+02
CR-51	0.00E+00	0.00E+00	2.75E+02	1.53E+02	6.03E+01	3.93E+02	4.62E+04
MN-54	0.00E+00	2.07E+06	4.11E+05	0.00E+00	6.18E+05	0.00E+00	4.25E+06
FE-59	2.08E+07	4.85E+07	1.87E+07	0.00E+00	0.00E+00	1.53E+07	1.15E+08
CO-58	0.00E+00	2.19E+06	5.04E+06	0.00E+00	0.00E+00	0.00E+00	3.02E+07
CO-60	0.00E+00	2.03E+07	4.56E+07	0.00E+00	0.00E+00	0.00E+00	2.64E+08
ZN-65	7.01E+07	2.43E+08	1.14E+08	0.00E+00	1.56E+08	0.00E+00	1.03E+08
SR-89	2.88E+07	0.00E+00	8.24E+05	0.00E+00	0.00E+00	0.00E+00	3.43E+06
SR-90	2.87E+09	0.00E+00	7.08E+08	0.00E+00	0.00E+00	0.00E+00	8.05E+07
ZR-95	2.14E+05	6.76E+04	4.65E+04	0.00E+00	9.93E+04	0.00E+00	1.56E+08
SB-124	2.18E+06	4.02E+04	8.52E+05	4.95E+03	0.00E+00	1.91E+06	4.40E+07
I-131	1.13E+05	1.58E+05	8.49E+04	4.61E+07	2.72E+05	0.00E+00	3.13E+04
I-133	3.82E-03	6.48E-03	1.98E-03	9.04E-01	1.14E-02	0.00E+00	4.90E-03
CS-134	1.73E+08	4.07E+08	1.89E+08	0.00E+00	1.29E+08	4.94E+07	5.06E+06
CS-137	2.58E+08	3.43E+08	1.20E+08	0.00E+00	1.17E+08	4.54E+07	4.88E+06
BA-140	3.59E+05	4.40E+02	2.31E+04	0.00E+00	1.49E+02	2.96E+02	5.54E+05
CE-141	7.45E+02	4.97E+02	5.71E+01	0.00E+00	2.34E+02	0.00E+00	1.42E+06
CE-144	3.56E+05	1.47E+05	1.91E+04	0.00E+00	8.80E+04	0.00E+00	8.96E+07

TABLE 4-7

Ri DOSE CONVERSION FACTORS FOR THE GRASS-COW-MEAT PATHWAY - CHILD RECEPTOR

NUCLIDES	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	3.12E+02	3.12E+02	3.12E+02	3.12E+02	3.12E+02	3.12E+02
CR-51	0.00E+00	0.00E+00	4.29E+02	2.38E+02	6.51E+01	4.35E+02	2.28E+04
MN-54	0.00E+00	2.37E+06	6.31E+05	0.00E+00	6.64E+05	0.00E+00	1.99E+06
FE-59	3.68E+07	5.96E+07	2.97E+07	0.00E+00	0.00E+00	1.73E+07	6.20E+07
CO-58	0.00E+00	2.55E+06	7.82E+06	0.00E+00	0.00E+00	0.00E+00	1.49E+07
CO-60	0.00E+00	2.40E+07	7.09E+07	0.00E+00	0.00E+00	0.00E+00	1.33E+08
ZN-65	1.05E+08	2.80E+08	1.74E+08	0.00E+00	1.77E+08	0.00E+00	4.92E+07
SR-89	5.45E+07	0.00E+00	1.56E+06	0.00E+00	0.00E+00	0.00E+00	2.11E+06
SR-90	3.70E+09	0.00E+00	9.39E+08	0.00E+00	0.00E+00	0.00E+00	4.99E+07
ZR-95	3.81E+05	8.36E+04	7.45E+04	0.00E+00	1.20E+05	0.00E+00	8.73E+07
SB-124	3.95E+06	5.12E+04	1.38E+06	8.72E+03	0.00E+00	2.19E+06	2.47E+07
I-131	2.09E+05	2.11E+05	1.20E+05	6.96E+07	3.46E+05	0.00E+00	1.87E+04
I-133	7.09E-03	8.77E-03	3.32E-03	1.63E+00	1.46E-02	0.00E+00	3.53E-03
CS-134	3.05E+08	5.00E+08	1.06E+08	0.00E+00	1.55E+08	5.56E+07	2.70E+06
CS-137	4.75E+08	4.55E+08	6.71E+07	0.00E+00	1.48E+08	5.33E+07	2.85E+06
BA-140	6.63E+05	5.81E+02	3.87E+04	0.00E+00	1.89E+02	3.46E+02	3.36E+05
CE-141	1.40E+03	6.99E+02	1.04E+02	0.00E+00	3.07E+02	0.00E+00	8.72E+05
CE-144	6.72E+05	2.11E+05	3.58E+04	0.00E+00	1.17E+05	0.00E+00	5.49E+07

TABLE 4-8

Ri DOSE CONVERSION FACTORS FOR THE GRASS-COW-MILK PATHWAY - ADULT RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	1.02E+03	1.02E+03	1.02E+03	1.02E+03	1.02E+03	1.02E+03
CR-51	0.00E+00	0.00E+00	8.28E+03	4.95E+03	1.82E+03	1.10E+04	2.08E+06
MN-54	0.00E+00	3.99E+06	7.61E+05	0.00E+00	1.19E+06	0.00E+00	1.22E+07
FE-59	9.69E+06	2.28E+07	8.73E+06	0.00E+00	0.00E+00	6.36E+06	7.59E+07
CO-58	0.00E+00	1.74E+06	3.90E+06	0.00E+00	0.00E+00	0.00E+00	3.53E+07
CO-60	0.00E+00	8.41E+06	1.85E+07	0.00E+00	0.00E+00	0.00E+00	1.58E+08
ZN-65	6.34E+08	2.02E+09	9.12E+08	0.00E+00	1.35E+09	0.00E+00	1.27E+09
SR-89	4.90E+08	0.00E+00	1.41E+07	0.00E+00	0.00E+00	0.00E+00	7.86E+07
SR-90	2.43E+10	0.00E+00	5.96E+09	0.00E+00	0.00E+00	0.00E+00	7.02E+08
ZR-95	3.39E+02	1.09E+02	7.37E+01	0.00E+00	1.71E+02	0.00E+00	3.45E+05
SB-124	9.11E+06	1.72E+05	3.61E+06	2.21E+04	0.00E+00	7.09E+06	2.59E+08
I-131	7.77E+07	1.11E+08	6.37E+07	3.64E+10	1.91E+08	0.00E+00	2.93E+07
I-133	1.02E+06	1.77E+06	5.39E+05	2.60E+08	3.08E+06	0.00E+00	1.59E+06
CS-134	2.83E+09	6.73E+09	5.50E+09	0.00E+00	2.18E+09	7.23E+08	1.18E+08
CS-137	3.83E+09	5.24E+09	3.43E+09	0.00E+00	1.78E+09	5.91E+08	1.01E+08
BA-140	7.11E+06	8.93E+03	4.66E+05	0.00E+00	3.04E+03	5.11E+03	1.46E+07
CE-141	8.73E+03	5.90E+03	6.70E+02	0.00E+00	2.74E+03	0.00E+00	2.26E+07
CE-144	1.01E+06	4.21E+05	5.41E+04	0.00E+00	2.50E+05	0.00E+00	3.41E+08

TABLE 4-9

Ri DOSE CONVERSION FACTORS FOR THE GRASS-COW-MILK PATHWAY - TEEN RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	1.33E+03	1.33E+03	1.33E+03	1.33E+03	1.33E+03	1.33E+03
CR-51	0.00E+00	0.00E+00	1.45E+04	8.03E+03	3.17E+03	2.06E+04	2.43E+06
MN-54	0.00E+00	6.64E+06	1.32E+06	0.00E+00	1.98E+06	0.00E+00	1.36E+07
FE-59	1.69E+07	3.95E+07	1.52E+07	0.00E+00	0.00E+00	1.24E+07	9.33E+07
CO-58	0.00E+00	2.93E+06	6.76E+06	0.00E+00	0.00E+00	0.00E+00	4.04E+07
CO-60	0.00E+00	1.42E+07	3.21E+07	0.00E+00	0.00E+00	0.00E+00	1.86E+08
ZN-65	9.74E+08	3.38E+09	1.58E+09	0.00E+00	2.17E+09	0.00E+00	1.43E+09
SR-89	9.03E+08	0.00E+00	2.59E+07	0.00E+00	0.00E+00	0.00E+00	1.08E+08
SR-90	3.43E+10	0.00E+00	8.48E+09	0.00E+00	0.00E+00	0.00E+00	9.64E+08
ZR-95	5.94E+02	1.87E+02	1.29E+02	0.00E+00	2.75E+02	0.00E+00	4.32E+05
SB-124	1.62E+07	2.99E+05	6.34E+06	3.69E+04	0.00E+00	1.42E+07	3.27E+08
I-131	1.41E+08	1.98E+08	1.06E+08	5.76E+10	3.40E+08	0.00E+00	3.91E+07
I-133	1.86E+06	3.15E+06	9.60E+05	4.39E+08	5.52E+06	0.00E+00	2.38E+06
CS-134	4.91E+09	1.16E+10	5.36E+09	0.00E+00	3.67E+09	1.40E+09	1.44E+08
CS-137	6.95E+09	9.24E+09	3.22E+09	0.00E+00	3.15E+09	1.22E+09	1.32E+08
BA-140	1.28E+07	1.57E+04	8.27E+05	0.00E+00	5.33E+03	1.06E+04	1.98E+07
CE-141	1.60E+04	1.07E+04	1.23E+03	0.00E+00	5.03E+03	0.00E+00	3.06E+07
CE-144	1.86E+06	7.68E+05	9.97E+04	0.00E+00	4.59E+05	0.00E+00	4.67E+08

TABLE 4-10

Ri DOSE CONVERSION FACTORS FOR THE GRASS-COW-MILK PATHWAY - CHILD RECEPTOR

NUCLIDES	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	2.09E+03	2.09E+03	2.09E+03	2.09E+03	2.09E+03	2.09E+03
CR-51	0.00E+00	0.00E+00	2.95E+04	1.64E+04	4.47E+03	2.99E+04	1.56E+06
MN-54	0.00E+00	9.94E+06	2.65E+06	0.00E+00	2.79E+06	0.00E+00	8.34E+06
FE-59	1.92E+07	6.35E+07	3.16E+07	0.00E+00	0.00E+00	1.84E+07	6.61E+07
CO-58	0.00E+00	4.48E+06	1.37E+07	0.00E+00	0.00E+00	0.00E+00	2.61E+07
CO-60	0.00E+00	2.21E+07	6.52E+07	0.00E+00	0.00E+00	0.00E+00	1.23E+08
ZN-65	1.91E+09	5.09E+09	3.17E+09	0.00E+00	3.21E+09	0.00E+00	8.95E+08
SR-89	2.23E+09	0.00E+00	6.38E+07	0.00E+00	0.00E+00	0.00E+00	8.65E+07
SR-90	5.80E+10	0.00E+00	1.47E+10	0.00E+00	0.00E+00	0.00E+00	7.81E+08
ZR-95	1.38E+03	3.03E+02	2.70E+02	0.00E+00	4.34E+02	0.00E+00	3.16E+05
SB-124	3.84E+07	4.99E+05	1.35E+07	8.49E+04	0.00E+00	2.13E+07	2.41E+08
I-131	3.42E+08	3.44E+08	1.96E+08	1.14E+11	5.55E+08	0.00E+00	3.06E+07
I-133	4.51E+06	5.57E+06	2.11E+06	1.04E+09	9.79E+06	0.00E+00	2.25E+06
CS-134	1.13E+10	1.86E+10	3.92E+09	0.00E+00	5.76E+09	2.07E+09	1.00E+08
CS-137	1.67E+10	1.60E+10	2.36E+09	0.00E+00	5.22E+09	1.88E+09	1.00E+08
BA-140	3.10E+07	2.71E+04	1.81E+06	0.00E+00	8.83E+03	1.62E+04	1.57E+07
CE-141	3.94E+04	1.97E+04	2.92E+03	0.00E+00	8.62E+03	0.00E+00	2.45E+07
CE-144	4.57E+06	1.43E+06	2.44E+05	0.00E+00	7.94E+05	0.00E+00	3.74E+08

TABLE 4-11

Ri DOSE CONVERSION FACTORS FOR THE GRASS-COW-MILK PATHWAY - INFANT RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	3.18E+03	3.18E+03	3.18E+03	3.18E+03	3.18E+03	3.18E+03
CR-51	0.00E+00	0.00E+00	4.67E+04	3.05E+04	6.66E+03	5.93E+04	1.36E+06
MN-54	0.00E+00	1.85E+07	4.19E+06	0.00E+00	4.10E+06	0.00E+00	6.79E+06
FE-59	7.32E+07	1.28E+08	5.04E+07	0.00E+00	0.00E+00	3.78E+07	6.11E+07
CO-58	0.00E+00	8.96E+06	2.23E+07	0.00E+00	0.00E+00	0.00E+00	2.23E+07
CO-60	0.00E+00	4.52E+07	1.07E+08	0.00E+00	0.00E+00	0.00E+00	1.07E+08
ZN-65	2.57E+09	8.81E+09	4.06E+09	0.00E+00	4.27E+09	0.00E+00	7.44E+09
SR-89	4.25E+09	0.00E+00	1.22E+08	0.00E+00	0.00E+00	0.00E+00	8.74E+07
SR-90	6.31E+10	0.00E+00	1.61E+10	0.00E+00	0.00E+00	0.00E+00	7.88E+08
ZR-95	2.45E+03	5.97E+02	4.23E+02	0.00E+00	6.43E+02	0.00E+00	2.97E+05
SB-124	7.41E+07	1.09E+06	2.30E+07	1.97E+05	0.00E+00	4.64E+07	2.29E+08
I-131	7.14E+08	8.42E+08	3.70E+08	2.77E+11	9.83E+08	0.00E+00	3.00E+07
I-133	9.52E+06	1.39E+07	4.06E+06	2.52E+09	1.63E+07	0.00E+00	2.35E+06
CS-134	1.82E+10	3.40E+10	3.44E+09	0.00E+00	8.76E+09	3.59E+09	9.24E+07
CS-137	2.67E+10	3.13E+10	2.22E+09	0.00E+00	8.39E+09	3.40E+09	9.78E+07
BA-140	6.37E+07	6.37E+04	3.28E+06	0.00E+00	1.51E+04	3.91E+04	1.57E+07
CE-141	7.81E+04	4.77E+04	5.61E+03	0.00E+00	1.47E+04	0.00E+00	2.46E+07
CE-144	6.55E+06	2.68E+06	3.67E+05	0.00E+00	1.08E+06	0.00E+00	3.76E+08

TABLE 4-12

R1 DOSE CONVERSION FACTORS FOR THE INHALATION PATHWAY - ADULT RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	1.26E+03	1.26E+03	1.26E+03	1.26E+03	1.26E+03	1.26E+03
CR-51	0.00E+00	0.00E+00	1.00E+02	5.95E+01	2.28E+01	1.44E+04	3.32E+03
MN-54	0.00E+00	3.96E+04	6.30E+03	0.00E+00	9.84E+03	1.40E+06	7.74E+04
FE-59	1.18E+04	2.78E+04	1.06E+04	0.00E+00	0.00E+00	1.02E+06	1.88E+05
CO-58	0.00E+00	1.58E+03	2.07E+03	0.00E+00	0.00E+00	9.28E+05	1.06E+05
CO-60	0.00E+00	1.15E+04	1.48E+04	0.00E+00	0.00E+00	5.97E+06	2.85E+05
ZN-65	3.24E+04	1.03E+05	4.66E+04	0.00E+00	6.90E+04	8.64E+05	5.34E+04
SR-89	3.04E+05	0.00E+00	8.72E+03	0.00E+00	0.00E+00	1.40E+06	3.50E+05
SR-90	9.92E+07	0.00E+00	6.10E+06	0.00E+00	0.00E+00	9.60E+06	7.22E+05
ZR-95	1.07E+05	3.44E+04	2.33E+04	0.00E+00	5.42E+04	1.77E+06	1.50E+05
SB-124	3.12E+04	5.89E+02	1.24E+04	7.55E+01	0.00E+00	2.48E+06	4.06E+05
I-131	2.52E+04	3.58E+04	2.05E+04	1.19E+07	6.13E+04	0.00E+00	6.28E+03
I-133	8.64E+03	1.48E+04	4.52E+03	2.15E+06	2.58E+04	0.00E+00	8.88E+03
CS-134	3.73E+05	8.48E+05	7.28E+05	0.00E+00	2.87E+05	9.76E+04	1.04E+04
CS-137	4.78E+05	6.21E+05	4.28E+05	0.00E+00	2.22E+05	7.52E+04	8.40E+03
BA-140	3.90E+04	4.90E+01	2.57E+03	0.00E+00	1.67E+01	1.27E+06	2.18E+05
CE-141	1.99E+04	1.35E+04	1.53E+03	0.00E+00	6.26E+03	3.62E+05	1.20E+05
CE-144	3.43E+06	1.43E+06	1.84E+05	0.00E+00	8.48E+05	7.78E+06	8.16E+05

TABLE 4-13

Ri DOSE CONVERSION FACTORS FOR THE INHALATION PATHWAY - TEEN RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	1.27E+03	1.27E+03	1.27E+03	1.27E+03	1.27E+03	1.27E+03
CR-51	0.00E+00	0.00E+00	1.35E+02	7.50E+01	3.07E+01	2.10E+04	3.00E+03
MN-54	0.00E+00	5.11E+04	8.40E+03	0.00E+00	1.27E+04	1.98E+06	6.68E+04
FE-59	1.59E+04	3.70E+04	1.43E+04	0.00E+00	0.00E+00	1.53E+06	1.78E+05
CO-58	0.00E+00	2.07E+03	2.78E+03	0.00E+00	0.00E+00	1.34E+06	9.52E+04
CO-60	0.00E+00	1.51E+04	1.98E+04	0.00E+00	0.00E+00	8.72E+06	2.59E+05
ZN-65	3.86E+04	1.34E+05	6.24E+04	0.00E+00	8.64E+04	1.24E+06	4.66E+04
SR-89	4.34E+05	0.00E+00	1.25E+04	0.00E+00	0.00E+00	2.42E+06	3.71E+05
SR-90	1.08E+08	0.00E+00	6.68E+06	0.00E+00	0.00E+00	1.65E+07	7.65E+05
ZR-95	1.46E+05	4.58E+04	3.15E+04	0.00E+00	6.74E+04	2.69E+06	1.49E+05
SB-124	4.30E+04	7.94E+02	1.68E+04	9.76E+01	0.00E+00	3.85E+06	3.98E+05
I-131	3.54E+04	4.91E+04	2.64E+04	1.46E+07	8.40E+04	0.00E+00	6.49E+03
I-133	1.22E+04	2.05E+04	6.22E+03	2.92E+06	3.59E+04	0.00E+00	1.03E+04
CS-134	5.02E+05	1.13E+06	5.49E+05	0.00E+00	3.75E+05	1.46E+05	9.76E+03
CS-137	6.70E+05	8.48E+05	3.11E+05	0.00E+00	3.04E+05	1.21E+05	8.48E+03
BA-140	5.47E+04	6.70E+01	3.52E+03	0.00E+00	2.28E+01	2.03E+06	2,29E+05
CE-141	2.84E+04	1.90E+04	2.17E+03	0.00E+00	8.88E+03	6.14E+05	1.26E+05
CE-144	4.89E+06	2.02E+06	2.62E+05	0.00E+00	1.21E+06	1.34E+07	8.64E+05

TABLE 4-14

RI DOSE CONVERSION FACTORS FOR THE INHALATION PATHWAY - CHILD RECEPTOR

NUCLIDE	BONE	LIVER	T BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03
CR-51	0.00E+00	0.00E+00	1.54E+02	8.55E+01	2.43E+01	1.70E+04	1.08E+03
MN-54	0.00E+00	4.29E+04	9.51E+03	0.00E+00	1.00E+04	1.58E+06	2.29E+04
FE-59	2.07E+04	3.34E+04	1.67E+04	0.00E+00	0.00E+00	1.27E+06	7.07E+04
CO-58	0.00E+00	1.77E+03	3.16E+03	0.00E+00	0.00E+00	1.11E+06	3.44E+04
CO-60	0.00E+00	1.31E+04	2.26E+04	0.00E+00	0.00E+00	7.07E+06	9.62E+04
ZN-65	4.26E+04	1.13E+05	7.03E+04	0.00E+00	7.14E+04	9.95E+05	1.63E+04
SR-89	5.99E+05	0.00E+00	1.72E+04	0.00E+00	0.00E+00	2.16E+06	1.67E+05
SR-90	1.01E+08	0.00E+00	6.44E+06	0.00E+00	0.00E+00	1.48E+07	3.43E+05
ZR-95	1.90E+05	4.18E+04	3.70E+04	0.00E+00	5.96E+04	2.23E+06	6.11E+04
SB-124	5.74E+04	7.40E+02	2.00E+04	1.26E+02	0.00E+00	3.24E+06	1.64E+05
I-131	4.81E+04	4.81E+04	2.73E+04	1.62E+07	7.88E+04	0.00E+00	2.84E+03
I-133	1.66E+04	2.03E+04	7.70E+03	3.85E+06	3.38E+04	0.00E+00	5.48E+03
CS-134	6.51E+05	1.01E+06	2.25E+05	0.00E+00	3.30E+05	1.21E+05	3.85E+03
CS-137	9.07E+05	8.25E+05	1.28E+05	0.00E+00	2.82E+05	1.04E+05	3.62E+03
BA-140	7.40E+04	6.48E+01	4.33E+03	0.00E+00	2.11E+01	1.74E+06	1.02E+05
CE-141	3.92E+04	1.95E+04	2.90E+03	0.00E+00	8.55E+03	5.44E+05	5.66E+04
CE-144	6.77E+06	2.12E+06	3.61E+05	0.00E+00	1.17E+06	1.20E+07	3.89E+05

TABLE 4-15

Ri DOSE CONVERSION FACTORS FOR THE INHALATION PATHWAY - INFANT RECEPTOR

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E+00	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02
CR-51	0.00E+00	0.00E+00	8.95E+01	5.75E+01	1.32E+01	1.28E+04	3.57E+02
MN-54	0.00E+00	2.53E+04	4.98E+03	0.00E+00	4.98E+03	1.00E+06	7.06E+03
FE-59	1.36E+04	2.35E+04	9.48E+03	0.00E+00	0.00E+00	1.02E+06	2.48E+04
CO-58	0.00E+00	1.22E+03	1.82E+03	0.00E+00	0.00E+00	7.77E+05	1.11E+04
CO-60	0.00E+00	8.02E+03	1.18E+04	0.00E+00	0.00E+00	4.51E+06	3.19E+04
ZN-65	1.93E+04	6.26E+04	3.11E+04	0.00E+00	3.25E+04	6.47E+05	5.14E+04
SR-89	3.98E+05	0.00E+00	1.14E+04	0.00E+00	0.00E+00	2.03E+06	6.40E+04
SR-90	4.09E+07	0.00E+00	2.59E+06	0.00E+00	0.00E+00	1.12E+07	1.31E+05
ZR-95	1.15E+05	2.79E+04	2.03E+04	0.00E+00	3.11E+04	1.75E+06	2.17E+04
SB-124	3.79E+04	5.56E+02	1.20E+04	1.01E+02	0.00E+00	2.65E+06	5.91E+04
I-131	3.79E+04	4.44E+04	1.96E+04	1.48E+07	5.18E+04	0.00E+00	1.06E+03
I-133	1.32E+04	1.92E+04	5.60E+03	3.56E+06	2.24E+04	0.00E+00	2.16E+03
CS-134	3.96E+05	7.03E+05	7.45E+04	0.00E+00	1.90E+05	7.97E+04	1.33E+03
CS-137	5.49E+05	6.12E+05	4.55E+04	0.00E+00	1.72E+05	7.13E+04	1.33E+03
BA-140	5.60E+04	5.60E+01	2.90E+03	0.00E+00	1.34E+01	1.60E+06	3.84E+04
CE-141	2.77E+04	1.67E+04	1.99E+03	0.00E+00	5.25E+03	5.17E+05	2.16E+04
CE-144	3.19E+06	1.21E+06	1.76E+05	0.00E+00	5.38E+05	9.84E+06	1.48E+05

TABLE 4-16

PALO VERDE NUCLEAR GENERATING STATION DISPERSION
AND DEPOSITION PARAMETERS FOR LONG TERM RELEASES
AT THE NEAREST PATHWAY LOCATIONS CENTERED ON UNIT 1

DIRECTION	RESIDENCE(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	GARDEN(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	MILK(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	
N	2.92E-06	1.4	3.25E-09	2.92E-06	1.4	3.25E-09	7.03E-07	(a)	3.48E-10	
NNE	1.81E-06	1.8	2.88E-09	4.70E-07	(a)	4.04E-10	4.70E-07	(a)	4.04E-10	
NE	1.95E-06	1.9	3.85E-09	1.76E-06	2.1	3.29E-09	5.77E-07	(a)	6.51E-10	
ENE	1.03E-06	2.7	1.08E-09	1.03E-06	2.7	1.08E-09	3.86E-07	(a)	2.86E-10	
E	9.39E-07	2.8	6.68E-10	3.71E-07	(a)	1.87E-10	3.71E-07	(a)	1.87E-10	
ESE	6.37E-07	3.7	2.84E-10	4.12E-07	4.6	1.60E-10	4.12E-07	4.6	1.60E-10	goat
SE	8.83E-07	4.1	2.61E-10	8.83E-07	4.1	2.61E-10	5.84E-07	(a)	1.52E-10	
SSE	1.27E-06	4.7	2.61E-10	1.09E-06	(a)	2.15E-10	1.09E-06	(a)	2.15E-10	
S	2.58E-06	4.6	4.85E-10	2.09E-06	5.2	3.59E-10	2.13E-06	5.1	3.71E-10	cow
SSW	3.26E-06	3.5	8.26E-10	2.28E-06	(a)	4.53E-10	2.28E-06	(a)	4.53E-10	
SW	2.80E-06	2.9	9.10E-10	1.58E-06	(a)	3.56E-10	1.58E-06	(a)	3.56E-10	
WSW	1.95E-06	2.6	1.09E-09	8.55E-07	(a)	3.18E-10	8.55E-07	(a)	3.18E-10	
W	7.54E-07	(a)	4.44E-10	7.54E-07	(a)	4.44E-10	7.54E-07	(a)	4.44E-10	
WNW	6.03E-07	(a)	3.25E-10	6.03E-07	(a)	3.25E-10	6.03E-07	(a)	3.25E-10	
NW	8.24E-07	3.8	5.25E-10	7.55E-07	4.1	4.61E-10	6.02E-07	(a)	3.27E-10	
NNW	1.46E-06	2.0	1.47E-09	5.20E-07	(a)	3.04E-10	5.20E-07	(a)	3.04E-10	

(a) 5-mile value used since there is no pathway located within the sector up to five miles.
(b) Controlling locations are discussed in Appendix A.

References: 1984 Land Use Census (letter ANPM-21221-JRM/LEB). NUS Corporation letters NUS-ANPP-1385 and NUS-ANPP-1386.

CONTROLLED DOCUMENT

TABLE 4-16 (Continued)

PALO VERDE NUCLEAR GENERATING STATION DISPERSION
AND DEPOSITION PARAMETERS FOR LONG TERM RELEASES
AT THE NEAREST PATHWAY LOCATIONS CENTERED ON UNIT 2

DIRECTION	RESIDENCE(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	GARDEN(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	MILK(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	
N	2.73E-06	1.5	2.92E-09	2.39E-06	1.7	2.35E-09	7.03E-07	(a)	3.48E-10	
NNE	2.20E-06	1.5	3.87E-09	2.20E-06	1.5	3.87E-09	4.70E-07	(a)	4.04E-10	
NE	1.85E-06	2.0	3.55E-09	1.57E-06	2.3	2.78E-09	5.77E-07	(a)	6.51E-10	
ENE	1.03E-06	2.7	1.08E-09	1.03E-06	2.7	1.08E-09	3.86E-07	(a)	2.86E-10	
E	8.80E-07	3.0	6.06E-10	3.71E-07	(a)	1.87E-10	3.71E-07	(a)	1.87E-10	
ESE	6.25E-07	3.7	2.76E-10	3.96E-07	4.7	1.51E-10	3.96E-07	4.7	1.51E-10	goat
SE	9.06E-07	4.0	2.72E-10	9.06E-07	4.0	2.72E-10	5.84E-07	(a)	1.52E-10	
SSE	1.34E-06	4.5	2.81E-10	1.09E-06	(a)	2.15E-10	1.09E-06	(a)	2.15E-10	
S	2.63E-06	4.5	5.01E-10	2.19E-06	5.0	3.88E-10	2.19E-06	5.0	3.88E-10	cow
SSW	3.48E-06	3.2	9.19E-10	2.28E-06	(a)	4.53E-10	2.28E-06	(a)	4.53E-10	
SW	2.93E-06	2.7	9.75E-10	1.58E-06	(a)	3.56E-10	1.58E-06	(a)	3.56E-10	
WSW	2.01E-06	2.5	1.16E-09	8.55E-07	(a)	3.18E-10	8.55E-07	(a)	3.18E-10	
W	7.54E-07	(a)	4.44E-10	7.54E-07	(a)	4.44E-10	7.54E-07	(a)	4.44E-10	
WNW	6.03E-07	(a)	3.25E-10	6.03E-07	(a)	3.25E-10	6.03E-07	(a)	3.25E-10	
NW	7.84E-07	4.0	4.88E-10	7.84E-07	4.0	4.88E-10	6.02E-07	(a)	3.27E-10	
NNW	1.46E-06	2.0	1.47E-09	5.20E-07	5.0	3.04E-10	5.20E-07	(a)	3.04E-10	

(a) 5-mile value used since there is no pathway located within the sector up to five miles.

(b) Controlling locations are discussed in Appendix A.

References: 1984 Land Use Census (letter ANPM-21221-JRM/LEB). NUS Corporation letters NUS-ANPP-1385 and NUS-ANPP-1386.

TABLE 4-16 (Continued)

PALO VERDE NUCLEAR GENERATING STATION DISPERSION
AND DEPOSITION PARAMETERS FOR LONG TERM RELEASES
AT THE NEAREST PATHWAY LOCATIONS CENTERED ON UNIT 3

DIRECTION	RESIDENCE(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	GARDEN(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	MILK(b) X/Q (Sec/m^3)	Dist. Miles	D/Q (m^{-2})	
N	2.58E-06	1.8	2.47E-09	2.42E-06	1.9	2.22E-09	7.03E-07	(a)	3.48E-10	
NNE	1.85E-06	1.7	2.97E-09	1.85E-06	1.7	2.97E-09	4.70E-07	(a)	4.04E-10	
NE	1.66E-06	2.2	3.00E-09	1.48E-06	2.4	2.54E-09	5.77E-07	(a)	6.51E-10	
ENE	8.75E-07	2.9	8.86E-10	8.75E-07	2.9	8.86E-10	3.86E-07	(a)	2.86E-10	
E	8.90E-07	3.0	6.17E-10	4.06E-07	4.6	2.15E-10	4.25E-07	4.5	2.31E-10	goat
ESE	6.37E-07	3.7	2.84E-10	5.80E-07	4.0	2.46E-10	3.73E-07	(a)	1.37E-10	
SE	5.84E-07	(a)	1.52E-10	5.84E-07	(a)	1.52E-10	5.84E-07	(a)	1.52E-10	
SSE	1.36E-06	4.4	2.88E-10	1.09E-06	(a)	2.15E-10	1.09E-06	(a)	2.15E-10	
S	2.65E-06	4.2	5.25E-10	2.25E-06	4.9	4.06E-10	2.31E-06	4.8	4.21E-10	cow
SSW	3.64E-06	3.1	9.82E-10	2.28E-06	(a)	4.53E-10	2.28E-06	(a)	4.53E-10	
SW	3.19E-06	2.5	1.11E-09	1.58E-06	(a)	3.56E-10	1.58E-06	(a)	3.56E-10	
WSW	2.12E-06	2.4	1.26E-09	8.55E-07	(a)	3.18E-10	8.55E-07	(a)	3.18E-10	
W	7.54E-07	(a)	4.44E-10	7.54E-07	(a)	4.44E-10	7.54E-10	(a)	4.44E-10	
WNW	6.03E-07	(a)	3.25E-10	6.03E-07	(a)	3.25E-10	6.03E-07	(a)	3.25E-10	
NW	6.83E-07	4.3	4.05E-10	6.82E-07	4.3	4.05E-10	6.02E-07	(a)	3.27E-10	
NNW	1.34E-06	2.2	1.26E-09	5.16E-07	5.0	3.01E-10	5.20E-07	(a)	3.04E-10	

(a) 5-mile value used since there is no pathway located within the sector up to five miles.

(b) Controlling locations are discussed in Appendix A.

References: 1984 Land Use Census (letter ANPM-21221-JRM/LEB). NUS Corporation letters NUS-ANPP-1385 and NUS-ANPP-1386.

CONTROLLED DOCUMENT

4.4 Requirements: Liquid Effluents

The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY (See Figure 6-4) shall be limited:

a. During any calendar quarter to less than or equal to 1.5 mrems to the total body and to less than or equal to 5 mrems to any organ, and

b. During any calendar year to less than or equal to 3 mrems to the total body and to less than or equal to 10 mrems to any organ.

Applicability: At all times.

Action:

With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

4.4.1 Surveillance Requirements:

Cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year shall be determined in accordance with the methodology and parameters in the ODCM at least once per 31 days.

4.4.2 Implementation of the Requirements:

This Requirement does not require implementation guidance. There are no offsite liquid effluent releases.

5.0 TOTAL DOSE AND DOSE TO PUBLIC ONSITE

5.1 Requirement: Total Dose

The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.

Applicability: At all times.

Action:

With the calculated doses from the release of radioactive materials in liquid and gaseous effluents exceeding twice the limits of Section 4.4a, 4.4b, 4.1a, 4.1b, 4.2a or 4.2b calculations should be made including direct radiation contributions from the reactor units and from outside storage tanks to determine whether the above limits of Section 5.1 have been exceeded. If such is the case, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2 , a Special Report that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits. This Special Report, as defined in 10 CFR 20.405c, shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes releases(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete.

5.1.1 Surveillance Requirements:

a. Cumulative dose contributions from the gaseous effluents shall be determined in accordance with the surveillance requirements of Section 4.4.1, 4.1.1 and 4.2.1 and in accordance with the methodology and parameters contained in Section 5.1.2.

b. Cumulative dose contributions from direct radiation from the reactor units and from radwaste storage tanks shall be determined in accordance with the methodology and parameters in Section 5.1.2. This requirement is applicable only under conditions set forth in Section 5.1, Action.

5.1.2 Implementation of the Requirement

Since all other uranium fuel cycle sources are greater than 20 miles away, only the PVNGS site need be considered.

The total dose to any MEMBER OF THE PUBLIC will be determined based on a sum of the doses from all three units' releases and doses from direct radiation from PVNGS.

This dose evaluation is performed annually and submitted with the Semiannual Radioactive Effluent Release Report for July through December to assure compliance with 40CFR Part 190, Environmental Radiation Protection Standards for Nuclear Power Operation. NUREG-0543, Methods for Demonstrating LWR Compliance With the EPA Uranium Fuel Cycle Standard (40 CFR Part 190), February, 1980, provides a discussion on compliance with 40 CFR Part 190 in relation to the Radiological Environmental Technical Specifications for sites of up to four nuclear power reactors. The NUREG concludes that as long as a nuclear plant site operates at a level below the 10 CFR Part 50, Appendix I reporting requirements, and there is no significant source of direct radiation from the site, no extra analysis is required to demonstrate compliance with 40 CFR Part 190. As a result, this dose evaluation will also be performed whenever calculated doses associated with effluent releases exceed twice the limits of Section 4.4a, 4.4b, 4.1a, 4.1b,4.2a or 4.2b.

Dose Contribution from Liquid and Gaseous Effluents

The annual whole body dose accumulated by a MEMBER OF THE PUBLIC for the noble gases released in gaseous effluents is determined by using the following equation:

$$D_{WB} = (3.17E\text{-}08) \sum [(K_i)\ (X/Q)_{UNIT}\ \ (Q_i)] \qquad (5\text{-}1)$$

Where:

K_i = the whole body dose factor due to gamma emissions for each identified noble gas radionuclide i, in mrem/yr per $\mu Ci/m^3$ from Table 3-3.

Q_i = the integrated release of radionuclide i, in μCi for the previous calendar year.

$(X/Q)_{UNIT}$ = the highest calculated annual average dispersion parameter, in sec/m^3, for a particular unit, at the controlling location, from Table 4-16, or concurrent meteorological data if available.

= 2.92E-06 from Unit 1
= 2.19E-06 from Unit 2
= 2.31E-06 from Unit 3

D_{WB} = the annual whole body dose in mrem to a MEMBER OF THE PUBLIC at the controlling location due to noble gases released in gaseous effluents.

3.17E-08 = the inverse of seconds in a year (yr/sec).

The annual dose to any organ accumulated by a MEMBER OF THE PUBLIC for iodine-131, iodine-133, tritium and all radionuclides in particulate form with half-lives greater than 8 days released in gaseous effluents is determined by using the following equation:

$$D_o = (3.17E\text{-}08) \sum [\sum_i (R_{ik} W_K)(Q_i)] \quad (5\text{-}2)$$

Where:

D_o = the total annual organ dose from gaseous effluents to a MEMBER OF THE PUBLIC, in mrem, at the controlling location.

Q_i = the integrated release of radionuclide i, in μCi, for the previous calendar year.

R_{ik} = the dose factor for each identified radionuclide i, for pathway k (for the inhalation pathway in mrem/yr per μCi/m^3 and for the food and ground plane pathways in m^2-mrem/yr per μCi/sec) at the controlling location. The R_{ik}'s for each age group are given in Tables 4-1 through 4-15.

W_K = the highest annual average dispersion or deposition parameter for the particular unit, used for estimating the total annual organ dose to a MEMBER OF THE PUBLIC at the controlling location for the particular unit.

= $(X/Q)_{UNIT}$, in sec/m^3 for the inhalation pathway and for all tritium calculations, for organ dose at the controlling location, from Table 4-16 or concurrent meteorological data if available.

= 2.92E-06 from Unit 1
= 2.19E-06 from Unit 2
= 2.31E-06 from Unit 3

= $(D/Q)_{UNIT}$, in m^{-2}, for the food and ground plane pathways, for organ dose at the controlling location, from Table 4-16 or concurrent meteorological data if available.

= 3.25E-09 from Unit 1
= 3.88E-10 from Unit 2
= 4.21E-10 from Unit 3

3.17E-08 = the inverse of seconds in a year (yr/sec).

Dose Due to Direct Radiation

The component of dose to a MEMBER OF THE PUBLIC due to direct radiation will be evaluated by first determining the direct radiation dose at the site boundary in each sector, and then extrapolating the site boundary dose to the controlling location by the inverse square law of distance.

Dose from Radioactive Liquid and Gaseous Effluents to MEMBERS OF THE PUBLIC due to their activities within the SITE BOUNDARY

These activities have been determined to be limited to the vicinity of the Visitor Center located inside the SITE BOUNDARY west of Unit 1. An assumption was made that no MEMBER OF THE PUBLIC would spend more than eight hours per year at this location. However this calculation has been historically performed assuming an occupancy factor of one, (implying continuous occupancy over the entire year).

A X/Q, determined for the Visitor Center, will be used for this assessment.

Equations 5-1 and 5-2 in Section 5.1.2 should be used for this assessment.

6.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

6.1 Requirements: REMP

The radiological environmental monitoring program shall be conducted as specified in Table 6-1.

Applicability: At all times.

Action:

a. With the radiological environmental monitoring program not being conducted as specified in Table 6-1, prepare and submit to the Commission, in the Annual Radiological Environmental Operating Report, as required by Section 7.2, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.

b. With the level of radioactivity as the result of plant effluents in an environmental sampling medium at a specified location exceeding the reporting levels of Table 6-2 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose* to A MEMBER OF THE PUBLIC is less than the calendar year limits of Section 4.4, 4.1 and 4.2. When more than one of the radionuclides in Table 6-2 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{concentration (1)}}{\text{reporting level (1)}} + \frac{\text{concentration (2)}}{\text{reporting level (2)}} + \ldots \geq 1.0$$

When radionuclides other than those in Table 6-2 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose* to a MEMBER OF THE PUBLIC is equal to or greater than the calendar year limits of Section 4.4, 4.1 and 4.2. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.

c. With milk or fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 6-1, identify locations for obtaining replacement samples and add them to the Radiological Environmental Monitoring Program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Pursuant to Section 7.1, Semiannual Radioactive Effluent Release Report, identify the cause of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next Semiannual Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).

* The methodology and parameters used to estimate the potential annual dose to a MEMBER OF THE PUBLIC shall be indicated in this report.

6.1.1 Surveillance Requirements:

a. The radiological environmental monitoring samples shall be collected pursuant to Table 6-1 from the specific locations given in Table 6-4 and Figures 6-1, 6-2, and 6-3, and shall be analyzed pursuant to the requirements of Table 6-1, and the detection capabilities required by Table 6-3.

6.1.2 Implementation of the Requirements: REMP

The results of the radiological environmental monitoring program are intended to supplement the results of the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected based on the effluent measurements and modeling of the environmental exposure pathways. Thus the specified environmental monitoring program provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures to individuals resulting from station operation.

This requirement is implemented by Station Manual Procedures.

CONTROLLED DOCUMENT

TABLE 6-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations[a]	Sampling and Collection Frequency[a]	Type and Frequency of Analysis[a]
Airborne			
Radioiodine and particulates	Samples from 5 locations: 3 samples at or near the SITE BOUNDARIES (#14A, 15, 21)in different sectors of the highest calculated annual average ground level D/Q.[e] 1 sample(#40) from areas of special interest, which is from the vicinity of a community having the highest calculated annual average D/Q. 1 sample(#6) from a control location 15-30 km (10-20 mi) distant and in the least prevalent wind direction.[f]	Continuous sampling collected weekly,[c] or more frequently if required by dust loading	Gross beta weekly,[d] I-131 weekly; gamma isotopic analysis of composite (by location) quarterly
Direct radiation[b]	40 stations(#6-45) with two or more dosimeters for measuring dose rate continuously, placed as follows: an inner ring of stations at the site boundary and an outer ring in the 4-to-5 mi range from the site with a station in each sector of each ring, except the WNW sector, which is inaccessible (16 sectors x 2 rings minus 1 = 31 stations). 7 additional stations are in local schools and population centers; 2 other stations are used as controls.	Quarterly	Gamma dose quarterly

[e] D/Q refers to average annual relative ground deposition rate.

TABLE 6-1(Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations[a]	Sampling and Collection Frequency[a]	Type and Frequency of Analysis[c]
Waterborne			
Surface	Water storage reservoir(#60) evaporation pond(#59)	Monthly composite of weekly grab sample	Gamma isotopic analysis monthly; tritium quarterly
Ground	2 onsite wells[g] (#57, 58)	Quarterly grab sample	Tritium and gamma isotopic analysis quarterly
Drinking (well)	3 wells from surrounding residences (#46,48,49) that would be affected by its discharge	Composite sample of weekly grab samples over 2-week period when I-131 analysis is performed, monthly composite of weekly grab samples otherwise	I-131 analysis on each composite when the dose calculated for the consumption of the water is greater than 1 mrem per year.[b] Composite for gross beta and gamma isotopic analyses monthly. Composite for tritium analysis quarterly.
Ingestion			
Milk	Samples from milking animals in 3 locations within 5 km distance having the highest dose potential. If there are none, 1 sample from milking animals in each of 3 areas (#50,51,53)between 5 and 8 km distant where doses are calculated to be greater than 1 mrem per year.[b] One sample from milking animals at a control location(#56), 15 to 30 km distant and in the least prevalent wind direction.	Semimonthly for animals on pasture; otherwise, monthly	Gamma isotopic and I-131 analysis semimonthly when animals are on pasture or monthly at other times.

TABLE 6-1(Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations*	Sampling and Collection Frequency*	Type and Frequency of Analysis*
Food Products*	Samples (#47,52) of 3 different kinds of broad leaf vegetation grown nearest each of two different offsite locations of highest predicted annual average ground-level D/Q if milk sampling is not performed	Monthly during growing season	Gamma isotopic and I-131 analysis.
	1 sample (#62) of each of the similar broad leaf vegetation grown 15-30 km distant in the least prevalent wind direction if milk sampling is not performed	Monthly during growing season	Gamma isotopic and I-131 analysis.

*When broad leaf vegetation samples are not available, reports from 4 existing supplemental airborne radioiodine sample locations will be substituted.

TABLE 6-1 (Continued)

TABLE NOTATIONS

a The number, media, frequency, and location of sampling may vary from site to site. It is recognized that, at times, it may not be possible or practical to obtain samples of the media of choice at the most desired location or time. In these instances suitable alternative media and locations may be chosen for the particular pathway in question and submitted for acceptance. Actual locations (distance and direction) from the site shall be provided in Table 6-4 and Figures 6-1, 6-2, or 6-3 in the ODCM. Refer to Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants".

b Regulatory Guide 4.13 provides guidance for thermoluminescence dosimetry (TLD) systems used for environmental monitoring. One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter may be considered to be one phosphor, and two or more phosphors in a packet may be considered as two or more dosimeters. Film badges should not be used for measuring direct radiation.

c Canisters for the collection of radioiodine in air are subject to channeling. These devices should be carefully checked before operation in the field or several should be mounted in series to prevent loss of iodine.

d Particulate sample filters shall be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic analysis should be performed on the individual samples.

e Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

f The purpose of this sample is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites that provide valid background data may be substituted.

g Groundwater samples should be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.

h The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in the ODCM.

Table 6-2

Reporting Levels for Radioactivity Concentrations in Environmental Samples

Analysis	Water (pCi/ℓ)	Airborne Particulate or Gases (pCi/m³)	Milk (pCi/ℓ)	Food Products (pCi/kg, wet)
H-3	20,000*			
Mn-54	1,000			
Fe-59	400			
Co-58	1,000			
Co-60	300			
Zn-65	300			
Zr-Nb-95	400			
I-131	2**	0.9	3	100
Cs-134	30	10	60	1,000
Cs-137	50	20	70	2,000
Ba-La-140	200		300	

* For Drinking water samples. This is 40 CFR 141 value. If no drinking pathway exists, a value of 30,000 pCi/ℓ may be used.

** If no drinking water pathway exists, a reporting level of 20 pCi/ℓ may be used.

Table 6-3

Detection Capabilities for Environmental Analysis *

Lower Limit Of Detection (LLD)*

Analysis	Water (pCi/*l*)	Airborne Particulate or Gases (pCi/m3)	Milk (pCi/*l*)	Food Products (pCi/kg, wet)
Gross Beta	4	0.01		
H-3	2,000*			
Mn-54	15			
Fe-59	30			
Co-58, -60	15			
Zn-65	30			
Zr-95	30			
Nb-95	15			
I-131	1**	0.07	1	60
Cs-134	15	0.05	15	60
Cs-137	18	0.06	18	80
Ba-140	60		60	
La-140	15		15	

Note: This list does not mean that only these nuclides are to be detected and reported. Other peaks that are measurable and identifiable, together with the above nuclides, shall also be identified and reported.

* If no drinking pathway exists, a value of 3,000 pCi/*l* may be used.

** If no drinking water pathway exists, a reporting level of 15 pCi/*l* may be used.

TABLE 6-3 (Continued)

TABLE NOTATION

a Guidance for detection capabilities for thermoluminescent dosimeters used for environmental measurements is given in Regulatory Guide 4.13.

b Table 6-3 indicates acceptable detection capabilities for radioactive materials in environmental samples. These detection capabilities are tabulated in terms of the lower limits of detection (LLDs). The LLD is defined, for purposes of this guide, as the smallest concentration of radioactive material in a sample that will yield a net 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 system (which may include radiochemical separation):

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

Where:

LLD is the a priori lower limit of detection as defined above (as pCi 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 (as counts per minute),

E is the counting efficiency (as counts per disintegration),

V is the sample size (in 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.

In calculating the LLD for a radionuclide determined by gamma-ray spectrometry the background should include the typical contributions of other radionuclides normally present in the samples (e.g., potassium-40 in milk samples). Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable 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.

6.2 Requirement: Land Use Census

A land use census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden* of greater than 50 m^2 (500 ft^2) producing broad leaf vegetation.

Applicability: At all times.

Action:

a. With a land use census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in Section 4.2.1, identify the new location(s) in the next Semiannual Radioactive Effluent Release Report, pursuant to Section 7.1.

b. With a land use census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with Section 6.1, add the new location(s) to the radiological environmental monitoring program within 30 days. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after (October 31) of the year in which this land use census was conducted. Pursuant to Section 7.1, identify the new location(s) in the next Semiannual Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).

6.2.1 Surveillance Requirements:

a. The land use census shall be conducted during the growing season at least once per 12 months using that information that will provide the best results, such as by a door-to-door survey, aerial survey, or by consulting local agriculture authorities. The results of the land use census shall be included in the Annual Radiological Environmental Operating Report pursuant to Section 7.2.

* Broad Leaf vegetation sampling of at least three different kinds of vegetation may be performed at the SITE BOUNDARY in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 6-1 shall be followed, including analysis of control samples.

6.2.2 Implementation of the Requirements:

The above Requirement is implemented by Station Manual Procedures.

6.3 Requirements: Interlaboratory Comparison Program

Analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program that has been approved by the Commission that correspond to samples required by Table 6-1.

Applicability: At all times.

Action:

a. With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report pursuant to Section 7.2.

6.3.1 Surveillance Requirements:

a. A summary of the results obtained as part of the above required Interlaboratory Comparison Program and in accordance with the methodology and parameters in this manual shall be included in the Annual Radiological Environmental Operating Report pursuant to Section 7.2.

6.3.2 Implementation of the Requirements:

PVNGS laboratories or contract laboratories which perform analyses for the Radiological Environmental Monitoring Program (REMP) participate in the Environmental Protection Agency (EPA) Environmental Radioactivity Laboratory Intercomparison Studies (crosscheck) Program. The participation includes all of the determinations (sample medium-radionuclide combinations) that are offered by the EPA and that are also included in the monitoring program.

The sample handling preparation and analysis procedures approved for use on routine REMP samples, at the time the crosscheck samples are received from the EPA, are used to implement the program. The results of the crosscheck sample analyses are reviewed, at minimum on an annual basis, to ensure that the control limits established by the EPA are not exceeded.

If deviation from these specified limits is identified an investigation is made to determine the reason for the deviation and corrective actions are taken as necessary. The results of all analyses made under this program are included in the Annual Radiological Environmental Operating Report.

TABLE 6-4

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE COLLECTION LOCATIONS

SAMPLE SITE	SAMPLE TYPE	NOTE (d)	LOCATION DESIGNATION(a)	LOCATION DESCRIPTION
1	TLD		E30	APS Western Division Office, Goodyear
1	Air		E30	Same as TLD (east of RR tracks)
2	TLD		ENE24	Scott-Libby School, Perryville Rd. and Thomas Rd.
3	TLD		E21	Liberty School, 19800 W. Hwy.85
4	TLD		E16	APS Buckeye Office, 615 N. 4th. St., Buckeye
4	Air		E16	Same as TLD
5	TLD		ESE11	Palo Verde School, Palo Verde Rd.(291st. Ave) and Old Hwy.80
6	TLD(b)	SP	SSE31	APS Gila Bend Substation, service road west of town off I-8
6	Air(b)	Control	SSE31	Same as TLD
7	TLD(b)	SP	SE7	Old US 80 and Arlington School Rd.
7A	Air		SE8	Arlington School, 16351 S. Arlington School Rd.
8	TLD(b)	OR	SSE5	Southern Pacific Pipeline Rd., 1.4 miles SW of 355th. Ave.
9	TLD(b)	OR	S5	Southern Pacific Pipeline Rd., 2.5 miles SW of 355th. Ave.
10	TLD(b)	OR	SE5	SE corner of 355th. Ave and Elliot Rd.
11	TLD(b)	OR	ESE5	NW corner of 339th. Ave. and Dobbins Rd.
12	TLD(b)	OR	E5	NE corner of 339th. Ave. and Buckeye-Salome Rd.
13	TLD(b)	IR	N1	N site boundary

CONTROLLED DOCUMENT

TABLE 6-4 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE COLLECTION LOCATIONS

SAMPLE SITE	SAMPLE TYPE	NOTE (d)	LOCATION DESIGNATION(a)	LOCATION DESCRIPTION
14	TLD(b)	IR	NNE2	NNE site boundary
14A	Air(b)		NNE2	SW corner of 371st. Ave. and Buckeye-Salome Rd.
15	TLD(b)	IR	NE2	NE site boundary, on WRF access Rd.
15	Air(b)		NE2	Same as TLD
16	TLD(b)	IR	ENE2	ENE site boundary
17	TLD(b)	IR	E2	E site boundary
17A	Air		E4	351st. Ave., 1 mile south of Buckeye-Salome Rd.
18	TLD(b)	IR	ESE2	ESE site boundary
19	TLD(b)	IR	SE2	SE site boundary
20	TLD(b)	IR	SSE2	SSE site boundary
21	TLD(b)	IR	S3	S site boundary
21	Air(b)		S3	Same as TLD
22	TLD(b)	IR	SSW3	SSW site boundary
23	TLD(b)	OR	W5	2 miles north of Elliot Rd., 3 miles west of Wintersburg Rd.
24	TLD(b)	OR	SW4	Elliot Rd., 2 miles west of Wintersburg Rd. at Desert Farms
25	TLD(b)	OR	WSW5	Elliot Rd., 3 miles west of Wintersburg Rd. at cattle guard
26	TLD(b)	OR	SSW5	Shepard farm, 13202 S. 383rd. Ave.,0.5 miles west of house
27	TLD(b)	IR	SW1	SW site boundary

TABLE 6-4 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE COLLECTION LOCATIONS

SAMPLE SITE	SAMPLE TYPE	NOTE (d)	LOCATION DESIGNATION(a)	LOCATION DESCRIPTION
28	TLD(b)	IR	WSW1	WSW site boundary
29	TLD(b)	IR	W1	W site boundary
29	Air(b)		W1	Same as TLD
30	TLD(b)	IR	WNW1	WNW site boundary
31	TLD(b)	IR	NW1	NW site boundary
32	TLD(b)	IR	NNW1	NNW site boundary
33	TLD(b)	OR	NW4	Buckeye Rd., 0.5 miles west of 395th. Ave.
34	TLD(b)	OR	NNW5	SE corner of 395th. Ave. and Van Buren St.
35	TLD(b)	SP	NNW9	Palo Verde Inn Fire Station, 40901 W. Osborn Rd., Tonopah
35	Air		NNW9	Same as TLD
36	TLD(b)	OR	N5	SW corner of Wintersburg Rd. and Van Buren St.
37	TLD(b)	OR	NNE5	SE corner of 363rd. Ave. and Van Buren St.
38	TLD(b)	OR	NE5	SW corner of 355th. Ave. and Buckeye Rd.
39	TLD(b)	OR	ENE5	343rd. Ave., 0.5 miles south of Lower Buckeye Rd.
40	TLD(b)	SP	N3	Wintersburg, Transmission Rd. at telephone pole
40	Air(b)		N3	Same as TLD
41	TLD(b)	SP	WNW20	Harquahala Valley School, Van Buren St., 1 mile west of Steve Martori Dr.

CONTROLLED DOCUMENT

TABLE 6-4 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE COLLECTION LOCATIONS

SAMPLE SITE	SAMPLE TYPE	NOTE (d)	LOCATION DESIGNATION(a)	LOCATION DESCRIPTION
42	TLD(b)	SP	N8	Ruth Fisher School, Indian School Rd. and Wintersburg Rd.
43	TLD(b)	SP	N45	Vulture Peak School, 1 mile south of US 60, Wickenburg
44	TLD(b)	Control	ENE35	APS El Mirage Office, 12313 W. Grand Ave.
44	Air	DELETED		
45	TLD(b)	Transit	E16	APS Buckeye Office, 615 N. Control 4th. St., REMP trailer (lead pig)
46	Water(b)	WD	NNW9	McArthur farm, 41701 W. Indian School Rd., Tonopah
46	TLD		ENE30	Litchfield Park School, 13825 W. Indian School Rd.
47	Vegeta-tion(b)		ENE3	Adams's residence, NW corner of 355th. Ave. and Buckeye-Salome Rd.
47	TLD		E35	Littleton School, 115th. Ave. and Hwy. 85, Cashion
48	Water(b)	WD	S5	Shepard farm, 13202 S. 383rd. Ave., at farm house
48	TLD		E24	Jackrabbit Trail south of I-10, north of Filmore St.
49	Water(b)	WD	ESE4	Scott residence, 9199 S. 351st. Ave., NE corner of 351st. Ave. and Dobbins Rd.
49	TLD		ENE11	Palo Verde Rd., 0.25 miles south of I-10
50	Milk(b)		ENE12	Crosswinds Dairy, 295th. Ave. and Van Buren St.
50	TLD		WNW5	Olinski Rd., 2 miles south of Buckeye-Salome Rd.

TABLE 6-4 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE COLLECTION LOCATIONS

SAMPLE SITE	SAMPLE TYPE	NOTE (d)	LOCATION DESIGNATION(a)	LOCATION DESCRIPTION
51	Milk(b)		E11	Butler Dairy, Palo Verde Rd. and Southern Ave.
52	DELETED			
53	Milk(b)		E20	Kerr Dairy, Dean Rd. and Buckeye Rd.
54	Milk		E17	Dickman Dairy, Broadway Rd. and Apache Rd. (Cemetery Rd.)
55	Water		SW3	Gavette residence, 39326 W. Elliot Rd.
56	Milk(b)	Control	E75	Pew Dairy, McQueen Rd. and Ryan Rd., Chandler
57	Water(b)	WG	onsite	Well 27ddc
58	Water(b)	WG	onsite	Well 34abb
59	Surface Water(b)	WS	onsite	PVNGS Evaporation Pond #1
60	Surface Water(b)	WS	onsite	PVNGS Reservoir
61	DELETED			
62	Vegeta-tion(b)	Control	ENE75	J.A. Wood Co., N. Alma School Rd.

TABLE 6-4 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE COLLECTION LOCATIONS

SAMPLE SITE	SAMPLE TYPE	NOTE (d)	LOCATION DESIGNATION(a)	LOCATION DESCRIPTION
63	Surface Water(b)	WS	onsite	PVNGS Evaporation Pond #2
64	DELETED			

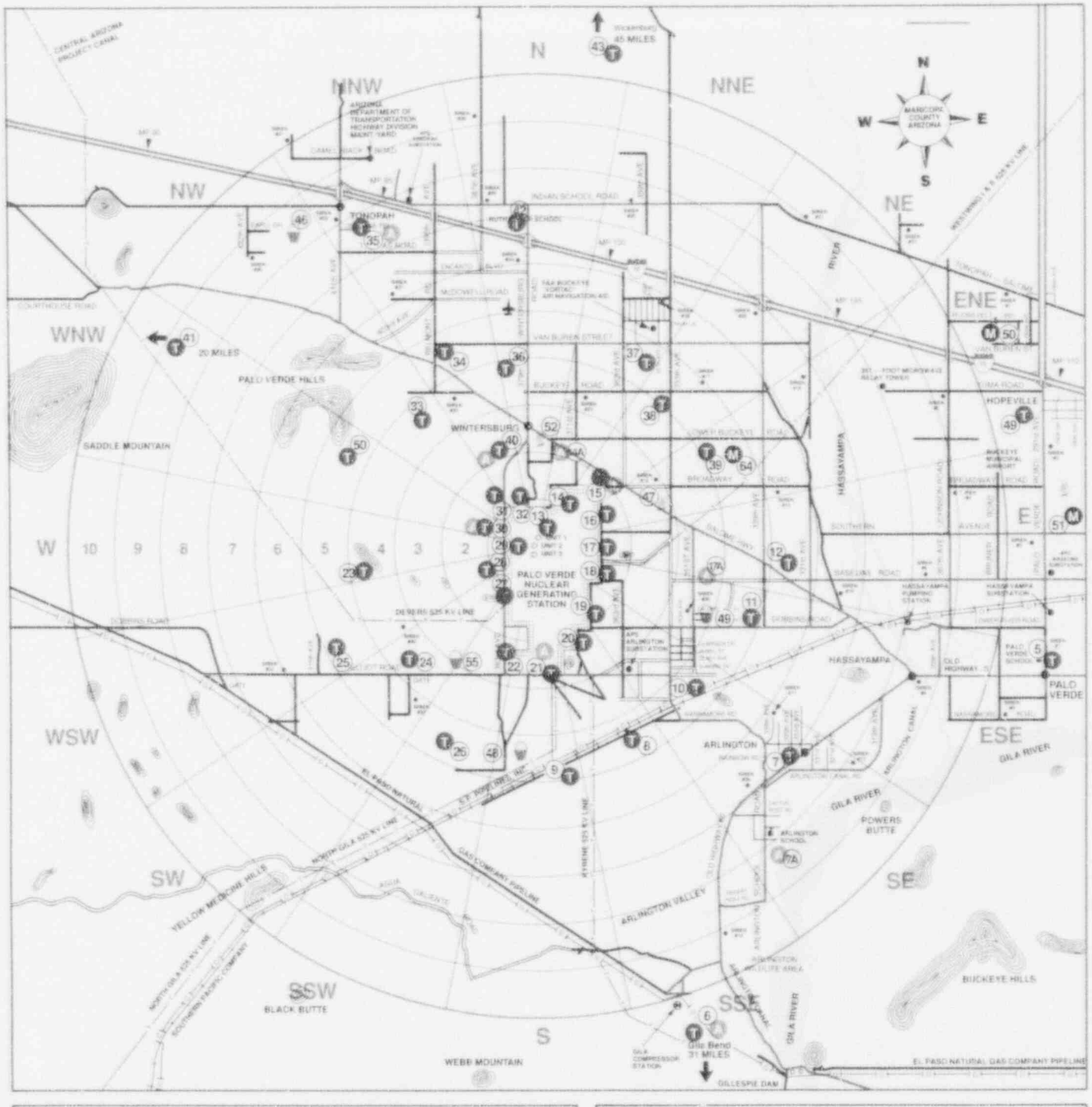
(a) Distance and direction are from the centerline of the Unit 2 containment.
(b) These samples fulfill the requirements of the PVNGS Technical Specifications.
(c) Refer to figures 6-1 and 6-2 for relative locations of sample sites.
(d) NOTE:

IR- inner ring
OR- outer ring
SP- school or population center
WS- waterborne surface
WG- waterborne ground
WD- waterborne drinking

Palo Verde Nuclear Generating Station

Graphic Scale in Miles

0 1 2 3 4 5



KEY TO MAP

- Paved Road
- Unpaved Road
- 4WD Road
- Gas Pipeline
- Oil Pipeline
- Power Line
- Railroad
- Airstrip
- School
- Siren
- Milepost
- Palo Verde Nuclear Generating Station Boundary
- Thermoluminescent Dosimeters (TLD)
- Air Sample
- Vegetation Sample
- Water Sample
- Milk Sample
- Sample Sites

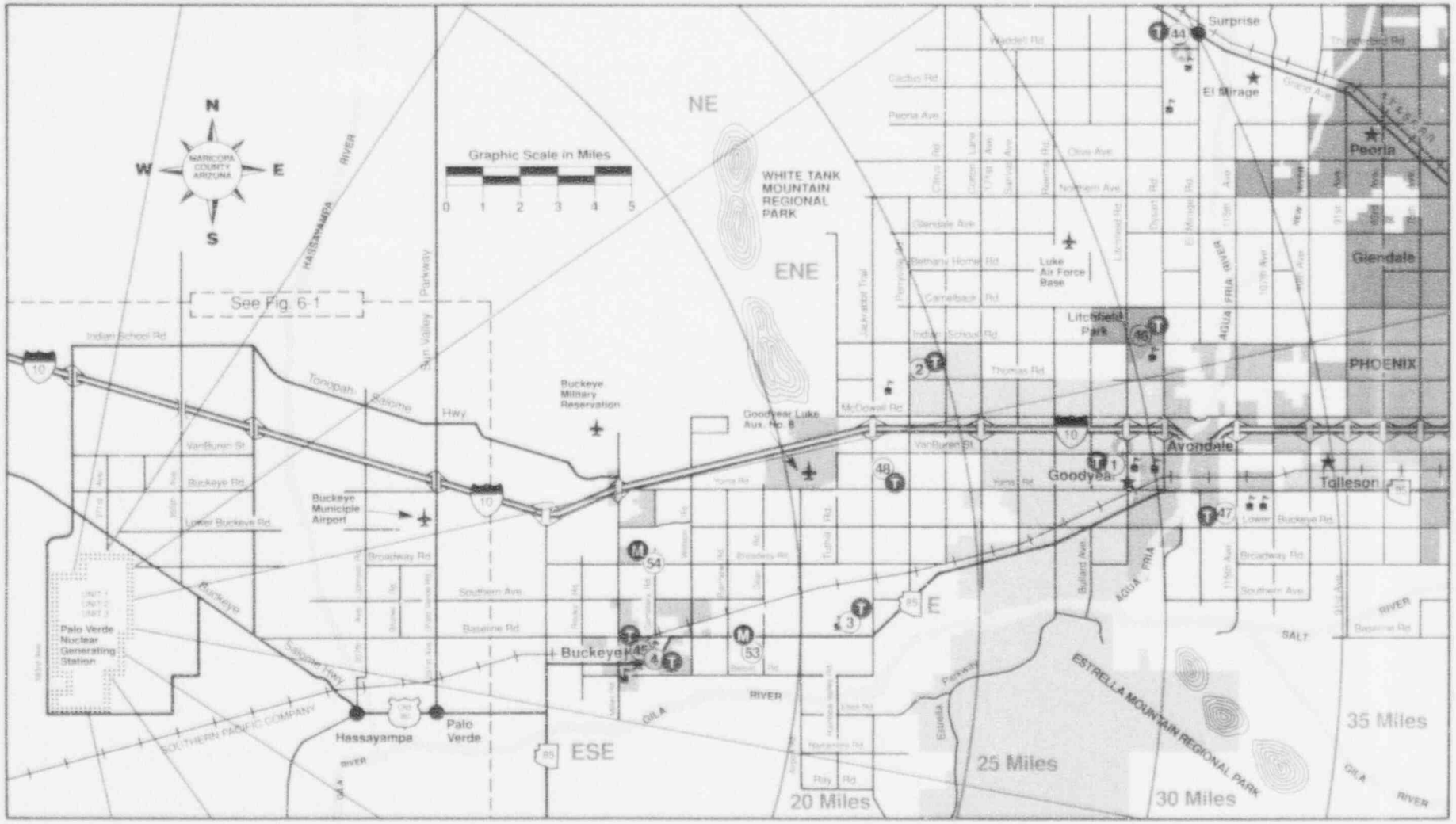
Palo Verde Nuclear Generating Station

Radiological Environmental Monitoring Program Sample Sites

0 – 10 Miles

Figure 6 – 1

Palo Verde Nuclear Generating Station



KEY TO MAP

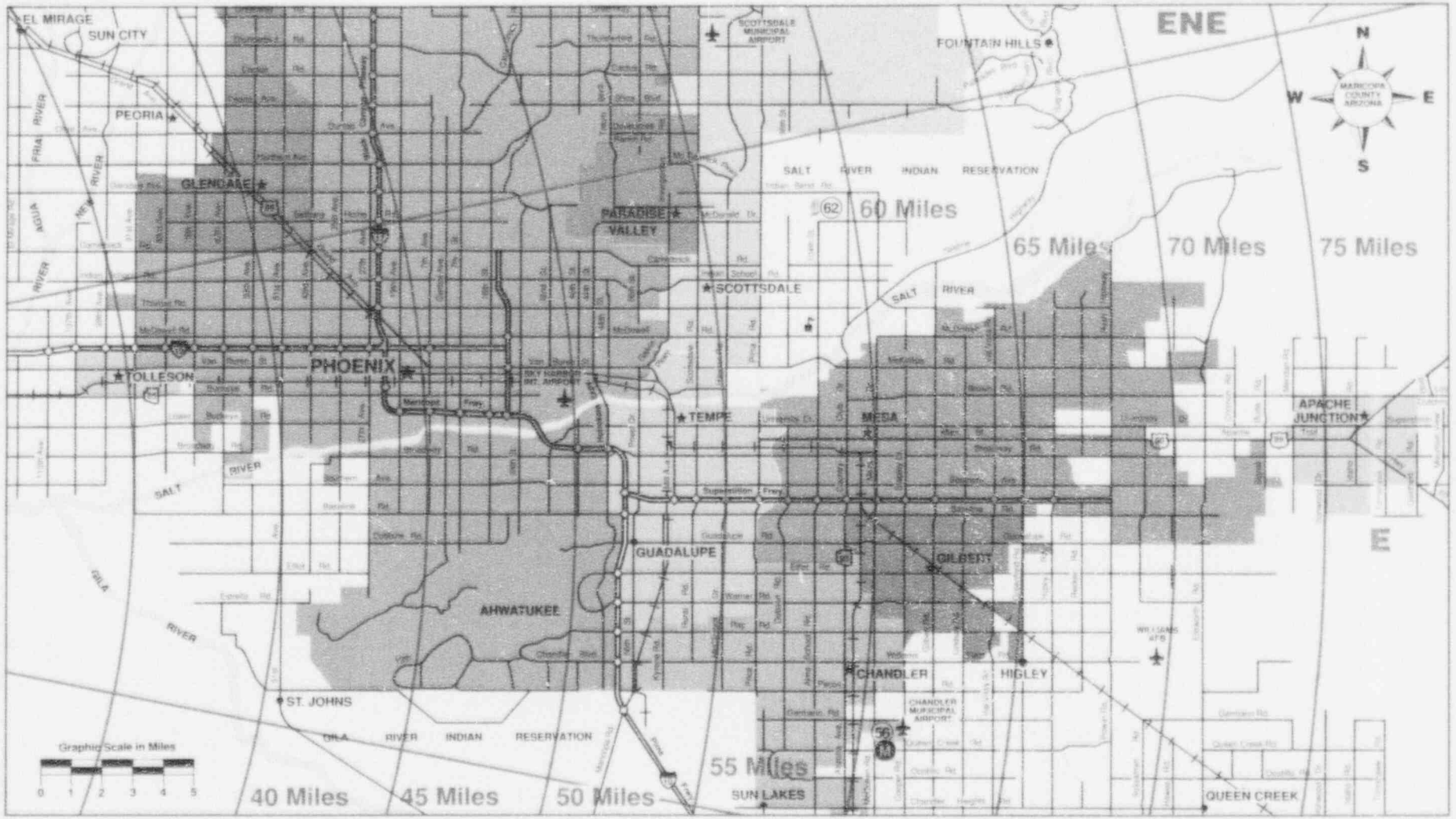
- Railroad
- Airstrip/Airport
- Schools Located Near Sample Sites
- Municipal Buildings
- Palo Verde Nuclear Generating Station Boundary
- Thermoluminescent Dosimeters (TLD)
- Air Sample
- Milk Sample
- Sample Sites

Palo Verde Nuclear Generating Station

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLE SITES

0–35 Miles

Fig. 6-2



KEY TO MAP

- Railroad
- Airstrip/Airport
- Schools Located Near Sample Sites
- Municipal Buildings
- Palo Verde Nuclear Generating Station Boundary
- (M) Milk Sample
- (1) Sample Sites
- Vegetation Sample

Palo Verde Nuclear Generating Station

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SAMPLE SITES

35-75 Miles

Fig. 6-3

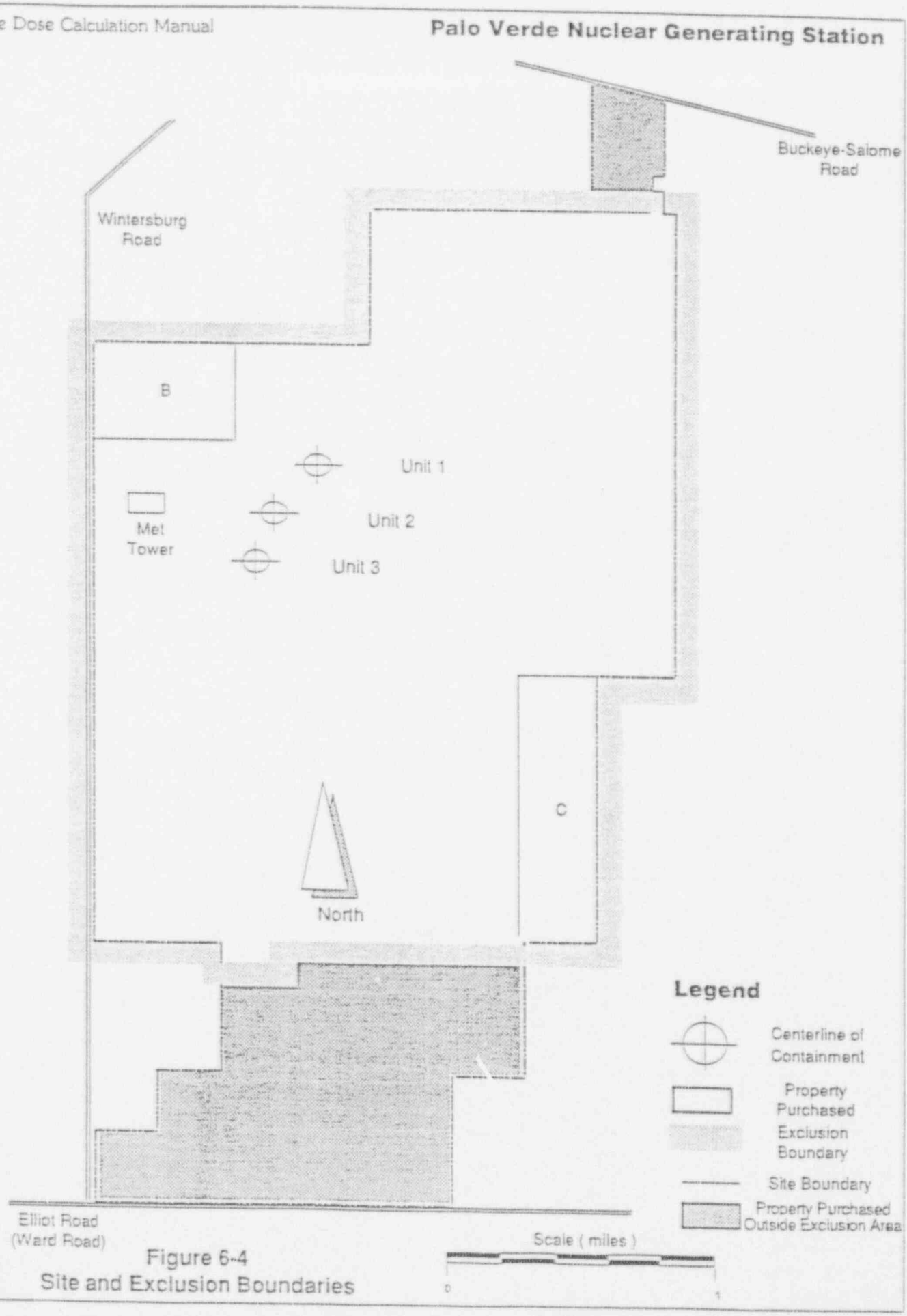
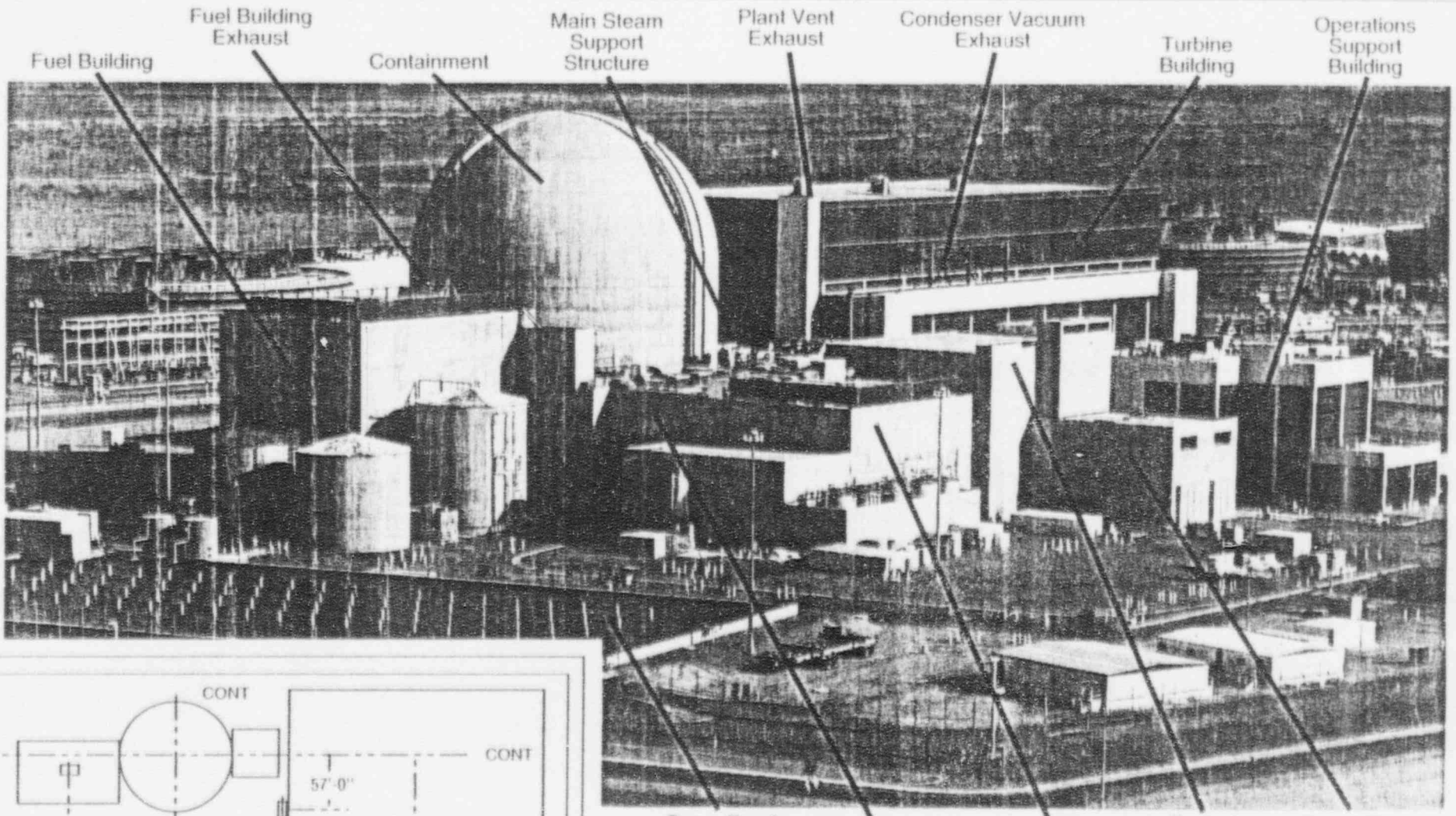
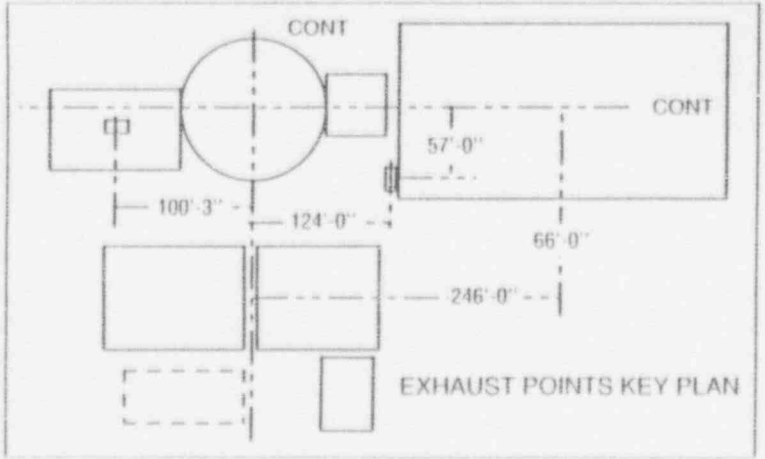


Figure 6-4
Site and Exclusion Boundaries





Elevation of Exhaust Point Above Grade	
Plant Vent	145'
Fuel Building	109'-9"
Condenser Vacuum	84'

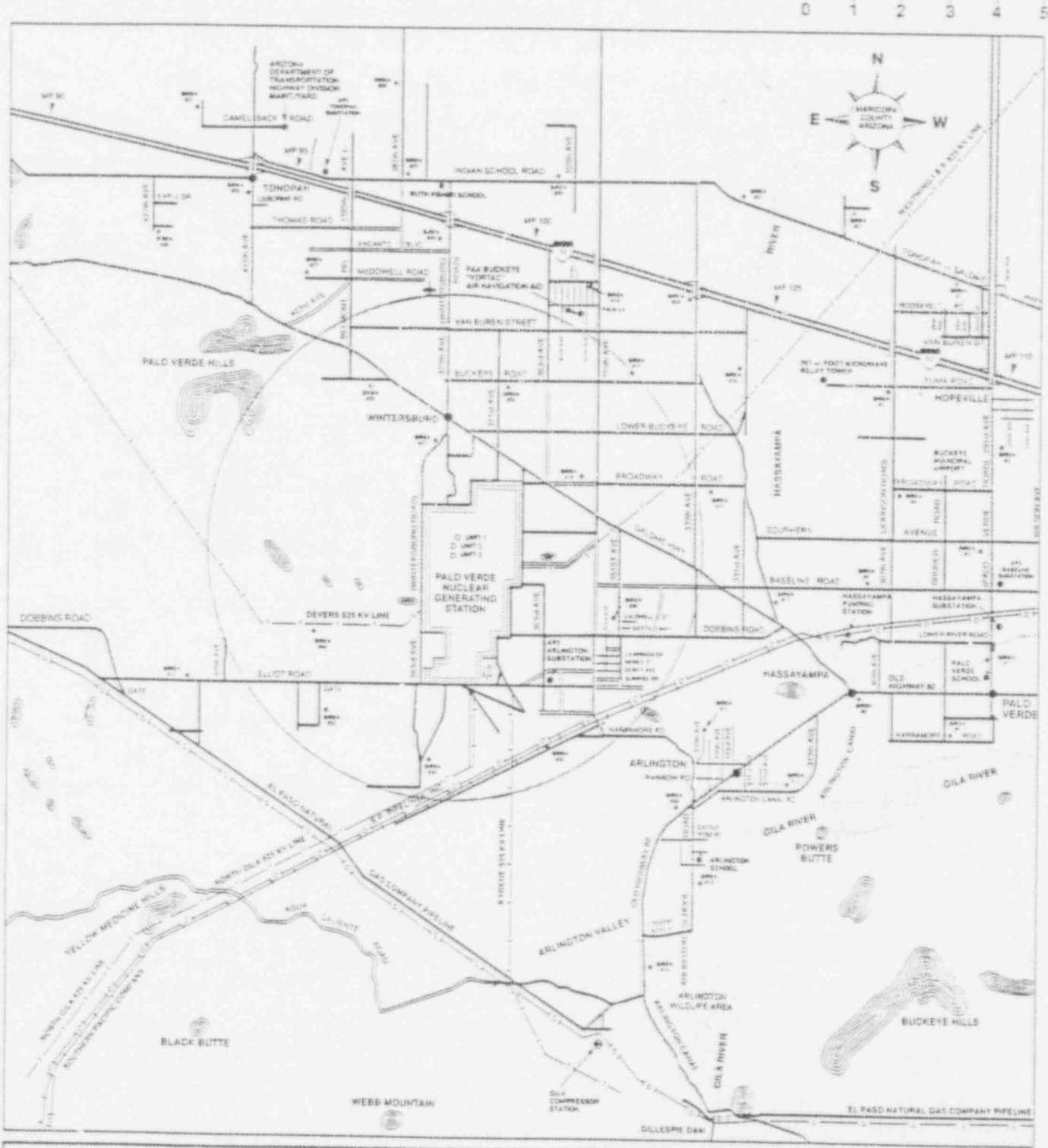
Palo Verde Nuclear Generating Station
GASEOUS EFFLUENT RELEASE POINTS

Fig. 6-5

Palo Verde Nuclear Generating Station

Graphic Scale in Miles

0 1 2 3 4 5



KEY TO MAP

- Paved Road
- Unpaved Road
- 4WD Road
- Gas Pipeline
- Oil Pipeline
- Power Line
- Railroad
- Airstrip
- Palo Verde Nuclear Generating Station Boundary
- School
- Siren
- MP Milepost

Palo Verde Nuclear Generating Station
LOW POPULATION ZONE

0–5 Miles

Figure 6-6

7.0 Radiological Reports

7.1 Requirement: Semiannual Radioactive Effluent Release Report *

Routine Semiannual Radioactive Effluent Release Reports covering the operation of the unit during the previous 6 months of operation shall be submitted within 60 days after January 1 and July 1 of each year. The period of the first report shall begin with the date of initial criticality.

The Semiannual Radioactive Effluent Release Reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a quarterly basis following the format of Appendix B thereof.

The Semiannual Radioactive Effluent Release Report to be submitted within 60 days after January 1 of each year shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability**. This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. This same report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY (Figure 6-4) during the report period. All assumptions used in making these assessments, i.e., specific activity, exposure time and location, shall be included in these reports. The meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents, as determined by sampling frequency and measurement, shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in the ODCM.

* A single submittal may be made for a multiple unit station. The submittal should combine those sections that are common to all units at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit.

** In lieu of submission with the first half year Semiannual Radioactive Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.

The Semiannual Radioactive Effluent Release Report to be submitted 60 days after January 1 of each year shall also include an assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, Environmental Radiation Protection Standards for Nuclear Power Operation. Acceptable methods for calculating the dose contributions are given Section 5.0 and Regulatory Guide 1.109 Rev. 1, October 1977.

The Semiannual Radioactive Effluent Release Reports shall include the following information for each class of solid waste (as defined by 10 CFR Part 61) shipped offsite during the report period:

a. Container volume,

b. Total curie quantity (specify whether determined by measurement or estimate),

c. Principal radionuclides (specify whether determined by measurement or estimate),

d. Source of waste and processing employed (e.g., dewatered spent resin, compacted dry waste, evaporator bottoms),

e. Type of container (e.g., LSA, Type A, Type B, Large Quantity), and

f. Solidification agent or absorbent (e.g., cement, urea formaldehyde).

The Semiannual Radioactive Effluent Release Reports shall include a list and description of unplanned releases from the site to UNRESTRICTED AREAS of radioactive materials in gaseous and liquid effluents made during the reporting period.

The Semiannual Radioactive Effluent Release Reports shall include any changes made during the reporting period to the PROCESS CONTROL PROGRAM and to the OFFSITE DOSE CALCULATION MANUAL, as well as a listing of new locations for dose calculations and/or environmental monitoring identified by the land use census pursuant to Section 6.2.

7.2 Requirement for Annual Radiological Environmental Operating Report*

Routine Annual Radiological Environmental Operating Reports covering the operation of the unit during the previous calendar year shall be submitted prior to May 1 of each year. The initial report shall be submitted prior to May 1 of the year following criticality.

The Annual Radiological Environmental Operating Reports shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, with operational controls as appropriate, and with previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of land use censuses required by Section 6.2.

The Annual Radiological Environmental Operating Reports shall include the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in Table 6-4 and Figures 6-1, 6-2, and 6-3., as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The reports shall also include the following: a summary description of the radiological environmental monitoring program; at least two legible maps** covering all sampling locations keyed to a table giving distances and directions from the centerline of one reactor; the results of licensee participation in the Interlaboratory Comparison Program, required by Section 6.3; discussion of all deviations from the sampling schedule of Table 6-1; and discussion of all analyses in which the LLD required by Table 6-3 was not achievable.

* A single submittal may be made for a multiple unit station.

** One map shall cover stations near the SITE BOUNDARY; a second shall include the more distant stations.

APPENDIX A

DETERMINATION OF CONTROLLING LOCATION

The controlling location is the location of the MEMBER OF THE PUBLIC who receives the highest doses.

The determination of a controlling location for implementation of 10CFR50 for radioiodines and particulates is known to be a function of:

(1) Isotopic release rates

(2) Meteorology

(3) Exposure pathway

(4) Receptor's age

The incorporation of these parameters into Equation 5-2 results in the respective equations at the controlling location. The isotopic release rates are based upon the source terms calculated using the PVNGS Environmental Report, Operating License Stage, Table 3.5-12, without carbon.

All of the locations and exposure pathways, identified in the 1984 Land Use Census, have been evaluated. These include cow milk ingestion, goat milk ingestion, vegetable ingestion, inhalation, and ground plane exposure. An infant is assumed to be present at all milk pathway locations. A child is assumed to be present at all vegetable garden locations. The ground plane exposure pathway is only considered to be present where an infant is not present. Naturally, inhalation is present everywhere an individual is present.

For the determination of the controlling locations, the highest X/Q and D/Q values, based on the 9 year meteorological data base, for the vegetable garden, cow milk, and goat milk pathways, are selected for each unit. The receptor organ doses have been calculated at each of these locations. Based upon these calculations, it is determined that the controlling receptor pathway is a function of unit location. For Unit 1, the controlling receptor is a garden-child pathway; for releases from Unit 2 and Unit 3 the controlling receptor is a cow milk-infant pathway. These determinations are based upon Table 4-16 which, in turn, is based upon the 1984 Land Use Census. Locations of the nearest residences, gardens and milk animals, as determined in the 1984 Land Use Census, are given in Table 4-16.

APPENDIX B

Bases for Requirements

B-2.1 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, 64 of Appendix A to 10 CFR PART 50.

There are two separate radioactive gaseous effluent monitoring systems: the low range effluent monitors for normal plant radioactive gaseous effluents and the high range effluent monitors for post-accident plant radioactive gaseous effluents. The low range monitors operate at all times until the concentration of radioactivity in the effluent becomes too high during post-accident conditions. The high range monitors only operate when the concentration of radioactivity in the effluent is above the setpoint in the low range monitors.

B-3.1 GASEOUS EFFLUENT - DOSE RATE

This requirement is provided to ensure that the dose at any time at and beyond the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20 to UNRESTRICTED AREAS. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II, Column 1. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of a MEMBER OF THE PUBLIC in an UNRESTRICTED AREA, either within or outside the SITE BOUNDARY, to annual average concentrations exceeding the limits specified in Appendix B, Table II of 10 CFR Part 20 (10 CFR Part 20.106(b)). For MEMBERS OF THE PUBLIC who may at times be within the SITE BOUNDARY, the occupancy of that MEMBER OF THE PUBLIC will usually be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. Examples of calculations for such MEMBERS OF THE PUBLIC, with the appropriate occupancy factors, shall be given in the ODCM. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to a MEMBER OF THE PUBLIC at or beyond the SITE BOUNDARY to less than or equal to 500 mrems/year to the total body or to less than or equal to 3000 mrems/year to the skin. These release rate limits also restrict , at all times, the corresponding thyroid dose rate above background to a child via the inhalation pathway to less than or equal to 1500 mrems/year.

This requirement applies to the release of radioactive materials in gaseous effluents from all reactor units at the site.

The required detection capabilities for radioactive materials in gaseous waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Anal. Chem. 40, 586-93 (1968), and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

B-3.2 SECONDARY SYSTEM LIQUID WASTE DISCHARGE TO ONSITE EVAPORATION PONDS - CONCENTRATION

This requirement is provided to ensure that at any time during the life of the nuclear station, the annual total body dose due to ground contamination of an UNRESTRICTED AREA, arising from transportation and deposition by wind of the accumulated activity discharged to the pond from the secondary system of the plant (if the pond gets dried up) on the UNRESTRICTED AREA, is within the guidelines of 10 CFR Part 20 for the above-mentioned postulated event.

Restricting the concentrations of the secondary liquid wastes discharged to the onsite evaporation ponds will restrict the quantity of radioactive material that can get accumulated in the ponds. This, in turn, provides assurance that in the event of an uncontrolled release of the pond's contents to an UNRESTRICTED AREA, the resulting total body annual exposure from ground contamination to a MEMBER OF THE PUBLIC at the nearest exclusion area boundary will be within 0.5 rem.

This requirement applies to the secondary system liquid waste discharges of radioactive materials from all reactor units to the onsite evaporation ponds. Since the chemical neutralizer tank concentrations will bound concentrations in other secondary waste discharges, surveillance requirements stipulate that sampling and analysis of other secondary waste discharges need be performed only if the sampling and analysis of the contents of the chemical neutralizer tank shows that the neutralizer tank concentration exceeds the specified LLD.

The required detection capabilities for radioactive materials in the secondary liquid waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Anal. Chem. 40, 586-93 (1968), and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

B-4.1 GASEOUS EFFLUENT - DOSE, Noble Gases

This requirement is provided to implement Sections II.B, III.A and IV.A of Appendix I, 10 CFR Part 50. This requirement implements the guides set forth in Section II.B of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The surveillance requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculation methodology and parameters established in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1, July 1977. The ODCM equations provided for determining the air doses at and beyond the SITE BOUNDARY are based upon the historical average atmospheric conditions.

This requirement applies to the release of radioactive materials in gaseous effluents from each reactor unit at the site.

B-4.2 GASEOUS EFFLUENT - DOSE - Iodine - 131, Iodine-133, Tritium, and All Radionuclides in Particulate Form With Half-Lives Greater Than 8 Days

This requirement is provided to implement the requirements of Sections II.C, III.A, IV.A of Appendix I, 10 CFR Part 50. This requirement is the guide set forth in Section II.C of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The ODCM calculational methods specified in the surveillance requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCM calculational methodology and parameters for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases for Light-Water-Cooled Reactors," Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for iodine-131, iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days are dependent upon the existing radionuclide pathways to man, in the areas at and beyond the SITE BOUNDARY. The pathways that were examined in the development of these calculations were: (1) individual inhalation of airborne radionuclides, (2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, (3) deposition onto grassy areas where milk animals and meat-producing animals graze with consumption of the milk and meat by man, and (4) deposition on the ground with subsequent exposure of man.

This requirement applies to the release of radioactive materials in gaseous effluents from each reactor unit at the site.

B-4.3 GASEOUS RADWASTE TREATMENT

The OPERABILITY of the GASEOUS RADWASTE SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM ensures that the systems will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of these systems be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as reasonably achievable." This requirement implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

This requirement applies to the release of radioactive materials in gaseous effluents from each reactor unit at the site.

The minimum analysis frequency of 4/M (i.e. at least 4 times per month at intervals no greater than 9 days and a minimum of 48 times a year) is used for certain radioactive gaseous waste sampling in Table 3-1. This will eliminate taking double samples when quarterly and weekly samples are required at the same time.

B-4.4 SECONDARY SYSTEM LIQUID WASTE DISCHARGE TO ONSITE EVAPORATION PONDS - DOSE

This requirement is provided to implement the requirements of Sections II.A, III.A and IV.A of Appendix I, 10 CFR Part 50. This requirement implements the guides set forth in Section II.A of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." Also, for fresh water sites with drinking water supplies that can be potentially affected by plant operations, there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in the finished drinking water that are in excess of the requirements of 40 CFR Part 141. The dose calculation methodology and parameters in the ODCM implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

This requirement applies to the release of liquid effluents from each reactor at the site. For units with shared radwaste treatment systems, the liquid effluents from the shared system are proportioned among the units sharing that system.

B-5.1 TOTAL DOSE AND DOSE TO PUBLIC ONSITE

This requirement is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20 by 46 FR 18525. The requirement specifies the preparation and submittal of a Special Report whenever the calculated doses from plant generated radioactive effluents and direct radiation exceed 25 mrems to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the reactor units and outside storage tanks are kept small. The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR Part 190.11 and 10 CFR Part 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in Section 3.2 and 3.1 of the ODCM. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

B-6.1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

The Radiological Environmental Monitoring Program required by this requirement provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposures of MEMBERS OF THE PUBLIC resulting from the station operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50 and 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 the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring. The initially specified monitoring program will be effective for at least the first 3 years of commercial operation. Following this period, program changes may be initiated based on operational experience.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs required by Table 6-3 are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

Detailed discussion of the LLD, and other detection limits, can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Anal. Chem. 40, 586-93 (1968), and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

B-6.2 LAND USE CENSUS

This requirement is provided to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the radiological environmental monitoring program are made if required by the results of this census. The best information from the door-to-door survey, from aerial survey or from consulting with local agricultural authorities shall be used. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 50 m^2 provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and (2) a vegetation yield of 2 kg/m^2.

B-6.3 INTERLABORATORY COMPARISON PROGRAM

The requirement for participation in an approved 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 valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

APPENDIX C

Definitions

Note:

The following definitions are from the ANPP Technical Specifications. These selected definitions support those portions of the Technical Specifications which were transferred to the ODCM and have been incorporated into the Requirements sections of the ODCM.

Definitions:

The defined terms of this section appear in capitalized type and are applicable throughout the Requirements sections of this ODCM.

ACTION

ACTION shall be that part of a requirement which prescribes remedial measures required under designated conditions.

CHANNEL CALIBRATION

A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel output such that it responds with the necessary range and accuracy to known values of the parameter which the channel monitors. The CHANNEL CALIBRATION shall encompass the entire channel including the sensor and alarm and/or trip functions, and shall include the CHANNEL FUNCTIONAL TEST. The CHANNEL CALIBRATION may be performed by any series of sequential, overlapping, or total channel steps such that the entire channel is calibrated.

CHANNEL CHECK

A CHANNEL CHECK shall be the qualitative assessment of channel behavior during operation by observation. This determination shall include, where possible, comparison of the channel indication and/or status with other indications and/or status derived from independent instrument channels measuring the same parameter.

CHANNEL FUNCTIONAL TEST

A CHANNEL FUNCTIONAL TEST shall be:

a. Analog channels - the injection of a simulated signal into the channel as close to the sensor as practicable to verify OPERABILITY including alarm and/or trip functions.

b. Bistable channels - the injection of a simulated signal into the sensor to verify OPERABILITY including alarm and/or trip functions.

c. Digital computer channels - the exercising of the digital computer hardware using diagnostic programs and the injection of simulated process data into the channel to verify OPERABILITY including alarm and/or trip functions.

d. Radiological effluent process monitoring channels - the CHANNEL FUNCTIONAL TEST may be performed by any series of sequential, overlapping, or total channel steps such that the entire channel is functionally tested.

The CHANNEL FUNCTIONAL TEST shall include adjustment, as necessary, of the alarm, interlock and/or trip setpoints such that the setpoints are within the required range and accuracy.

DOSE EQUIVALENT I-131

DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134 and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, Calculation of Distance Factors for Power and Test Reactor Sites.

FREQUENCY NOTATION

The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table C-1.

GASEOUS RADWASTE SYSTEM

A GASEOUS RADWASTE SYSTEM shall be any system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system offgases from the primary system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

MEMBER(S) OF THE PUBLIC

MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the licensee, its contractors, or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational, or other purposes not associated with the plant.

OFFSITE DOSE CALCULATION MANUAL

The OFFSITE DOSE CALCULATION MANUAL shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints, and in the conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain:

(1) the Radioactive Effluent Controls and Radiological Environmental Monitoring Programs required by Technical Specification Section 6.8.4, and

(2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Semiannual Radioactive Effluent Release Reports required by Technical Specifications 6.9.1.7 and 6.9.1.8.

OPERABLE-OPERABILITY

A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

OPERATIONAL MODE-MODE

An OPERATIONAL MODE (i.e. MODE) shall correspond to any one inclusive combination of core reactivity condition, power level, and cold leg reactor coolant temperature specified in Table C-2.

PROCESS CONTROL PROGRAM

The PROCESS CONTROL PROGRAM shall contain the current formulas, sampling, analyses, test, and determinations to be made to ensure that processing and packaging of solid radioactive wastes based on demonstrated processing of actual or simulated wet solid wastes will be accomplished in such a way as to assure compliance with 10 CFR Parts 20, 61, and 71, State regulations, burial ground requirements, and other requirements governing the disposal of solid radioactive waste.

PURGE-PURGING

PURGE or PURGING shall be 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.

RATED THERMAL POWER

RATED THERMAL POWER shall be a total reactor core heat transfer rate to the reactor coolant of 3800 MWt.

SITE BOUNDARY

The SITE BOUNDARY shall be that line beyond which the land is neither owned, nor leased, nor otherwise controlled by the licensee.

SOLIDIFICATION

SOLIDIFICATION shall be the conversion of radioactive wastes from liquid systems to a homogeneous (uniformly distributed), monolithic, immobilized solid with definite volume and shape, bounded by a stable surface of distinct outline on all sides (free-standing).

SOURCE CHECK

A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity.

THERMAL POWER

THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

UNRESTRICTED AREA

An UNRESTRICTED AREA shall be any area at or beyond the SITE BOUNDARY access to which is not controlled by the licensee for the purposes of protection of individuals from exposure to radiation and radioactive materials, or any area within the SITE BOUNDARY used for residential quarters or for industrial, commercial, institutional, and/or recreational purposes.

VENTILATION EXHAUST TREATMENT SYSTEM

A VENTILATION EXHAUST TREATMENT SYSTEM shall be any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment. Such a system is not considered to have any effect on noble gas effluents. Engineered Safety Feature (ESF) atmospheric cleanup systems are not considered to be VENTILATION EXHAUST TREATMENT SYSTEM components.

VENTING

VENTING shall be 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 VENTING. Vent, used in system names, does not imply a VENTING process.

TABLE C-1
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.
4/M	At least 4 times per month at intervals no greater than 9 days and a minimum of 48 times per year
M	At least once per 31 days.
Q	At least once per 92 days.
SA	At least once per 184 days.
R	At least once per 18 months.
P	Completed prior to each release.
S/U	Prior to reactor startup.
N.A.	Not Applicable.

TABLE C-2
Operational Modes

Operational Mode	Reactivity Condition, K_{eff}	% of Rated Thermal Power*	Cold Leg Temperature(T_{cold})
1. POWER OPERATION	≥ 0.99	> 5%	≥ 350° F
2. STARTUP	≥ 0.99	≤ 5%	≥ 350° F
3. HOT STANDBY	< .99	0	≥ 350° F
4. HOT SHUTDOWN	< 0.99	0	350° > T_{cold} > 210°F
5. COLD SHUTDOWN	< 0.99	0	≤ 210° F
6. REFUELING**	≤ 0.95	0	≤ 135° F

* Excluding decay heat.

** Fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed.

Appendix D

Disposition of NRC Generic Letter 89-01 Items from the PVNGS Technical Specifications to the ODCM

NUREG 0472 Tech Spec #	PVNGS T.S. #	ODCM	Item	Disposition
Table 1.2	Table 1.1	Table C-1	FREQUENCY NOTATION	Table retained in Technical Specifications and duplicated in the ODCM.
N/A	Table 1.2	Table C-2	OPERATIONAL MODES	Table retained in Technical Specifications and duplicated in the ODCM.
1.17	1.18	Apx C	OFFSITE DOSE CALCULATION MANUAL	Definition incorporated in Technical Specifications and the ODCM definitions.
1.30	1.24	Apx C	PROCESS CONTROL PROGRAM	Definition incorporated in Technical Specifications and the ODCM definitions.
1.31	1.32	Apx C	SOLIDIFICATION	Definition deleted from Technical Specifications and relocated to the ODCM and PCP.
3/4.3.3.10	N/A	N/A	RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION	This item does not exist in the PVNGS Technical Specifications since there are no liquid effluents.
3/4.3.3.11	3/4.3.3.8	2.1	RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION	Relocated to the ODCM. Existing requirements for explosive gas monitoring instrument-action are retained in the Technical Specifications.
Table 3.3-13	Table 3.3-12	Table 2-1	RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION	Relocated to the ODCM.
Table 4.3-13	Table 4.3-8	Table 2-2	RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION	Relocated to the ODCM.

Appendix D (Continued)

Disposition of NRC Generic Letter 89-01 Items from the PVNGS Technical Specifications to the ODCM

NUREG 0472 Tech Spec #	PVNGS T.S. #	ODCM	Item	Disposition
3/4.11.1.1	3/4.11.1.1	3.2	LIQUID EFFLUENTS: CONCENTRATION	Relocated to the ODCM.
Table 4.11-1	Table 4.11-1	Table 3-5	RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM	Relocated to the ODCM.
3/4.11.1.2	3/4.11.1.2	4.4	LIQUID EFFLUENTS: DOSE	Relocated to the ODCM.
3/4.11.1.3	N/A		LIQUID EFFLUENTS: LIQUID RADWASTE TREATMENT SYSTEM	This item does not exist in the PVNGS Technical Specifications since there are no liquid effluents.
3/4.11.1.4	3/4.11.1.3	N/A	LIQUID HOLDUP TANKS	Existing specification requirements are retained in the Technical Specifications.
3/4.11.2.1	3/4.11.2.1	3.1	GASEOUS EFFLUENTS: DOSE RATE	Relocated to the ODCM.
Table 4.11-2	Table 4.11-2	Table 3-1	RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM	Relocated to the ODCM.
3/4.11.2.2	3/4.11.2.2	4.1	GASEOUS EFFLUENTS: DOSE-NOBLE GASES	Relocated to the ODCM.
3/4.11.2.3	3/4.11.2.3	4.2	GASEOUS EFFLUENTS: DOSE- I-131, I-133,Tritium, and Radioactive Material in Particulate form.	Relocated to the ODCM.

CONTROLLED DOCUMENT

Disposition of NRC Generic Letter 89-01 Items from the PVNGS Technical Specifications to the ODCM

NUREG 0472 Tech Spec #	PVNGS T.S. #	ODCM	Item	Disposition
3/4.11.2.4	3/4.11.2.4	4.3	GASEOUS EFFLUENTS: Gaseous Radwaste Treatment or Ventilation Exhaust Treatment System	Relocated to the ODCM.
3/4.11.2.5	3/4.11.2.5	N/A	EXPLOSIVE GAS MIXTURE	Retained in the Technical Specifications.
3/4.11.2.6	3/4.11.2.6	N/A	GAS STORAGE TANKS	Retained in the Technical Specifications.
3/4.11.3	3/4.11.3	N/A	SOLID RADIOACTIVE WASTES	Relocated to the PCP.
3/4.11.4	3/4.11.4	5.1	RADIOACTIVE EFFLUENTS: Total Dose	Relocated to the ODCM.
3/4.12.1	3/4.12.1	6.1	RADIOLOGICAL ENVIRONMENTAL MONITORING: Monitoring Program	Relocated to the ODCM.
Table 3.12-1	Table 3.12-1	Table 6-1	RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM	Relocated to the ODCM.
Table 3.12-2	Table 3.12-2	Table 6-2	REPORTING LEVELS FOR RADIO-ACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES	Relocated to the ODCM.
Table 4.12-1	Table 4.12-1	Table 6-3	DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS	Relocated to the ODCM.
3/4.12.2	3/4.12.2	6.2	RADIOACTIVE ENVIRONMENTAL MONITORING: Land Use Census	Relocated to the ODCM.

Disposition of NRC Generic Letter 89-01 Items
from the PVNGS Technical Specifications to the ODCM

NUREG 0472 Tech Spec #	PVNGS T.S. #	ODCM	Item	Disposition
3/4.12.3	3/4.12.3	6.3	RADIOACTIVE ENVIRONMENTAL MONITORING: Interlaboratory Comparison Program	Relocated to the ODCM.
			DESIGN FEATURES:	
Figure 5.1-1	Figure 5.1-1	Figure 6-4	SITE AND EXCLUSION BOUNDARIES	Figure revised in Technical Specifications and duplicated in the ODCM.
Figure 5.1-2	Figure 5.1-2	Figure 6-6	LOW POPULATION ZONE	Figure revised in Technical Specifications and duplicated in the ODCM.
Figure 5.1-3	Figure 5.1-3	Figure 6-5	GASEOUS RELEASE POINTS	Figure revised in Technical Specifications and duplicated in the ODCM.
N/A	6.8.6.g	N/A	Radioactive Effluent Controls Program	New Section is added to Technical Specifications to address programmatic controls being relocated to the ODCM.
N/A	6.8.6.h	N/A	Radiological Environmental Monitoring Program	New Section is added to Technical Specifications to address programmatic controls being relocated to the ODCM.
6.9.1.3	6.9.1.7	7.2	REPORTING REQUIREMENTS: Annual Radiological Environmental Operating Report	Relocated to the ODCM and simplified in Technical Specifications.

CONTROLLED DOCUMENT

Disposition of NRC Generic Letter 89-01 Items
from the PVNGS Technical Specifications to the ODCM

NUREG 0472 Tech Spec #	PVNGS T.S. #	ODCM	Item	Disposition
6.9.1.4	6.9.1.8	7.1	REPORTING REQUIREMENTS: Semiannual Radiological Effluent Release Report	Relocated to ODCM and simplified in Technical Specifications.
N/A	6.10.2.q	N/A	RECORD RETENTION	New section is added to Technical Specifications to address records of reviews performed for changes made to the ODCM and PCP.
6.13	6.13	N/A	PROCESS CONTROL PROGRAM	Technical Specification requirements simplified.
6.14	6.14	N/A	OFFSITE DOSE CALCULATION MANUAL	Technical Specification requirements simplified.
6.15	6.15	N/A	MAJOR CHANGES TO LIQUID, GASEOUS, AND SOLID RADWASTE TREATMENT SYSTEMS	No changes, retained in Technical Specifications.

Disposition of NRC Generic Letter 89-01 Items
from the PVNGS Technical Specifications to the ODCM

NUREG 0472 Tech Spec #	PVNGS T.S. #	ODCM	Item	Disposition
			BASES	The BASES for the above sections that were relocated from the Technical Specifications to the ODCM are also relocated to the ODCM, Appendix B. F convenience, the section references are includ below.
3/4.3.3.10	3/4.3.3.8	2.1		
3/4.11.1.1	3/4.11.1.1	3.2		
3/4.11.1.2	3/4.11.1.2	4.4		
3/4.11.2.1	3/4.11.2.1	3.1		
3/4.11.2.2	3/4.11.2.2	4.1		
3/4.11.2.3	3/4.11.2.3	4.2		
3/4.11.2.4	3/4.11.2.4	4.3		
3/4.11.4	3/4.11.4	5.1		
3/4.12.1	3/4.12.1	6.1		
3/4.12.2	3/4.12.2	6.2		
3/4.12.3	3/4.12.3	6.3		

CONTROLLED DOCUMENT

Evaluation Log No.: _____ — _____

10CFR50.59

SCREENING AND EVALUATION

ACTION UNDER REVIEW: OFFSITE DOSE CALCULATION MANUAL (ODCM) | REVISION 5 | PCN N/A

DESCRIPTION OF PROPOSED CHANGE:

IMPLEMENT GENERIC LETTER 89-01 UTILIZING THE GUIDANCE PROVIDED IN NUREG-1301

10CFR50.59 SCREEN *(Provide References on Response Justification Page)*

Does the proposed change:	NO	YES
1. Make changes in the facility as it is described in the UFSAR?	X	
2. Make changes in procedures as they are described in the UFSAR?	X	
3. Involve test or experiments not described in the UFSAR?	X	
4. Require a change to the technical specifications?	X	

____ Any answer to questions 1 through 3 "YES," then a 10CFR50.59 evaluation is required. Contact Document Control at ext. 82-6633 to obtain a tracking log number and enter the number in the Evaluation Log number block above. UFSAR Change Request per procedure 93AC-0LC01 may also be required.

____ Answer 4 is "YES," then Technical Specification Change Request per procedure 93AC-0LC01 and NRC approval is required prior to implementation.

____ All answers 1 through 4 are "NO," no 10CFR50.59 Evaluation required or Technical Specification change required, recommend action approval.

10CFR50.59 EVALUATION *(Provide Response Justification with References)*

5. May the probability of an accident previously evaluated in the UFSAR be increased?	____	____
6. May the consequences of an accident previously evaluated in the UFSAR be increased?	____	____
7. May the probability of a malfunction of equipment important to safety be increased?	____	____
8. May the consequences of a malfunction of equipment important to safety be increased?	____	____
9. May the possibility of an accident of a different type than any previously evaluated in the UFSAR be created?	____	____
10. May the possibility of a different type of malfunction than any previously evaluated in the UFSAR be created?	____	____
11. Is the margin of safety as defined in the basis for any technical specification reduced?	____	____

____ Any answer to questions 5 through 11 "YES," then an unreviewed safety question is identified. Proceed to procedure 93AC-0LC03 prior to implementation.

____ All answers 5 through 11 are "NO," there is no unreviewed safety question and action approval is recommended.

____ If UFSAR Chapter 6/Chapter 15 is potentially affected, forward a copy of evaluation to Nuclear Fuels Management.

I verify that the above screening/evaluation is adequate and accurate and that the undersigned has received required training.

K. Kutner — 11-12-91
SCREENER/EVALUATOR — DATE

Thomas W. Murphy — 11-22-91
50.59 REVIEWER — DATE

KEVIN KUTNER
SCREENER/EVALUATOR (PRINT)

Thomas W. Murphy
50.59 REVIEWER (PRINT)

10CFR50.59 REVIEW AND EVALUATION

RESPONSE JUSTIFICATION

ACTION UNDER REVIEW: (NAME/TITLE)	REVISION	PCN
OFFSITE DOSE CALCULATION MANUAL	5	N/A

PROCEDURE/PCP/TEMPORARY MODIFICATION NO:
ODCM

QUESTION	RESPONSE JUSTIFICATION

Refer to the attached REVISION REQUEST FORM for a complete list of changes and justification.

REFERENCES:

Operating License; Unit 1, Amend 56
Unit 2. Amend 43
Unit 3, Amend 29

Sections and BASES:

3/4.3.3.8	3/4.11.1.2	3/4.11.2.1
3/4.11.2.2	3/4.11.2.3	3/4.11.2.4
3/4.11.3	3/4.11.4	3/4.12.1
3/4.12.2	3/4.12.3	6.9.1.7
6.9.1.8	6.13	6.14

UFSAR, REV 3, Sections:

1.8 2.3 3.1 11.5 12.3 12.4 13.5

ER-OL, Supplement 4, Section 2.1.3.4

RG 1.109, Rev 1, Oct 1977
NUREG 0597, Jan 1980
NUREG 0133, Oct 1978
NUREG 0172, Nov 1977
NUREG 1301, Apr 1991

1 There are no changes to the facility. This revision relocates requirements from the Technical Specifications to the ODCM utilizing the guidance of NUREG 1301.

2 There is no specific requirement for the content of the ODCM stated in the UFSAR.

3 There are no tests or experiments performed by this revision.

4 Revision 5 of the ODCM relocates requirements from the Technical Specifications to the ODCM utilizing the guidance of NUREG 1301. Prior to, or concurrent with, the approval of the ODCM, Rev. 5, the Technical Specifications for Units 1, 2, and 3 must be amended. Therefore, there are no changes required to the Technical Specifications by this revision of the ODCM. However, there is a prerequisite. LDCR, Log# 91-015 must be processed.

Kevin Kutner 11-12-91

REVISION REQUEST FORM

DATE: 11/12/91

ORIGINATOR: Kevin Kutner EXT: 1966 PAGE 1 OF 1

Description and Justification of Revision:

Revision 5 to the ODCM implements Generic Letter 89-01, "Guidance for the Implementation of Programmatic Controls for RETS in the Administrative Controls Section of Technical Specifications and the Relocation of Procedural Details of Current RETS to the Offsite Dose Calculation Manual or Process Control Program." Guidance for the implementation of GL 89-01 is provided in NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors", Generic Letter 89-01, Supplement No. 1. Changes to the ODCM required by GL 89-01 are described, in detail, in Appendix D of the ODCM, Rev. 5.

All Sections — Due to the extensive changes made to the ODCM to incorporate GL 89-01, many sections have been renumbered. These changes are editorial in nature and are not listed individually.

All Sections — The subscripts for X/Q, ("SWB" and "SBU") have been replaced with "SITE" and "UNIT" to improve clarity.

All Sections — The conversion factor, 471.9, has been rounded to 472.

All Sections — Sections that were relocated from the Technical Specifications were incorporated word for word. The only exceptions are Table and section numbers and references to other sections and Tables.

Section 1.0 — The entire section was reworded to reflect the content of the ODCM following the inclusion of GL 89-01.

Section 1.3 — This section was reworded to improve clarity. Since the pathways listed in Table 1-1 have been evaluated as nuisance pathways, there is no need to "periodically" evaluate these pathways. The ambiguity of evaluating these pathways "periodically" has been replaced by the requirement to evaluate a pathway if "a likely potential arises for contributing more than 10% of the doses evaluated in this manual".

Section 1.4 — New section added for information.

The changes made in Rev. 5 of the ODCM do not reduce the accuracy or reliability of dose calculations or setpoint determinations.

Approved By: Thomas W. Mangan Date: 11-22-91
RMS/Effluents Supervisor (Site Chemistry)

TECHNICAL SPECIFICATION REFERENCE

A. Periodic Review and/or Revision Requirements:

Technical Specification Surveillance requirements and/or limiting conditions for operation have been reviewed. This review/revision of the ODCM includes verification that the methods and procedures, methodology and parameters, and figures and tables referenced in the following Tech Specs are included in this revision of the ODCM;

(NOTE: Signature below denotes the review of all Tech Specs referenced)

Tech Spec -	4.11.1.2	Methodology and Parameters (M&P)
	4.11.2.1.1	Methods and Procedures
	4.11.2.1.2	Methods and Procedures
	4.11.2.2	M&P
	4.11.2.3	M&P
	4.11.2.4	M&P
	4.11.4.1	M&P
	4.11.4.2	M&P
	4.12.1	Figures and Tables
LCO -	3.3.3.8	M&P
	3.12.2.b	Figures and Tables
	4.12.3	M&P

ODCM Revision No. 5

Initiator Name (printed) Kevin Kutner

Signature [signature] Date 11-12-91

Technical Reviewer [signature] Date 11-22-91

B. Additional Revision Requirements:

Does the ODCM revision submittal contain;

1. Sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information? Yes X No ___ (Information submitted should consist of those pages of the ODCM to be changed with each page numbered and provided with an approval and date box, together with appropriate analyses or evaluations justifying the change(s)) (RCTS 011072) and;

2. A determination that the change will not reduce the accuracy or reliability of dose calculations or setpoint determinations? (RCTS 011050). Yes X No ___

Initiator [signature] Date 11-12-91

Technical Reviewer [signature] Date 11-22-91

ADMINISTRATIVE/TECHNICAL REVIEW CHECKLIST

PROCEDURE NO.	REV.	PCN.	
ODCM	5	N/A	Page 1

PROCEDURE TITLE:
OFFSITE DOSE CALCULATION MANUAL (ODCM)

TECHNICAL REVIEWER (PLEASE PRINT)	STA.	EXT.
Thomas W. Murphy	6986	82-1958

Questions to consider:	*Response:* NO	YES	N/A
ADMINISTRATIVE			
1. Does the proposed procedure action involve an intent change?	☑	☐	
2. If a procedure revision, are all appropriate ICR's incorporated?	☐	☐	☑
3. Is a Nuclear Safety Review (10CFR50.59) screening required? If *Yes*, perform a 10CFR50.59 Screening in accordance with 93AC-0NS01, 10CFR50.59 Screening and Evaluation and attach to the procedure package.	☐	☑	
4. Is this a new procedure or an intent change that changes the quality classification of the procedure per 60AC-0QQ09, Classification of Activities? If Yes, Lead Manager shall notify DDC in writing of quality classification.	☑	☐	
5. Is the procedure action known to conflict with or require changes in other procedures? If Yes, ensure ICRs are transmitted to affected departments.	☐	☑	
6. Does the procedure action conflict with commitments in any of the CATS partitions? If Yes, effect changes to eliminate conflict.	☑	☐	
7. Does the APS Corporate Policy and Procedure Manual have any procedure with content related to the procedure action?	☑	☐	
A. If Yes, are there differences between the two procedures?	☐	☐	
B. If A is Yes, then justify the need for differences between procedures. Attach additional sheets as necessary.			
8. Is this a revision? If Yes, then list in the appropriate space, all PCNs/TPCNs, by number, that were associated with the last revision.	☐	☑	
Incorporated NONE			
Not incorporated NONE			
9. Does the procedure action agree with the purpose of the procedure?	☐	☑	
10. Does the procedure action conform with technical aspects of the current developmental and implementing references?	☐	☑	
11. Are interfaces and transitions to other procedures appropriately identified and sequenced?	☐	☐	☑
12. Would the designated procedure user be able to perform the required activity based on instructions specified in the procedure?	☐	☐	N/A TJM 11-22-91
13. Does the procedure format comply with the applicable writer's guide?	☐	☐	N/A TJM 11-22-91

(Continued on page 2)

ADMINISTRATIVE/TECHNICAL REVIEW CHECKLIST - *Continued*

PROCEDURE NO.:	REV.:	PCN:	
ODCM	5	N/A	Page 2

Questions to consider:	*Response:* NO	YES	N/A
TECHNICAL *(Not required for OG, GB, PR, AC and non-intent implementing procedures)*			
14. Are cautions, essential to personnel and/or equipment safety appropriate?	☐	☐	☑
A. Are notes provided where necessary to clarify instructions?	☐	☐	
15. Are parameters that are expected to change during the performance of the procedure properly identified and located?	☐	☐	☑
16. Is acceptance criteria provided, consistent with developmental references?	☐	☐	☑
17. Are contingency actions provided for reasonable deviations beyond expected results?	☐	☐	☑
18. Are visual aids *(i.e., graphs, charts, tables, etc.)* technically accurate and properly implemented?	☐	☐	☑
19. Does the procedure action clearly identify when a safety system is required to be defeated and require shift supervisor permission prior to defeating or testing?	☐	☐	☑
20. Are independent verification steps properly identifed in accordance with 02AC-0ZZ01, Independent Verification of Valves, Breakers, and Components?	☐	☐	☑
21. Are computations required by the procedure based on industry practices and standards?	☐	☐	☑
A. Are computations technically accurate and are independent verifications specified where appropriate?	☐	☐	
B. Are derived computations correct?	☐	☐	
22. Is the type of instrument and special tooling specified an appropriate application for the desired task?	☐	☐	☑
23. Does the procedure contain restoration steps adequate to return the system, etc. to a normal configuration, if applicable?	☐	☐	☑

Technical Reviewer: Thomas W. Mapp *Date* 11-22-91

TECHNICAL SPECIFICATION REFERENCE

A. Periodic Review and/or Revision Requirements:

Technical Specification, Section 6.8.4.g and Section 6.8.4.h have been reviewed. The program elements required to be contained in the ODCM are present in this review/revision of the ODCM.

ODCM Revision No. 5

Initiator Name (printed) KEVIN KUTNER

Signature [signature] Date 8-31-92

Technical Reviewer [signature] Date 8-31-92

B. Additional Revision Requirements:

This ODCM revision submittal contains;

1. Sufficient information to support the change together with the appropriate analyses or evaluations justifying the change(s) (RCTS 011072-01) and;

2. A determination that the change will maintain the level of radioactive effluent control required by 10 CFR 20.106, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR Part 50 and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations. (RCTS 011050-01).

3. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area if the page that was changed, and shall indicate the date(e.g., month/year) the change was implemented.

Initiator [signature] Date 8-31-92

Technical Reviewer [signature] Date 8-31-92

Operating License amendment numbers:
Unit 1 62
Unit 2 48
Unit 3 34

APPENDIX G

Process Control Program, Revision 2.00

FOR INFORMATION ONLY

PROCEDURE ACTION COVER SHEET

PROCEDURE NO: 76PR-9RW01

REV #: 02.00

PROCEDURE TITLE: SOLID RADWASTE PROCESS CONTROL PROGRAM

DESCRIPTION OF ACTION:

Added procedural details from Tech Specs to the PCP per NRC Generic Letter 89-01/NUREG 1301. T/S LCO and Surveillance Requirement 3/4.11.3, surveillance requirement 4.11.3.1 incorporated into PCP as step 3.1.1 through 3.1.5. T/S surveillance 4.11.3.2 incorporated into PCP as step 3.8.1 and 3.8.2, definition of solidification incorporated into PCP as step 4.1.11. PCP step 3.8.2 did read: "Solid Radwaste System," now reads: "Solidification Bench Test." Changed several references from Developmental to Implementing. Added implementing reference to 76ST-XSR01, 76ST-9SR02, and NuReg 1301. Deleted 76DP-0AP02 and 76DP-0RW02 from implementing references (as directed by the writers guide 01AC-0AP01, step 3.4.3.1). Updated developmental references. Changed procedure Revision No. format 2.0 to 02.00 as directed in 01AC-0AP01.

TYPE OF PROCEDURE ACTION

DECIMAL REVISION	
REVISION	X
TEMPORARILY APPROVED PROCEDURE ACTION	
NEW PROCEDURE	
CANCELLATION	

PREPARED BY: Frank Petty | EXT.: 5675 | STA.: 7902 | UNITS AFFECTED: All | INTENT CHANGE: X YES ___ NO

TEMPORARY APPROVAL SIGNATURES (Refer to Section 3.4)

Place a copy of the temporarily approved procedure action in the assigned pickup box immediately upon completion.

(PRINT) MEMBER PLANT SUPERVISORY STAFF (Step 3.4.2.2) SIGNATURE DATE

(PRINT) ASSISTANT SHIFT SUPERVISOR (SRO) (Step 3.4.2.2) SIGNATURE DATE

Total Number of Pages for the Temporarily Approved Procedure Action: ___

1. A CATS DATABASE SEARCH IS REQUIRED FOR ALL PROCEDURE ACTIONS IN ACCORDANCE WITH 90GB-0CQ01, COMMITMENT ACTION TRACKING SYSTEM - CATS. (CATS search is not required for clerical or administrative actions)

2. IF THIS IS AN INTENT CHANGE PROCEDURE ACTION, THEN PERFORM A 10CFR50.59 SCREENING AND EVALUATION PER 93AC-0NS01.

Procedure Action Package Documents (Refer to Section 3.2.1.3)

Procedure Action Cover Sheet.	1 page.
QA Document Review Summary.	4 pages.
CATS Document Quick Search.	2 pages.
10 CFR 50.59 Screen.	2 pages.
Cross-organization Review.	5 pages
Procedure.	25 pages. (1-25)

Total Pages Turned Over to DDC (include PAC) (Technical Reviewer Only): 37 39 39 9/15/92

CRAIG PODGURSKI	TECHNICAL REVIEWER		9-8-92	(Refer to Section 3.2.8.5)
PRINT		SIGNATURE	DATE	
ROBERT B. CHERBA	QA CONCURRENCE (PR and AC only)		9/11/92	(Refer to Section 3.2.9)
PRINT		SIGNATURE	DATE	
Michael Conner for	LEAD MANAGER		9/14/92	(Refer to Section 3.2.10)
PRINT		SIGNATURE	DATE	
PW HUGHES	DOCUMENT APPROVER		9/14/92	(Refer to Section 3.2.11)
PRINT		SIGNATURE	DATE	

9-15-92
Effective Date, if requested

FOR INFORMATION ONLY

Evaluation Log No.: _____ - _____

10CFR50.59

SCREENING AND EVALUATION

ACTION UNDER REVIEW: 76PR-9RW01, SOLID RADWASTE PROCESS CONTROL PROGRAM	REVISION: 02	PCN: 0

DESCRIPTION OF PROPOSED CHANGE: Relocate Process Control Program procedural details from the Technical Specifications to the PCP Nuclear Administrative and Technical Manual Procedure utilizing the guidance of Generic Letter 89-01/NuReg 1301.

10CFR50.59 SCREEN (Provide References on Response Justification Page)	NO	YES
Does the proposed change:		
1. Make changes in the facility as it is described in the UFSAR?	X	
2. Make changes in procedures as they are described in the UFSAR?	X	
3. Involve test or experiments not described in the UFSAR?	X	
4. Require a change to the technical specifications?	X	

____ Any answer to questions 1 through 3 **"YES"**, then a 10CFR50.59 evaluation is required. Contact Document Control at ext. 82-6633 to obtain a tracking log number and enter the number in the Evaluation Log number block above. UFSAR Change Request per procedure 93AC-OLC01 may also be required.

____ Answer 4 is **"YES"**, then Technical Specification Change Request per procedure 93AC-OLC01 and NRC approval is required prior to implementation.

__X__ All answers 1 through 4 are **"NO"**, no 10CFR50.59 Evaluation required, or Technical Specification change required. Recommend action approval.

10CFR50.59 EVALUATION (Provide Response Justification with References)		
5. May the probability of an accident previously evaluated in the UFSAR be increased?	_____	_____
6. May the consequences of an accident previously evaluated in the UFSAR be increased?	_____	_____
7. May the probability of a malfunction of equipment important to safety be increased?	_____	_____
8. May the consequences of a malfunction of equipment important to safety be increased?	_____	_____
9. May the possibility of an accident of a different type than any previously evaluated in the UFSAR be created?	_____	_____
10. May the possibility of a different type of malfunction than any previously evaluated in the UFSAR be created?	_____	_____
11. Is the margin of safety as defined in the basis for any technical specification reduced?	_____	_____

____ Any answer to questions 5 through 11 **"YES"**, then a unreviewed safety question is identified. Proceed to procedure 93AC-OLC03 prior to implementation.

____ All answers 5 through 11 are **"NO"**, there is no unreviewed safety question and action approval is recommended.

____ If UFSAR chapter 6/Chapter 15 is potentially affected, forward a copy of evaluation to Nuclear Fuels Management.

I verify that the above screening/evaluation is adequate and accurate and that the undersigned has received required training.

Francis M Petty 08/10/92
SCREENER/EVALUATOR DATE

John C. Schlag 09-09-92
50.59 REVIEWER DATE

Francis M. Petty
SCREENER/EVALUATOR (print)

John C, Schlag
50.59 REVIEWER (print)

FOR INFORMATION ONLY

10CFR50.59 REVIEW AND EVALUATION
RESPONSE JUSTIFICATION

ACTION UNDER REVIEW: SOLID RADWASTE PROCESS CONTROL PROGRAM REVISION: 2 PCN: 0
Name/Title

PROCEDURE/PCP/TEMP. MOD. NO: 76PR-9RW01

QUESTION	RESPONSE JUSTIFICATION
1.	No changes to the facility are required by this procedure revision. The revision relocates the Process Control Program procedural details found in the Technical Specifications to the Nuclear Administrative and Technical Manual PCP Procedure in support of LDCR Log# 91-015 utilizing the guidance of Generic Letter 89-01/NuReg 1301. References: Rev. 4, UFSAR, Sections 11.2, 11.4.1, 11.4.2.3.3, 12.1.2.4, 12.3.1.1.1.1, 12.3.2.2.5. NRC Generic letter 89-01, Nureg 1301. PVNGS Licensing Document Amendment Request, Log No. 91-015.
2.	No changes to procedures as they are described in UFSAR are required by this revision. References: Rev. 4, UFSAR, Section 12.5.3, 13.5.2.2.E.2, 13.5.2.2.E.3, 17.2.2.3.1.
3.	There are no tests or experiments in this procedure. Step 3.8 through step 3.8.2.6 of the PCP allude to "solidification bench tests, and/or test specimens" which are described in UFSAR, Rev. 4, section 11.4.2.3.1.
4.	This procedure revision relocates the Process Control Program procedural details found in the Technical Specifications to the Nuclear Administrative and Technical Manual PCP Procedure in support of LDCR Log# 91-015. The guidance of Generic Letter 89-01/NuReg 1301 has been utilized for the procedural detail relocation. Implementation of LDCR No. 90-015 will result in Technical Specification amendments. The following Technical Specifications have been incorporated into the PCP in this procedure revision: T/S 1.32, definition of solidification, incorporated into PCP as step 4.1.11. T/S 3/4.11.3 and Surveillance Requirement 4.11.3.1 incorporated into PCP as steps 3.1.1 through 3.1.5. Surveillance Requirement 4.11.3.2 incorporated into PCP as steps 3.8.1 and 3.8.2. Ref. Technical Specification (U-1, amendment 61, U-2, amendment 47, U-3, amendment 33.) NRC Generic Letter 89-01. Licensing Document Amendment Request 91-015.

QUALITY ASSURANCE
DOCUMENT REVIEW SUMMARY/ PROCEDURE CONCURRENCE

Date: 09/11/92

Procedure No. 76PR-9RW01 Rev No. 02.00

Procedure Title: SOLID RADWASTE PROCESS CONTROL PROGRAM

Comment Concurrence: RBCherba Date: 9/11/92 Resolution Concurrence: RBCherba Date: 9/11/92
Manager/Supervisor Manager/Supervisor

Procedure Concurrence: RBCherba **Date:** 9/11/92
Director, QA/ or Designee

NUMBER OF COMMENTS: 0 - ED 0 - CQ Type of review: New/Major Rev__ Minor Rev * X Cancellation__ * This review consists of a minor portion of the revision. See comment on page 2

Reviewer: P.F. LUCAS 9/11/92 Ext. 6777 Sta # 7995

Originator: F. PETTY Ext. 5675 Sta # 7902 Originating Org. RAD PROTECTION STANDARDS

Applicable 10 CFR 50 App. B Review Criteria

1 [] 2 [] 3 [] 4 [] 5 [X] 6 [X] 7 [] 8 [] 9 [] 10 [] 11 [] 12 [] 13 [] 14 [] 15 [] 16 [] 17 [] 18 []

List procedures that were used during the review.
Reference (list Reg. Guides, ANSI standards, and other documents that provide the basis for the review). List sections of reference that was used during review.

01AC-OAP02
OPS QA PLAN

FOR INFORMATION ONLY

ED = Editorial CQ = QA Program/Regulatory Requirement

Continuation Page

Comm Code	Item No.	Page/Para	Comments (show actual proposed rewording if possible)	Comment Resolution	QA Concurrence
			* This review supplements the QA review performed on 11/15/91. QA concurrence was documented for that review on 08/10/92 upon resolution of previous comments Two cross organizational comments were incorporated since that review was performed, these additions were included in steps 3.8.2.1 & 3.8.3.1 and provided clarification. This review consisted of the enhancement to these two steps only.		

FOR INFORMATION ONLY

QUALITY ASSURANCE
DOCUMENT REVIEW SUMMARY

Date: 11/15/91

Procedure No. 76PR-9RW01 Rev No. 2 PCNs

Procedure Title: SOLID RADWASTE PROCESS CONTROL PROGRAM

Comment Concurrence: R.K. Fortin Date: 11/15/91 Resolution Concurrence: R.K. Fortin Date: 8/10/92
Manager/Supervisor Manager/Supervisor

NUMBER OF COMMENTS: 3 - ED ___ - CQ Type of review: New/Major Rev X Minor Rev__

Reviewer: E. HECKMAN Originator: F. PETTY Ext. 3718 Sta # 6281 Originating Org. RP STANDARDS

Applicable 10 CFR 50 App. B Review Criteria

1 [] 2 [] 3 [] 4 [] 5 [X] 6 [X] 7 [] 8 [] 9 [] 10 [] 11 [] 12 [] 13 [] 14 [] 15 [] 16 [] 17 [] 18 []

List procedures that were used during the review.
Reference (list Reg. Guides, ANSI standards, and other documents that provide the basis for the review). List sections of reference that was used during review.

01AC-0AP01 Format And Content Of Nuclear Administrative And Technical Procedures
Tech Spec 6.13 Process Control Program (PCP)
Tech Spec 3/4.11.3 Solid Radioactive Waste
10CFR71 Packaging and Transportation of Radioactive Material
10CFR61 Licensing Requirements for Land Disposal of Radioactive Waste

FOR INFORMATION ONLY

ED = Editorial CQ = QA Program/Regulatory Requirement

Continuation Page

Comm Code	Item No.	Page/Para	Comments (show actual proposed rewording if possible)	Comment Resolution	QA Concurrence
ED	1	2/3.0	PROGRAM should read POLICY.	Changed to POLICY	8/10/92
ED	2	12/3.6.3	76DF-0RW03 needs to added next to title of procedure. (Classification of Radioactive Waste)	Added	8/10/92
ED	3	12/3.7.2	76RW-XSR01 needs to be added to title of proecure. (Operation of Solidification System)	Added	8/10/92

FOR INFORMATION ONLY

FOR INFORMATION ONLY
CROSS-ORGANIZATION REVIEW

☐ MANAGEMENT REVIEW ☒ DISCIPLINE REVIEW ☐ LEGAL REVIEW

PROCEDURE NO.	REV. NO.	PCN NO.	DUE DATE
76PR-9RW01	02	0	Dec. 16th, 1991

RESPONSIBLE ORGANIZATION	PREPARER	STA. NO.	EXT.
RP Standards	Frank Petty	6281	82-3718

CROSS-ORGANIZATION REVIEWER	STA.	EXT.
Thomas P. Hillmer	6983	82-2780

DESCRIPTION OF CHANGES:

Relocation of procedural details from Tech Specs to the PCP per NUREG 1301.
T/S 3/4.11.3 and Surveillance Requirement 4.11.3.1: Incorporated into PCP as section 3.1 (3.1.1 through 3.1.5).
Surveillance Requirement 4.11.3.2 incorporated into PCP as section 3.8 (3.8.1 through 3.8.2).
T/S 1.32, definition of solidification placed into PCP as step 4.1.11.
Changed heading of step 3.8.2: Was "Solid Radwaste System" to "Solidification Bench Test".
Changed several references from Developmental to Implementing. Added reference 76ST-XSR01, 76ST-9SR02, and NUREG 1301.

COMMENTS:

[redacted]

2.2.2. Add "4) MANAGER, RADIATION PROTECTION SUPPORT SERVICES" TPH

RESOLUTION:

Added as requested

CROSS-ORGANIZATION REVIEW INITIALS:
8/10/92 CK Telecon ✓
TPH/FMP f

COMMENTS:

3.5.3 refers to Huffman Nuclear & Development Corp. This company is owned under this name anymore. CB/TPH

RESOLUTION:

That is the name of the company that performed Start-up Testing and the name on the Topical Report. That is how it needs to be shown in the procedure.

CROSS-ORGANIZATION REVIEW INITIALS:
8/10/92 CK Telecon ✓
TPH/FMP f
CB/FMP f

COMMENTS:

3.8.2.1 states where data for bench tests come from. It covers Huffman, U.S. Gypsum, CNSI, but not NuRic using Portland cement CB/TPH

RESOLUTION:

Added "or other PUNGS approved vendor procedure."

CROSS-ORGANIZATION REVIEW INITIALS:
8/10/92 CK Telecon ✓
TPH/FMP f
CB/FMP f

FOR INFORMATION ONLY

CROSS-ORGANIZATION REVIEW

☐ MANAGEMENT REVIEW ☐ DISCIPLINE REVIEW ☐ LEGAL REVIEW

TDLRE NO:	REV. NO:	PCN NO:	DUE DATE:
76PR-9 RW01	62	0	12/16/91

RESPONSIBLE ORGANIZATION:	PREPARER:	STA. NO:	EXT:
RP STANDARDS	FRANK PETTY	G2E1	82-3718

CROSS-ORGANIZATION REVIEWER:	STA:	EXT:
THOMAS P. HILLMER	G983	2480

DESCRIPTION OF CHANGES:

COMMENTS:
3.5.7.1 Reword as follows: " Class B and Class C ion exchange resin may be dewatered in accordance with approved procedures in High integrity Containers that have been approved by the state agency which regulates the disposal site where the waste will be disposed or where a 10 CFR 61 Topical Report has been approved or is under review by the NRC."

RESOLUTION:
Current wording is more concise and less confusing. Change not made.

CROSS-ORGANIZATION REVIEW INITIALS:
8/10/92 OK Telecon
TPH/FMP

COMMENTS:
3.8.3.1 after the words "procedure and" ADD the words " for Class B and Class C waste".

RESOLUTION:
Added statement as requested.

CROSS-ORGANIZATION REVIEW INITIALS:
8/10/92 OK Telecon
TPH/FMP

COMMENTS:
One general comment is that the PCP change should be submitted with the semi-annual report as required and only referenced in the Tech Spec change not submitted with any Tech Spec change request.

RESOLUTION:
NRC required it be submitted with the Tech Spec change request.

CROSS-ORGANIZATION REVIEW INITIALS:
8/10/92 OK Telecon
TPH/FMP

FOR INFORMATION ONLY
CROSS-ORGANIZATION REVIEW

☐ MANAGEMENT REVIEW ☒ DISCIPLINE REVIEW ☐ LEGAL REVIEW

PROCEDURE NO.:	REV. NO.:	PCN NO.:	DUE DATE:
76PR-9RW01	02	0	Dec. 16th, 1991

RESPONSIBLE ORGANIZATION:	PREPARER:	STA. NO.:	EXT.:
RP Standards	Frank Petty	6281	82-3718

CROSS-ORGANIZATION REVIEWER:	STA.:	EXT.:
Harvey Ingalsbe	6313	82-3724

DESCRIPTION OF CHANGES:

Relocation of procedural details from Tech Specs to the PCP per NUREG 1301.
T/S 3/4.11.3 and Surveillance Requirement 4.11.3.1: Incorporated into PCP as section 3.1 (3.1.1 through 3.1.5).
Surveillance Requirement 4.11.3.2 incorporated into PCP as section 3.8 (3.8.1 through 3.8.2).
T/S 1.32, definition of solidification placed into PCP as step 4.1.11.
Changed heading of step 3.8.2: Was "Solid Radwaste System" to "Solidification Bench Test".
Changed several references from Developmental to Implementing. Added reference 76ST-XSR01, 76ST-9SR02, and NUREG 1301.

COMMENTS:

NONE

Hay D/L

RESOLUTION:

CROSS-ORGANIZATION REVIEW INITIALS:

COMMENTS:

RESOLUTION:

CROSS-ORGANIZATION REVIEW INITIALS:

COMMENTS:

RESOLUTION:

CROSS-ORGANIZATION REVIEW INITIALS:

FOR INFORMATION ONLY
CROSS-ORGANIZATION REVIEW

☐ MANAGEMENT REVIEW ☒ DISCIPLINE REVIEW ☐ LEGAL REVIEW

PROCEDURE NO.:	REV. NO.:	PCN NO.:	DUE DATE:
76PR-9RW01	02	0	

RESPONSIBLE ORGANIZATION:	PREPARER:	STA. NO.:	EXT.:
RP Standards	Frank Petty	6281	82-3718

CROSS-ORGANIZATION REVIEWER:	STA.:	EXT.:
J. R. Provasoli	1515	82-4160

DESCRIPTION OF CHANGES:

Relocation of procedural details from Tech Specs to the PCP per NUREG 1301.
T/S 3/4.11.3 and Surveillance Requirement 4.11.3.1: Incorporated into PCP as section 3.1 (3.1.1 through 3.1.5).
Surveillance Requirement 4.11.3.2 incorporated into PCP as section 3.8 (3.8.1 through 3.8.2).
T/S 1.32, definition of solidification placed into PCP as step 4.1.11.
Changed heading of step 3.8.2: Was "Solid Radwaste System" to "Solidification Bench Test".
Changed several references from Developmental to Implementing. Added reference 76ST-XSR01, 76ST-9SR02, and NUREG 1301.

COMMENTS:

I reviewed the attached PCP, Rev. 2 as it pertains to the proposed changes per NUREG 1301 and I have no comments. Joseph R. Provasoli 11/11/91

RESOLUTION: | CROSS-ORGANIZATION REVIEW INITIALS:

COMMENTS:

RESOLUTION: | CROSS-ORGANIZATION REVIEW INITIALS:

COMMENTS:

RESOLUTION: | CROSS-ORGANIZATION REVIEW INITIALS:

FOR INFORMATION ONLY
CROSS-ORGANIZATION REVIEW

☐ MANAGEMENT REVIEW ☒ DISCIPLINE REVIEW ☐ LEGAL REVIEW

PROCEDURE NO.	REV. NO.	PCN NO.	DUE DATE
76PR-9RW01	02	0	

RESPONSIBLE ORGANIZATION	PREPARER	STA. NO.	EXT.
RP Standards	Frank Petty	6281	82-3718

CROSS-ORGANIZATION REVIEWER	STA.	EXT.
J. R. Provasoli	1515	82-4160

DESCRIPTION OF CHANGES:

Relocation of procedural details from Tech Specs to the PCP per NUREG 1301.
T/S 3/4.11.3 and Surveillance Requirement 4.11.3.1: Incorporated into PCP as section 3.1 (3.1.1 through 3.1.5).
Surveillance Requirement 4.11.3.2 incorporated into PCP as section 3.8 (3.8.1 through 3.8.2).
T/S 1.32, definition of solidification placed into PCP as step 4.1.11.
Changed heading of step 3.8.2: Was "Solid Radwaste System" to "Solidification Bench Test".
Changed several references from Developmental to Implementing. Added reference 76ST-XSR01, 76ST-9SR02, and NUREG 1301.

COMMENTS:

I reviewed the attached PCP, Rev. 2 as it pertains to the proposed changes per NUREG 1301 and I have no comments. Joseph R. Provasoli 11/11/91

RESOLUTION: | CROSS-ORGANIZATION REVIEW INITIALS:

COMMENTS:

RESOLUTION: | CROSS-ORGANIZATION REVIEW INITIALS:

COMMENTS:

RESOLUTION: | CROSS-ORGANIZATION REVIEW INITIALS:

FOR INFORMATION ONLY

CROSS-ORGANIZATION REVIEW

☐ MANAGEMENT REVIEW ☒ DISCIPLINE REVIEW ☐ LEGAL REVIEW

PROCEDURE NO.:	REV. NO.:	PCN NO.:	DUE DATE:
76PR-9RW01	02	0	

RESPONSIBLE ORGANIZATION:	PREPARER:	STA. NO.:	EXT.:
RP Standards	Frank Petty	6281	82-3718

CROSS-ORGANIZATION REVIEWER:	STA.:	EXT.:
Kevin Kutner	6986	82-1966

DESCRIPTION OF CHANGES:

Relocation of procedural details from Tech Specs to the PCP per NUREG 1301.
T/S 3/4.11.3 and Surveillance Requirement 4.11.3.1: Incorporated into PCP as section 3.1 (3.1.1 through 3.1.5).
Surveillance Requirement 4.11.3.2 incorporated into PCP as section 3.8 (3.8.1 through 3.8.2).
T/S 1.32, definition of solidification placed into PCP as step 4.1.11.
Changed heading of step 3.8.2: Was "Solid Radwaste System" to "Solidification Bench Test".
Changed several references from Developmental to Implementing. Added reference 76ST-XSR01, 76ST-9SR02, and NUREG 1301.

COMMENTS: NONE

RESOLUTION: NA

CROSS-ORGANIZATION REVIEW INITIALS: KK

COMMENTS:

RESOLUTION:

CROSS-ORGANIZATION REVIEW INITIALS:

COMMENTS:

RESOLUTION:

CROSS-ORGANIZATION REVIEW INITIALS:

FOR INFORMATION ONLY

PF13 (SHFT PF1) - SEARCH MENU

PF14 (SHFT PF2) - DETAIL REPORTS

PF15 (SHFT PF3) - STATISTICAL REPORTS

PF16 (SHFT PF4) - EXCEPTION REPORTS

PF17 (SHFT PF5) - SINGLE RECORD REPORTS

PF20 (SHFT PF8) - SEARCH CRITERIA

PF21 (SHFT PF9) - SEARCH RESULTS

PF22 (SHFT PF10) - DOCUMENT QUICK SEARCH:

SRC:

DOC TYPE: PROC DOC NBR: 76PR-9RW01 REF:

DISP: Y

---------- OPTIONS ----------

PF01: HELP PF04: CATS MENU PF12: SIGNON

NO DOCUMENTS FOUND FOR QUICK SEARCH CRITERIA R06011

FOR INFORMATION ONLY

PF13 (SHFT PF1) - SUMMARY REPORTS

PF14 (SHFT PF2) - DETAIL REPORTS

PF15 (SHFT PF3) - STATISTICAL REPORTS

PF16 (SHFT PF4) - EXCEPTION REPORTS

PF17 (SHFT PF5) - SINGLE RECORD REPORTS

PF20 (SHFT PF8) - SEARCH CRITERIA

PF21 (SHFT PF9) - SEARCH RESULTS

PF22 (SHFT PF10) - DOCUMENT QUICK SEARCH:

SRC:

DOC TYPE: PROC DOC NBR: 76AC-9RW01 REF:

DISP: Y

---------- OPTIONS ----------

PF01: HELP PF04: CAIS MENU PF12: SIGNON

LIR050 CATS SEARCH RESULTS 08/10/92

12:37:37

S	PART	MSIR NBR	ACTION	TITLE/DESCRIPTION
	RCTS	010746	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032630	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032631	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032632	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032633	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032634	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032635	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032636	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032637	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032639	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032640	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032641	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032642	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032644	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032647	01	SEE COMMITMENT FOR FURTHER DETAIL
	RCTS	032648	01	SEE COMMITMENT FOR FURTHER DETAIL
	RQMT	010746	01	TAKE THE NECESSARY ACTIONS TO VERIFY THE

---------- OPTIONS ----------

ENTER: SELECT PF02: TOP PF06: PRNT PF07: BACK PF09: RPT MENU

PF01: HELP RMT: RMT163E PF08: FWD PA1(PG UP): OPTIONS

NO MORE SEARCH RECORDS TO DISPLAY R05002

SOLID RADWASTE PROCESS CONTROL PROGRAM	76PR-9RW01	Revision 02.00

The purpose of the Process Control Program (PCP) is to establish a set of process parameters which will provide reasonable assurance of complete solidification of various liquid radioactive "wet wastes" including resin slurries, evaporator bottoms, filter sludges and chemical drains. The PCP ensures that the solidified substance is a monolith having no freestanding liquid and is within the limits set forth in various regulations and acceptance criteria.

9-15-92
Effective Date

FOR INFORMATION ONLY

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

FOR INFORMATION ONLY

1.0 PURPOSE AND SCOPE

1.1 Purpose (RCTS 032630-01)

1.1.1 The purpose of the Process Control Program (PCP) for the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3 is to establish a set of process parameters which will provide reasonable assurance of complete solidification of various liquid radioactive "wet wastes" including resin slurries, evaporator bottoms, filter sludges, and chemical drains in accordance with the requirements of applicable portions of the PVNGS Quality Assurance Program, PVNGS Technical Specifications, PVNGS Final Safety Analysis Report, Department of Transportation (DOT) regulations, Arizona State Regulations, Nuclear Regulatory Commission (NRC) regulations, and licensed burial facilities acceptance criteria for solidification, packaging and shipment to an approved offsite burial site.

1.1.2 Toward this purpose, the PCP ensures that the solidified substance is a monolith having no freestanding liquid and is within the limits as set forth in the above mentioned regulations and acceptance criteria. This PCP will also ensure that solidification will be performed to maintain any potential radiation exposure to plant personnel to "as low as is reasonably achievable" (ALARA) levels, in accordance with 75PR-0RP03, "ALARA Program." (RCTS 032630-01, 032639-01)

1.1.3 The program addresses dewatering and drying of resin in conformance with 10 CFR 61 and packaging of various Class B and Class C waste in High Integrity Containers to meet waste form stability requirements.

1.2 Scope

1.2.1 This program applies to operation of plant installed and plant portable processing systems and vendor provided portable processing systems at PVNGS. It provides reasonable assurance of compliance with Low Level Radioactive Waste Regulations.

2.0 RESPONSIBILITIES

2.1 The Vice President, Nuclear Production or designee, shall assure the performance of a review by a qualified individual/organization of changes to the PROCESS CONTROL PROGRAM in accordance with this document.

2.2 The General Manager, Site Radiation Protection shall:

2.2.1 Ensure a periodic review of the Process Control Program (PCP) is completed at a minimum of every two years subsequent to the latest revision to maintain compliance with applicable State and Federal Regulations, licensing commitments, and burial facility requirements in accordance with 75AC-0RP01, "Review of Radiological Protection and Chemistry Program Performance."

2.2.2 Ensure that the Periodic Review Control Form is forwarded to NRM-DDC and copies are distributed to the following:

1) Vice President, Nuclear Production
2) General Manager, Site Radiation Protection
3) Nuclear Safety Group
4) Manager, Radiation Protection Support Services

2.2.3 Initiate any required changes to the Process Control Program identified during the review.

2.2.4 Report changes to the Process Control Program to the NRC in the Semi-annual Radioactive Effluent Release Report for the period in which the change(s) was made. This submittal shall contain:

2.2.4.1 Sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information; and

2.2.4.2 A determination that the change did not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes.

2.2.5 Provide an independent review of Process Control Program related "Instruction Change Request" received to evaluate the impact of the proposed change upon the program. Make changes to the program as necessary to maintain compliance with applicable state and federal regulation.

2.2.6 Develop station procedures or make necessary changes to existing procedures to maintain compliance with the Process Control Program subsequent to any change to the program.

2.2.7 Review and process vendor solidification procedures through the PVNGS procedure approval process.

2.3 **Manager, Radiation Protection Support Services is responsible for:**

2.3.1 Implementation of the Solid Radwaste Process Control Program.

2.3.2 Assuring that personnel under his control are fully aware of, and operate equipment in compliance with, the Process Control Program.

2.3.3 Monitoring the activities of Vendor personnel to assure Vendor compliance with the Process Control Program.

2.3.4 Communicating to the appropriate department, any apparent need for change to the PCP to maintain compliance with State and Federal Regulations, Licensing commitments and burial site requirements.

2.3.5 Communicating, to the appropriate department, the need for procedure changes, or new procedures to maintain compliance with the Process Control Program.

3.0 POLICY

3.1 Solid Radwaste System

3.1.1 The solid radwaste system shall be OPERABLE and used, as applicable in accordance with this PROCESS CONTROL PROGRAM, for the SOLIDIFICATION and packaging of radioactive wastes to ensure meeting the requirements of 10 CFR Part 20 and 10 CFR Part 71 prior to shipment of radioactive wastes from the site.

3.1.2 Step 3.1.1 above is applicable at all times.

3.1.3 The solid radwaste system(s) shall be demonstrated OPERABLE at lease once per 92 days by:

(a) Operating the solid radwaste system(s) at least once in the previous 92 days in accordance with this PROCESS CONTROL PROGRAM,

or

(b) Verification of the existence of a valid contract for SOLIDIFICATION to be performed by a contractor in accordance with a PROCESS CONTROL PROGRAM.

3.1.4 Step 3.1.3 (a) & (b) above shall be documented by completion of 76ST-XSR01, "Solid Radwaste System Surveillance Test Procedure."

3.1.5 If operability is not demonstrated as directed in step 3.1.3 above and:

(a) With the packaging requirements of 10 CFR Part 20 and/or 10 CFR Part 71 not satisfied, suspend shipments of defectively packaged solid radioactive waste from the site.

(b) With the solid radwaste system inoperable for more than 31 days, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report which includes the following information:

- Identification of the inoperable equipment or subsystems and the reason for inoperability.
- Action(s) taken to restore the inoperable equipment to OPERABLE status.
- A description of the alternative used for SOLIDIFICATION and packaging of radioactive wastes, and
- Summary description of action(s) taken to prevent a recurrence.

3.2 Precautions

3.2.1 When the radiation level of a waste batch is determined to be excessive by ALARA standards, a waste substitute shall be prepared and used for performance of the prequalification bench test in accordance with 76RW-9SR01, "Solidification Process Control."

3.2.2 Radiological Precautions; the radiological precautions necessary for implementing the Process Control Program shall be followed and are covered in 75PR-0RP01, "Radiation Protection Program." (RCTS 032648-01).

3.2.3 Sited State Acceptance; waste generators are allowed to stabilize Class B & C waste utilizing topical reports "Approved by" or "Under Review by" the NRC provided the burial site State agrees to accept the waste so stabilized.

3.3 Prerequisites

3.3.1 Typical and atypical wet waste types shall be identified by 76RW-9SR01, "Solidification Process Control," or appropriate vendor procedure which shall provide a record of waste formulations.

3.3.2 All Radioactive wet waste processing will be accomplished in accordance with an approved procedure.

3.3.3 Vendor operating procedures will undergo the same review process as PVNGS procedures.

3.4 Waste Types

3.4.1 Appendix A, "Schematic Flow Diagram," and Appendix B, "Radwaste Cement Solidification System," illustrate the different waste types to be processed by the solidification system. They are listed as follows:

3.4.2 Chemical regenerative and decontamination waste - evaporator concentrates - from a forced recirculation evaporator.

3.4.3 Boric acid waste from the Boric Acid Concentrator.

3.4.4 Bead resin waste as a slurry from the Spent Resin Tanks.

3.4.5 Chemical Drain Tank waste

3.4.6 Spent filter cartridges.

3.5 Process Parameters

3.5.1 An acceptable waste product for transfer and disposal in accordance with 10 CFR 20.311 for Class A, B, and C waste shall be provided by compliance with 76RW-9SR01, "Solidification Process Control" and 76DP-0RW03, "Classification of Radioactive Waste."

3.5.2 The process parameter for various Class A wastes shall be based on the Hittman Radwaste Solidification System (Cement) Topical Report, HN-R1109, Revision 4, U.S. Gypsum Envirostone Topical Report 5/84, or Chem-Nuclear Systems, CNSI-WF-C-02-P, (or a vendor process control program) and 76RW-9SR01, "Solidification Process Control." These documents establish boundary conditions to provide reasonable assurance that solidification will be complete. (RCTS 032631-01)

3.5.3 For Class A waste containing concentrations of chemical that do not fall within the bound of chemical concentrations for which preoperational solidification tests have been performed by Hittman Nuclear and Development Corporation, U.S. Gypsum, or Chem-Nuclear Systems acceptable base data for test solidification shall be developed in accordance with 76RW-9SR01, "Solidification Process Control." (RCTS 032646, 032647)

3.5.4 As plant conditions dictate, including ALARA considerations as well as inplant system inoperability due to maintenance, repairs, or modifications a portable solidification system will be used to process Class A waste in accordance with approved operating procedures. Class A ion exchange resins may be dewatered in an appropriate container in accordance with approved operating procedure.

3.5.5 For Class B and Class C waste, a 10 CFR 61 qualified solidification process will be used on the installed solid radwaste system in accordance with 76RW-9SR01, "Solidification Process Control," or a portable solidification system will be used in accordance with approved operating procedures and a 10 CFR 61 Topical Report approved by, or under review by, the NRC.

3.5.6 Process mixing ratios for Class A, B, and C waste shall be determined for each waste batch in accordance with 76RW-9SR01, "Solidification Process Control," or the vendors operating procedure.

3.5.7 Packaging Class B and Class C radioactive waste in High Integrity Containers.

3.5.7.1 Class B and Class C ion exchange resins may be dewatered in an approved High Integrity Container in accordance with a Process Control Program and a 10 CFR 61 Topical Report approved by, or under review by, the NRC.

3.5.7.2 Class B and Class C spent filters and other appropriately sized radioactive material may be placed in an approved High Integrity Container for disposal, in accordance with approved procedures, provided all the requirements of 10 CFR 61 are ensured.

3.6 Waste Classification

3.6.1 The Classification of Radioactive Waste procedure provides for the use of PWR scaling factors for identifying specific radionuclides as required by 10 CFR 61.55, "Waste Classification."

3.6.2 Scaling factors shall be verified or updated as required in 10 CFR Part 61 by waste stream analysis to ensure acceptable standards are maintained for waste classification.

3.6.3 During incident conditions where the use of the existing scaling factors is questionable, the waste shall be classified by correlation factors or actual sample analysis in accordance with 76DP-0RW03, "Classification of Radioactive Waste."

3.7 Waste Preconditioning

3.7.1 76RW-XSR01, "Operation of Solidification System" shall designate the required mixing/recirculation times and system operations to ensure a representative sample is obtained after chemical addition and prior to process initiation. (RCTS 032642-01, 032643-01, 032645-01)

3.7.2 Adjustment of the waste solution pH shall be in accordance with 76RW-XSR01, "Operation of Solidification System."

3.7.3 76RW-XSR01, "Operation of Solidification System" shall designate when heat tracing is required to ensure chemical suspension.

3.8 Verification of Solidification

3.8.1 This PROCESS CONTROL PROGRAM shall be used to verify the SOLIDIFICATION of at least one representative test specimen from at least every tenth batch of each type of wet radioactive waste (e.g., spent resins, evaporator bottoms, and boric acid solutions).

3.8.1.1 If any test specimen fails to verify SOLIDIFICATION, THE SOLIDIFICATION of the batch under test shall be suspended until such time as additional test specimens can be obtained, alternative SOLIDIFICATION parameters can be determined in accordance with this PROCESS CONTROL PROGRAM, and a subsequent test verifies SOLIDIFICATION. SOLIDIFICATION of the batch may then be resumed using the alternative SOLIDIFICATION parameters determined by this PROCESS CONTROL PROGRAM.

3.8.1.2 If the initial test specimen from a batch of waste fails to verify SOLIDIFICATION, this PROCESS CONTROL PROGRAM provides for the collection and testing of representative test specimens from each consecutive batch of the same type of wet waste until at least three consecutive initial test specimens demonstrate SOLIDIFICATION. This PROCESS CONTROL PROGRAM shall be modified as required, as provided in Technical Specification 6.13, to assure SOLIDIFICATION of subsequent batches of waste.

3.8.1.3 Verification of solidification of test specimens shall be documented by completion of 76ST-9SR02, "Process Control Program Solidification Verification."

3.8.2 Solidification Bench Test

3.8.2.1 The solidification bench tests, in accordance with the Hittman Topical Report, Radwaste Solidification System (Cement), HN-R1109, Revision 4, U.S. Gypsum Envirostone Topical Report 5/84, Chem-Nuclear Systems (CNSI-WF-C-02-P), or other PVNGS approved vendor procedure provide the solidification bench testing base data for 76RW-9SR01, "Solidification Process Control," for use with Class A waste.

3.8.2.2 The solidification bench tests in accordance with a vendor's 10CFR61 Topical Report approved by, or under review by, the NRC will provide the bench testing base data for 76RW-9SR01, "Solidification Process Control," for use with Class B and C waste.

3.8.2.3 During solidification system operations, additions to the waste feed tank, waste feed pump operation, and process mixing ratio adjustments shall be in accordance with 76RW-XSR01, "Operation of Solidification System."

No additions will be made to the waste feed tank while the tank is being recirculated for sampling or processing. (RCTS 032644)

The waste feed pump will not be stopped during sampling.

3.8.2.4 A periodic solidification bench test shall be performed as specified by and in accordance with 76RW-9SR01, "Solidification Process Control," for verification of an acceptable solidification process.

3.8.2.5 If any solidification bench test is found to be not acceptable, subsequent operations and testing shall be in accordance with 76RW-9SR01, "Solidification Process Control."

3.8.2.6 The solidification bench test acceptance criteria shall be in accordance with 76RW-9SR01, "Solidification Process Control."

3.8.2.7 Solidification product quality is controlled by the performance of 76RW-XSR01, "Operation of Solidification System."

FOR I/ FORMATION ONLY

3.8.3 Portable Solidification System

3.8.3.1 The portable solidification vendor will verify proper solidification of the waste product in accordance with the vendor's operating procedure and for Class B and C waste, a 10 CFR 61 Topical Report approved by, or under review by, the NRC.

3.8.3.2 Handling of containers of unacceptable solidified waste shall be in accordance with 76RW-XSR01, "Operation of Solidification System."

3.9 Stability Requirements

3.9.1 Wet radioactive waste shall be classified in accordance with 76DP-0RW03, "Classification of Radioactive Waste," prior to solidification to assure stability specification set forth in 10CFR61.56 "Waste Characteristics," and Branch Technical Position ETSB 11-3, Revision 2, July 1981, "Design Guidance For Solid Radioactive Waste Management Systems Installed in Light Water Cooled Nuclear Power Reactor Plants."

3.10 Data Sheets (RCTS 032649-01)

3.10.1 For each solidification bench test actually used for waste processing, a test data record shall be maintained in accordance with 76RW-9SR01, "Solidification Process Control."

3.10.2 For each batch solidification process, a feed rate determination shall be completed in accordance with the 76RW-9SR01, "Solidification Process Control." (RCTS 032650-01)

3.10.3 For each batch solidification process, records shall be maintained of the unique batch information in accordance with 76RW-9SR01, "Solidification Process Control."

3.10.4 For each batch solidification process, a waste classification record shall be completed in accordance with 76DP-0RW03, "Classification of Radioactive Waste."

3.11 Record Retention

3.11.1 For each batch solidification process, all records generated shall be maintained in accordance with 84AC-0RM05, "Document/Record Turnover Control."

4.0 DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

4.1.1 Batch - An isolated quantity of waste feed to be processed having essentially constant physical and chemical characteristics,

or

A quantity of wet waste type(s) prepared in the waste feed tank for solidification.

4.1.2 Bench test - A prequalification program of the solidification process, performed on a reduced scale with representative mixing ratios, implemented to demonstrate that the proposed method of wet waste processing will result in a waste form acceptable to the land disposal facility.

4.1.3 Chelating Agent - For the purpose of this document chelating agents are amine polycarboxylic acids (e.g., EDTA, DTPA), hydroxy-carboxylic acids, and polycarboxylic acids (e.g., citric acid, carbolic acid and glucinic acid) as defined in 10 CFR Part 61.2.

4.1.4 Approved High Integrity Container: A container used to provide the long term stability requirement of 10 CFR 61. Approval to be evidenced by a copy of the 10 CFR 61 "Certificate of Compliance" being reviewed prior to the containers use and maintained in station file during and subsequent to the containers use.

4.1.5 Low level radioactive waste (LLW)

4.1.5.1 Those low-level radioactive wastes containing source, special nuclear, or by-product material that are acceptable for disposal in a near surface land disposal facility.

4.1.5.2 Radioactive waste that contains no hazardous materials as defined in RCRA.

4.1.5.3 Radioactive waste not classified as high-level radioactive waste, transuranic waste or spent nuclear fuel.

4.1.6 Monolith - A freestanding, solid object.

4.1.7 Operable - A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, control, electrical power, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

4.1.8 Procedure - A document that specifies or prescribes how an activity is to be performed. Procedures shall be approved for use in accordance with 01AC-0AP02, "Review and Approval of Nuclear Administrative and Technical Procedures."

4.1.9 Process(ing) - Changing, modifying, and/or packaging the commercial nuclear power plant generated wet radioactive waste into a form that is acceptable to a disposal facility.

4.1.10 Quality Assurance/Quality Control - As used in this document, "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of the material, structure, component, or system to predetermined requirements.

4.1.11 Solidification - The conversion of radioactive waste from liquid systems to a homogeneous (uniformly distributed), monolithic, immobilized solid with definite volume and shape, bounded by a stable surface of distinct outline on all sides (free-standing).

4.1.12 Stability - As used in this document, "stability" means structural stability. Stability requires that the waste form maintain its structural integrity under the expected disposal conditions.

4.1.13 Waste Container - An approved vessel of any shape, size, and composition used to contain the final processed waste.

4.1.14 Waste Form - Waste in a waste container acceptable for disposal at a licensed near-surface disposal facility.

4.1.15 Wet Waste Types - Liquid radioactive wastes, sludges, spent filter cartridges, and ion exchanger resins.

4.2 Abbreviations

4.2.1 ALARA - As Low As Reasonably Achievable

4.2.2 HIC - High Integrity Container

4.2.3 PCP - Process Control Program

4.2.4 RCRA - Resource Conservation and Recovery Act

5.0 REFERENCES

5.1 Implementing

5.1.1 76ST-XSR01, "Solid Radwaste System Surveillance Test Procedure"

5.1.2 76ST-9SR02, "Process Control Program Solidification Verification"

5.1.3 76RW-XSR01, "Operation of Solidification System"

5.1.4 76RW-9SR01, "Solidification Process Control"

5.1.5 76DP-0RW03, "Classification of Radioactive Waste"

5.1.6 76DP-9RW01, "Aquaset, Aquaset II, Petroset, and Petroset II Solidification Process"

5.2 Developmental

5.2.1 10 CFR 20, "Standards for Protection Against Radiation"

5.2.2 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste" (RCTS 032637)

5.2.3 10 CFR 71, "Packaging and Transportation of Radioactive Material"

5.2.4 49 CFR Subchapter C, "Hazardous Materials Regulations"

5.2.5 NUREG-0472, Rev 2, July 1979, "Radiological Effluent Technical Specification for PWRs"

5.2.6 NUREG-1301, Rev. 0, April 1991, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Control for Pressurized Water Reactors"

5.2.7 Palo Verde Nuclear Generating Station Technical Specification. Sections 1.24, 6.10.2, 6.13. (Amendment 61, U-1, 47, U-2, 33, U-3)

5.2.8 Palo Verde Nuclear Generating Station updated Final Safety Analysis Report, Rev. 4, Sections 11.4, 12.1, and 12.3. (RCTS 032632-01)

5.2.9 "Operations Quality Assurance Plan," Rev 0, 4/29/92 (RCTS 032634-01)

5.2.10 84AC-0RM05, Rev 3, "Document/Record Turnover Control"

5.2.10 75PR-0RP01, Rev 1, "Radiation Protection Program"

5.2.11 75PR-0RP03, Rev 2, "ALARA Program" (RCTS 032633)

5.2.12 01AC-0AP01, Rev 2, "Format & Content of Nuclear Administrative And Technical Procedures"

5.2.13 75AC-0RP01, Rev 1, "Review of Radiological Protection and Chemistry Program Performance"

5.2.14 USNRC Branch Technical Position ETSB 11-3, Rev 2, July 1981 "Design Guidance for Solid Radioactive Waste Management Systems Installed in Light Water Cooled Nuclear Power Reactor Plants." (RCTS 032636)

5.2.15 NRC Technical Position on Waste Form, Rev 0, May 1983.

5.2.16 Chem-Nuclear Systems (CNSI-WF-C-02-P), "Development and Testing of Waste Solidification Formulas to meet Title 10 CFR Part 61 Waste Form Criteria"

5.2.17 U.S. NRC Standard Review Plan 11.4, Rev 2, July 1981 "Solid Waste Management Systems," NUREG 0800, Rev 2, July 1981 (RCTS 032635-01)

5.2.18 U.S. Gypsum Envirostone Topical Report 5/84.

5.2.19 NRC Information Notice 89-27, "Limitations on the Use of Waste Forms and High Integrity Containers for the Disposal of Low-Level Radioactive Waste," March 8, 1989.

5.2.21 Technical Specification Interpretation #6.0-13-01-00, May 4, 1990

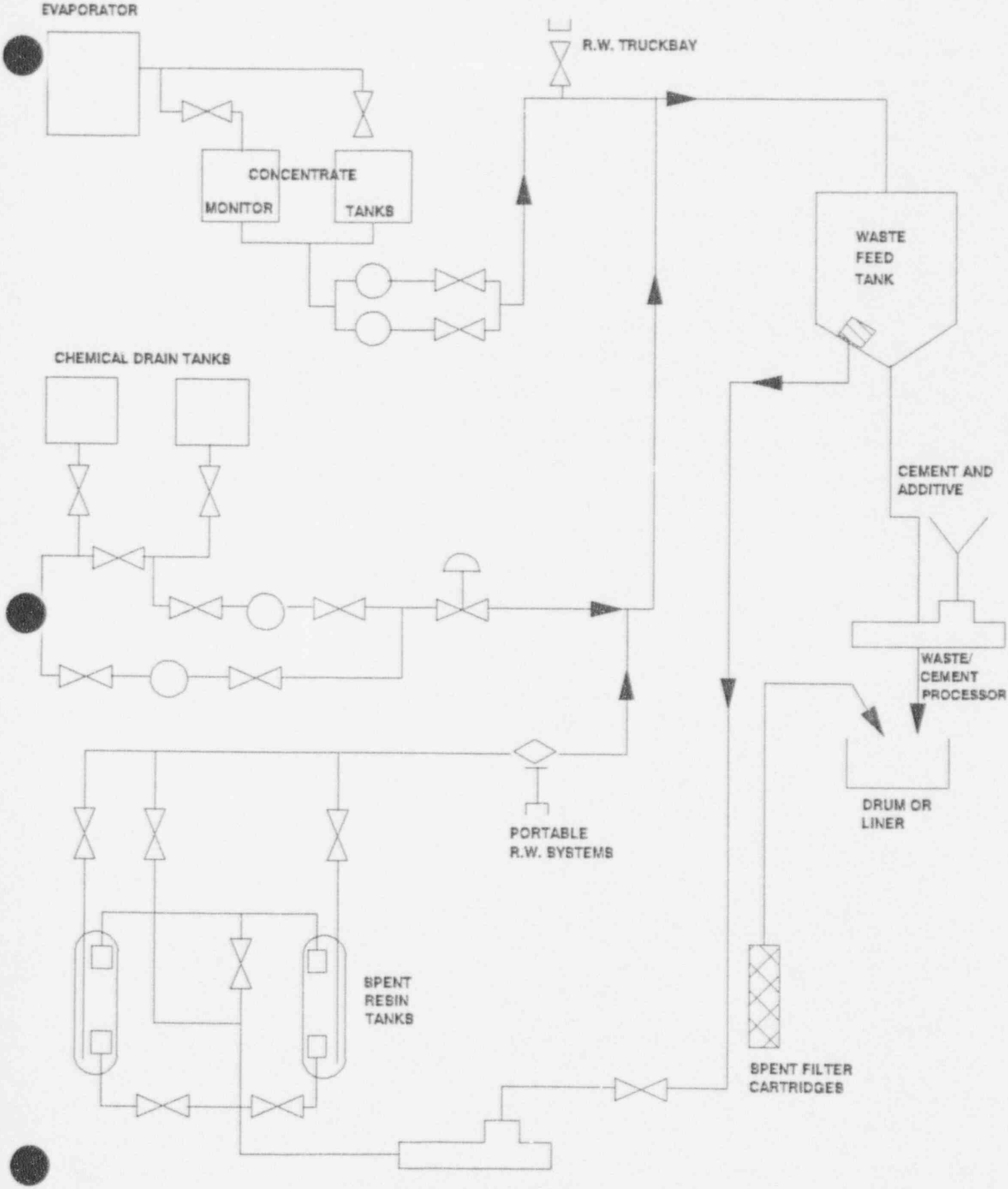
5.2.22 Regulatory Commitment Tracking System

Partition	Commitment Number	Action Number	Procedure Section
RCTS	032630	01	1.1.2
RCTS	032631	01	3.5.2
RCTS	032632	01	5.2.8
RCTS	032633	01	5.2.11
RCTS	032634	01	5.2.9
RCTS	032635	01	5.2.18
RCTS	032636	01	5.2.15
RCTS	032637	01	5.2.2
RCTS	032638	01	The PCP
RCTS	032639	01	1.1.2
RCTS	032641	01	6.1
RCTS	032642	01	3.7.1
RCTS	032643	01	3.7.1
RCTS	032644	01	3.8.2.3
RCTS	032645	01	3.7.1
RCTS	032646	01	3.5.3
RCTS	032647	01	3.5.3
RCTS	032648	01	3.2.2
RCTS	032649	01	3.10
RCTS	032650	01	3.10.2

6.0 APPENDICES

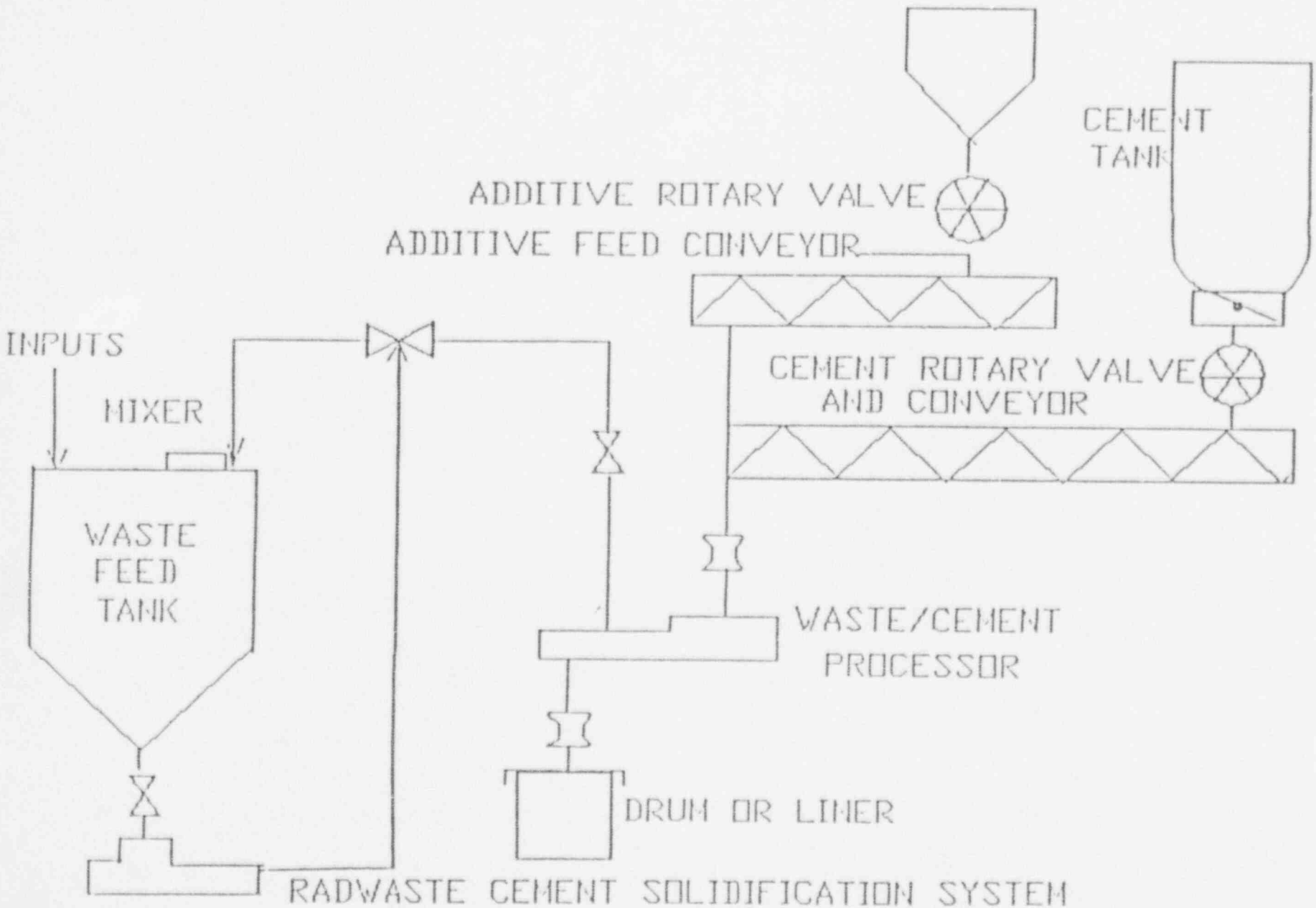
6.1 Appendix A - Schematic Flow Diagram (RCTS 032641-01)

6.2 Appendix B - Radwaste Cement Solidification System



SCHEMATIC FLOW DIAGRAM

FOR INFORMATION ONLY



PVNGS LICENSING DOCUMENT AMENDMENT/ AMENDMENT REQUEST APPROVAL

DATE: Nov. 13, 1991

UNIT
- ☐ PVNGS-1
- ☐ PVNGS-2
- ☐ PVNGS-3
- ☑ GENERIC

LOG NO: 91-015

AMENDMENT NO./REVISION NO: 2

DOCUMENT
- ☐ UFSAR
- ☐ QAP (UFSAR Chap. 17)
- ☑ TS *
- ☐ RMAC
- ☐ SDIP
- ☐ EP
- ☐ EPP *
- ☐ OTHER _____
- ☐ SP
- ☐ OL *

SECTION(S) AFFECTED (ATTACH REVISED OR MARKED-UP PAGES)
3/4.3; 3/4.11; 3/4.12
Bases; Sect. 5 & 6

DESCRIPTION (BASIS/JUSTIFICATION) **

The proposed Technical Specification Amendment would remove the radiological effluent section of the Technical Specification and relocate them to either the ODCM or the Process Control Program. The proposed change is consistent with the guidance provided in Generic Letter 89-01.

RESULTING TRANSMITTAL LETTERS TO AGENCIES

PREPARED BY: Joseph A. Bonasoli — 11/13/91 (DATE)

REVIEWED BY: R.G. Bernier — 11-13-91 (DATE)

- ☐ Capital Improv.
- ☐ O & M Improv.

NRC PRIOR APPROVAL OR NOTIFICATION REQUIRED: ☑ YES ☐ NO

☐ ALL SIGNED (Approval Forms Attached)

REQUIRED CONCURRENCE/APPROVALS

☐	CONCUR	APPLICABLE DEPARTMENT HEAD	DATE
☐	CONCUR	APPLICABLE DEPARTMENT HEAD	DATE
☑	CONCUR	Dick Coone — PLANT REVIEW BOARD	1-29-92 — DATE
☑	CONCUR	PVNGS PLANT MANAGER(S)	DATE
☐	CONCUR	DIRECTOR QUALITY ASSURANCE QUALITY CONTROL	DATE
☑	CONCUR	T. Weber — NUCLEAR SAFETY GROUP	2/10/92 — DATE
☑	CONCUR APPROVE	MANAGER, NUCLEAR LICENSING	2/10/92 * — DATE

* INCLUDE EFFECT ON PLANT OPERATIONS IN JUSTIFICATION
** ATTACH ADDITIONAL SHEETS AS NECESSARY

(*) Verbal approval was provided prior to submittal to the NRC. [illegible] 2/10/92

Pv419.05AE Rev. 7.90