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MONTICELLO NUCLEAR GENERATING PLANT.

Offsite Radiation Dose Assessment for January 1, - December 31, 2001

An assessment of radiation dose due to releases from the Monticello Nuclear Generating Plant during 2001 was performed in accordance with the Offsite Dose Calculation Manual (ODCM). Computed doses were well below the 40 CFR 190 Standards and 10 CFR Part 50, Appendix I Guidelines.

Offsite dose calculation formulas and meteorological data from the Offsite Dose Calculation Manual were used in making this assessment. Source terms were obtained from the Radioactive Effluent Release Report for 2001.

Offsite Dose from Gaseous Releases (ODCM -08.01 section 2.1.3)

Computed dose due to gaseous releases are reported in Table 1. Critical receptor location and pathways for organ dose are reported in Table 2. Whole body and organ dose due to gaseous releases are a small percentage of Appendix I Guidelines.

Offsite Dose From Liquid Releases (ODCM -08.01 section 2.1.3)

Dose from liquid releases are listed in Table 1. Dose is based on release of Turbine Building Normal Drain Sump water releases in the second and fourth quarters with H-3, Mn-54, Co-58, Co-60, Zn-65, and Cs-137 activity present. Whole body and organ dose due to liquid releases are a small percentage of Appendix I Guidelines.

Dose to Individuals Due to Their Activities Inside the Site Boundary (ODCM -08.01 section 2.1.3)

Computed dose to the whole body, skin and organ (thyroid), are reported in Table 1. There are several groups of concern, construction work on the cooling towers, sportsmen entering the Monticello site for recreational activities and XCEL Energy Company transmission and distribution crews working in the substation. Use of a very conservative assumption of 40 hours/week spent inside the site boundary by these groups would conservatively represent the most exposed individual. The annual whole body, skin and organ dose was computed using plant stack and reactor building vent X/Q and D/Q values for the number 11 cooling tower location (a bounding location due to predominant wind direction and nearness to the release points) as input to the GASPARE code. This computed dose was reduced by the factor of 40/168 to account for limited occupancy.

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Dose to the Likely Most Exposed Member of the General Public from Reactor Releases and Other Nearby Uranium Fuel Cycle Sources (ODCM -08.01 section 2.1.4)

There are no other uranium fuel facilities in the vicinity of the Monticello site. The only artificial source of exposure to the general public in addition to the plant effluent releases is from direct radiation of the reactor and the steam turbines.

Environmental TLDs were used to provide data on direct and skyshine radiation dose and the GASPARE code was used to provide data on dose from airborne pathways. The net dose from the TLDs was added to the GASPARE dose data for locations of off site residences and personnel with activities inside the site boundary. This data indicates that the annual whole body and organ dose to each of these locations is less than 16 millirem. (see pages 5 and 6 for details)

Therefore, the likely most exposed member of the general public will not receive an annual radiation dose from reactor effluent releases and all other fuel cycle activities in excess of 40 CFR 190 standards of 25 millirem to the whole body, 75 millirem to the thyroid, and 25 millirem to any other organ.

Changes in Land Use and Non Obtainable Milk or Vegetable Samples
(ODCM -08.01 sections 2.1.8 and 2.1.9)

There were no changes in land use resulting in significant increases in calculated doses. Milk samples were unavailable at sample location M-28 (Hoglund Farm) from 7/25/01 to 12/31/01 due to the farm being temporarily out of business. Land use census results show that there were no other indicator sample locations to replace this farm. Milk production and sampling has resumed at the Hoglund farm starting 1/02/02. There were no vegetable samples that could not be obtained during this reporting period.

Table 1

OffSite Radiation Dose Assessment - Monticello

PERIOD: January 1, through December 31, 2001

GASEOUS RELEASES	DOSE	10CFR50 Appendix I Guidelines
Maximum Site Boundary Gamma Air Dose (mrad/year)	0.003	10
Maximum Site Boundary Beta Air Dose (mrad/year)	0.004	20
Maximum Off-Site Dose to Any Organ (mrem/year)	0.011	15
Maximum Dose to the Likely Most Exposed Member of the General Public (mrem/year)		
Whole Body	0.006	5
Skin	0.007	15
Organ (Thyroid)	0.011	15
LIQUID RELEASES		
Maximum Off-Site Dose (mrem)		
Whole Body	1.61E-05	3
Organ	1.72E-04	10
GASEOUS RELEASES	DOSE	40CFR 190 LIMITS
Maximum Dose to Individuals due to their Activities Inside the Site Boundary (mrem)		
Whole Body	0.012	25
Thyroid	0.014	75
Any Other Organ (Skin)	0.015	25

Table 2

OffSite Radiation Dose Assessment - Monticello
Supplemental Information

PERIOD: January 1, through December 31, 2001

GASEOUS RELEASES		
Maximum Site Boundary Dose Location (from Reactor Building Vents)		
Sector	SSE	
Distance (miles)	0.40	
Number 11 Cooling Tower		
Sector	NE	
Distance from Plant Stack (miles)	0.09	
Distance from Reactor Building Vents	0.13	
Critical Receptor Location		
Sector	SSW	
Distance from Reactor Building Vents (miles)	0.60	
Pathways	Plume, Ground, Inhalation, Vegetable	
Age Group	CHILD	
Organ	THYROID	
LIQUID RELEASES		
St. Paul Drinking Water Intake Location		
Pathways	Drinking Water	Drinking Water, Fish
Age Group	Infant	Adult
Organ	Whole Body	GI Tract
Dilution Factor (drinking water)	7:1	7:1

Bases for Radiation Dose Statements

40 CFR 190 Limits for Annual Dose Equivalent

Whole Body – 25 mrem

Thyroid – 75 mrem

Any Other Organ – 25 mrem

Critical Receptor Locations

Maximum Organ Dose – 0.6 miles SSW

Maximum Site Boundary TLD – 0.4 miles W

Maximally Exposed Individuals

A. Maximum Offsite Dose from Airborne Effluents (Calculated by GASPAR program)

Whole Body:	0.012 mrem
Thyroid:	0.014 mrem
Any Other Organ:	0.015 mrem

B. Dose from Shine

<u>TLD</u>	<u>Location</u>	<u>Mean Reading (mrem/91 days)</u>	<u>Standard Deviation</u>
Controls	4 quadrants @ 90° separation	14.1	0.36 (4 sites all >10 mile distance)
M-09A	0.6 miles SSW	13.6	0.89 (in direction of Critical Receptor)
M-12A	0.4 miles W	16.0	1.18 (maximum site boundary TLD)

The difference (D) between the indicator and control TLDs, the standard deviation of D, and the limits for D at the 90% confidence level are as follows:

<u>TLD</u>	<u>D</u>	<u>Std Dev</u>	<u>90% Conf</u>	<u>Limits at 90% Confidence</u>
M-09A	-0.51	0.96	1.58	-2.09 < D < 1.07
M-12A	2.25	0.41	0.67	-0.13 < D < 3.92

M-09A – Because zero is in the interval, there may be no difference between the indicator and control TLDs. At the 90% confidence level, the difference is no greater than 1.07 mrem per 91 days, or approximately 4.3 mrem/year.

M-12A – Because zero is in the interval, there may be no difference between the indicator and control TLDs. At the 90% confidence level, the difference is no greater than 3.92 mrem per 91 days, or approximately 15.7 mrem/year.

C. Maximum Total Dose

Annual Dose from effluents to any individual, regardless of location, will be no more than:

Whole Body:	0.011 mrem
Thyroid:	0.014 mrem
Other Organs:	0.015 mrem

Annual Direct Dose will be no more than: 15.7 mrem

Therefore, the maximum dose quantities for comparison to 49 CFR 190 limits are (mrem/year):

	<u>Dose</u>	<u>Limit</u>
Whole Body:	15.71	25
Thyroid:	15.71	75
Any Other Organ:	15.72	25