

May 21, 2004

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

ULNRC-5003



Ladies and Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
1998 ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT**

Enclosed are revised sections of the 1998 Annual Radioactive Effluent Release Report (ARERR). This submittal includes revised Meteorological data tables and recalculated doses to the public from gaseous releases in 1998. These tables were revised due to intermittent electrical interferences that affected the Primary Meteorological Tower 10 and 60 meter wind speed transmitters. These errors resulted in a slight increase in the calculated dose to the public. However, the calculated dose is still only a small percentage of the regulatory limits.

Sincerely,

A handwritten signature in black ink that reads "Keith D. Young".

Keith D. Young
Manager, Regulatory Affairs

DJW/hao

Enclosure

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ULNRC-5003

5/21/04

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cc: U.S. Nuclear Regulatory Commission (Original and 1 copy)
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Missouri Public Service Commission
Governor Office Building
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PO Box 360
Jefferson City, MO 65102-0360

TABLE 5

DOSE AT THE SITE BOUNDARY AND TO THE NEAREST RESIDENT
FROM GASEOUS EFFLUENTS

		SITE BOUNDARY		NEAREST RESIDENT	
		LOCATION: 1.40 km SSE		LOCATION: 2.41 km N	
		AGE GROUP: CHILD		AGE GROUP: CHILD	
ORGAN	UNITS	DOSE	% LIMIT(a)	DOSE	% LIMIT(b)
1. GAMMA AIR DOSE *	MRAD	4.17E-03	0.04	2.32E-03	N/A
2. BETA AIR DOSE *	MRAD	7.93E-03	0.04	4.41E-03	N/A
3. WHOLE BODY ***	MREM	8.05E-03	N/A	4.85E-03	N/A
4. SKIN ***	MREM	1.19E-02	N/A	6.98E-03	N/A
5. BONE **	MREM	4.36E-03	N/A	9.71E-03	0.06
6. LIVER **	MREM	8.21E-03	N/A	2.97E-02	0.20
7. TOTAL BODY **	MREM	8.20E-03	N/A	2.32E-02	0.15
8. THYROID **	MREM	8.56E-03	N/A	1.02E-01	0.68
9. KIDNEY **	MREM	8.21E-03	N/A	2.44E-02	0.16
10. LUNG **	MREM	8.42E-03	N/A	2.25E-02	0.15
11. GI-LLI **	MREM	8.20E-03	N/A	2.18E-02	0.15

* Dose from Noble Gases only

** Dose from Tritium, Radioiodines, and Particulates only

*** Dose from Noble Gases plus Ground Plane dose

(a) Annual dose limits of Offsite Dose Calculation Manual (APA-ZZ-01003) of 10 mrad gamma air dose and 20 mrad beta air dose.

(b) Annual dose limits of Offsite Dose Calculation Manual (APA-ZZ-01003) of 15 mrem to any organ from I-131, I-133, H-3 and particulate radionuclides with halflives greater than 8 days.

TABLE 6

DOSE TO THE MEMBER OF THE PUBLIC FROM ACTIVITIES
WITHIN THE SITE BOUNDARY

ORGAN	UNITS	EFFLUENT DOSE WITHIN THE SITE BOUNDARY	DIRECT RADIATION FROM THE UNIT	DIRECT RADIATION FROM OUTSIDE TANKS	TOTAL DOSE FOR THE YEAR
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1. SKIN	MREM	2.13E-03	N/A	N/A	2.13E-03
2. BONE	MREM	1.24E-03	8.79E-03	8.22E-03	1.83E-02
3. LIVER	MREM	2.53E-03	8.79E-03	8.22E-03	1.95E-02
4. TOTAL BODY	MREM	3.57E-03	8.79E-03	8.22E-03	2.06E-02
5. THYROID	MREM	2.60E-03	8.79E-03	8.22E-03	1.96E-02
6. KIDNEY	MREM	2.52E-03	8.79E-03	8.22E-03	1.95E-02
7. LUNG	MREM	2.58E-03	8.79E-03	8.22E-03	1.96E-02
8. GI-LLI	MREM	2.53E-03	8.79E-03	8.22E-03	1.95E-02

TABLE 7

TOTAL DOSE DUE TO THE URANIUM FUEL CYCLE
(MEMBER OF THE PUBLIC)

ORGAN	UNITS	DOSE AT THE RESIDENCE LOCATION	DOSE FROM ACTIVITIES WITHIN SITE BOUNDARY	TOTAL DOSE TO THE MEMBER OF THE PUBLIC	% LIMITS *
1. SKIN	MREM	2.13E-03	2.13E-03	4.26E-03	0.02
2. BONE	MREM	1.76E-03	1.83E-02	2.00E-02	0.08
3. LIVER	MREM	7.82E-03	1.95E-02	2.74E-02	0.11
4. TOTAL BODY	MREM	8.56E-03	2.06E-02	2.91E-02	0.12
5. THYROID	MREM	1.77E-02	1.96E-02	3.73E-02	0.05
6. KIDNEY	MREM	7.08E-03	1.95E-02	2.66E-02	0.11
7. LUNG	MREM	6.82E-03	1.96E-02	2.64E-02	0.11
8. GI-LLI	MREM	6.89E-03	1.95E-02	2.64E-02	0.11

* Annual dose limits from 40CFR190.10(a) of 25 mrem whole body, 75 mrem to the thyroid, and 25 mrem to any other organ.

Meteorological Data
Averages Using Hourly Averaged Data

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

		UNITS	VALUES	% GOOD DATA
Stability Class		A - G	E	94%
Total Precipitation		CM.	1.44E+02	97%
10 Meter Level:	Wind Speed	Meter/Sec	3.20E+00	100%
	Wind Direction	Degrees	1.83E+02	99%
	Wind Direction Variability	Degrees	1.30E+01	99%
	Reference Temperature	Degrees C	1.38E+01	100%
	Dewpoint	Degrees C	7.33E+00	100%
60 Meter Level:	Wind Speed	Meter/Sec	5.09E+00	99%
	Wind Direction	Degrees	1.89E+02	96%
	Wind Direction Variability	Degrees	8.56E+00	98%
	Dewpoint	Degrees C	0.00E+00	0%
	Temperature Difference 60 - 10	Degrees C	2.02E-01	94%

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: A

Wind Speed at 10.00 Meter Level (MPH)							
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	0	1	0	0	0	4
NNE	4	0	0	0	0	0	4
NE	0	2	0	0	0	0	2
ENE	2	0	0	0	0	0	2
E	2	5	0	0	0	0	7
ESE	0	2	1	0	0	0	3
SE	1	5	0	1	0	0	7
SSE	1	8	2	1	0	0	12
S	1	7	2	0	0	0	10
SSW	0	11	8	0	0	0	19
SW	1	4	1	0	0	0	6
WSW	0	0	0	0	0	0	0
W	1	1	3	0	0	0	5
WNW	0	2	0	0	0	0	2
NW	0	0	4	1	0	0	5
NNW	0	1	0	0	0	0	1
TOT	16	48	22	3	0	0	89

Hours of Calm Data: 1
Hours of Invalid Data: 1

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: B

	Wind Speed at 10.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	0	3	3	0	0	0	6
NNE	1	3	3	0	0	0	7
NE	0	3	1	0	0	0	4
ENE	1	1	1	0	0	0	3
E	0	4	2	0	0	0	6
ESE	0	6	1	0	0	0	7
SE	1	12	8	0	0	0	21
SSE	0	15	12	2	2	1	32
S	0	23	13	3	0	0	39
SSW	1	19	19	0	1	0	40
SW	3	11	12	1	0	0	27
WSW	0	7	3	1	0	0	11
W	0	2	7	1	0	0	10
WNW	2	6	3	0	0	0	11
NW	1	4	6	0	0	0	11
NNW	0	2	1	1	0	0	4
TOT	10	121	95	9	3	1	239

Hours of Calm Data: 0
Hours of Invalid Data: 5

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: C

	Wind Speed at 10.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	2	11	11	0	0	0	24
NNE	2	9	4	0	0	0	15
NE	1	3	1	1	0	0	6
ENE	2	8	3	2	0	0	15
E	0	4	3	0	0	0	7
ESE	2	11	7	0	0	0	20
SE	1	19	16	0	0	0	36
SSE	3	22	19	1	0	1	46
S	1	18	19	4	1	1	44
SSW	1	24	15	0	3	0	43
SW	1	21	12	4	0	0	38
WSW	1	8	9	1	0	0	19
W	1	4	12	0	0	0	17
WNW	1	17	7	0	0	0	25
NW	1	19	8	1	0	0	29
NNW	3	14	9	2	0	0	28
TOT	23	212	155	16	4	2	412

Hours of Calm Data: 0
Hours of Invalid Data: 8

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: D

Wind Speed at 10.00 Meter Level (MPH)							
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	16	85	93	22	0	0	216
NNE	18	80	46	3	0	0	147
NE	24	64	39	6	0	0	133
ENE	10	60	63	17	3	0	153
E	8	58	57	3	0	0	126
ESE	11	68	66	5	0	0	150
SE	16	80	63	10	1	0	170
SSE	20	71	57	19	10	0	177
S	15	71	62	47	3	1	199
SSW	18	103	55	23	3	0	202
SW	7	66	55	14	6	0	148
WSW	15	53	54	12	14	2	150
W	20	85	57	14	0	0	176
WNW	18	72	56	12	0	0	158
NW	17	91	66	27	6	0	207
NNW	21	81	124	33	4	0	263
TOT	254	1188	1013	267	50	3	2775

Hours of Calm Data: 1
Hours of Invalid Data: 30

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: E

Wind Speed at 10.00 Meter Level (MPH)							
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	25	121	65	10	5	0	226
NNE	29	87	26	1	0	0	143
NE	31	117	39	5	0	0	192
ENE	20	90	47	23	0	0	180
E	24	67	43	7	3	0	144
ESE	26	86	75	7	0	0	194
SE	33	110	96	4	0	0	243
SSE	22	114	116	27	5	0	284
S	27	152	176	41	0	0	396
SSW	27	89	57	10	2	0	185
SW	24	62	35	14	5	0	140
WSW	32	62	42	13	4	0	153
W	27	94	57	8	0	0	186
WNW	30	105	53	1	0	0	189
NW	34	101	58	15	0	0	208
NNW	26	95	57	2	1	0	181
TOT	437	1552	1042	188	25	0	3244

Hours of Calm Data: 29
Hours of Invalid Data: 16

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: F

	Wind Speed at 10.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	23	43	0	0	0	0	66
NNE	20	34	0	0	0	0	54
NE	22	32	0	0	0	0	54
ENE	15	34	3	0	0	0	52
E	11	47	4	0	0	0	62
ESE	19	55	4	0	0	0	78
SE	37	147	16	0	0	0	200
SSE	25	147	30	2	0	0	204
S	25	127	19	0	0	0	171
SSW	18	50	2	0	0	0	70
SW	24	34	1	0	0	0	59
WSW	13	22	2	0	0	0	37
W	13	36	3	0	0	0	52
WNW	33	38	3	0	0	0	74
NW	39	39	1	0	0	0	79
NNW	28	49	0	0	0	0	77
TOT	365	934	88	2	0	0	1389

Hours of Calm Data: 27
Hours of Invalid Data: 21

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: G

	Wind Speed at 10.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	20	14	0	0	0	0	34
NNE	11	3	0	0	0	0	14
NE	7	11	0	0	0	0	18
ENE	4	4	0	0	0	0	8
E	3	2	0	0	0	0	5
ESE	6	3	0	0	0	0	9
SE	14	38	2	0	0	0	54
SSE	22	59	2	0	0	0	83
S	13	28	0	0	0	0	41
SSW	17	23	0	0	0	0	40
SW	12	10	0	0	0	0	22
WSW	5	1	0	0	0	0	6
W	3	6	0	0	0	0	9
WNW	26	8	0	0	0	0	34
NW	16	13	0	0	0	0	29
NNW	23	12	0	0	0	0	35
TOT	202	235	4	0	0	0	441

Hours of Calm Data: 16
 Hours of Invalid Data: 11
 Hours of Good Data: 8663 = 98.9% of Total Hours

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: A

	Wind Speed at 60.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	0	1	1	0	0	0	2
NNE	0	2	0	0	0	0	2
NE	0	0	0	0	0	0	0
ENE	0	3	0	0	0	0	3
E	0	3	1	0	0	0	4
ESE	0	3	3	0	0	0	6
SE	0	3	1	0	0	0	4
SSE	1	5	7	1	1	0	15
S	1	4	5	1	0	0	11
SSW	0	8	9	3	0	0	20
SW	0	0	5	0	0	0	5
WSW	0	0	0	0	0	0	0
W	0	2	0	3	0	0	5
WNW	0	1	0	0	0	0	1
NW	0	0	1	4	0	0	5
NNW	0	1	0	0	0	0	1
TOT	2	36	33	12	1	0	84

Hours of Calm Data: 0
Hours of Invalid Data: 7

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: B

	Wind Speed at 60.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	0	2	3	0	0	0	5
NNE	0	1	4	0	0	0	5
NE	0	1	3	0	0	0	4
ENE	1	1	1	0	0	0	3
E	0	1	2	0	0	0	3
ESE	0	4	5	0	0	0	9
SE	0	7	15	1	0	0	23
SSE	0	12	6	6	0	2	26
S	0	12	23	3	3	2	43
SSW	0	6	23	9	1	1	40
SW	1	10	7	10	0	0	28
WSW	0	4	3	2	1	0	10
W	0	2	1	8	1	0	12
WNW	0	4	7	2	0	0	13
NW	1	2	5	2	0	0	10
NNW	0	3	1	0	0	0	4
TOT	3	72	109	43	6	5	238

Hours of Calm Data: 2
Hours of Invalid Data: 4

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: C

	Wind Speed at 60.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	0	8	13	1	0	0	22
NNE	2	7	13	0	0	0	22
NE	0	5	0	2	0	0	7
ENE	0	3	4	4	0	0	11
E	0	4	3	1	0	0	8
ESE	1	5	12	0	0	0	18
SE	1	12	19	2	0	0	34
SSE	0	17	17	8	1	1	44
S	1	16	17	12	3	2	51
SSW	2	7	21	5	2	3	40
SW	0	14	14	9	3	0	40
WSW	0	2	9	5	1	0	17
W	1	3	9	7	0	0	20
WNW	0	7	17	5	0	0	29
NW	0	7	15	3	1	0	26
NNW	1	9	8	3	0	0	21
TOT	9	126	191	67	11	6	410

Hours of Calm Data: 0
Hours of Invalid Data: 10

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: D

Wind Speed at 60.00 Meter Level (MPH)							
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	9	41	115	45	16	1	227
NNE	13	64	63	19	2	0	161
NE	6	51	36	11	5	0	109
ENE	3	26	62	52	5	4	152
E	5	28	65	21	1	0	120
ESE	6	37	69	36	3	0	151
SE	8	50	72	35	7	1	173
SSE	14	37	49	35	10	10	155
S	6	40	70	49	37	10	212
SSW	8	40	82	55	16	10	211
SW	7	31	56	34	11	10	149
WSW	8	19	42	49	6	21	145
W	6	42	65	37	17	2	169
WNW	7	36	66	47	6	2	164
NW	6	45	67	45	15	20	198
NNW	13	50	82	64	15	3	227
TOT	125	637	1061	634	172	94	2723

Hours of Calm Data: 7
Hours of Invalid Data: 76

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: E

	Wind Speed at 60.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	8	23	113	38	6	5	193
NNE	6	40	80	22	5	0	153
NE	8	35	86	33	2	0	164
ENE	5	37	117	33	21	1	214
E	4	28	64	39	5	4	144
ESE	1	24	91	75	8	0	199
SE	3	33	82	92	3	1	214
SSE	9	29	79	124	24	6	271
S	5	27	102	199	41	2	376
SSW	1	20	97	107	13	2	240
SW	5	26	53	38	17	11	150
WSW	3	39	42	31	14	9	138
W	4	33	67	66	12	2	184
WNW	6	38	90	57	6	0	197
NW	4	31	75	63	13	2	188
NNW	5	29	77	38	3	0	152
TOT	77	492	1315	1055	193	45	3177

Hours of Calm Data:
Hours of Invalid Data:

8
104

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: F

	Wind Speed at 60.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	1	10	33	14	0	0	58
NNE	0	15	26	14	0	0	55
NE	0	21	22	8	0	0	51
ENE	0	14	33	18	0	0	65
E	1	12	32	21	0	0	66
ESE	4	16	46	34	0	0	100
SE	3	16	58	45	1	0	123
SSE	1	28	83	55	5	0	172
S	1	24	100	49	8	0	182
SSW	0	14	70	57	1	0	142
SW	1	13	28	30	0	0	72
WSW	1	11	13	17	0	0	42
W	1	5	15	18	2	0	41
WNW	3	5	31	18	1	0	58
NW	1	9	30	13	0	0	53
NNW	0	19	39	6	0	0	64
TOT	18	232	659	417	18	0	1344

Hours of Calm Data: 2
Hours of Invalid Data: 91

Meteorological Data
Totals of Hours at Each Wind Speed & Direction

1-JAN-1998 00:00:00.00 to 31-DEC-1998 23:00:00.00

Stability Class: G

	Wind Speed at 60.00 Meter Level (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	1	1	15	0	0	0	17
NNE	1	3	18	1	0	0	23
NE	1	15	5	2	0	0	23
ENE	0	3	9	6	0	0	18
E	0	8	4	4	0	0	16
ESE	0	5	6	4	0	0	15
SE	0	6	7	3	0	0	16
SSE	0	6	30	10	0	0	46
S	1	9	42	15	0	0	67
SSW	1	5	21	6	0	0	33
SW	0	6	20	16	0	0	42
WSW	3	3	6	7	0	0	19
W	0	3	2	2	0	0	7
WNW	0	4	13	7	0	0	24
NW	0	3	10	3	0	0	16
NNW	0	4	12	1	0	0	17
TOT	8	84	220	87	0	0	399

Hours of Calm Data: 2
 Hours of Invalid Data: 67
 Hours of Good Data: 8396 = 95.8% of Total Hours