Union Electric

One Ameren Plaza
1901 Chouteau Avenue
PO Box 66149
St. Louis, MO 63166-6149
314.621.3222

April 29, 2003

U. S. Nuclear Regulatory Commission
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Ladies and Gentlemen: ULNRC-04838

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
2002 ANNUAL ENVIRONMENTAL OPERATING REPORT

Please find enclosed the 2002 Annual Environmental Operating Report for the Callaway Plant. This report is submitted in accordance with Section 5.6.2 of the Technical Specification and Appendix B to the Callaway Plant Operating License.

Very truly yours,

David Shafer

David Shafer
Acting Manager, Regulatory Affairs

BFH/mlo
Enclosure

IE25

cc: U. S. Nuclear Regulatory Commission (Original and 1 copy)
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

Bruce S. Mallett
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-4005

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. Jack N. Donohew (2 copies)
Licensing Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop 7E1
Washington, DC 20555-2738

Manager, Electric Department
Missouri Public Service Commission
PO Box 360
Jefferson City, MO 65102

Mr. Gerhard K. Samide
ANI Account Engineer
Town Center, Suite 3005
29 S. Main St.
West Hartford, CT 06107-2445

Regional Administrator
Department of Natural Resources
Central Regional Office
P.O. Box 176
Jefferson City, MO 65102-0176

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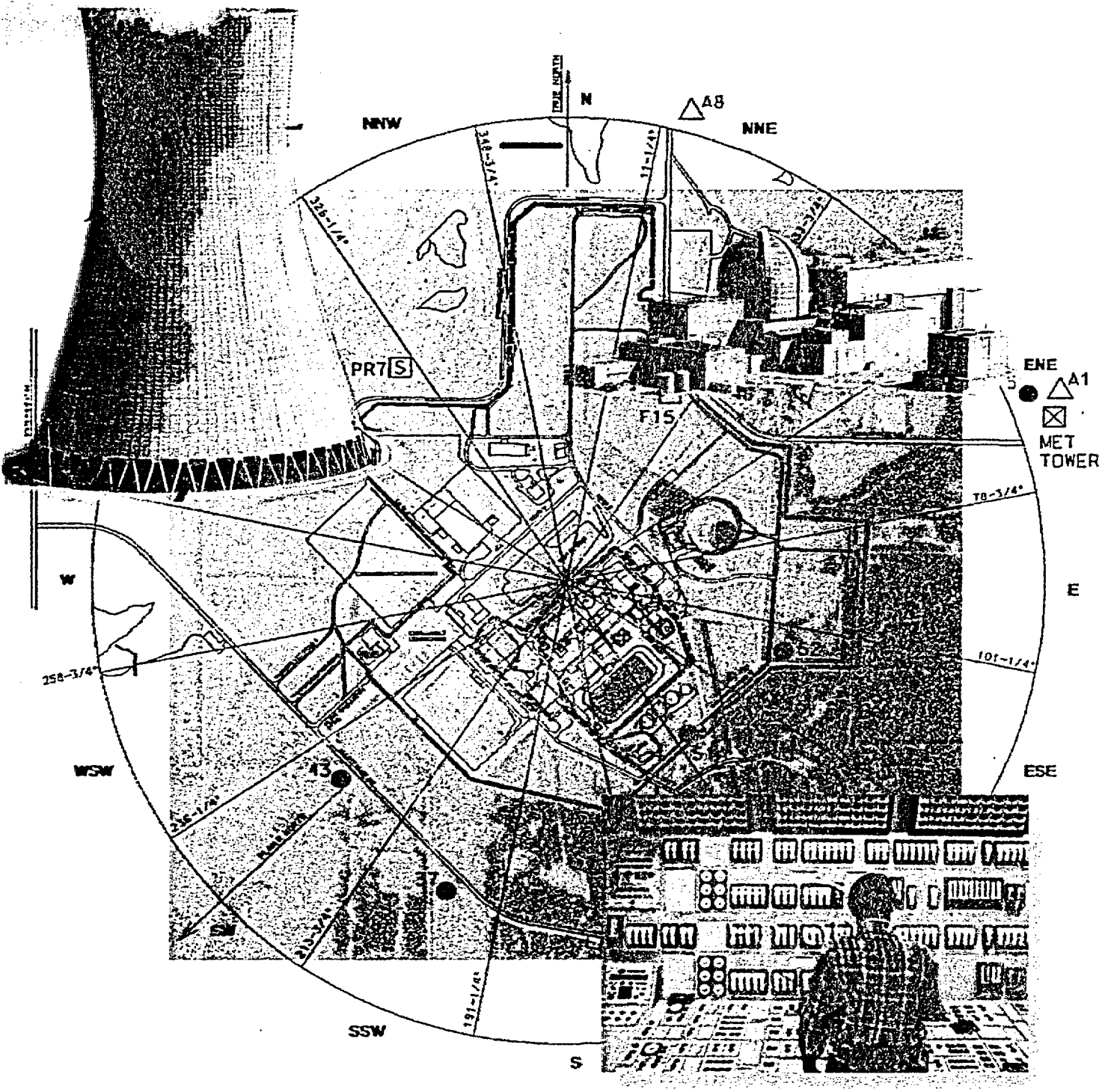
2002 Callaway Plant

Annual Radiological Environmental Operating Report



Docket no. 50-483

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1.0 Executive Summary

This Annual Radiological Environmental Operating Report describes the Union Electric Company, Callaway Plant Radiological Environmental Monitoring Program (REMP), and the program results for the calendar year 2002. It is submitted in accordance with section 5.6.2 of the Callaway Plant Technical Specifications.

Section 2.0 describes the Radiological Monitoring Program. Included is the identification of sampling locations, descriptions of sampling and analysis procedures, analysis results, data interpretations and program modifications. Quality assurance results, sampling deviations, unavailable samples and program changes are also discussed.

Section 3.0 describes the Non-Radiological Monitoring Program. Included are any unusual or important events, Environmental Protection Plan non-compliance, non-routine reports and plant design and operation environmental evaluations.

During 2002 the Callaway Plant operated in compliance with the OffSite Dose Calculation Manual requirements. Comparison of results for 2002 to pre-operational data and data from previous years show no significant differences.

Results from the REMP indicate the Callaway Plant has had no significant radiological impact on the health and safety of the public or on the environment.

2.0 Radiological Monitoring Program

2.1 Introduction

This report presents an analysis of the results of the REMP conducted during 2002 for Union Electric Company, Callaway Plant.

The radiological environmental monitoring program began in April 1982.

The objectives of the REMP are to monitor potential critical pathways of radioactive effluent to man and determine the radiological impact on the environment caused by operation of Callaway Plant.

Callaway Plant consists of one 1239 MWe pressurized water reactor, which achieved initial criticality on October 2, 1984. The plant is located on a plateau approximately ten miles southeast of the City of Fulton in Callaway County, Missouri and approximately eighty miles west of the St. Louis metropolitan area. The Missouri River flows by the site in an easterly direction approximately five miles south of the site at its closest point.

2.2 Program Design

The sample locations, frequency of sampling and sample analysis requirements originate from the Callaway Plant OffSite Dose Calculation Manual, NPDES Permit, and continuation of the Callaway Plant Pre-Operational Environmental Monitoring Program.

Samples are collected from waterborne, airborne, ingestion, and direct radiation pathways. The types of sample media collected are: milk, surface water, groundwater, shoreline sediment, bottom sediment, soil, wetlands, fish, vegetation, airborne particulate, airborne radioiodine and direct radiation (TLD). Indicator samples are collected from locations which could be influenced by plant effluents. Control samples are collected at locations that are not significantly affected by plant operation.

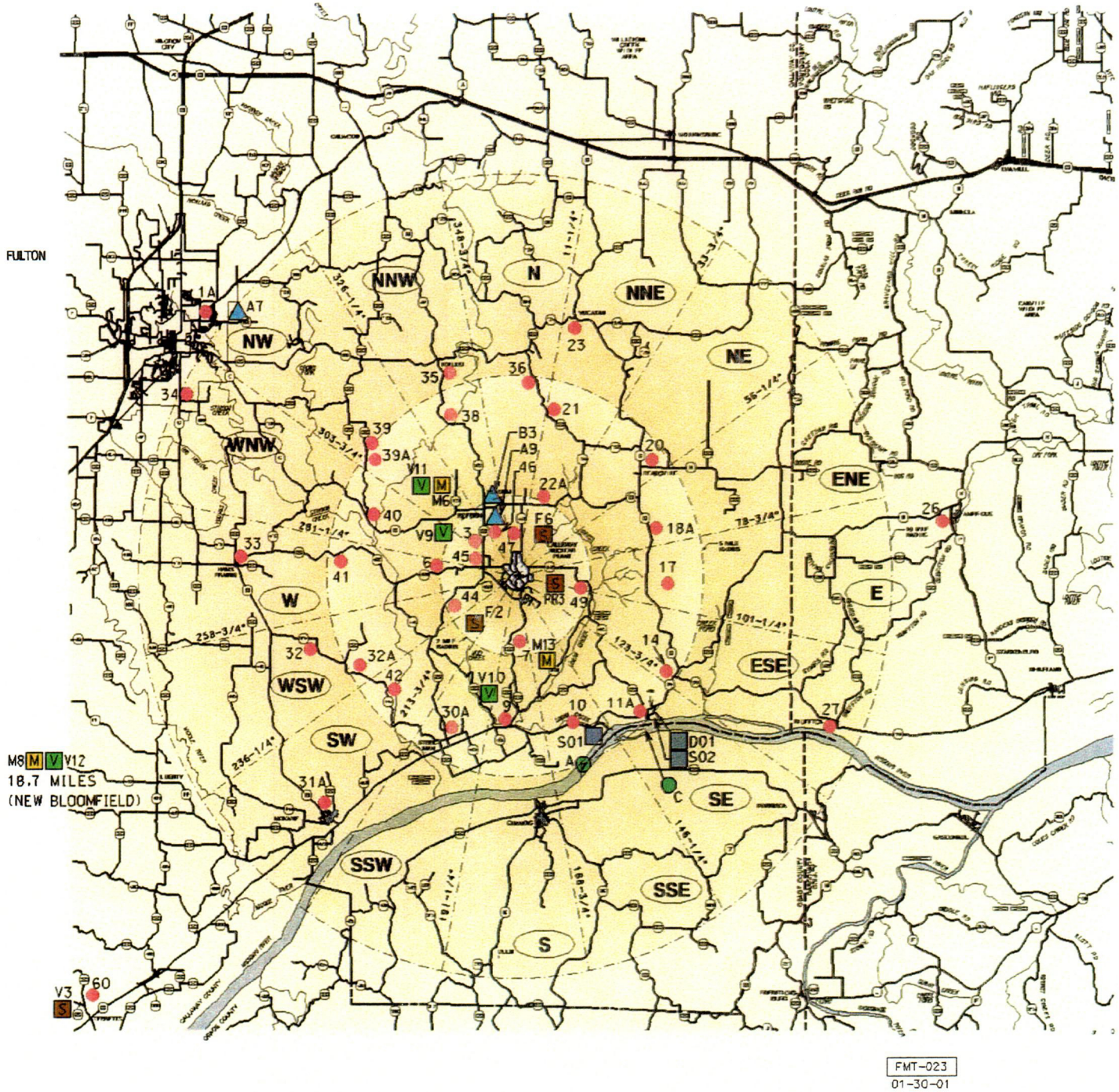
Samples are collected by Union Electric personnel or contractors to Union Electric and shipped to Environmental, Inc. Mid West Laboratory for analysis. The data is reported monthly and summarized in the annual report. TLD's are analyzed by Union Electric personnel.

2.3 Program Description

Sample locations for the REMP are shown in Figures I, and II. Table I identifies the location code, description, and sample type. Table II specifies the collection frequency and required analysis.

Figure I

Distant Collection Locations



FMT-023
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LEGEND:

- = TLD
- = AIR
- = WATER
- = VEGETATION
- = MILK
- = SOIL
- = FISH, SEDIMENT

C01

Figure II

Near Site Collection Locations

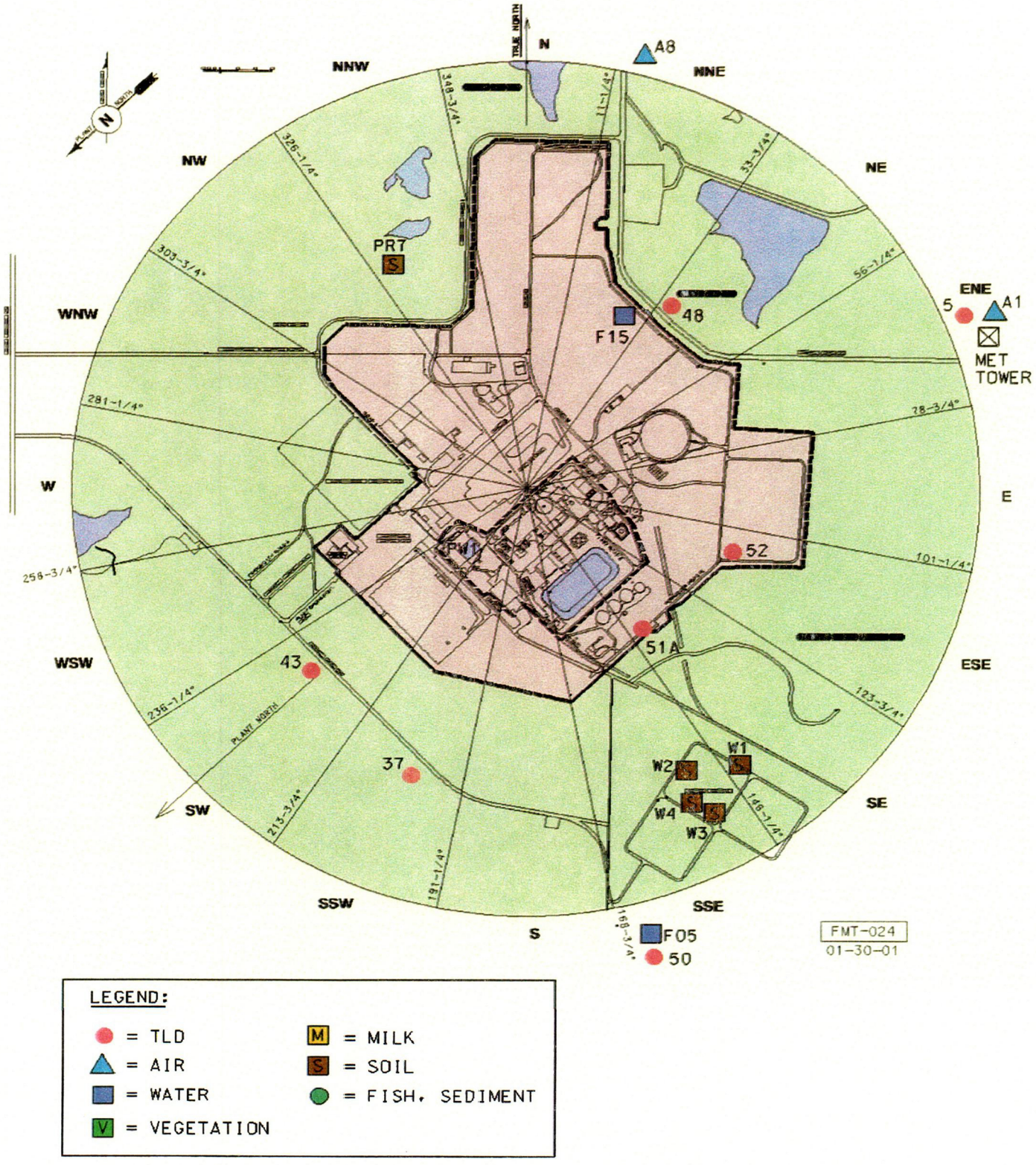

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Table I

Sampling Locations

Location Code	Description[1]	Sample Types[2]
1a	10.8 mi. NW, City of Fulton on Hwy Z, 0.65 mi. East of Business 54, West of Campus Apartments	IDM
3	1.2 mi. NW; 0.1 mi. West of Hwy CC on Gravel Road, 0.8 mi. South Hwy 0, Callaway Electric Cooperative Utility Pole No. 18559.	IDM
5	1.3 mi. ENE; Primary Meteorological Tower.	IDM
6	2.0 mi. W; County Road 428, 1.2 mi. West of Hwy CC, Callaway Electric Cooperative Utility Pole No. 18609.	IDM
7	1.4 mi. S; County Road 459, 2.6 mi. North of Hwy 94, Callaw ay Electric Cooperative Utility Pole No. 35097	IDM
9	3.8 mi. S; NW Side of the County Road 459 and Hwy 94 Junction, Callaway Electric Cooperative Utility Pole No. 06754.	IDM
10	3.9 mi. SSE; Hwy 94, 1.8 mi. East of County Road 459, Callaway Electric Cooperative Utility Pole No. 12182.	IDM
11a	4.7 mi. SE; City of Portland, Callaway Electric Cooperative Utility Pole No. 12110.	IDM
14	4.9 mi. ESE; SE Side of Intersection D and 94, Callaway Electric Cooperative Utility Pole No. 11940.	IDM
17	3.8 mi. E; County Road 4053, 0.3 mi. East of Hwy 94, Kingdom Telephone Company Pole No. 3X12.	IDM
18a	3.7 mi. ENE; East side of Hwy D, 0.5 mi. South of 0, Callaway Electric Cooperative Utility Pole No. 38579.	IDM
20	4.7 mi. NE; City of Readsville, Callaway Electric Cooperative Utility Pole No. 12830.	IDM
21	3.8 mi. NNE; County Road 155, 1.9 mi. North of Hwy 0, Callaway Electric Cooperative Utility Pole No. 19100	IDM
22a	1.9 mi. NNE; North side of Hwy O, 100 feet East of County Road 150, Callaway Electric Cooperative Utility Pole No. 31094.	IDM
23	6.6 mi. NNE; City of Yucatan, Callaway Electric Cooperative Utility Pole No. 12670	IDM
26[3]	11.7 mi. E; Town of Americus, Callaway Cooperative Utility Pole No. 11159.	IDM

Location Code	Description[1]	Sample Types[2]
27[3]	9 3 mi. ESE; Town of Bluffton, Callaway Electric Cooperative Utility Pole No. 11496.	IDM
30a	4 4 mi. SSW; City of Steedman, N side of Belgian Dr., 150 feet East of Hwy CC, Callaway Electric Cooperative Utility Pole No. 06557.	IDM
31a	7.8 mi. SW; City of Mokane, Junction Hwy C and County Road 400, 0.9 mi. North of Hwy 94, Callaway Electric Cooperative Utility Pole.	IDM
32	5.4 mi. WSW; Hwy VV, 0.6 mi. West of County Road 447, Callaway Electric Cooperative Utility Pole No. 27031.	IDM
32a	5.0 mi. WSW; County Road 447, Callaway Electric Cooperative Utility Pole No. 06354.	IDM
33	7.4 mi. W; City of Hams Prairie, SE of Hwy C and AD Junction	IDM
34	9.5 mi. WNW; NE Side of Hwy C and County Road 408 Junction.	IDM
35	5.8 mi. NNW; City of Toledo, Callaway Electric Cooperative Utility Pole No. 17684.	IDM
36	4.9 mi. N; County Road 155, 0.8 mi. South of County Road 132, Callaway Electric Cooperative Utility Pole No. 19137.	IDM
37	0.5 mi. SSW; County Road 459, 0.9 mi. South of Hwy CC, Callaway Electric Cooperative Utility Pole No. 35077.	IDM
38	4.6 mi. NNW; County Road 133, 1.5 mi. South of Hwy UU, Callaway Electric Cooperative Utility Pole No. 34708.	IDM
39	5.4 mi. NW; County Road 111, Callaway Electric Cooperative Utility Pole No. 17516.	IDM
39a	5.0 mi. NW County Road 111, Callaway Electric Cooperative Utility Pole No. 17526	IDM
40	4.2 mi. WNW; NE Side of County Road 112 and Hwy 0, Callaway Electric Cooperative Utility Pole No. 06326.	IDM
41	4.9 mi. W; Hwy AD, 2.8 mi. East of Hwy C, Callaway Electric Cooperative Utility Pole No. 18239.	IDM
42	4.4 mi. SW; County Road 447, 2.6 mi. North of County Road 463, Callaway Electric Cooperative Utility Pole No. 06326.	IDM

Location Code	Description[1]	Sample Types[2]
43	0.5 mi. SW; County Road 459, 0.7 mi. South of Hwy CC, Callaway Electric Cooperative Utility Pole No. 35073.	IDM
44	1.6 mi. WSW; Hwy CC, 1.0 mi. South of County Road 459, Callaway Electric Cooperative Utility Pole No. 18769.	IDM
45	1.0 mi. WNW; County Road 428, 0.1 mi. West of Hwy CC, Callaway Electric Cooperative Utility Pole No. 18580.	IDM
46	1.5 mi. NNW; NE Side of Hwy CC and County Road 466 Intersection, Callaway Electric Cooperative Utility Pole No. 28242.	IDM
47	1.0 mi. N; County Road 448, 0.9 mi. South of Hwy 0, Callaway Electric Cooperative Utility Pole No. 28151.	IDM
48	0.4 mi. NE; County Road 448, 1.5 mi. South of Hwy 0, Plant Security Sign Post.	IDM
49	1.6 mi. E; County Road 448, Callaway Electric Cooperative Utility Pole No. 06959, Reform Wildlife Management Parking Area.	IDM
50	0.9 mi. SSE; County Road 459, 3.3 mi. North of Hwy 94, Callaway Electric Cooperative Utility Pole No. 35086.	IDM
51a	0.3 mi. SE; Owner Control Fence, SE of the Water Treatment Plant.	IDM
52	0.4 mi. ESE; Light Pole Near the East Plant Security Fence	IDM
60[3]	13.5 mi. SW; Callaway Electric Cooperative Utility Pole No. 43744 just past Tebbetts City sign.	IDM
A1	1.3 mi. ENE; Primary Meteorological Tower.	APT, AIO
A7	9.5 mi. NW; C. Bartley Farm.	APT, AIO
A8	0.9 mi. NNE; County Road 448, 0.9 miles South of Hwy 0.	APT, AIO
A9	1.9 mi. NNW; Community of Reform.	APT, AIO
B3	1.8 mi. NNW; 0.3 mi. East of the O and CC Junction, Callaway Electric Cooperative Utility Pole No. 50422.	APT, AIO
D01	5.0 mi. SE; Holzhouser Grocery Store/Tavern (Portland, MO).	WWA

Location Code	Description[1]	Sample Types[2]
F05	0.9 mi. SSE; Offsite Groundwater Monitoring Well.	WWA
F15[3]	0.4 mi. NNE; Onsite Groundwater Monitoring Well.	WWA
PW1	Callaway Cafeteria	WWA
M6	2.6 mi. NW, Pierce's Farm (Cow's Milk)	MLK
M8[3]	18.7 mi. WSW, Kissock's Farm, South of New Bloomfield, MO (Cow's Milk).	MLK
M13	2.53 mi. SSE, Miller's Farm, located on Highway 448	MLK
V3[3]	15.0 mi. SW; Beazley Farm, West of Tebbetts, MO.	SOL
V9	2.0 mi. WNW; Meehan Farm	FPL
V10	3.4 mi. SSW; Brandt Farm	FPL
V11	3.2 mi. NW; Hickman Farm	FPL
V12[3]	18.7 mi. WSW, Kissock's Farm, South of New Bloomfield, MO	FPL
A[3,4]	4.9 mi. SSE; 0.6 River Miles Upstream of Discharge North Bank.	AQS, AQF
C[4]	4.9 mi. SE; 1.0 River Miles Downstream of Discharge North Bank.	AQS, AQF
S01[3]	4.7 mi. SSE; 105 feet Upstream of Discharge North Bank.	SWA
S02	4.9 mi. SE; 1.1 River Miles Downstream of Discharge North Bank.	SWA
F2	1.64 mi. SW; Callaway Plant Forest Ecology Plot F2.	SOL
F6	1.72 mi. NE; Callaway Plant Forest Ecology Plot F6.	SOL
PR3	1.02 mi. ESE; Callaway Plant Prairie Ecology Plot PR3.	SOL
PR7	0.45 mi. NNW; Callaway Plant Prairie Ecology Plant PR7.	SOL
W4	0.68 mi. SSE; Callaway Plant Wetlands, SW Bank	SOL
W2	0.60 mi. SSE; Callaway Plant Wetlands, Inlet Area	SOL
W1[3]	0.61 mi. SE; Callaway Plant Wetlands, High Ground	SOL
W3	0.72 mi. SSE; Callaway Plant Wetlands, Discharge Area	SOL

[1] Distance is measured from the centerline of the reactor.

[2] AIO = Air Iodine, APT = Air Particulate, AQF = Fish, AQS = Sediment, FPL = Leafy Green Vegetables, IDM = TLD, MLK = Milk, SOL = Soil, SWA = Surface Water, WWA = Ground Water.

[3] Control Location.

[4] The fish collection area for location "A" is between 0.6 river miles and 3.0 river miles upstream of the plant discharge. Location "C" is between the plant discharge and 1.5 miles downstream.

Table II REMP Sample Collection Frequencies and Required Analysis[1]

Sample	Sample Type	Collection Frequency	Required Analysis
Airborne Iodine	AIO	Weekly	I-131 weekly
Air Particulate	APT	Weekly	Gross Beta weekly[2] and Gamma Isotopic of quarterly filter composite
Soil	SOL	Annually	Gamma Isotopic (Continuation of preoperational program)
Fish	AQF	Semiannually	Gamma Isotopic
Sediment (Shoreline and Bottom)	AQS	Semiannually	Gamma Isotopic (Bottom sample NPDES requirement)
Leafy Green Vegetables	FPL	Monthly during the growing season	I-131, and Gamma Isotopic
TLD	IDM	Quarterly	Gamma Dose
Milk	MLK	Semimonthly when animals are on Pasture; monthly otherwise	I-131, and Gamma Isotopic
Surface Water	SWA	Monthly composite	H-3 and Gamma Isotopic
Ground Water	WWA	Quarterly Grab	H-3 and Gamma Isotopic (NPDES Requirement)

[1] Samples required by ODCM and NPDES permit. Additional sampling is performed as a continuation of the pre-operational monitoring program.

[2] If gross beta activity is greater than the established baseline activity level, gamma isotopic analysis is performed on the individual sample.

2.4 Sampling Program Execution and Results

2.4.1 Program Modifications and Exceptions

During 2002, air station B-3 was moved to a new location due to access restrictions imposed by the local landowner(CAR 200200443/200204218). No other significant changes were made to the Radiological Environmental Monitoring Program.

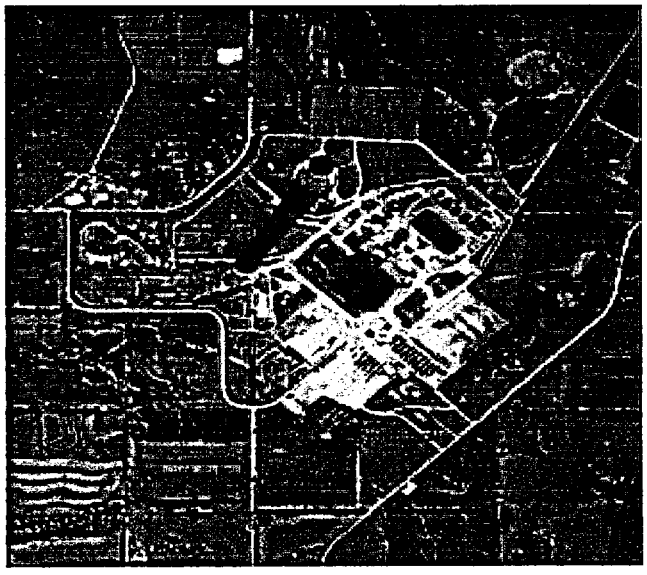
The Radiological Environmental Monitoring Program was executed as described in the ODCM with any exceptions listed in this report.

2.4.2 Detection and Reporting Limits

Table III gives the required detection limits for radiological environmental sample analysis. For each sample type, the table lists the detection level for each isotope.

The lower limit of detection (LLD) used in this report is described in NRC Regulatory Guide 4.1 Rev. 1, "Program for Monitoring Radioactivity in the Environs of Nuclear Power Plants" and the NRC Branch Technical Position, November 1979, "An Acceptable Radiological Environmental Monitoring Program".

Positive sample results are reported with a 2 sigma counting uncertainty (corresponding to the 95% confidence level). In cases where the activity is found to be below the sample analysis minimum detection level it is reported as Not Detected(ND).



Aerial view of the Callaway Plant site. Included is some of the land worked by local farmers to produce feed for cattle.

Table III Detection Capabilities for Radiological Environmental Sample Analysis[1]

Analysis	Water (pCi/l)	Airborne (pCi/m^3)	Fish (pCi/kg wet)	Milk (pCi/l)	Food Products (pCi/kg wet)	Soil and Sediment (pCi/kg dry)
Gross beta	4	0.01				
H-3	3000/2000[3]					
Mn-54	15		130			
Fe-59	30		260			
Co-58, -60	15		130			
Zr-Nb-95[2]	15					
I-131	1000/1[3]	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140[2]	15			15		

[1] This list does not mean only these nuclides will be detected and reported. Other peaks which are measurable and identifiable will be reported.

[2] Total activity, parent plus daughter activity.

[3] LLDs for Surface and Drinking water are the same, with the exception of H-3 and I-131. The Drinking water LLDs for H-3 and I-131 are 2000 and 1 pCi/liter respectively.

2.4.3 Quality Control Program

The contractor laboratory (Environmental, Inc. Midwest Laboratory) maintains a quality control (QC) program in accordance with Regulatory Guide 4.15. The Program includes laboratory procedures designed to prevent cross-contamination and ensure accuracy and precision of analyses. QC checks include blind samples, duplicate samples, and spiked samples as necessary to verify laboratory analysis activities are being maintained at a high level of accuracy.

The contractor laboratory participates in the Department of Energy's Environmental Measurements Laboratory Quality Assessment Program (EML), Mixed Analyte Performance Evaluation Program (MAPEP), and Environmental Resource Associates (ERA). The results of these crosscheck programs are presented in Section 2.6.

The Callaway Plant Personnel Dosimetry program is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology (NIST). The Environmental TLD Program has demonstrated compliance with the recommendations of Regulatory Guide 4.13. Quality control checks are performed including blanks, blind samples, daily performance checks and quarterly crosschecks.

2.4.4 Data Interpretations

Sample analysis results are evaluated to determine if the result was due to the operation of the Callaway Plant or other sources.

One evaluation method used is the indicator-control concept. Most sample types are collected at both indicator (areas potentially affected by plant operations) and control locations (areas not significantly affected by plant discharge). A possible plant effect would be indicated if the detected level at an indicator location was statistically greater than at the control location.

Another method involves determining if the result originated from weapons testing. The indicator or control sample result can be compared to established environmental levels produced from weapons testing.

Sample results can also be compared with preoperational levels or samples collected in other parts of the country. Results can also be related to events known to have caused elevated levels of radiation in the environment.

2.4.5 Waterborne Pathway

Surface Water

Analysis

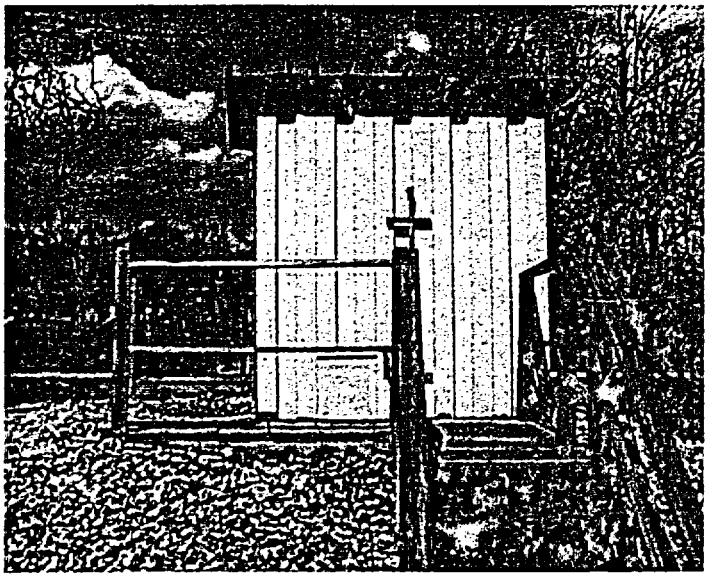
Tritium: A 60-70 ml aliquot of water is purified by distillation. A portion of the distillate is transferred to a counting vial and scintillation fluid added. The contents of the vial are thoroughly mixed and counted in a liquid scintillation counter.

Gamma Spectrometry: A suitable aliquot of sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based multichannel analyzer.

Sampling and Frequency

Monthly composite samples of surface water from the Missouri River are collected from one indicator location (SO2) and from one control location (SO1) and shipped to Environmental, Inc., Midwest Laboratory for analyses.

Radiological Monitoring Program



Sampling of the Missouri River is accomplished using an automated compositor. Samples are collected on an hourly basis and mixed to make the monthly composite sample. River sampling verifies that Callaway Plant discharges meet stringent regulatory requirements.

Results

The indicator water sampler (S02) was operational 92% of the time during 2002. Sampler operability is verified daily by use of a dial up modem. Immediate action is taken to return the sampler to service when a problem is identified. If the sampler cannot be returned to service within 24 hours, daily grab samples are collected.

Operational problems with the indicator water samplers included pump failure and/or maintenance, sample proportioning valve leakage, frozen sample lines, scale/modem problems, electric power outages, and low river water levels. The problems encountered with indicator water sampler S02 are documented in CARs 200200573/200204649/200204708/200205052/ 200205940. The corrective actions taken in 2001 and described in the Annual Radiological Environmental Monitoring Report, dramatically improved the operability of the indicator water sampler (S02) from 60% in 2001 to 92% in 2002. One exception for 2002 was a mispositioned composite sample line during restart, documented in CAR 200204761. Grab samples were taken on the day of the restart and the following day upon investigation of low compositor sample bottle volume as indicated via dial up modem. Self checking and component positioning was emphasized to the technicians to prevent reoccurrence.

The control water sampler (S01) was operational 97% of the time during 2002. This sampler is checked weekly. Immediate action is taken to return the sampler back to service when a problem is identified. If the sampler cannot be returned to service within 24 hours, daily grab samples are collected. Exceptions during 2002: (1) Composite samples collected during the week of 11/21/02 were inadvertently discarded (CAR 200208134). The individual and responsible group were coached on the importance of these samples; and (2) Grab sampling on 1/1/02 was not performed due to miscommunication (CAR 200200052). The persons involved and responsible group were coached on the importance of proper communication. A section of the laboratory logs were also changed to prevent future occurrences. Operational problems during 2002 for S01 included sample proportioning valve leakage and pump failure.

Tritium was the only radionuclide detected in surface water samples collected during 2002. Four of twelve samples collected at indicator location S02 contained measurable levels of tritium with a mean concentration of 285.3 pCi/L. The Tritium results at S02 are less than 1.0% of the reporting limit in surface water and well within regulatory requirements. Tritium results at S02 are being trended along with monthly liquid H-3

releases and Missouri river flow. The 2002 results are consistent with previous operational levels and there was no significant radiological impact on the health and safety of the public or the environment.

The gamma analysis results for surface water samples were consistent with previously accumulated data and no plant operational effects were identified.

Ground Water

Analysis

Tritium: A 60-70 ml aliquot of water is purified by distillation. A portion of the distillate is transferred to a counting vial and scintillation fluid added. The contents of the vial are thoroughly mixed and counted in a liquid scintillation counter.

Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based, multichannel analyzer. Analysis for I-131 is accomplished using chemical separation followed by gas flow proportional counting techniques.

Sampling and Frequency

Ground water samples are collected quarterly from two sampling wells (F05 and F15) and two drinking water wells (D01 and PW1). Ground water samples were collected each quarter, however, they were not collected within the grace period of +25% of the scheduled sample date in accordance with HTP-ZZ-07101, for the 2nd, 3rd, and 4th quarters (CAR 200300743). The responsible supervisor was coached on the proper sample frequency for REMP samples. Also, HTP-ZZ-07101 was revised to provide more specific guidance for REMP sampling.

The well samples are collected using an electric pump that is located in the well. The drinking water sample is collected from a faucet after allowing the line to flush for two minutes. Samples are shipped to Environmental, Inc., Midwest Laboratory for analyses.

Results

The analysis results for all ground water samples were consistent with previously accumulated data and no plant operational effects were identified.

Bottom Sediment

Analysis

Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based, multichannel analyzer.

Sampling and Frequency

Bottom sediment samples are collected semiannually from one indicator location (C) and one control location (A). The samples are taken from water at least 2 meters deep to prevent influence of bank erosion. A Ponar dredge is used to obtain the samples, consisting of the uppermost layer of sediment. Each sample is placed, without preservative, in a plastic bag, sealed and shipped to Environmental, Inc., Midwest Laboratory for analyses.

Results

The analysis results for bottom sediment samples were consistent with previously accumulated data including pre-operation and no plant operational effects were identified.

Shoreline Sediment

Analysis

Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based,

multichannel analyzer.

Sampling and Frequency

Shoreline sediment samples are collected semiannually in the same area as bottom sediment. The samples are collected within two feet of the edge of the water and consist of 2 six-inch diameter by two-inch deep sediment plugs. Each sample is placed in a plastic bag, sealed and shipped to Environmental, Inc., Midwest Laboratory for analyses.

Results

The analysis results for shoreline sediment samples were consistent with previously accumulated data including pre-operation and no plant operational effects were identified.

Shoreline sediment samples are collected two feet from the edge of the water in the same location as the bottom sediment samples. Sediment samples indicate there has been no impact on the environment from the Callaway Plant liquid discharge.

Wetlands Soil

Analysis

prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based, multichannel analyzer.

Sampling and Frequency

Wetlands soil samples are collected annually from 3 indicator locations (W2, W3, and W4) and one control location (W1). Two 6-inch square soil plugs consisting of the uppermost two-inch layer of soil are taken at each location. The samples are placed in plastic bags, sealed and shipped to Environmental, Inc., Midwest Laboratory for analyses.

Results

Cs-137 was detected in the Wetlands soil samples. Station W1 indicated 84/60 pCi/Kg dry and Station W2 indicated 159/157 pCi/Kg dry.

The analysis results for Wetlands soil samples were consistent with previously accumulated data and no plant operational effects were identified. The Cs-137 activity is due to worldwide fallout from atmospheric nuclear testing.

2.4.6 Airborne Pathway

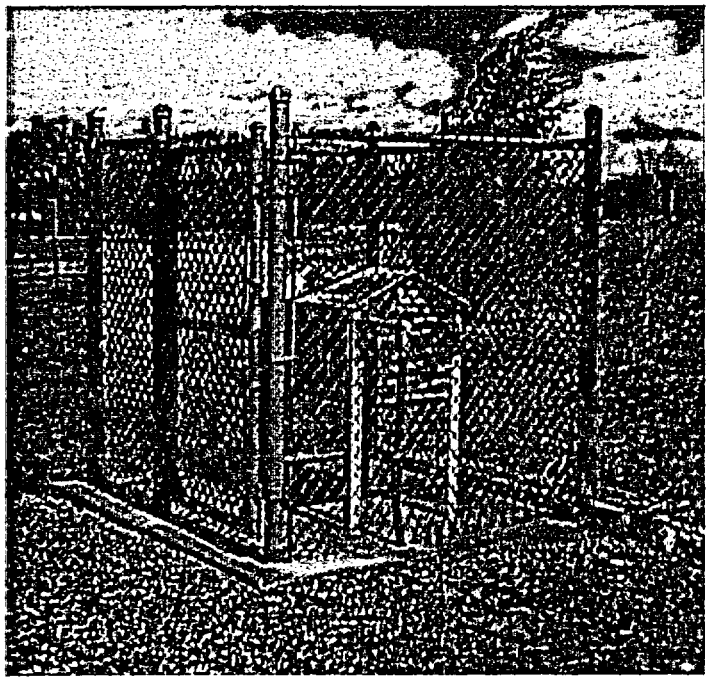
Airborne

Analysis

Gross Beta: The filters are analyzed approximately five days after collection to allow for decay of natural short-lived radionuclides. The glass fiber type filter is placed into a stainless steel planchet and counted for gross beta radioactivity using a proportional counter.

Iodine: Each Charcoal cartridge is placed on the germanium detector and counted. A peak of 0.36 MeV is used to calculate the concentration at counting time. The equilibrium concentration at the end of collection is then calculated. Decay correction for the time interval between sample collection and counting is then made.

Gamma Spectrometry: Filters are composited according to location and counted using a germanium detector coupled to a computer based



Airborne samples are continuously collected. Particulates are gathered on a glass fiber filter. A charcoal filter is in line after the particulate filter to collect iodines. Air samples indicate the Callaway Plant has had no impact on the surrounding environment.

multichannel analyzer. The resulting spectrum is analyzed by computer and specific nuclides, if present, identified and quantified.

Sampling and Frequency

Airborne particulate samples are collected on a 47mm diameter glass fiber filter type A/E (99 percent removal efficiency at 1 micron particulate) at a volumetric rate of one and one-half cubic feet per minute.

Each airborne particulate air sampler is equipped with a charcoal cartridge filter in-line after the particulate filter holder.

The filters are collected weekly and shipped to Environmental, Inc., Midwest Laboratory for analysis.

All five sample locations are considered indicator locations (A1, A7, A8, A9, and B3). One indicator station (A9) is located at the community with the highest D/Q.

Results

In 2002, air station A-8 was operational 100% of the time.

Station B-3 was operational for only 69% of the time during 2002, due to access restrictions imposed by the local landowner (CAR 200200443/200204218). Samples were not collected from 1/13/02 thru 2/21/02 and from 7/3/02 thru 9/19/02. After numerous attempts to reconcile the situation, air station B-3 was moved to a new location within the same sector on AmerenUE property. Air station B-3 resumed operation on 9/19/02.

Air station A-1 was operational 96% of the time during 2002. During the week of 12/12/02, the timer on the pump skid stopped, thus giving no indication of sample collection time. On 1/3/02, sample flow was found to be 10% lower than normal (CAR 200200046). For each instance, the pump skid was replaced and the filter analyzed.

Air station A-7 was operational 98% of the time during 2002. During the week of 9/26/02, the air station flow regulator failed causing sample flow to be reduced. The pump skid was replaced and the filter was analyzed.

Air station A-9 was operational 98% of the time during 2002. During the week of 9/5/02, air sample line integrity was found to be unsatisfactory. The pump skid was replaced, the filter was analyzed, and operation of air station A-9 was resumed.

Gross beta activity ranged from 0.010 to 0.043 pCi/m^3 in all samples. The average gross beta activity at all locations was 0.023 pCi/m^3. During 2002 there were 18 weekly samples with gross beta activities greater then the baseline action level of 0.037 pCi/m^3. Gamma spectral analysis

was performed on these filters and no gamma emitting isotopes of plant origin were detected.

The analysis results for airborne samples are consistent with previously accumulated data and no plant operational effects were identified.

2.4.7 Ingestion Pathway

Milk

Analysis

Iodine-131: Two liters of milk containing standardized Iodine carrier is stirred with anion exchange resin for one hour. The resin is washed with NaCl and the iodine is eluted with sodium hypochlorite. Iodine in the iodate form is reduced to I_2 and the elemental iodine extracted into CCl_4, back-extracted into water, then precipitated as palladium iodide. The precipitate is counted for I-131 using a proportional counter.

Gamma Spectrometry: An aliquot of milk is placed in a standard counting container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based, multichannel analyzer. Analysis for I-131 is accomplished using chemical separation followed by gas proportional counting techniques.

Sampling and Frequency

When available, two-gallon milk samples are collected semimonthly during the pasture season (April through September) and monthly during the winter from two cow milk locations near the Plant (M6 and M13) and one cow milk location away from the Plant (M8). Cow Milk location M13 was added to the Callaway REMP program on 8/13/02. Milk samples are shipped on ice to Environmental, Inc., Midwest Laboratory for analyses within eight days after collection.

Results

Milk samples were unavailable/limited due to animals not producing milk during the following periods:

Location M13:

Only one gallon of milk was available on 12/10/02, therefore, an additional half gallon was collected on 12/17/02.

The analysis results for milk samples were consistent with previously accumulated data and no plant operational effects were identified.

Fish

Analysis

Gamma Spectrometry: A prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based, multichannel analyzer.

Sampling and Frequency

The five most abundant recreational or commercial fish species are collected semiannually from one indicator location (C) and one control location (A). One exception in 2002, channel catfish samples were not collected since the species was not included in Union Electric's scientific collection permit (CAR 200202263/199902033). On 1/22/03, the Missouri Dept. of Conservation issued a revised permit that allowed Union Electric to resume collecting channel catfish samples for 2003.

After collection, Fish samples are shipped on ice to Environmental, Inc., Midwest Laboratory for analyses.

Results

The analysis results for fish samples were consistent with previously accumulated data and no plant operational effects were identified.

Vegetation

Analysis

Iodine-131: A suitable aliquot of wet (as received) sample is placed into a standard calibrated container and counted using a germanium detector coupled to a computer based, multichannel analyzer. A peak of 0.36 MeV is used to calculate the concentration at counting time. The equilibrium concentration at the end of collection is calculated by decay correcting for the time interval between sample collection and counting.

Gamma Spectrometry: A suitable aliquot of wet (as received) sample is placed into a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based, multichannel analyzer.

Sampling and Frequency

Monthly during the growing season, green leafy vegetation is collected from three indicator locations V9, V10, and V11 and from one control location V12. Vegetation samples consist of mustard greens, turnip greens, cabbage, lettuce, and spinach. Other vegetation is collected if primary varieties are not available. Samples are shipped to Environmental, Inc., Midwest Laboratory for analyses.

Results

Green leafy vegetation was unavailable due to lack of plant growth during the following periods:

Location V9:
January through May, August and December

Location V10:
January through July, and December

Location V11:
January through April, June and December

Fish are collected by Ameren UE biologists. Fish samples indicate there has been no impact on the environment due to operation of the Callaway Plant.

Location V12:
January through April, and October through December

The analysis results for vegetation samples were consistent with previously accumulated data and no plant operational effects were identified.

Direct Radiation

Analysis

The Union Electric program uses the Panasonic Model UD-814 TLD and Model UD-710A automatic dosimeter reader. Each dosimeter consists of three elements of $CaSO_4$:Tm. The dosimeters are sealed in a water proof plastic bag and placed inside a polypropylene mesh cylindrical holder in the environment. After exposure in the environment the dosimeters are read and the result is adjusted to a standard quarter of 90 days.

Sampling and Frequency

Thermoluminescent Dosimetry (TLD) is used to determine direct radiation levels in and around the

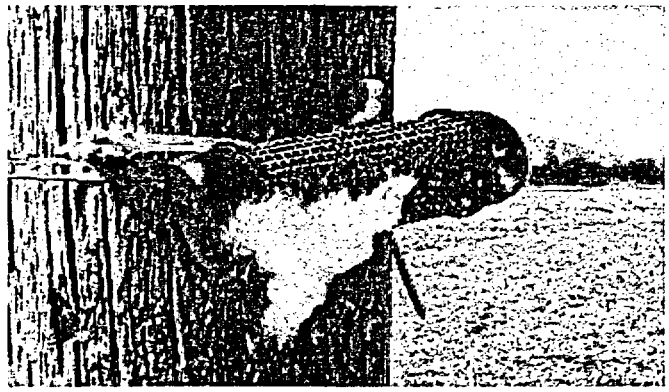
Callaway site. Forty-three dosimeters are placed in 16 sectors around the plant as specified in the ODCM. The dosimeters are read once per quarter. Three locations are designated as controls (IDM-26, IDM-27 and IDM-60).

Results

Direct Radiation data for IDM-49 was not found during the quarterly changeout and was unavailable during the third quarter of 2002. The sample station for IDM-49 was promptly replaced.

The Envrionmental TLD changeouts, following the second and fourth quarters, were not performed in accordance with HTP-ZZ-07101. The procedure requires that the TLDs be changed out quarterly with a plus 25% grace period(CAR 200302153). The late changeout during the second quarter was due to poor Human Performance, while the fourth quarter changeout was primarily due to snow and icy road conditions.

The analysis results for TLD samples were consistent with previously accumulated data and no plant operational effects were identified.



Pictured is one of the forty three dosimeter locations used to measure direct radiation. Direct radiation data indicates there has been no impact from the operation of the Callaway Plant.

Soil

Analysis

Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based, multichannel analyzer.

Sampling and Frequency

Soil samples are collected annually from four indicator locations (F2, PR3, F6, and PR7) and one control location (V3). To ensure only the most recent deposition is sampled, the uppermost two-inch layer of soil is taken at each location. Samples consist of 2 six-inch square soil plugs. The litter at the surface and the root mat is considered part of the sample. The samples are placed in plastic bags, sealed and shipped to Environmental, Inc., Midwest Laboratory for analyses.

Results

Cs-137 was detected in the soil samples. Control station V3 indicated 224 pCi/Kg dry while the highest indicator station indicated 957 pCi/L dry.

The analysis results for soil samples were consistent with previously accumulated data including pre-operation and no plant operational effects were identified. The Cs-137 activity is due to worldwide fallout from atmospheric nuclear testing.

2.5 Land Use Census

The Land Use Census is performed annually during the growing season within a five-mile radius of the Callaway Plant. The location of the nearest resident, milking animal, and garden greater than 50 square meters is identified in each of the sixteen meteorological sectors.

The AmerenUE Real Estate Department conducted the 2002 Land Use Census during the month of October. Information was collected by contacting residents by phone and conducting field surveys.

Results

The results of the 2002 Land Use Census are presented in Table IV. The table includes radial direction and distance from the Callaway Plant for each location. These parameters were determined using a combination of map position, aerial photography and Global Positioning System (GPS) receiver.

View of land near the Callaway Plant during late Winter. In the background is the Missouri River.

Nearest Resident

The distance of the nearest resident with the highest D/Q was unchanged for 2002. This resident lives 1.8 miles from the plant in the NNW sector.

Milking Animals

Milking animals were identified in the SW sector. However, milk is not collected for human consumption at this location and the animal owners did not want to participate in the sampling program. Sample station M13, located in the SSE sector, was added to the sampling program in August 2002.

Vegetable Gardens

A resident in the NNW sector had a greater than 20% higher average ground level D/Q than the current participants. The Union Electric Real Estate Dept. made several attempts by phone and U.S. mail to contact the resident, but was unable to do so. The resident will not be added to the REMP vegetable garden sampling program.

Changes were identified for the nearest garden in the following sectors: NE, ENE, E, ESE, SE, SW, and WSW.

Table IV 2002 Land Use Census Results

Closest Receptor in Miles[1]

Sector	Residence	Garden	Milk
N(A)	2.2	NI	NI
NNE(B)	2.2	2.4	NI
NE(C)	2.3	3.0	NI
ENE(D)	1.7	3.5	NI
E(E)	3.5	NI	NI
ESE(F)	2.1	2.1	NI
SE(G)	2.2	4.8	NI
SSE(H)	2.5	2.5	2.5
S(J)	2.7	2.9	NI
SSW(K)	2.4	2.8	NI
SW(L)	2.6	3.3	2.7
WSW(M)	1.2	4.0	3.2
W(N)	1.6	2.3	4.0
WNW(P)	1.9	1.9	NI
NW(Q)	2.1	3.2	2.6
NNW(R)	1.8	3.2	NI

[1] NI=None Identified

2.6 Cross-Check Results

The crosscheck results performed by the vendor laboratory during 2002 are presented in Table V. The results indicate satisfactory laboratory performance.

2002 Environmental Measurement Laboratory

Table V Quality Assessment Program Results

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Mar-02	Water	Am-241	1.68 ± 0.14	1.47	0.79 - 1.41	PASS
Mar-02	Water	Co-60	349.20 ± 2.60	347.33	0.80 - 1.20	PASS
Mar-02	Water	Cs-134	3.40 ± 0.60	3.36	0.80 - 1.30	PASS
Mar-02	Water	Cs-137	57.20 ± 1.70	56.07	0.80 - 1.22	PASS
Mar-02	Water	Pu-238	0.45 ± 0.11	0.49	0.74 - 1.20	PASS
Mar-02	Water	Pu-239/40	4.47 ± 0.28	4.22	0.79 - 1.20	PASS
Mar-02	Water	Sr-90	7.40 ± 1.30	7.58	0.69 - 1.34	PASS
Mar-02	Water	Uranium	3.27 ± 0.43	2.84	0.75 - 1.33	PASS
Mar-02	Water	Gr. Alpha	265.40 ± 7.70	375.00	0.58 - 1.29	PASS
Mar-02	Water	Gr. Beta	930.60 ± 12.00	1030.00	0.61 - 1.43	PASS
Mar-02	Water	H-3	226.30 ± 32.70	283.70	0.78 - 2.45	PASS
Mar-02	Soil	Ac-228	55.00 ± 5.50	51.17	0.80 - 1.38	PASS
Mar-02	Soil	Am-241	8.30 ± 3.30	10.93	0.65 - 2.28	PASS
Mar-02	Soil	Bi-212	49.20 ± 12.40	53.43	0.50 - 1.34	PASS
Mar-02	Soil	Bi-214	46.60 ± 3.10	53.93	0.78 - 1.42	PASS
Mar-02	Soil	Cs-137	1401.60 ± 9.10	1326.67	0.80 - 1.25	PASS
Mar-02	Soil	K-40	613.10 ±28.10	621.67	0.80 - 1.32	PASS
Mar-02	Soil	Pb-212	51.60 ± 2.60	51.10	0.78 - 1.32	PASS
Mar-02	Soil	Pb-214	52.00 ± 3.60	54.37	0.76 - 1.46	PASS
Mar-02	Soil	Pu-239/40	14.70 ± 3.50	19.10	0.71 - 1.30	PASS
Mar-02	Soil	Sr-90	52.10 ± 6.30	53.76	0.67 - 2.90	PASS
Mar-02	Soil	Th-234	122.40 ± 6.30	89.30	0.63 - 2.35	PASS
Mar-02	Soil	Uranium	143.40 ± 9.40	194.77	0.71 - 1.32	PASS
Mar-02	Vegetation	Am-241	3.10 ± 2.20	2.23	0.73 - 2.02	PASS
Mar-02	Vegetation	Cm-244	0.90 ± 0.80	1.32	0.61 - 1.59	PASS
Mar-02	Vegetation	Co-60	13.50 ± 2.10	11.23	0.80 - 1.44	PASS
Mar-02	Vegetation	Cs-137	350.40 ± 6.30	313.67	0.80 - 1.31	PASS
Mar-02	Vegetation	K-40	940.80 ± 45.60	864.33	0.79 - 1.39	PASS
Mar-02	Vegetation	Pu-239/40	16.90 ± 0.70[3]	3.54	0.69 - 1.31	PASS
Mar-02	Vegetation	Sr-90	543.40 ± 24.90	586.28	0.55 - 1.21	PASS

[1]Results are reported as follows: Water Bq/L, Air Filters Bq/Filter, Soil and Vegetation Bq/Kg.

[2]Control Limits are the ratio of Reported Value / Reference Value established using historic data.

[3]An error was found in the conversion from pCi/g to Bq/Kg. Corrected result 2.84 +/-0.59 Bq/Kg.

2002 Environmental Measurement Laboratory

Table V Quality Assessment Program Results

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Mar-02	Air Filter	Am-241	0.09 ± 0.05	0.09	0.70 - 2.34	PASS
Mar-02	Air Filter	Co-60	30.10 ± 0.30	30.52	0.80 - 1.26	PASS
Mar-02	Air Filter	Cs-137	29.90 ± 0.30	28.23	0.79 - 1.32	PASS
Mar-02	Air Filter	Mn-54	40.40 ± 0.40	38.53	0.80 - 1.35	PASS
Mar-02	Air Filter	Pu-238	0.05 ± 0.02	0.06	0.67 - 1.33	PASS
Mar-02	Air Filter	Pu-239/40	0.15 ± 0.02	0.19	0.73 - 1.26	PASS
Mar-02	Air Filter	Sr-90	3.40 ± 0.40	4.83	0.53 - 1.84	PASS
Mar-02	Air Filter	Uranium	0.80 ± 0.20	0.61	0.79 - 2.10	PASS
Mar-02	Air Filter	Gr. Alpha	0.43 ± 0.04	0.53	0.73 - 1.43	PASS
Mar-02	Air Filter	Gr. Beta	1.34 ± 0.05	1.30	0.76 - 1.36	PASS
Sep-02	Water	Am-241	3.00 ± 0.10	3.04	0.79 - 1.41	PASS
Sep-02	Water	Co-60	258.40 ± 2.30	268.67	0.80 - 1.20	PASS
Sep-02	Water	Cs-134	50.80 ± 3.30	60.20	0.80 - 1.30	PASS
Sep-02	Water	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22	PASS
Sep-02	Water	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22	PASS
Sep-02	Water	Am-241	3.00 ± 0.10	3.04	0.79 - 1.41	PASS
Sep-02	Water	Am-241	3.00 ± 0.10	3.04	0.79 - 1.41	PASS
Sep-02	Water	Co-60	258.40 ± 2.30	268.67	0.80 - 1.20	PASS
Sep-02	Water	Cs-134	50.80 ± 3.30	60.20	0.80 - 1.30	PASS
Sep-02	Water	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22	PASS
Sep-02	Water	H-3	271.90 ± 20.90	227.30	0.78 - 2.45	PASS
Sep-02	Water	Pu-238	4.40 ± 0.20	4.33	0.74 - 1.20	PASS
Sep-02	Water	Pu-239/40	2.10 ± 0.10	2.07	0.79 - 1.20	PASS
Sep-02	Water	Sr-90	9.70 ± 0.20	8.69	0.69 - 1.34	PASS
Sep-02	Water	Uranium	5.60 ± 0.10	6.84	0.75 - 1.33	PASS
Sep-02	Water	Gr. Alpha	204.90 ± 3.20	210.00	0.58 - 1.29	PASS
Sep-02	Water	Gr. Beta	852.00 ± 26.50	900.00	0.61 - 1.43	PASS
Sep-02	Soil	Ac-228	47.60 ± 1.90	42.30	0.80 - 1.38	PASS
Sep-02	Soil	Am-241	7.80 ± 1.40	6.77	0.65 - 2.28	PASS
Sep-02	Soil	Bi-212	45.60 ± 1.70	45.93	0.50 - 1.34	PASS

[1] Results are reported as follows: Water Bq/L, Air Filters Bq/Filter, Soil and Vegetation Bq/Kg.

[2] Control Limits are the ratio of Reported Value/Reference Value established using historic data.

2002 Environmental Measurement Laboratory

Table V Quality Assessment Program Results

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Sep-02	Soil	Bi-214	48.80 ± 4.90(3)	33.63	0.78 - 1.42	FAILED
Sep-02	Soil	Cs-137	819.60 ± 16.60	829.33	0.80 - 1.25	PASS
Sep-02	Soil	K-40	705.30 ± 31.40	637.67	0.80 - 1.32	PASS
Sep-02	Soil	Pb-212	48.60 ± 3.40	43.43	0.78 - 1.32	PASS
Sep-02	Soil	Pb-214	51.10 ± 5.10	35.20	0.76 - 1.46	PASS
Sep-02	Soil	Pu-239/40	20.20 ± 0.80(4)	12.90	0.71 - 1.30	PASS
Sep-02	Soil	Sr-90	38.50 ± 0.10	41.16	0.67 - 2.90	PASS
Sep-02	Soil	Uranium	58.90 ± 0.70(6)	87.21	0.71 - 1.32	FAILED
Sep-02	Vegetation	Am-241	2.10 ± 0.30	2.25	0.73 - 2.02	PASS
Sep-02	Vegetation	Cm-244	1.00 ± 0.30	1.25	0.61 - 1.59	PASS
Sep-02	Vegetation	Co-60	11.80 ± 1.50	9.66	0.80 - 1.44	PASS
Sep-02	Vegetation	Cs-137	340.30 ± 16.80	300.67	0.80 - 1.31	PASS
Sep-02	Vegetation	K-40	1646.00 ± 74.40	1480.00	0.79 - 1.39	PASS
Sep-02	Vegetation	Pu-239/40	3.00 ± 0.30	3.43	0.69 - 1.31	PASS
Sep-02	Vegetation	Sr-90	345.60 ± 97.80	476.26	0.55 - 1.21	PASS
Sep-02	Air Filter	Am-241	0.20 ± 0.01(5)	0.19	0.70 - 2.34	PASS
Sep-02	Air Filter	Co-60	24.90 ± 0.60	23.00	0.80 - 1.26	PASS
Sep-02	Air Filter	Cs-137	38.00 ± 1.30	32.50	0.80 - 1.32	PASS
Sep-02	Air Filter	Mn-54	60.80 ± 1.90	52.20	0.80 - 1.35	PASS
Sep-02	Air Filter	Pu-238	0.11 ± 0.02(5)	0.12	0.67 - 1.33	PASS
Sep-02	Air Filter	Pu-239/40	0.21 ± 0.01(5)	0.21	0.73 - 1.26	PASS
Sep-02	Air Filter	Sr-90	5.20 ± 0.20	5.56	0.53 - 1.84	PASS
Sep-02	Air Filter	Uranium	0.41 ± 0.04(5)	0.47	0.79 - 2.10	PASS
Sep-02	Air Filter	Gr. Alpha	0.40 ± 0.10	0.29	0.73 - 1.43	PASS
Sep-02	Air Filter	Gr. Beta	0.80 ± 0.10	0.87	0.76 - 1.36	PASS

[1]Results are reported as follows: Water Bq/L, Air Filters Bq/Filter, Soil and Vegetation Bq/Kg.

[2]Control Limits are the ratio of Reported Value / Reference Value established using historic data.

[3]Naturally-occurring radium daughters are present in the shielded background, and a probable cause of the higher bias seen for isotopes of lead and bismuth.

[4]Reporting error. The average result of the triplicate analyses was 14.1 +/- 5.7 Bq/Kg.

[5]STAP-963, Calculations for the tranuranics analyses(Am-241, Uranium, Pu-238, -239/40) were not converted to Bq/total filter. The data listed is the result of the recalculation.

[6]The analysis was repeated in duplicate; result of reanalysis, 87.05 +/- 7.64 Bq/kg.

Table V

2002 MAPEP Results

MAPEP

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Dec-01	Water	Am-241	1.25 ± 0.0	1.19	0.83 - 1.6	**PASS**
Dec-01	Water	Co-57	138.9 ± 0.5	143	100.1 - 185.9	**PASS**
Dec-01	Water	Co-60	139.1 ± 0.5	141	98.7 - 183.3	**PASS**
Dec-01	Water	Cs-134	25.16 ± 0.2	28.5	19.95 - 37.1	**PASS**
Dec-01	Water	Cs-137	279.96 ± 0.9	286	200.2 - 371.8	**PASS**
Dec-01(3)	Water	Fe-55	19.68 ± 23.2	9.2	6.44 - 12.0	**PASS**
Dec-01	Water	Mn-54	253.64 ± 0.9	246	172.2 - 319.8	**PASS**
Dec-01	Water	Ni-63	65.88 ± 1.9	88.3	61.81 - 114.8	**PASS**
Dec-01(4)	Water	Pu-238	0.060 ± 0.01	0.0	NA	**PASS**
Dec-01	Water	Pu-239/40	2.79 ± 0.0	2.99	2.09 - 3.9	**PASS**
Dec-01	Water	Sr-90	4.88 ± 0.3	4.8	3.36 - 6.2	**PASS**
Dec-01	Water	U-233/4	0.89 ± 0.0	0.98	0.69 - 1.3	**PASS**
Dec-01	Water	U-238	6.75 ± 0.0	7.8	5.46 - 10.1	**PASS**
Dec-01	Water	Zn-65	70.6 ± 1.1	67.3	47.11 - 87.5	**PASS**
Oct-02	Soil	Am-241	40.54 ± 2.7	43.5	30.45 - 56.6	**PASS**
Oct-02	Soil	Co-57	210.58 ± 2.0	246	172.2 - 319.8	**PASS**
Oct-02	Soil	Co-60	84.38 ± 0.9	87.5	61.25 - 113.8	**PASS**
Oct-02	Soil	Cs-134	692.6 ± 2.1	862	603.4 - 1120.6	**PASS**
Oct-02	Soil	Cs-137	96.98 ± 1.7	111	77.7 - 144.3	**PASS**
Oct-02	Soil	Fe-55	1714.6 ± 299.6	1870	1309 - 2431	**PASS**
Oct-02	Soil	Mn-54	509.74 ± 3.4	546	382.2 - 709.8	**PASS**
Oct-02	Soil	Ni-63	890.6 ± 22.4	1180	826 - 1534	**PASS**
Oct-02	Soil	Pu-238	34.04 ± 6.0	33.3	23.31 - 43.3	**PASS**
Oct-02	Soil	Pu-239/40	68.7 ± 3.7	72.9	51.03 - 94.8	**PASS**
Oct-02(4)	Soil	Sr-90	1.5 ± 3.0	0.0	NA	**PASS**
Oct-02	Soil	U-233/4	166.33 ± 3.8	229	160.3 - 297.7	**PASS**
Oct-02	Soil	U-238	169.76 ± 3.8	220	154.0 - 286.0	**PASS**
Oct-02	Soil	Zn-65	783.59 ± 6.4	809	566.3 - 1051.7	**PASS**

[1]Results are reported as: Bq/Kg or Bq/L for MAPEP and pCi/L for ERA.

[2]Control Limits are defined by MAPEP and ERA.

[3]Known activity below the laboratory LLD. The sample was recounted for 2000 minutes: 11.52 +/- 5.55 Bq/L

[4]False positive. No activity expected.

Table V

2002 ERA Results

ERA

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Feb-02	Water	Sr-89	53.0 ± 2.5	55.3	46.6 - 64.0	**PASS**
Feb-02	Water	Sr-90	16.6 ± 0.5	15.9	7.2 - 24.6	**PASS**
Feb-02	Water	Gr. Alpha	6.5 ± 0.6	8.0	0.0 - 16.7	**PASS**
Feb-02	Water	Gr. Beta	45.7 ± 3.1	48.3	39.6 - 57.0	**PASS**
Feb-02	Water	Ba-133	25.8 ± 1.5	28.9	20.2 - 37.6	**PASS**
Feb-02	Water	Co-60	76.9 ± 2.7	73.4	64.7 - 82.1	**PASS**
Feb-02	Water	Cs-134	38.7 ± 1.6	42.1	33.4 - 50.8	**PASS**
Feb-02	Water	Cs-137	92.9 ± 2.7	88.8	80.1 - 97.5	**PASS**
Feb-02	Water	Ra-226	15.3 ± 0.7	14.3	10.6 - 18.0	**PASS**
Feb-02	Water	Ra-228	17.5 ± 0.4	16.9	9.6 - 24.2	**PASS**
Feb-02	Water	Uranium	23.8 ± 1.1	28.3	23.1 - 33.5	**PASS**
Feb-02	Water	Zn-65	361.0 ± 9.2	359.0	298.0 - 420.0	**PASS**
May-02	Water	Gr. Alpha	23.9 ± 2.5	22.8	13.0 - 32.6	**PASS**
May-02	Water	Ra-226	5.9 ± 0.5	6.1	4.5 - 7.7	**PASS**
May-02	Water	Ra-228	5.6 ± 0.9	4.5	2.6 - 6.5	**PASS**
May-02	Water	Uranium	7.6 ± 0.2	9.3	4.1 - 14.5	**PASS**
May-02	Water	Co-60	37.9 ± 0.7	39.1	30.4 - 47.8	**PASS**
May-02	Water	Cs-134	14.5 ± 0.8	17.1	8.4 - 25.8	**PASS**
May-02	Water	Cs-137	50.0 ± 2.0	52.1	43.4 - 60.8	**PASS**
May-02	Water	Gr. Beta	171.0 ± 2.5	189.0	140.0 - 238.0	**PASS**
May-02	Water	Sr-89	28.4 ± 4.8	31.7	23.0 - 40.4	**PASS**
May-02	Water	Sr-90	32.4 ± 3.1	28.3	19.6 - 37.0	**PASS**
May-02	Water[3]	H-3	13900 ± 100.0	17,400	14400 - 20400	**PASS**
May-02	Water	I-131	14.6 ± 0.3	14.7	11.2 - 18.2	**PASS**
Aug-02	Water	Ba-133	71.9 ± 2.1	80.0	66.4 - 93.6	**PASS**
Aug-02	Water	Co-60	23.8 ± 1.0	23.3	14.6 - 32.0	**PASS**

[1]Results are reported as: pCi/l for ERA.

[2]Control Limits are defined by ERA.

[3]Analysis was repeated; result is 16114 +/-487 pCi/L.

Table V **2002 ERA Results (cont.)**

ERA

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Aug-02	Water	Cs-134(3)	62.9 ± 1.2	71.7	63.0 - 80.4	**FAILED**
Aug-02	Water	Cs-137	219.3 ± 10.7	214.0	195.0 - 233.0	**PASS**
Aug-02	Water	Gr. Alpha	74.4 ± 0.6	58.8	33.5 - 84.1	**PASS**
Aug-02	Water	Gr. Beta	26.7 ± 0.4	21.9	13.2 - 30.6	**PASS**
Aug-02	Water	Ra-226	5.0 ± 0.5	5.0	3.7 - 6.3	**PASS**
Aug-02	Water	Ra-228	6.0 ± 0.7	4.7	2.7 - 6.7	**PASS**
Aug-02	Water	Sr-89	28.4 ± 1.5	29.0	20.3 - 37.7	**PASS**
Aug-02	Water	Sr-90	36.5 ± 1.1	36.4	27.7 - 45.1	**PASS**
Aug-02	Water	Uranium	4.1 ± 0.1	5.0	0.0 - 10.2	**PASS**
Nov-02	Water	Zn-65	92.4 ± 2.2	95.7	79.4 - 112.0	**PASS**
Nov-02	Water	Gr. Alpha	9.3 ± 0.4	12.2	3.5 - 20.9	**PASS**
Nov-02	Water	Gr. Beta	44.7 ± 1.0	47.0	38.3 - 55.7	**PASS**
Nov-02	Water	H-3	10100.00 ± 38.7	10200.0	8440 - 12000	**PASS**
Nov-02	Water	Ra-226	11.6 ± 0.1	12.1	9.0 - 15.2	**PASS**
Nov-02	Water	Ra-228	16.0 ± 1.4	15.1	8.6 - 21.6	**PASS**
Nov-02	Water	Uranium	15.5 +- 0.5	19.2	14.0 - 24.4	**PASS**
Nov-02	Water	I-131	6.0 ± 0.4	6.8	3.3 - 10.2	**PASS**
Nov-02	Water	Co-60	104.0 ± 7.1	104.0	95.0 - 113.0	**PASS**
Nov-02	Water	Cs-134	48.2 ± 2.3	55.5	46.8 - 64.2	**PASS**
Nov-02	Water	Cs-137	109.0 ± 12.6	117.0	107.0 - 127.0	**PASS**
Nov-02	Water	Gr. Beta	252.0 ± 26.8	288.0	244.0 - 416.0	**PASS**
Nov-02	Water	Sr-89	43.2 ± 0.7	47.6	38.9 - 56.3	**PASS**
Nov-02	Water	Sr-90	7.5 ± 0.2	7.6	0.0 - 16.2	**PASS**
Nov-02	Water	Gr. Alpha	74.9 ± 1.5	103.0	58.4 - 148.0	**PASS**
Nov-02	Water	Ra-226	8.9 ± 0.0	9.1	6.7 - 11.5	**PASS**
Nov-02	Water	Ra-228	15.3 ± 0.1	17.8	10.1 - 25.5	**PASS**
Nov-02	Water	Uranium	51.7 ± 1.6	61.7	51.0 - 72.4	**PASS**

[1]Results are reported as: pCi/l for ERA.

[2]Control Limits are defined by ERA.

[3]ERA acknowledged a high % of failure for Cs-134 and questioned its own control limits. No problems identified in the analysis.

2.7 Data Reporting Conventions

Lower Limit of Detection

The lower limit of detection (LLD) used in this report is per NRC Regulatory Guide 4.1, Rev. 1, "Program for Monitoring Radioactivity in the Environs of Nuclear Power Plants", and the NRC Branch Technical Position, November 1979, "An Acceptable Radiological Environmental Monitoring Program". The LLD is defined as the smallest concentration of radioactivity 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.

The maximum LLDs for radiological environmental sample analysis is presented in Table III.

Data Reporting

Positive sample results are reported with a 2 sigma counting uncertainty (corresponding to the 95% confidence level). In cases where the activity is found to be below the sample analysis minimum, the activity is reported as Not Detected (ND).

2.8 Radiological Environmental Monitoring Program Annual Summary

The REMP Summary is presented in Table VI in accordance with NRC Regulatory Guide 4.1, Rev. 1, "Program for Monitoring Radioactivity in the Environs of Nuclear Power Plants", and the NRC Branch Technical Position, November 1979, "An Acceptable Radiological Environmental Monitoring Program". In cases where the activity is found to be below the sample analysis minimum, the activity is reported as < LLD.

With the exception of a small indication of tritium in river water, there was no measurable impact on the environment due to plant operation.

Table VI

REMP Summary

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (f)[2] Range	Location With Highest Annual Mean		Control Location Mean (f)[2] Range	Number of Non-routine Reported Measurements
					Name Distance and Direction	Mean (f)[2] Range		
Waterborne Pathway								
Surface Water (pCi/l)	H-3	(24)	132	285 (4/12) (183 - 370)	S02 4.9 mi SE	285 (4/12) (183 - 370)	< LLD	0
	Gamma	(24)	--	< LLD	--	< LLD	< LLD	0
Shoreline Sediment (pCi/kg)	Gamma	(4)	--	< LLD	--	< LLD	< LLD	0
Airborne Pathway								
Airborne Particulate (pCi/m^3)	Gross Beta	(244)	0.010	(0.010 - 0.043)	B-3 1.8 mi. NNW	0.025 (36/36) (0.013 - 0.040)	--	0
	Gamma	(18)	—	< LLD	--	< LLD	--	0
	I-131	(244)	0.070	< LLD	--	< LLD	--	0

Table VI

REMP Summary

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (f)[2] Range	Location With Highest Annual Mean		Control Location Mean (f)[2] Range	Number of Non-routine Reported Measurements
				Name Distance and Direction	Mean (f)[2] Range		
Ingestion Pathway							
Milk	Gamma (44)	—	< LLD	--	< LLD	< LLD	0
	I-131 (44)	0.2	< LLD	--	< LLD	< LLD	0
Fish (pCi/kg - wet)	Gamma (18)	—	< LLD	--	< LLD	< LLD	0
Vegetation (pCi/kg - wet)	Gamma (33)	—	< LLD	--	< LLD	< LLD	0
	I-131 (33)	7.1	< LLD	--	< LLD	< LLD	0
Direct Radiation							
Quarterly TLDs (mRem/Standard Quarter)	Gamma (171) Dose	9.4	15.5 (159/159) (10-18)	3 1.2 mi. NW	17.2 (4/4) (16 - 18)	14.6 (12/12) (9 - 18)	0

[1]The LLDs quoted is the lowest actual detection limit obtained in the various media during the reporting period. The required LLDs for radiological environmental sample analysis is found in Table III. Where all nuclides were LLD for specific media, no LLD was listed.

[2]Mean and range are based upon detectable measurements only. Fraction of detectable measurements is indicated in parentheses .

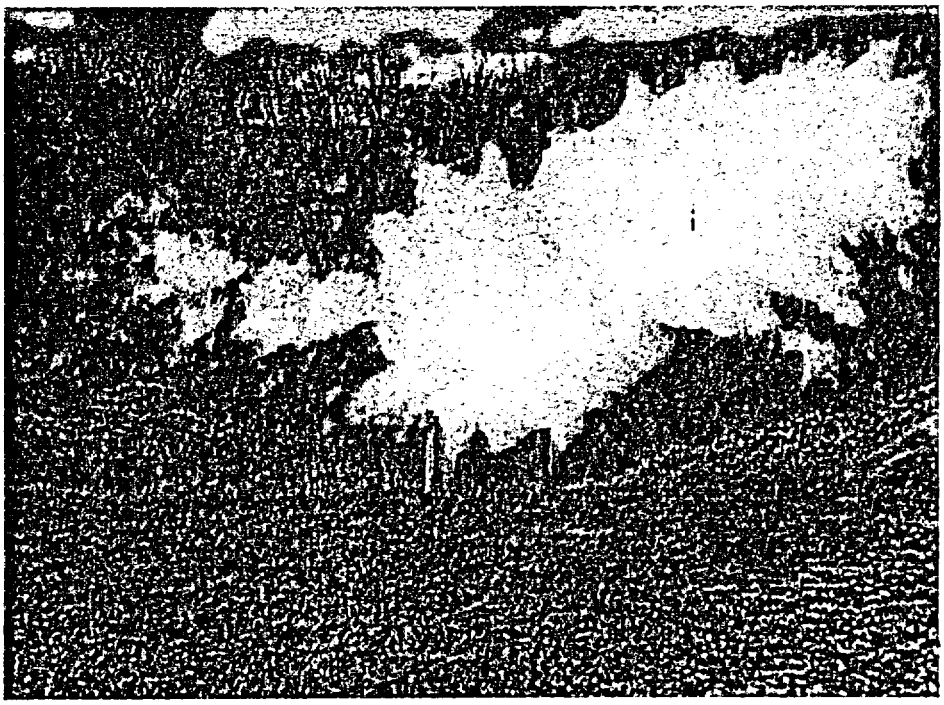
2.9 Individual Sampling Results

The REMP Individual sample results are presented in Tables VII through XVI.

The following acronyms are used in these tables:

ND = Not Detected (Result below analysis detection limit)

NA = Not Available (Circumstances discussed in body of report)



The area surrounding the Callaway Plant includes the Reform Conservation Area. The 7,044 acres that comprise this area is owned by Ameren UE and managed by the Missouri Department of Conservation.

Airborne Beta & Iodine

Table VII *(All results are the effect of natural background)*

Gross Beta data is listed. All Iodine-131 results are <0.07. All results are in pCi/m³.

	A-1	B-3	A-7	A-8	A-9
01/03/02	0.023[4]	0.035	0.029	0.027	0.030
01/10/02	0.035	0.041	0.035	0.035	0.036
01/17/02	0.018	0.024	0.016	0.019	0.016
01/24/02	0.030	0.039	0.032	0.034	0.032
01/31/02	0.023	NA	0.023	0.027	0.030
02/07/02	0.037	NA	0.039	0.032	0.038
02/14/02	0.018	NA	0.018	0.024	0.018
02/21/02	0.016	NA	0.014	0.019	0.015
02/28/02	0.017	0.017	0.017	0.025	0.020
03/07/02	0.034	0.037	0.032	0.034	0.032
03/14/02	0.024	0.025	0.024	0.024	0.025
03/21/02	0.015	0.016	0.019	0.017	0.017
03/28/02	0.025	0.028	0.025	0.026	0.027
04/04/02	0.019	0.015	0.016	0.018	0.017
04/11/02	0.028	0.026	0.026	0.028	0.029
04/18/02	0.020	0.021	0.025	0.022	0.022
04/25/02	0.016	0.015	0.012	0.012	0.016
05/02/02	0.020	0.017	0.014	0.015	0.016
05/09/02	0.015	0.016	0.015	0.015	0.015
05/17/02	0.017	0.019	0.014	0.019	0.018
05/23/02	0.015	0.013	0.012	0.015	0.015
05/30/02	0.015	0.015	0.014	0.017	0.016
06/06/02	0.018	0.020	0.020	0.022	0.021
06/13/02	0.013	0.017	0.015	0.015	0.011
06/20/02	0.017	0.017	0.018	0.019	0.018
06/28/02	0.020	0.023	0.024	0.021	0.023
07/03/02	0.018	NA	0.020	0.021	0.022
07/11/02	0.018	NA	0.025	0.025	0.027
07/18/02	0.017	NA	0.020	0.020	0.021
07/25/02	0.015	NA	0.018	0.019	0.019
08/01/02	0.018	NA	0.024	0.020	0.022
08/08/02	0.023	NA	0.027	0.028	0.028
08/15/02	0.016	NA	0.021	0.018	0.020
08/22/02	0.013	NA	0.014	0.013	0.012
08/29/02	0.017	NA	0.021	0.019	0.020
09/05/02	0.019	NA	0.026	0.026	0.023
09/12/02	0.027	NA	0.039	0.026	0.031[1]
09/19/02	0.028	NA	0.032[2]	0.024	0.026
09/26/02	0.017	0.019	0.016	0.017	0.020
10/03/02	0.037	0.029	0.033	0.033	0.033
10/10/02	0.019	0.022	0.020	0.023	0.022
10/17/02	0.018	0.020	0.019	0.019	0.020
10/24/02	0.023	0.028	0.023	0.026	0.030
10/31/02	0.023	0.027	0.024	0.026	0.027
11/07/02	0.032	0.037	0.036	0.036	0.038
11/14/02	0.032	0.035	0.031	0.037	0.032
11/21/02	0.022	0.027	0.028	0.031	0.030
11/29/02	0.020	0.025	0.023	0.026	0.025
12/05/02	0.016	0.021	0.020	0.022	0.022
12/12/02	0.031[3]	0.039	0.040	0.040	0.039
12/20/02	0.039	0.040	0.042	0.043	0.039
12/27/02	0.030	0.027	0.010	0.032	0.027
01/03/03	0.032	0.032	0.033	0.035	0.035

1 Air sample line integrity failed. Air station inoperable for the week. (Filter analyzed)

2 Low sample flow ==> Air station inoperable.

3 Timer stopped ==> Air station inoperable.

4 Low sample flow ==> Air station inoperable.

Airborne Gamma Composites

Table VIII *(All results are the effect of natural background)*

Gamma Isotopic[1] (pCi/m^3)

A-1

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.082	0.067	0.068	0.050

A-7

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.065	0.061	0.062	0.060

A-8

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.073	0.066	0.071	0.070

A-9

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.065	0.079	0.065	0.044

B-3

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.085	0.079	0.149	0.046

[1]Co-58, Co-60, Zr-95, Nb-95, Cs-134, Cs-137, Ba-140, La-140, Ce-144 Not Detectable

Table IX *(All results are the effect of natural background)*

Gamma Isotopic[1] (pCi/kg)

	F2A/2B	F6A/6B	PR3A/3B	PR7A/7B	V3A/3B
	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02
Gross Alpha	15,246/15,174	16,965/12,838	13,253/14,640	16,766/16,842	19,373/12,871
Gross Beta	25,189/24,677	25,597/23,584	22,341/23,409	24,094/23,934	28,616/29,399
K-40	11,494/14,065	10,828/11,150	11,499/10,790	10,829/10,002	14,106/14,238
Cs-137	835/532	762/957	420/403	317/319	224/231

	W1A/1B	W2A/2B	W3A/3B	W4A/4B
	12/20/02	12/20/02	12/20/02	12/20/02
Gross Alpha	12,217/10,764	15,001/9,916	12,763/15,404	13,897/11,942
Gross Beta	18,324/20,907	22,948/24,875	16,414/16,326	19,483/17,549
K-40	14,067/13,011	17,153/13,889	7,612/9,964	9,601/10,926
Cs-137	84/60	159/157	ND/ND	ND/ND

[1]Mn-54, Fe-59, Co-58, Co-60, Zr-95, Nb-95, Cs-134, Ba-140, La-140, Not Detectable

Vegetation

Table X *(All results are the effect of natural background)*

Gamma Isotopic[1] (pCi/kg wet)

	V9				
	6/10/02 Lettuce	6/10/02 Mustard	7/8/02 Lettuce	7/8/02 Cabbage	9/9/02 Mustard
Gross Alpha	127	220	395	214	ND
Gross Beta	3,596	4054	8,646	5,037	5,177
K-40	4,130	3,800	8,523	4,464	4,754

	V9				
	9/9/02 Lettuce	9/9/02 Turnips	10/7/02 Lettuce	10/7/02 Turnips	10/7/02 Mustard
Gross Alpha	111	203	170	146	143
Gross Beta	4,010	4,377	4,204	4,570	4,238
K-40	4,148	3,523	4,077	3,807	4,275

	V9			
	11/11/02 Lettuce	11/11/02 Turnips	11/11/02 Mustard	11/11/02 Cabbage
Gross Alpha	ND	ND	ND	ND
Gross Beta	3,235	4,574	5,235	3,421
K-40	3,905	4,546	4,852	3,216

[1]Mn-54, Co-58, Co-60, I-131, Cs-134, Cs-137, Not Detectable

Vegetation

Table X *(All results are the effect of natural background)*

Gamma Isotopic[1] (pCi/kg wet)

	V10				
	8/13/02 Mustard	8/13/02 Lettuce	9/10/02 Turnips	9/10/02 Lettuce	10/8/02 Turnips
Gross Alpha	ND	93	175	46	177
Gross Beta	4,961	4,724	5,212	4,056	3,926
K-40	4,010	4,088	4,908	5,099	3,998

	V10		
	10/8/02 Cabbage	11/12/02 Cabbage	11/12/02 Turnips
Gross Alpha	ND	51	33
Gross Beta	3,647	3,875	3,963
K-40	2,268	3,416	3,956

Vegetation

Table X *(All results are the effect of natural background)*

Gamma Isotopic[1] (pCi/kg wet)

V12

	5/27/02 Cabbage	6/11/02 Lettuce	7/9/02 Cabbage	8/13/02 Cabbage	9/10/02 Cabbage
Gross Alpha	132	83	141	< 36	< 40
Gross Beta	3,280	3,327	3,667	3,045	3,249
K-40	2,990	3,181	4,637	2,791	3,529

V11

	5/27/02 Broccoli	7/9/02 Lettuce	8/27/02 Cabbage	9/9/02 Lettuce	10/7/02 Broccoli
Gross Alpha	171	241	186	255	ND
Gross Beta	4,479	5,494	4,332	7,811	5,306
K-40	3,275	5,513	2,114	6,749	5,136

V11

	11/11/02 Cabbage
Gross Alpha	80
Gross Beta	5,835
K-40	3,096

Surface Water

Table XI *(All results except tritium are the effect of natural background)*

Gamma Isotopic[1] (pCi/L)

S01

	1/8/02	2/12/02	3/12/02	4/9/02	5/15/02	6/11/02
Gross Alpha	3.1	3.1	2.2	3.5	2.0	3.9
Gross Beta	8.1	8.9	8.1	6.5	6.9	8.6
H-3	ND	ND	ND	ND	ND	ND

	7/10/02	8/13/02	9/12/02	10/9/02	11/12/02	12/10/02
Gross Alpha	2.6	2.7	< 1.8	2.1	3.1	< 1.7
Gross Beta	6.3	7.1	7.6	7.3	5.9	6.4
H-3	ND	ND	ND	ND	ND	ND

S02

	1/8/02	2/12/02	3/12/02	4/9/02	5/15/02	6/11/02
Gross Alpha	2.7	3.8	4.7	2.2	2.5	3.7
Gross Beta	8.7	6.9	8.6	8.4	6.4	7.2
H-3	ND	ND	323	370	ND	ND

	7/10/02	8/13/02	9/12/02	10/9/02	11/12/02	12/10/02
Gross Alpha	4.4	3.6	1.3	3.0	< 2.1	2.6
Gross Beta	8.0	8.2	4.1	7.7	6.9	8.2
H-3	183	ND	ND	ND	265	ND

[1]Mn-54, Fe-59, Co-58, Co-60, Zr-95, Nb-95, Cs-134, Cs-137, Ba-140, La-140, Not Detectable

Gamma Isotopic[1] (pCi/L)

D01

	QTR 1	QTR 2	QTR 3	QTR 4
All	ND	ND	ND	ND

F05

	QTR 1	QTR 2	QTR 3	QTR 4
All	ND	ND	ND	ND

F015

	QTR 1	QTR 2	QTR 3	QTR 4
All	ND	ND	ND	ND

PW001

	QTR 1	QTR 2	QTR 3	QTR 4
All	ND	ND	ND	ND

[1]H-3, Mn-54, Fe-59, Co-58, Co-60, Zr-95, Nb-95, Cs-134, Cs-137, Ba-140, La-140, Not Detectable

Sediments

Table XIII *(All results are the effect of natural background)*

Gamma Isotopic[1] (pCi/kg dry)

Bottom Sediments

	A		C	
	4/10/02	10/15/02	4/10/02	10/15/02
K-40	14,522	11,280	13,255	12,924

Shoreline Sediments

	A		C	
	4/10/02	10/15/02	4/10/02	10/15/02
K-40	11,002	11,914	13,532	10,581

[1]Mn-54, Fe-59, Co-58, Co-60, Zr-95, Nb-95, Cs-134, Cs-137, Ba-140, and La-140, Not Detectable

Fish

Table XIV *(All results are the effect of natural background)*

Gamma Isotopic[1] (pCi/kg wet)

A

	4/10/02	4/10/02	4/10/02	4/10/02	4/10/02
	Carp	Freshwater Drum	River Carpsucker	Bigmouth Buffalo	Smallmouth Buffalo
K-40	2,547	2,383	2,481	3,303	2,940

	10/15/02	10/15/02	10/15/02	10/15/02
	Carp	Freshwater Drum	Bigmouth Buffalo	River Carpsucker
K-40	2,890	2,672	3,227	2,765

C

	4/10/02	4/10/02	4/10/02	4/10/02	4/10/02
	Carp	Freshwater Drum	River Carpsucker	Smallmouth Buffalo	Bigmouth Buffalo
K-40	2,618	2,589	2,822	2,792	2,944

	10/15/02	10/15/02	10/15/02	10/15/02
	Carp	Freshwater Drum	Bigmouth Buffalo	River Carpsucker
K-40	2,859	2,775	2,811	2,772

[1]Mn-54, Fe-59, Co-58, Co-60, Cs-134, Cs-137, Not Detectable

Milk

Table XV *(All results are the effect of natural background)*

Gamma Isotopic and Iodine[1] (pCi/L)

M 6

	1/8/02	2/12/02	3/12/02	4/9/02	4/23/02	5/14/02
K-40	1,302	1,197	1,211	1,185	1,332	1,201
	5/28/02	**6/11/02**	**6/25/02**	**7/9/02**	**7/23/02**	**8/13/02**
K-40	1,394	1,240	1,067	1,126	1,118	1,167
	8/27/02	**9/10/02**	**9/24/02**	**10/8/02**	**11/12/02**	**12/10/02**
K-40	1,257	1,214	1,227	1,168	1,121	1,171

M 8

	1/8/02	2/12/02	3/12/02	4/9/02	4/23/02	5/14/02
K-40	1,341	1,347	1,375	1,218	1,159	1,314
	5/28/02	**6/10/02**	**6/25/02**	**7/09/02**	**7/23/02**	**8/13/02**
K-40	1,212	1,077	1,228	1,239	1,224	1,308
	8/26/02	**9/9/02**	**9/24/02**	**10/8/02**	**11/11/02**	**12/10/02**
K-40	1,350	1,255	1,140	966	1,130	1,330

[1]I-131, Zn-65, Cs-134, Cs-137, Ba-140, La-140,Not Detectable.

Milk

Table XV *(All results are the effect of natural background)*

Gamma Isotopic and Iodine[1] (pCi/L)

	M13 (2)					
	8/13/02	8/27/02	9/10/02	9/24/02	10/7/02	11/12/02
K-40	1,477	1,426	1,663	1,535	1,603	1,445
	12/10/02	12/17/02				
K-40	1,184	765(3)				

[1]I-131, Zn-65, Cs-134, Cs-137, Ba-140, La-140,Not Detectable.

[2]New sample location as of 8-13-02.

[3]Sample recounted for K-40 only with a result of 878 +/- 228 pCi/L.

Direct Radiation

Table XVI *(All results are the effect of natural background)*

Gamma Dose (mrem)

	QTR 1	QTR 2	QTR 3	QTR 4		QTR 1	QTR 2	QTR 3	QTR 4
1a	14.5	16.4	15.3	17.7	**34**	14.1	15.7	15.4	16.2
3	16.9	17.0	18.4	16.9	**35**	12.9	15.0	14.7	14.8
5	12.8	14.4	14.0	14.7	**36**	14.2	15.1	15.4	15.6
6	14.6	14.8	17.6	18.2	**37**	15.4	14.6	16.3	14.9
7	15.3	15.7	15.7	16.1	**38**	10.4	10.6	10.3	11.6
9	13.3	14.4	15.6	14.6	**39**	14.0	15.3	15.9	17.1
10	15.9	17.0	17.0	17.1	**39a**	15.4	16.6	17.7	17.0
11a	15.7	17.0	17.7	16.6	**40**	15.5	16.8	15.7	17.7
14	14.5	15.8	15.2	16.0	**41**	15.3	14.6	17.3	16.0
17	13.9	17.3	15.6	16.9	**42**	11.8	13.2	12.3	13.6
18a	14.9	16.3	16.7	17.0	**43**	14.5	15.4	16.2	16.5
20	15.3	16.9	16.6	16.8	**44**	15.6	16.0	17.3	16.3
21	16.4	16.9	17.5	18.1	**45**	13.2	14.9	14.5	15.7
22a	14.2	15.0	15.7	16.1	**46**	14.5	15.4	16.9	18.2
23	14.9	15.8	16.6	16.3	**47**	15.2	15.2	17.0	15.5
26	9.5	10.9	10.6	10.8	**48**	16.2	16.9	16.0	16.6
27	16.0	16.3	17.3	17.5	**49**	14.3	15.1	**NA**	16.2
30a	14.7	14.6	16.3	16.0	**50**	15.4	16.0	16.4	16.3
31a	17.1	16.1	18.6	17.4	**51a**	14.6	16.6	16.2	17.0
32	15.9	16.4	18.6	17.0	**52**	15.4	16.3	15.6	16.7
32a	15.0	16.4	17.2	18.1	**60**	16.4	16.1	17.2	16.8
33	15.4	15.4	17.3	16.1					

3.1 Introduction

Union Electric Company in accordance with federal regulations and a desire to maintain the quality of the local environment around Callaway Plant has implemented an Environmental Protection Plan, (EPP) contained in Appendix B of the Callaway Plant Operating License.

The objective of the EPP is to provide for protection of non-radiological environmental values during operation of the Callaway Plant.

This report describes the conduct of the EPP for the Callaway Plant during 2002.

3.2 Unusual or Important Events

No unusual or important events reportable under the EPP were identified during 2002.

3.3 EPP Noncompliances

During 2002 there were no noncompliances with the EPP.

3.4 Nonroutine Reports

There were no nonroutine reports submitted in accordance with the EPP.

3.5 Plant Design and Operation Environmental Evaluations.

This section lists all changes in the plant design, operation, tests or experiments completed during 2002, which could have involved a potentially significant unreviewed environmental question.

The interpretations and conclusions regarding these plant changes along with a description of the change are presented below.

Callaway Modification 98-1007A

Description of Change:

MP 98-1007 replaced the 25,000 gallon bulk sulfuric acid tank, the 2,500 gallon day tank at the Cooling Tower basin plus all of the associated components, i.e.. pumps, valves, and piping. They were replaced with a new 15,000 gallon tank located at the Cooling Tower basin. The new system has a polymer lined carbon steel tank which gravity feeds acid to the cooling tower basin via the use of a pH controlled modulating valve. As a backup to the modulating valve will be a second line with a manually controlled valve. Either option will provide the ability to maintain the pH of the Circulating Water System.

Evaluation of Change:

This modification makes changes to the storage and delivery system for sulfuric acid used to control pH of the water in the Circulating and Service water systems. These systems are described in the FES-OL. The changes actually result in a lower total amount of acid stored at the site which will have less of an environmental concern than the original system.

The location of the majority of the acid storage has changed and it will now be near the Cirulating and Service water pumphouse. The new storage tank will be surrounded by a berm that will contain 110% of the tank contents in the event of a tank failure. Additionally the new system is simpler with a lower probability of failure of components that could possibly result in a release of product. Any land disturbance associated with this modification is limited to areas previously disturbed during plant construction.

The same acid is being used to control pH so this modification will not significantly affect the concentrations, frequencies or types of effluent being discharged from the plant, and does not affect the current plant power level. Therefore, this change does not constitute an unreviewed environmental question per Section 3.1 of appendix B to the Callaway Plant Operating License.

Callaway Modification MP 97-2011A

Description of Change:

MP 97-2011A installs a new addition chemical storage and addition system for the Circulating and Service Water (C&SW) systems. The new system is a modular unit that replaced separate units.

Evaluation of Change:

The modification involves changes to the C & SW systems chemical storage tanks and addition system. Although some of the tanks are larger, there are significant improvements in containment and the system design and materials that should prevent any tank or system failure to allow unintentional release of these chemicals to the environment.

There will be no significant change in the effluents as a result of this modification as addition rates or chemicals are not being changed with this modification. The new tanks are better sized to our current use rate and replenishment schedule. This modification will not significantly affect the concentrations, frequencies or types of effluent being discharged from the plant, and does not affect the current plant power level. Therefore, this change does not constitute an unreviewed environmental question per Section 3.1 of appendix B to the Callaway Plant Operating License.

Callaway Modification MP 02-1016A

Description of Change:

MP 02-1016A installs security modifications to support security measures to comply with 2002 NRC "Interim compensatory measures for high threat environment". The modification involves installing swing gates and supports, a new security control building, changes to plant roads, changes in parking lots, changes to switchyard fencing, and changes to vehicle barriers.

Evaluation of Change:

The modification involves construction of a new security access control building, fencing, and paving. Some land disturbance is involved in most of these activities.

The modification only involves limited areas and the majority of the stormwater from these areas drain to sedimentation ponds. Therefore, this will not significantly affect the concentrations, frequencies or types of effluent being discharged from the plant, and doe not affect the current plant power level.

The land disturbance will be confined to areas that were previously disturbed during plant construction. Since this land disturbance is limited and confined to areas previously disturbed, this change does not constitute an unreviewed environmental question per Section 3.1 of appendix B to the Callaway Plant Operating License.

Callaway Modification MP 01-2007A

Description of Change:

MP 01-2007A is a partial backfill of the unused Callaway Plant Unit 2 excavation. The fill material was from the soil that was stockpiled from the plant construction.

Evaluation of Change:

The modification involves partial filling of the unused unit 2 excavation with soil that was removed and stockpiled during construction. The modification will only disturb areas that were previously disturbed during construction.

As a result of this modification, some stormwater that is now discharged from the storm water outfall 12 will be discharged from stormwater outfall 10. These stormwater outfalls are already in our NPDES permit. Although there will be some change in individual outfall flows, there will be no net increase in flow from the stormwater outfalls. Retention ponds will maintain effluents from stormwater outfalls within permit limits.

This modification will not significantly affect the concentrations, frequencies or types of effluent being discharged from the plant, and does not affect the current plant power level. Therefore, this change does not constitute an unreviewed environmental question per Section 3.1 of appendix B to the Callaway Plant Operating License.