

**Radiological Environmental
Monitoring Manual
-REMM-**

For performance of the

**Radiological Environmental
Monitoring Program**

at

**COOPER NUCLEAR STATION
Brownville, Nebraska**

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RADIOLOGICAL ENVIRONMENTAL
MONITORING MANUAL
(REMM)

INTRODUCTION

The Radiological Environmental Monitoring Manual (REMM) required by Specification 3.20.F.1 of the Cooper Nuclear Station Radiological Technical Specifications, describes the Radiological Environmental Monitoring Program for Cooper Nuclear Station (CNS). The radiological environmental monitoring program shall be conducted in accordance with the REMM.

A radiological environmental monitoring program, approved by the Nuclear Regulatory Commission (NRC), was initiated at CNS before initial criticality was attained on 21 February 1974. The program monitors radiation levels in the air, terrestrial, and aquatic environments. Most samples are collected by Nebraska Public Power District (NPPD) personnel. However, all samples are shipped for analysis to a contractor's laboratory where there exists the special facilities required for measurements of extremely low levels of radioactivity.

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1. PROGRAM DESCRIPTION

A. SAMPLE DESCRIPTION

Background Radiation

Ambient levels of external radiation are measured at selected locations within an approximate 10-mile radius of the plant by exposing thermoluminescent dosimeters (TLD) for quarterly time periods. Selection of locations and periods of exposure are based on prevailing winds and anticipated radiation levels to provide suitable measurements for evaluation of probable radiation doses to the environs surrounding the plant location.

Soil

Soil samples consist of approximately 2 kg. of soil obtained by inserting a tubular sample template into the earth to a depth of approximately 6 inches and removing the enclosed soil to a suitable container.

Vegetation - Food and Feed Crops

Food and feed crop samples consist of approximately 2 kg. of the consumable portions of the food or feed crop being grown at the designated sample location.

Vegetation - Garden Crops

Garden crop samples consist of approximately 2 kg. of the edible portions of garden vegetables (usually tomatoes, sweet corn, and cabbage, when available) taken from family gardens at the designated sample stations within a 5-mile radius of the plant.

Vegetation - Feed and Forage - Beef Producers and Nearest Milk Producers

Approximately 2 kg. of forage will be sampled during the pasture season where milk and/or beef cattle are raised at the designated sample stations within an approximate 5-mile radius of the plant. These forage samples will be taken at the accelerated frequency rate, during peak pasture season, as shown in the sampling schedule. When the beef and milk cattle are not on pasture, sampling will consist of approximately 2 kg. of feed, sampled at the less frequent sampling frequency as shown in the sampling schedule.

When coupled with the use of transfer coefficients and intake figures, a reliable monitoring program for Cs-137 uptake in beef cattle is obtained.

The average daily cattle intake Cs-137 will be estimated from the forage sampling data as follows:

$$\begin{array}{l} \text{Average Cs-137 concentration} \\ \text{in forage-dry matter} \end{array} \quad \begin{array}{l} \text{pCi} \\ \text{kg.} \end{array} \times \quad \begin{array}{l} 0.03 \text{ kg. dry matter intake} \\ \text{kg. animal body weight} \end{array}$$

$$\times 500 \text{ kg. body wt.} = \text{mean daily cattle intake of Cs-137} \quad \begin{array}{l} \text{pCi} \\ \text{day} \end{array}$$

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The average beef concentrations may be estimated for the steady state (equilibrium) condition using the feed to meat transfer coefficient (T.C.) proposed by Johnson, Tyler and Ward (J. An. Sci 29, 695, 1969) for pasture conditions.

$$T.C. = \frac{\text{pCi/kg meat (wet basis)}}{\text{pCi/day intake}} = 0.02$$

Therefore the average beef concentration of Cs-137 in pCi/kg. =
T.C. [pCi/day intake] (wet basis)

In the event the average beef concentration of Cs-137, as determined above, exceeds 500 pCi/kg. (which is approximately twice the concentration present in beef due to Cs-137 fallout) beef cattle will be sampled directly.

Vegetation - Feed and Forage - Commercial Milk Producers

These feed and forage samples will consist of approximately 2 kg. of the feed or forage that the milk cows have been consuming just prior to producing the milk sample.

Apples

Since apples are grown for commercial market in the area of the plant at nearby locations, the fruit from these orchards are sampled. These samples will be of approximately 1 kg. each.

Airborne - Particulates and Halides

Continuous air sampling is performed at selected locations within an approximate ten mile radius of the plant. Locations have been selected on the basis of prevailing winds and existing populated areas for evaluation of probable exposure to airborne particulate and halide radioactivity of the environs surrounding the plant location. The collection devices for iodine will contain potassium iodide impregnated charcoal or equivalent, and be constructed and operated so as to retain quantitatively the iodine in the air passing through the device. Sensitivities will be such that an iodine concentration of 2.0×10^{-14} uCi/cc may be measured. Appropriate analyses of particulate filters and halide collection devices are performed on all samples in accordance with accepted techniques and nuclides of interest.

River Water

Sampling of the Missouri River water is performed at the designated location extending from approximately three miles above the plant intake structure to approximately two to three miles downstream from the station.

Aquatic Biota-Fish

At least 5 kg. of each of two species at each location are collected from the Missouri River at locations from one to three miles upstream and one to three miles downstream from the plant. An attempt is made to include bottom-feeding types as well as middle- or top-feeding types in the species collected from each sampling location.

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Aquatic Biota-Vegetation

Rooted aquatic plants and/or algal growth on submerged natural surfaces in littoral locations of the Missouri River are sampled when available during scheduled collection times at selected locations from immediately upstream to two miles downstream from the plant.

Ground Water

Sampling of ground water is performed from the plant well water supply header and from a municipal water supply well.

Milk (Nearest Producers)

During the season the cows are on pasture, samples of fresh milk will be obtained at the frequency specified in the sampling schedule from cows at locations that may be significantly affected by emissions from the Cooper Station (i.e., where the calculated dose to a child's two gram thyroid using NRC models and assumptions is equal to or exceeds 15 mrem/yr) and analyzed for their radioiodine content, calculated as iodine-131. Analysis will be carried out within eight days (one I-131 half-life) of sampling. Suitable analytical procedures will be used to determine the radioiodine content to a sensitivity of 0.5 picocuries I-131 per liter of milk at the time of sampling. Counting statistics will be such that the standard deviation (one sigma confidence level) of the net counting rate will be 10% or less. Overall error of the analysis will be within $\pm 25\%$. Results will be reported, with associated calculated error, as picocuries of I-131 per liter of milk at the time of sampling.

Milk

Milk is sampled from commercial milk producers within an approximate ten mile radius of the station. In the selection of milk sampling locations, an attempt has been made to select producers within areas of potential station influence with well established herds, who are most likely to remain in the business of milk production during succeeding years of station operation.

Eggs

Since eggs are a common edible farm product in the area, egg samples (two dozen per sample) are taken at the designated egg sample stations.

Bases:

The limiting conditions for operation of CNS include restricting environmental effects due to the operation of CNS (including exposure to the population) in unrestricted areas surrounding the CNS plant site to within limits in NRC Regulations 10 CFR - parts 20, 50 and 100. This monitoring program thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways.

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TABLE 1.B

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations^a</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
1. AIRBORNE			
a. Radioiodine and Particulates	(Locations 1-10)	Continuous operation of sampler with sample collection as required by dust loading but at least once per 7 days.	Radioiodine canister Analyze at least once per 7 days for I-131 Particulate sampler Analyze for gross beta radioactivity \geq 24 hours following filter change. Perform gamma isotopic analysis on each sample when gross beta activity is >300 dpm/sample. Perform gamma isotopic analysis on composite (by location) sample at least once per 92 days.
2. DIRECT RADIATION	(Locations 1-10, 15, 18, 22, 44, 58, 59) \geq 2 dosimeters at each location.	Thermoluminescent Dosimeters (TLD) exchange and read out at least once per 92 days.	Gamma dose. At least once per 92 days.

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TABLE 1.B (CONTINUED)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations^a</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
3. WATERBORNE			
a. Surface/ River Water	(Locations 12, 13, 28)	Collect a four (4) liter grab sample at least once per 31 days. Container will be held under the surface of the water but within 1 ft. of the surface.	At least once per 31 days perform the following anal- yses of the sample Suspended - gross alpha Suspended - gross beta Dissolved - gross alpha Dissolved - gross beta Sr - 89, Sr - 90. At least once per 92 days perform the following anal- yses of the sample Gamma Isotopic ^b Tritium (H-3).
b. Ground/Drinking	(Locations 11 and 47)	Collect a four (4) liter grab sample at least once per 92 days.	At least once per 92 days perform the following anal- yses of the sample Gross alpha Gross beta Gamma Isotopic ^b Tritium (H-3)

TABLE 1.B (CONTINUED)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations^a</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
c. Fish	(Locations 28 and 35)	Two times per year (once in the Summer & once in the Fall of each year). Attempt to include the following. 1. Bottom-feeding species 2. Middle-Top feeding species	Using the edible portions perform the following analyses. Gross beta Sr-89, Sr-90 Gamma Isotopic ^b
d. Food Products			
1. Garden	(Locations 34, 56, 62)	At time of harvest. Attempt to collect one of the samples listed below from each station. 1. Tomato 2. Cucumber 3. Cabbage or lettuce	Perform the following analyses on the edible portion. Gross beta Sr-89, Sr-90 Gamma Isotopic ^b Elemental Calcium
2. Tree Fruit Apples	(Locations 53 and 54)	At time of harvest.	Perform the following analyses on the edible portion. Gross beta Sr-89, Sr-90 Gamma Isotopic ^b Elemental Calcium
3. Eggs	(Locations 42, 51, 66, 67)	At least once per 92 days.	Perform the following analyses on the edible portion. Gross beta Sr-89, Sr-90 Gamma Isotopic ^b Elemental Calcium

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TABLE 1.B (CONTINUED)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations^a</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
4. INGESTION-HUMAN			
a. Milk-Nearest Producers	(Locations 61 and 74)	At least once per 15 days during <u>Peak Pasture Period</u> . ^c At least once per 31 days at other-times.	Each Individual sample collected perform an I-131 (Low Level) analysis. During peak pasture periods, ^c monthly the two consecutive (15 day and 30 day) samples shall be composited and analyzed as follows: Gamma Isotopic ^b Sr-89, Sr-90 Elemental Calcium The rest of the year analyze at least once per 31 days as follows: Gamma Isotopic ^b Sr-89, Sr-90 Elemental Calcium
b. Milk-Commercial Producers	(Locations 42,73, 75)	At least once per 92 days.	At least once per 92 days perform the following analyses. I-131 (Low Level) Gamma Isotopic ^b Sr-89, Sr-90 Elemental Calcium

TABLE 1.B (CONTINUED)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations^a</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
5. INGESTION-LIVESTOCK			
a. Vegetation-Feed/Forage			
1. Beef Producers	(Locations 64, 68, 71)	At least once per 15 days during <u>Peak Pasture Period</u> . ^c At least once per 31 days at other times.	At least once per 31 days perform a Gamma Isotopic ^b analysis of the following samples. 1. During Peak Pasture Periods. ^c Monthly the two consecutive (15 day and 30 day) samples shall be composited and analyzed. 2. At other times, individual samples collected once per 31 days.
2. Milk-Nearest Producer	(Locations 61 and 74)	At least once per 31 days during <u>Peak Pasture Period</u> . ^c At least once per 92 days at other times.	At least once per 31 days during <u>Peak Pasture Period</u> . ^c and once per 92 days perform the following analyses. Gamma Isotopic ^b Sr-89, Sr-90 Elemental Calcium
3. Milk-Commercial Producers	(Locations 42, 73, 75)	At least once per 92 days.	At least once per 92 days perform the following analyses. Gamma Isotopic ^b Sr-89, Sr-90 Elemental Calcium

TABLE 1.B (CONTINUED)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations^a</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
6. MISCELLANEOUS			
a. Vegetation Aquatic Biota	(Locations 12, 13, 28)	At least 2 times per year, if available, during the Summer and early Fall of each year.	Perform the following analyses for each sample collected. Gross beta Sr-89, Sr-90 Gamma Isotopic ^b
b. Vegetation Food & Feed Crops. 27, 29, 38, 41)	(Locations 15, 18, 20,	At least once per year at harvest time.	At least once per year perform the following analyses. Gross beta Sr-89, Sr-90 Gamma Isotopic ^b
c. Soil	(Locations 2-10)	At least once per 3 years. ^d	At least once per 3 years perform the following analyses. Gamma Isotopic ^b Sr-90 on collection

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TABLE 1.B (CONTINUED)

TABLE NOTATION

- a. Sample locations are shown on Figure 1.F.1.
- b. Ge(Li) gamma isotopic analysis refers to high resolution Ge(Li) gamma spectrum analysis as follows: the sample is scanned for gamma-ray activity. If no activity is found for a selected nuclide, the detection sensitivity for that nuclide will be calculated using the counting time, detector efficiency, gamma energy, geometry, and detector background appropriate to the particular sample in question. The following nineteen (19) nuclides shall be analyzed for and routinely reported:

Be-7	Ru-103	Ce-144
K40	Ru106	Ra226
Mn54	I131	Th228
Fe59	Cs134	
Co58	Cs137	
Co60	BaLa 140	
Zn65	Ce141	
Zr95		
Nb95		

Any nuclide detected, having a concentration greater than the LLD shall be reported quantitatively whether or not it is one of the above 19 nuclides.

- c. Peak Pasture Period is June 1 through September 30 of each year.
- d. Years of collection include 1978, 1981, 1984 etc.

C. LAND USE CENSUS

A land use census shall be conducted annually and shall identify the location of the nearest garden* that is greater than 500 square feet producing fresh leafy vegetables, the location of the nearest milk animal, and the location of the nearest resident in each of the 16 meteorological sectors within three miles of the Station.

The land use census shall be conducted at least once per 12 months between the dates of (June 1 and October 1), by door-to-door survey, aerial survey, or by consulting local agriculture authorities.

The land use census shall be used to identify location(s) which yields a calculated dose or dose commitment (via the same exposure pathway) greater than at a location from which samples are currently being obtained in accordance with the REMM. With a land use census identifying a location(s) which yields a calculated dose or dose commitment greater than the values currently being calculated in Specification 4.20.C.3a initiate a change in the REMM pursuant to Specification 6.8.2.

The results of the land use census shall be included in the Annual Radiological Environmental Operating Report.

Bases:

This specification is provided to ensure that changes in the use of unrestricted areas are identified and that modifications to the monitoring program are made if required by the results of this census. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 500 square feet provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg./year) of leafy vegetables assumed in Regulator Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were used, 1) that 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and 2) a vegetation yield of two kg./square meter.

*Broad leaf vegetation sampling may be performed at the site boundary in the direction sector with the highest D/Q in lieu of the garden census.

D. INTERLABORATORY COMPARISON PROGRAM

Analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program.

A vendor is utilized to analyze radiological environmental samples collected for the C.N.S. Radiological Environmental Program. This vendor is required by NPPD to participate in an Interlaboratory Comparison Program.

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

A brief summary of results obtained as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Report.

Bases:

The requirement for participation in an Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of a quality assurance program for environmental monitoring in order to demonstrate that the results are reasonably valid.

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TABLE 1.E

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD)^a

Analysis	Water (pCi/l)	Airborne Particulate or Gas ³ (pCi/m ³)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)
gross beta	4 ^b	1 x 10 ⁻²			
H-3	2000(1000 ^b)				
Mn-54	15		130		
Fe-59	30		260		
Co-58,60	15		130		
Zn-65	30		260		
Zr-Nb-95	15				
I-131	1	7 x 10 ⁻²		1	60 ^c
Cs-134,137	15(10 ^b), 18	1 x 10 ⁻²	130	15	80
Ba-La-140	15			15	

TABLE 1.E (CONTINUED)

TABLE NOTATION

- a - The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radio-chemical separation):

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

where

LLD is the lower limit of detection as defined above (as pCi per unit mass or volume)

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

E is the counting efficiency (as counts per transformation)

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

2.22 is the number of transformation per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

λ is the radioactive decay constant for the particular radionuclide

Δt is the elapsed time between sample collection (or end of the sample collection period) and time of counting

The value of s_b used in the calculation of the LLD for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background shall include the typical contributions of other radio-nuclides normally present in the samples (e.g., potassium-40 in milk samples).

Analyses shall be performed in such a manner that the stated LLD's will be achieved under routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLD's unachievable. In such cases, the contributing factors will be identified and described in the Annual Radiological Environmental Operating Report.

- b - LLD for drinking water.
c - LLD for leafy vegetables.

TABLE 1.F

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 1	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample</p> <p>Location: On Site - Approximately 500 ft. west of Elevated Release Point. Sample type (1) is obtained from the top of the CNS materials warehouse. Sample type (2) is taken approx. 30 inches off the ground on the ladder going up to the air sampler. (NW 1/4 S32 T5N R16E) Nemaha County, Nebraska.</p>
No. 2	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: On north side of county road access to the south portion of the CNS site approximately 275 feet west of former Jefferson Broady farmstead. (SW 1/4 32 T5N-R16E) Nemaha County, Nebraska.</p>
No. 3	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: Located on the north side of the Brownville State Recreation Park access road, near water gauging station. (SE 1/4 S18 T5N-R16E) Nemaha County, Nebraska.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 4	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: 1/2 mile south of Phelps City, Missouri on west side of Highway "U". (NE 1/4 S2 T64N-R42W) Atchison County, Missouri on Henry Hinrich's farm.</p>
No. 5	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: 1/4 mile south and 1/4 mile east of Langdon, Missouri on north side of road, west of railroad tracks. (SW 1/4 S18 T64N-R41W) Atchison County, Missouri on Dean A. Campbell farm.</p>
No. 6	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: 1 mile west of the end of Missouri State Highway "U". South side of road at southwest corner of intersection with north-south county road. (NW 1/4 S34 T64N-R42W) Atchison County, Missouri on Bluford LaHue farm.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 7	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: 150 yards west of Nemaha Elevator on the north side of road. (SW 1/4 S5 T4N-R16E) Nemaha County, Nebraska on Richard Andrew property.</p>
No. 8	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: 1/2 mile north, 3/4 mile west and 3/4 mile north of Nemaha on west side of road, adjacent to the "Mark T. Moore" transmission line. (NE 1/4 S35 T5N-R15E) Nemaha County, Nebraska on Kenneth Andrew farm.</p>
No. 9	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: 4 miles north of Highway #136 on Highway #67. One (1) mile east of Highway #67 and 1/2 mile north on west side of road. (SW 1/4 S26 T6N-R15E) Nemaha County, Nebraska on Lloyd Reeves farm.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 10	<p>Type: (1) Air Particulate & Charcoal Filters (2) Environmental Thermoluminescent Dosimetry (3) Initial Background Radiation (4) Reference Soil Sample (5) Soil</p> <p>Location: 1 mile north of Barada, Nebraska in SW corner of county road intersection. (NE 1/4 S14 T3N-R16E) Richardson County, Nebraska on Mildred Birdsley farm.</p>
No. 11	<p>Type: (1) Water-Ground</p> <p>Location: CNS Site - Plant well water header at well pits. (NW 1/4 S32 T5N-R16E) Nemaha County, Nebraska.</p>
No. 12	<p>Type: (1) Water-River (2) Vegetation-Aquatic</p> <p>Location: Taken from Missouri River immediately upstream from the CNS Intake Structure at River Mile 532.5.</p>
No. 13	<p>Type: (1) Water-River (2) Vegetation-Aquatic</p> <p>Location: Taken from Missouri River 1/4 mile below CNS Plant Discharge Flume Outfall (River Mile 532.2).</p>
No. 14	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: CNS Site - Southeast corner of NPPD training facility lawn. (SE 1/4 S32 T5N-R16E) Nemaha County, Nebraska.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 15	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample (3) Environmental Thermoluminescent Dosimetry (4) Food & Feed Crops</p> <p>Location: On Site - approximately 2700 ft. from CNS Elevated Release Point in a south southwesterly direction. (SW 1/4 S32 T5N-R16E) Nemaha County, Nebraska.</p>
No. 16	<p>Type: Sample Station discontinued 3/73. Farm vacated - replaced by Station #62.</p> <p>Location: The former "Broady Farm". (SW 1/4 S32 T5N-R16E) Nemaha County, Nebraska.</p>
No. 17	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: Southwest corner of NPPD property, west of county road and railroad track at base of bluff. (SE 1/4 S31 T5N-R16E) Nemaha County, Nebraska.</p>
No. 18	<p>Type: (1) Initial Background Radiation (2) Environmental Thermoluminescent Dosimetry (3) Reference Soil Sample (4) Food & Feed Crops</p> <p>Location: West center of NPPD property boundary 45 ft. north of barn on former "Charles Garver" farmstead at base of the bluff. (NE 1/4 S31 T5N-R16E) Nemaha County, Nebraska.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 19	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: In northwest corner of NPPD property west of county road and railroad track at base of bluff. (SE 1/4 S30 T5N-R16E) Nemaha County, Nebraska.</p>
No. 20	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample (3) Food & Feed Crops</p> <p>Location: On the north-northwest boundary of NPPD property, approximately 20 yds. east of the county road. (SW 1/4 S30 T5N-R16E) Nemaha County, Nebraska.</p>
No. 21	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: In the northeast corner of NPPD property in Missouri. 80 ft. west of center of levee south side of ramp at Levee Mile 14.5. (SW 1/4 S10 T64N-R42W) Atchison County, Missouri.</p>
No. 22	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample (3) Environmental Thermoluminescent Dosimetry</p> <p>Location: East center of NPPD property boundary in Missouri. 80 ft. west of center of levee. North side of ramp at Levee Mile 14.1. (NW 1/4 S15 T64N-R42W) Atchison County, Missouri.</p>
No. 23	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 3 miles south and 1/2 mile west of Phelps City, Missouri in northeast corner of intersection. (SE 1/4 S11 T64N-R42W) Atchison County, Missouri.</p>

TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 24	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 1/4 mile north of Langdon, Missouri on west side of road in ditch at intersection of fence lines approximately 200 yds. north of old fashioned brick house. (SW 1/4 S13 T64N-R42W) Atchison County, Missouri.</p>
No. 25	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 1/4 mile south and 1/4 mile east of Langdon, Missouri 50 yards east of railroad track on south side of road (NW 1/4 S19 T64N-R41W) Atchison County, Missouri.</p>
No. 26	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 1 mile south and 1 mile west of Langdon, Missouri, south side of road at point where power line crosses road diagonally. (NW 1/4 S25 T64N-R42W) Atchison County, Missouri.</p>
No. 27	<p>Type: (1) Food & Feed Crops</p> <p>Location: Three (3) miles southeast of CNS Plant Site in Missouri. 5 miles south of Highway #136 on State Highway "U" (southwest of Langdon, Missouri) 100 ft. north of Paul Klump farm house (gray asbestos) on east side of road. (SE 1/4 S26 T64N-R42W) Atchison County, Missouri.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 28	<p>Type: (1) Water-River (2) Vegetation-Aquatic (3) Fish</p> <p>Location: Sample types 1-2-3 are taken from the Missouri River at the general location of River mile 530 (approx. 2 miles below the Plant Discharge Flume Outfall). (River Mile 532 to River Mile 529) and encompasses (S 1/2 S32 T5N-R16E) and (Section 5 T4N-R16E) Nemaha County, Nebraska.</p>
No. 29	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample (3) Food & Feed Crops</p> <p>Location: 1-1/4 miles west of end of State Highway "U" and 50 yards east of levee on the south side of the road on Bluford LaHue farm in Atchison County, Missouri (NW 1/4 S34 T64N-R42W).</p>
No. 30	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 3 miles south of Nemaha, Nebraska on Highway #67, 2 miles east of Highway #67 at north-south deadend county road. In field on north side of east-west road approximately 50 yards west of north-south intersection. (SE 1/4 S20 T4N-R16E) Nemaha County, Nebraska.</p>
No. 31	<p>Type: Sample Station discontinued 4/76.</p> <p>Location: Nemaha Municipal Water Supply Well. SW corner of Nemaha. (SE 1/4 S1 T4N-R15E) Nemaha County, Nebraska.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 32	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 2 miles south of Highway #136 2 miles west of Highway #67, 200 yds. north of "Mark T. Moore" Transmission Line, 100 yards north of "Willard Allen" farmstead in field on east side of county road. (NW 1/4 S35 T5N-R15E) Nemaha County, Nebraska.</p>
No. 33	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 1 mile west of Highway #67, 1/2 mile south of Highway #136, 50 yds. south of NPPD transmission line in field east side of county road. (SW 1/4 S24 T5N-R15E) Nemaha County, Nebraska.</p>
No. 34	<p>Type: (1) Food/Garden Crops</p> <p>Location: Jim Garber garden at the northeast edge of Brownville, Nebraska. (SE 1/4 S18 T5N-R16E) Nemaha County, Nebraska.</p>
No. 35	<p>Type: (1) Fish</p> <p>Location: Sample (1) will be taken from the Missouri River in the area of 1 to 3 miles above intake structure.</p>
No. 36	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 1 mile north of Brownville, Nebraska on North 7th Street. Top of hill on "S" curve - north side of road. (SE 1/4 S12 T5N-R15E) Nemaha County, Nebraska.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 37	<p>Type: Sample Station discontinued 4/76.</p> <p>Location: Northwest of Brownville, Nebraska on north 7th Street. First county road on left then right at "Y" intersection. Samples taken in garden on west side of road across from Jim Smith farmhouse. (SW 1/4 S12 T5N-R15E) Nemaha County, Nebraska.</p>
No. 38	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample (3) Food & Feed Crops</p> <p>Location: In Atchison County, Missouri (4 miles north of CNS Plant Site) 3/4 mile east of Brownville Bridge, 1-1/4 miles north of Highway #136, northeast side of curve on county road. (NE 1/4 S28 T65N-R42W) Atchison County, Missouri.</p>
No. 39	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: Located 1-3/4 mile east of Brownville Bridge, 1/4 mile south of Highway #136 on county road 70 yds. south of vacant house at fence line on west side of road. (SE 1/4 S34 T65N-R42W) Atchison County, Missouri.</p>
No. 40	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample</p> <p>Location: 4 miles northeast of ERP (northeast of Phelps City, Missouri) 1/4 mile north of Highway #136 (north of "Missouri Beef Packers" Plant, Phelps City, Missouri), west side of county road - north of fence line. Field south of MBP Airport. (NE 1/4 S35 T65N-R41W) Atchison County, Missouri.</p>

TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 41	<p>Type: (1) Food & Feed Crops</p> <p>Location: 3/4 mile east of Watson, Missouri on Highway "A" north side of highway on the George Ellison farm. (NW 1/4 S2 T65N-R42W) Atchison County, Missouri.</p>
No. 42	<p>Type: (1) Milk (Commerical Producers) (2) Feed & Forage - Milk Producers (3) Eggs (started 4-1-71)</p> <p>Location: 1 mile south and 1-1/4 miles east of Barada, Nebraska on south side of county road "Meinert Wissman" dairy farm. (NW 1/4 S30 T3N-R17E) Richardson County, Nebraska.</p>
No. 43(a)	<p>Type: (1) Milk (Commercial Producers) - discontinued 9/78 (2) Feed & Forage - Milk Producers - discontinued 9/78</p> <p>Location: Two (2) blocks east of the south end of the main street in the town of Stella, Nebraska - "Arnold Huffman" dairy farm. (NE 1/4 S18 T3N-R15E) Richardson County, Nebraska.</p>
No. 44	<p>Type: (1) Initial Background Radiation (2) Reference Soil Sample (3) Environmental Thermoluminescent Dosimetry</p> <p>Location: Two (2) miles south of Auburn stop light on Highway #73-75. 1/4 mile south of Auburn Country Club, turn east 1/2 mile to fence line (north-south) on the north side of county road. (SE 1/4 S27 T5N-R14E) Nemaha County, Nebraska.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 45	Type: Sample Station discontinued 1/77 Location: One (1) mile west of Brownville, Nebraska on U.S. Highway #136 - 1 mile north of Highway on county road - jog to the right and proceed approximately 1/4 mile north up a lane to the "John Sierks" farm. (SW 1/4 S12 T5N-R15E) Nemaha County, Nebraska.
No. 46	Type: Sample Station discontinued 4/76. Location: Missouri River (River Mile 498). Sample will be taken from the River south of Rulo, Nebraska bridge opposite or adjacent to the boat dock on the Nebraska side of the Missouri River.
No. 47	Type: (1) Water-Ground Location: Falls City Municipal Water Supply Wells located approximately 1 mile south of Rulo, Nebraska (SW 1/4 S20 T1N-R18E) Richardson County, Nebraska.
No. 48	Type: Sample Station discontinued 4/76. Location: Sample will be taken from the Nemaha Rural Water District #1 well approximately 3 miles north of Brownville, Nebraska. (NE 1/4 S2 T5N-R15E) Nemaha County, Nebraska.
No. 49	Type: (1) Eggs (started 4-1-71 & discontinued 12-31-72) sold layers. Replaced by Station #57. Location: 1/4 mile west and 1/2 mile north of Stella, Nebraska. Loy Dettman farm. (NW 1/4 S7 T3N-R15E) Richardson County, Nebraska.

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 50	Type: (1) Eggs (started 4-1-71 & discontinued Oct. 1973) sold layers. Location: 1-1/2 miles north of Nemaha, Nebraska on Highway #67 then 3/4 mile east. Leland Moore farm. (NW 1/4 S31 T5N-R16E) Nemaha County, Nebraska.
No. 51	Type: (1) Eggs (started 4-1-71) Location: 1-1/4 mile south of Langdon, Missouri on east side of road. Irwin Palm farm. (NW 1/4 S30 T64N-R41W) Atchison County, Missouri.
No. 52	Type: Sample Station discontinued 4/76, replaced by Station #60. Location: Two miles south of Rockport, Missouri on Highway #111 and one mile east on the north side of county road. Glenn Owen farm. (SE 1/4 S3 T64N-R41W) Atchison County, Missouri.
No. 53	Type: (1) Apples (started 4-1-71) Location: 1-1/2 miles south of CNS Plant Site on the east side of county road (Leonard Moore orchard). (SE 1/4 S6 T4N-R16E) Nemaha County, Nebraska.
No. 54	Type: (1) Apples (started 4-1-71) Location: Two (2) miles west of Brownville, Nebraska on U.S. Highway #136, then 1-3/4 miles north on the east side of county road (Clay Kennedy orchard). (NW 1/4 S11 T5N-R15E) Nemaha County, Nebraska.

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 55	Type: Sample Station discontinued 4/76. Location: 1-1/2 miles north of Nemaha, Nebraska, on Highway #67, turn west on country road. Farm is about 200 yards on south side of country road. C. Emil Skeen farm. (NE 1/4 S36 T5N-R15E) Nemaha County, Nebraska.
No. 56	Type: (1) Garden Crops (started 4-1-71) Location: 1-1/4 miles south and west of Langdon, Missouri on State Highway "U". Farm is located on the right side of highway just at curve (Bill Gebheart farm). (NW 1/4 S23 T64N-R42W) Atchison County, Missouri.
No. 57	Type: (1) Eggs (started 1-1-73, replaced Station #49) (discontinued 9-1-73 and replaced by Station #66). Location: 3 miles north and 1/2 mile west of Shubert, Nebraska on the north side of county road. Harlan Brewer farm. (SE 1/4 S26 T4N-R15E) Nemaha County, Nebraska.
No. 58	Type: (1) Environmental Thermoluminescent Dosimetry (started 4-1-73) Location: 3 miles south of Brownville, Nebraska on county road at the southwest corner of NPPD property boundary - 50 yards east of county road. (NE 1/4 S31 T5N-R15E) Nemaha County, Nebraska.

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 59	<p>Type: (1) Environmental Thermoluminescent Dosimetry (started 4-1-73)</p> <p>Location: 1 mile south southeast of the CNS Elevated Release Point - 50 yards west of the levee at the south boundary of NPPD property. (NE 1/4 S32 T5N-R15E) Nemaha County, Nebraska.</p>
No. 60	<p>Type: Sample Station discontinued 1/74 and replaced by Station #73.</p> <p>Location: Located 1 mile west of Rockport, Missouri, on Highway #136 to Highway #275, then north 2 miles on #275, east side of the highway. Lee Edward McCoy farm. (NE 1/4 S16 T65N-R41W) Atchison County, Missouri.</p>
No. 61	<p>Type: (1) Milk (Nearest Producer) (2) Feed & Forage - Milk Producers (started 4-1-73)</p> <p>Location: 1 mile west of Brownville, Nebraska on U.S. Highway #136 1 mile north of Highway on county road - turn right and proceed approximately 1/2 mile east. South side of the road. Raymond Gentert farm. (NW 1/4 S13 T5N-R15E) Nemaha County, Nebraska.</p>
No. 62	<p>Type: (1) Garden Crops (First sample taken 8-73)</p> <p>Location: Approximately 1-1/2 miles southwest of the Elevated Release Point on west side of county road. Leonard Moore farmstead. (NE 1/4 S6 T4N-R16E) Nemaha County, Nebraska.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 63	<p>Type: Sample Station discontinued 10/73 and replaced by Station #71.</p> <p>Location: 2 miles east of Phelps City, Missouri on U.S. Highway #136, 1/4 miles south on west side of county road. Guy Moorman farm. (SE 1/4 S31 T65N-R41W) Atchison County, Missouri.</p>
No. 64	<p>Type: (1) Feed & Forage-Beef Producers</p> <p>Location: 1 mile west of Langdon, Missouri and 1/2 mile north on west side of road. R. A. Meyer Korth farm. (SW 1/4 S14 T64N-R42W) Atchison County, Missouri.</p>
No. 65	<p>Type: (1) Feed & Forage-Beef Producers</p> <p>Location: 1-1/2 miles south of Brownville, Nebraska on the west side of county road at the northwest corner of NPPD property boundary. Harold Davis farm. (NE 1/4 S30 T5N-R16E) Nemaha County, Nebraska.</p>
No. 66	<p>Type: (1) Feed & Forage-Beef Producers (2) Eggs</p> <p>Location: 2 miles south of Nemaha, Nebraska on Highway #67 - east side of Highway. Clyde Kennedy farm. (NW 1/4 S19 T4N-R16E) Nemaha County, Nebraska.</p>
No. 67	<p>Type: (1) Feed & Forage-Beef Producers (2) Eggs</p> <p>Location: 2-1/2 miles west of Brownville, Nebraska on U.S. Highway #136 then north 2 miles on county road, then east 3/4 mile on south side of road. Walter Parkurst farm. (NE 1/4 S11 T5N-R15E) Nemaha County, Nebraska.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 68(b)	<p>Type: (1) Feed & Forage-Beef Producers (2) Feed & Forage-Milk Producers - discontinued 5/78 (3) Milk (Nearest Producer) - discontinued 5/78</p> <p>Location: 2-1/2 miles west of Brownville, Nebraska on U.S. Highway #136, then south 2 miles on the east side of county road. Manford Cade farm. (SW 1/4 S26 T4N-R15E) Nemaha County, Nebraska.</p>
No. 69	<p>Type: Sample Station discontinued 10/73 and replaced by Station #70.</p> <p>Location: 1/4 mile west of Phelps City, Missouri on U.S. Highway #136 - north side of highway. Gerald Armstrong farm. (NE 1/4 S35 T65N-R42W) Atchison County, Missouri.</p>
No. 70	<p>Type: Sample Station discontinued 3/77.</p> <p>Location: North edge of Phelps City, Missouri alongside U.S. Highway #136, south side of highway. Donald Daugherty trailer. (SW 1/4 S35 T65N-R42W) Atchison County, Missouri.</p>
No. 71	<p>Type: (1) Feed & Forage-Beef Producers</p> <p>Location: 2 miles east of Phelps City, Missouri on U.S. Highway #136, then south 1-1/2 miles on county road, then west 1/4 mile. Tom Boatman farm. (SE 1/4 S6 T64N-R41W) Atchison County, Missouri.</p>

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TABLE 1.F (CONTINUED)

SAMPLE STATION LOCATIONS AND SAMPLE TYPES
(see Sample Station Locations Map - Figure 1.F.1)

<u>Sample Station</u>	<u>Sample Description - Type and Location</u>
No. 72	<p>Type: Sample Station discontinued 3/77.</p> <p>Location: 1/8 mile north of U.S. Highway #136, on east side of drive, directly across from "Missouri Beef Packers" at Phelps City, Missouri. Tom Pester residence. (NE 1/4 S35 T65N-R42W) Atchison County, Missouri.</p>
No. 73	<p>Type: (1) Milk (Commercial Producer) (2) Feed & Forage - Milk Producer</p> <p>Location: 1 (one) mile west of Rockport, Missouri, on U.S. Highway #136 to U.S. Highway #275, then 4 miles north on #275. West side of road. Bernice Grable farm (NW 1/4 S4 T65N-R41W) Atchison County, Missouri.</p>
No. 74(b)	<p>Type: (1) Milk (Nearest Producer) (2) Feed & Forage - Milk Producer</p> <p>Location: 1/2 mile north, 3/4 mile west and 1 1/4 miles north of Nemaha on east side of road. Faye Andrew, Jr. farm (SW 1/4 S25 T5N-R15E) Nemaha County, Nebraska.</p>
No. 75(a)	<p>Type: (1) Milk (Commercial Milk Producer) (2) Feed & Forage - Milk Producer</p> <p>Location: 1 3/4 miles east of the intersection of Highway 67 and 62 on the south side of the road. (NE 1/4 S17 T3N-R16E) Richardson County, Nebraska, on the William Kuttler farm.</p>

NOTES:

- (a) The one cow herd at Station #43 was sold and will not be replaced, therefore, Station #43 was discontinued and was replaced by Station #75 as a commercial milk producer on 10/1/78.
- (b) The single cow at Station #68 dried up and was replaced as a nearest milk producer by Station #74 on 6/1/78. Station #68 will continue as a Feed and Forage - Beef Producer.

Figure 1.F.1



TABLE 1.G

SAMPLING LOCATIONS
DISTANCE-DIRECTION-CLASSIFICATION

<u>Station No.</u>	<u>Distance^a</u> (miles)	<u>Direction^a</u> (degrees)	<u>Classification^b</u>
1	0.10	225	IND
2	0.75	225	IND
3	2.5	338	IND
4	3.0	43	IND
5	3.5	102	IND
6	3.0	165	IND
7	2.5	230	IND
8	2.5	260	IND
9	7.3	335	IND
10	10.0	160	IND
11	0.15	225	IND
12	0.10	360	CON
13	0.25	120	IND
14	0.50	140	PO
15	0.51	180	IND
16	0.75	202	NA
17	1.5	235	PO
18	0.80	270	IND
19	1.0	300	PO
20	0.96	315	IND
21	0.60	46	PO
22	0.70	95	IND
23	1.9	80	PO
24	3.0	97	PO
25	3.8	105	PO
26	3.0	130	PO
27	3.0	143	IND
28	1.8	150	IND
29	3.0	170	IND
30	5.0	178	PO
31	2.8	222	NA
32	3.4	268	PO
33	2.8	302	PO
34	2.5	333	IND
35	2.0	350	CON
36	3.6	335	PO
37	3.9	330	NA
38	4.0	360	IND
39	2.8	25	PO
40	3.9	37	PO
41	8.4	11	IND
42	12.9	156	IND
43	11.8	217	NA
44	10.3	270	CON
45	4.0	325	NA
46	24.8	153	NA
47	25.8	154	IND
48	5.6	332	NA
49	11.4	222	NA
50	1.1	270	NA

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TABLE 1.G (CONTINUED)

SAMPLING LOCATIONS
DISTANCE-DIRECTION-CLASSIFICATION

<u>Station No.</u>	<u>Distance</u> ^a (miles)	<u>Direction</u> ^a (degrees)	<u>Classification</u> ^b
51	4.2	125	IND
52	7.4	79	NA
53	2.0	216	IND
54	5.2	320	IND
55	1.8	270	NA
56	1.9	118	IND
57	6.6	208	NA
58	1.3	219	IND
59	1.0	189	IND
60	8.4	42	NA
61	3.5	326	IND
62	1.5	225	IND
63	5.0	56	NA
64	2.3	99	IND
65	1.1	305	IND
66	4.5	200	IND
67	4.8	325	IND
68	3.4	270	IND
69	3.5	31	NA
70	3.5	36	NA
71	4.3	71	IND
72	3.8	39	NA
73	10.0	35	IND
74	2.4	270	IND
75	9.0	180	IND

^a Distance and direction are specified with respect to reactor elevated release point.

^b Classification codes: IND = indicator; CON = control; PO = pre-operational sampling site not used in 1979-80 sampling period; NA = not active as of 1 January 1979.

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TABLE 1.H

DISTANCE AND DIRECTION FROM THE ELEVATED RELEASE POINT (ERP)
TO THE EXCLUSION AREA BOUNDARY

SECTOR	DISTANCE		DIRECTION (Degrees)
	Kilometers	Miles	
I	1.15	.71	360
II	1.22	.76	22.5
III	1.08	.67	45
IV	.93	.58	67.5
V	1.13	.70	90
VI	.92	.57	112.5
VII	1.53	.95	135
VIII	1.44	.89	157.5
IX	1.33	.83	180
X	1.44	.89	202.5
XI	1.88	1.17	225
XII	1.43	.89	247.5
XIII	1.26	.78	270
XIV	1.31	.81	292.5
XV	1.54	.96	315
XVI	1.18	.73	337.5

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