GULF STATES UTILITIES COMPANY
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December 15, 1983

RBG- 16,587
File Code G9.5, G9.14

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Schwencer:

River Bend Station
Docket No. 50-458/Unit 1
Docket No. 50-459/Unit 2

Please find enclosed Gulf States Utilities Company's response to review question E 290.8 of our River Bend Station (RBS) Environmental Report-Operating License Stage (ER-OLS). Also enclosed for your review is an ER-OLS revision describing changes to the liquid radioactive waste treatment system. Dose estimate revisions resulting from this change for comparison to 10CFR Part 50 Appendix I design objectives as well as this review question response will be provided in a future supplement to the ER-OLS. Forty copies of this information are enclosed according to Generic Letter No. 82-14.

Sincerely,

J. E. Booker

J. E. Booker
Manager-Engineering,
Nuclear Fuels & Licensing
River Bend Nuclear Group

JEB/JWC/kt

Enclosures

cc: Dr. Richard McLean, Project Leader
Oak Ridge National Laboratory
Building 4500-N, MS D33
Oak Ridge, Tennessee 37830

B001
1/1

QUESTION E290.8 1.10

On page 2.2-3 it is stated that 170 acres of the site area 1.11
permanently affected by construction are classified as prime 1.12
farmland or farmland of statewide importance. Provide a map 1.13
of the site identifying the prime farmland and farmland of
statewide importance. Also provide in tabular form the 1.14
total area of prime farmland and the area of farmland of
statewide importance onsite and the area of each of the two 1.15
classifications of farmland permanently affected by plant
construction.

RESPONSE 1.16

The response to this request is provided in 1.17
Sections 2.2.1.1, 2.4.1.1.1, and 4.3.1.1. 1.18

7

Approximately 379 acres of site area permanently affected by 1.10 |7
construction are classified as prime farmland or farmland of 1.11
statewide importance. This area represents about 27 percent 1.12 |7
of those classifications available on the original site[2] 1.13
(Table 4.3-3). |7

2.2.1.2 The Vicinity 1.15

Table 2.2-1 provides a summary (based on 1972 data) of the 1.16
land uses for the four parishes that are within the 10-km 1.19
radius. Approximately 53 percent of West Feliciana Parish, 1.20
21 percent of Pointe Coupee, 20 percent of East Feliciana, 1.22
and 12 percent of East Baton Rouge's land area are within 1.23
the 10-km radius. The major land uses for the region in 1.24
Table 2.2-1 are agricultural land, forest land, and wetland. 1.25
In West Feliciana, Pointe Coupee, and East Feliciana, urban 1.26
and built-up land compose approximately 1 percent of the 1.27
total parish acreage. East Baton Rouge has approximately 1.29
19 percent urban and built-up land. 1.30

West Feliciana and Pointe Coupee Parishes have each gained a 1.32
utilities land use since 1972. West Feliciana presently 1.33
contains the River Bend site, which occupies 3,342 acres, of 1.34
which approximately 80 percent was forest land and 1.35
20 percent was agricultural prior to construction. Pointe 1.36
Coupee now contains the Cajun Electric Power Cooperative's
Big Cajun No. 2 on a 2,200-acre property, of which roughly 1.38
80 percent was farmland and 20 percent was floodplain prior 1.39
to construction.

Principal land use features within 10 km of the River Bend 1.40
Station are identified in Fig. 2.2-1 and 2.2-2 and are 1.43
discussed in the following paragraphs. Residential 1.44
development occurs for the most part in towns in the
vicinity of River Bend Station or along the major roads. 1.45
St. Francisville is the only town within the 10-km radius. 1.46
The town of New Roads lies southwest of the station, just 1.47
outside the 10-km radius at the northeastern end of the 1.49
residential development (largely weekend and vacation use) 1.50
encircling False River. The town of Jackson is 1.51
approximately 11 km northeast of River Bend Station on 1.52
Route 10.

Population growth in the St. Francisville area has declined 1.53
in recent years despite overall growth in population in the 1.54
state. For the District 2 Region, encompassing parishes 1.55
from Pointe Coupee east to Tangipahoa, southwest to 1.56
Ascension, west to Iberville, and north to Pointe Coupee, 1.57
population estimates showed growth of more than 13 percent 2.1
between 1970 and 1978. The same estimates showed declines 2.2

References - 2.2

1. Telephone conversation between J.K. Jackson and C.S. Ellis of Stone & Webster Engineering Corporation, Boston, MA, and J. Perry, Agent for Woodville District, Illinois Central Gulf Railroad, Slaughter, LA, December 18, 1979.

2. Telephone conversation between C.S. Ellis of Stone & Webster Engineering Corporation, Boston, MA, and B. Phipps and J. Butler of American Telephone & Telegraph Long Lines Division, December 21, 1979.

3. Telephone conversations between J. G. Brown, August 9, 1983, and G. A. Jacob, November 3, 1983, of Stone & Webster Engineering Corporation, Boston, MA, and D. Johnson, District Conservationist, United States Soil Conservation Service, Clinton, LA.

4. Louisiana Population Estimates by District and Parish, Table III, Louisiana Technical University, Division of Business Research, Ruston, LA, February 1979.

5. Telephone conversation between C.S. Ellis of Stone & Webster Engineering Corporation, Boston, MA, and N. Wagoner, Louisiana Department of Transportation and Development, Baton Rouge, LA, December 26, 1979.

6. Telephone conversation between C.S. Ellis of Stone & Webster Engineering Corporation, Boston, MA, and Attorney S.P. Dart, an owner of the former Dipple and Enette Field, St. Francisville, LA, January 22, 1980.

7. Telephone conversation between C.S. Ellis of Stone & Webster Engineering Corporation, Boston, MA, and C. Taylor, Maintenance Section, Louisiana Department of Transportation and Development, Baton Rouge, LA, January 22, 1980.

8. Telephone conversation between C.S. Ellis of Stone & Webster Engineering Corporation, Boston, MA, and Staff, Redi-Mix Concrete, St. Francisville, LA, December 20, 1979.

9. Telephone conversation between C.S. Ellis of Stone & Webster Engineering Corporation, Boston, MA, and F. Metz, Joan of Arc Co., St. Francisville, LA, December 20, 1979.

2.4 ECOLOGY

2.4.1 Terrestrial Ecology

2.4.1.1 The Site and Vicinity

Descriptions of the terrestrial ecosystems comprising the GSU River Bend site were derived from extensive field surveys conducted in 1971-1972[1], a site reconnaissance made in October 1979, and available literature.

2.4.1.1.1 General Site Characteristics

Location and General Physiography

The site encompasses approximately 1,352 ha (3,342 acres) bordered on the east bank by the Mississippi River, about 4.8 km (3 mi) south of St. Francisville, Louisiana. The site has two distinct physiographic types (Fig. 2.4-1 and 2.4-2) including: floodplain comprising about 336 ha (830 acres) of alluvial soil between the alluvial uplands and the Mississippi River, and about 1,005 ha (2,484 acres) of alluvial upland. In addition, water bodies comprise about 5.8 ha (14.4 acres) in the bottomland and 5.7 ha (14.2 acres) in the uplands. Prime farmland constitutes about 449 ha (1109 acres), land of statewide or local importance constitutes an additional 122 ha (300 acres), with other land making up the remaining 782 ha (1933 acres). Table 2.4-1 provides a description of the soil types of the site and categorizes these soils into important farmland classifications. Figure 2.4-3 delineates soil types and important farmland areas of the site.

Climate

The climate of the River Bend site is subtropical, with the major influence being southeasterly winds carrying moisture from the Gulf of Mexico. Temperatures in the summer generally range from 22°C to 38°C (72°F to 91°F) and in the winter from 6°C to 17°C (42°F to 63°F). Precipitation averages about 6.7 cm (2.65 in) to 16.5 cm (6.51 in) per month. Snow or freezing rain is rare (Section 2.7.1).

Local and Regional Forest Types

Prior to construction of River Bend Station, the alluvial bottomland consisted of 39 ha (95.6 acres) of open, unimproved pasture and 297 ha (734.1 acres) of hardwood forest. The alluvial uplands contained 223 ha (551 acres)

Life and Fisheries, and Mr. D. Post, Stone & Webster Engineering Corporation, Boston, MA, January 8, 1980.

60. Telephone conversations between Mr. D. Johnson, District Conservationist, United States Soil Conservation Service, Clinton, LA and Mr. J. G. Brown, August 9, 1983, and Mr. G. A. Jacob, November 3, 1983, Stone & Webster Engineering Corporation.

TABLE 2.4-1

DESCRIPTION OF THE SOILS OF THE RIVER BEND SITE[1, 2]

I. SOIL TYPES (SOIL MAPPING UNITS)

1. CASCILLA SERIES (16A1)

The Cascilla Series consists of well drained, acid, silty soils. These soils occur in the higher areas bordering old stream channels. Typically, the surface layer is brown silt loam and the subsoil is dark brown to yellowish brown silt loam over fine sandy loam at about 6 inches, slopes range from 0 to 2 percent.

2. COMMERCE SERIES (4Bu)

The Commerce Series consists of nearly level to gently sloping, somewhat poorly drained, moderately slowly permeable soils. They have a dark grayish brown silt loam or silty clay loam surface layer and a grayish brown silt loam or silty clay loam subsoil with brownish mottles. These soils formed in Mississippi River sediments. They occur at high local elevations. Slopes range from 0 to 5 percent.

3. CONVENT SERIES (5A1)

The Convent Series consists of nearly level to very gently sloping, somewhat poorly drained, moderately premeable soils. In a representative profile, the surface is dark grayish brown silt loam overlying layers of grayish brown silt loam and very fine sandy loam. These soils formed in loamy alluvial sediments primarily from the Mississippi River. They occur at high local elevations. Slopes range from 0 to 3 percent.

4. LORING SERIES (27A1, 27B1, AND 27CD1)

The Loring Series consists of moderately well drained soils on uplands and terraces. These soils formed in loess. They have a brown silt loam surface soil and a brown silt loam subsoil underlain by a fragipan at about 28 inches below the surface. Slopes range from 0 to 20 percent.

TABLE 2.4-1 (Cont)

5. MEMPHIS SERIES (17B1, 17CD1, AND 50) 2.7

The Memphis Series consists of well drained, acid 2.9
soils of the uplands that have formed in silty
materials. They have dark grayish brown silt loam 2.11
surface layers and dark brown silty clay loam to 2.12
silt loam subsoils. Slopes range from 0 to 2.13
40 percent.

6. OLIVER SERIES (8B1) 2.16

The Oliver Series consists of nearly level to 2.18
gently sloping, somewhat poorly drained, slowly 2.20 7
permeable soils. They have grayish brown silt loam 2.21
surface layer and yellowish brown silt loam subsoil 2.22
mottled in shades of brown and gray, and with firm
brittle fragipan in the lower part. These soils 2.23
formed in loess. They occur primarily on 2.24
pleistocene age terrace. Slopes range from 0 to 2.25
5 percent.

7. SHARKEY SERIES (45A1) 2.28

The Sharkey Series consists of level to gently 2.30
sloping, poorly drained, very slowly permeable
soils. They have a very dark grayish brown clay or 2.32
silty clay loam surface and a dark gray clay 2.33
subsoil mottled with yellowish brown. These soils 2.34
formed in clayey Mississippi River sediments. They 2.35
occur dominantly on the Mississippi River alluvial
plain at low level elevations. Slopes range from 0 2.36
to 5 percent.

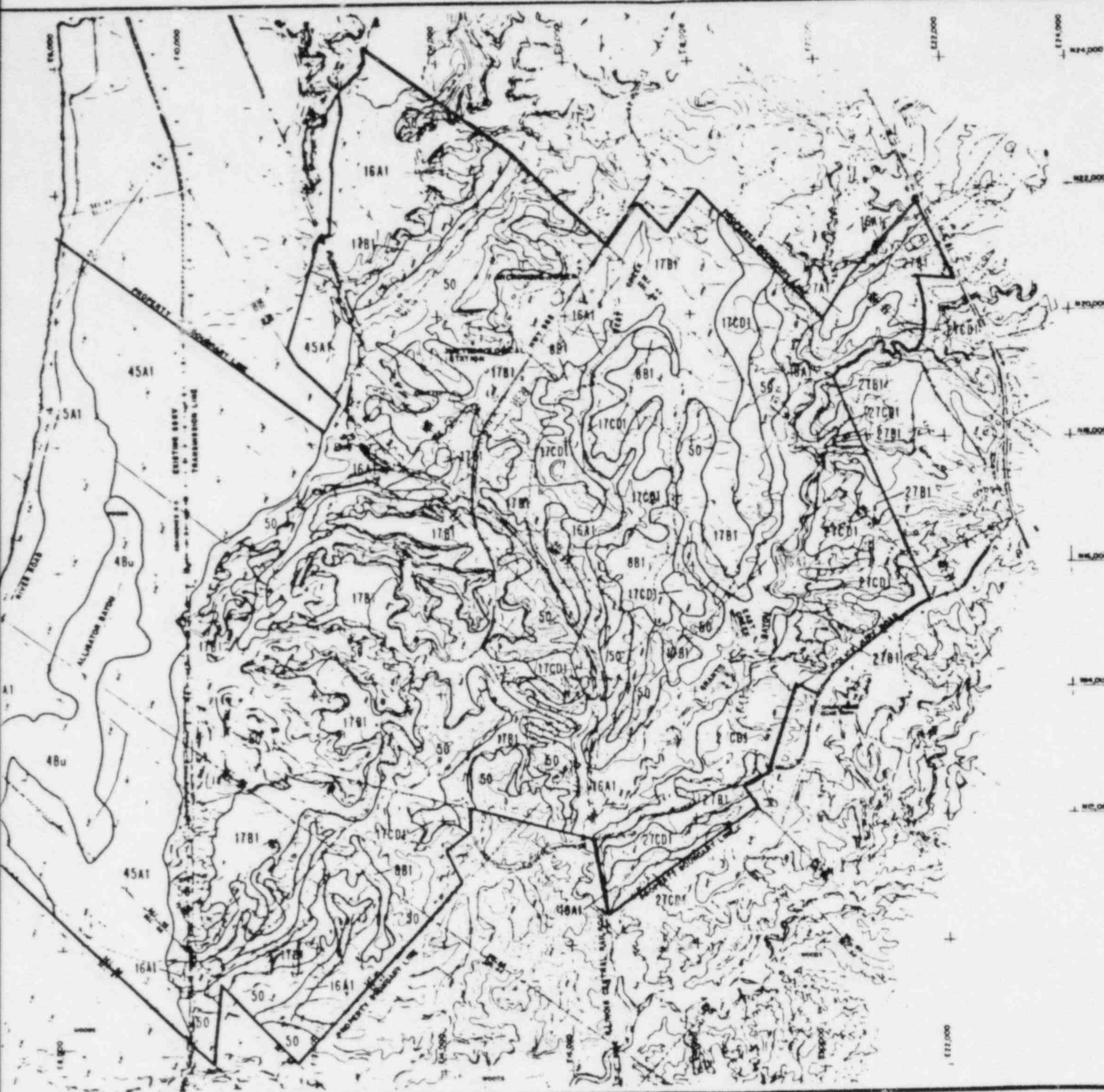
TABLE 2.4-1 (Cont)

II. IMPORTANT FARMLAND (SOIL MAPPING UNITS)		2.49
1.	PRIME FARMLAND	2.51
	Commerce silt loam, gently undulating (4 Bu)	2.53
	Convent silt loam, 0 to 1 percent slopes (5A1)	2.54
	Olivier silt loam, 0 to 1 percent slopes (8B1)	2.56
	Memphis silt loam, 1 to 3 percent slopes (17B1)	2.57
	Loring silt loam, 0 to 1 percent slopes (27A1)	2.58
	Loring silt loam, 1 to 3 percent slopes (27B1)	3.1
2.	STATEWIDE OR LOCAL IMPORTANCE	3.4
	Memphis silt loam, 3 to 8 percent slopes (17 CD1)	3.6
	Loring silt loam, 3 to 8 percent slopes (27CD1)	3.7
3.	OTHER LAND	3.11
	Cascilla soils, frequently flooded (16A1)	3.13
	Sharkey clay, frequently flooded (45A1)	3.14
	Memphis complex, steep (50)	3.16

7

(1) See Reference 60.
(2) See Fig. 2.4-3.

7



LEGEND

- CONVENT SILT LOAM (5A1)
- COMMERCE SILT LOAM (4Bu)
- SHARKEY CLAY (45A1)
- OLIVIER SILT LOAM (8B1)
- CASCILLA SOILS (16A1)
- LORING SILT LOAM (27A1, 27B1, 27CD1)
- MEMPHIS SILT LOAM (17B1, 17CD1)

NB -
this figure will be a color print with the soil types distinguished by varying shades of browns, oranges, and greens, and water bodies by blue.

NOTE
SEE TABLE 2.4-1 FOR SOIL DESCRIPTIONS

0 1000 2000 3000
SCALE-FEET

0 200 400 600
SCALE-METERS

FIGURE 2.4-3

SITE SOIL TYPES

RIVER BEND STATION
ENVIRONMENTAL REPORT – OLS

4.3 ECOLOGICAL IMPACTS 1.11

4.3.1 Terrestrial Ecosystems 1.12

4.3.1.1 The Site and Vicinity 1.13

Areas cleared for construction of River Bend Station are 1.14
listed in Tables 4.3-1 through 4.3-3 and shown in 1.15 7
Figs. 4.3-1 and 4.3-2. Major construction activities 1.16
included land clearing, excavation, and spoil disposal.
Site construction activity resulted in some erosion, dust, 1.17
displacement of fauna through loss of habitat, and disposal 1.18
of uprooted vegetation and spoils. A total of 304 ha 1.19
(754 acres) of the 1,352-ha (3,342-acre) site was affected
by construction activities, of which 195 ha (483 acres) will 1.20
be occupied by permanent plant facilities (Table 4.3-1). A 1.21
total of 126 ha (312 acres) of prime farmland was
permanently lost and 5 additional hectares (12 acres) 1.22 7
disturbed during construction. Twenty-seven hectares 1.23
(67 acres) of statewide or locally important farmland was 1.24
permanently lost and one hectare (3 acres) was disturbed.

The highly erodible soils at the site coupled with the 1.31
relatively high amount of annual rainfall in the area 1.32
resulted in considerable erosion during the early part of
the construction period. On cleared land subject to 1.33
frequent heavy-equipment use, some erosion and sediment
deposition was unavoidable. Where traffic volume was high, 1.34
crushed rock, gravel, or macadam was used to reduce erosion
and dust. Along streams, drainage ditches, and in areas of 1.35
potentially severe erosion, concrete mats, riprap, energy
dissipators, or other drainage control structures were 1.37
employed. Erosion control structures and chemical 1.38
stabilizers were used on the spoil pile area (the primary
area of erosion) during construction and resulted in a 1.39
reduction in the amount of erosion.

The most effective form of erosion control proved to be the 1.40
reestablishment of vegetation on exposed soil. Where 1.41
practicable, erosion was minimized by reseeding. Natural 1.42
recolonization by early successional-stage vegetative forms
also contributed to the control efforts in some cases.
Where possible, gentle slopes were formed and mulch applied 1.43
to stabilize topsoil until revegetation or sodding occurred.

Erosion damage to some areas was repaired by construction 1.44
crews and caused little terrestrial impact. However, in 1.46
other instances, as in the case of the primary spoil pile,
erosion was a continuing problem. Sediments were deposited 1.47
in the basin of the future Wildlife Management Lake

(Section 2.4.1). A review of sediment deposition in the 1.48
lake will be performed prior to lake construction.

Some sediments were also deposited in the area west of the 1.49
Wildlife Management Lake in the tupelo gum-bald cypress

TABLE 4.3-3

IMPORTANT FARMLAND AFFECTED BY ONSITE CONSTRUCTION[1]

Type	Original Area (ha)	Area Disturbed (ha)	Transmission Corridors[2] (ha)	Area Permanently Lost[3, 4] (ha)	Percent Loss[5]	
Prime farmland	449	131	5	126	28%	1.31
Land of statewide and local importance	122	29	1	27	22%	1.33 1.34 1.35
Other land	782	145	30	115	15%	1.37

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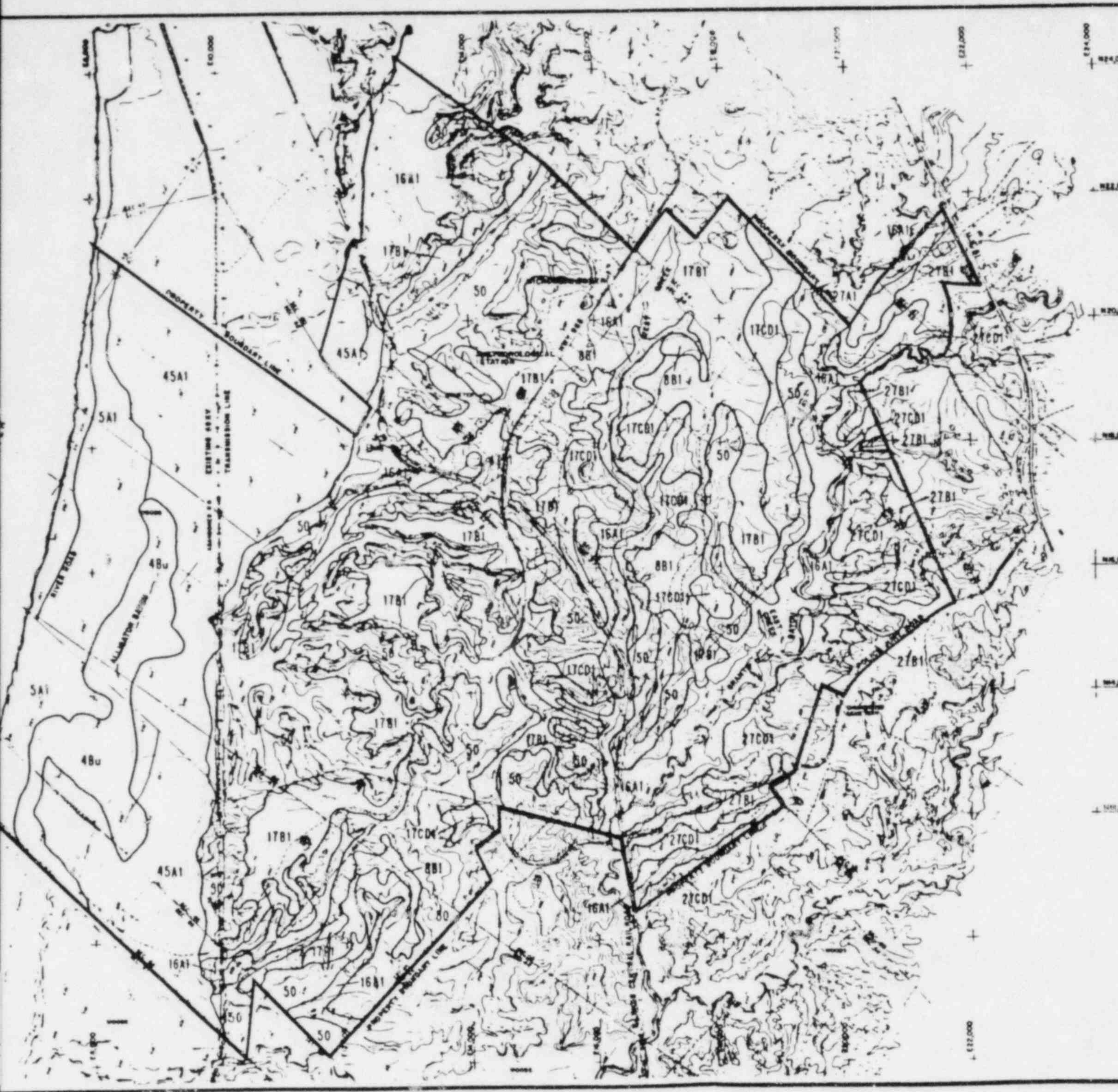
(1) See Fig. 4.3-2.
(2) Transmission corridors were cleared of vegetation but were not excavated or covered with fill. Thus, they were not "lost" as a soil type.
(3) Area permanently lost includes areas occupied by permanent plant facilities and areas excavated or covered with fill and thus lost as a soil type.
(4) Area permanently lost = area disturbed - transmission corridors.
(5) Percent loss = area permanently lost ÷ original area.



LEGEND

STATEWIDE OR LOCAL IMPORTANCE (17CD1, 27CD1)

PRIME FARMLAND (4Bu, 5A1, 8B1, 17B1, 27A1, 27B1)

OTHER LAND (16A1, 45A1, 50)

AREAS AFFECTED BY CONSTRUCTION

TRANSMISSION LINE R.O.W. CLEARED ONLY

N.B. - This figure will be a color print with the two farmland classification soils and the other land soils distinguished by varying shades o green, water areas by blue, and the construc areas by brown.

NOTE
SEE TABLE 2.4-1 FOR SOIL DESCRIPTIONS.

0 1000 2000 3000
SCALE-FEET

0 200 400 600
SCALE-METERS

FIGURE 4.3-2

IMPORTANT FARMLANDS AFFECTED BY CONSTRUCTION

RIVER BEND STATION
ENVIRONMENTAL REPORT - OLS

solidification system. Outside areas with controlled access will be designated for trucks or rail cars containing radioactive radwaste material prior to shipment.

3.5.3 Radioactive Liquid Waste System

The liquid radioactive waste subsystems collect, monitor, and process for re-use or disposal all liquids received from the reactor coolant system or liquids which can become contaminated from contact with the reactor coolant system liquids for both Units 1 and 2.

3.5.3.1 Sources of Radioactive Liquid

Table 3.5-4 identifies the sources of input to the radwaste system. The system is capable of processing these quantities and activities of liquid wastes which result from normal operation and maintenance. Furthermore, the system is capable of processing the maximum daily input from all sources within 24 hr. It processes the liquid waste so that a majority of the recovered water is re-used, and the waste effluent discharged from the station is within the 10CFR20 limits and results in doses that are within the guidelines of 10CFR50, Appendix I.

3.5.3.2 System Description

The system is divided into one minor and one major subsystem so that the liquid wastes from various sources can be segregated and processed separately. The segregation is done according to the liquid conductivity and/or radioactivity. All collection tanks, pumps, and processing equipment are located in the radwaste building. Major flow paths, equipment data, leakage, and drainage are indicated on Fig. 3.5-2. Refer to Table 3.5-4 for a summary of design parameters for the liquid radioactive waste systems.

3.5.3.2.1 Waste and Floor Drain Collector Subsystem

Wastes entering the waste collector tanks have variable activity levels depending on their source and relatively low conductivity (less than 50 umho/cm). There are four waste collector tanks to receive liquid waste from designated systems within both units. Radioactive materials are removed from these wastes by filtration (insolubles and oil removal) and ion exchange (soluble and colloidal removal).

One radwaste filter is provided. This filter is a backflushable, deepbed filter using walnut shells as the filter media.

One demineralizer train is provided. It consists of one nonregenerable cation, anion, and mixed bed unit in series. The cation and anion unit resin beds are replaced together when an anion effluent conductivity breakthrough occurs, and the mixed bed unit is replaced independently on effluent conductivity breakthrough.

The processed liquids are collected in the recovery sample tanks. Following batch sampling and analysis, the processed liquids will be either returned to one of the condensate storage tanks for reuse in the plant, recycled to the waste collector tank for reprocessing, if required, or discharged to the Mississippi River through the cooling tower blowdown line.

Waste collector tank influents include drains from piping and equipment containing high quality water that cannot be returned directly to the condenser hotwell due to conductivity and wastes from the reactor coolant system, condensate system, feedwater system, off-gas system drains, and associated auxiliaries. It also includes reactor expansion drainage via the reactor water cleanup system, and low conductivity wastes from the condensate demineralizer regeneration system (resin transfer and backwash water).

Off standard process effluents, such as water of relatively high radioactivity concentration (e.g., greater than 10^{-3} uCi/cc), will be recycled to the waste collector tank for reprocessing. See Section 3.5.3.4.

The floor drain tanks collect floor drainage from the machine shop, fuel, radwaste, reactor, auxiliary, and turbine building sumps.

The water collected could contain up to 50 ppm of oil, 200 2.37
ppm of suspended solids, and 500 umhos/cm conductivity
produced from soluble materials. 2.38

Floor drains are processed through an identical treatment to 2.39 7
that provided for the waste collector tanks. Demineralizer 2.41
effluent, if acceptable, is sent to the recovery sample
tanks. If unacceptable, it is recycled back to the 2.43
collector tank.

3.5.3.2.2 Phase Separator/Backwash Tank Subsystem 2.45

Filter sludges, slurries, spent resins, and laboratory and 2.46
decontamination area drains are collected and conveyed to 2.47 7
the radioactive solid waste system by the phase 2.49
separator/backwash tank subsystem. Dewatering and 2.50
drying of sludges 2.51
is accomplished just prior to solidification within 2.52
the solid waste cask. The phase separator decant is sent to 2.53
the waste collector tank.

3.5.3.3 System Operation Analysis 2.56

The liquid streams processed within the radwaste facility, 2.58
which are significant contributors to the total liquid 3.1
radwaste activity discharged to the environment, are shown 3.2
on Table 3.5-4.

Concentrations of significant isotopes in the cooling tower 3.4
blowdown and annual liquid activity releases are shown in 3.5
Tables 3.5-5 and 3.5-6, respectively. The tables were 3.7
developed using the following bases:

1. A failed fuel basis of 50,000 uCi/sec (after 30-min 3.9
decay) has been used as the basis for expected 3.10
reactor coolant and steam concentrations. 3.11

2. A demineralizer design decontamination factor for 3.12
7 the waste collector tanks of 100 for Cs, Rb, and
1,000 for other isotopes, and for the floor drain 3.14
collector tanks of 20 for Cs, Rb and 1,000 for
other isotopes.

7 3. Actual concentrations in the ultrasonic resin 3.15
cleaner waste result from a collection of 3.17
corrosion/activation products over a 7-day period.
These wastes are subsequently removed from the 3.18
condensate demineralizer resin and directed to the 3.19
radwaste system.

7 4. The filter decontamination factor is 1.0 for 3.20
corrosion/activation products. 3.21

In addition, the following processing assumptions have been 3.24
made regarding Table 3.5-4: 3.25

1. All recoverable equipment drains are routed to the 3.27
main condenser hotwell after monitoring. (When 3.29

conductivity does not permit, they are diverted to 3.32
the waste collector tank.) 3.33

2. Approximately 96 percent of all normally collected 3.35
liquid wastes is recycled to the condensate storage 3.36
tanks. Less than 1 percent is packaged in the 3.37
solid waste system. The remainder is discharged to 3.38
the cooling tower blowdown.

3. In previous boiling water reactor plants, the 3.39
majority of radioactivity entering the system was
contained in the condensate demineralizer 3.40
regenerant chemicals. However, the RBS condensate 3.41
demineralizers are not regenerable and use of 3.42 7
ultrasonic resin cleaning results in long intervals 3.43
between resin replacement, substantially reducing
overall radioactivity entering the system because 3.45
radioisotopes decay on the condensate demineralizer 3.46
resin, rather than in the radwaste system.

3.5.3.4 System Operation 3.48

3.5.3.4.1 Waste and Floor Drain Collector Subsystem 3.49 7

Condensate demineralizer backwash, ultrasonic resin cleaner 3.50
wastes, and equipment drainage from both units are the major 3.51
influents to the waste collector tanks. The phase separator 3.53 7
decant is intermittent during the normal operation of the 3.54
station. Reduction of waste influents to the liquid 3.55
radwaste system is achieved by utilizing ultrasonic resin 3.56
cleaning of the condensate demineralizers and routing of 3.58
equipment drainage to the condenser hotwell on conductivity 4.1
controls.

7 The floor drain collector tanks will have an influent activity, conductivity, and volume that will vary widely due to reactor cycle variation. During initial startup of the units, floor drainage will contain high conductivity from the general cleanup of the plant, leaks from equipment, or washdown from startup maintenance. These wastes will not contain significant radioactivity and will be filtered and demineralized.

7 3.5.3.4.2 Control of Waste Activity Movement

Improved operating techniques, careful consideration of drainage routing, and equipment selection have resulted in reduction in estimated waste volumes entering the radwaste systems. To the greatest possible extent, water is recycled back to the process instead of diverting it to radwaste. High purity drains (equipment drains) are directed to the main condenser, and conductivity controls divert the drains to radwaste if conductivity is excessive. Regenerant waste volumes are reduced by the use of ultrasonic resin cleaning, extending the duration between resin replacement of the condensate polishers.

7 Direct packaging of decontamination solutions where possible will free equipment from excessive flushing to remove

materials which would make subsequent recovery of effluent 4.29
water difficult.

Wet vacumming techniques and administrative programs to 4.30
decrease floor drainage are imposed to restrict the 4.31
excessive development of waste from washdown or overflow 4.32
drainage. 7

In summary, wastes will be combined to make the most 4.33
effective use of processing equipment available and to 4.34
minimize the number of times that a batch of waste must be 4.35
handled prior to final disposition. The recirculating load 4.36
of water within the radioactive liquid waste system will be 4.37
restricted to the minimum.

3.5.3.5 Release of Processed Waste 4.39

Liquid waste from each of the four recovery sample tanks 4.40
will be discharged to the cooling tower blowdown stream on a 4.42
batch basis. Each batch will be analyzed prior to release 4.44
for gross beta/gamma activity, pH, and conductivity, and the 4.45
activity, temperature and flow rate of water discharged to 4.47
the river will be recorded.

Prior to commercial operation of Unit 2, 2,200 gpm of 4.48
cooling tower blowdown from Unit 1 will be available for 4.49
dilution with liquid radwaste discharge. Treated radwaste 4.51
effluents will be discharged at a rate to maintain 4.52
radioactivity concentrations in the diluted discharge below 4.53
10CFR20 limits.

Complete isotopic analyses of composites or retained samples 4.54
will be performed in accordance with the procedures outlined 4.55
in Regulatory Guide 1.21. Detailed administrative records 4.57
of all radioactive liquid releases will be maintained. 4.58
Table 3.5-5 presents the discharge pipe concentrations for 5.1
significant isotopes from both Units 1 and 2. Table 3.5-6 5.3
provides a tabulation of expected annual activity releases
for two units. About 45.6 Ci/yr of tritium will be released 5.5
from each unit. An average of about 2,330 gal/day is 5.7
anticipated from both units after being processed by the 5.8
radioactive liquid waste system. 5.9

TABLE 3.5-2

DATA USED IN CALCULATING ANNUAL RELEASES OF RADIOACTIVE LIQUID AND GASEOUS EFFLUENTS

Maximum core thermal power	3,039 MWt
Total tritium release	0.03 Ci/yr per MWt
Total steam flow rate	1.31×10^{7} lb/hr
Mass coolant in RPV	4.39×10^{5} lb
RWCU average flow rate	1.24×10^{5} lb/hr
RWCU F/D regeneration frequency	6-14 days
RWCU F/D regeneration volume	1,300 gal
Condensate demineralizers (8) total flow rate	9.42×10^{6} lb/hr
Liquid radwaste tank capacities:	
Recovery sample tanks	19,500 gal/tk
Waste collector tanks	25,000 gal/tk
Floor drain collector tanks	25,000 gal/tk
Regenerant waste tanks	25,000 gal/tk
Phase separator tanks	5,600 gal/tk
Backwash tank	10,700 gal
Plant capacity factor	80%
Ventilation filter efficiencies:	
4-in charcoal element	90%

TABLE 3.5-4

SIGNIFICANT RADIOACTIVE SOURCES TO THE LIQUID RADWASTE SYSTEM
COMBINED RADWASTE FACILITY

	Condensate Demineralizer Resin Rinse	Equipment Drains	Ultrasonic Resin Cleaner Backwash	Floor Drains	Decon and Lab Drains
Normal Number - Batches/day	3.65	3.65	3.65	0.645	0.301
Volume Per Batch - gal	1,370	6,137	8,219	17,674	3,997
Normal Daily Volume - gal/day	5,000	22,400	30,000	11,400	1,200
Normal Activity (Fraction of Primary Coolant Activity)	2.0-02(1)	3.47-01	5.0-02	1.0-03	2.0-02
Assumed Discharge Fraction/Batch	1%	1%	1%	10%	10%

TABLE 3.5-8 (Cont)

	Reactor Water Cleanup System Filter/Resin Backwash	Phase Separator Tank Decant	Solid Waste Dewater	Backwash Tank Influents
Normal Number - Batches/day	0.286	3.65	(3)	N/A
Volume Per Batch - gal(2)	4,876	175	(3)	N/A
Normal Daily Volume - gal/day	1,280	640	3,815	(4)
Normal Activity (Fraction of Primary Coolant Activity)	1.9+03	2.0-03	2.0-03	N/A
Assumed Discharge Fraction/batch	10%	1%	10%	10%

Note: (1)Exponents to Base 10 such as 2.0×10^{-2} are listed as 2.0-02.
(2)Volumes shown for all streams are total inputs from both Units 1 and 2. One batch is defined as the contribution of each input stream needed to fill one tank to 80% capacity in conjunction with the other input streams for that tank.
(3)Normal number of batches per day and volume per batch varies.
(4)Backwash tank receives influents on an intermittent basis. These influents include condensate demineralizers spent resin, radwaste demineralizers spent resin, radwaste filter backwash, radwaste strainer assembly backwash, and spent fuel pool filter backwash.

January 1984

TABLE 3.5-5

CONCENTRATION OF SIGNIFICANT ISOTOPES IN THE COOLING TOWER BLOWDOWN AT RIVER BEND STATION (FAILED FUEL BASIS - 50,000 uCi/SEC AFTER 30-MIN DECAY)

A. Fission Products

Radio Nuclide	M.P.C.[1] (Conc. in Water) uCi/ml	D.C. (Conc. in Discharge) uCi/cc	Dc/mpc (50,000 uCi/sec)
Br-83	3.0-06[2]	1.5-10	5.0-05
Sr-89	3.0-06	1.7-11	5.7-06
Sr-90	3.0-07	1.2-12	4.0-06
Sr-91	7.0-05	3.8-10	5.4-06
Sr-92	7.0-05	2.7-10	3.9-06
Y-91	3.0-05	7.5-12	2.5-07
Y-92	6.0-05	6.3-10	1.1-05
Y-93	3.0-05	4.0-10	1.3-05
Mo-99	2.0-04	3.1-10	1.6-06
Tc-99m	6.0-03	1.4-09	2.3-07
Ru-103	8.0-05	3.5-12	4.4-08
Ru-105	1.0-04	1.0-10	1.0-06
Ru-106	1.0-05	5.2-13	5.2-08
Te-129m	3.0-05	6.8-12	2.3-07
Te-131m	6.0-05	1.4-11	2.3-07
Te-132	3.0-05	1.6-12	5.3-08
Cs-134	9.0-06	5.9-11	6.6-06
Cs-136	9.0-05	3.8-11	4.2-07
Cs-137	2.0-05	1.6-10	8.0-06
Ba-140	3.0-05	6.7-11	2.2-06
Ce-141	9.0-05	5.1-12	5.7-08
Ce-143	4.0-05	4.2-12	1.1-07
Ce-144	1.0-05	5.2-13	5.2-08
Pr-143	5.0-05	6.8-12	1.4-07
Nd-147	6.0-05	5.1-13	8.5-09
I-131	3.0-07	6.1-10	2.0-03
I-132	8.0-06	1.5-09	1.5-04
I-133	1.0-06	6.6-09	6.6-03
I-134	2.0-05	1.6-10	8.0-06
I-135	4.0-06	3.8-09	9.5-04
Np-239	1.0-04	1.2-09	1.2-05

TABLE 3.5-5 (Cont)

B. Activation/Corrosion Products (independent of failed fuel)

Radic Nuclide	M.P.C.[1] (Conc. in Water) uCi/ml	D.C. (Conc. in Discharge) Canal uCi/cc	Dc/mpc (50,000 uCi/sec)		
Na-24	2.0-04	1.2-09	6.0-06	2.21	
P-32	2.0-05	3.5-11	1.8-06	2.22	
Cr-51	2.0-03	1.0-09	5.0-07	2.23	
Mn-54	1.0-04	1.2-11	1.2-07	2.24	
Mn-56	1.0-04	1.2-09	1.2-05	2.25	
Fe-55	8.0-04	1.7-10	2.1-07	2.26	
Fe-59	6.0-05	5.1-12	8.5-08	2.27	
Co-58	1.0-04	3.5-11	3.5-07	2.28	
Co-60	5.0-05	6.8-11	1.4-06	2.29	
Ni-63	3.0-05	1.7-13	5.7-09	2.30	
Ni-65	1.0-04	7.2-12	7.2-08	2.31	7
Cu-64	3.0-04	3.3-09	1.1-05	2.32	
Zn-65	1.0-04	3.5-11	3.5-07	2.33	
Zn-69m	2.0-03	4.1-12	2.1-09	2.34	
Zr-95	6.0-05	1.4-12	2.3-08	2.35	
Zr-97	2.0-05	7.2-13	3.6-08	2.36	
Nb-95	1.0-04	1.4-12	1.4-08	2.37	
Ag-110m	3.0-05	1.7-13	5.7-09	2.38	
W-187	7.0-05	4.0-11	5.7-07	2.39	
H-3	3.0-03	1.0-05	3.3-03	2.40	4

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[1]Source: 10CFR20, Appendix B, Table II, Column 2.
[2]Exponents to Base 10 such as 3×10^{-6} are listed as 3.0-06.

TABLE 3.5-6

EXPECTED ANNUAL LIQUID ACTIVITY RELEASES

Radio Nuclide	Releases Ci/yr	Radio Nuclide	Releases Ci/yr
Br-83	1.3-03*	I-131	5.3-03
Sr-89	1.5-04	I-132	1.1-02
Sr-90	1.1-05	I-133	5.7-02
Sr-91	3.4-03	I-134	1.4-03
Sr-92	2.3-03	I-135	3.3-02
Y-91	6.6-05	Np-239	1.0-02
Y-92	5.5-03	Na-24	1.0-02
Y-93	3.5-03	P-32	3.0-04
Mo-99	2.7-03	Cr-51	9.0-03
Tc-99m	1.2-02	Mn-54	1.0-04
Ru-103	3.1-05	Mn-56	1.1-02
Ru-105	8.9-04	Fe-55	1.5-03
Ru-106	4.5-06	Fe-59	4.5-05
Te-129m	5.9-05	Co-58	3.1-04
Te-131m	1.2-04	Co-60	6.0-04
Te-132	1.4-05	Ni-63	1.5-06
Cs-134	5.1-04	Ni-65	6.3-05
Cs-136	3.4-04	Cu-64	2.9-02
Cs-137	1.4-03	Zn-65	3.1-04
Ba-140	5.9-04	Zn-69m	3.6-05
Ce-141	4.5-05	Zr-95	1.2-05
Ce-143	3.7-05	Zr-97	6.3-06
Ce-144	4.5-06	Nb-95	1.2-05
Pr-143	5.9-05	Ag-110m	1.5-06
Nd-147	4.4-06	W-187	3.5-04

TOTAL CURIES PER YEAR 2.20-01

TOTAL H-3 = 45.6 Ci/yr/unit

*Exponents to Base 10 such as 1.3×10^{-3} are listed as 1.3-03. 7

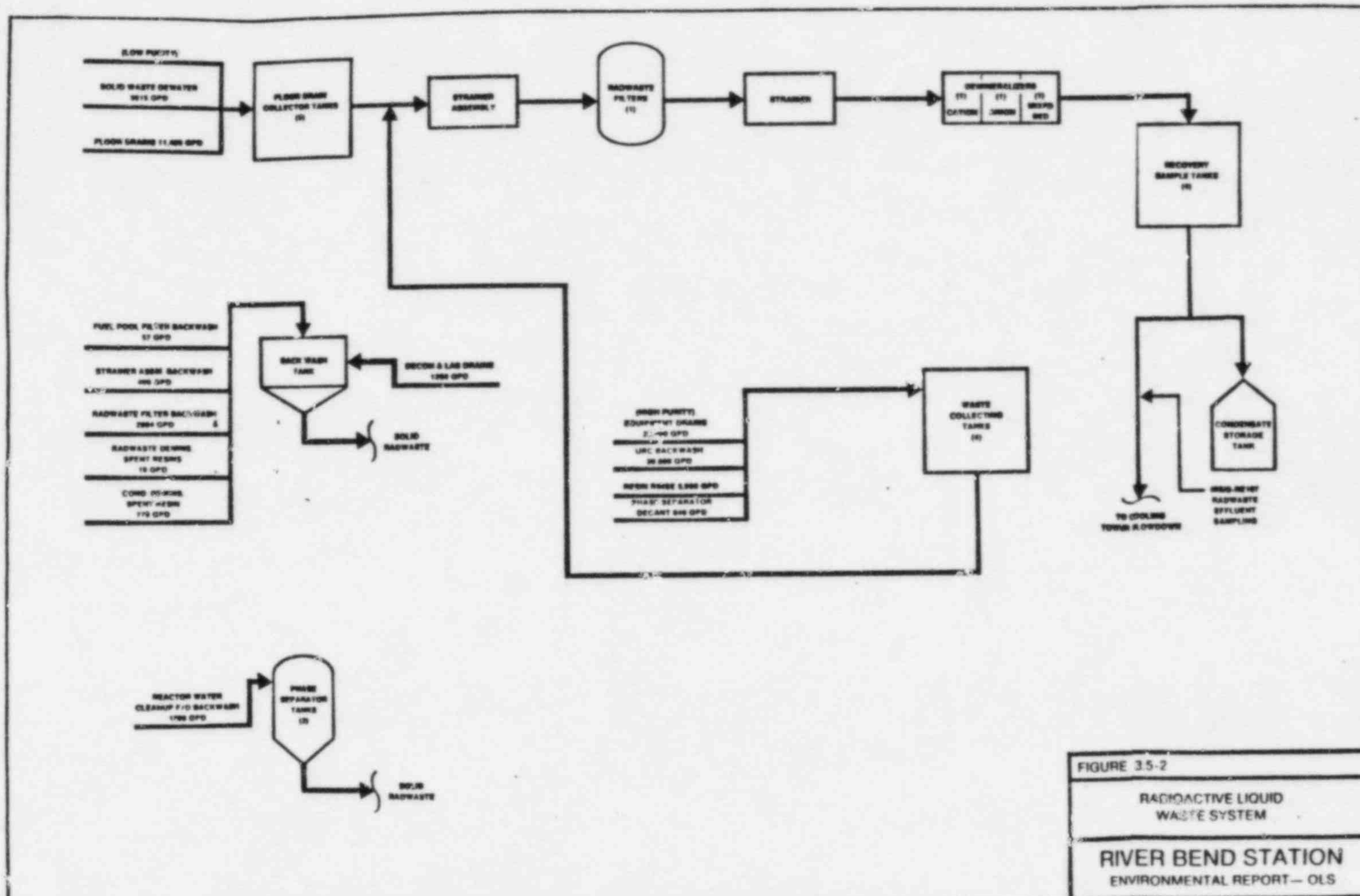

FIGURE 3.5-2

RADIOACTIVE LIQUID WASTE SYSTEM

RIVER BEND STATION
ENVIRONMENTAL REPORT— OLS