CP&L

Carolina Power & Light Company

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United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 & 50-324/LICENSE NOS. DPR-71 & DPR-62
TRANSFER OF DIRT/SAND TO STORM DRAIN COLLECTION POND

Gentlemen:

The purpose of this letter is to provide the NRC with information relative to Carolina Power & Light Company's (CP&L) plans to transfer sand and dirt from inside the Protected Area of the Brunswick Plant to a fenced area at the Storm Drain Collection Pond, for use as dike stabilization material. This submittal provides follow-up to information previously provided to the NRC, as discussed in NRC Inspection Report 50-325 & 50-324/92-25. Enclosed are details of the transfer, as well as information necessary for NRC Staff review of this issue.

As discussed with the NRC Staff, CP&L considers this activity a transfer of material to a restricted area on the site, not a disposal; therefore, CP&L considers it unnecessary to submit a 10 CFR 20.302 application for alternate disposal. Our current plans are to begin transfer of the dirt/sand materials to the Storm Drain Collection Pond dike area in early 1993.

Please refer any questions regarding this submittal to Mr. D. B. Waters at (919) 546-2710.

Yours very truly,

D. C. McCarthy

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ENCLOSURE 1

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
NRC DOCKET NOS. 50-325 & 50-324
OPERATING LICENSE NOS. DPR-71 & DPR-62
TRANSFER OF DIRT/SAND TO STORM DRAIN COLLECTION POND

DETAILS OF TRANSFER PROCEDURE

The dirt and sand being transferred to the Storm Drain Collection Pond (SDCP) dike area is being generated as a result of three efforts: 1) lowering of the grade of certain areas inside the Protected Area to ensure proper drainage, 2) removal of sand and dirt from the Storm Drain Collection System, and 3) removal of sand and dirt from the Condensate Storage Tank (CST) pump area to permit installation of a concrete slab and building around these pumps. Figure 1 provides a drawing showing the relationship of the Storm Drain Collection Basin (SDCB) to the Storm Drain Collection Pond. Table 1 provides the results of samples taken on the sand and dirt in the SDCB. Table 2 provides the results of samples taken at various locations inside the Brunswick Plant Protected Area.

The SDCP (identified as the stabilization pond in Technical Specification Tables 4.11.1-1 and 4.11.1-2) is located outside the Brunswick Plant Protected Area but inside the Owner Controlled Area. The area is approximately 64 acres, with approximately 39 acres under water. The entire dike area is fenced and posted as a Radioactive Materials Area. The sand and dirt to be moved to the SDCP will be shoveled from the Storm Drain Collection Basin and placed into dumpsters. The sand and dirt removed from the CST area is currently being stored in dumpsters in the Brunswick Low Level Warehouse. The dumpsters will be moved by trailer to the Storm Drain Collection Pond dike area. The sand/dirt will then be removed from the dumpsters and placed on and inside the bank of the SDCP to aid in building-up and fortifying the banks of the SDCP.

RADIOLOGICAL CONTROLS TO BE USED DURING TRANSFER

The sand/dirt collected in the SDCB consists of soil materials that have washed into the basin from various areas inside the Protected Area over the years. As shown in Tables 1 and 2, the sand/dirt has very low levels of radioactive contamination; therefore, no special radiological protection devices, such as respirators or additional dosimetry, would be necessary. The dumpsters will be surveyed for loose contamination prior to leaving the Protected Area in accordance with approved plant procedures.

DISTRIBUTION OF MATERIAL AROUND THE SDCP

The dirt and sand removed from the Protected Area is to be placed on top of, and inside of the existing bank around the SDCP. The top of the bank is maintained wide enough so that a service vehicle can be driven around the SDCP periodically to inspect bank integrity.

ENVIRONMENTAL MONITORING PROGRAM FOR SDCP

The SDCP is a permitted release point for the Brunswick Plant, as discussed in the Brunswick Technical Specifications and Updated Final Safety Analysis Report (UFSAR). Releases from the SDCP are sampled for radioactivity in accordance with Technical Specification requirements.

Typical isotopic analysis of the SDCP effluent only shows Tritium. Data for these releases included in the Semiannual Radioactive Effluent Release Report.

As shown in UFSAR Figure 9.3.3-1, multiple areas within the Protected Area drain into the Storm Drain Collection Basin. The basin effluent is transferred to the Storm Drain Collection Pond via a transfer line equipped with a radiation monitor with automatic isolation capability. SDCP effluent is released into the Brunswick Plant intake canal (see Figure 1) and are typically made according to expected rainfall. Releases from the SDCP are typically made over a several-day period, at a release rate of approximately 1,000,000 gallons/day.

DIKE FAILURE ANALYSIS

An analysis was performed with respect to the SDCB sand/dirt to consider the worst-case pathway for transfer to man from radionuclides inside and around the SDCP. Four potential pathways to humans were considered, including those resulting from dike overflow, dike failure, or game animal consumption. Since the majority of the radionuclides in the SDCP are adhered to the sand in and around the pond area, a failure of the dike would result in a localized transfer of radioactive material. The concentrations in the pond water would be quickly diluted below detectible amounts in the surrounding estuary system; therefore, the radiological consequences from the loss of the pond water inventory to the surrounding environment, either by overflow of the SDCP or dike failure, are not expected to be any more severe than a controlled, permitted release. Dike overflow has been experienced during one period of heavy rainfall. In April, 1991, the plant area received 10.22 inches of rainfall, with the majority falling in a 6 to 7 hour period. This resulted in water overflowing the dike of the SDCP. Overflow water was sampled and analyzed. Radionuclide concentrations were less than detectable in the overflow water. Reporting of this event was made to the North Carolina Division of Environmental Management.

Since the majority of the gamma-emitting inventory of the SDCP area is in the sediments, two events become the most limiting scenarios: analysis of the food chain pathway resulting from the vegetation and SDCP water being consumed by game animals in the area (i.e., deer), and a pathway resulting from the water inventory in the SDCP drying up (as would occur as a result of a dike failure) and the sand becoming airborne. Of these scenarios, the food chain pathway through game animals was shown as the most limiting pathway. The analyses were performed using criteria of Regulatory Guide 1.109, and showed a conservative worst-case organ exposure to individuals consuming these game animals of 5.68E-2 mrem / year.

The analysis discussed above considered worst-case pathway for the sand/dirt in the SDCB. When removing sand/dirt from other areas of the plant a check will be made to ensure that the concentration of radionuclides in this material is bounded by the concentration of radionuclides in the SDCB. If the concentration of radionuclides is found to be greater and additional analyses indicate that the total worst-case organ exposure is significantly higher than that from the SDCB, then the material will not be transferred to the SDCP.

PROCEDURES TO MINIMIZE DIKE FAILURE

Building-up and stabilizing the SDCP dike, using the sand/dirt material from inside the Protected Area, will help to ensure that the SDCP does not overflow or fail in the future. Vegetation growth along the SDCP over the past several years has been allowed to help stabilize the dike. In addition, as discussed earlier, the top of the SDCP bank is maintained wide enough so that a service vehicle can be driven around the SDCP periodically to inspect bank integrity. To help

prevent an overflow event similar to the one that occurred in April, 1991, normal practice is to initiate a permitted release when extremely high rainfall is expected.

RELATIONSHIP TO OCTOBER 9, 1991 DREDGING SUBMITTAL

The October 9, 1991 10 CFR 20.302 submittal sent to the State of North Carolina was in support of normal dredging activity in the Discharge Canal in the area of the Caswell Beach Ocean Discharge Pumps. This area is property of CP&L and is fenced to minimize intruders. The discharge canal bottom sediments contain very low levels of radionuclides as a result of routine radioactive liquid releases from the Brunswick Plant. CP&L believed that a 20.302 request for alternate disposal was in order since the spoil pond used to receive the dredged materials is not posted or controlled as a Radioactive Materials Area. By contrast, the SDCP is a controlled, restricted area and is posted as a Radioactive Materials Area. The SDCP is a permitted liquid release point and is identified as such in the Brunswick Technical Specifications. The movement of sand and dirt from inside the Protected Area to the posted area around the SDCP is actually a transfer of a slightly contaminated soil from one radiologically controlled area to another radiologically controlled area and has a beneficial purpose in helping to build up and stabilize the dike.

ATTACHMENTS

TABLE 1: Average Isotopic Concentration in Storm Drain Collection Basin Sand

TABLE 2: Results of Soil Samples Taken Inside the Brunswick Plant Protected Area

FIGURE 1: Drawing showing the relationship of the Storm Drain Collection Basin (SDCB) and the Storm Drain Collection Pond.

Applicable portions of the Brunswick Liquid Effluent Technical Specifications.

Applicable portions of the Brunswick Updated Final Safety Analysis Report.

TABLE 1

AVERAGE ISOTOPIC CONCENTRATION IN STORM DRAIN COLLECTION BASIN SAND

Nuclide	μCi/g (Wet Weight)	μCi/g (Dry Weight)
Co-60	5.27E-07	7.15E-07
I-131	5.16E-07	6.24E-07
I-133	8.54E-07	<LLD
Cs-134	1.66E-08	3.89E-08
Cs-137	7.64E-07	1.02E-06
Mn-54	<LLD	3.23E-08
La-140	1.67E-08	4.54E-08
K-40	5.64E-07	7.96E-07

LLD--Lower Limit of Detectability

TABLE 2

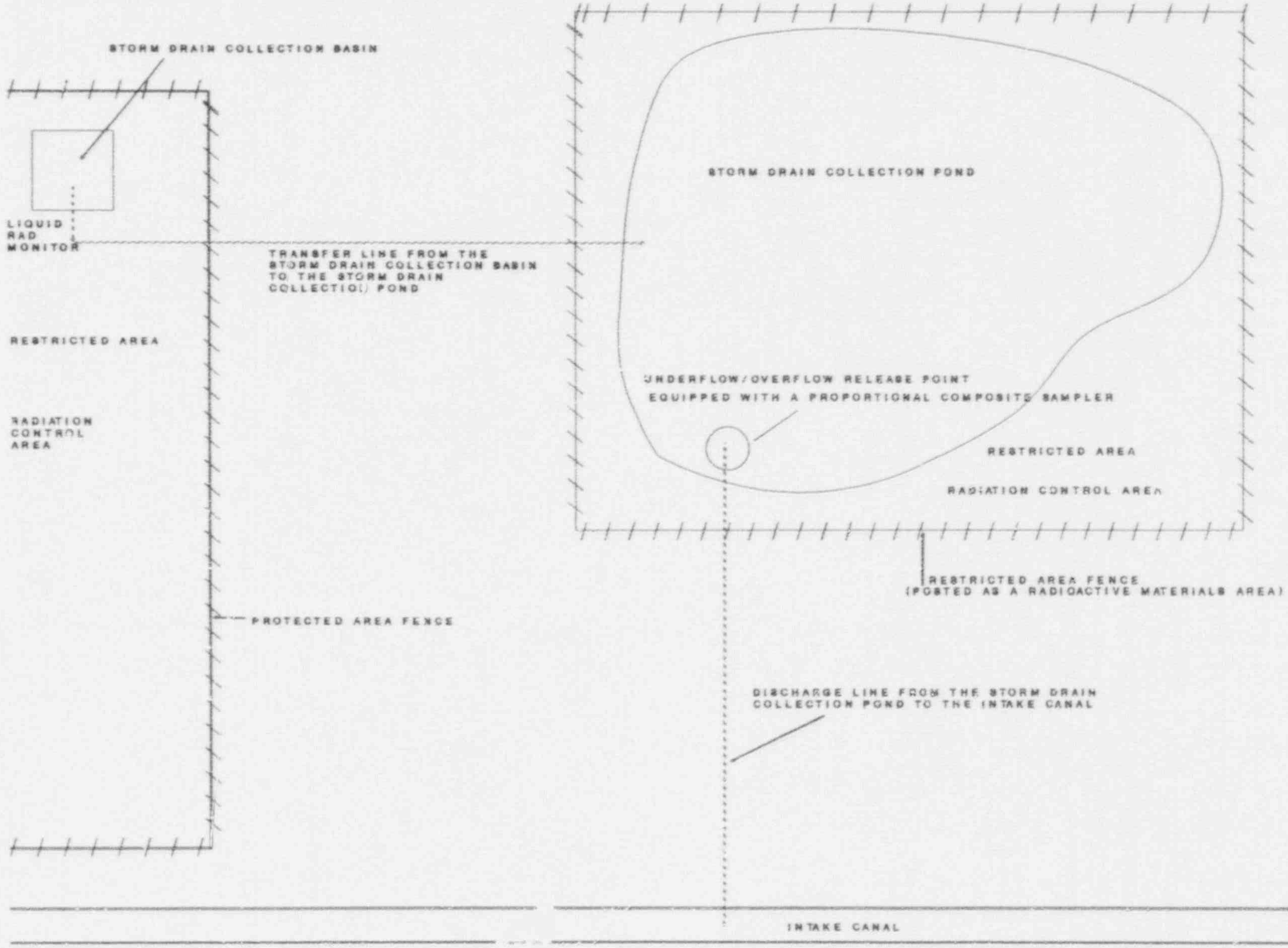
RESULTS OF SOIL SAMPLES TAKEN INSIDE THE BRUNSWICK PLANT PROTECTED AREA

LOCATION	RESULTS (μCI/g)
AUX SURGE TANK (OUTSIDE FENCE)	4.50E-6
UNIT #2 CONDENSATE STORAGE TANK (INSIDE FENCE)	6.48E-6
UNIT #2 CONDENSATE STORAGE TANK (OUTSIDE FENCE)	1.62E-6
AUXILIARY BOILER	2.07E-5
WAREHOUSE 'C' FRONT	<LLD
WAREHOUSE 'C' SOUTH	5.79E-7
SERVICE WATER BUILDING	2.34E-7
UNIT #1 CONDENSATE STORAGE TANK (INSIDE FENCE)	4.33E-8
DIESEL GENERATOR SHIELD AREA	8.88E-6
UNIT #1 SHIELD STORAGE	1.38E-5
MAKE-UP WATER TREATMENT TANK	6.00E-6
SCAFFOLD WAREHOUSE SOUTH	1.62E-6
SCAFFOLD WAREHOUSE NORTH	5.49E-8
SCAFFOLD WAREHOUSE WEST	7.46E-7
STORM DRAIN	1.96E-7
WEST TURBINE	5.31E-7
CST PUMP AREA (DUMPSTER COMPOSITE SAMPLE)	1.84E-7
CST PUMP AREA (DUMPSTER COMPOSITE SAMPLE)	9.32E-7

LLD--Lower Limit of Detectability

FIGURE 1

RELATIONSHIP OF STORM DRAIN BASIN TO STORM DRAIN POND (NOT DRAWN TO SCALE)



APPLICABLE SECTIONS OF THE

BNP UPDATED FINAL SAFETY ANALYSIS REPORT

3) The 2C turbine building closed cooling water heat exchanger and pump.

4) The lube water system crosstied at Valves 2-SW-V482 and 2-SW-V483.

7 5) The service water intake structure which houses the service water pumps, screen wash pumps, and lube water pumps for both units.

The circulating water systems share a common intake structure. The intake structure houses the circulating water pumps for both units (eight pumps total).

3.1A.16 MAKEUP WATER

Water drawn from wells at the plant site and potable water from the county system provide all non-saline water needs. Water is piped directly to the fire system storage tank and is also supplied to the makeup water treatment system which supplies both potable water and demineralized water for the plant. Dual demineralizer trains in this system enhance reliability even though the systems supplied are not significant in terms of interaction criteria.

3.1A.17 DEMINERALIZED WATER

Water that has been demineralized to a high degree of purity by the makeup water treatment system is stored in the demineralized water storage tank. This common, non-critical vessel provides separate egress routes for both reactor water makeup systems. Normally closed valves provide a connection with the fire protection system as an emergency backup to the normal fire protection system water supply.

3.1A.18 CONDENSATE STORAGE AND TRANSFER

Storage tanks for condensate from each reactor cooling system are independent, with a valved crosstie permitting interchange between units. Single independent transfer pumps serve each tank.

3.1A.19 DRAINAGE SYSTEMS

3.1A.19.1 <u>Turbine Building</u>

There is no sharing of drainage systems between the Unit 1 and the Unit 2 areas of the Turbine Building.

Clean floor drains and roof drains for the Unit 1 side of the Turbine Building are conveyed separately from those of the Unit 2 side into the yard area, where they are drained independently into the yard storm drainage system. The yard storm drainage system also collects numerous other drains, and is ultimately consolidated into a single drain line emptying into the storm drain basin and pumped into the stabilization pond.

The potentially contaminated drains in each of the two sides of the Turbine Building (i.e., the Unit 1 and 2 areas) are conveyed to separate sumps, from which the drainages are pumped and separately piped to the Radwaste Building

for processing. Some clean drains from the lower elevations of the Turbine Building are combined with the potentially contaminated drains from elevations

above them, in which cases running primed traps are provided, with each side of the trap vented to its respective area.

3.1A.19.2 Reactor Buildings

There is no sharing of drainage systems between the Unit 1 and the Unit 2 Reactor Buildings. Potentially contaminated drains from each of the two Reactor Buildings are conveyed separately to the Radwaste Building for processing. Roof drains and drains from the intake air equipment rooms are conveyed separately to the yard storm drainage system.

3.1A.20 FIRE PROTECTION

The entire facility is protected by a fire protection system. The system has sufficient redundancy to minimize the probability of one failure causing loss of fire protection capability for the entire plant. The fire protection water 4
system can supply either unit individually. Other fire protection features are unique to each unit, with the exception of areas which are common to both units.

3.1A.21 INSTRUMENT AIR AND SERVICE AIR

Two compressor systems, one for each unit, are installed to provide dry, oil-free instrument air for instrument operation and valve operation. Oil-free service air is provided for various uses including breathing atmosphere. These systems distribute compressed air throughout the plant.

The systems are crosstied through a line connecting the air headers for each unit. Sharing of the two systems is not normal and can be accomplished only by manually opening a normally locked closed valve in this crosstie line.

In normal operations, all six compressors run. Air receivers are sized to carry the maximum surge loads of postulated emergencies.

On-line receivers are located in local areas near critical loads. These provide capacity needed for 15 min of operation during a shutdown independent of feed from the distribution piping. Check valves upstream of on-line receivers prevent backflow. Feeds to critical areas are looped and service will be maintained with a line break in either side of the loop. Service so designed is applied to non-interruptible loads: namely, vital instrumentation and valve operation.

9.3.3 EQUIPMENT, FLOOR, AND YARD DRAINAGE SYSTEM

The objective of the drainage systems is to collect and remove all liquid wastes from their points of origin in the plant to the circulating water system directly or, if necessary, to the Radwaste Building for treatment prior to appropriate disposal.

9.3.3.1 Design Basis

Liquid wastes are collected and discharged in such a manner that the operation or availability of the plant is not limited, and discharges of radioactive material are within the guidelines discussed in Chapter 11.

9.3.3.2 System Description

Plant equipment and floor drainage systems receive both contaminated and noncontaminated drains. Contaminated drains are conveyed to the radwaste system for determination of radioactivity and appropriate treatment prior to disposal. Noncontaminated drains are drained to the storm drain system which discharges into the storm drain collection basin and then into the stabilization pond. A block flow diagram of the drainage system is shown in Figure 9.3.3-1.

9.3.3.2.1 Contaminated Equipment Drainage System

Reactor building equipment drains are collected in two separate systems. One handles drainage from all equipment drains located in the drywell; the other handles drainage from equipment drains located in the Reacotr Building. Individual drywell equipment drain lines collect in branch lines and discharge to the drywell equipment drain tank. Sump pumps are provided to transfer these wastes from the tank to the radwaste system. The reactor building equipment drain system begins with drain connections at equipment. The effluents from these drains are collected in branch lines and discharged to the Reactor Building equipment drain tank for transfer to the radwaste system. Containment is maintained in transferring wastes from the sumps to the radwaste system by maintaining a minimum water level in the sump which seals the pump suction lines so that there is no continuous air path between the pump suction inlet and lines passing the containment boundary. Two automatic isolation valves outside the drywell are provided to ensure containment integrity.

The Turbine Building contaminated equipment drainage system begins with funnel drains at the equipment. Liquid waste from these funnel drains flows by gravity into branch drain lines and discharges into an equipment drain sump location below the basement level. A sump pump is provided to transfer these wastes from the Turbine Building to the radwaste system.

The Radwaste Building contaminated equipment drainage system begins with funnel drains at the equipment, where liquid waste flows by gravity into drain lines and discharges to a collecting sump. A sump pump is provided to transfer these wastes from the sump to the radwaste system.

9.3.3.2.2 Contaminated Floor Drainage System

The contaminated floor drainage system includes all floor drains from the Reactor Building, Turbine Building, Nitrogen and Off-gas Services Building, the Radwaste Building and all other floor drains having a potential for radioactive spillage. Precautions have also been taken within the building to preclude overflow of any radioactive liquids into areas served by the non-radioactive drainage system.

Drains in the contaminated floor drainage system are routed to sumps in various parts of the plant as required, from which the liquids are transferred by sump pumps to a collector tank in the radwaste system.

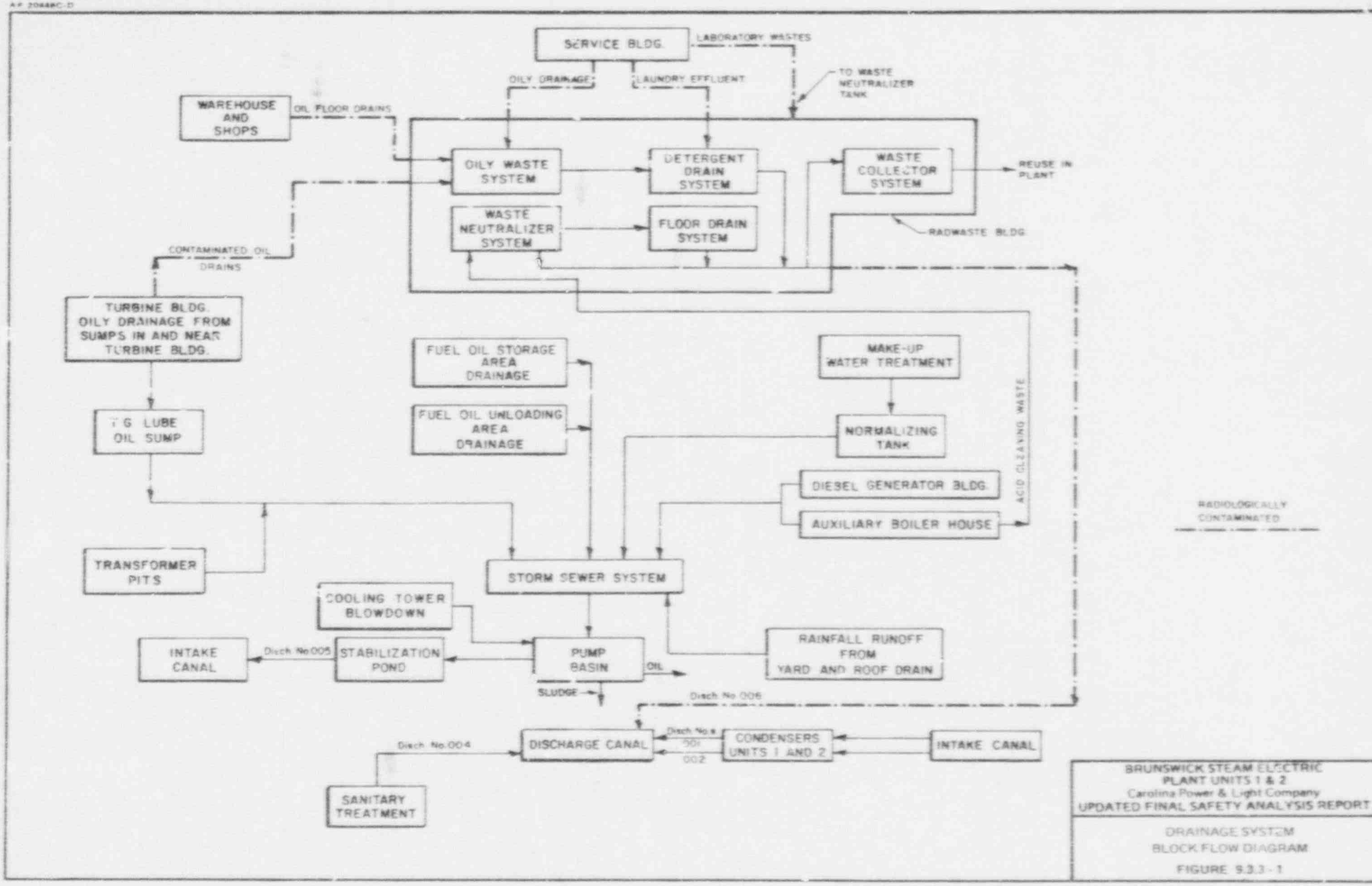
9.3.3.2.3 Noncontaminated Water Drainage System

The drainage collection system consists of an underground network of storm sewer piping, noncontaminated building floor drains, and building roof drainage piping. (See Section 2.4.10.2 for further information concerning building roof drainage.) Gravity supplies the motive force for drainage. Surface drainage, runoff after rains, and neutral non-radioactive wastes are collected by this system. These sources, as well as the cooling tower blowdown discharge and the makeup water treatment system discharge, feed into the storm drainage basin.

The storm drainage basin, located northwest of the Turbine Building, is a concrete structure with a total capacity of 102,000 gallons. The basin originally was constructed with a removable gate at the south end which allowed free flow through a culvert to the head of the discharge canal and provided relief from overfilling of the basin. The basin is equipped with two, locked closed butterfly valves in series to prevent free flow and to ensure there is not an inadvertent release during periods of heavy rain, the contents of the basin may be released to the discharge canal in accordance with regulatory requirements. An oil skimmer removes surface oils that may be present in the drainage water. The water is directed through a weir into the storm drainage basin pump bay where it is pumped into a stabilization pond.

The stabilization pond is an area for final retention of storm drainage water. The pond is enlarged to provide an increased surface area to aid in evaporation of the water to the atmosphere. The stabilization pond covers approximately 64 acres; however, a standpipe located at 30 feet above mean sea level only allows water to collect in 39 acres. The stabilization pond is constructed from a spoils pond used during the dredging of the intake canal and has a storage capacity of 4.7×10^7 gallons. When full, the mean depth of the pond is 3.5 feet. The underflow-overflow discharge structure that leads to the intake canal prevents discharge of oil, grease, and floating debris to the environment.

The storm drainage basin and the stabilization pond as a possible radioactive effluent release pathway is discussed in Section 11.2.2.7.



BRUNSWICK STEAM ELECTRIC PLANT UNITS 1 & 2
Carolina Power & Light Company
UPDATED FINAL SAFETY ANALYSIS REPORT

DRAINAGE SYSTEM
BLOCK FLOW DIAGRAM

FIGURE 9.3.3-1

11.2.2.6 Surge System

The surge system is a multiple purpose system which affords both redundant design and increased production capability since:

a) It serves as a bulk storage facility for quantities of radioactive waste in excess of normal operational quantities.

b) It offers a parallel treatment path to the waste collector system.

The major components of the surge system are the waste surge tank, the waste collector filter, the waste demineralizer, the auxiliary surge tank, the auxiliary surge filter, and the auxiliary surge demineralizer.

Water may be transferred from the waste surge tank to the auxiliary surge tank. The "off standard" line from the two waste sample tanks goes directly to the auxiliary surge tank. The auxiliary surge system receives water directly from the Residual Heat Removal (RHR) Systems and the overflow from either condensate storage tank.

There is only one path provided for water from the auxiliary surge tank; a pipe line with double block valves leads from the auxiliary surge tank directly into the top of the waste surge tank. Any water that enters the surge system can exit that system only through the waste collector filter and demineralizer or through the surge filter and demineralizer.

This system will facilitate the rapid treatment of large quantities of high purity, low activity water following reactor refueling.

11.2.2.7 Storm Drainage Collection System

The storm drain collection basin has been recognized as a potential effluent pathway due to contaminated liquids entering the storm drains. A discussion of the storm drain collection system is presented in Section 9.3.3.2.3.

The storm drain basin is equipped with a monitoring system comprised of a radiation monitor, a pH meter, a flow monitor, and a composite sampler. The storm drain basin can be operated in the manual or automatic mode. The monitoring system will lock-out normal operation of the basin pumps on high radiation or low or high pH conditions, preventing releases that exceed specifications. The lock-out feature can be overridden manually via a key-locked switch, or automatically via a basin high-high level signal. The high-high level override signal prevents contaminated water from backing up into the plant.

In manual position, the basin is sampled daily for liquid pumped from the basin to the stabilization pond. The stabilization pond is released to the intake canal after sampling requirements have been met.

Only releases from the stabilization pond are considered off-site releases since the pond is located in a restricted (fenced) area. An analysis performed using conservative values of radioactive concentrations and leak rates indicated that environmental doses attributable to this pathway are insignificant.

The collection basin is provided with an overflow line to the head of the discharge canal. This line is equipped with two locked closed butterfly valves in series to prevent an inadvertent release. During periods of heavy rains, the contents of the basin may be released to the discharge canal in accordance with regulatory requirements.

11.2.2.8 Means for Keeping Activity Discharges as Low as Practicable

Radwastes are received and processed in the subsystems described below. To ensure operability of each of these systems so that wastes are processed by the treatment methods provided, the following system features are included:

APPLICABLE SECTIONS OF THE

BNP TECHNICAL SPECIFICATIONS

(UNIT 1 ONLY)

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.1 LIQUID EFFLUENTS

CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.11.1.1 The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS (see Figure 5.1.3-1) after dilution in the discharge canal shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2×10^{-4} microcuries/ml.

APPLICABILITY: At all times.

ACTION:

With the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS exceeding the above limits, without delay restore the concentration to within the above limits.

SURVEILLANCE REQUIREMENTS

4.11.1.1.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analysis program of Table 4.11.1-1. If the stabilization pond or service water samples analyzed according to Table 4.11.1-1 indicate concentrations of any gamma-emitting radionuclides greater than 5×10^{-6} μCi/ml (trigger level), then the liquid wastes exceeding the trigger level shall be sampled and analyzed according to the sampling and analysis program of Table 4.11.1-2 until such time as the sample concentration of each gamma-emitting nuclide is less than 5×10^{-6} μCi/ml.

4.11.1.1.2 The results of radioactivity analyses shall be used in accordance with the methods in the ODCM to assure that the concentrations at the point of release are maintained within the limits of Specification 3.11.1.1.

NOTE: See Bases 3/4.11.1.1

TABLE 4.11.1-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (µCi/ml) (a)(e)
A.1. Sample Tanks, Detergent Drain Tank, and Salt Water Release Tanks (Batch Release)(h)	P Each Batch	P Each Batch	Principal Gamma Emitters(g)	5×10^{-7}(b)
			I-131	1×10^{-6}
	P One Batch/M	M	Dissolved and Entrained Gases (gamma emitters)	1×10^{-5}
2. Circulating Water Pit	P Each Batch	M Composite(c)	Gross Alpha	1×10^{-7}
			H-3	1×10^{-5}
	P Each Batch	Q Composite(c)	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}
B. Stabilization Pond(d)	P Each Release D During Periods of Release(f)	P Each Release D During Periods of Release(f)	Principal Gamma Emitters(g)	5×10^{-7}(b)
C. Service Water(d) (Potential Continuous Release)	W During System Operation	W During System Operation	Principal Gamma Emitters(g)	5×10^{-7}(b)

TABLE 4.11.1-1 (Continued)

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

TABLE NOTATION

(a) The detectability limits for activity analysis are based on technical feasibility limits and on the potential significance in the environment of the quantities released. For some nuclides, lower detection limits may be readily achievable; and when nuclides are measured below the stated limits, they should also be reported.

(b) When operational limitations preclude specific gamma radionuclide analysis of each batch, gross radioactivity measurements shall be made to estimate the quantity and concentrations of radioactive material released in the batch; and a weekly sample composited from proportional aliquots from each batch released during the week shall be analyzed for principal gamma-emitting radionuclides.

(c) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen that is representative of the liquids released.

(d) The stabilization pond and service water liquid release types represent potential release pathways and not actual release pathways. Surveillance of these pathways is intended to alert the plant to a potential problem; analysis for principal gamma emitters should be sufficient to meet this intent. If analysis for principal gamma emitters indicates a problem (i.e., exceeds the trigger level of 5×10^{-6} µCi/ml), then complete sampling and analyses shall be performed as per Table 4.11.1-2.

(e) The lower limit of detectability (LLD) is the smallest concentration of a radioactive material in an unknown sample that will be detected with a 95% probability with a 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda_1 t_e)}$$

where:

LLD is the "a priori" lower limit of detection as defined above (as microcuries per unit mass or volume).

s_b = $(N/t_b)^{1/2}$

= standard deviation of background (cpm)

TABLE 4.11.1-1 (Continued)

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

TABLE NOTATION

N	=	background count rate (cpm)
t_b	=	time background counted for (min)
E	=	counting efficiency, as counts per disintegration
V	=	volume or mass of sample
2.22×10^6	=	conversion factor (dpm/microcurie)
Y	=	fractional radiochemical yield
λ_i	=	radioactive decay constant of ith nuclide (sec^{-1})
t_e	=	elapsed time between sample collection and counting (sec)

Typical values of E, V, Y, and t_e should be used in the calculation. It should be recognized that the LLD is defined as an "a priori" (before the fact) limit representing the capability of a measurement system and not as an "a posteriori" (after the fact) limit for a particular measurement.

(f) The stabilization pond is typically released over a several-day period. The pond is to be sampled and analyzed prior to commencing release. When composite sampling instrumentation becomes available and is OPERABLE, daily grab sampling of the stabilization pond effluent will not be required during release and the composite sample will be analyzed on a weekly basis.

(g) The principal gamma emitters for which the LLD specifications apply exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.1.8.

(h) A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated and then thoroughly mixed to assure representative sampling. Once fully operational, the salt water tanks will be included as indicated in Table 4.11.1-1.

TABLE 4.11.1-2

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM FOR POTENTIAL RELEASE PATHWAYS WHICH HAVE EXCEEDED TRIGGER LEVELS

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (μCi/ml)(a)(e)
A. Stabilization Pond	P Each Release	P Each Release	Principal Gamma Emitters(g)	5×10^{-7}(b)
	D During Periods of Release(f)	D During Periods of Release(f)	I-131	1×10^{-6}
	P One Release/M	M	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
	P Each Release	M Composite(c)	Gross Alpha	1×10^{-7}
			H-3	1×10^{-5}
	P Each Release	Q Composite(c)	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}
B. Service Water (Continuous Release)(h)	D(d)	W Composite(c)	Principal Gamma Emitters(g)	5×10^{-7}(b)
			I-131	1×10^{-6}
	M Grab Sample	M	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
	D(d)	M Composite(c)	Gross Alpha	1×10^{-7}
			H-3	1×10^{-5}
	D(d)	Q Composite(c)	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}

TABLE 4.11.1-2 (Continued)

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM FOR POTENTIAL RELEASE PATHWAYS WHICH HAVE EXCEEDED TRIGGER LEVELS

TABLE NOTATION

(a) The detectability limits for activity analysis are based on technical feasibility limits and on the potential significance in the environment of the quantities released. For some nuclides, lower detection limits may be readily achievable; and when nuclides are measured below the stated limits, they should also be reported.

(b) When operational limitations preclude specific gamma radionuclide analysis of each batch, gross radioactivity measurements shall be made to estimate the quantity and concentrations of radioactive material released in the batch; and a weekly sample composited from proportional aliquots from each batch released during the week shall be analyzed for principal gamma-emitting radionuclides.

(c) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen that is representative of the liquids released.

(d) Until such time as continuous proportional composite samplers are installed on the service water discharge line, daily grab sampling of the service water effluent will be required for use in making up the composite.

(e) The lower limit of detectability (LLD) is the smallest concentration of a radioactive material in an unknown sample that will be detected with a 95% probability with a 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\sigma_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda_1 t_e)}$$

Where:

LLD is the "a priori" lower limit of detection as defined above (as microcuries per unit mass or volume)

σ_b = $(N/t_b)^{1/2}$

= standard deviation of background (cpm)

N = background count rate (cpm)

t_b = time background counted for (min)

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM
FOR POTENTIAL RELEASE PATHWAYS WHICH HAVE EXCEEDED TRIGGER LEVELS

TABLE NOTATION

E = counting efficiency, as counts per disintegration

V = volume or mass of sample

2.22×10^6 = conversion factor (dpm/microcurie)

Y = fractional radiochemical yield

λ_i = radioactive decay constant of ith nuclide (sec^{-1})

t_e = elapsed time between sample collection and counting (sec)

Typical values of E, V, Y, and t_e should be used in the calculation. It should be recognized that the LLD is defined as an "a priori" (before the fact) limit representing the capability of a measurement system and not as an "a posteriori" (after the fact) limit for a particular measurement.

(f) The stabilization pond is typically released over a several-day period. The pond is to be sampled and analyzed prior to commencing release. When composite sampling instrumentation becomes available and is OPERABLE, daily grab sampling of the stabilization pond effluent will not be required during release and the composite sample will be analyzed on a weekly basis.

(g) The principal gamma emitters for which the LLD specifications apply exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.1.8.

(h) A continuous release is the discharge of liquid waste of a nondiscrete volume, e.g., from a volume of a system that has an input flow during the continuous release.

DOSE - LIQUID EFFLUENTS

LIMITING CONDITION FOR OPERATION

3.11.1.2 The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released to UNRESTRICTED AREAS (see Figure 5.1.3-1) shall be limited:

a. During any calendar quarter to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ, and

b. During any calendar year to less than or equal to 6 mrem to the total body and to less than or equal to 20 mrem to any organ.

APPLICABILITY: At all times.

ACTION:

a. With the calculated doses from the release of radioactive materials in liquid effluents exceeding any of the above limits, in lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective action to be taken to assure that subsequent releases will be in compliance with the above limits.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.2 Dose Calculations - Cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year shall be determined in accordance with the ODCM at least once per 31 days.

NOTE: See Bases 3/4.11.1.2

3/4.11.1 LIQUID EFFLUENTS

3/4.11.1.1 CONCENTRATION

This specification is provided to ensure that the concentration of radioactive materials released in liquid waste effluents to UNRESTRICTED AREAS after dilution in the discharge canal will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2. This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will not result in exposures within (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to a MEMBER OF THE PUBLIC and (2) the limits of 10 CFR Part 20.106(e) to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its MPC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP), Publication 2.

The required detection capabilities for radioactive materials in liquid waste samples are tabulated in terms of the Lower Limits of Detection (LLDs). Detailed discussion of the LLD and other detection limits can be found in HASL Procedures Manuals, HASL-300 (revised annually), Currie, L. A. "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry" Anal. Chem. 40, 586-93 (1968), and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

"Without delay" implies that the operator, upon determining the limiting condition for operation is being exceeded, takes the next appropriate action to comply with the specification.

Note that for batch releases, recirculation of at least two tank volumes shall be considered adequate for thorough mixing.

The stabilization pond and service water liquid release types represent potential release pathways and not actual release pathways. Surveillance of these pathways is intended to alert the plant to a potential problem; analysis for principal gamma emitters should be sufficient to meet this intent. If analysis for principal gamma emitters indicates a problem (i.e., exceeds the trigger level of 5×10^{-6} µCi/ml), then complete sampling and analyses shall be performed as per Table 4.11.1-2. The trigger level of 5×10^{-6} µCi/ml was chosen as being sufficient to provide reasonable assurance of accountability of all nuclides released based upon lower limits of detection and expected concentrations.

3/4.11.1.2 DOSE - LIQUID EFFLUENTS

This specification is provided to implement the requirements of Sections II.A, III.A, and IV.A of Appendix I, 10 CFR Part 50. The limiting condition for

DOSES (Continued)

operation implements the guides set forth in Section II.A of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I of 10 CFR Part 50 to assure that releases of radioactive material in liquid effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The dose calculations in the ODCM implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents will be consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

The dose or dose commitment to a MEMBER OF THE PUBLIC is based on the 10 CFR Part 50, Appendix I, guideline of:

a. 1.5 mrem to the total body and 5.0 mrem to any organ during any calendar quarter, and

b. 3 mrem to the total body and 10 mrem to any organ during any calendar year,

from radioactive material in liquid effluents from each reactor unit to UNRESTRICTED AREAS. This specification is written for a two unit site.

3/4.11.1.3 LIQUID RADWASTE TREATMENT SYSTEM

The requirement that appropriate portions of this system be used, when specified, provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as reasonably achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criteria 60 of Appendix A to 10 CFR Part 50 and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

Mechanical filtration as per system design is considered to be an appropriate component of the liquid radwaste treatment system.

The requirements of 0.12 mrem total body or 0.4 mrem to any organ in a 31-day period is based on two reactor units having a shared liquid radwaste treatment system.

OUTGOING NRC CORRESPONDENCE
COMMITMENT ID FORM
(Alternate Fo m NGGM-304-01)

FACTS #: 92G0299
LETTER DATE:
NLS/PLANT #: NLS-92-245

DEPARTMENT:

The following commitments are being made in this response:

COMMITMENT	RESPONSIBLE GROUP	COMPLETION DATE	FACTS ITEM ASSIGNED
Perform additional analyses for exposure pathways prior to moving sand/dirt from CST area and other plant areas to the SDCP.	E&RC	Prior to moving material to SDCP.	

PREPARER: ________________ DATE: ______

RESPONSE MANAGER: ________________ DATE: ______

OUTGOING NRC CORRESPONDENCE INPUT VERIFICATION

FACTS #: 92G0299
NLS #: NLS-92-245

DOCUMENT IDENTIFICATION: **Brunswick Nuclear Project - Transfer of Sand/Dirt to SDCP**

INPUT VERIFICATION: For items 1-5 below, attachments to, or notes on the reverse of this page, are acceptable to ensure completeness.

THE ACCURACY OF THE ATTACHED INPUT WAS VERIFIED BY ONE OR MORE OF THE FOLLOWING METHOD(S) [SEE NOTE 1]:

		PACKAGE PREPARER
PERSONAL KNOWLEDGE OF SUBJECT/PROJECT		Tony Harris
INPUT OBTAINED FROM OTHERS (LIST SOURCES)		
Name	Organization	
Jim Davis, Sue Fitzpatrick	E&RC	Tony Harris
Gary Worley	E&RC	Tony Harris
REVIEW OF PLANT TECHNICAL DOCUMENTS (LIST DOCUMENTS)		
UFSAR, Technical Specifications		Tony Harris
VERIFIED BY FIELD OBSERVATIONS (DISCUSS EXTENT)		
OTHER (DESCRIBE)		
6/5/92 MEMO from Spencer to Essig/Carrion		Tony Harris

COMMITMENT ID FORM (NG-5021)	Attached	X	No Commitments	
FSAR CHANGE FORM (NG-5024)	Attached		No FSAR Changes (NOTE 2)	X

RESPONSE MANAGER (See NOTE 1)	**DATE**

NOTE 1: Each individual, b his signature, attests that to the best of his knowledge and based on personal knowledge, reports from cognizant individuals, or reference to appropriate documentation that the input provided is accurate and free from material false statement.

NOTE 2: 10 CFR 50.71(e) requires that the FSAR(s) be revised "to contain all the changes necessary to reflect information and analyses submitted to the Commission."