

GPU NUCLEAR CORPORATION  
OYSTER CREEK NUCLEAR GENERATING STATION  
EFFLUENT RELEASE REPORT  
1986-2  
ADDENDUM #1

18  
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## SUMMARY

### OYSTER CREEK NUCLEAR GENERATING STATION 1986-2 SEMIANNUAL EFFLUENT RELEASE REPORT

The Semiannual Effluent Release Report is submitted to the United States Nuclear Regulatory Commission (NRC) every six months in accordance with the Oyster Creek Nuclear Generating Station (OCNGS) Technical Specifications. It summarizes the radioactive liquid and gaseous effluents released and solid radioactive wastes shipped from the OCNGS. In addition, meteorological data is presented in joint frequency tables per atmospheric stability class. This report concludes that exposures to man from OCNGS radioactive effluents are well below the federal limits contained in Title 10, Part 50 of the Code of Federal Regulations which are considered by the NRC to be acceptable limits to protect the health and welfare of the public.

For clarity, the report is organized into three parts. Section I provides a summary of plant operations for the reporting period. The reactor was shutdown during the period from July 1, 1986 through December 20, 1986 for maintenance and refueling. Reactor startup occurred on December 21, 1986 for low power testing. The generator was placed on-line on December 28, 1986.

Section II summarizes the meteorological data and effluents released from the facility for the reporting period. It itemizes gaseous releases

of 37.1 curies of fission and activation gases, 0.0316 curies of non-particulate halogens, 4.61 curies of tritium, and 0.00232 curies of particulate radioactivity. In addition, 0.00135 curies of dissolved gases, and 1.07 curies of tritium were released in 9 batch liquid releases. Section II also itemizes 694.2 curies of radioactivity, contained in 445 cubic meters of waste, which was shipped offsite in 35 shipments. These releases are similar to or less than releases of nuclear plants of comparable type, age, and size. The report underscores the fact that all effluents released were within the federal regulatory requirements of OCNCS Technical Specifications.

Section III provides an assessment of Oyster Creek's radiological impact on man. Written and tabular output concludes that exposures to man from facility radioactive effluents for this reporting period are well below the federal regulatory limits specified in 10CFR20, 10CFR50, and the OCNCS Technical Specifications.

The OCNCS Technical Specifications were revised during the second quarter of the reporting period. Data are reported accordingly.

II. EFFLUENT AND WASTE DISPOSAL SUMMARY

## EFFLUENT AND WASTE DISPOSAL SUMMARY

### A. Gaseous Effluents

During the reporting period, July 1, 1986 through December 31, 1986, 3.71 E1 curies of fission and activation gases, 6.07 E-4 curies of non-particulate halogens (Iodines) with half-lives greater than eight days, 4.46 E-4 curies of particulates with half-lives greater than eight days, and 4.61 curies of tritium were released. The maximum hourly release rate of gross activity from the stack was estimated to be 3.86 E-4 microcuries per second which was a result of residual particulate activity and occurred between September 23, 1986 and September 26, 1986. The first and second quarter airborne releases for this period are summarized in Tables 1A through 1E which are found on pages 12 through 16.

### B. Liquid Effluents

A total of 1.09 E7 liters of water was processed through the radwaste system. Of this, 6.69 E5 liters containing 1.07 curies of activity were released to the environment. Prior to November 20, 1986, seven liquid releases to the environment were made. No "unidentified" gross radioactivity (beta-gamma) was detected prior to any of these releases, therefore, no maximum concentration of gross radioactivity (beta-gamma) was released to the unrestricted area. The first and second quarter liquid releases for this period are summarized in Tables 2A and 2B which are found on pages 17 and 18.

C. Solid

During the reporting period, a total volume of 4.45 E2 cubic meters of solid waste containing 6.94 E2 curies of radioactivity was shipped off site in 35 shipments. No irradiated fuel was shipped. The solid waste shipments are summarized in Tables 3A and 3B which are found on pages 19 and 20.

D. Meteorological Data

During the reporting period of July 1, 1986 through December 31, 1986, onsite meteorological conditions were monitored and recorded. Joint frequency distribution of wind speed and direction data obtained from the 116 meter (380 feet) and the 10 meter (33 feet) sensors are summarized for each stability class per quarter. Also included are percent of data recovery and cumulative wind roses for 10 meter (33 feet) and 116 meter (380 feet) elevations. The meteorological data for this reporting period are summarized in Tables 4 through 9 which are found on pages 26 through 58 and page 63.

Meteorological data presented in the format described above for the period of January 1, 1986 through June 30, 1986 can be found in the OCNCS Effluent Release Report 1986-1.



TABLE 2A  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1986-2  
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	1st. Total Error %
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A. Fission & activation gases

1. Total releases (not including tritium, gases, alpha)	Ci	*	< LLD	3.0 E1
2. Average diluted concentration during period	uCi/ml	-	-	
3. Percent of applicable limit	%	-	-	

B. Tritium

1. Total release	Ci	*	1.07	3.0 E1
2. Average diluted concentration during period	uCi/ml	-	4.56 E-8	
3. Percent of applicable limit	%	-	1.52 E-3	

C. Dissolved and entrained gases

1. Total release	Ci	*	1.35 E-3	3.0 E1
2. Average diluted concentration during period	uCi/ml	-	5.76 E-11	
3. Percent of applicable limit	%	-	2.87 E-5	

D. Gross alpha radioactivity

1. Total release	Ci	-	1.08 E-5 **	3.0 E1
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E. Volume of waste released (prior to dilution)	liters	0.00	6.69 E5	1.0 E1
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F. Volume of dilution water used during period	liters	5.53 E10	8.82 E10	1.0 E1
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\* NO RELEASES THIS PERIOD.

\*\* REVISED DATA FROM ORIGINAL REPORT

TABLE 2B  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1986-2  
LIQUID EFFLUENTS

Nuclides Released	Unit	BATCH MODE		LLD uCi/ml
		First Quarter	Second Quarter	
Strontium-99	Ci	*	< LLD	4.12 E-8
Strontium-90	Ci	*	< LLD	5.17 E-9
Cesium-134	Ci	*	< LLD	5.73 E-7
Cesium-137	Ci	*	< LLD	5.54 E-7
Iodine-131	Ci	*	< LLD	4.05 E-7
Cobalt-53	Ci		< LLD	4.68 E-7
Cobalt-60	Ci	*	< LLD	1.57 E-6
Iron-59	Ci	*	< LLD	8.04 E-7
Zinc-65	Ci	*	< LLD	7.18 E-7
Manganese-54	Ci	*	< LLD	6.29 E-7
Chromium-51	Ci	*	< LLD	3.42 E-6
Zirconium-95	Ci	*	< LLD	7.22 E-7
Niobium-95	Ci	*	< LLD	3.45 E-7
Molybdenum-99	Ci	*	< LLD	2.62 E-6
Technetium-99m	Ci	*	< LLD	3.83 E-7
Barium-140	Ci	*	< LLD	1.90 E-6
Lanthanum-140	Ci	*	< LLD	6.27 E-7
Cerium-141	Ci	*	< LLD	6.91 E-7
TOTAL FOR PERIOD	Ci	*	< LLD	
Xenon-133	Ci	*	4.52 E-4	2.07 E-6
Xenon-135	Ci	*	8.95 E-4	4.59 E-7
TOTAL FOR PERIOD	Ci	*	1.35 E-3	

\* NO RELEASES THIS PERIOD.



### III. RADIOLOGICAL IMPACT ON MAN

#### RADIOLOGICAL IMPACT ON MAN

Two principle exposure pathways, inhalation and ingestion, are available to gaseous and liquid effluent isotopes, respectively, in the vicinity of Oyster Creek. Intakes via the inhalation pathway are from gaseous effluents, while the ingestion pathway is via consumption of shellfish and fish from Oyster Creek's discharge canal and Barnegat Bay as well as the consumption of garden vegetables. Additionally, a third means of exposure is from direct radiation from Oyster Creek effluents. The maximum hypothetical exposure to any individual from liquid pathways would occur to someone standing at the offsite boundary on the shore of the discharge canal (direct exposure) and who consumes shellfish and fish (ingestion). For purposes of this report this hypothetical individual is designated as Receptor #1. Maximum exposure due to gaseous pathways (inhalation, ingestion, and direct radiation) would depend on the predominant wind direction and the location of persons living in a sector around the plant. The direction and distance for this individual is given in Tables 10 and 11, pages 67 and 68.

The following tables represent the offsite dose summary for the two quarters of the six-month reporting period. The information provided was calculated using the models and methodology outlined in NRC Regulatory Guide 1.109 and proposed NRC Regulatory Guide 1.111. The analysis herein represents the maximum hypothetical liquid and gaseous pathway individual doses (Tables 10, 11, and 12, pages 67, 68, and 69). Also included are the dose limits as given in the Oyster Creek Technical Specifications, the age group, and the receptor location.

For both quarterly periods, the maximum individual exposures resulting from OCNGS operation from all pathways are below the Technical Specification limits.

TABLE 11  
SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR THE  
PERIOD FROM OCTOBER 1, 1986 THROUGH DECEMBER 31, 1986

REPORTING PERIOD - OCTOBER 1, 1986 THROUGH NOVEMBER 19, 1986

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (mRem)	AGE GROUP	LOCATION	
				DIST (m)	DIR (TOWARD)
LIQUID	TOTAL BODY	6.71 E-6	ADULT	RECEPTOR 1	
LIQUID	LIVER	6.71 E-6	ADULT	RECEPTOR 1	
NOBLE GAS*	AIR DOSE ( $\gamma$ -mRAD)	-	-	-	-
NOBLE GAS*	AIR DOSE ( $\beta$ -mRAD)	-	-	-	-
IODINE & * PARTICULATE	-	-	-	-	-

\* NO RELEASES DURING THIS PERIOD.

REPORTING PERIOD - NOVEMBER 20, 1986 THROUGH DECEMBER 31, 1986

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (mRem)	AGE GROUP	LOCATION		TECH SPEC LIMIT
				DIST (m)	DIR (TOWARD)	
LIQUID	TOTAL BODY	8.77 E-6	ADULT	RECEPTOR 1		1.5 mRem/quarter
LIQUID	LIVER	8.77 E-6	ADULT	RECEPTOR 1		5 mRem/quarter
NOBLE GAS	AIR DOSE ( $\gamma$ -mRAD)	1.35 E-3	$\gamma$ -AIR DOSE	430	ESE	5 mRAD/quarter
NOBLE GAS	AIR DOSE ( $\beta$ -mRAD)	1.15 E-4	$\beta$ -AIR DOSE	522	SE	10 mRAD/quarter
I-131, I-133 PARTICULATE	THYROID	9.47 E-4	INFANT	966	SE	7.5 mRem/quarter

TABLE 12  
SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR THE  
PERIOD FROM JULY 1, 1986 THROUGH DECEMBER 31, 1986

EFFLUENT	APPLICABLE ORGAN	ESTIMATED SEMIANNUAL DOSE (mRem)	TECH SPEC LIMIT
LIQUID	TOTAL BODY	8.77 E-6	3 mRem/year
LIQUID	LIVER	8.77 E-6	10 mRem/year
NOBLE GAS	TOTAL BODY	2.75 E-3	500 mRem/year
NOBLE GAS	SKIN	2.83 E-3	3000 mRem/year
NOBLE GAS	AIR DOSE - T (mRad)	1.35 E-3	10 mRAD/year
NOBLE GAS	AIR DOSE - B (mRad)	1.15 E-4	20 mRAD/year
H-3, I-131, I-133 & PARTICULATES	BONE/THYROID	1.06 E-3	1500 mRem/year
I-131, I-133 & PARTICULATES	BONE/THYROID	1.06 E-3	15 mRem/year