



Commonwealth Edison  
Zion Generating Station  
Shiloh Blvd. & Lake Michigan  
Zion, Illinois 60099  
Telephone 708 / 746-2084

February 21, 1990

Director of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Mail Station P1-137  
Washington, DC 20555

Subject: Zion Station Operating Report NRC Dockets 50-295 and 50-304

To Whom It May Concern:

Enclosed is the Radioactive Effluent Report for July through December, 1989 for Zion Nuclear Station.

A copy of this report will be furnished to the NRC Resident Inspector.

Sincerely,

*for* T. P. Joyce  
Station Manager  
Zion Station

TPJ/BT/es

Enclosure

cc: Distribution List

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NRC Resident Inspector  
Zion Station

• Station Manager  
Zion Station

Chemistry Department  
Zion Station

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

A. Gaseous Effluents Released - Summary Sheet

	Units	July	August	September	Third Quarter
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1. Gross Radioactivity Releases

a. Total Release	Ci	2.2 E+1	5.4 E+1	6.6 E+1	1.4 E+2
b. Max. Release Rate	μCi/Hr	3.5 E+4	8.8 E+4	5.8 E+5	5.8 E+5
c. % of Quarterly Limit (5mRy/10mR B) <sup>1</sup>	%	--	--	--	0.11 0.33

2. Iodine Releases

a. Total I-131, I-133	Ci	7.9 E-5	2.5 E-4	6.7 E-4	1.0 E-3
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3. Particulate Releases

a. Gross Radioactivity	Ci	1.6 E-3	8.7 E-4	2.7 E-4	2.7 E-3
b. Gross Alpha Radioactivity <sup>2</sup>	Ci	--	--	--	--
c. Gross Particulate with Half Lives > 8 Days	Ci	2.6 E-4	2.4 E-4	5.6 E-5	5.6 E-4

4. Sum of I-131, I-133 & Particulate With Half Lives Greater Than 8 Days

a. Total	Ci	3.6 E-4	4.9 E-4	7.3 E-5	9.2 E-4
b. % of Quarterly Limit (7.5 mR Organ)	%	--	--	--	0.26

5. Tritium Releases

a. Total Release	Ci	1.4 E+1	8.3 E0	1.1 E0	2.3 E+1
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1 - Noble Gas Gamma/Beta

2 - Data will be presented in an errata to the Semi-Annual Report

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
GASEOUS EFFLUENTS - VENT STACK RELEASES

A. Gaseous Effluents Released - Isotopes

Isotopes Released	Units	July	August	September	Third Quarter
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1. Gross Radioactivity Releases

Ar-41	Ci	2.0 E-2	1.2 E-2	5.6 E-1	5.9 E-1
Kr-85		<LLD	1.9 E-1	7.6 E-1	9.5 E-1
Kr-85M		<LLD	<LLD	<LLD	<LLD

Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88		<LLD	<LLD	6.2 E-1	6.2 E-1

Xe-131	Ci	<LLD	<LLD	<LLD	<LLD
Xe-131M		<LLD	8.4 E-3	3.2 E-1	3.3 E-1
Xe-133		2.1 E+1	5.1 E+1	6.3 E+1	1.4 E+2
Xe-133M		<LLD	<LLD	9.5 E-2	9.5 E-2

Xe-135	Ci	1.2 E0	3.2 E0	3.7 E-1	4.8 E0
Xe-135M		<LLD	<LLD	<LLD	<LLD
Xe-138		<LLD	<LLD	<LLD	<LLD

	Ci				

	Ci				

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
GASEOUS EFFLUENTS - VENT STACK RELEASES

B. Gaseous Effluents Released - Isotopes (continued)

Isotopes Released	Units	July	August	September	Third Quarter
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2. Iodine Releases

Na-24	Ci	2.2 E-8	9.4 E-9	5.8 E-8	8.9 E-8
Mn-54		<LLD	<LLD	8.6 E-10	8.6 E-10

Co-58	Ci	<LLD	<LLD	1.8 E-7	1.8 E-7
Co-60		3.5 E-9	9.7 E-9	7.7 E-9	2.1 E-8
Co-57		<LLD	<LLD	<LLD	<LLD

Se-75	Ci	<LLD	<LLD	<LLD	<LLD
Br-82		3.0 E-6	3.0 E-6	2.5 E-6	8.5 E-6
Rb-88		<LLD	<LLD	<LLD	<LLD

	Ci				
Ru-105		<LLD	<LLD	<LLD	<LLD
I-130		<LLD	<LLD	<LLD	<LLD
Ag-110M		<LLD	<LLD	<LLD	<LLD
Sn-113		<LLD	<LLD	4.4 E-10	4.4 E-10

I-131	Ci	2.8 E-5	1.5 E-4	6.4 E-4	8.2 E-4
I-132		5.0 E-6	8.2 E-6	1.7 E-5	3.0 E-5
I-133		7.3 E-5	9.9 E-5	3.2 E-5	2.0 E-4
I-134		6.7 E-7	8.0 E-6	3.9 E-7	9.1 E-6
Cs-134		4.1 E-8	7.2 E-8	6.2 E-9	1.2 E-7

I-135	Ci	3.0 E-4	5.4 E-4	3.3 E-6	8.4 E-4
Ce-144		<LLD	<LLD	<LLD	<LLD
Cs-136		<LLD	<LLD	<LLD	<LLD
Cs-137		3.9 E-9	8.8 E-4	1.0 E-8	8.8 E-4
Cs-138		<LLD	<LLD	1.5 E-7	1.5 E-7

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT 1989  
GASEOUS EFFLUENTS - VENT STACK RELEASES

B. Gaseous Effluents Released - Isotopes (continued)

Isotopes Released	Units	July	August	September	Third Quarter
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3. Particulate Releases

Na-24	Ci	9.7 E-7	7.0 E-7	1.2 E-5	1.4 E-5
Mn-54		4.8 E-9	4.9 E-8	8.6 E-8	1.4 E-7
Mn-56		1.4 E-8	5.3 E-8	4.9 E-8	1.2 E-7

Co-58	Ci	1.0 E-8	2.8 E-8	8.0 E-7	8.4 E-7
Co-60		1.4 E-8	7.0 E-6	8.3 E-7	7.8 E-6

	Ci				
Br-82		3.8 E-9	2.1 E-8	1.4 E-8	3.9 E-8

Rb-88	Ci	2.3 E-4	1.9 E-4	4.6 E-5	4.7 E-4
Sr-89 <sup>1</sup>		--	--	--	--
Sr-90 <sup>1</sup>		--	--	--	--

Sr-91	Ci	<LLD	1.8 E-8	1.1 E-7	1.3 E-7
Sr-92		<LLD	<LLD	<LLD	<LLD
Nb-95		<LLD	<LLD	<LLD	<LLD

	Ci				
Mo-99		4.3 E-8	2.0 E-6	1.8 E-7	2.2 E-6
Tc-99M		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

1 - Data will be presented in an errata to the Semi-Annual Report



ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
GASEOUS EFFLUENTS - VENT STACK RELEASES

B. Gaseous Effluents Released - Isotopes (continued)

Isotopes Released	Units	July	August	September	Third Quarter
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3. Particulate Releases(continued)

Ru-103	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110M		<LLD	3.1 E-9	<LLD	1.1 E-9

Sb-122	Ci	<LLD	<LLD	<LLD	<LLD
Sb-124		<LLD	<LLD	<LLD	<LLD
I-131		1.5 E-7	1.1 E-6	2.2 E-7	1.5 E-6
I-132		4.3 E-7	7.0 E-7	1.5 E-7	1.3 E-6
Te-132		<LLD	<LLD	<LLD	<LLD

I-133	Ci	5.2 E-7	1.2 E-6	2.6 E-7	2.0 E-6
Cs-134		1.7 E-6	1.4 E-5	1.3 E-6	1.7 E-5
I-134		6.8 E-8	7.3 E-8	<LLD	1.4 E-7
I-135		7.1 E-7	7.5 E-7	1.3 E-7	1.6 E-6

Cs-136	Ci	<LLD	2.9 E-6	3.9 E-8	2.9 E-6
Cs-137		1.9 E-6	2.4 E-6	5.1 E-7	4.8 E-6
Cs-138		2.2 E-5	2.5 E-5	6.1 E-6	5.3 E-5
Ba-139		1.1 E-7	4.3 E-7	3.7 E-7	9.1 E-7

Ba-140	Ci	4.1 E-9	1.2 E-7	1.5 E-7	2.7 E-7
La-140		1.8 E-9	3.2 E-8	2.7 E-8	6.1 E-8

W-187	Ci	8.8 E-9	1.7 E-8	1.3 E-8	3.9 E-8
Bi-214		<LLD	<LLD	<LLD	<LLD
Pb-214		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

UNIT 1

C. Liquid Effluents Released - Summary Sheet

	Units	July	August	September	Third Quarter
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1. Gross Radioactivity<sup>1</sup>

a. Total Release	Ci	<LLD	2.6 E-2	1.3 E-2	3.9 E-2
b. Avg. Concentration Released	μCi/ml	<LLD	7.6 E-10	7.4 E-10	5.0 E-10
c. Max. Concentration Released	μCi/ml	<LLD	1.9 E-8	1.6 E-8	1.9 E-8
d. % of Tech. Spec. Qtr. Limit (1.5mR/5mR) <sup>2</sup>	%		--	--	0.00
					0.00
e. % of Tech. Spec. Yearly Limit (3mR/10mR) <sup>2</sup>	%		--	--	0.03
					0.01

2. Tritium

a. Total Release	Ci	6.7 E-3	1.1 E+1	7.8 E0	1.9 E+1
b. Avg. Concentration Released	μCi/ml	3.3 E-10	3.2 E-7	4.4 E-7	2.5 E-7

3. Dissolved Noble Gases

a. Total Release	Ci	3.9 E-5	1.8 E-2	4.7 E-2	6.5 E-2
b. Avg. Concentration Released	μCi/ml	1.9 E-12	5.3 E-10	2.7 E-9	1.1 E-9

4. Gross Alpha Radioactivity

a. Total Release	Ci	5.9 E-6	7.3 E-6	2.8 E-6	1.6 E-5
b. Avg. Concentration Released	μCi/ml	2.9 E-13	2.1 E-13	1.6 E-13	2.2 E-13

5. Volume of Liquid Waste to Discharge

	Liters	1.9 E+6	2.4 E+6	9.5 E+5	5.3 E+6
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6. Volume of Dilution Water

	Liters	1.1 E+11	1.1 E+11	3.7 E+10	2.6 E+11
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1 - Excludes Tritium, Alpha, and Dissolved Noble Gases  
2 - Whole body/organ  
<LLD - No detectable activity above background

ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS  
UNIT 1

D. Liquid Effluents Released - Isotopes

Isotopes Released	Units	July	August	September	Third Quarter
Na-24	Ci	<LLD	<LLD	<LLD	<LLD
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54		<LLD	4.0 E-5	1.8 E-4	2.2 E-4
Co-57		<LLD	<LLD	2.0 E-5	2.0 E-5
Co-58		<LLD	9.6 E-4	2.6 E-3	3.6 E-3
Fe-59		<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	3.3 E-3	5.5 E-3	8.8 E-3
Kr-85M		<LLD	<LLD	2.7 E-5	2.7 E-5
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88		<LLD	<LLD	<LLD	<LLD
Rb-88		<LLD	<LLD	2.1 E-4	2.1 E-4
Sr-89 <sup>1</sup>		--	--	--	--
Sr-90 <sup>1</sup>		--	--	--	--
Sr-92		<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	8.7 E-4	8.7 E-4
Zr-95		<LLD	<LLD	3.4 E-4	3.4 E-4
Mo-99		<LLD	<LLD	<LLD	<LLD
Tc-99M		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

1 - Data will be presented in an errata to the Semi-Annual Report

ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS  
UNIT 1

D. Liquid Effluents Released - Isotopes (continued)

Isotopes Released	Units	July	August	September	Third Quarter
	Cl				
Ru-105		<LLD	<LLD	<LLD	<LLD
Sn-113		<LLD	<LLD	<LLD	<LLD
Ag-110M		<LLD	2.1 E-2	1.0 E-3	2.2 E-2
	Cl				
Sb-122		<LLD	<LLD	<LLD	<LLD
Sb-124		<LLD	<LLD	6.6 E-5	6.6 E-5
Sb-125		<LLD	1.1 E-4	9.5 E-4	1.1 E-3
Xe-131M		<LLD	4.0 E-4	<LLD	4.0 E-4
	Cl				
I-131		<LLD	2.3 E-5	<LLD	2.3 E-5
I-132		<LLD	<LLD	<LLD	<LLD
I-133		<LLD	<LLD	<LLD	<LLD
Xe-133		3.9 E-5	1.7 E-2	4.6 E-2	6.3 E-2
	Cl				
Xe-133M		<LLD	2.9 E-4	4.2 E-4	7.1 E-4
Cs-134		<LLD	2.9 E-5	4.5 E-4	4.8 E-4
I-134		<LLD	<LLD	<LLD	<LLD
Xe-135		<LLD	3.1 E-4	1.8 E-3	2.1 E-3
	Cl				
Cs-136		<LLD	<LLD	<LLD	<LLD
Cs-137		<LLD	5.9 E-5	7.2 E-4	7.8 E-4
Cs-138		<LLD	<LLD	<LLD	<LLD
	Cl				
La-140		<LLD	1.5 E-4	8.8 E-5	2.4 E-4
W-187		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

UNIT 2

C. Liquid Effluents Released -- Summary Sheet

	Units	July	August	September	Third Quarter
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1. Gross Radioactivity<sup>1</sup>

a. Total Release	Ci	1.6 E-1	1.6 E-1	1.2 E-1	4.4 E-1
b. Avg. Concentration Released	μCi/ml	1.4 E-9	1.4 E-9	1.0 E-9	1.3 E-9
c. Max. Concentration Released	μCi/ml <sup>2</sup>	9.2 E-9	7.4 E-9	9.2 E-9	9.2 E-9
d. % of Tech. Spec. Qtr. Limit (1.5mR/5mR) <sup>2</sup>	%	--	--	--	0.02
e. % of Tech. Spec. Yearly Limit (3mR/10mR) <sup>2</sup>	%	--	--	--	0.08
					0.03

2. Tritium

a. Total Release	Ci	7.6 E+1	8.5 E+1	6.2 E+1	2.2 E+2
b. Avg. Concentration Released	μCi/ml	6.7 E-7	7.5 E-7	5.3 E-7	6.5 E-7

3. Dissolved Noble Gases

a. Total Release	Ci	1.3 E-1	5.2 E-1	3.6 E-1	1.0 E0
b. Avg. Concentration Released	μCi/ml	1.2 E-9	4.6 E-9	3.1 E-9	3.0 E-9

4. Gross Alpha Radioactivity

a. Total Release	Ci	4.9 E-5	6.9 E-5	3.5 E-5	1.5 E-4
b. Avg. Concentration Released	μCi/ml	4.3 E-13	6.1 E-13	3.0 E-13	4.5 E-13

5. Volume of Liquid Waste to Discharge	Liters	1.5 E+7	1.7 E+7	2.0 E+7	5.2 E+7
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6. Volume of Dilution Water	Liters	1.3 E+11	1.3 E+11	1.3 E+11	3.9 E+11
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- 1 - Excludes Tritium, Alpha, and Dissolved Noble Gases
- 2 - Whole Body/Organ
- <LLD - No detectable activity above background

ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS  
UNIT 2

D. Liquid Effluents Released - Isotopes

Isotopes Released	Units	July	August	September	Third Quarter
Na-24	Ci	<LLD	3.2 E-5	6.8 E-5	1.0 E-4
Ar-41		<LLD	<LLD	<LLD	<LLD
Cr-51	Ci	1.0 E-2	<LLD	2.8 E-3	1.3 E-2
Mn-54		2.5 E-3	4.4 E-4	4.2 E-4	3.4 E-3
Co-57		2.4 E-4	<LLD	1.4 E-5	2.5 E-4
Co-58		6.5 E-2	1.1 E-2	5.2 E-2	1.3 E-1
Fe-59		1.0 E-3	<LLD	7.5 E-4	1.8 E-3
Co-60	Ci	4.7 E-2	2.2 E-2	1.3 E-2	8.2 E-2
Kr-85M		<LLD	<LLD	3.6 E-5	3.6 E-5
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88		<LLD	<LLD	<LLD	<LLD
Sr-89 <sup>1</sup>		--	--	--	--
Sr-90 <sup>1</sup>	Ci	--	--	--	--
Sr-92		<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	1.3 E-2	1.7 E-4	3.4 E-4	1.4 E-2
Zr-95		6.7 E-3	8.0 E-5	1.4 E-4	6.9 E-3
Mo-99		4.6 E-5	1.1 E-5	4.1 E-4	4.7 E-4
Tc-99M		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

1 - Data will be presented in an errata to the Semi-Annual Report

ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS  
UNIT 2

D. Liquid Effluents Released - Isotopes (continued)

Isotopes Released	Units	July	August	September	Third Quarter
Ru-103	Ci	<LLD	<LLD	1.6 E-5	1.6 E-5
Ru-105		<LLD	<LLD	<LLD	<LLD
Sn-113		1.2 E-3	<LLD	1.1 E-4	1.3 E-3
Sn-117M		<LLD	<LLD	4.3 E-4	4.3 E-4
Ag-110M		1.1 E-2	1.2 E-1	3.9 E-3	1.3 E-1
Sb-122	Ci	<LLD	<LLD	<LLD	<LLD
Sb-124		2.0 E-4	2.6 E-3	7.8 E-3	1.1 E-2
Sb-125		2.5 E-3	7.3 E-4	9.6 E-3	1.3 E-2
Sb-126		<LLD	<LLD	7.4 E-5	7.4 E-5
Xe-131M		<LLD	2.0 E-3	3.8 E-3	5.8 E-3
Te-132		<LLD	<LLD	3.9 E-4	3.9 E-4
I-131	Ci	4.9 E-4	4.2 E-4	1.6 E-2	1.7 E-2
I-132		<LLD	<LLD	4.3 E-4	4.3 E-4
I-133		2.3 E-4	1.3 E-4	3.3 E-3	3.7 E-3
Xe-133		1.3 E-1	5.0 E-1	3.5 E-1	9.8 E-1
Xe-133M	Ci	8.6 E-4	1.0 E-2	2.6 E-3	1.3 E-2
Cs-134		5.5 E-4	1.4 E-3	3.1 E-3	5.1 E-3
I-134		<LLD	<LLD	<LLD	<LLD
I-135		<LLD	<LLD	<LLD	<LLD
Xe-135		2.9 E-3	1.0 E-2	7.8 E-3	2.1 E-2
Cs-136	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137		1.2 E-3	2.3 E-3	4.5 E-3	8.0 E-3
Cs-138		<LLD	<LLD	<LLD	<LLD
Ba-140		<LLD	<LLD	<LLD	<LLD
La-140	Ci	4.8 E-5	6.4 E-4	9.7 E-4	1.7 E-3
W-187		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

A. Gaseous Effluents Released - Summary Sheet

	Units	October	November	December	Fourth Quarter
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1. Gross Radioactivity Releases

a. Total Release	Ci	2.4 E0	1.2 E-1	1.6 E0	4.1 E0
b. Max. Release Rate	μCi/Hr.	0	7.7 E+2	2.4 E+5	2.4 E+5
c. % of Quarterly Limit (5mRy/10mR B) <sup>1</sup>	%	--	--	--	0.03 0.02

2. Iodine Releases

a. Total I-131, I-133	Ci	2.7 E-4	9.6 E-6	9.6 E-6	2.9 E-4
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3. Particulate Releases

a. Gross Radioactivity		1.5 E-3	3.0 E-4	1.5 E-4	2.0 E-3
b. Gross Alpha Radioactivity <sup>2</sup>	Ci	--	--	--	--
c. Gross Particulate with Half Lives > 8 Days	Ci	4.3 E-5	4.5 E-5	7.3 E-5	1.6 E-4

4. Sum of I-131, I-133 & Particulate With Half Lives Greater Than 8 Days

a. Total	Ci	3.1 E-4	5.5 E-5	8.3 E-5	4.5 E-4
b. % of Quarterly Limit (7.5 mR Organ)	%	--	--	--	0.05

5. Tritium Releases

a. Total Release	Ci	2.8 E0	8.0 E-1	1.3 E0	4.9 E0
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1 - Noble Gas Gamma/Beta

2 - Data will be presented in an errata to the Semi-Annual Report

<LLD - No detectable activity above background



ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT 1989  
GASEOUS EFFLUENTS - VENT STACK RELEASES

B. Gaseous Effluents Released - Isotopes

Isotopes Released	Units	October	November	December	Fourth Quarter
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1. Gross Radioactivity Releases

Ar-41	C1	1.8 E0	6.8 E-2	9.1 E-1	2.8 E0
Kr-85		<LLD	<LLD	2.2 E-1	2.2 E-1
Kr-85M		2.0 E-2	1.2 E-3	1.0 E-2	3.1 E-2

Kr-87	C1	5.0 E-2	1.2 E-3	1.0 E-2	6.1 E-2
Kr-88		7.0 E-2	1.2 E-3	3.1 E-1	3.8 E-1

Xe-131	C1	<LLD	<LLD	<LLD	<LLD
Xe-131M		<LLD	<LLD	<LLD	<LLD
Xe-133		9.0 E-2	2.4 E-3	3.5 E-2	1.3 E-1
Xe-133M		<LLD	<LLD	1.8 E-4	1.8 E-4

Xe-135	C1	1.9 E-1	4.6 E-2	1.1 E-1	3.5 E-1
Xe-135M		5.0 E-2	<LLD	<LLD	5.0 E-2
Xe-138		9.0 E-2	3.6 E-3	<LLD	9.4 E-2

	C1				

	C1				

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
GASEOUS EFFLUENTS - VENT STACK RELEASES

B. Gaseous Effluents Released - Isotopes (continued)

Isotopes Released	Units	October	November	December	Fourth Quarter
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2. Iodine Releases

Na-24	C1	6.6 E-8	1.3 E-6	8.6 E-8	1.5 E-6

Co-58	C1	<LLD	5.8 E-7	1.8 E-7	7.6 E-7
Co-60		1.9 E-5	8.0 E-7	5.5 E-7	2.0 E-5

	C1				
Br-82		1.0 E-6	1.4 E-6	1.0 E-6	3.4 E-6
Rb-88		<LLD	<LLD	<LLD	<LLD

Mo-99	C1	<LLD	<LLD	<LLD	<LLD
Ag-110M		<LLD	<LLD	<LLD	<LLD

I-131	C1	2.7 E-4	9.3 E-6	4.0 E-6	2.8 E-4
I-132		<LLD	<LLD	7.5 E-7	7.5 E-7
I-133		3.0 E-6	3.0 E-7	5.6 E-6	8.9 E-6
I-134		<LLD	<LLD	7.3 E-7	7.3 E-7
Cs-134		<LLD	<LLD	8.1 E-9	8.1 E-9

I-135	C1	1.9 E-8	3.9 E-8	1.1 E-6	1.2 E-6
Ba-140		<LLD	<LLD	<LLD	<LLD
Cs-136		<LLD	<LLD	<LLD	<LLD
Cs-137		<LLD	<LLD	1.0 E-8	1.0 E-8
Cs-138		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
GASEOUS EFFLUENTS - VENT STACK RELEASES

B. Gaseous Effluents Released - Isotopes (continued)

Isotopes Released	Units	October	November	December	Fourth Quarter
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3. Particulate Releases

Na-24	Ci	1.0 E-6	2.8 E-6	1.8 E-5	2.2 E-5
Cr-51		<LLD	3.4 E-6	<LLD	3.4 E-6
Mn-54		<LLD	1.9 E-6	3.8 E-9	1.9 E-6
Mn-56		<LLD	<LLD	<LLD	<LLD

Co-58	Ci	2.1 E-6	1.4 E-5	1.6 E-7	1.6 E-5
Co-60		3.6 E-5	2.3 E-5	2.4 E-7	5.9 E-5

	Ci				
Br-82		<LLD	<LLD	<LLD	<LLD
Br-84		<LLD	<LLD	<LLD	<LLD

Rb-88	Ci	<LLD	<LLD	6.2 E-5	6.2 E-5
Rb-89		<LLD	<LLD	<LLD	<LLD
Sr-89 <sup>1</sup>		--	--	--	--
Sr-90 <sup>1</sup>		--	--	--	--

Sr-91	Ci	<LLD	<LLD	<LLD	<LLD
Sr-92		<LLD	<LLD	<LLD	<LLD
Nb-95		1.4 E-9	5.6 E-6	6.7 E-9	5.6 E-6

Zr-95	Ci	<LLD	3.4 E-6	2.4 E-9	3.4 E-6
Mo-99		<LLD	<LLD	2.9 E-10	2.9 E-10
Tc-99M		<LLD	<LLD	8.3 E-8	8.3 E-8

<LLD - No detectable activity above background

1 - Data will be presented in an errata to the Semi-Annual Report

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
GASEOUS EFFLUENTS - VENT STACK RELEASES

B. Gaseous Effluents Released - Isotopes (continued)

Isotopes Released	Units	October	November	December	Fourth Quarter
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3. Particulate Releases (continued)

Ru-103	C1	4.6 E-8	<LLD	<LLD	4.6 E-8
Ag-110M		<LLD	<LLD	1.8 E-8	1.8 E-8

Sb-122	C1	<LLD	<LLD	<LLD	<LLD
I-131		<LLD	9.5 E-10	2.3 E-8	2.4 E-8
I-132		<LLD	<LLD	3.9 E-7	3.9 E-7
Te-132		<LLD	<LLD	<LLD	<LLD

I-133	C1	8.0 E-9	3.0 E-8	3.7 E-7	4.1 E-7
Cs-134		1.9 E-6	2.1 E-7	1.5 E-7	2.3 E-6
I-134		<LLD	<LLD	<LLD	<LLD
I-135		<LLD	<LLD	5.7 E-7	5.7 E-7

Cs-136	C1	<LLD	<LLD	<LLD	<LLD
Cs-137		2.9 E-6	5.1 E-7	1.9 E-7	3.6 E-6
Cs-138		<LLD	<LLD	9.6 E-7	9.6 E-6
Ba-139		<LLD	<LLD	3.9 E-7	3.9 E-7

Ba-140	C1	<LLD	<LLD	<LLD	<LLD
La-140		<LLD	<LLD	<LLD	<LLD
Ba-142		<LLD	<LLD	<LLD	<LLD

W-187	C1	<LLD	<LLD	2.9 E-7	2.9 E-7
Bi-214		<LLD	<LLD	<LLD	<LLD
Pb-214		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

UNIT 1

C. Liquid Effluents Released - Summary Sheet

	Units	October	November	December	Fourth Quarter
1. Gross Radioactivity <sup>1</sup>					
a. Total Release	Ci	No	No	No	No Releases
b. Avg. Concentration Released	µCi/ml	Releases	Releases	Releases	This Quarter
c. Max. Concentration Released	µCi/ml	This	This	This	
d. % of Tech. Spec. Qtr. Limit (1.5mR/5mR) <sup>2</sup>	%	Month	Month	Month	0.00
e. % of Tech. Spec. Yearly Limit (3mR/10mR) <sup>2</sup>	%				0.03
					0.01
2. Tritium					
a. Total Release	Ci				
b. Avg. Concentration Released	µCi/ml				
3. Dissolved Noble Gases					
a. Total Release	Ci				
b. Avg. Concentration Released	µCi/ml				
4. Gross Alpha Radioactivity					
a. Total Release	Ci				
b. Avg. Concentration Released	µCi/ml				
5. Volume of Liquid Waste to Discharge	Liters				
6. Volume of Dilution Water	Liters	1.1 E+10	2.3 E+10	4.9 E+10	8.3 E+10

1 - Excludes Tritium, Alpha, and Dissolved Noble Gases

2 - Whole body/organ

<LLD - No detectable activity above background

ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS  
UNIT 1

D. Liquid Effluents Released - Isotopes

Isotopes Released	Units	October	November	December	Fourth Quarter
Na-24	C1	No Releases This Month	No Releases This Month	No Releases This Month	No Releases This Quarter
Ar-41					
Cr-51	C1				
Mn-54					
Co-57					
Co-58					
Fe-59					
Fe-55					
Co-60	C1				
Kr-85M					
Kr-85	C1				
Kr-88					
Rb-88					
Sr-89					
Sr-90	C1				
Sr-92					
Nb-95	C1				
Zr-95					
Mo-99					

<LLD - No detectable activity above background

1 - Data will be presented in errata to Semi-Annual Report

ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS  
UNIT 1

D. Liquid Effluents Released - Isotopes (continued)

Isotopes Released	Units	October	November	December	Fourth Quarter
Ru-103	Ci	No	No	No	No
Ru-105		Releases	Releases	Releases	Releases
Sn-113		This	This	This	This
Sn-117M		Month	Month	Month	Quarter
Ag-110M					
Sb-122	Ci				
Sb-124					
Sb-125					
Xe-131M					
I-131	Ci				
I-132					
I-133					
Xe-133					
Xe-133M	Ci				
Cs-134					
I-134					
I-135					
Xe-135					
Cs-136	Ci				
Cs-137					
Cs-138					
La-140	Ci				
W-187					

<LLD - No detectable activity above background

ZION STATION

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

UNIT 2

C. Liquid Effluents Released - Summary Sheet

	Units	October	November	December	Fourth Quarter
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1. Gross Radioactivity<sup>1</sup>

a. Total Release	Ci	4.5 E-1	2.3 E-1	1.3 E-1	8.1 E-1
b. Avg. Concentration Released	µCi/ml	3.8 E-9	1.9 E-9	1.3 E-9	2.3 E-9
c. Max. Concentration Released	µCi/ml	1.1 E-8	1.5 E-8	7.8 E-9	1.5 E-8
d. % of Tech. Spec. Qtr. Limit (1.5mR/5mR) <sup>2</sup>	%	--	--	--	0.03 0.02
e. % of Tech. Spec. Yearly Limit (3mR/10mR) <sup>2</sup>	%	--	--	--	0.08 0.11

2. Tritium

a. Total Release	Ci	2.9 E+1	6.4 E+1	3.9 E+1	1.3 E+2
b. Avg. Concentration Released	µCi/ml	2.4 E-7	5.4 E-7	3.8 E-7	3.9 E-7

3. Dissolved Noble Gases

a. Total Release	Ci	6.1 E-3	4.9 E-3	3.7 E-3	1.5 E-2
b. Avg. Concentration Released	µCi/ml	5.1 E-11	4.1 E-11	3.6 E-11	4.3 E-11

4. Gross Alpha Radioactivity

a. Total Release	Ci	1.6 E-5	1.1 E-4	9.3 E-5	2.2 E-4
b. Avg. Concentration Released	µCi/ml	1.3 E-13	9.2 E-13	9.1 E-13	6.5 E-13

5. Volume of Liquid Waste to Discharge	Liters	1.8 E+7	2.0 E+7	2.7 E+7	6.5 E+7
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6. Volume of Dilution Water	Liters	1.4 E+11	8.9 E+10	1.1 E+11	3.4 E+11
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- 1 - Excludes Tritium, Alpha, and Dissolved Noble Gases  
2 - Whole Body/Organ  
<LLD - No detectable activity above background



ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT 1989  
LIQUID EFFLUENTS  
UNIT 2

D. Liquid Effluents Released - Isotopes

Isotopes Released	Units	October	November	December	Fourth Quarter
Na-24	Ci	1.2 E-3	1.1 E-4	8.2 E-6	1.3 E-3
Cr-51	Ci	3.7 E-2	2.4 E-2	7.0 E-3	6.8 E-2
Mn-54		4.0 E-4	1.5 E-3	9.9 E-4	2.9 E-3
Co-57		1.2 E-3	8.1 E-5	2.8 E-5	1.3 E-3
Co-58		2.4 E-1	9.3 E-2	5.2 E-2	3.9 E-1
Fe-59		9.1 E-4	2.0 E-3	1.1 E-3	4.0 E-3
Co-60	Ci	3.5 E-2	4.0 E-2	1.9 E-2	9.4 E-2
Zn-65		<LLD	7.5 E-5	<LLD	7.5 E-5
Se-75		1.6 E-4	<LLD	<LLD	1.6 E-4
Kr-85M		<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88		2.6 E-4	<LLD	<LLD	2.6 E-4
Rb-88		<LLD	<LLD	<LLD	<LLD
Sr-89 <sup>1</sup>		--	--	--	--
Sr-90 <sup>1</sup>	Ci	--	--	--	--
Sr-92		<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	3.6 E-3	8.3 E-3	4.0 E-3	1.6 E-2
Zr-95		1.8 E-3	4.8 E-3	2.4 E-3	9.0 E-3
Mo-99		<LLD	<LLD	9.3 E-5	9.3 E-5

<LLD - No detectable activity above background

1 - Waiting for analysis results - Data will be presented in an errata to the Semi-Annual Report

ZION STATION  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1989  
LIQUID EFFLUENTS  
UNIT 2

D. Liquid Effluents Released - Isotopes

Isotopes Released	Units	October	November	December	Fourth Quarter
Ru-103	Ci	8.7 E-5	2.9 E-4	<LLD	3.8 E-4
Ru-105		<LLD	<LLD	<LLD	<LLD
Sn-113		1.2 E-3	1.6 E-3	6.2 E-4	3.4 E-3
Sn-117M		6.9 E-4	6.6 E-4	<LLD	1.4 E-3
Ag-110M		1.5 E-2	9.3 E-3	8.4 E-3	3.3 E-2
Sb-122	Ci	<LLD	<LLD	<LLD	<LLD
Sb-124		5.1 E-2	1.8 E-2	7.9 E-3	7.7 E-2
Sb-125		4.2 E-2	1.9 E-2	1.8 E-2	7.9 E-2
Sb-126		7.4 E-5	<LLD	<LLD	7.4 E-5
Xe-131M		<LLD	<LLD	<LLD	<LLD
I-131	Ci	5.6 E-3	<LLD	2.9 E-4	5.9 E-3
I-132		<LLD	<LLD	<LLD	<LLD
I-133		3.2 E-5	<LLD	7.6 E-4	7.9 E-4
Xe-133		5.8 E-3	4.8 E-3	3.7 E-3	1.4 E-2
Xe-133M	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134		3.6 E-3	4.3 E-3	3.7 E-3	1.2 E-2
I-134		<LLD	<LLD	<LLD	<LLD
I-135		<LLD	<LLD	5.5 E-5	5.5 E-5
Xe-135		8.9 E-5	7.9 E-5	4.5 E-5	2.1 E-4
Cs-136	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137		6.7 E-3	6.9 E-3	5.4 E-3	1.9 E-2
Cs-138		<LLD	<LLD	<LLD	<LLD
Ba-140		<LLD	<LLD	<LLD	<LLD
La-140	Ci	3.6 E-5	6.8 E-6	1.6 E-5	5.9 E-5
W-187		<LLD	<LLD	<LLD	<LLD

<LLD - No detectable activity above background

ZION GENERATING STATION UNIT 1/2

Month JULY Year 1989

SOLID RADIOACTIVE WASTE

(Tech Spec 6.6.1.D.3)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft³)	Activity * (millicuries)
07/18/89	BARNWELL	Solidified Spent Bead Resins	Co-58(M) Cs-134(M) Ni-63(E) Cs-137(M) Ca-60(M)	LSA	8-120B	CNSI-MIX Cement	125.2	690,075.76(C)
07/25/89	BARNWELL	Dewatered Spent Bead Resins	Cs-137(M) Co-58(M) Cs-134(M) Co-60(M) Fe-55(E)	LSA	14-215	N/A	205.8	18,084.72(C)

MONTH TOTAL

331.0 / 708,160.48(C)

\* Specify whether measured (M), estimated (E), or a combination (C).

ZION GENERATING STATION UNIT 1/2

Month     AUGUST     Year     1989    

SOLID RADIOACTIVE WASTE

(Tech Spec 6.6.1.D.3)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft <sup>3</sup> )	Activity * (millicuries)
08/08/89	BARNWELL	Solidified Spent Bead Resins	Co-60(M) Cs-134(M) Co-58(M) Cs-137(M) Ni-63(E)	LSA	8-120A	CNSI - Mix Cement	125.2	261,825.51(C)
08/09/89	BARNWELL	Dewatered Spent Bead Resins	Fe-55(E) Co-60(M) C-14(E) Cs-137(M) I-131(M)	LSA	14-215-H	N/A	205.8	182.02(C)
08/29/89	BARNWELL	Solidified Spent Bead Resins	Co-60(M) Fe-55(E) Ni-63(E) Cs-137(M) Co-58(M)	LSA	8-120B	CNSI - Mix Cement	125.2	60,166.67(C)

MONTH TOTAL

    456.2         322,174.20(C)    

\* Specify whether measured (M), estimated (E), or a combination (C).

ZION GENERATING STATION UNIT 1/2

Month SEPTEMBER Year 1989

SOLID RADIOACTIVE WASTE

(Tech Spec 6.6.1.D.3)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft <sup>3</sup> )	Activity * (millicuries)
09/12/89	BARNWELL	Dewatered Spent Bead Resins	Co-58(M) Cs-137(M) Fe-55(E) Cs-134(M) Co-60(M)	LSA	14-215	N/A	205.8	1,987.44(C)
09/25/89	BARNWELL	Dewatered Spent Bead Resins	Cs-137(M) Co-58(M) Cs-134(M) Fe-55(E) Co-60(M)	LSA	14-195	N/A	205.8	2,019.88(C)

MONTH TOTAL

411.6 4,007.32(C)

\* Specify whether measured (M), estimated (E), or a combination (C).

ZION GENERATING STATION UNIT 1/2

Month OCTOBER Year 1989

SOLID RADIOACTIVE WASTE

(Tech Spec 6.6.1.D.3)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft <sup>3</sup> )	Activity * (millicuries)
10/24/89	BARNWELL	Dewatered Spent Bead Resins	Fe-55(E) Co-58(M) Co-60(M) C-14(E) Ni-63(E)	LSA	14-195	N/A	205.8	14,654.07(C)

MONTH TOTAL

205.8 14,654.07(C)

\* Specify whether measured (M), estimated (E), or a combination (C).

ZION GENERATING STATION UNIT 1/2

Month NOVEMBER Year 1989

SOLID RADIOACTIVE WASTE

(Tech Spec 6.6.1.D.3)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft <sup>3</sup> )	Activity * (millicuries)
11/02/89	BARNWELL	Solidified Spent Bead Resins	Cr-51(M) Sb-125(M) Co-60(M) Ni-63(E) Sb-124(M)	LSA	8-120B	CNSI - MIX Cement	125.2	11,086.82(C)
11/14/89	BARNWELL	Dewatered Spent Bead Resins	Co-58(M) C-14(E) Fe-55(E) Ni-63(E) Co-60(M)	LSA	14-215	N/A	205.8	6,471.04(C)
11/15/89	BARNWELL	DAW and (Dry) Boric Acid	Co-60(M) Co-58(M) Fe-55(E) Cs-137(M) Ni-63(E) Cs-134(M)	LSA	14-215	N/A	120.3	5,156.72(C)
11/30/89	BARNWELL	Dewatered Filters and DAW	Fe-55(E) Cr-51(E) Co-60(E) Cs-137(E) Ni-63(E)	NON LSA	8-120B	N/A	120.3	64,602.00(E)

MONTH TOTAL

571.6 87,316.58(C)

\* Specify whether measured (M), estimated (E), or a combination (C).

ZION GENERATING STATION UNIT 1/2

Month DECEMBER Year 1989

SOLID RADIOACTIVE WASTE

(Tech Spec 6.6.1.D.3)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft <sup>3</sup> )	Activity * (millicuries)
12/05/89	BARNWELL	Dewatered Spent Bead Resins	Co-58(M) Ni-63(E) Fe-55(E) Cs-137(M) Co-60(M)	LSA	14-215	N/A	205.8	12,333.06(C)
12/08/89	BARNWELL	Dewatered Spent Bead Resins	Co-58(M) Ni-63(E) Fe-55(E) Cs-137(M) Co-60(M)	LSA	14-195	N/A	205.8	10,591.67(C)
12/18/89	BARNWELL	Dewatered Spent Bead Resins	Co-60(M) Cs-137(M) Fe-55(E) C-14(E) Ni-63(E)	LSA	14-215	N/A	205.8	90.80(C)
12/19/89	BARNWELL	Dewatered Spent Bead Resins	Co-58(M) Ni-63(E) Fe-55(E) Cs-137(M) Co-60(M)	LSA	14-195	N/A	205.8	1,557.97(C)

MONTH TOTAL

823.2     24,573.50(C)

\* Specify whether measured (M), estimated (E), or a combination (C).



ATTACHMENT A

01Jul89 - 31Dec89 Semi-Annual Report

Pursuant to Zion Nuclear Generating Station Technical Specifications, Units 1 and 2, paragraph 6.6.1.D.5, the following change was made to the Process Control Program:

U.S. Ecology was added for the purpose of solidifying glycol and oily wastes.