

ATTACHMENT A

ZION NUCLEAR POWER STATION  
 UNITS 1 & 2  
 DOCKET NUMBERS 50-295 & 50-304  
 EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

TYPE OF RELEASE	UNITS	1st	2nd
		QUARTER	QUARTER

A. Fission and Activation Products (Gross)

1. Total Release	Ci	1.2 E+0	5.3 E+1
2. Average Release Rate	µCi/sec	1.5 E-1	6.8 E+0
3. Maximum Release Rate	µCi/sec	9.7 E+0	1.9 E+3
4. % of ODCM Section 12 (Noble Gas)		@ (T=Teenager C=Child)	
a. Qtr. Limit: Gamma ( 5 mR)	%	.00 ( T )	.05 ( C )
Beta ( 10 mR)	%	.02 ( T )	.18 ( C )
b. Yr. Limit: Gamma ( 10 mR)	%	.00 ( T )	.03 ( C )
Beta ( 20 mR)	%	.00 ( T )	.10 ( C )

B. Iodines

1. Total I-131	Ci	2.3 E-6	3.0 E-6
2. Average Release Rate	µCi/sec	3.0 E-7	3.8 E-7
3. % of ODCM Section 12 Limits		(I & P Combined Limit: See C)	

C. Particulates

1. Total with Half-Lives > 8 Days	Ci	4.1 E-4	1.3 E-6
2. Avg. Release Rate	µCi/sec	5.3 E-5	1.6 E-7
3. % of ODCM Section 12 (Iodine & Part > 8 Days)		@ (T=Teenager C=Child)	
a. Qtr. Limit: Organ ( 7.5 mR)	%	.41 ( T )	7.78 ( C )
b. Yr. Limit: Organ ( 15 mR)	%	.25 ( T )	4.09 ( C )
4. Gross Alpha	Ci	‡	‡

D. Tritium

1. Total Release	Ci	5.0 E+1	4.8 E+1
2. Average Release Rate	µCi/sec	6.5 E+0	6.2 E+0

<LLD - No detectable activity above background.  
 ‡ - Data presented in an errata to the Annual Report.  
 @ - Te receptor with the highest value is listed.

ZPZRPW-6100-6

ATTACHMENT A  
 (Continued)

ZION NUCLEAR POWER STATION  
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EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 GASEOUS EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	1st Quarter	2nd Quarter	1st Quarter	2nd Quarter
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1. Fission Gases

Ar-41	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	1.0 E-3
Xe-131	Ci	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	<LLD	1.1 E-1
Xe-133	Ci	2.9 E+0	1.6 E+1	4.2 E-1	3.6 E+1
Xe-133m	Ci	<LLD	<LLD	<LLD	3.3 E-1
Xe-135	Ci	<LLD	1.3 E+0	<LLD	1.6 E-1
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD
Others (specify)					
Total for Qtr	Ci	2.9 E+0	1.7 E+1	4.2 E-1	3.7 E+1

2. Iodines

I-131	Ci	5.9 E-7	3.2 E-7	1.7 E-6	2.7 E-6
I-132	Ci	<LLD	<LLD	7.1 E-7	1.2 E-6
I-133	Ci	2.2 E-7	4.6 E-7	3.5 E-6	5.0 E-6
I-134	Ci	<LLD	<LLD	7.6 E-8	<LLD
I-135	Ci	<LLD	<LLD	2.5 E-6	3.5 E-6
Total for Qtr	Ci	8.1 E-7	7.8 E-7	8.5 E-6	1.2 E-5

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 GASEOUS EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	1st Quarter	2nd Quarter	1st Quarter	2nd Quarter
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3. Particulates

Cr-51	C1	<LLD	<LLD	4.8 E-5	<LLD
Mn-54	C1	<LLD	<LLD	<LLD	<LLD
Co-57m	C1	<LLD	<LLD	<LLD	<LLD
Co-58	C1	<LLD	<LLD	9.0 E-5	8.3 E-9
Co-60	C1	9.5 E-6	7.0 E-7	1.9 E-4	1.0 E-8
Se-75	C1	<LLD	<LLD	<LLD	<LLD
Br-82	C1	<LLD	8.2 E-8	2.4 E-6	3.5 E-6
Rb-88	C1	<LLD	6.7 E-4	1.0 E-5	1.5 E-3
Sr-89 †	C1				
Sr-90 †	C1				
Nb-95	C1	<LLD	<LLD	4.5 E-5	<LLD
Zr-95	C1	<LLD	<LLD	2.2 E-5	<LLD
Tc-99m	C1	<LLD	<LLD	<LLD	2.7 E-9
Ru-103	C1	<LLD	<LLD	<LLD	<LLD
Ag-110m	C1	<LLD	<LLD	<LLD	<LLD
Cs-134	C1	<LLD	<LLD	<LLD	<LLD
Cs-136	C1	<LLD	<LLD	<LLD	<LLD
Cs-137	C1	<LLD	2.9 E-7	1.5 E-6	2.0 E-8
Cs-138	C1	<LLD	<LLD	2.0 E-7	2.7 E-7
Others (specify)					
Na-24	C1	<LLD	<LLD	3.0 E-8	1.8 E-7
Total for Qtr	C1	9.5 E-6	6.7 E-4	4.1 E-4	1.5 E-3

† Data presented in an errata to the Annual Report.

ATTACHMENT A  
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ZION NUCLEAR POWER STATION  
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EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 GASEOUS EFFLUENTS  
 SUPPLEMENTAL RELEASE INFORMATION

A. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

1. Fission & Activ. Gases:	Gamma Spectroscopy
2. Iodines:	Gamma Spectroscopy
3. Particulates:	Gamma Spectroscopy

UNITS	<u>1st</u> QUARTER	<u>2nd</u> QUARTER	TOTAL
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B. BATCH RELEASES

1. Total Number:		62	60	122
2. Total Time Period:	min	1.3 E+4	6.7 E+3	2.0 E+4
3. Max. Time Period:	min	1.4 E+3	2.2 E+2	
4. Avg. Time Period:	min	2.1 E+2	1.1 E+2	
5. Min. Time Period:	min	7.1 E+1	1.5 E+1	

C. ABNORMAL RELEASES

1. Number of Releases:		0	0	0
2. Total Activity Released:	Ci	0	0	0

D. ABNORMAL RELEASE DATA

ATTACHMENT A  
 (Continued)

ZION NUCLEAR POWER STATION  
 UNITS 1 & 2  
 DOCKET NUMBERS 50-295 & 50-304  
 EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

TYPE OF RELEASE	UNIT	1st	2nd
		QUARTER	QUARTER

A. Fission and Activation Products (Gross)

1. Total Release (not including tritium, dislv. nobles, alpha)	Ci	2.1 E-1	8.3 E-2
2. Ave Concentration Released	$\mu$ Ci/ml	7.3 E-9	3.6 E-9
3. Max Concentration Released	$\mu$ Ci/ml	2.8 E-8	1.3 E-8
4. % of ODCM Section 12		@ (I=Infant A=Adult)	
a. Qtr. Limit: Body (3 mR)	%	.01 (I)	.03 (I)
Organ (10 mR)	%	.02 (I)	.01 (I)
b. Yr. Limit: Body (6 mR)	%	.01 (I)	.02 (I)
Organ (20 mR)	%	.01 (I)	.01 (I)

B. Tritium

1. Total Release	Ci	1.8 E+2	4.8 E+2
2. Ave Concentration Released*	$\mu$ Ci/ml	6.4 E-6	2.1 E-5

C. Dissolved Noble Gases

1. Total Release	Ci	5.5 E-2	6.6 E-1
2. Ave Concentration Released*	$\mu$ Ci/ml	1.9 E-9	2.8 E-8

D. Gross Alpha Radioactivity

1. Total Release	Ci	2.6 E-4	4.5 E-4
2. Ave Concentration Released*	$\mu$ Ci/ml	9.3 E-12	1.9 E-11

E. Volume of Waste Released*	Liters	1.4 E+7	5.4 E+6
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F. Volume of Dilution Water*	Liters	2.8 E+10	2.3 E+10
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<LLD - No detectable activity above background.

\* - This includes only the waste released from the two lake discharge tanks. Radioactive effluent released through the fire sump was found to be negligible.

@ - The receptor with the highest value is listed.

ATTACHMENT A  
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 EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 LIQUID EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	<u>1st</u> Quarter	<u>2nd</u> Quarter	<u>1st</u> Quarter	<u>2nd</u> Quarter
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1. Fission Gases

Ar-41	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	2.5 E-3	3.8 E-5
Xe-131m	Ci	<LLD	<LLD	<LLD	3.8 E-3
Xe-133	Ci	<LLD	<LLD	4.9 E-2	6.4 E-1
Xe-133m	Ci	<LLD	<LLD	2.5 E-4	1.0 E-2
Xe-135	Ci	<LLD	<LLD	2.0 E-3	9.1 E-3
Others (specify)					
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD
Total for Qtr	Ci	<LLD	<LLD	5.4 E-2	6.6 E-1

2. Iodines

I-131	Ci	<LLD	<LLD	8.8 E-3	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	1.2 E-3	5.9 E-4
I-134	Ci	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for Qtr	Ci	<LLD	<LLD	1.0 E-2	5.9 E-4

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 LIQUID EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	<u>1st</u> Quarter	<u>2nd</u> Quarter	<u>1st</u> Quarter	<u>2nd</u> Quarter
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3. Particulates

Na-24	Ci	<LLD	<LLD	2.3 E-4	2.5 E-5
Cr-51	Ci	<LLD	<LLD	1.1 E-2	7.0 E-4
Mn-54	Ci	<LLD	<LLD	5.7 E-4	1.6 E-5
Co-57	Ci	<LLD	<LLD	8.1 E-6	<LLD
Fe-55 †	Ci				
Fe-59	Ci	<LLD	<LLD	1.0 E-4	<LLD
Co-58	Ci	<LLD	<LLD	4.2 E-2	5.6 E-3
Co-60	Ci	<LLD	<LLD	4.6 E-2	4.0 E-2
Rb-88	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89 †	Ci				
Sr-90 †	Ci				
Sr-92	Ci	<LLD	<LLD	6.7 E-4	1.2 E-5
Nb-95	Ci	<LLD	<LLD	1.1 E-3	1.2 E-5
Zr-95	Ci	<LLD	<LLD	7.3 E-4	1.3 E-5
Mo-99	Ci	<LLD	<LLD	1.8 E-4	<LLD
Tc-99m	Ci	<LLD	<LLD	1.8 E-4	<LLD
Ru-103	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	6.4 E-3	6.5 E-4
Sr-113	Ci	<LLD	<LLD	2.3 E-4	1.7 E-4

† Data presented in an errata to the Annual Report.

ATTACHMENT A  
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EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 LIQUID EFFLUENT-GROUND RELEASES

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	1st Quarter	2nd Quarter	1st Quarter	2nd Quarter
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3. Particulates (Continued)

Sn-117m	Ci	<LLD	<LLD	3.1 E-5	1.4 E-3
Sb-122	Ci	<LLD	<LLD	<LLD	<LLD
Sb-124	Ci	<LLD	<LLD	1.5 E-2	3.5 E-3
Sb-125	Ci	<LLD	<LLD	6.6 E-2	2.7 E-2
Sb-126	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	2.9 E-3	3.3 E-4
Te-132	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	5.5 E-3	1.4 E-3
Cs-138	Ci	<LLD	<LLD	<LLD	1.5 E-3
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	4.5 E-5	2.4 E-4
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total for Qtr	Ci	<LLD	<LLD	2.0 E-1	8.2 E-2

‡ Data presented in an errata to the Annual Report.



ATTACHMENT A  
 (Continued)

ZION NUCLEAR POWER STATION  
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DOCKET NUMBERS 50-295 & 50-304

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 LIQUID EFFLUENTS  
 SUPPLEMENTAL RELEASE INFORMATION

A. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

1. Liquid Effluents:	Gamma Spectroscopy, Liquid Scintillation, Alpha Scintillation
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UNITS	<u>1st</u> QUARTER	<u>2nd</u> QUARTER	TOTAL
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B. BATCH RELEASES

1. Total Number:		116	95	211
2. Total Time Period:	min	1.4 E+4	1.1 E+4	2.5 E+4
3. Max. Time Period:	min	3.9 E+2	3.5 E+2	
4. Avg. Time Period:	min	1.2 E+2	1.2 E+2	
5. Min. Time Period:	min	7.5 E+1	4.3 E+1	
6. Average Stream Flow During Periods Effluent Release Into A Flowing Stream:	<u>gal</u> min	N/A	N/A	

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 EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

TYPE OF RELEASE	UNITS	3rd	4th
		QUARTER	QUARTER

A. Fission and Activation Products (Gross)

1. Total Release	Ci	1.0 E+2	2.5 E+3
2. Average Release Rate	µCi/sec	1.3 E+1	3.3 E+2
3. Maximum Release Rate	µCi/sec	2.1 E+3	4.9 E+4
4. % of ODCM Section 12 (Noble Gas)		@ (I=Infant C=Child)	
a. Qtr. Limit: Gamma ( 5 mR)	%	.04 ( C )	.62 ( C )
Beta ( 10 mR)	%	.13 ( C )	1.80 ( C )
b. Yr. Limit: Gamma ( 10 mR)	%	.05 ( C )	.36 ( C )
Beta ( 20 mR)	%	.16 ( C )	1.06 ( C )

B. Iodines

1. Total I-131	Ci	8.7 E-6	1.1 E-2
2. Average Release Rate	µCi/sec	1.1 E-6	1.4 E-3
3. % of ODCM Section 12 Limits	(I & P Combined Limit: See C)		

C. Particulates

1. Total with Half-Lives > 8 Days	Ci	2.0 E-5	2.3 E-2
2. Avg. Release Rate	µCi/sec	2.5 E-6	3.0 E-3
3. % of ODCM Section 12 (Iodine & Part > 8 Days)		@ (I=Infant C=Child)	
a. Qtr. Limit: Organ ( 7.5 mR)	%	6.58 ( C )	12.77 ( C )
b. Yr. Limit: Organ ( 15 mR)	%	7.22 ( C )	13.57 ( C )
4. Gross Alpha	Ci	‡	‡

D. Tritium

1. Total Release	Ci	4.9 E+1	1.2 E+2
2. Average Release Rate	µCi/sec	6.3 E+0	1.5 E+1

<LLD - No detectable activity above background.  
 ‡ - Data presented in an errata to the Annual Report.  
 @ - The receptor with the highest value is listed.

ATTACHMENT A  
 (Continued)

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 EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
 GASEOUS EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	<u>3rd</u> Quarter	<u>4th</u> Quarter	<u>3rd</u> Quarter	<u>4th</u> Quarter
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1. Fission Gases

Ar-41	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	1.1 E-2	8.8 E+0
Kr-85m	Ci	<LLD	<LLD	<LLD	1.6 E-1
Xe-131	Ci	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	2.4 E-1	1.2 E+0
Xe-133	Ci	3.2 E+1	5.0 E+2	6.7 E+1	1.9 E+3
Xe-133m	Ci	<LLD	5.6 E-1	8.0 E-1	1.1 E+1
Xe-135	Ci	<LLD	1.2 E+0	2.5 E-1	2.5 E+1
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD
Others (specify)					
Total for Qtr	Ci	3.2 E+1	5.0 E+2	6.8 E+1	1.9 E+3

2. Iodines

I-131	Ci	4.1 E-6	8.4 E-4	4.7 E-6	1.0 E-2
I-132	Ci	<LLD	1.1 E-4	1.0 E-6	8.9 E-4
I-133	Ci	9.2 E-6	<LLD	6.1 E-6	4.3 E-3
I-134	Ci	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	<LLD	3.8 E-6	1.1 E-3
Total for Qtr	Ci	1.3 E-5	9.5 E-4	1.6 E-5	1.6 E-2

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GASEOUS EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
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3. Particulates

Cr-51	C1	<LLD	<LLD	<LLD	1.0 E-3
Mn-54	C1	<LLD	<LLD	<LLD	<LLD
Co-57m	C1	<LLD	<LLD	<LLD	<LLD
Co-58	C1	1.3 E-5	1.3 E-5	6.8 E-8	2.0 E-2
Co-60	C1	6.4 E-7	1.6 E-6	6.2 E-8	1.4 E-3
Se-75	C1	<LLD	<LLD	<LLD	<LLD
Br-82	C1	<LLD	<LLD	4.3 E-6	6.8 E-5
Rb-88	C1	<LLD	<LLD	2.1 E-3	1.9 E-1
Sr-89 †	C1				
Sr-90 †	C1				
Nb-95	C1	<LLD	<LLD	<LLD	1.6 E-4
Zr-95	C1	<LLD	<LLD	<LLD	8.5 E-5
Tc-99m	C1	<LLD	<LLD	1.0 E-8	2.1 E-5
Ru-103	C1	<LLD	<LLD	<LLD	1.6 E-5
Ag-110m	C1	<LLD	<LLD	<LLD	<LLD
Cs-134	C1	<LLD	<LLD	5.5 E-8	2.5 E-4
Cs-136	C1	<LLD	<LLD	<LLD	7.0 E-5
Cs-137	C1	<LLD	<LLD	9.6 E-8	2.9 E-4
Cs-138	C1	<LLD	<LLD	6.4 E-6	<LLD
Others (specify)					
Na-24	C1	<LLD	<LLD	1.6 E-6	1.2 E-4
Fe-59	C1	<LLD	<LLD	<LLD	3.3 E-5
Total for Qtr	C1	1.4 E-5	1.5 E-5	2.1 E-3	2.1 E-1

† Data presented in an errata to the Annual Report.

ATTACHMENT A  
(Continued)

ZION NUCLEAR POWER STATION  
UNITS 1 & 2

DOCKET NUMBERS 50-295 & 50-304

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
GASEOUS EFFLUENTS  
SUPPLEMENTAL RELEASE INFORMATION

A. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

1. Fission & Activ. Gases:	Gamma Spectroscopy
2. Iodines:	Gamma Spectroscopy
3. Particulates:	Gamma Spectroscopy

B. BATCH RELEASES

	UNITS	<u>3rd</u> QUARTER	<u>4th</u> QUARTER	TOTAL
1. Total Number:		67	102	169
2. Total Time Period:	min	7.3 E+8	1.0 E+5	1.1 E+5
3. Max. Time Period:	min	1.9 E+2	3.6 E+3	
4. Avg. Time Period:	min	1.1 E+2	9.8 E+2	
5. Min. Time Period:	min	1.2 E+1	4.0 E+0	

C. ABNORMAL RELEASES

1. Number of Releases:		0	0	0
2. Total Activity Released:	Ci	0	0	0

D. ABNORMAL RELEASE DATA

ATTACHMENT A  
(Continued)  
ZION NUCLEAR POWER STATION  
UNITS 1 & 2  
DOCKET NUMBERS 50-295 & 50-304  
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

TYPE OF RELEASE	UNIT	3rd	4th
		QUARTER	QUARTER

A. Fission and Activation Products (Gross)

1. Total Release (not including tritium, disiv. nobles, alpha)	Ci	1.2 E-1	6.2 E-1
2. Ave Concentration Released	$\mu$ Ci/ml	4.6 E-9	2.0 E-8
3. Max Concentration Released	$\mu$ Ci/ml	7.3 E-7	9.3 E-8
4. % of ODCM Section 12		@ (I=Infant C=Child)	
a. Qtr. Limit: Body (3 mR)	%	.02 (C)	.01 (C)
Organ (10 mR)	%	.01 (C)	.01 (C)
b. Yr. Limit: Body (6 mR)	%	.04 (C)	.04 (C)
Organ (20 mR)	%	.02 (C)	.02 (C)

B. Tritium

1. Total Release	Ci	4.2 E+2	1.6 E+2
2. Ave Concentration Released*	$\mu$ Ci/ml	1.6 E-5	5.2 E-6

C. Dissolved Noble Gases

1. Total Release	Ci	1.3 E+0	1.8 E+0
2. Ave Concentration Released*	$\mu$ Ci/ml	5.0 E-8	5.6 E-8

D. Gross Alpha Radioactivity

1. Total Release	Ci	1.3 E-4	1.6 E-4
2. Ave Concentration Released*	$\mu$ Ci/ml	4.8 E-12	5.1 E-12

E. Volume of Waste Released*	Liters	5.9 E+6	5.4 E+6
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F. Volume of Dilution Water*	Liters	2.7 E+10	3.1 E+10
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<LLD - No detectable activity above background.

\* - This includes only the waste released from the two lake discharge tanks. Radioactive effluent released through the fire sump was found to be negligible.

@ - The receptor with the highest value is listed.

ATTACHMENT A  
(Continued)

ZION NUCLEAR POWER STATION  
UNITS 1 & 2

DOCKET NUMBERS 50-295 & 50-304

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
LIQUID EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
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1. Fission Gases

Ar-41	C1	<LLD	<LLD	<LLD	<LLD
Kr-85	C1	<LLD	<LLD	5.5 E-5	9.9 E-3
Xe-131m	C1	<LLD	<LLD	1.2 E-2	2.8 E-2
Xe-133	C1	<LLD	<LLD	1.3 E+0	1.6 E+0
Xe-133m	C1	<LLD	<LLD	1.8 E-2	1.5 E-2
Xe-135	C1	<LLD	<LLD	1.9 E-2	7.6 E-3
Others (specify)					
Kr-85m	C1	<LLD	<LLD	3.8 E-5	<LLD
Total for Qtr	C1	<LLD	<LLD	1.3 E+0	1.7 E+0

2. Iodines

I-131	C1	<LLD	<LLD	2.6 E-4	4.5 E-3
I-132	C1	<LLD	<LLD	<LLD	3.9 E-3
I-133	C1	<LLD	<LLD	<LLD	9.4 E-5
I-134	C1	<LLD	<LLD	<LLD	<LLD
I-135	C1	<LLD	<LLD	<LLD	<LLD
Total for Qtr	C1	<LLD	<LLD	2.6 E-4	8.5 E-3

ATTACHMENT A  
(Continued)

ZION NUCLEAR POWER STATION  
UNITS 1 & 2  
DOCKET NUMBERS 50-295 & 50-304  
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
LIQUID EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
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3. Particulates

Na-24	C1	<LLD	<LLD	<LLD	5.5 E-3
Cr-51	C1	<LLD	<LLD	3.5 E-5	9.1 E-2
Mn-54	C1	<LLD	<LLD	8.1 E-5	2.4 E-3
Co-57	C1	<LLD	<LLD	<LLD	<LLD
Fe-55 †	C1				
Fe-59	C1	<LLD	<LLD	<LLD	1.1 E-2
Co-58	C1	<LLD	<LLD	4.8 E-3	3.1 E-1
Co-60	C1	<LLD	<LLD	6.1 E-2	6.6 E-2
Rb-88	C1	<LLD	<LLD	<LLD	<LLD
Sr-89 †	C1				
Sr-90 †	C1				
Sr-92	C1	<LLD	<LLD	3.5 E-4	4.9 E-3
Nb-95	C1	<LLD	<LLD	5.2 E-5	6.2 E-3
Zr-95	C1	<LLD	<LLD	<LLD	5.2 E-3
Mo-99	C1	<LLD	<LLD	<LLD	5.1 E-5
Tc-99m	C1	<LLD	<LLD	<LLD	5.9 E-5
Ru-103	C1	<LLD	<LLD	<LLD	1.6 E-4
Ag-110m	C1	<LLD	<LLD	5.6 E-3	3.6 E-2
Sn-113	C1	<LLD	<LLD	5.5 E-6	1.1 E-3

† Data presented in an errata to the Annual Report.



ATTACHMENT A  
(Continued)

ZION NUCLEAR POWER STATION  
UNITS 1 & 2

DOCKET NUMBERS 50-295 & 50-304

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
LIQUID EFFLUENT-GROUND RELEASE

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Units	CONTINUOUS MODE		BATCH MODE	
		3rd Quarter	4th Quarter	3rd Quarter	4th Quarter

3. Particulates (Continued)

Sn-117m	C1	<LLD	<LLD	1.4 E-5	8.7 E-4
Sb-122	C1	<LLD	<LLD	<LLD	8.2 E-4
Sb-124	C1	<LLD	<LLD	7.8 E-4	2.7 E-2
Sb-125	C1	<LLD	<LLD	2.1 E-2	4.4 E-2
Sb-126	C1	<LLD	<LLD	<LLD	2.9 E-5
Cs-134	C1	<LLD	<LLD	8.4 E-3	1.9 E-3
Te-132	C1	<LLD	<LLD	<LLD	2.5 E-3
Cs-137	C1	<LLD	<LLD	1.9 E-2	2.9 E-3
Cs-138	C1	<LLD	<LLD	<LLD	<LLD
Ba-140	C1	<LLD	<LLD	<LLD	<LLD
La-140	C1	<LLD	<LLD	5.7 E-5	1.1 E-3
Ce-141	C1	<LLD	<LLD	<LLD	<LLD
Ce-144	C1	<LLD	<LLD	<LLD	<LLD
Zr-97	C1	<LLD	<LLD	<LLD	5.1 E-6
Te-132m	C1	<LLD	<LLD	<LLD	1.8 E-6
Total for Qtr	C1	<LLD	<LLD	1.2 E-1	6.2 E-1

† Data presented in an errata to the Annual Report.

ATTACHMENT A  
(Continued)

ZION NUCLEAR POWER STATION  
UNITS 1 & 2

DOCKET NUMBERS 50-295 & 50-304

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - YEAR 1993  
LIQUID EFFLUENTS  
SUPPLEMENTAL RELEASE INFORMATION

A. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

1. Liquid Effluents:	Gamma Spectroscopy, Liquid Scintillation, Alpha Scintillation
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UNITS	<u>3rd</u> QUARTER	<u>4th</u> QUARTER	TOTAL
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B. BATCH RELEASES

1. Total Number:		99	85	184
2. Total Time Period:	min	1.1 E+4	1.9 E+4	3.0 E+4
3. Max. Time Period:	min	1.5 E+2	6.7 E+2	
4. Avg. Time Period:	min	1.1 E+2	2.2 E+2	
5. Min. Time Period:	min	6.5 E+1	5.0 E+0	
6. Average Stream Flow During Periods Effluent Release Into A Flowing Stream:	<u>gal</u> min	N/A	N/A	

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month JANUARY Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)
02/18/93	Barnwell 93-001	Filters	Co-60(E), Ni-63(E) Co-58(E), Fe-55(E) Nb-95 (E)	LSA	8-120 HIC	N/A	120.3	9338.14 (E)
01/25/93	Barnwell 93 -002	Dewatered Resin	Co-58(M), Co-60(M) Fe-55(E), Ni-63(E) Cs-137 (M)	LSA	8-120 HIC	N/A	120.3	60206.01 (C)

MONTH TOTAL

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

240.6

69544.15 (C)

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month FEBRUARY Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)
02/22/93	Barnwell 93-003	Dewatered Resin	Co-58(M), Co-60(M) Fe-55(E), Ni-63(E) Cs-137 (M)	LSA	8-120 HIC	N/A	120.3	17132.93 (C)
02/23/93	Barnwell 93-004	Dewatered Resin	Co-58(M), Co-60(M) Ni-63(E), CS-137(M) Cs-134 (M)	LSA	14-215 HIC	N/A	205.8	2847.59 (C)

MONTH TOTAL

326.1      19980.52 (C)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month MARCH Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft <sup>3</sup> )	Activity * (millicuries)
03/03/93	Barnwell 93-005	Filters and D.A.W. Media	Co-58(E), Co-51(E) Fe-55(E), Co-60(E) Nb-95 (E)	LSA	8-120 HIC	N/A	120.3	11222.23 (E)
03/08/93	Barnwell 93-006	Dewatered Resin	Co-60(M), Ni-63(E) Fe-55(E), Co-58(M)	LSA	14-215 HIC	N/A	205.8	1308.30 (C)
03/12/93	Barnwell 93-007	Dewatered Resin	Co-60(M), Ni-63(E) Fe-55(E), Co-58(M) Cs-137 (M)	LSA	14-195 HIC	N/A	194.1	4138.4 (C)
03/24/93	Barnwell 93-008	Dewatered Resin	C-14(E), Co-60(M) Fe-55(E), Ni-63(E) Cs-137 (M)	LSA	14-215 HIC	N/A	205.8	25.28 (C)
03/25/93	Barnwell 93-009	Filters and D.A.W. Media	Co-60(E), Fe-55(E) Ni-63(E), Cs-137(E)	LSA	8-120 HIC	N/A	120.3	128779.07 (E)

MONTH TOTAL

846.3      145473.28 (C)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month APRIL Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)
04/22/93	Barnwell 93-010	Dewatered Resin	Co-60(M), Fe-55(E) Co-58(M), Ni-63(E) Cs-137(M)	LSA	14-195 HIC	N/A	194.1	675.34 (C)

MONTH TOTAL

194.1      675.34 (C)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month MAY Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft <sup>3</sup> )	Activity * (millicuries)
05/28/93	Barnwell 93011	Filters and D.A.W.	Co-60(E), Cs-137(E) Fe-55(E), Ni-63(E)	LSA	B-120 HIC	N/A	120.3	26798.96 (E)

MONTH TOTAL

120.3      26798.96 (E)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month JUNE Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)

MONTH TOTAL

0      0

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



ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month JULY Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)
07/12/93	Barnwell 93012	Dewatered Resin	Co-60(M), Fe-55(E) Ni-63(E), Co-58(M)	LSA	14-215 HIC	N/A	205.8	3196.02 (C)
07/19/93	Barnwell 93013	Dewatered Resin	Co-60(M), Ni-63(E) Fe-55(E), Co-58(M) Mn-54 (M)	LSA	8-120 HIC	N/A	120.3	13576.0 (C)
07/29/93	Barnwell 93014	Dry Active Waste	Co-60(E), Fe-55(E) Ni-63(E), CS-137(E) C-14 (E)	LSA	8-120 HIC	N/A	120.3	3611.09 (E)

MONTH TOTAL

446.4      20383.11 (C)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month AUGUST Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)
08/16/93	Barnwell 93015	Filters and D.A.W.	Co-60(E), Fe-55(E) Ni-63(E), Cs-137(E) Co-58 (E)	LSA	8-120 HIC	N/A	120.3	45965.88 (E)
08/31/93	Barnwell 93016	Dry Active Waste	Fe-55(E), Co-60(E) Ni-63(E), Cs-137(E) Co-58 (E)	LSA	(73) 55 Gal. Drums	N/A	547.5	94.19 (E)

MONTH TOTAL

667.8      46060.07 (E)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month SEPTEMBER YEAR 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)
09/16/93	Barnwell 93018	Dry Active Waste	Fe-55(E), Co-60(E) Ni-63(E), Cs-137(E) Co-58 (E)	LSA	(48) 55 Gal Drums	N/A	360	48.54 (E)
09/28/93	Barnwell 93017	Solidified Resin	Co-60(M), Co-58(M) Ni-63(E), Cs-137(M) Cs-134 (M)	LSA	8-120 HIC	Cement	120.3	337906.23 (C)

MONTH TOTAL

480.3    337954.77 (C)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month OCTOBER Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)
10/14/93	Barnwell 93019	Dry Active Waste	Fe-55(E), Co-60(E) Ni-63(E), Cs-137(E) Co-58 (E)	LSA	(35) 55 Gal. Drums	N/A	262.5	33.61 (E)
10/26/93	Barnwell 93020	Dewatered Resin	Co-60(M), Fe-55(E) Ni-63(E), I-131(M) Co-58 (M)	LSA	14-170 Steel	N/A	180.1	1260.91 (C)
10/28/93	Barnwell 93021	Dewatered Resin	Co-58(M), Co-60(M) Ni-63(E), Co-58 (M)	LSA	14-195 HIC	N/A	194.1	5404.38 (C)

MONTH TOTAL

636.7    6698.7 (C)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month NOVEMBER Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft 3)	Activity * (millicuries)
11/12/93	Barnwell 93022	Dewatered Resin	Co-58 (M) Co-60 (M)	LSA	8-120 HIC	N/A	120.3	289420.85 (C)

MONTH TOTAL

120.3    28420.85 (C)

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

ATTACHMENT A  
 (Continued)

ZION GENERATING STATION UNIT 1/2

Month DECEMBER Year 1993

SOLID RADIOACTIVE WASTE  
 (ODCM Section 12)

Date	Destination of Material	Waste Material	Principal Radionuclides *	LSA/ NON LSA	Container Type	Solidification Agent (If Applicable)	Volume (ft <sup>3</sup> )	Activity * (millicuries)
12/20/93	Barnwell 93023	Dewatered Resin	Co-60(M), Fe-55(E) Ni-63(E), Co-58(M) Ct-137(M)	LSA	8-120 HIC	N/A	120.3	19749.22 (C)
12/21/93	Barnwell 93024	Dry Active Waste	Co-60(E), Fe-55(E) Ni-63(E), Cs-137(E) Ni-59 (E)	LSA	8-120 HIC	N/A	120.3	12607.10 (E)

MONTH TOTAL

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

240.6      32356.32 (C)