

May 4, 2004

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Zion Nuclear Power Station, Units 1 and 2  
Facility Operating License Nos. DRP-39 and DPR-48  
NRC Docket Nos. 50-295 and 50-304

Reference: Letter from Artice Daniels Jr. (Exelon Generation Company, LLC) to U. S. NRC, "Radioactive Effluent Release Report for 2003 and Offsite Dose Calculation Manual for 2003," dated March 16, 2004

Subject: Corrections to Radioactive Effluent Release Report

In the referenced letter, Zion Nuclear Power Station submitted the Radioactive Effluent Release Report for 2003. Subsequently, errors were identified in the report. Following identification of the error, Zion Nuclear Power Station conducted a review of all of the gaseous and liquid effluent spreadsheets. Additional errors were identified. The attachment to this letter provides a corrected report.

If you have any questions concerning this letter, please contact Mr. Ron Schuster at 847-746-2084 at extension 2700.

Respectfully,

A handwritten signature in black ink, appearing to read 'Artice Daniels Jr.', with a stylized flourish at the end.

Artice Daniels Jr.  
Decommissioning Plant Manager  
Zion Nuclear Power Station

Attachment

cc: Regional Administrator – NRC Region III

IE48

bcc: NRC Project Manager – NRR – Zion Nuclear Power Station  
Decommissioning Branch Chief – NRC Region III  
Manager of Energy Practice – Winston & Strawn (w/o enclosures)  
Office of Nuclear Safety – IEMA  
Decommissioning Plant Manager – Zion Nuclear Power Station (w/o enclosures)  
Director, Licensing – West (w/o enclosures)  
Manager, Licensing – Braidwood, Byron, and LaSalle Stations  
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ZION NUCLEAR POWER STATION  
2003 RADIOACTIVE EFFLUENT RELEASE REPORT  
UNIT 1 & 2 (DOCKET Numbers 50-295 & 50-304)

EXECUTIVE SUMMARY

A review of 2003 effluent data versus previous years' data showed there were no abnormally high amounts of radioactivity released during 2003. In 2003, there was no radioactive iodine released. The release of noble gas and particulates continued to trend downward. This trend can be attributed to the shutdown of both units. Unit 1 discharge vent was mechanically closed.

Airborne

	Yearly Dose Limit per Reactor Unit	Dose to Maximally Exposed Receptor (Adult) from Unit 1	Dose to Maximally Exposed Receptor (Adult) from Unit 2
Gamma Air	10 mrad	0 mrad	0 mrad
Beta Air	20 mrad	0 mrad	0 mrad
Total Body	5 mrem	7.53e-5mrem	1.74e-4 mrem
Skin	15 mrem	0 mrem	0 mrem
Organ	15 mrem	8.55e-5 mrem	1.97e-4 mrem

Aquatic doses were low because both units are no longer operational. Aquatic doses for Unit 1 were higher than the doses for Unit 2 because there are no discharges of radioactive effluents performed using the Unit 2 Discharge Canal.

#### Aquatic

	Yearly Dose Limit per Reactor Unit	Dose to Maximally Exposed Receptor (Teenage) from Unit 1	Dose to Maximally Exposed Receptor from Unit 2
Total Body	3 mrem	2.48e-2 mrem	0 mrem
Organ	10 mrem	3.93e-2 mrem	0 mrem

The doses to the public, from all Zion Station effluent paths during 2003, were extremely low and far below all regulatory limits.

**Attachment 2:**

**To the Zion Nuclear Power Station, Units 1 and 2, 2003 Radioactive Effluent Release Report.**

**The following identifies those actions committed to by Exelon Nuclear in this document. Any other actions discussed in this submittal represent intended or planned actions by Exelon Nuclear. They are described to the NRC for the NRC's information, and are not Regulatory Commitments.**

**Commitment:**

**None**

**ZION STATION**  
**Unit 1**  
**10CFR20 Compliance Assessment**

1. 10CFR 20.1301 (a) (1) Compliance

Total Effective Dose Equivalent,	<u>mrem/year</u>	<u>6.29e-2</u>
10 CFR 20.1301 (a) (1) limit	<u>mrem/yr</u>	<u>100</u>
% of the limit		<u>0.06</u>

2. Compliance Summary 10CFR20

	1 <sup>st</sup> Qtr.	2 <sup>nd</sup> Qtr.	3 <sup>rd</sup> Qtr.	4 <sup>th</sup> Qtr	% of Limit
TEDE	0	1.01e-4	4.14e-2	2.12e-2	0.06%

**ZION STATION**  
**Unit 2**  
**10CFR20 Compliance Assessment**

1. 10CFR 20.1301 (a) (1) Compliance

Total Effective Dose Equivalent,	<u>mrem/year</u>	<u>3.36e-4</u>
10 CFR 20.1301 (a) (1) limit	<u>mrem/yr</u>	<u>100</u>
% of the limit		<u>0.00034</u>

2. Compliance Summary 10CFR20

	1 <sup>st</sup> Qtr.	2 <sup>nd</sup> Qtr.	3 <sup>rd</sup> Qtr.	4 <sup>th</sup> Qtr	% of Limit
TEDE	0	9.2e-5	1.9e-4	5.41e-5	0.00034%

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

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GASEOUS DOSE SUMMARY  
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Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS === QUARTER 1 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 1 - Admin. Any Organ			0.00E+00	1.00E+01	0.00E+00
Qtr 1 - Admin. Total Body			0.00E+00	1.00E+01	0.00E+00

Qtr 1 - T.Spc. Any Organ 0.00E+00 1.00E+01 0.00E+00

Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway:

Major Contributors ( 0% or greater to total)

Nuclide Percentage  
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Qtr 1 - T.Spc. Total Body 0.00E+00 1.00E+01 0.00E+00

Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway:

Major Contributors ( 0% or greater to total)

Nuclide Percentage  
-----



## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

-----  
GASEOUS DOSE SUMMARY  
-----

Report for: 2003

Unit Range - From: 1 To: 2

## === NG DOSE LIMIT ANALYSIS ===== QUARTER 1 =====

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 1 - Admin. Gamma	0.00E+00	1.00E+01	0.00E+00
Qtr 1 - Admin. Beta	0.00E+00	1.00E+01	0.00E+00

Qtr 1 - T.Spc. Gamma	0.00E+00	1.00E+01	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

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Qtr 1 - T.Spc. Beta	0.00E+00	1.00E+01	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

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40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

=== I&P DOSE LIMIT ANALYSIS === QUARTER 2 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 2 - Admin. Any Organ	ADULT	GILLI	1.08E-04	5.63E+00	1.92E-03
Qtr 2 - Admin. Total Body	CHILD	TBODY	9.50E-05	5.25E+00	1.81E-03

Qtr 2 - T.Spc. Any Organ ADULT GILLI 1.08E-04 7.50E+00 1.44E-03

Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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Qtr 2 - T.Spc. Total Body CHILD TBODY 9.50E-05 7.50E+00 1.27E-03

Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

CO-60	1.00E+02
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40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS === QUARTER 2 ===

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 2 - Admin. Gamma	0.00E+00	7.50E+00	0.00E+00
Qtr 2 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00

Qtr 2 - T.Spc. Gamma	0.00E+00	7.50E+00	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

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Qtr 2 - T.Spc. Beta	0.00E+00	7.50E+00	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS === QUARTER 3 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 3 - Admin. Any Organ	ADULT	GILLI	1.11E-04	5.63E+00	1.98E-03
Qtr 3 - Admin. Total Body	CHILD	TBODY	9.82E-05	5.25E+00	1.87E-03

Qtr 3 - T.Spc. Any Organ	ADULT	GILLI	1.11E-04	7.50E+00	1.49E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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Qtr 3 - T.Spc. Total Body	CHILD	TBODY	9.82E-05	7.50E+00	1.31E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

CO-60	1.00E+02
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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

-----  
GASEOUS DOSE SUMMARY  
-----

Report for: 2003

Unit Range - From: 1 To: 2

## === NG DOSE LIMIT ANALYSIS === QUARTER 3 ===

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 3 - Admin. Gamma	0.00E+00	7.50E+00	0.00E+00
Qtr 3 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00

Qtr 3 - T.Spc. Gamma	0.00E+00	7.50E+00	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

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Qtr 3 - T.Spc. Beta	0.00E+00	7.50E+00	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS === QUARTER 4 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 4 - Admin. Any Organ	ADULT	GILLI	6.32E-05	5.63E+00	1.12E-03
Qtr 4 - Admin. Total Body	CHILD	TBODY	5.57E-05	5.25E+00	1.06E-03

Qtr 4 - T.Spc. Any Organ	ADULT	GILLI	6.32E-05	7.50E+00	8.43E-04
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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Qtr 4 - T.Spc. Total Body	CHILD	TBODY	5.57E-05	7.50E+00	7.43E-04
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS === QUARTER 4 ===

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 4 - Admin. Gamma	0.00E+00	7.50E+00	0.00E+00
Qtr 4 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00

Qtr 4 - T.Spc. Gamma	0.00E+00	7.50E+00	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

Qtr 4 - T.Spc. Beta	0.00E+00	7.50E+00	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

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GASEOUS DOSE SUMMARY  
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Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS === ANNUAL 2003 ===

Annual - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2003 - Admin. Any Organ	ADULT	GILLI	2.82E-04	1.13E+01	2.51E-03
2003 - Admin. Total Body	CHILD	TBODY	2.49E-04	1.05E+01	2.37E-03

2003 - T.Spc. Any Organ	ADULT	GILLI	2.82E-04	1.50E+01	1.88E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

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CO-60 1.00E+02

2003 - T.Spc. Total Body	CHILD	TBODY	2.49E-04	1.50E+01	1.66E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

-----  
CO-60 1.00E+02



## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS === ANNUAL 2003 ===

Annual - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
2003 - Admin. Gamma	0.00E+00	1.50E+01	0.00E+00
2003 - Admin. Beta	0.00E+00	1.50E+01	0.00E+00

2003 - T.Spc. Gamma	0.00E+00	1.50E+01	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

2003 - T.Spc. Beta	0.00E+00	1.50E+01	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Nuclide Percentage

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## LIQUID DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem), === QUARTER 1 ===

Agegrp Bone Liver Thyroid Kidney Lung GI-LLI Skin TB

=== SITE DOSE LIMIT ANALYSIS === QUARTER 1 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
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Qtr 1 - Admin. Any Organ

Qtr 1 - Admin. Total Body ADULT TBODY 0.00E+00 1.13E+00 0.00E+00

Qtr 1 - T.Spc. Any Organ

Critical Pathway: 0.00E+00 3.75E+00 0.00E+00

Major Contributors ( 0% or greater to total)

Nuclide Percentage

Qtr 1 - T.Spc. Total Body ADULT TBODY 0.00E+00 1.50E+00 0.00E+00

Critical Pathway: Potable Water (PWtr)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## LIQUID DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) === QUARTER 2 ===

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
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=== SITE DOSE LIMIT ANALYSIS === QUARTER 2 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 2 - Admin. Any Organ			0.00E+00	5.00E+00	0.00E+00
Qtr 2 - Admin. Total Body	ADULT	TBODY	0.00E+00	1.13E+00	0.00E+00

Qtr 2 - T.Spc. Any Organ			0.00E+00	3.75E+00	0.00E+00
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Critical Pathway:

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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Qtr 2 - T.Spc. Total Body	ADULT	TBODY	0.00E+00	1.50E+00	0.00E+00
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Critical Pathway: Potable Water (PWtr)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## LIQUID DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) === QUARTER 3 ===

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	1.82E-02	2.50E-02	1.83E-07	8.48E-03	2.82E-03	5.91E-04	0.00E+00	1.64E-02
TEEN	1.94E-02	2.60E-02	1.34E-07	8.84E-03	3.44E-03	4.44E-04	0.00E+00	9.11E-03
CHILD	2.45E-02	2.36E-02	1.84E-07	7.67E-03	2.76E-03	1.74E-04	0.00E+00	3.51E-03
INFANT	2.59E-05	3.09E-05	1.26E-07	8.30E-06	3.44E-06	8.10E-07	0.00E+00	2.88E-06

=== SITE DOSE LIMIT ANALYSIS === QUARTER 3 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 3 - Admin. Any Organ	TEEN	LIVER	2.60E-02	3.75E+00	6.94E-01
Qtr 3 - Admin. Total Body	ADULT	TBODY	1.64E-02	1.13E+00	1.46E+00

Qtr 3 - T.Spc. Any Organ	TEEN	LIVER	2.60E-02	5.00E+00	5.20E-01
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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H-3	5.16E-04
CO-60	2.20E-02
CS-134	1.41E+00
CS-137	9.86E+01

Qtr 3 - T.Spc. Total Body	ADULT	TBODY	1.64E-02	1.50E+00	1.10E+00
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

H-3	1.11E-03
CO-60	7.70E-02
CS-134	1.80E+00
CS-137	9.81E+01

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## LIQUID DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) === QUARTER 4 ===

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	9.31E-03	1.28E-02	7.93E-08	4.34E-03	1.44E-03	3.02E-04	0.00E+00	8.41E-03
TEEN	9.97E-03	1.33E-02	5.83E-08	4.53E-03	1.76E-03	2.27E-04	0.00E+00	4.66E-03
CHILD	1.26E-02	1.21E-02	7.98E-08	3.93E-03	1.41E-03	8.88E-05	0.00E+00	1.80E-03
INFANT	1.33E-05	1.58E-05	5.45E-08	4.25E-06	1.75E-06	4.01E-07	0.00E+00	1.46E-06

=== SITE DOSE LIMIT ANALYSIS === QUARTER 4 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 4 - Admin. Any Organ	TEEN	LIVER	1.33E-02	3.75E+00	3.55E-01
Qtr 4 - Admin. Total Body	ADULT	TBODY	8.41E-03	1.13E+00	7.48E-01

Qtr 4 - T.Spc. Any Organ	TEEN	LIVER	1.33E-02	5.00E+00	2.67E-01
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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H-3	4.37E-04
CO-60	2.17E-02
CS-134	1.07E+00
CS-137	9.89E+01

Qtr 4 - T.Spc. Total Body	ADULT	TBODY	8.41E-03	1.50E+00	5.61E-01
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

H-3	9.42E-04
CO-60	7.58E-02
CS-134	1.37E+00
CS-137	9.86E+01

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## LIQUID DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) === ANNUAL 2003 ===

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	2.75E-02	3.78E-02	2.62E-07	1.28E-02	4.26E-03	8.93E-04	0.00E+00	2.49E-02
TEEN	2.94E-02	3.93E-02	1.92E-07	1.34E-02	5.20E-03	6.71E-04	0.00E+00	1.38E-02
CHILD	3.70E-02	3.56E-02	2.64E-07	1.16E-02	4.17E-03	2.63E-04	0.00E+00	5.31E-03
INFANT	3.92E-05	4.67E-05	1.80E-07	1.25E-05	5.19E-06	1.21E-06	0.00E+00	4.34E-06

=== SITE DOSE LIMIT ANALYSIS === ANNUAL 2003 ===

Annual - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2003 - Admin. Any Organ	TEEN	LIVER	3.93E-02	7.50E+00	5.25E-01
2003 - Admin. Total Body	ADULT	TBODY	2.49E-02	2.25E+00	1.10E+00

2003 - T.Spc. Any Organ	TEEN	LIVER	3.93E-02	1.00E+01	3.93E-01
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

H-3	4.89E-04
CO-60	2.19E-02
CS-134	1.29E+00
CS-137	9.87E+01

2003 - T.Spc. Total Body	ADULT	TBODY	2.49E-02	3.00E+00	8.28E-01
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

H-3	1.05E-03
CO-60	7.66E-02
CS-134	1.65E+00
CS-137	9.83E+01

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

-----  
GASEOUS DOSE SUMMARY  
-----

Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS ===== QUARTER 1 =====

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 1 - Admin. Any Organ			0.00E+00	1.00E+01	0.00E+00
Qtr 1 - Admin. Total Body			0.00E+00	1.00E+01	0.00E+00

Qtr 1 - T.Spc. Any Organ			0.00E+00	1.00E+01	0.00E+00
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Receptor: 0

Distance: (meters) Compass Point:

Critical Pathway:

Major Contributors ( 0% or greater to total)

Nuclide Percentage  
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Qtr 1 - T.Spc. Total Body			0.00E+00	1.00E+01	0.00E+00
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Receptor: 0

Distance: (meters) Compass Point:

Critical Pathway:

Major Contributors ( 0% or greater to total)

Nuclide Percentage  
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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

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GASEOUS DOSE SUMMARY  
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Report for: 2003

Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS ===== QUARTER 1 =====

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
-----	-----	-----	-----
Qtr 1 - Admin. Gamma	0.00E+00	1.00E+01	0.00E+00
Qtr 1 - Admin. Beta	0.00E+00	1.00E+01	0.00E+00
Qtr 1 - T.Spc. Gamma	0.00E+00	1.00E+01	0.00E+00
Receptor: 0			
Distance: (meters)		Compass Point:	
Nuclide Percentage			
-----	-----		
Qtr 1 - T.Spc. Beta	0.00E+00	1.00E+01	0.00E+00
Receptor: 0			
Distance: (meters)		Compass Point:	
Nuclide Percentage			
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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

-----  
GASEOUS DOSE SUMMARY  
-----

Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS === QUARTER 2 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 2 - Admin. Any Organ	ADULT	GILLI	1.08E-04	5.63E+00	1.92E-03
Qtr 2 - Admin. Total Body	CHILD	TBODY	9.50E-05	5.25E+00	1.81E-03

Qtr 2 - T.Spc. Any Organ	ADULT	GILLI	1.08E-04	7.50E+00	1.44E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

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CO-60 1.00E+02

Qtr 2 - T.Spc. Total Body	CHILD	TBODY	9.50E-05	7.50E+00	1.27E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

-----

CO-60 1.00E+02

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

-----  
GASEOUS DOSE SUMMARY  
-----

Report for: 2003

Unit Range - From: 1 To: 2

## === NG DOSE LIMIT ANALYSIS === QUARTER 2 ===

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
-----	-----	-----	-----
Qtr 2 - Admin. Gamma	0.00E+00	7.50E+00	0.00E+00
Qtr 2 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00
Qtr 2 - T.Spc. Gamma	0.00E+00	7.50E+00	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Distance: 0.00 (meters)			Compass Point: NA
Nuclide Percentage			
-----	-----		
Qtr 2 - T.Spc. Beta	0.00E+00	7.50E+00	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Distance: 0.00 (meters)			Compass Point: NA
Nuclide Percentage			
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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

-----  
GASEOUS DOSE SUMMARY  
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Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS ===== QUARTER 3 =====

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 3 - Admin. Any Organ	ADULT	GILLI	1.11E-04	5.63E+00	1.98E-03
Qtr 3 - Admin. Total Body	CHILD	TBODY	9.82E-05	5.25E+00	1.87E-03

Qtr 3 - T.Spc. Any Organ	ADULT	GILLI	1.11E-04	7.50E+00	1.49E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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Qtr 3 - T.Spc. Total Body	CHILD	TBODY	9.82E-05	7.50E+00	1.31E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS === QUARTER 3 ===

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 3 - Admin. Gamma	0.00E+00	7.50E+00	0.00E+00
Qtr 3 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00
Qtr 3 - T.Spc. Gamma	0.00E+00	7.50E+00	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Distance: 0.00 (meters) Compass Point: NA			
Nuclide	Percentage		
-----	-----		
Qtr 3 - T.Spc. Beta	0.00E+00	7.50E+00	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Distance: 0.00 (meters) Compass Point: NA			
Nuclide	Percentage		
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## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS === QUARTER 4 ===

Quartr - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 4 - Admin. Any Organ	ADULT	GILLI	6.32E-05	5.63E+00	1.12E-03
Qtr 4 - Admin. Total Body	CHILD	TBODY	5.57E-05	5.25E+00	1.06E-03

Qtr 4 - T.Spc. Any Organ	ADULT	GILLI	6.32E-05	7.50E+00	8.43E-04
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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Qtr 4 - T.Spc. Total Body	CHILD	TBODY	5.57E-05	7.50E+00	7.43E-04
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Report for: 2003  
Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS === QUARTER 4 ===

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 4 - Admin. Gamma	0.00E+00	7.50E+00	0.00E+00
Qtr 4 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00
Qtr 4 - T.Spc. Gamma	0.00E+00	7.50E+00	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Distance: 0.00 (meters) Compass Point: NA			
Nuclide	Percentage		
-----	-----		
Qtr 4 - T.Spc. Beta	0.00E+00	7.50E+00	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Distance: 0.00 (meters) Compass Point: NA			
Nuclide	Percentage		
-----	-----		

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

## GASEOUS DOSE SUMMARY

Report for: 2003

Unit Range - From: 1 To: 2

## === I&amp;P DOSE LIMIT ANALYSIS ===== ANNUAL 2003 =====

Annual - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2003 - Admin. Any Organ	ADULT	GILLI	2.82E-04	1.13E+01	2.51E-03
2003 - Admin. Total Body	CHILD	TBODY	2.49E-04	1.05E+01	2.37E-03

2003 - T.Spc. Any Organ	ADULT	GILLI	2.82E-04	1.50E+01	1.88E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

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CO-60 1.00E+02

2003 - T.Spc. Total Body	CHILD	TBODY	2.49E-04	1.50E+01	1.66E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00 (meters) Compass Point: NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide Percentage

-----  
CO-60 1.00E+02

## 40CFR190 URANIUM FUEL CYCLE DOSE REPORT

-----  
GASEOUS DOSE SUMMARY  
-----

Report for: 2003

Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS ===== ANNUAL 2003 =====

Annual - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
-----	-----	-----	-----
2003 - Admin. Gamma	0.00E+00	1.50E+01	0.00E+00
2003 - Admin. Beta	0.00E+00	1.50E+01	0.00E+00
2003 - T.Spc. Gamma	0.00E+00	1.50E+01	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Distance: 0.00 (meters) Compass Point: NA			
Nuclide	Percentage		
-----	-----		
2003 - T.Spc. Beta	0.00E+00	1.50E+01	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Distance: 0.00 (meters) Compass Point: NA			
Nuclide	Percentage		
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40CFR190 URANIUM FUEL CYCLE DOSE REPORT  
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Report for: 2003

Unit Range - From: 1 To: 2

## === MAXIMUM DOSE ANALYSIS ===== ANNUAL 2003 =====

Dose Type	Age Group	Organ	Dose (mrem)
Any Organ	TEEN	LIVER	3.72E+00
Liquid Receptor: 0	Liquid Receptor		
Gaseous Receptor: 5	Composite Crit. Receptor - IP		
Distance: 0.00 (meters)	Compass Point: NA		

Liquid Dose: 3.93E-02 % of Total: 1.06E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
H-3	4.89E-04
CO-60	2.19E-02
CS-134	1.29E+00
CS-137	9.87E+01

Gaseous Dose: 2.38E-04 % of Total: 6.40E-03

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
CO-60	1.00E+02

## === MAXIMUM DOSE ANALYSIS ===== ANNUAL 2003 =====

Dose Type	Age Group	Organ	Dose (mrem)
Total Body	ADULT	TBODY	2.35E+00
Liquid Receptor: 0	Liquid Receptor		
Gaseous Receptor: 5	Composite Crit. Receptor - IP		
Distance: 0.00 (meters)	Compass Point: NA		

Liquid Dose: 2.49E-02 % of Total: 1.06E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
H-3	1.05E-03
CO-60	7.66E-02
CS-134	1.65E+00
CS-137	9.83E+01

40CFR190 URANIUM FUEL CYCLE DOSE REPORT  
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Gaseous Dose: 2.40E-04 % of Total: 1.02E-02

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
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CO-60	1.00E+02
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ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
DOSE TO PUBLIC  
UNIT 1 (Docket Number 50-295)

INFANT RECEPTOR

Maximum Quarterly Dose (mrad, mrem)				
Qtrly Obj	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr

Yearly Limit	Maximum Annual Dose (mrad, mrem)	% of Yearly Dose Limit
10CFR50 Appendix I		

A. Airborne

Gamma Air	5.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	10.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Body	2.5 mrem	0.00E+00	4.53E-05	0.00E+00	2.65E-05
Skin	7.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Organ	7.5 mrem	0.00E+00	4.68E-05	0.00E+00	2.75E-05
Critical Organ			Lung		Lung

10.0 mrad	0.00E+00	0.00%
20.0 mrad	0.00E+00	0.00%
5.0 mrem	7.18E-05	0.00%
15.0 mrem	0.00E+00	0.00%
15.0 mrem	7.43E-05	0.00%
	Lung	

B. Aquatic

Total Body	1.5 mrem	0.00E+00	0.00E+00	2.88E-06	1.46E-06
Internal Organ	5.0 mrem	0.00E+00	0.00E+00	3.09E-05	1.58E-05
Critical Organ				Liver	Liver

3.0 mrem	4.34E-06	0.00%
10.0 mrem	4.67E-05	0.00%
	Liver	

Total body doses to individuals and populations in unrestricted areas from direct radiation from Zion Station are judged to be negligible in comparison with 10CFR20 annual limit of 100 mrem TEDE and 40CFR190 annual limits of 25 mrem DDE whole body, 75 mrem CDE thyroid, and 25 mrem CDE other organs.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
DOSE TO PUBLIC  
UNIT 1 (Docket Number 50-295)

CHILD RECEPTOR

Maximum Quarterly Dose (mrad, mrem)				
Qtrly Obj	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr

Yearly Limit	Maximum Annual Dose (mrad, mrem)	% of Yearly Dose Limit
10CFR50 Appendix I		

A. Airborne

Gamma Air	5.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	10.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Body	2.5 mrem	0.00E+00	4.75E-05	0.00E+00	2.79E-05
Skin	7.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Organ	7.5 mrem	0.00E+00	4.99E-05	0.00E+00	2.93E-05
Critical Organ			Gi-Lli		Gi-Lli

10.0 mrad	0.00E+00	0.00%
20.0 mrad	0.00E+00	0.00%
5.0 mrem	7.54E-05	0.00%
15.0 mrem	0.00E+00	0.00%
15.0 mrem	7.92E-05	0.00%
	Gi-Lli	

B. Aquatic

Total Body	1.5 mrem	0.00E+00	0.00E+00	3.51E-03	1.80E-03
Internal Organ	5.0 mrem	0.00E+00	0.00E+00	2.45E-02	1.26E-02
Critical Organ				bone	bone

3.0 mrem	5.31E-03	0.18%
10.0 mrem	3.71E-02	0.37%
	bone	

Total body doses to individuals and populations in unrestricted areas from direct radiation from Zion Station are judged to be negligible in comparison with 10CFR20 annual limit of 100 mrem TEDE and 40CFR190 annual limits of 25 mrem DDE whole body, 75 mrem CDE thyroid, and 25 mrem CDE other organs.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
DOSE TO PUBLIC  
UNIT 1 (Docket Number 50-295)

TEENAGE RECEPTOR

Maximum Quarterly Dose (mrad, mrem)				
Qtrly Obj	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr

Yearly Limit	Maximum Annual Dose (mrad, mrem)	% of Yearly Dose Limit
10CFR50 Appendix I		

A. Airborne

Gamma Air	5.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	10.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Body	2.5 mrem	0.00E+00	4.62E-05	0.00E+00	2.71E-05
Skin	7.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Organ	7.5 mrem	0.00E+00	5.30E-05	0.00E+00	3.11E-05
Critical Organ			Gi-Lli		Gi-Lli

10.0 mrad	0.00E+00	0.00%
20.0 mrad	0.00E+00	0.00%
5.0 mrem	7.33E-05	0.00%
15.0 mrem	0.00E+00	0.00%
15.0 mrem	8.41E-05	0.00%
	Gi-Lli	

B. Aquatic

Total Body	1.5 mrem	0.00E+00	0.00E+00	9.11E-03	4.66E-03
Internal Organ	5.0 mrem	0.00E+00	0.00E+00	2.60E-02	1.33E-02
Critical Organ				liver	liver

3.0 mrem	1.38E-02	0.46%
10.0 mrem	3.93E-02	0.39%
	liver	

Total body doses to individuals and populations in unrestricted areas from direct radiation from Zion Station are judged to be negligible in comparison with 10CFR20 annual limit of 100 mrem TEDE and 40CFR190 annual limits of 25 mrem DDE whole body, 75 mrem CDE thyroid, and 25 mrem CDE other organs.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
DOSE TO PUBLIC  
UNIT 1 (Docket Number 50-295)

ADULT RECEPTOR

Maximum Quarterly Dose (mrad, mrem)				
Qtrly Obj	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr

A. Airborne

Gamma Air	5.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	10.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Body	2.5 mrem	0.00E+00	4.95E-05	0.00E+00	2.69E-05
Skin	7.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Organ	7.5 mrem	0.00E+00	5.39E-05	0.00E+00	3.16E-05
Critical Organ			Gi-Lli		Gi-Lli

Yearly Limit	Maximum Annual Dose (mrad, mrem)	% of Yearly Dose Limit
10CFR50 Appendix I		

10.0 mrad	0.00E+00	0.00%
20.0 mrad	0.00E+00	0.00%
5.0 mrem	7.64E-05	0.00%
15.0 mrem	0.00E+00	0.00%
15.0 mrem	8.55E-05	0.00%
	Gi-Lli	

B. Aquatic

Total Body	1.5 mrem	0.00E+00	0.00E+00	1.64E-02	8.41E-03
Internal Organ	5.0 mrem	0.00E+00	0.00E+00	2.50E-02	1.28E-02
Critical Organ				liver	liver

3.0 mrem	2.48E-02	0.83%
10.0 mrem	3.78E-02	0.38%
	liver	

Total body doses to individuals and populations in unrestricted areas from direct radiation from Zion Station are judged to be negligible in comparison with 10CFR20 annual limit of 100 mrem TEDE and 40CFR190 annual limits of 25 mrem DDE whole body, 75 mrem CDE thyroid, and 25 mrem CDE other organs.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
DOSE TO PUBLIC  
UNIT 2 (Docket Number 50-304)

INFANT RECEPTOR

Maximum Quarterly Dose (mrad, mrem)				
Qtrly Obj	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr

Yearly Limit	Maximum Annual Dose (mrad, mrem)	% of Yearly Dose Limit
10CFR50 Appendix I		

A. Airborne

Gamma Air	5.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	10.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Body	2.5 mrem	0.00E+00	4.52E-05	9.35E-05	2.66E-05
Skin	7.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Organ	7.5 mrem	0.00E+00	4.68E-05	9.68E-05	2.75E-05
Critical Organ	Na	Lung	Lung	Lung	

10.0 mrad	0.00E+00	0.00%
20.0 mrad	0.00E+00	0.00%
5.0 mrem	1.65E-04	0.00%
15.0 mrem	0.00E+00	0.00%
15.0 mrem	1.71E-04	0.00%
	Lung	

B. Aquatic

Total Body	1.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Internal Organ	5.0 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Critical Organ	N/A	N/A	N/A	N/A	

3.0 mrem	0.00E+00	0.00%
10.0 mrem	0.00E+00	0.00%
	N/A	

Total body doses to individuals and populations in unrestricted areas from direct radiation from Zion Station are judged to be negligible in comparison with 10CFR20 annual limit of 100 mrem TEDE and 40CFR190 annual limits of 25 mrem DDE whole body, 75 mrem CDE thyroid, and 25 mrem CDE other organs.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
DOSE TO PUBLIC  
UNIT 2 (Docket Number 50-304)

CHILD RECEPTOR

Maximum Quarterly Dose (mrad, mrem)				
Qtrly Obj	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr

Yearly Limit	Maximum Annual Dose (mrad, mrem)	% of Yearly Dose Limit
10CFR50 Appendix I		

A. Airborne

Gamma Air	5.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	10.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Body	2.5 mrem	0.00E+00	4.75E-05	9.82E-05	2.78E-05
Skin	7.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Organ	7.5 mrem	0.00E+00	4.99E-05	1.03E-04	2.93E-05
Critical Organ		NA	GI-Li	GI-Li	GI-Li

10.0 mrad	0.00E+00	0.00%
20.0 mrad	0.00E+00	0.00%
5.0 mrem	1.74E-04	0.00%
15.0 mrem	0.00E+00	0.00%
15.0 mrem	1.82E-04	0.00%
	GI-Li	

B. Aquatic

Total Body	1.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Internal Organ	5.0 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Critical Organ		N/A	N/A	N/A	N/A

3.0 mrem	0.00E+00	0.00%
10.0 mrem	0.00E+00	0.00%
	N/A	

Total body doses to individuals and populations in unrestricted areas from direct radiation from Zion Station are judged to be negligible in comparison with 10CFR20 annual limit of 100 mrem TEDE and 40CFR190 annual limits of 25 mrem DDE whole body, 75 mrem CDE thyroid, and 25 mrem CDE other organs.



ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
DOSE TO PUBLIC  
UNIT 2 (Docket Number 50-304)

TEENAGE RECEPTOR

Maximum Quarterly Dose (mrad, mrem)				
Qtrly Obj	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr

Yearly Limit	Maximum Annual Dose (mrad, mrem)	% of Yearly Dose Limit
10CFR50 Appendix I		

A. Airborne

Gamma Air	5.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	10.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Body	2.5 mrem	0.00E+00	4.62E-05	9.55E-05	2.71E-05
Skin	7.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Organ	7.5 mrem	0.00E+00	5.30E-05	1.10E-04	3.11E-05
Critical Organ		Na	GI-Li	GI-Li	GI-Li

10.0 mrad	0.00E+00	0.00%
20.0 mrad	0.00E+00	0.00%
5.0 mrem	1.69E-04	0.00%
15.0 mrem	0.00E+00	0.00%
15.0 mrem	1.94E-04	0.00%
	GI-Li	

B. Aquatic

Total Body	1.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Internal Organ	5.0 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Critical Organ		N/A	N/A	N/A	N/A

3.0 mrem	0.00E+00	0.00%
10.0 mrem	0.00E+00	0.00%
	N/A	

Total body doses to individuals and populations in unrestricted areas from direct radiation from Zion Station are judged to be negligible in comparison with 10CFR20 annual limit of 100 mrem TEDE and 40CFR190 annual limits of 25 mrem DDE whole body, 75 mrem CDE thyroid, and 25 mrem CDE other organs.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
DOSE TO PUBLIC  
UNIT 2 (Docket Number 50-304)

ADULT RECEPTOR

Maximum Quarterly Dose (mrad, mrem)				
Qtrly Obj	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr

Yearly Limit	Maximum Annual Dose (mrad, mrem)	% of Yearly Dose Limit
10CFR50 Appendix I		

A. Airborne

Gamma Air	5.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	10.0 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Body	2.5 mrem	0.00E+00	4.59E-05	9.48E-05	2.69E-05
Skin	7.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Organ	7.5 mrem	0.00E+00	5.40E-05	1.11E-04	3.16E-05
Critical Organ		Na	GI-Li	GI-Li	GI-Li

10.0 mrad	0.00E+00	0.00%
20.0 mrad	0.00E+00	0.00%
5.0 mrem	1.68E-04	0.00%
15.0 mrem	0.00E+00	0.00%
15.0 mrem	1.97E-04	0.00%
	GI-Li	

B. Aquatic

Total Body	1.5 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Internal Organ	5.0 mrem	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Critical Organ		N/A	N/A	N/A	N/A

3.0 mrem	0.00E+00	0.00%
10.0 mrem	0.00E+00	0.00%
	N/A	

Total body doses to individuals and populations in unrestricted areas from direct radiation from Zion Station are judged to be negligible in comparison with 10CFR20 annual limit of 100 mrem TEDE and 40CFR190 annual limits of 25 mrem DDE whole body, 75 mrem CDE thyroid, and 25 mrem CDE other organs.

LIQUID ANNUAL DOSE SUMMARY REPORT  
 ----- (PERIOD BASIS) -----

Report for: 2003

Release ID: 1 All Liquid Release Types

						Liquid Receptor	
=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ===						QUARTER 1 ===	
Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
-----							

=== SITE DOSE LIMIT ANALYSIS =====

Period - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
-----					
Qtr 1 - Admin. Any Organ			0.00E+00	3.75E+00	0.00E+00
Qtr 1 - Admin. Total Body	ADULT	TBODY	0.00E+00	1.13E+00	0.00E+00
Qtr 1 - T.Spec Any Organ			0.00E+00	1.50E+00	0.00E+00
Critical Pathway: Potable Water (PWtr)					
Major Contributors ( 0% or greater to total)					
Nuclide	Percentage				
-----	-----				

Qtr 1 - T.Spec Total Body	ADULT	TBODY	0.00E+00	1.50E+00	0.00E+00
Critical Pathway: Potable Water (PWtr)					
Major Contributors ( 0% or greater to total)					
Nuclide	Percentage				
-----	-----				

LIQUID ANNUAL DOSE SUMMARY REPORT  
----- (PERIOD BASIS) -----

Report for: 2003  
Release ID: 1 All Liquid Release Types

						Liquid Receptor	
=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ===						QUARTER 2 ===	
Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
-----							

=== SITE DOSE LIMIT ANALYSIS =====

Period - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
-----					
Qtr 2 - Admin. Any Organ			0.00E+00	1.13E+00	0.00E+00
Qtr 2 - Admin. Total Body	ADULT	TBODY	0.00E+00	1.13E+00	0.00E+00
Qtr 2 - T.Spec Any Organ			0.00E+00	1.50E+00	0.00E+00
Critical Pathway: Potable Water (PWtr)					
Major Contributors ( 0% or greater to total)					
Nuclide	Percentage				
-----	-----				

Qtr 2 - T.Spec Total Body	ADULT	TBODY	0.00E+00	1.50E+00	0.00E+00
Critical Pathway: Potable Water (PWtr)					
Major Contributors ( 0% or greater to total)					
Nuclide	Percentage				
-----	-----				

LIQUID ANNUAL DOSE SUMMARY REPORT  
 ----- (PERIOD BASIS) -----

Report for: 2003

Release ID: 1 All Liquid Release Types

	Liquid Receptor							
=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ===	===== QUARTER 3 =====							
	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
ADULT	1.82E-02	2.50E-02	1.83E-07	8.48E-03	2.82E-03	5.91E-04	0.00E+00	1.64E-02
TEEN	1.94E-02	2.60E-02	1.34E-07	8.84E-03	3.44E-03	4.44E-04	0.00E+00	9.11E-03
CHILD	2.45E-02	2.36E-02	1.84E-07	7.67E-03	2.76E-03	1.74E-04	0.00E+00	3.51E-03
INFANT	2.59E-05	3.09E-05	1.26E-07	8.30E-06	3.44E-06	8.10E-07	0.00E+00	2.88E-06

=== SITE DOSE LIMIT ANALYSIS =====

Period - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 3 - Admin. Any Organ	TEEN	LIVER	2.60E-02	3.75E+00	6.94E-01
Qtr 3 - Admin. Total Body	ADULT	TBODY	1.64E-02	1.13E+00	1.46E+00
Qtr 3 - T.Spec Any Organ	TEEN	LIVER	2.60E-02	5.00E+00	5.20E-01

Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

H-3	5.16E-04
CO-60	2.20E-02
CS-134	1.41E+00
CS-137	9.86E+01

Qtr 3 - T.Spec Total Body	ADULT	TBODY	1.64E-02	1.50E+00	1.10E+00
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

H-3	1.11E-03
CO-60	7.70E-02
CS-134	1.80E+00
CS-137	9.81E+01

LIQUID ANNUAL DOSE SUMMARY REPORT  
----- (PERIOD BASIS) -----

Report for: 2003

Release ID: 1 All Liquid Release Types

	Liquid Receptor						
	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin TB
ADULT	9.31E-03	1.28E-02	7.93E-08	4.34E-03	1.44E-03	3.02E-04	0.00E+00 8.41E-03
TEEN	9.97E-03	1.33E-02	5.83E-08	4.53E-03	1.76E-03	2.27E-04	0.00E+00 4.66E-03
CHILD	1.26E-02	1.21E-02	7.98E-08	3.93E-03	1.41E-03	8.88E-05	0.00E+00 1.80E-03
INFANT	1.33E-05	1.58E-05	5.45E-08	4.25E-06	1.75E-06	4.01E-07	0.00E+00 1.46E-06

=== SITE DOSE LIMIT ANALYSIS ===

Period - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 4 - Admin. Any Organ	TEEN	LIVER	1.33E-02	3.75E+00	3.55E-01
Qtr 4 - Admin. Total Body	ADULT	TBODY	8.41E-03	1.13E+00	7.48E-01
Qtr 4 - T.Spec Any Organ	TEEN	LIVER	1.33E-02	5.00E+00	2.67E-01

Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

H-3	4.37E-04
CO-60	2.17E-02
CS-134	1.07E+00
CS-137	9.89E+01

Qtr 4 - T.Spec Total Body	ADULT	TBODY	8.41E-03	1.50E+00	5.61E-01
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

H-3	9.42E-04
CO-60	7.58E-02
CS-134	1.37E+00
CS-137	9.86E+01

LIQUID ANNUAL DOSE SUMMARY REPORT  
----- (PERIOD BASIS) -----

Report for: 2003

Release ID: 1 All Liquid Release Types

Liquid Receptor

PERIOD	DOSE BY ORGAN AND AGE GROUP (mrem)	ANNUAL 2003
	Bone Liver Thyroid Kidney Lung GI-Lli Skin TB	
ADULT	2.75E-02 3.78E-02 2.62E-07 1.28E-02 4.26E-03 8.93E-04 0.00E+00 2.49E-02	
TEEN	2.94E-02 3.93E-02 1.92E-07 1.34E-02 5.20E-03 6.71E-04 0.00E+00 1.38E-02	
CHILD	3.70E-02 3.56E-02 2.64E-07 1.16E-02 4.17E-03 2.63E-04 0.00E+00 5.31E-03	
INFANT	3.92E-05 4.67E-05 1.80E-07 1.25E-05 5.19E-06 1.21E-06 0.00E+00 4.34E-06	

=== SITE DOSE LIMIT ANALYSIS ===

Period - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2003 - Admin. Any Organ	TEEN	LIVER	3.93E-02	7.50E+00	5.25E-01
2003 - Admin. Total Body	ADULT	TBODY	2.49E-02	2.25E+00	1.10E+00
2003 - T.Spec Any Organ	TEEN	LIVER	3.93E-02	1.00E+01	3.93E-01

Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

H-3	4.89E-04
CO-60	2.19E-02
CS-134	1.29E+00
CS-137	9.87E+01

2003 - T.Spec Total Body	ADULT	TBODY	2.49E-02	3.00E+00	8.28E-01
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Critical Pathway: Fresh Water Fish - Sport (FFSP)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

H-3	1.05E-03
CO-60	7.66E-02
CS-134	1.65E+00
CS-137	9.83E+01

GASEOUS ANNUAL DOSE SUMMARY REPORT  
-- (Composite Critical Receptor) ---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

=== I&P DOSE LIMIT ANALYSIS === QUARTER 1 ===

Period-Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Admin. Any Organ			0.00E+00	5.63E+00	0.00E+00
Q1 - Admin. Total Body			0.00E+00	5.25E+00	0.00E+00
Q1 - T.Spec Any Organ			0.00E+00	7.50E+00	0.00E+00

Receptor: 0

Distance: 0.00E+00 (meters)

Compass Point:

Critical Pathway:

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
-----	-----

Q1 - T.Spec Total Body

0.00E+00 7.50E+00 0.00E+00

Receptor: 0

Distance: 0.00E+00 (meters)

Compass Point:

Critical Pathway:

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
-----	-----



GASEOUS ANNUAL DOSE SUMMARY REPORT  
-- (Composite Critical Receptor)---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

## === NG DOSE LIMIT ANALYSIS ===== QUARTER 1 =====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q1 - Admin. Gamma	0.00E+00	3.75E+00	0.00E+00
Q1 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00
Q1 - T.Spec Gamma	0.00E+00	5.00E+00	0.00E+00

Receptor: 0

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

Q1 - T.Spec Beta

0.00E+00 1.00E+01 0.00E+00

Receptor: 0

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

GASEOUS ANNUAL DOSE SUMMARY REPORT  
 --(Composite Critical Receptor)---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

=== I&P DOSE LIMIT ANALYSIS ===== QUARTER 2 =====

Period-Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Admin. Any Organ	ADULT	GILLI	1.08E-04	5.63E+00	1.92E-03
Q2 - Admin. Total Body	CHILD		9.50E-05	5.25E+00	1.81E-03
Q2 - T.Spec Any Organ	ADULT	GILLI	1.08E-04	7.50E+00	1.44E-03

Receptor: 5 Composite Crit. Receptor - IP  
 Distance: 0.00E+00 (meters) Compass Point:NA  
 Critical Pathway: Ground Plane Deposition (GPD)  
 Major Contributors ( 0% or greater to total)

Nuclide	Percentage
CO-60	1.00E+02

Q2 - T.Spec Total Body	CHILD	9.50E-05	7.50E+00	1.27E-03
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Receptor: 5 Composite Crit. Receptor - IP  
 Distance: 0.00E+00 (meters) Compass Point:NA  
 Critical Pathway: Ground Plane Deposition (GPD)  
 Major Contributors ( 0% or greater to total)

Nuclide	Percentage
CO-60	1.00E+02

GASEOUS ANNUAL DOSE SUMMARY REPORT  
 --(Composite Critical Receptor)---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

=== NG DOSE LIMIT ANALYSIS === QUARTER 2 ===

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q2 - Admin. Gamma	0.00E+00	3.75E+00	0.00E+00
Q2 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00
Q2 - T.Spec Gamma	0.00E+00	5.00E+00	0.00E+00

Receptor: 5 Composite Crit. Receptor - IP  
 Major Contributors ( 0% or greater to total)  
 Nuclide Percentage  
 -----

Q2 - T.Spec Beta 0.00E+00 1.00E+01 0.00E+00

Receptor: 5 Composite Crit. Receptor - IP  
 Major Contributors ( 0% or greater to total)  
 Nuclide Percentage  
 -----

GASEOUS ANNUAL DOSE SUMMARY REPORT  
 -- (Composite Critical Receptor) ---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

## === I&amp;P DOSE LIMIT ANALYSIS === QUARTER 3 ===

Period-Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Admin. Any Organ	ADULT	GILLI	1.11E-04	5.63E+00	1.98E-03
Q3 - Admin. Total Body	CHILD		9.82E-05	5.25E+00	1.87E-03
Q3 - T.Spec Any Organ	ADULT	GILLI	1.11E-04	7.50E+00	1.49E-03

Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00E+00 (meters) Compass Point:NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

CO-60	1.00E+02
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Q3 - T.Spec Total Body	CHILD	9.82E-05	7.50E+00	1.31E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00E+00 (meters) Compass Point:NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

CO-60	1.00E+02
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GASEOUS ANNUAL DOSE SUMMARY REPORT  
 --(Composite Critical Receptor)---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

=== NG DOSE LIMIT ANALYSIS === QUARTER 3 ===

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q3 - Admin. Gamma	0.00E+00	3.75E+00	0.00E+00
Q3 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00
Q3 - T.Spec Gamma	0.00E+00	5.00E+00	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Major Contributors ( 0% or greater to total)			
Nuclide	Percentage		
-----	-----		

Q3 - T.Spec Beta	0.00E+00	1.00E+01	0.00E+00
Receptor: 5 Composite Crit. Receptor - IP			
Major Contributors ( 0% or greater to total)			
Nuclide	Percentage		
-----	-----		

GASEOUS ANNUAL DOSE SUMMARY REPORT  
-- (Composite Critical Receptor) ---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

=== I&P DOSE LIMIT ANALYSIS ===== QUARTER 4 =====

Period-Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Admin. Any Organ	ADULT	GILLI	6.32E-05	5.63E+00	1.12E-03
Q4 - Admin. Total Body	CHILD		5.57E-05	5.25E+00	1.06E-03
Q4 - T.Spec Any Organ	ADULT	GILLI	6.32E-05	7.50E+00	8.43E-04

Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00E+00 (meters) Compass Point:NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

CO-60	1.00E+02
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Q4 - T.Spec Total Body	CHILD		5.57E-05	7.50E+00	7.43E-04
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00E+00 (meters) Compass Point:NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
---------	------------

CO-60	1.00E+02
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GASEOUS ANNUAL DOSE SUMMARY REPORT  
-- (Composite Critical Receptor) --

Release ID: 1 All Gas Releases

Coefficient Type: Historical

=== NG DOSE LIMIT ANALYSIS === QUARTER 4 ===

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q4 - Admin. Gamma	0.00E+00	3.75E+00	0.00E+00
Q4 - Admin. Beta	0.00E+00	7.50E+00	0.00E+00
Q4 - T.Spec Gamma	0.00E+00	5.00E+00	0.00E+00

Receptor: 5 Composite Crit. Receptor - IP  
Major Contributors ( 0% or greater to total)  
Nuclide Percentage  
-----

Q4 - T.Spec Beta	0.00E+00	1.00E+01	0.00E+00
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Receptor: 5 Composite Crit. Receptor - IP  
Major Contributors ( 0% or greater to total)  
Nuclide Percentage  
-----

GASEOUS ANNUAL DOSE SUMMARY REPORT  
 --(Composite Critical Receptor)---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

=== I&P DOSE LIMIT ANALYSIS ===== ANNUAL 2003 =====

Period-Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2003 - Admin. Any Organ	ADULT	GILLI	2.82E-04	1.13E+01	2.51E-03
2003 - Admin. Total Body	CHILD		2.49E-04	1.05E+01	2.37E-03
2003 - T.Spec Any Organ	ADULT	GILLI	2.82E-04	1.50E+01	1.88E-03

Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00E+00 (meters) Compass Point:NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
CO-60	1.00E+02

2003 - T.Spec Total Body	CHILD		2.49E-04	1.50E+01	1.66E-03
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Receptor: 5 Composite Crit. Receptor - IP

Distance: 0.00E+00 (meters) Compass Point:NA

Critical Pathway: Ground Plane Deposition (GPD)

Major Contributors ( 0% or greater to total)

Nuclide	Percentage
CO-60	1.00E+02



GASEOUS ANNUAL DOSE SUMMARY REPORT  
--(Composite Critical Receptor)---

Release ID: 1 All Gas Releases

Coefficient Type: Historical

=== NG DOSE LIMIT ANALYSIS ===== ANNUAL 2003 =====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
2003 - Admin. Gamma	0.00E+00	7.50E+00	0.00E+00
2003 - Admin. Beta	0.00E+00	1.50E+01	0.00E+00
2003 - T.Spec Gamma	0.00E+00	1.00E+01	0.00E+00

Receptor: 5 Composite Crit. Receptor - IP

Major Contributors ( 0% or greater to total)

Nuclide Percentage

2003 - T.Spec Beta

0.00E+00 2.00E+01 0.00E+00

Receptor: 5 Composite Crit. Receptor - IP

Major Contributors ( 0% or greater to total)

Nuclide Percentage

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 (Docket Number 50-295)

GASEOUS EFFLUENTS  
SUPPLEMENTAL INFORMATION

1. Regulatory Limits

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

2. Maximum Permissible Concentrations

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

3. Average Energy

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

4. Measurements and Approximations of Total Radioactivity

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

5. Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a. Total Number of Batch Releases	0	0	0	0	0
b. Total Time Period for Batch Releases (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
c. Maximum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
d. Average Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
e. Minimum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Abnormal Releases					
a. Number of Releases	0	0	0	0	0
b. Total Activity Released (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 2 (Docket Number 50-304)

GASEOUS EFFLUENTS  
SUPPLEMENTAL INFORMATION

1. Regulatory Limits

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

2. Maximum Permissible Concentrations

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

3. Average Energy

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

4. Measurements and Approximations of Total Radioactivity

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

5. Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a. Total Number of Batch Releases	0	0	0	0	0
b. Total Time Period for Batch Releases (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
c. Maximum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
d. Average Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
e. Minimum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Abnormal Releases					
a. Number of Releases	0	0	0	0	0
b. Total Activity Released (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)

GASEOUS EFFLUENTS  
SUPPLEMENTAL INFORMATION

1. Regulatory Limits

The calculated annual total quantity of all radioactive material above background released from each unit at Zion Station to the atmosphere is limited by off-site dose restrictions stated in the station technical specifications, Off-site Dose Calculation Manual (ODCM), and 10CFR50 Appendix I. The off-site dose limits per reactor unit are listed below.

	Quarterly (mrem)	Yearly (mrem)
Gamma Air	5	10
Beta Air	10	20
Total Body	2.5	5
Skin	7.5	15
Organ	7.5	15

2. Maximum Permissible Concentrations

Zion Station gaseous effluent release-rate limits were not calculated using maximum permissible concentrations of activity. Gaseous effluent activity release rates are limited by off-site dose-rate restrictions stated in station technical specifications and the ODCM. The release-rate limits were determined by using the ODCM computer code to calculate release rates which would produce a specified instantaneous dose rate at the site boundary. The off-site dose-rate limits are listed below.

Noble Gases	500	mrem/year Total Body
Noble Gases	3000	mrem/year Skin
I-131, I-133, H-3, and particulates with half-lives greater than 8 days	1500	mrem/year Organ

3. Average Energy

There were no measurable noble gas releases during 2003. Due to permanent cessation of operation and radioactive decay, the only gas available for release is Kr-85 present in spent fuel rods.

Isotope	Percent of Effluent
Kr-85	100

Average Gamma Energy per Decay of the Mixture (keV)	5.0
Average Beta Energy per Decay of the Mixture (keV)	269.0

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)

GASEOUS EFFLUENTS  
SUPPLEMENTAL INFORMATION

4. Measurements and Approximations of Total Radioactivity

- |                                 |  |
|---------------------------------|--|
| a. Fission and Activation Gases | Gamma Spectroscopy   |
| b. Iodines                      | Gamma Spectroscopy   |
| c. Particulates                 | Gamma Spectroscopy, Liquid Scintillation<br>Gas Flow Proportional Counting |
| d. Tritium                      | Liquid Scintillation   |

Composite sample analyses for gross alpha, Sr-89, and Sr-90 are performed by off-site vendor.

5. Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a. Total Number of Batch Releases	0	0	0	0	0
b. Total Time Period for Batch Releases (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
c. Maximum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
d. Average Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
e. Minimum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Abnormal Releases					
a. Number of Releases	0	0	0	0	0
b. Total Activity Released (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
GASEOUS EFFLUENTS - ALL RELEASES ARE AT GROUND LEVEL  
UNIT 1 (Docket Number 50-295)  
SUMMATION OF ALL RELEASES

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Gases**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**B. Iodine**

1. Total I-131 Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**C. Particulates (half-lives > 8 days)**

1. Total Release Activity†	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	1.02E-06	<LLD	1.02E-06	<LLD	<LLD	<LLD	<LLD	<LLD	5.93E-07	<LLD	5.93E-07	1.61E-06
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	3.81E-07	<LLD	1.30E-07	<LLD	<LLD	<LLD	<LLD	<LLD	2.29E-07	<LLD	7.46E-08	5.11E-09
3. Gross Alpha Activity†	Ci				<LLD				<LLD				<LLD				<LLD	<LLD

**D. Tritium**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**E. Sum of Iodine, Particulate (half-lives > 8 days), and Tritium Releases.**

1. Total Release Activity	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-06	0.00E+00	1.02E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.93E-07	0.00E+00	5.93E-07	1.61E-06
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† Gross Alpha, Sr-89, and Sr-90 Activities are quantified by quarterly composite analyses. The difference between the quarterly Particulates total and the sum of the totals of the three corresponding months equals the total quarterly activities of Sr-89 and Sr-90. The cells for monthly activity values of Gross Alpha on this page and Sr-89 and Sr-90 on the Batch and Continuous Mode data sheets are blank because monthly values are not applicable.

Lower limit of detection (LLD) values are presented in the Gaseous Effluents LLD Values for Gaseous Releases section. The abbreviation "<LLD" indicates the activity concentration of the radionuclide for each individual sample analyzed during the applicable period was less than the LLD value for that nuclide. If the abbreviation "<LLD" is listed for a group of radionuclides, the activity concentration of each radionuclide for each sample during the period was less than the LLD value for the respective radionuclide.

Percent of technical specification limit information is presented in the Gaseous Effluents Supplemental Information and Dose to Public sections of this report.

The abbreviation "No Rel" indicates that no batch releases were performed during the applicable period.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
GASEOUS EFFLUENTS - ALL RELEASES ARE AT GROUND LEVEL  
UNIT 1 (Docket Number 50-295)  
BATCH MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Gases**

Ar-41	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Kr-85	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Kr-85m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Kr-87	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Kr-88	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-131	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-131m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-133	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-133m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-135	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-135m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-138	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD

**B. Iodines**

Br-82	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-131	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-132	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-133	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-134	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-135	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD

**C. Particulates**

Na-24	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cr-51*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Mn-54*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Co-57*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Co-58*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Co-60*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Zn-65*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Se-75*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Rb-88	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Sr-89*	Ci				No Rel				No Rel				No Rel				No Rel	No Rel
Sr-90*	Ci				No Rel				No Rel				No Rel				No Rel	No Rel
Zr-95*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Nb-95*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Mo-99	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Tc-99m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Ru-103*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Ag-110m*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cs-134*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cs-136*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cs-137*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cs-138	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Ba-140*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
La-140	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Ce-144*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Pr-144	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
VV-187	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel

**D. Tritium**

1. Total Release Activity	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
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\* Particulate isotope with half-life greater than 8 days.

### CONTINUOUS MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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### A. Fission and Activation Gases

[illegible]

### B. Iodines

[illegible]

### C. Particulates

[illegible]

### D. Tritium

[illegible]

\* Particulate isotope with half-life greater than 8 days.



ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
GASEOUS EFFLUENTS - ALL RELEASES ARE AT GROUND LEVEL  
UNIT 2 (Docket Number 50-304)  
SUMMATION OF ALL RELEASES

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Gases**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**B. Iodine**

1. Total I-131 Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**C. Particulates (half-lives > 8 days)**

1. Total Release Activity‡	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	1.02E-06	<LLD	1.02E-06	<LLD	2.09E-06	<LLD	2.09E-06	<LLD	5.93E-07	<LLD	5.93E-07	3.70E-06
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	3.81E-07	<LLD	1.30E-08	<LLD	7.80E-07	<LLD	2.63E-07	<LLD	2.29E-07	<LLD	7.46E-09	1.17E-08
3. Gross Alpha Activity‡	Ci				<LLD				<LLD				<LLD				<LLD	<LLD

**D. Tritium**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**E. Sum of Iodine, Particulate (half-lives > 8 days), and Tritium Releases.**

1. Total Release Activity	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-06	0.00E+00	1.02E-06	0.00E+00	2.09E-06	0.00E+00	2.09E-06	0.00E+00	5.93E-07	0.00E+00	5.93E-07	3.70E-06
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‡ Gross Alpha, Sr-89, and Sr-90 Activities are quantified by quarterly composite analyses. The difference between the quarterly Particulates total and the sum of the totals of the three corresponding months equals the total quarterly activities of Sr-89 and Sr-90. The cells for monthly activity values of Gross Alpha on this page and Sr-89 and Sr-90 on the Batch and Continuous Mode data sheets are blank because monthly values are not applicable.

Lower limit of detection (LLD) values are presented in the Gaseous Effluents LLD Values for Gaseous Releases section. The abbreviation "<LLD" indicates the activity concentration of the radionuclide for each individual sample analyzed during the applicable period was less than the LLD value for that nuclide. If the abbreviation "<LLD" is listed for a group of radionuclides, the activity concentration of each radionuclide for each sample during the period was less than the LLD value for the respective radionuclide.

Percent of technical specification limit information is presented in the Gaseous Effluents Supplemental Information and Dose to Public sections of this report.

The abbreviation "No Rel" indicates that no batch releases were performed during the applicable period.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
GASEOUS EFFLUENTS - ALL RELEASES ARE AT GROUND LEVEL  
UNIT 2 (Docket Number 50-304)  
BATCH MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Gases**

Ar-41	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Kr-85	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Kr-85m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Kr-87	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Kr-88	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-131	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-131m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-133	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-133m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-135	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-135m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Xe-138	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD

**B. Iodines**

Br-82	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-131	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-132	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-133	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-134	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
I-135	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD

**C. Particulates**

Na-24	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Cr-51*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Mn-54*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Co-57*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Co-58*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Co-60*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Zn-65*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Se-75*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Rb-88	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Sr-89*	Ci				No Rel				No Rel				No Rel				No Rel	<LLD
Sr-90*	Ci				No Rel				No Rel				No Rel				No Rel	<LLD
Zr-95*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Nb-95*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Mo-99	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Tc-99m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Ru-103*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Ag-110m*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Cs-134*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Cs-136*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Cs-137*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Cs-138	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Ba-140*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
La-140	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Ce-144*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
Pr-144	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
W-187	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD

**D. Tritium**

1. Total Release Activity	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	<LLD
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\* Particulate isotope with half-life greater than 8 days.

## CONTINUOUS MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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### A. Fission and Activation Gases

[illegible]

### B. Iodines

[illegible]

### C. Particulates

[illegible]

#### D. Tritium

[illegible]

\* Particulate isotope with half-life greater than 8 days.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
GASEOUS EFFLUENTS - ALL RELEASES ARE AT GROUND LEVEL  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)  
SUMMATION OF ALL RELEASES

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Gases**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**B. Iodine**

1. Total I-131 Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**C. Particulates (half-life > 8 days)**

1. Total Release Activity‡	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	2.02E-06	<LLD	2.02E-06	<LLD	2.09E-06	<LLD	2.09E-06	<LLD	1.19E-06	<LLD	1.19E-06	5.30E-06
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	7.54E-07	<LLD	2.57E-08	<LLD	7.80E-07	<LLD	2.63E-07	<LLD	4.59E-07	<LLD	1.50E-08	1.68E-08
3. Gross Alpha Activity‡	Ci				<LLD				<LLD				<LLD				<LLD	<LLD

**D. Tritium**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Release Rate	uCi/sec	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**E. Sum of Iodine, Particulate (half-lives > 8 days), and Tritium Releases.**

1. Total Release Activity	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-06	0.00E+00	2.02E-06	0.00E+00	2.09E-06	0.00E+00	2.09E-06	0.00E+00	1.19E-06	0.00E+00	1.19E-06	5.30E-06
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‡ Gross Alpha, Sr-89, and Sr-90 Activities are quantified by quarterly composite analyses. The difference between the quarterly Particulates total and the sum of the totals of the three corresponding months equals the total quarterly activities of Sr-89 and Sr-90. The cells for monthly activity values of Gross Alpha on this page and Sr-89 and Sr-90 on the Batch and Continuous Mode data sheets are blank because monthly values are not applicable.

Lower limit of detection (LLD) values are presented in the Gaseous Effluents LLD Values for Gaseous Releases section. The abbreviation "<LLD" indicates the activity concentration of the radionuclide for each individual sample analyzed during the applicable period was less than the LLD value for that nuclide. If the abbreviation "<LLD" is listed for a group of radionuclides, the activity concentration of each radionuclide for each sample during the period was less than the LLD value for the respective radionuclide.

Percent of technical specification limit information is presented in the Gaseous Effluents Supplemental Information and Dose to Public sections of this report.

The abbreviation "No Rel" indicates that no batch releases were performed during the applicable period.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
GASEOUS EFFLUENTS - ALL RELEASES ARE AT GROUND LEVEL  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)  
BATCH MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Gases**

Ar-41	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Kr-85	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Kr-85m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Kr-87	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Kr-88	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Xe-131	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Xe-131m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Xe-133	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Xe-133m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Xe-135	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Xe-135m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Xe-138	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel

**B. Iodines**

Br-82	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
I-131	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
I-132	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
I-133	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
I-134	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
I-135	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel

**C. Particulates**

Na-24	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cr-51*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Mn-54*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Co-57*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Co-58*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Co-60*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Zn-65*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Se-75*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Rb-88	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Sr-89*	Ci				No Rel				No Rel				No Rel				No Rel	No Rel
Sr-90*	Ci				No Rel				No Rel				No Rel				No Rel	No Rel
Zr-95*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Nb-95*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Mo-99	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Tc-99m	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Ru-103*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Ag-110m*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cs-134*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cs-136*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cs-137*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Cs-138	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Ba-140*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
La-140	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Ce-144*	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
Pr-144	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
W-187	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel

**D. Tritium**

1. Total Release Activity	Ci	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel	No Rel
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\* Particulate isotope with half-life greater than 8 days.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
GASEOUS EFFLUENTS - ALL RELEASES ARE AT GROUND LEVEL  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)  
CONTINUOUS MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Gases**

Ar-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

**B. Iodines**

Br-82	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
I-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

**C. Particulates**

Na-24	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cr-51*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Co-57*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	2.02E-06	<LLD	2.02E-06	<LLD	2.09E-06	<LLD	2.09E-06	<LLD	1.19E-06	<LLD	1.19E-06
Zn-65*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Se-75*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Rb-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-89*	Ci				<LLD				<LLD				<LLD			<LLD	<LLD
Sr-90*	Ci				<LLD				<LLD				<LLD			<LLD	<LLD
Zr-95*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Tc-99m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ru-103*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ag-110m*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-136*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ba-140*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-144*	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Pr-144	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
W-187	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

**D. Tritium**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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\* Particulate isotope with half-life greater than 8 days.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 (Docket Number 50-295)

GASEOUS EFFLUENTS  
SUPPLEMENTAL INFORMATION

1. Regulatory Limits

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

2. Maximum Permissible Concentrations

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

3. Average Energy

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

4. Measurements and Approximations of Total Radioactivity

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

5. Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a. Total Number of Batch Releases	0	0	0	0	0
b. Total Time Period for Batch Releases (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
c. Maximum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
d. Average Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
e. Minimum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Abnormal Releases					
a. Number of Releases	0	0	0	0	0
b. Total Activity Released (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 2 (Docket Number 50-304)

GASEOUS EFFLUENTS  
SUPPLEMENTAL INFORMATION

1. Regulatory Limits

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

2. Maximum Permissible Concentrations

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

3. Average Energy

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

4. Measurements and Approximations of Total Radioactivity

See "Unit 1 & 2 GASEOUS EFFLUENTS SUPPLEMENTAL INFORMATION"

5. Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a. Total Number of Batch Releases	0	0	0	0	0
b. Total Time Period for Batch Releases (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
c. Maximum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
d. Average Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
e. Minimum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Abnormal Releases					
a. Number of Releases	0	0	0	0	0
b. Total Activity Released (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)

GASEOUS EFFLUENTS  
SUPPLEMENTAL INFORMATION

1. Regulatory Limits

The calculated annual total quantity of all radioactive material above background released from each unit at Zion Station to the atmosphere is limited by off-site dose restrictions stated in the station technical specifications, Off-site Dose Calculation Manual (ODCM), and 10CFR50 Appendix I. The off-site dose limits per reactor unit are listed below.

	Quarterly (mrem)	Yearly (mrem)
Gamma Air	5	10
Beta Air	10	20
Total Body	2.5	5
Skin	7.5	15
Organ	7.5	15

2. Maximum Permissible Concentrations

Zion Station gaseous effluent release-rate limits were not calculated using maximum permissible concentrations of activity. Gaseous effluent activity release rates are limited by off-site dose-rate restrictions stated in station technical specifications and the ODCM. The release-rate limits were determined by using the ODCM computer code to calculate release rates which would produce a specified instantaneous dose rate at the site boundary. The off-site dose-rate limits are listed below.

Noble Gases	500	mrem/year Total Body
Noble Gases	3000	mrem/year Skin
I-131, I-133, H-3, and particulates with half-lives greater than 8 days	1500	mrem/year Organ

3. Average Energy

There were no measurable noble gas releases during 2003. Due to permanent cessation of operation and radioactive decay, the only gas available for release is Kr-85 present in spent fuel rods.

Isotope	Percent of Effluent
Kr-85	100

Average Gamma Energy per Decay of the Mixture (keV)	5.0
Average Beta Energy per Decay of the Mixture (keV)	269.0

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)

GASEOUS EFFLUENTS  
SUPPLEMENTAL INFORMATION

4. Measurements and Approximations of Total Radioactivity

- |                                 |  |
|---------------------------------|--|
| a. Fission and Activation Gases | Gamma Spectroscopy   |
| b. Iodines                      | Gamma Spectroscopy   |
| c. Particulates                 | Gamma Spectroscopy, Liquid Scintillation<br>Gas Flow Proportional Counting |
| d. Tritium                      | Liquid Scintillation   |

Composite sample analyses for gross alpha, Sr-89, and Sr-90 are performed by off-site vendor.

5. Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a. Total Number of Batch Releases	0	0	0	0	0
b. Total Time Period for Batch Releases (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
c. Maximum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
d. Average Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
e. Minimum Time Period for a Batch Release (minutes)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Abnormal Releases					
a. Number of Releases	0	0	0	0	0
b. Total Activity Released (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)

GASEOUS EFFLUENTS  
LOWER LIMIT OF DETECTION (LLD) VALUES FOR GASEOUS RELEASES

<u>Isotope</u>	<u>LLD (uCi/ml)</u>
Alpha	1.00E-11
H-3	1.00E-06
Kr-85	1.00E-06
Mn-54	1.00E-11
Co-58	1.00E-11
Co-60	1.00E-11
Zn-65	1.00E-11
Sr-89	1.00E-11
Sr-90	1.00E-11
Mo-99	1.00E-11
Cs-134	1.00E-11
Cs-137	1.00E-11
Ce-141	1.00E-11
Ce-144	1.00E-11

ZION NUCLEAR POWER STATION

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003

## LIQUID RELEASES

UNIT 1 (Docket Numbers 50-295)

### CONTINUOUS MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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### A. Fission and Activation Products

[illegible]

### B. Iodines

[illegible]

### C. Tritium

[illegible]

#### D. Dissolved and Entrained Gases

[illegible]

**BATCH MODE**

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
-------	-----	-----	-----	---------	-----	-----	-----	---------	-----	-----	-----	---------	-----	-----	-----	---------	-------

### A. Fission and Activation Products

[illegible]

### B. Iodines

[illegible]

### C. Tritium

1. Total Release Activity	CI	<LLD	<LLD	<LLD	No Rel	<LLD	<LLD	<LLD	No Rel	<LLD	4.47E-04	1.18E-04	5.65E-04	2.35E-04	<LLD	<LLD	2.35E-04	8.00E-04
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#### D. Dissolved and Entrained Gases

[illegible]

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
LIQUID RELEASES  
UNIT 2 (Docket Numbers 50-304)  
SUMMATION OF ALL RELEASES

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Products (not incl. tritium, gases, alpha)**

1. Total Activity Released \$	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
3. % of Value (9E-7 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**B. Tritium**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
3. % of Value (1E-3 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**C. Dissolved and Entrained Gases**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
3. % of Value (7E-5 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**D. Gross Alpha**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
3. % of Value (2E-9 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

**E. Volume of Releases**

1. Volume of Waste Released‡	liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Volume of Dilution Water‡	liters	4.46E+10	2.18E+10	2.75E+09	6.92E+10	3.49E+09	3.29E+09	3.17E+09	9.95E+09	3.28E+09	3.29E+09	3.17E+09	9.74E+09	3.29E+09	3.17E+09	3.29E+09	9.75E+09

§ Fe-55, Sr-89, and Sr-90 Activities are quantified by quarterly composite analyses. Therefore, the difference between the Fission and Activation Products total quarterly activity and the sum of the total activities of the three corresponding months equals the total quarterly activities of Fe-55, Sr-89, and Sr-90. The cells for monthly activity values of Fe-55, Sr-89, and Sr-90 on the Batch and Continuous Mode data sheets are blank because monthly values are not applicable.

‡ These data include only information for batch releases from Lake Discharge Tanks.

Lower limit of detection (LLD) values are presented in the Liquid Effluents LLD Values for Liquid Releases section. The abbreviation "<LLD" indicates the activity concentration of the radionuclide for each individual sample analyzed during the applicable period was less than the LLD value for that nuclide. If the abbreviation "<LLD" is listed for a group of radionuclides, the activity concentration of each radionuclide for each sample during the period was less than the LLD value for the respective radionuclide.

The abbreviation "No Rel" indicates that no releases were performed during the applicable period.

"% of Value" means percent of concentration values in Appendix B, Table 2, Column 2 to 10CFR20. The % of Value for Fission and Activation Products and Dissolved and Entrained Gases provides a comparison of the total concentration of the group to the lowest isotopic concentration value of the particular group. The concentration of Fission and Activation Products and Dissolved and Entrained Gases are compared to the concentration limits for Cs-134 (9E-7 uCi/ml) and Ar-41 (7E-5 uCi/ml), respectively. Concentration limits for Dissolved and Entrained Gases are listed in ODCM Table 12.3-1.

ZION NUCLEAR POWER STATION

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003

## LIQUID RELEASES

UNIT 2 (Docket Numbers 50-304)

## BATCH MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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### A. Fission and Activation Products

[illegible]

### B. Iodines

[illegible]

### C. Tritium

[illegible]

#### D. Dissolved and Entrained Gases

[illegible]

## UNIT 2 (Docket Numbers 50-304)

### A. Fission and Activation Products

**B. iodines**

### C. Tritium

#### D. Dissolved and Entrained Gases

[illegible]



ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
LIQUID RELEASES  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)  
SUMMATION OF ALL RELEASES

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
-------	-----	-----	-----	---------	-----	-----	-----	---------	-----	-----	-----	---------	-----	-----	-----	---------	-------

**A. Fission and Activation Products (not incl. tritium, gases, alpha)**

1. Total Activity Released §	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	3.43E-05	2.50E-05	5.93E-05	2.88E-05	<LLD	<LLD	2.88E-05	8.80E-05
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	9.81E-12	6.95E-12	5.49E-12	7.74E-12	<LLD	<LLD	2.61E-12	8.51E-13
3. % of Value (9E-7 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	1.09E-03	7.72E-04	6.10E-04	8.61E-04	<LLD	<LLD	2.90E-04	9.46E-05

**B. Tritium**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	4.47E-04	1.18E-04	5.65E-04	2.35E-04	<LLD	<LLD	2.35E-04	8.00E-04
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	1.28E-10	3.29E-11	5.23E-11	6.33E-11	<LLD	<LLD	2.13E-11	7.74E-12
3. % of Value (1E-3 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	1.28E-05	3.29E-06	5.23E-06	6.33E-06	<LLD	<LLD	2.13E-06	7.74E-07

**C. Dissolved and Entrained Gases**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
3. % of Value (7E-5 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**D. Gross Alpha**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
3. % of Value (2E-9 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

**E. Volume of Releases**

1. Volume of Waste Released‡	liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E+05	1.24E+05	3.65E+05	1.29E+05	0.00E+00	0.00E+00	1.29E+05	4.94E+05
2. Volume of Dilution Water‡	liters	4.51E+10	2.19E+10	3.71E+09	7.07E+10	3.59E+09	3.71E+09	3.58E+09	1.09E+10	3.70E+09	3.50E+09	3.59E+09	1.08E+10	3.71E+09	3.59E+09	3.71E+09	1.10E+10	1.03E+11

§ Fe-55, Sr-89, and Sr-90 Activities are quantified by quarterly composite analyses. Therefore, the difference between the Fission and Activation Products total quarterly activity and the sum of the total activities of the three corresponding months equals the total quarterly activities of Fe-55, Sr-89, and Sr-90. The cells for monthly activity values of Fe-55, Sr-89, and Sr-90 on the Batch and Continuous Mode data sheets are blank because monthly values are not applicable.

‡ These data include only information for batch releases from Lake Discharge Tanks.

Lower limit of detection (LLD) values are presented in the Liquid Effluents LLD Values for Liquid Releases section. The abbreviation "<LLD" indicates the activity concentration of the radionuclide for each individual sample analyzed during the applicable period was less than the LLD value for that nuclide. If the abbreviation "<LLD" is listed for a group of radionuclides, the activity concentration of each radionuclide for each sample during the period was less than the LLD value for the respective radionuclide.

The abbreviation "No Rel" indicates that no releases were performed during the applicable period.

"% of Value" means percent of concentration values in Appendix B, Table 2, Column 2 to 10CFR20. The % of Value for Fission and Activation Products and Dissolved and Entrained Gases provides a comparison of the total concentration of the group to the lowest isotopic concentration value of the particular group. The concentration of Fission and Activation Products and Dissolved and Entrained Gases are compared to the concentration limits for Cs-134 (9E-7 uCi/ml) and Ar-41 (7E-5 uCi/ml), respectively. Concentration limits for Dissolved and Entrained Gases are listed in ODCM Table 12.3-1.

## UNIT 1 &amp; 2 (Docket Numbers 50-295 &amp; 50-304)

### A. Fission and Activation Products

### B. Iodines

### C. Tritium

#### D. Dissolved and Entrained Gases

[illegible]

## UNIT 1 &amp; 2 (Docket Numbers 50-295 &amp; 50-304)

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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### A. Fission and Activation Products

[illegible]

**B. lodines**

[illegible]

### C. Tritium

[illegible]

#### D. Dissolved and Entrained Gases

[illegible]

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
LIQUID RELEASES  
UNIT 1 (Docket Numbers 50-295)  
SUMMATION OF ALL RELEASES

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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**A. Fission and Activation Products (not incl. tritium, gases, alpha)**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	3.43E-05	2.50E-05	5.93E-05	2.88E-05	<LLD	<LLD	2.88E-05	8.80E-05
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	1.62E-10	8.34E-10	8.93E-11	6.81E-11	<LLD	<LLD	6.81E-11	1.39E-12
3. % of Value (9E-7 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	1.80E-02	9.26E-02	9.92E-03	7.57E-03	<LLD	<LLD	7.57E-03	1.55E-04

**B. Tritium**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	4.74E-04	1.18E-04	5.65E-04	2.35E-04	<LLD	<LLD	2.35E-04	8.00E-04
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	2.23E-09	3.95E-09	8.51E-10	5.57E-10	<LLD	<LLD	2.78E-10	1.27E-11
3. % of Value (1E-3 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	2.23E-04	3.95E-04	8.51E-05	5.57E-05	<LLD	<LLD	2.78E-05	1.27E-06

**C. Dissolved and Entrained Gases**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00
3. % of Value (7E-5 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	0.00E+00

**D. Gross Alpha**

1. Total Activity Released	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2. Average Conc. Released	uCi/ml	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
3. % of Value (2E-9 uCi/ml)	%	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

**E. Volume of Releases**

1. Volume of Waste Released†	liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E+05	1.24E+05	3.65E+05	1.29E+05	0.00E+00	0.00E+00	1.29E+05	4.94E+05
2. Volume of Dilution Water‡	liters	4.14E+10	1.86E+10	4.22E+08	6.04E+10	4.08E+08	4.22E+08	4.08E+08	1.24E+09	4.22E+08	2.12E+08	2.98E+07	6.64E+08	4.22E+08	4.00E-08	4.22E+08	8.44E+08	6.32E+10	

§ Fe-55, Sr-89, and Sr-90 Activities are quantified by quarterly composite analyses. Therefore, the difference between the Fission and Activation Products total quarterly activity and the sum of the total activities of the three corresponding months equals the total quarterly activities of Fe-55, Sr-89, and Sr-90. The cells for monthly activity values of Fe-55, Sr-89, and Sr-90 on the Batch and Continuous Mode data sheets are blank because monthly values are not applicable.

† These data include only information for batch releases from Lake Discharge Tanks.

Lower limit of detection (LLD) values are presented in the Liquid Effluents LLD Values for Liquid Releases section. The abbreviation "<LLD" indicates the activity concentration of the radionuclide for each individual sample analyzed during the applicable period was less than the LLD value for that nuclide. If the abbreviation "<LLD" is listed for a group of radionuclides, the activity concentration of each radionuclide for each sample during the period was less than the LLD value for the respective radionuclide.

The abbreviation "No Rel" indicates that no releases were performed during the applicable period.

"% of Value" means percent of concentration values in Appendix B, Table 2, Column 2 to 10CFR20. The % of Value for Fission and Activation Products and Dissolved and Entrained Gases provides a comparison of the total concentration of the group to the lowest isotopic concentration value of the particular group. The concentration of Fission and Activation Products and Dissolved and Entrained Gases are compared to the concentration limits for Cs-134 (9E-7 uCi/ml) and Ar-41 (7E-5 uCi/ml), respectively. Concentration limits for Dissolved and Entrained Gases are listed in ODCM Table 12.3-1.

## 4154 JOURNAL OF CLIMATE

### LIQUID RELEASES

## LIQUID RELEASES

### Docket Numbers

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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### A. Fission and Activation Products

[illegible]

### B. lodines

[illegible]

### C. Tritium

1. Total Release Activity	CJ	<LLD	<LLD	<LLD	No Rel	<LLD	<LLD	<LLD	No Rel	<LLD	4.47E-04	1.18E-04	5.65E-04	2.35E-04	<LLD	<LLD	2.35E-04	8.00E-04
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#### D. Dissolved and Entrained Gases

[illegible]

## 4019 INGLETON, WYOMING STATION

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003

## LIQUID RELEASES

UNIT 1 (Docket Numbers 50-295)

## CONTINUOUS MODE

Units	Jan	Feb	Mar	1st Qtr	Apr	May	Jun	2nd Qtr	Jul	Aug	Sep	3rd Qtr	Oct	Nov	Dec	4th Qtr	Total
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### A. Fission and Activation Products

[illegible]

### B. Iodines

[illegible]

### C. Tritium

[illegible]

#### D. Dissolved and Entrained Gases

[illegible]

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)

LIQUID EFFLUENTS  
LOWER LIMIT OF DETECTION (LLD) VALUES FOR LIQUID RELEASES

<u>Isotope</u>	<u>LLD (uCi/ml)</u>
Alpha	1.00E-07
H-3	1.00E-05
Kr-85	1.00E-05
Mn-54	5.00E-07
Fe-55	1.00E-06
Co-58	5.00E-07
Fe-59	5.00E-07
Co-60	5.00E-07
Zn-65	5.00E-07
Sr-89	5.00E-08
Sr-90	5.00E-08
Mo-99	5.00E-07
Cs-134	5.00E-07
Cs-137	5.00E-07
Ce-141	5.00E-07
Ce-144	5.00E-07

NOTE: LLDs for other liquid effluent isotopes included in the Annual Radioactive Effluent Release Report were not available for submittal.

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 (Docket Number 50-295)

LIQUID EFFLUENTS  
SUPPLEMENTAL RELEASE INFORMATION

1	Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a.	Total Number of Batch Releases	0	0	6	2	8



ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 2 (Docket Number 50-304)

LIQUID EFFLUENTS  
SUPPLEMENTAL RELEASE INFORMATION

4. Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a. Total Number of Batch Releases	0	0	0	0	0

ZION NUCLEAR POWER STATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT FOR 2003  
UNIT 1 & 2 (Docket Numbers 50-295 & 50-304)

LIQUID EFFLUENTS  
SUPPLEMENTAL RELEASE INFORMATION

1. Regulatory Limits

The calculated annual total quantity of all radioactive material above background released from each unit at Zion Station to unrestricted areas is limited by off-site dose restrictions stated in the station technical specifications, Off-site Dose Calculation Manual (ODCM), and 10CFR50 Appendix I. The off-site dose limits per reactor unit are listed below.

	Quarterly (mrem)	Yearly (mrem)
Total Body	1.5	3
Organ	5	10

2. Maximum Permissible Concentrations

Zion Station technical specifications limit concentrations of radioactive material released in liquid effluents to unrestricted areas to ten times the concentration values in Appendix B, Table 2, Column 2 to 10CFR20.

3. Measurements and Approximations of Total Radioactivity

- |                                    |  |
|------------------------------------|--|
| a. Fission and Activation Products | Gamma Spectroscopy, Liquid Scintillation<br>Low-energy Photon Spectroscopy (LEPS, for Fe-55) |
| b. Tritium                         | Liquid Scintillation   |
| c. Noble Gases                     | Gamma Spectroscopy   |
| d. Gross Alpha                     | Gas Flow Proportional Counting   |

Composite sample analyses for Fe-55, Sr-89, and Sr-90 are performed by off-site vendor.

4. Batch Releases	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	2003
a. Total Number of Batch Releases	0	0	6	2	8