

MONTICELLO NUCLEAR GENERATING PLANT
NORTHERN STATES POWER COMPANY

Period: Jul - Dec 1982
License No. DPR-22

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT

Supplemental Information

TE HQ FILE COPY

1. Regulatory Limits - Qtrly Levels Requiring Report to NRC

A. Noble Gases:

$$50*(QTV*NBARV+QTS*NBARS) = 1 \quad \text{AND}$$

$$25*(QTV*MBARV+QTS*MBARS) = 1$$

QTV = Noble Gas Release Rate from Bldg Vents (Ci/sec)
QTS = Noble Gas Release Rate from Plant Stack (Ci/sec)
NBARV = Vent Avg Gamma Air Dose Factor (Rad/yr per Ci/sec)
NBARS = Stack Avg Gamma Air Dose Factor (Rad/yr per Ci/sec)
MBARV = Vent Avg Beta Air Dose Factor (Rad/yr per Ci/sec)
MBARS = Stack Avg Beta Air Dose Factor (Rad/yr per Ci/sec)

B. Iodines and Particulates:

$$50*(3.7E05*QV+2.5E04*QS) = 1$$

QV = Building Vent Release Rate of Iodines and Particulates
with Half-Lives Greater than 8 Days (Ci/sec)

QS = Plant Stack Release Rate of Iodines and Particulates
with Half-Lives Greater than 8 Days (Ci/sec)

C. Liquid Effluents:

Concentration - 10CFR20, App B, Table II, Col 2,
and notes thereto

Total Quantity - 2.5 Ci/Quarter

2. Average Dose Factors for Noble Gases

(Rem/yr per Ci/sec and Rad/yr per Ci/sec:

	Vent Releases		Stack Releases	
	1ST Qtr	2ND Qtr	1ST Qtr	2ND Qtr
KBAR (Body Gamma)	4.78E 00	1.72E 00	1.35E 00	1.20E 00
LBAR (Skin Beta)	3.78E 01	1.73E 01	1.53E 00	1.35E 00
MBAR (Air Beta)	4.07E 01	2.07E 01	1.63E 00	1.46E 00
NBAR (Air Gamma)	5.06E 00	1.83E 00	1.41E 00	1.25E 00

3. Average Energy:

(Not Applicable)

8303150307 830301
PDR ADOCK 05000263
R PDR

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Supplemental Information (continued)

4. Measurements and Approximations of Total Radioactivity:

A. Noble Gases:

Continuous gross activity monitors in Reactor Building Vent and plant stack exhaust streams. Weekly isotopic analysis of steam jet air ejector stream. Monthly analysis of storage tank contents.

B. Iodines in Gaseous Effluent:

Continuous monitoring with charcoal cartridges in Reactor Building vent and plant stack exhaust streams with weekly analysis.

C. Particulates in Gaseous Effluent:

Continuous monitoring with particulate filters in Reactor Building vent and plant stack exhaust streams with weekly analysis.

D. Tritium in Gaseous Effluent:

Continuous monitoring with silica gel cartridges in Reactor Building vent and plant stack exhaust streams with biweekly analysis.

E. Liquid Effluents:

Tank sample analyzed prior to each planned release and continuous monitoring of gross activity during planned release.

5. Batch Releases:

A. Liquid:

1. Number of Batch Releases	0	
2. Total Time Period For Batch Releases	0.0	Min
3. Maximum Time Period for a Batch Release	0.0	Min
4. Average Time Period for a Batch Release	0.0	Min
5. Minimum Time Period for a Batch Release	0.0	Min
6. Average River Flow During Releases	0.0	Cf/sec

B. Gaseous:

1. Number of Batch Releases	0	
2. Total Time Period for Batch Releases	NA	Min
3. Maximum Time Period for a Batch Release	NA	Min
4. Average Time Period for a Batch Release	NA	Min
5. Minimum Time Period for a Batch Release	NA	Min

6. Abnormal Releases:

A. Liquid:

1. Number of Releases	0	
2. Total Activity Released	0.0	Ci

B. Gaseous:

1. Number of Releases	0	
2. Total Activity Released	0.0	Ci

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Table 1A Gaseous Effluents - Summation of all Releases

	Units	1st Qtr	2nd Qtr	Pcnt Est Error

A. Noble Gases:				
1. Total Release:				
A. Elevated Release	Ci	6.40E 02	1.75E 02	
B. Building Vent Release	Ci	2.78E 02	2.08E 02	
C. Total	Ci	9.17E 02	3.83E 02	5.00E 01
2. Average Release Rate:				
A. Elevated Release	uCi/sec	8.05E 01	2.20E 01	
B. Building Vent Release	uCi/sec	3.49E 01	2.62E 01	
C. Total	uCi/sec	1.15E 02	4.81E 01	5.00E 01
3. Percent Tech Spec Qtrly Reporting Level		3.88E 00	1.43E 00	
B. Iodines:				
1. Total I-131:				
A. Elevated Release	Ci	2.82E-03	1.06E-03	
B. Building Vent Release	Ci	5.47E-02	3.83E-04	
C. Total	Ci	5.75E-02	1.45E-03	5.00E 01
2. Average I-131 Release Rate:				
A. Elevated Release	uCi/sec	3.55E-04	1.34E-04	
B. Building Vent Release	uCi/sec	6.88E-03	4.82E-05	
C. Total	uCi/sec	7.23E-03	1.82E-04	5.00E 01
C. Long Lived Particulates and Gross Alpha Releases:				
1. Total Particulates:				
A. Elevated Release	Ci	8.16E-04	3.46E-04	
B. Building Vent Release	Ci	4.50E-03	1.75E-03	
C. Total	Ci	5.31E-03	2.09E-03	5.00E 01
2. Average Release Rate:				
A. Elevated Release	uCi/sec	1.03E-04	4.35E-05	
B. Building Vent Release	uCi/sec	5.66E-04	2.20E-04	
C. Total	uCi/sec	6.68E-04	2.63E-04	5.00E 01
3. Percent Tech Spec Qtrly Reporting Level for Long-Lived Iodines and Particulates		1.38E 01	5.18E-01	

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Table 1A Gaseous Effluents - Summation of All Releases (Continued)

	Units	1st Qtr	2nd Qtr	Pcnt Est Error
	-----	-----	-----	-----
4. Gross Alpha Radioactivity:				
A. Elevated Release	Ci	4.68E-06	5.95E-06	
B. Building Vent Release	Ci	4.42E-05	2.67E-05	
C. Total	Ci	4.88E-05	3.27E-05	1.00E 02
D. Tritium:				
1. Total Release:				
A. Elevated Release	Ci	1.00E 00	2.25E-01	
B. Building Vent Release	Ci	1.10E 01	9.06E 00	
C. Total	CI	1.20E 01	9.29E 00	5.00E 01
2. Average Release Rate:				
A. Elevated Release	uCi/sec	1.26E-01	2.83E-02	
B. Building Vent Release	uCi/sec	1.39E 00	1.14E 00	
C. Total	uCi/sec	1.51E 00	1.17E 00	5.00E 01

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Table 1B Gaseous Effluents - Elevated Release

Nuclides Released	Units	Continuous Mode		Batch Mode	
		1st Qtr	2nd Qtr	1st Qtr	2nd Qtr
1. Noble Gases:					
Xe133	Ci	9.90E 01	5.23E 00	0.0	0.0
Xe135	Ci	7.62E 00	1.46E 00	0.0	0.0
Kr85M	Ci	1.62E 00	3.17E-01	0.0	0.0
Kr88	Ci	4.81E 00	9.85E-01	0.0	0.0
Kr87	Ci	8.23E 00	1.39E 00	0.0	0.0
Xe138	Ci	1.41E 02	3.74E 01	0.0	0.0
Kr90	Ci	4.79E 00	1.10E 00	0.0	0.0
Xe139	Ci	1.43E 01	3.27E 00	0.0	0.0
Kr89	Ci	1.42E 02	3.21E 01	0.0	0.0
Xe137	Ci	1.85E 02	4.18E 01	0.0	0.0
Xe135M	Ci	1.10E 01	2.43E 00	0.0	0.0
Kr83M	Ci	1.52E 00	3.15E-01	0.0	0.0
Xe133M	Ci	1.95E-01	7.06E-02	0.0	0.0
Xe131M	Ci	7.47E-01	1.44E-01	0.0	0.0
Kr85	Ci	1.81E 01	4.64E 01	0.0	0.0
Total for Period	Ci	6.40E 02	1.75E 02	0.0	0.0
2. Iodines:					
I-131	Ci	2.82E-03	1.06E-03	0.0	0.0
I-133	Ci	8.35E-03	5.74E-03	0.0	0.0
I-135	Ci	5.72E-03	5.97E-03	0.0	0.0
Total	Ci	1.69E-02	1.28E-02	0.0	0.0

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Table 1B Gaseous Effluents - Elevated Release (Continued)

Nuclides Released	Units	Continuous Mode		Batch Mode	
		1st Qtr	2nd Qtr	1st Qtr	2nd Qtr
3. Particulates:					
Ce144	Ci	4.03E-06	2.01E-06	0.0	0.0
Ce141	Ci	1.40E-06	4.15E-07	0.0	0.0
Ba140	Ci	4.59E-04	1.97E-04	0.0	0.0
Cs137	Ci	7.38E-06	1.50E-05	0.0	0.0
Cs136	Ci	0.0	1.72E-07	0.0	0.0
Cs134	Ci	8.29E-08	4.05E-06	0.0	0.0
Sr90	Ci	7.64E-06	7.46E-06	0.0	0.0
Sr89	Ci	3.34E-04	1.03E-04	0.0	0.0
Zn65	Ci	0.0	4.93E-06	0.0	0.0
Co60	Ci	1.74E-06	9.12E-06	0.0	0.0
Co58	Ci	4.07E-07	8.56E-07	0.0	0.0
Mn54	Ci	3.34E-07	2.30E-06	0.0	0.0
Total	Ci	8.16E-04	3.46E-04	0.0	0.0

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Table 1C Gaseous Effluents - Building Vent Release

Nuclides Released	Units	Continuous Mode		Batch Mode	
		1st Qtr	2nd Qtr	1st Qtr	2nd Qtr
1. Noble Gases:					
Xe133	Ci	4.29E 01	2.03E 01	0.0	0.0
Xe135	Ci	3.30E 00	6.75E-01	0.0	0.0
Kr85M	Ci	6.94E-01	1.47E-01	0.0	0.0
Kr88	Ci	2.07E 00	4.64E-01	0.0	0.0
Kr87	Ci	3.54E 00	6.48E-01	0.0	0.0
Xe138	Ci	6.01E 01	1.74E 01	0.0	0.0
Kr90	Ci	2.05E 00	5.12E-01	0.0	0.0
Xe139	Ci	6.08E 00	1.52E 00	0.0	0.0
Kr89	Ci	6.06E 01	1.50E 01	0.0	0.0
Xe137	Ci	7.91E 01	1.95E 01	0.0	0.0
Xe135M	Ci	4.69E 00	1.13E 00	0.0	0.0
Kr83M	Ci	6.54E-01	1.47E-01	0.0	0.0
Xe133M	Ci	2.29E-01	1.46E-01	0.0	0.0
Xe131M	Ci	2.93E-01	4.78E-01	0.0	0.0
Kr85	Ci	1.14E 01	1.30E 02	0.0	0.0
Total for Period	Ci	2.78E 02	2.08E 02	0.0	0.0
2. Iodines:					
I-131	Ci	5.47E-02	3.83E-04	0.0	0.0
I-133	Ci	1.46E-02	1.11E-03	0.0	0.0
I-135	Ci	0.0	0.0	0.0	0.0
Total	Ci	6.92E-02	1.49E-03	0.0	0.0

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Table 1C Gaseous Effluents - Building Vent Releases (Continued)

Nuclides Released	Units	Continuous Mode		Batch Mode	
		1st Qtr	2nd Qtr	1st Qtr	2nd Qtr
3. Particulates:					
Ce144	Ci	2.31E-06	0.0	0.0	0.0
Ce141	Ci	1.33E-05	1.61E-06	0.0	0.0
Ba140	Ci	1.75E-03	2.69E-04	0.0	0.0
Cs137	Ci	3.54E-04	8.03E-04	0.0	0.0
Cs134	Ci	2.19E-05	6.05E-05	0.0	0.0
Ru103	Ci	9.13E-06	8.74E-06	0.0	0.0
Nb95	Ci	2.29E-06	9.37E-06	0.0	0.0
Sr90	Ci	4.32E-05	5.26E-05	0.0	0.0
Sr89	Ci	6.20E-04	3.65E-05	0.0	0.0
Zn65	Ci	5.72E-04	1.02E-04	0.0	0.0
Co60	Ci	4.51E-04	2.85E-04	0.0	0.0
Fe59	Ci	1.16E-05	0.0	0.0	0.0
Co58	Ci	1.43E-05	5.49E-06	0.0	0.0
Mn54	Ci	9.32E-05	1.13E-04	0.0	0.0
Cr51	Ci	5.35E-04	0.0	0.0	0.0
Total	Ci	4.50E-03	1.75E-03	0.0	0.0

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Table 2A Liquid Effluents - Summation of All Releases

	Units	1st Qtr	2nd Qtr	Pcnt Est Error
A. Fission and Activation Products:				
1. Total Release (Except H-3, Gases, and Alpha)	Ci	0.0	0.0	0.0
2. Avg Diluted Concentration	uCi/ml	0.0	0.0	
3. Percent Qtrly Tech Spec Reporting Level		0.0	0.0	
B. Tritium:				
1. Total Release	Ci	0.0	0.0	0.0
2. Avg Diluted Concentration	uCi/ml	0.0	0.0	
3. Percent Qtrly Tech Spec Reporting Level		NA	NA	
C. Dissolved and Entrained Gases:				
1. Total Release	Ci	0.0	0.0	0.0
2. Avg Diluted Concentration	uCi/ml	0.0	0.0	
3. Percent Qtrly Tech Spec Reporting Level		NA	NA	
D. Gross Alpha Radioactivity:				
1. Total Release	Ci	0.0	0.0	0.0
E. Volume of Waste Released				
	Liters	0.0	0.0	0.0
F. Volume of Dilution Water Used				
	Liters	0.0	0.0	0.0

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Table 2B Liquid Effluents

Nuclides Released	Units	Continuous Mode		Batch Mode	
		1st Qtr	2nd Qtr	1st Qtr	2nd Qtr

None Released This Period

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Table 3 Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Offsite For Burial or Disposal:

1. Type of Waste:

	Units	Total	Pcnt Est Error
	-----	-----	-----
A. Spent Resins, Filter Sludges, Evaporator Bottoms, Ect.	Cu Meter	1.55E 01	
	Ci	1.21E 02	5.00E 01
B. Dry Compressible Waste, Contaminated Equip, Ect.	Cu Meter	4.52E 02	
	Ci	6.50E 00	5.00E 01
C. Irradiated Components, Control Rods, Ect.	Cu Meter	6.80E 00	
	Ci	3.00E 03	5.00E 01
D. Other (described below):			
None			

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Table 3 Solid Waste and Irradiated Fuel Shipments (Coontinued)

2. Measured Major Nuclide Composition by Type of Waste:

TYPE	Nuclide	Percent
----	-----	-----
A	Ba140	1.48E 00
	Cs137	3.58E 01
	Cs134	3.39E 00
	Sr90	4.76E-02
	Zn65	2.50E 01
	Co60	2.41E 01
	Fe59	1.05E-01
	Co58	8.72E-01
	Mn54	3.44E 00
	Cr51	3.82E 00
	La140	6.70E-01
	I 131	3.36E-01
B	Ce141	2.19E-01
	Ba140	9.74E 00
	Cs137	1.01E 01
	Ru103	7.67E-02
	Zr95	8.12E-01
	Nb95	9.65E-01
	Sr90	1.56E-01
	Zn65	6.92E 00
	Co60	5.64E 01
	Fe59	1.50E 00
	Co58	6.84E-01
	Mn54	4.78E 00
	Cr51	4.84E-01
	La140	6.72E 00
C	Zn65	1.68E-03
	Co60	9.30E 01
	Mn54	7.00E 00

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Table 3 Solid Waste and Irradiated Fuel Shipments (Continued)

3. Solid Waste Disposition:

Number of Shipments	Mode	Destination
-----	-----	-----
3	Truck	Chem-Nuc Inc., Barnwell, SC
15	Truck	US Ecology, Richland, WA

B. Irradiated Fuel Shipments:

Number of Shipments	Mode	Destination
-----	-----	-----

None

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Table 3 Solid Waste and Irradiated Fuel Shipments (Continued)

C. Shipping Container and Solidification Method:

No.	Volume (Ft ³)	Activity (Ci)	Type of Waste	Container Code	Solidification Code
(82-28)	1.61E 01	6.81E-01	B	L	
(82-29)	5.18E 00	5.14E 01	A	A	C
(82-32)	5.10E 00	1.20E 00	C	L	
(82-34)	5.18E 00	3.90E 01	A	A	C
(82-33)	1.70E 00	3.00E 03	C	Q	
(82-35)	3.81E 01	5.35E-01	B	L	
(82-36)	3.81E 01	7.40E-01	B	L	
(82-37)	3.81E 01	6.05E-01	B	L	
(82-38)	3.81E 01	8.37E-01	B	L	
(82-39)	1.69E 01	2.46E-01	B	L	
(82-40)	3.81E 01	4.10E-01	B	L	
(82-42)	3.81E 01	2.05E-01	B	L	
(82-43)	3.81E 01	4.32E-01	B	L	
(82-48)	3.81E 01	4.40E-01	B	L	
(82-50)	3.81E 01	5.20E-01	B	L	
(82-52)	5.18E 00	3.02E 01	A	A	C
(82-55)	3.81E 01	4.41E-01	B	L	
(82-57)	3.81E 01	4.12E-01	B	L	

CONTAINER CODES: L - LSA
A - Type A
B - Type B
Q - Large Quantity

SOLIDIFICATION CODES: C - Cement
U - Urea Formaldehyde

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Notes:

1. Release of individual noble gas isotopes from the plant stack was determined using an isotopic analysis at the steam jet air ejector. Xe133, Xe135, Kr85M, Kr88, Kr87, and Xe138 were measured and used to characterize the mode of gas release from the fuel. Other significant noble gases were determined using known ratios, the measured total offgas holdup system delay time, and the known fraction of the offgas stream released via the gland exhauster.

2. An isotopic analysis for noble gases is normally not possible at the building vents. Individual isotopes are generally below their lower limit of detection (LLD). Therefore, for reactor building vent releases, the noble gas isotopic mixture is assumed to be the same as the mixture determined at the steam jet air ejector.

3. Information specified in Regulatory Guide 1.21 which is not applicable to the Monticello plant is indicated by 'NA'.

4. Nuclides not detected in plant effluents (those below the LLD of the analysis) are not included in the quantities reported released. LLD values are recorded and must be less than the minimum LLD values stated in the Monticello Technical Specifications.

Northern States Power Company
Monticello Nuclear Generating Plant

Offsite Radiation Dose Assessment for January 1 - December 31, 1982

An assessment of radiation dose due to releases from the Monticello Nuclear Generating Plant during 1982 was performed in accordance with the Technical Specifications. Computed doses were well below the 40 CFR Part 190 and 10 CFR Part 50, Appendix I, standards and guidelines.

NRC Computer programs GASPAR and LADTAP were used in conjunction with meteorological parameters from the Offsite Dose Calculation Manual in making this assessment. Source terms were obtained from the two Effluent and Waste Disposal Semiannual Reports prepared for NRC review during the year.

Offsite Doses from Gaseous Releases

Computed doses due to gaseous releases are reported in Table 1. Critical receptor location and pathways for organ dose are reported in Table 2. Doses, both whole body and organ, are a small percentage of Appendix I guidelines.

Offsite Doses from Liquid Releases

Computed doses due to liquid releases are reported in Table 1. Receptor information is reported in Table 2. Doses, both whole body and organ, are a small percentage of Appendix I guidelines. Liquid releases are not routinely made from the Monticello plant. One unplanned release occurred during the year.

Doses to Individuals Due to Activities Inside the Site Boundary

Occasional sportsmen will enter the Monticello site for recreational activities. In addition, an Environmental Protection Agency Field Station is located at the Monticello site (see Figure 3.8.1 or Figure 3.8.2 in the Monticello Technical Specifications). Workers at this field station, spending an average of 40 hours/week, are the most exposed individuals. Whole body doses to these individuals have been computed using stack and vent X/Q values at the field station location. Annual computed doses were reduced by the factor 40/168 to account for the limited occupancy for workers at this location. Organ doses to workers at the EPA field station due to gaseous releases have been computed for the inhalation pathway (no other pathways exists). Doses to workers at the EPA field station due to liquid releases are not expected to be higher than those computed for individuals beyond the site boundary. Doses at the EPA field station are reported in Table 1.

Doses to Most Exposed Member of the General Public from Reactor Releases and Other Nearby Uranium Fuel Cycle Sources

There are no uranium fuel cycle facilities in the vicinity of the Monticello site.

The only other source of exposure to the general public in addition to the plant gaseous and liquid effluents is from direct radiation. Calculations performed in the past have shown this source to be negligible. An array of TLD monitoring locations at the site boundary has consistently indicated that plant operation in recent years has had no effect on ambient gamma radiation.

Therefore, the most exposed member of the general public will not receive a radiation dose from reactor releases and all other fuel cycle activities in excess of the sum of the liquid and gaseous whole body and organ doses reported in Table 1 for the site boundary and critical receptor, respectively. These doses are well within the 40 CFR Part 190 standards of 25 mrem to the whole body or any organ (except the thyroid) and 75 mrem to the thyroid every 12 months.

TABLE 1

OFFSITE RADIATION DOSE ASSESSMENT - MONTICELLO

PERIOD: JANUARY 1 THROUGH DECEMBER 31, 1982

<u>Gaseous Releases</u>		<u>10 CFR Part 50 Appendix I Guideline per unit per year</u>
Maximum Site Boundary Gamma Air Dose (mrad)	2.07	10
Maximum Site Boundary Beta Air Dose (mrad)	2.37	20
Maximum Offsite Dose to Any Organ* (mrem)		
Total	0.489	15
H-3 Dose	0.018	-
EPA Field Station Dose (mrem)		-
Whole Body	0.437	5
Organ	0.003	15
<u>Liquid Releases</u>		
Maximum Offsite Whole Body Dose (mrem)		
Total	1.32 E-05	3
H-3 Dose	0.0	-
Maximum Offsite Organ Dose (mrem)*		
Total	4.95 E-05	10
H-3 Dose	2.86 E-06	-

* Long lived particulates, I-131, and tritium.

TABLE 2

OFFSITE RADIATION DOSE ASSESSMENT
SUPPLEMENTAL INFORMATION - MONTICELLO

PERIOD: JANUARY 1 THROUGH DECEMBER 31, 1982

Gaseous Effluents

Maximum Site Boundary
Dose Location
(from building vents)

Sector	SSE
Distance (mi)	0.43

EPA Field Station

Sector	ESE
Distance (mi)	0.31

Maximum Offsite
Dose Location

Sector	SSW
Distance (mi)	0.4
Pathways	Ground, inhalation, vegetables

Age Group	Child
Organ	Thyroid

Liquid Effluents

Maximum Offsite
Dose Location Downstream

Pathways	Drinking water	Drinking water, fish
Age Group	Infant	Adult
Organ	Whole body	GI-LLI

Dilution Factor (drinking water)	7:1	7:1
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