

UNITED NUCLEAR CORPORATION



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January 28, 1998

U.S. Nuclear Regulatory Commission
Region IV
Attn: Ross Scarano, Director
Division of Radiation Safety and Safeguards
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-4351

40-8907

Gentlemen:

Pursuant to License Condition 28A of our License SUA-1475, submitted herewith are the results of our ALARA Audit conducted on December 29, 1997.

If you have any questions, please advise.

Sincerely yours,

Edward M. Morales
General Manager and
Radiation Safety Officer

EMM:r

Enclosure

cc: J. Velasquez, UNC
USNRC, Div. of Waste Management

IED 1/



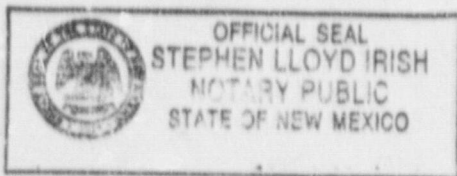
OATH & AFFIRMATION

I, Juan R. Velasquez, do solemnly swear and affirm that to the best of my knowledge, the information enclosed herewith is true and correct, under the pain of penalties and perjury.

By: [Signature]
President & Manager of Environmental Affairs
United Nuclear Corporation

This ~~30th~~ day of JANUARY, 1998 appeared before me, the undersigned, a notary public of the county of Bernalillo, and state of New Mexico, Juan R. Velasquez, and did solemnly swear and affirm that the enclosed information is true and correct to the best of his knowledge.

Witness my hand and official seal.

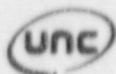


My Commission Expires:

MAY 13 1999

[Signature]
Notary Public

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TO: File

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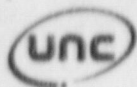
FROM: Edward M. Morales

SUBJECT: ALARA Committee Meeting and Audit, December 29, 1997

The UNC Mining and Milling ALARA Committee met on December 29, 1997, to audit the results of the radiological monitoring program for the fourth quarter of 1996 and the first three quarters of data for 1997. The Committee members are: Mr. Juan Velasquez, Manager of Environmental Affairs; Mr. Edward Morales, General Manager and Radiation Safety Officer; and Mr. Max Chischilly, Radiation Technician. The committee reviewed Mr. Morales' Annual Report entitled Environmental Monitoring Program for Inactive Status 1997, dated December, 1997, and Data Summary for the fourth quarter of 1996, and for the first three quarters of 1997.

The Committee's findings are as follows:

1. Radiation exposures to United Nuclear Corp. (UNC), employees, contractors, and the public were well below permissible levels and are as low as can normally be expected.
2. The mill site was released from our License SUA-1475 as a restricted area by Amendment #21 in 1995.
3. The final tailings reclamation was completed in 1995. The last of drainage channels was completed in 1996. The reclamation of evaporation ponds is being delayed until the Ground Water Corrective Action Plan is deemed completed by the NRC and EPA.
4. Training and refresher training of employees on Radiation Protection and Safety was done in 1997 as required.
5. All documentation required by our monitoring program is in order for 1997.
6. The data for this Report is also reported as per suggested for at in Regulatory Guide 4.14.
7. The committee reviewed the ALARA Reports for the last four years and compared it to the 1997 ALARA Report. The data shows that the results have continuously been lower than the allowable concentrations.
8. Due to the following conditions United Nuclear will request a License Amendment to discontinue monitoring. And only monitor when an (RWP) Radiation Work Permit requires monitoring to be performed.
 - By comparing the data for five years we concluded the results have continuously been lower than allowable concentrations.



Data Summary copies are enclosed for the last four years for your review.

- The radon cap cover was completed in 1996 with the exception of the lined evaporation ponds.
- The report submitted January 3, 1997, & January 13, 1998, on Radon Emanation Testing of UNC's Church Rock Tailings Site shows the average Radon Flux to be 5.71 pci/m²s; which is less than the allowable of 20.0 pci/m²s.

ENVIRONMENTAL MONITORING SUMMARY DTA

for 4th-Q 1996 to 3rd-Q 1997

<u>Environmental Monitoring</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
° Qtly Air Sample Composite: (also note: ALARA Goal is 10-20% or less of effluent limit depending on circumstances)	U-Nat. ($\frac{\text{uci}}{\text{ml}}$)	4.26E^{-16}	9.00E^{-14} (Effluent)
	Th-230 ($\frac{\text{uci}}{\text{ml}}$)	2.20E^{-16}	3.00E^{-14} (Effluent)
	RA-226 ($\frac{\text{uci}}{\text{ml}}$)	4.26E^{-16}	9.00E^{-13} (Effluent)
	PB-210 ($\frac{\text{uci}}{\text{ml}}$)	1.39E^{-14}	6.00E^{-13} (Effluent)
° Qtly Ambient Radon: (Also note: Annual average = 1.50E^{-9} uci/ml at the site with the high result)	RN-222 ($\frac{\text{uci}}{\text{ml}}$) (-Daughter)	1.90E^{-9}	1.00E^{-8} (Effluent)
° Semi-Annual Area TLD:	Gamma ($\frac{\text{mrem}}{\text{yr}}$)	*13.5	50 (compliance) 100 (TEDE Annual Limit)
° Qtly Ground Water GW-Wells:	U-Nat ($\frac{\text{mg}}{\text{l}}$)	0.086 (dissolved)	0.30 (NRC) 5.0 (ARAR)
	Th-230 ($\frac{\text{pci}}{\text{l}}$)	0.80 (dissolved)	5.0 (NRC) 15.0 (ARAR)
	RA-226 ($\frac{\text{pci}}{\text{l}}$)	2.60 (dissolved)	5.0 (NRC) 5.0 (ARAR)
	PB-210 ($\frac{\text{pci}}{\text{l}}$)	< 1.0 (dissolved)	1.0 (NRC)
	PO-210 ($\frac{\text{pci}}{\text{l}}$)	< 1.0 (dissolved)	1.0 (NRC)
	PH (units)	7.30	6-9 (NMED)

*Based on the combined summation average of high results (i.e. at Site C 2nd half of 96 = 10.0 mrem and at Site F 1st half of 97 = 6.0 mrem) above Site D's background results.

° Only Domestic Water Well:

(Also note: 3 of 4 ntly dissolved analysis = <1.0 and the LLD : 1.0 for PB-210 analysis)

(PB-210 Annual Avg. = 2.00)

U-Nat ($\frac{\text{mg}}{\text{l}}$)	0.0070 (dissolved)	0.30 (NRC)	5.0 (ARAR)
Th-230 ($\frac{\text{pci}}{\text{l}}$)	0.60 (dissolved)	5.0 (NRC)	15.0 (ARAR)
RA-226 ($\frac{\text{pci}}{\text{l}}$)	0.70 (dissolved)	5.0 (NRC)	5.0 (ARAR)
PB-210 ($\frac{\text{pci}}{\text{l}}$)	5.0 (dissolved)	1.0 (NRC)	
PO-210 ($\frac{\text{pci}}{\text{l}}$)	<1.0 (dissolved)	1.0 (NRC)	

Other Environmental Item

° Su. face Alpha:
(as needed)

All material of equipment sold or released met the requirements for unrestricted use

Removable <1000 $\frac{\text{dpm}}{100\text{cm}^2}$

Fixed Average
<5000 $\frac{\text{dpm}}{\text{cm}^2}$

Where Area is $\geq 1\text{m}^2$
Gamma is < 40 ur/hr

PERSONNEL MONITORING SUMMARY DATA

From 4th-Q 1996 to 3rd-Q 1997

<u>Personnel Monitoring Item</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
° Semi-Annual or as needed Personnel TLD (DDE):	Gamma ($\frac{\text{rem}}{\text{yr}}$)	0.0	0.500 (action level)
° Semi-Annual or as needed Bioassay:	Total Uranium ($\frac{\mu\text{g}}{\text{l}}$)	All < 5	15-35 (action level)
° Bi-weekly or quarterly air samples: (also note: Action level is 10% of an applicable dose limit)	Gross Alpha ($\frac{\mu\text{Ci}}{\text{ml}}$)	1.59E^{-14}	6E^{-11} (DAC)
	Th-230 (μCi)/ml	2.20E^{-16}	6E^{-12} (DAC)
	RA-226 ($\frac{\mu\text{Ci}}{\text{ml}}$)	4.26E^{-16}	3E^{-10} (DAC)
	PB-210 ($\frac{\mu\text{Ci}}{\text{ml}}$)	1.39E^{-14}	1E^{-10} (DAC)
	RN-222 ($\frac{\mu\text{Ci}}{\text{ml}}$) (-Daughter)	1.90E^{-9}	4E^{-6} (DAC)
	U-Nat ($\frac{\mu\text{Ci}}{\text{ml}}$)	4.26E^{-16}	2E^{-11} (DAC)

Personnel Exposure

° Estimated Annual Total Effective Dose Equivalent (TEDE):	TEDE (rem)	0.003	5.0 (MAX.) 2.0 (Action Level)
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Note: The above items are only required under an RWP as needed (see PMP, REV. 4), and the above data are based only on available data (i.e. not required due to no RWP issuance during this reporting period).

AIR SAMPLES

<u>Sample Date</u>	<u>Location</u>	<u>Type and Air Volume</u>	<u>Radionuclide and Class</u>	<u>Concentration (uci/ml)</u>	<u>Error Est. (uci/ml)</u>	<u>LLD (uci/ml)</u>	<u>Eff. Conc. Limit (uci/ml)</u>	<u>Eff. Conc. of Limit (%)</u>
4th-Q 1996 to 3rd-Q 1997	Site:C, F, E and C	Continuous	U-Nat (year)	$4.26E^{-16}$		$1.0E^{-16}$	$9.0E^{-14}$	$4.73E^{-1}$
		Perimeter	Th-230 (year)	$2.20E^{-16}$	$6.0E^{-17}$	$1.0E^{-16}$	$3.0E^{-14}$	$7.33E^{-1}$
		Air S.	Ra-226 (week)	$4.26E^{-16}$	$1.28E^{-16}$	$1.0E^{-16}$	$9.0E^{-13}$	$4.73E^{-2}$
		Composite	Pb-210 (day)	$1.39E^{-14}$	$1.36E^{-15}$	$2.0E^{-15}$	$6.0E^{-13}$	$1.55E^{+0}$
		3.83E ⁹ to 5.46E ⁹ ml of Air	Rn-222 (Minus Daughters)	$1.90E^{-}$			$1.0E^{-8}$	$19.0E^{+0}$

COMMENT:

QUARTERLY LIQUID SAMPLES

<u>Date/Qt.</u>	<u>Location</u>	<u>Type</u>	<u>Radionuclide</u>	<u>Concentration</u>		<u>Error Est.</u> <u>uci/ml</u>	<u>LLD</u> <u>uci/ml</u>
				<u>Mg/l</u>	<u>uci/ml</u>		
4th-Q 1996 to 3rd-Q 1997	GW-3 & GW-4	Groundwater	U-Nat(dissolved)		6.0E ⁻⁸		2.0E ⁻¹⁰
			Th-230(dissolved)		8.0E ⁻¹⁰	5.0E ⁻¹⁰	2.0E ⁻¹⁰
			Ra-226(dissolved)		2.6E ⁻⁹	3.0E ⁻¹⁰	2.0E ⁻¹⁰
UNC Field Data: PH(STD. Units) = 7.3							
			Pb-210(dissolved)		<1.0E ⁻⁹		1.0E ⁻⁹
			Pu-210(dissolved)		<1.0E ⁻⁹		1.0E ⁻⁹

COMMENTS:

QUARTERLY LIQUID SAMPLES

Date/QT.	Location	Type	Radionuclide	Concentration Mg/l uci/ml	Error Est. uci/ml	LLD uci/ml	
4th-Q 1996 to 3rd-Q 1997	N of	Domestic	U-Nat (dissolved)	4.7E ⁻⁹		2.0E ⁻¹⁰	
	Mill Area	Waterwell	U-Nat (suspended)	1.62E ⁻⁹		2.0E ⁻¹⁰	
			Th-230(dissolved)	6.0E ⁻¹⁰	4.0E ⁻¹⁰	2.0E ⁻¹⁰	
			Th-230(suspended)	<2.0E ⁻¹⁰		2.0E ⁻¹⁰	
			Ra-226(dissolved)	7.0E ⁻¹⁰	2.0E ⁻¹⁰	2.0E ⁻¹⁰	
			Ra-226(suspended)	1.0E ⁻¹⁰	3.0E ⁻¹⁰	2.0E ⁻¹⁰	
UNC Field Data:	PH (STD. Units)	=	8.77	Pb-210(dissolved)	5.0E ⁻⁹	8.0E ⁻¹⁰	1.0E ⁻⁹
	Cond. (u MHOS)	=	2,800	Pb-210(suspended)	<1.0E ⁻⁹		1.0E ⁻⁹
	Temp. (°C)	=	19.0	Po-210(dissolved)	<1.0E ⁻⁹		1.0E ⁻⁹
			Po-210(suspended)	2.0E ⁻⁸	6.0E ⁻¹⁰	1.0E ⁻⁹	

COMMENTS: 3 of 4 Qrtly. dissolved analysis =<1.0E⁻⁹ for Pb-210

ENVIRONMENTAL MONITORING SUMMARY DATA

from 4th-Q 1995 to 3rd-Q 1996

<u>Environmental Monitoring Item</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
° Qtly Air Sample Composite:	U-Nat. ($\frac{\text{uci}}{\text{ml}}$)	4.39E^{-16}	9.00E^{-14} (Effluent)
(Also note: ALARA goal is 10-20% or less of effluent limit depending on circumstances)	Th-230 ($\frac{\text{uci}}{\text{ml}}$)	2.29E^{-16}	3.00E^{-14} (Effluent)
	RA-226 ($\frac{\text{uci}}{\text{ml}}$)	3.30E^{-16}	9.00E^{-13} (Effluent)
	PB-210 ($\frac{\text{uci}}{\text{ml}}$)	1.54E^{-14}	6.00E^{-13} (Effluent)
° Qtly Ambient Radon:	RN-222 ($\frac{\text{uci}}{\text{ml}}$)	2.40E^{-9}	1.00E^{-8} (Effluent)
(Also note: Annual average = 1.38E^{-9} uci/ml at the site with the high result)	(-Daughter)		
° Semi-Annual Area TLD:	Gamma ($\frac{\text{mrem}}{\text{yr}}$)	* 29.3	50 (compliance) 100 (TEDE Annual Limit)
° Qtly Ground Water GW-Wells:	U-Nat ($\frac{\text{mg}}{\text{l}}$)	0.100 (dissolved)	0.30 (NRC) 5.0 (ARAR)
	Th-230 ($\frac{\text{pci}}{\text{l}}$)	0.40 (dissolved)	5.0 (NRC) 15.0 (ARAR)
	RA-226 ($\frac{\text{pci}}{\text{l}}$)	0.40 (dissolved)	5.0 (NRC) 5.0 (ARAR)
	PB-210 ($\frac{\text{pci}}{\text{l}}$)	< 1.0 (dissolved)	1.0 (NRC)
	PO-210 ($\frac{\text{pci}}{\text{l}}$)	< 1.0 (dissolved)	1.0 (NRC)
	PH (units)	7.10	6-9 (NMED)

*Based on the combined summation average of high results (i.e. at Site C 2nd half of 95 = 28.6 mrem and at Site F 1st half of 96 = 6.4 mrem) above Site D's background results.

Qlty Domestic Water Well: U-Nat ($\frac{\text{mg}}{\text{l}}$) 0.0041(dissolved) 0.30(NRC)5.0(ARAR)

(Also note: 3 of 4 qtlly dissolved
analyses = ≤ 1.0 and the LLD = 1.0
for PB-210 analysis)

Th-230 ($\frac{\text{pci}}{\text{l}}$) ≤ 0.2 (dissolved) 5.0(NRC)15.0(ARAR)

RA-226 ($\frac{\text{pci}}{\text{l}}$) 0.90(dissolved) 5.0(NRC)5.0(ARAR)

(PB-210 Annual Avg. = ≤ 2.13) PC-210 ($\frac{\text{pci}}{\text{l}}$) 5.5(dissolved) 1.0(NRC)

PO-210 ($\frac{\text{pci}}{\text{l}}$) ≤ 1.0 (dissolved) 1.0(NRC)

(Classified as a non-community
water system under the NM
water supply regulations but
monitoring is no longer
required as of 1-11-96)

Nitrate + ite
as N ($\frac{\text{mg}}{\text{l}}$) ≤ 0.10 10(NMED)

Monthly Total Coliform
(Present or Absent) 1 positive per mo.
(NMED)
All Absent

Other Environmental Item

Surface Alpha:
(as needed)

All material or equipment sold or
released met the requirements for
unrestricted use.

Removable $\leq 1000 \frac{\text{dpm}}{100\text{cm}^2}$

Fixed average
 $\leq 5000 \frac{\text{dpm}}{100\text{cm}^2}$

Where area is $\geq 1\text{m}^2$

Gamma is $\leq 40 \text{ ur/hr}$

PERSONNEL MONITORING SUMMARY DATA
from 4th-Q 1995 to 3rd-Q 1996

<u>Personnel Monitoring Item</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
* Semi-Annual or as needed Personnel TLD(DDE): (UNC and contractor external exposure)	Gamma ($\frac{\text{rem}}{\text{yr}}$)	0.024	0.500(action level)
* Daily Personnel Alpha Surveys: (UNC and contractor)	Alpha ($\frac{\text{dpm}}{100\text{cm}^2}$)	832	1000
* Semi-Annual or as needed Bioassay: (UNC and contractor)	Total Uranium ($\frac{\mu\text{g}}{\text{l}}$)	All < 5	< 35(action level)
* Bi-weekly or quarterly Air Samples: (UNC and contractor internal exposures)	Gross Alpha ($\frac{\mu\text{ci}}{\text{ml}}$)	7.02E ⁻¹⁰	6E ⁻¹¹ (DAC)
	Th-230 ($\frac{\mu\text{ci}}{\text{ml}}$)	2.29E ⁻¹⁶	6E ⁻¹² (DAC)
(Also note: Action level is 10% of an applicable dose limit)	RA-226 ($\frac{\mu\text{ci}}{\text{ml}}$)	3.32E ⁻¹⁶	3E ⁻¹⁰ (DAC)
	PB-210 ($\frac{\mu\text{ci}}{\text{ml}}$)	1.54E ⁻¹⁴	1E ⁻¹⁰ (DAC)
	RN-222 ($\frac{\mu\text{ci}}{\text{ml}}$) (-Daughter)	2.4E ⁻⁹	4E ⁻⁶ (DAC)
	U-Nat ($\frac{\mu\text{ci}}{\text{ml}}$)	4.39E ⁻¹⁶	2E ⁻¹¹ (DAC)
* Monthly Surface Alpha: (weekly for contractor)	All uncontrolled areas have met the requirements for unrestricted use Note: Removable < $\frac{200\text{dpm}}{100\text{cm}^2}$ for lab areas		Removable < 1000 $\frac{\text{dpm}}{100\text{cm}^2}$ Fixed average < 5000 $\frac{\text{dpm}}{100\text{cm}^2}$ where area is $\geq 1\text{m}^2$

Personnel Exposure

* Estimated Annual Total Effective Dose Equivalent (TEDE): (UNC and contractor)	TEDE (rem)	0.024	5.0(Max.) 2.0(Action level)
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From: 4th-Q 1994
To 3rd-Q 1995

ENVIRONMENTAL MONITORING SUMMARY DATA

<u>Environmental Monitoring Item</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
• Qtly Air Sample Composite: (Also note: ALARA goal is 10-20% or less of effluent limit depending on circumstances)	U-Nat. ($\frac{\text{uci}}{\text{ml}}$)	5.13E^{-16}	9.00E^{-14} (Effluent)
	Th-230 ($\frac{\text{uci}}{\text{ml}}$)	5.32E^{-16}	3.00E^{-14} (Effluent)
	RA-226 ($\frac{\text{uci}}{\text{ml}}$)	1.01E^{-15}	9.00E^{-13} (Effluent)
	PB-210 ($\frac{\text{uci}}{\text{ml}}$)	2.44E^{-14}	6.00E^{-13} (Effluent)
• Qtly Ambient Radon:	RN-222 ($\frac{\text{uci}}{\text{ml}}$)	1.80E^{-9}	1.00E^{-8} (Effluent)
• Semi-Annual Area TLD:	Gamma ($\frac{\text{mrem}}{\text{yr}}$)	* 9.6	50 (compliance) 100 (TEDE Annual Limit)
• Qtly Ground Water GW-Wells: (Also note: 3 of 4 GW-3 PB-210 analyses = <1.0 and 2 of 3 GW-3 PO-210 analyses = <1.0. The LLD = 1.0 for both PB-210 and PO-210 analysis) (PB-210 Annual Avg. = <1.17) (PO-210 Annual Avg. = <1.20)	U-Nat ($\frac{\text{mg}}{\text{l}}$)	0.088 (dissolved)	0.30 (NRC) 5.0 (ARAR)
	Th-230 ($\frac{\text{pci}}{\text{l}}$)	0.40 (dissolved)	5.0 (NRC) 15.0 (ARAR)
	RA-226 ($\frac{\text{pci}}{\text{l}}$)	1.1 (dissolved)	5.0 (NRC) 5.0 (ARAR)
	PB-210 ($\frac{\text{pci}}{\text{l}}$)	1.7 (GW-3) (dis.)	1.0 (NRC)
	PO-210 ($\frac{\text{pci}}{\text{l}}$)	1.6 (GW-3) (dis.)	1.0 (NRC)
	PH (units)	7.78	6-9 (NMED)
• Qtly Domestic Water Well: (Also note: 3 of 4 qtly dissolved analyses = <1.0 and the LLD = 1.0 for both PB-210 and PO-210 analysis) (PB-210 Annual Avg. = <1.40)	U-Nat ($\frac{\text{mg}}{\text{l}}$)	0.023 (dissolved)	0.30 (NRC) 5.0 (ARAR)
	Th-230 ($\frac{\text{pci}}{\text{l}}$)	< 0.2 (dissolved)	5.0 (NRC) 15.0 (ARAR)
	RA-226 ($\frac{\text{pci}}{\text{l}}$)	0.90 (dissolved)	5.0 (NRC) 5.0 (ARAR)
	PB-210 ($\frac{\text{pci}}{\text{l}}$)	2.60 (dissolved)	1.0 (NRC)

*Based on the combined summation average of high results (i.e. at Site C 2nd half of 94 = 7.6 mrem and at Site F 1st half of 95 = 14.4 mrem) above Site D's background results.

<u>Environmental Monitoring Item</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
(PO-210 Annual Avg. = < 1.05)	PO-210 ($\frac{\text{pci}}{1}$)	1.20(dissolved)	1.0(NRC)
(Classified as a non-community water system under the NM water supply regulations)	Nitrate + ite as N ($\frac{\text{mg}}{1}$)	< 0.10	10(NMED)
	Monthly Total Coliform (Present or Absent)	All Absent	1 positive per mo. (NMED)

Other Environmental Item

<u>Other Environmental Item</u>	<u>Allowable</u>
* Surface Alpha: (as needed)	All material or equipment sold or released met the requirements for unrestricted use
	Removable < 1000 $\frac{\text{dpm}}{100 \text{ cm}^2}$
	Fixed average < 5000 $\frac{\text{dpm}}{100 \text{ cm}^2}$
	Where is $\geq 1 \text{ m}^2$
	Gamma is < 40 $\mu\text{r/hr}$

Other Personnel Data

Comment: Attached is a supplemental table and trend graph for Site A showing the highest reading (i.e. 1991 2nd half = 305.2 mrem) during the mill decommissioning process to the lowest reading (i.e. 1994 1st half = 34.2 mrem) after the completed decommissioning project. Additionally, calculated and graphically exemplified the year end exposure (mrem/yr) from 193.5 in 1991 to 28.6 in 1994.

Although not a requirement but remonitored Site A on 10-6-95 pending forthcoming results on 1-26 and based on NRC's recommendation to show any further significant change in the readings. Ideally, the readings should be close to background readings following the ALARA goal or concept but this might be difficult to achieve due to the presence of unprocessed ore in the soil adjacent to and outside the mill perimeter fence line area.

PERSONNEL MONITORING SUMMARY DATA

<u>Personnel Monitoring Item</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
° Semi-Annual or as needed Personnel TLD: (UNC and contractor external exposure)	Gamma ($\frac{\text{rem}}{\text{yr}}$)	0.014	0.500(action level)
° Daily Personnel Alpha Surveys: (UNC and contractor)	Alpha ($\frac{\text{dpm}}{100\text{cm}^2}$)	509	1000
° Semi-Annual or as needed Bioassay: (UNC and contractor)	Total Uranium ($\frac{\mu\text{g}}{1}$)	All < 5	15-35 (action level)
° Bi-weekly or quarterly Air Samples: (UNC and contractor internal exposures) (Also note: Action level is 10% of an applicable dose limit)	Gross Alpha ($\frac{\text{uci}}{\text{ml}}$)	6.67E^{-15}	6E^{-11} (DAC)
	TH-230 ($\frac{\text{uci}}{\text{ml}}$)	2.96E^{-15}	6E^{-12} (DAC)
	RA-226 ($\frac{\text{uci}}{\text{ml}}$)	3.22E^{-15}	3E^{-10} (DAC)
	PB-210 ($\frac{\text{uci}}{\text{ml}}$)	2.44E^{-14}	1E^{-10} (DAC)
	RN-222 ($\frac{\text{uci}}{\text{ml}}$)	1.8E^{-9}	4E^{-6} (DAC)
	U-Nat ($\frac{\text{uci}}{\text{ml}}$)	1.18E^{-15}	2E^{-11} (DAC)
° Monthly Surface Alpha: (weekly for contractor)	All uncontrolled areas have met the requirements for unrestricted use Note: Removable < $\frac{200 \text{ dpm}}{100 \text{ cm}^2}$ for lab areas		Removable < $1000 \frac{\text{dpm}}{100\text{cm}^2}$ Fixed average < $5000 \frac{\text{dpm}}{100\text{cm}^2}$ where area is $\geq 1\text{m}^2$

Personnel Exposure

° Estimate Annual Total Effective Dose Equivalent (TEDE): (UNC and contractor)	TEDE (rem)	0.002	5.0(Max.) 2.0(Action Level)
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From: 4th-Q 1993
to 3rd-Q 1994

ENVIRONMENTAL MONITORING SUMMARY DATA

<u>Environmental Monitoring Item</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
° Bi-weekly air sample:	Gross Alpha ($\frac{\text{uci}}{\text{ml}}$)	2.19E^{-14}	6.00E^{-11}
° Qtly Air Sample Composite:	U-Nat. ($\frac{\text{uci}}{\text{ml}}$)	1.94E^{-15}	9.00E^{-14} (Effluent)
	Th-230 ($\frac{\text{uci}}{\text{ml}}$)	$<1.00\text{E}^{-16}$	3.00E^{-14} (Effluent)
	RA-226 ($\frac{\text{uci}}{\text{ml}}$)	1.97E^{-15}	9.00E^{-13} (Effluent)
	PB-210 ($\frac{\text{uci}}{\text{ml}}$)	2.11E^{-14}	6.00E^{-13} (Effluent)
° Qtly Ambient Radon.	RN-222 ($\frac{\text{uci}}{\text{ml}}$)	1.50E^{-9}	1.00E^{-8} (Effluent)
° Semi-Annual Area TLD:	Gamma ($\frac{\text{mrem}}{\text{yr.}}$)	0.22 13.02	50
° Qtly Ground Water GW-Wells:	U-Nat ($\frac{\text{mg}}{\text{l}}$)	0.099	0.30(NRC)5.0(ARAR)
	TH-230 ($\frac{\text{pci}}{\text{l}}$)	<0.2	5.0(NRC)15.0(ARAR)
	RA-226 ($\frac{\text{pci}}{\text{l}}$)	1.7	5.0(NRC)5.0(ARAR)
	PB-210 ($\frac{\text{pci}}{\text{l}}$)	6.8	1.0(NRC)
	PO-210 ($\frac{\text{pci}}{\text{l}}$)	<1.0	1.0(NRC)
	PH (units)	7.71	6-9 (EID)
° Qtly Domestic Water Well:	U-Nat ($\frac{\text{mg}}{\text{l}}$)	0.087	0.30(NRC)5.0(ARAR)
	TH-230 ($\frac{\text{pci}}{\text{l}}$)	<0.2	5.0(NRC)15.0(ARAR)
	RA-226 ($\frac{\text{pci}}{\text{l}}$)	4.20	5.0(NRC)5.0(ARAR)
	PB-210 ($\frac{\text{pci}}{\text{l}}$)	4.50	1.0(NRC)
	PO-210 ($\frac{\text{pci}}{\text{l}}$)	1.10	1.0(NRC)
	PH (units)	8.75	6-9 (EID)
	(Monthly) Total Coliform (Present or Absent)	All Absent	1 positive per mo. (EID)

Other Environmental Item

° Surface Alpha: All material or equipment sold or released met the requirements for unrestricted use

Allowable

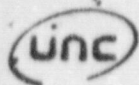
Removable $\leq 1000 \frac{\text{dpm}}{100 \text{ cm}^2}$

Fixed $\leq 5000 \frac{\text{dpm}}{100 \text{ cm}^2}$ where

$$\bar{z} \leq 1 \text{ m}^2$$

PERSONNEL MONITORING SUMMARY DATA

<u>Personnel Monitoring Item</u>	<u>Required Analysis</u>	<u>Highest Result Obtained</u>	<u>Allowable</u>
° Semi-Annual Area TLD:	Gamma ($\frac{\text{mrem}}{\text{yr.}}$)	0.294 [~] 35.7	100
° Semi-Annual or as needed Personnel TLD: (UNC and contractor external exposure)	Gamma ($\frac{\text{rem}}{\text{yr.}}$)	0.127	0.500 (action level)
° Daily Personnel Alpha Surveys: (UNC and contractor)	Alpha ($\frac{\text{dpm}}{100\text{cm}}$) ²	602	1000
° Semi-Annual or as needed Bioassay: (UNC and contractor)	Total Uranium ($\frac{\mu\text{g}}{\text{l}}$)	All < 1	15-35 (action level)
° Bi-weekly or quarterly Air Samples: (UNC and contractor internal exposures)	Gross Alpha ($\frac{\mu\text{ci}}{\text{ml}}$)	2.19E ⁻¹⁴	6E ⁻¹¹ (DAC)
	TH-230 ($\frac{\mu\text{ci}}{\text{ml}}$)	All < 1.00E ⁻¹⁶	6E ⁻¹² (DAC)
	RA-226 ($\frac{\mu\text{ci}}{\text{ml}}$)	9.86E ⁻¹⁶	3E ⁻¹⁰ (DAC)
	PB-210 ($\frac{\mu\text{ci}}{\text{ml}}$)	2.79 E ⁻¹⁴	1E ⁻¹⁰ (DAC)
	RN-222 ($\frac{\mu\text{ci}}{\text{ml}}$)	1.5E ⁻⁹	4E ⁻⁶ (DAC)
	U-Nat ($\frac{\mu\text{ci}}{\text{ml}}$)	9.68E ⁻¹⁶	2E ⁻¹¹ (DAC)
<u>Personnel Exposure</u>			
° Estimated Annual Total Effective Dose Equivalent (TEDE): (UNC and contractor)	TEDE (rem)	0.02	5.0



Environmental Monitoring Data Summary

Page 2

Area Surveillance

- ° All monthly inspections documented

From: 4th-Q 1992
to 3rd-Q 1993

Weekly Wind Blown Tailing Inspections

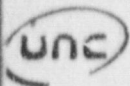
- ° Completed through September 30, 1993.
Change as per Rev. 5 of Monitoring Program.

Area Occurrences 1993

- ° Spray Gun System startup, April 4
- ° Spray Gun System shutdown, November 12
- ° Mist System startup, March
- ° Mist System shutdown, November 12
- ° Completed final cover and rock mulch on the North Cell
- ° Constructed and riprapped Swales E, F, and G and west run-off control ditch for the North Cell
- ° Submitted the final radiological data for the mill site to the NRC and requested the site to be released for unrestricted use.

Environmental Monitoring Data

	Highest Results Obtained	Allowable	
° Bi-weekly air sample gross alpha	7.47E ⁻¹⁵ uci/ml	3.0E ⁻¹² uci/ml	
° Quarterly air sample composite Unat	2.9E ⁻¹⁵ uci/ml	5.0E ⁻¹⁵ uci/ml	
Quarterly air sample composite Th ²³⁰	1.0E ⁻¹⁶ uci/ml	8.0E ⁻¹⁴ uci/ml	
Quarterly air sample composite Ra ²²⁶	1.0E ⁻¹⁵ uci/ml	3.0E ⁻¹² uci/ml	
Quarterly air sample composite Pb ²¹⁰	2.57E ⁻¹⁴ uci/ml	4.0E ⁻¹² uci/ml	
° Ambient Radon Rn ²²²	1.5E ⁻⁹ uci/ml	3.0E ⁻⁹ uci/ml	
° Area Gamma $\dot{\gamma}$ D gamma	2.65 mr/wk	100 mr/wk	
° Annual soil sample Unat	8.0E ⁻⁷ uci/gm	NA	
Annual soil sample Ra ²²⁶	1.24E ⁻⁶ uci/gm	5000 uci/gm	
Annual soil sample Pb ²¹⁰	1.62E ⁻⁶ uci/gm	NA	
° Annual Vegetation Ra ²²⁶	28.0E ⁻⁶ uci/kg	NA	
	110.0E ⁻⁶ uci/kg	NA	
° Groundwater GW Wells		NRC	ARAR
Unat	0.602 mg/l	.30	5.0
Ra ²²⁶	2.3 pci/l	5.0	5.0
Th ²³⁰	0.2 pci/l	5.0	15.0
Pb ²¹⁰	3.2 pci/l	1.0	
Po ²¹⁰	2.6 pci/l	1.0	
Ph	7.72	6-8.5 (EID)	



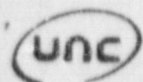
° Domestic Water Well

		<u>NRC</u>	<u>ARAR</u>
Unat	0.768 mg/l	.30	5.0
Ra ²²⁶	1.6 pci/l	5.0	5.0
Th ²³⁰	0.2 pci/l	5.0	15.0
Pb ²¹⁰	26.6 pci/l	1.0	
Po ²¹⁰	1.6 pci/l	1.0	
Ph	8.87 units	6 -8.5 (EID)	

° Surface Alpha

All monitoring met the requirements
of less than 1000 DPM/100cm² including
equipment sold for unrestricted use

Removable 1000d,
100 cm
Fixed 5000dpm/
100 cm



Personnel Monitoring Data Summary

	Highest Results Obtained	Allowable
° Area TLD	4.58 mr/wk	200 mr/wk
° Personnel TLD	0.01 Rem/1/2 yr.	2.5 rem/1/2yr. or 5 rem/yr.
° Gamma Survey	26 ur/hr	1000 ur/hr
° Working Levels	0.02 WL	0.33 WL
° Alpha Surface Surveys	126 dpm/100 cm ²	1000 dpm/100 c.
° Internal Exposure gross alpha	0.0207 MPCH	40 MPCH/wk
Air Samples Unat	0.0058 MPCH	520 MPCH/qt
° Bioassay Unat	6.3 mg/l	15 to 35 mg/l is Action Level
° Personnel Alpha Survey		
Clothing	429 dpm/100cm ²)	
Skin	237 dpm/100cm)	1000dpm/100cm ²