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40-4492

# AMERICAN NUCLEAR CORPORATION

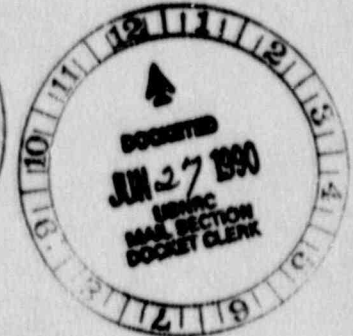
June 21, 1990

RETURN ORIGINAL TO PDR, HQ.

JOHN C. FERGUSON, PRESIDENT  
TELEPHONE (307) 265-7912

314 WEST MIDWEST AVE  
P.O. BOX 2710  
CASPER, WYOMING 82602

Ramon Hall  
U.S. Nuclear Regulatory Commission  
Uranium Recovery Field Office  
Region IV  
P.O. Box 25325  
Denver, CO 80228



Re: SUA-667  
Docket No. 40-4492

Dear Mr. Hall:

American Nuclear Corporation has entered into an agreement with Ferret Exploration Company of Nebraska to permanently dispose of radioactive waste material generated under Source and Byproduct Materials License SUA-1534 at their Crow Butte ISL Mine near Crawford, Nebraska. The agreement provides for radioactive waste disposal at American's Gas Hills mill site, subject to NRC's and other applicable regulatory approval, until December 31, 1992. It is estimated that an amount not to exceed 500 cubic yards of Ferret's waste material may be disposed of during this period. The waste material will consist of pond residue, contaminated soils, pumps, processing equipment, miscellaneous fittings and parts. The waste material is expected to be contaminated with the typical byproducts associated with an insitu uranium operation (Radium-226 and natural uranium). The estimated weighted average Radium-226 concentration for the waste material is expected to average 177 pCi/gram by volume. The pond sludge should not exceed a maximum of 50% contained moisture. Other hazardous waste materials will not be accepted for disposal.

Waste material shipped to the site will be accompanied by a manifest describing the waste material (activity, description, etc.) in accordance with all State and Federal requirements. The waste material will be permanently disposed of in a specific area of Tailings Pond No. 1 as shown on the attached plat. A permanent record will be kept showing the location of each waste material shipment placed at the site. Free volumes in the waste material will be minimized by filling, sectioning or crushing prior to placement. The waste material will be placed on the surface of the Tailings Pond or in shallow trenches, as appropriate. A one foot (1') thick intermediate cover will be placed over the waste material after each shipment. Contaminated soils and solids will be placed in layers not exceeding twelve inches (12") in thickness and ...

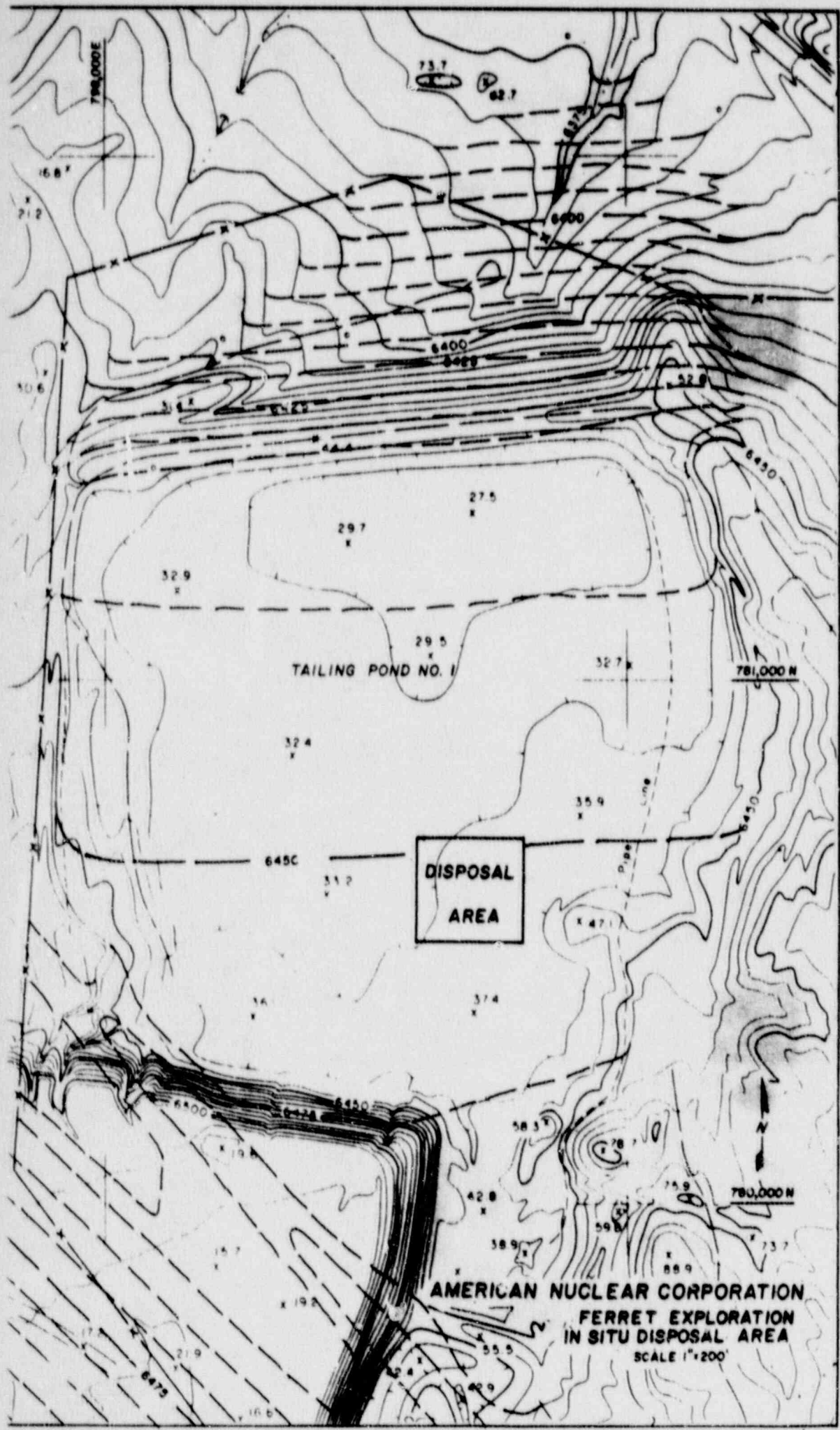
DESIGNATED ORIGINAL

Certified By Mary C. Ford

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PDR P.D. JACK 04004492  
PDC



**DISPOSAL  
AREA**

**TAILING POND NO. 1**

**AMERICAN NUCLEAR CORPORATION  
FERRET EXPLORATION  
IN SITU DISPOSAL AREA  
SCALE 1"=200'**

be compacted with at least one pass of the construction equipment. Evaporation pond residues will be spread in containment areas to enhance evaporation prior to covering.

American's approved reclamation plan provides for a minimum of four feet (4') of fill material, five and one-half feet (5.5') of compacted cover and one-half foot (.5') of topsoil to be placed over the waste disposal area. The attached calculation was made utilizing Regulatory Guide 3.64's "Calculation of Radon Flux Attenuation By Earthen Uranium Mill Tailings Covers", BASIC program. The radon flux calculation was 14.7 pCi/m<sup>2</sup>s. This was achieved with the before mentioned cover thickness. The parameters used are identified and attached to the calculation.

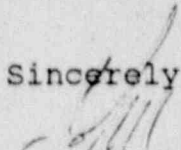
American's personnel radiation program will be expanded to include an air particulate monitor located in the vicinity of the disposal activities. The air pump filter will be site analyzed utilizing an energy independent alpha counting system (SAC R-5 and scaler) calibrated on a semiannual frequency. The gross alpha activity will be recorded and documentation will be made regarding employee exposure concentrations. The pump will be operating during the waste disposal and intermediate covering activities for this proposed amendment. No other changes to the program will be made.

The disposal of the Ferret waste material in Tailings Pond No. 1 will not effect American's approved reclamation plan contour or elevations as the material will be substituted for other fill material located outside the licensed area. Receipt of the waste material will not interfere with our estimated time table for completion of reclamation on Tailings Pond No. 1 by the end of 1992.

American Nuclear hereby requests that License SUA-667 be amended to allow for the permanent disposal in Tailings Pond No. 1 of up to 500 cubic yards of waste material generated under License SUA-1534. Enclosed is American's check in the amount of \$150.00 for this amendment request.

If you have any questions, please feel free to contact Bill Salisbury or myself.

Sincerely,

  
John C. Ferguson  
President

JCF/WCS/mk



June 20, 1990

SUA-667, DOCKET No. 40-4492

AMERICAN NUCLEAR CORPORATION'S COVER CALCULATION FOR TAILINGS POND NO. 1, in association with License Amendment for accepting waste material from Ferret Exploration Company of Nebraska, Inc.

Regulatory Guide 3.64, "Calculation Of Radon Flux Attenuation By Earthen Uranium Mill Tailings Covers", and its associated BASIC program were used for the following cover calculation.

Constants as identified in the program were not changed.

General Parameters are outlined on the calculation sheet attached.

The five layers are identified as:

- Tailings
- Ferret's Waste Material
- Fill Material
- Compacted Cover
- Topsoil.

Laboratory analyses were performed on tailings and cover material so that site specific values of the following parameters could be entered into the program:

Tailings Porosity	0.57
Tailings Weight % Moisture	35%
Cover Material Weight % Moisture	11.9%

Regarding site specific historical data the following assumptions were made and entered into the program:

Tailings		
Thickness (uniform)	457	cm
Radium Activity (uniform)	226	pCi/gm
Ferret Waste Material		
Thickness (uniform) assuming a 200' x 200' disposal area	10	cm
Porosity (default)	0.40	unitless
Radium Activity (uniform)	177	pCi/gm
Weight % Moisture (default)	10%	
Fill Material		
Thickness (uniform)	122	cm
Porosity (default)	0.40	unitless
Radium Activity (uniform)	50	pCi/gm
Weight % Moisture (default)	10%	
Compacted Cover		
Thickness (uniform)	167	cm
Porosity (default)	0.40	unitless
Radium Activity (uniform)	10	pCi/gm
Weight % Moisture (see above)		
Topsoil		
Thickness (uniform)	167	cm
Porosity (default)	0.40	unitless
Radium Activity (uniform)	10	pCi/gm
Weight % Moisture	6%	

RADON FLUX, CONCENTRATION AND TAILINGS COVER THICKNESS  
 ARE CALCULATED FOR MULTIPLE LAYERS

Ferret on TP-1 w/4'fill & 5.5'compacted cover

CONSTANTS

RADON DECAY CONSTANT	.0000021	s <sup>-1</sup>
RADON WATER/AIR PARTITION COEFFICIENT	.26	
SPECIFIC GRAVITY OF COVER & TAILINGS	2.65	

GENERAL INPUT PARAMETERS

LAYERS OF COVER AND TAILINGS	5	
DESIRED RADON FLUX LIMIT	20	pCi m <sup>-2</sup> s <sup>-1</sup>
LAYER THICKNESS NOT OPTIMIZED		
DEFAULT SURFACE RADON CONCENTRATION	0	pCi l <sup>-1</sup>
SURFACE FLUX PRECISION	.9	pCi m <sup>-2</sup> s <sup>-1</sup>

LAYER INPUT PARAMETERS

LAYER 1 Tailings

THICKNESS	457	cm
POROSITY	.57	
CALCULATED MASS DENSITY	1.1395	g cm <sup>-3</sup>
MEASURED RADIUM ACTIVITY	226	pCi/g <sup>-1</sup>
DEFAULT LAYER EMANATION COEFFICIENT	.35	
CALCULATED SOURCE TERM CONCENTRATION	3.321D-04	pCi cm <sup>-3</sup> s <sup>-1</sup>
WEIGHT % MOISTURE	35	%
MOISTURE SATURATION FRACTION	.700	
CALCULATED DIFFUSION COEFFICIENT	5.410D-03	cm <sup>2</sup> s <sup>-1</sup>

LAYER 2 Ferret ISL Waste

THICKNESS	10	cm
DEFAULT POROSITY	.4	
CALCULATED MASS DENSITY	1.59	g cm <sup>-3</sup>
MEASURED RADIUM ACTIVITY	177	pCi/g <sup>-1</sup>
DEFAULT LAYER EMANATION COEFFICIENT	.35	
CALCULATED SOURCE TERM CONCENTRATION	5.171D-04	pCi cm <sup>-3</sup> s <sup>-1</sup>
WEIGHT % MOISTURE	10	%
MOISTURE SATURATION FRACTION	.397	
CALCULATED DIFFUSION COEFFICIENT	1.769D-02	cm <sup>2</sup> s <sup>-1</sup>

LAYER 3      Fill Material

THICKNESS	122	cm
DEFAULT POROSITY	.4	
CALCULATED MASS DENSITY	1.59	g cm <sup>-3</sup>
MEASURED RADIUM ACTIVITY	50	pCi/g <sup>-1</sup>
DEFAULT LAYER EMANATION COEFFICIENT	.35	
CALCULATED SOURCE TERM CONCENTRATION	1.461D-04	pCi cm <sup>-3</sup> s <sup>-1</sup>
WEIGHT % MOISTURE	11.9	%
MOISTURE SATURATION FRACTION	.473	
CALCULATED DIFFUSION COEFFICIENT	1.299D-02	cm <sup>2</sup> s <sup>-1</sup>

LAYER 4      Compacted Cover

THICKNESS	167	cm
DEFAULT POROSITY	.4	
CALCULATED MASS DENSITY	1.59	g cm <sup>-3</sup>
MEASURED RADIUM ACTIVITY	10	pCi/g <sup>-1</sup>
DEFAULT LAYER EMANATION COEFFICIENT	.35	
CALCULATED SOURCE TERM CONCENTRATION	2.922D-05	pCi cm <sup>-3</sup> s <sup>-1</sup>
WEIGHT % MOISTURE	11.9	%
MOISTURE SATURATION FRACTION	.473	
CALCULATED DIFFUSION COEFFICIENT	1.299D-02	cm <sup>2</sup> s <sup>-1</sup>

LAYER 5      Topsoil

THICKNESS	13.2	cm
DEFAULT POROSITY	.4	
CALCULATED MASS DENSITY	1.59	g cm <sup>-3</sup>
MEASURED RADIUM ACTIVITY	0	pCi/g <sup>-1</sup>
DEFAULT LAYER EMANATION COEFFICIENT	.35	
CALCULATED SOURCE TERM CONCENTRATION	0.000D+00	pCi cm <sup>-3</sup> s <sup>-1</sup>
WEIGHT % MOISTURE	6	%
MOISTURE SATURATION FRACTION	.238	
CALCULATED DIFFUSION COEFFICIENT	3.131D-02	cm <sup>2</sup> s <sup>-1</sup>



DATA SENT TO THE FILE 'RNDATA' ON DRIVE A:

N	FOI	CNI	ICOST	CRITJ	ACC
5	-1.000D+00	0.000D+00	0	2.000D+01	9.000D-01

LAYER	DX	D	P	Q	XMS	RHO
1	4.570D+02	5.410D-03	5.700D-01	3.321D-04	9.97D-01	1.139
2	1.000D+01	1.769D-02	4.000D-01	5.171D-04	5D-01	1.590
3	1.220D+02	1.299D-02	4.000D-01	1.461D-04	0D-01	1.590
4	1.670D+02	1.299D-02	4.000D-01	2.922D-05	4.730D-01	1.590
5	1.520D+01	3.131D-02	4.000D-01	0.000D+00	2.385D-01	1.590

BARE SOURCE FLUX FROM LAYER 1: 9.606D+01 pCi m<sup>-2</sup> s<sup>-1</sup>

RESULTS OF THE RADON DIFFUSION CALCULATIONS

LAYER	THICKNESS (cm)	EXIT FLUX (pCi m <sup>-2</sup> s <sup>-1</sup> )	EXIT CONC. (pCi l <sup>-1</sup> )
1	4.570D+02	3.680D+01	9.753D+04
2	1.000D+01	4.573D+01	1.369D+05
3	1.220D+02	2.857D+01	5.298D+04
4	1.670D+02	1.477D+01	1.407D+03
5	1.520D+01	1.466D+01	0.000D+00