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THE STATE OF WYOMING

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GOVERNOR

PDR

Department of Environmental Quality

LAND QUALITY DIVISION

401 WEST 19TH STREET

TELEPHONE 307-777-7756

CHEYENNE, WYOMING 82002

MEMORANDUM

TO: Fred Ross, NRC

FROM: Rick Lawton, Soil Scientist

DATE: March 28, 1983

SUBJECT: Collins Draw Leach Field



Attached to this memorandum is a review done on the Collins Draw Leach Field. This cover memo will outline the major findings and make recommendations for further action.

Summary of Data to Date

1. Initial sampling scheme was not sufficient to determine if upward migration of salts would occur. Composite samples won't work for this. For baseline, it would have been necessary to sample at 4 or more points on 5 to 10 centimeter intervals down to 2 meters. This would then be compared to post operation conditions.
2. No data is provided below the leach lines and down gradient into Collins Draw. Potential horizontal flow of leachate was not assumed to be a problem. LQD disagrees.

Proposed Further Action

1. The applicant has two alternatives to establish a "baseline" or bottom line with which to compare pre and post operational levels for some parameters.
 - a. To establish an actual "baseline" by utilizing adjacent unaffected areas with the sampling scheme outlined above.
 - b. To utilize LQD established fixed criteria for suitability for specific parameters. These would include, but not be restricted to, those set in Guideline No. 1 of LQD.
2. Further assessment of the actual chemistry of the leachate is necessary, but initially the parameters of interest are EC, pH, Se, As, Mo, radiological parameters, SO₄, possibly heavy metals, and possibly Cl.

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3. This sampling should extend to a minimum of 2 meters and extend down slope (down gradient) into Collins Draw.
4. An assessment should be made of deeper depths to determine if further and/or future contamination may result.

RL:kv
Attachment
cc: Gary Beach
Kathy Ogle
District IV



Department of Environmental Quality

LAND QUALITY DIVISION

401 WEST 19TH STREET

TELEPHONE 307-777-7756

CHEYENNE, WYOMING 82002

MEMORANDUM

TO: Gary Beach

FROM: Rick Lawton RL

DATE: February 8, 1983

SUBJECT: Review of restoration plan for wastewater leach field of R & D 3 Cleveland Cliffs Uranium.

It is not possible to compare pre-operational conditions versus post-operational conditions or to assess present environmental variables with the information available. The R & D permit and various other documents are disorganized and incomplete.

The following summarizes the situation as perceived at this time. For clarification, this review is assessing impacts to the surface and near surface environment including potential resurfacing of contaminants down slope if penetration of fluids from the leach field was shallow and restricted.

I. Pre-operation baseline

The pre-operation baseline soil quality data is scant and generalized. No mention is made of sampling intervals or analyses used. Additionally, what is called "subsoil" here (column 1) is called "surface" soil when used in the post-operational comparison (column 1). Soil data should not be reported in mg/kg. Very probably the EC values are in mmhos/cm. not μ mhos/cm. Baseline values for As and Mo are the highest yet reported for undisturbed soils and should be checked or redone. The operator should clarify whether these values are total or extractable. These samples should not have been composited.

Pre-operation Baseline Soil Data

<u>Parameters</u>		<u>Topsoil</u>	<u>Subsoil</u>
Arsenic	mg/kg	59.5	51.0
Molybdenum	mg/kg	9.8	8.2
Selenium	mg/kg	<0.05	0.65

Pre-operation Baseline Soil Data (Continued)

<u>Parameters</u>		<u>Topsoil</u>	<u>Subsoil</u>
Sodium absorption ratio		0.28	1.65
Exchangeable sodium percentage	%	0	1.16
Conductivity	umho/cm	0.65	4.4
Calcium	meq/L	5.1	26.38
Magnesium	meq/L	1.12	30.87
Sodium	meq/L	0.49	8.83
Nitrate	mg/L	6.84	3.68
pH		7.3	7.7

No data is available for that volume of material below the "subsoil" which is still part of the root zone. This would be the volume of material from the surface to the continuing shale layer and extend downslope and down dip some distance. This data should be supplied for the restoration assessment. It includes lithologic logs, particle size analysis, cross-sections, etc.

The data on baseline soil radiological environment was foot-noted on this table as "to-be-sent-when-available." It could not be found. The following soil baseline radiological data is from Collins Draw and is probably similar.

<u>Topsoil</u>	<u>²²⁶Ra</u>	<u>²³⁰Th</u>	<u>U₃O₈</u>
	pCi/g	pCi/g	ppm
#1	2.3±0.7	3.1±0.8	8.0
#2	1.5±0.6	2.2±0.7	7.3
#3	1.8±0.6	1.9±0.6	4.5
#4	2.3±0.7	1.8±0.6	4.0
#5	2.1±0.7	2.8±0.8	5.0

Some radiological data was generated in the R & D permit document. These data follow.

gamma = .018 mR/hr ± .0018 mR/hr
 U₃O₈ = 2.1 pL/gm ± 0.3
 Ra₂₂₆ = 0.77 pL/gm ± 0.04
 where error is for 2σ.

These data are quite different than that for Collins Draw. If there is data specific to the leach field site, it should be supplied.

II. Post-operational data

The following table summarizes the post-operational surface environment. Again, they are composite samples. No means are available with composite samples to illustrate or present variability and are much less desirable than multiple samples. Uranium was not included in this sampling and an explanation for that will be necessary from the company. Additional information is necessary on sampling methods, depths, and means of analysis. Data is requested for the system to the shale layer and downdip and down slope to the surface and alluvium in Collins Draw.

SEE ATTACHED TABLE.

This data has excluded from any analysis the rest of the root zone in the field itself (depths greater than 4 feet) and that area downdip and downslope where groundwater with a horizontal vector may surface or reach the near surface environment. This horizontal vector has not been demonstrated to be non-existent. The data above does not demonstrate no salt movement upwards and only describes that volume of soil above the leach lines.

III. Conclusion and Summary

1. There are serious errors in data presentation in this document and attached presentations.
2. There is insufficient data to analyze for restoration quality or sufficiency, and insufficient data was presented in the original document to prepare a baseline environmental assessment.
3. Recommendations are made to present data and until they are included the operator should not be released from restoration and reclamation responsibilities.

RL:rjc

cc: K. Ogle
District II
District IV

<u>Parameter</u>	<u>Baseline</u>	<u>January 28, 1982</u> <u>10 Months Post Shutdown</u>		<u>August 19, 1982</u> <u>17 Months Post Shutdown</u>	
	<u>Surface</u>	<u>Surface</u>	<u>4-feet Below Surface</u>	<u>Surface</u>	<u>4-feet Below Surface</u>
pH	7.7	7.3	7.1	7.5	7.6
Conductivity mmhos/cm	4.40	3.51	4.88	3.44	3.29
Sodium meq/l	8.83	7.52	8.05	0.83	2.13
Calcium meq/l	26.38	26.16	29.18	35.88	32.78
Magnesium meq/l	30.87	23.89	37.01	15.12	14.06
Selenium ppm	0.65	0.20	0.60	0.10	0.40
Sodium Absorption Ratio	1.65	1.50	1.39	0.16	0.44
Exchangeable Sodium %	1.16	0.90	0.80	0.00	0.00
Nitrate ppm	3.68	4.80	3.90	2.20	0.40
Arsenic ppm	51.0	6.6	6.0	2.8	3.1
Molybdenum ppm	8.2	3.2	2.1	0.1	0.1
Radium 226 pCi/gram	0.5	0.8	1.3	1.0	0.9