

UNC TETON EXPLORATION DRILLING, INC.



A UNC RESOURCES Company

P.O. Drawer QQ
Gallup, New Mexico 87301

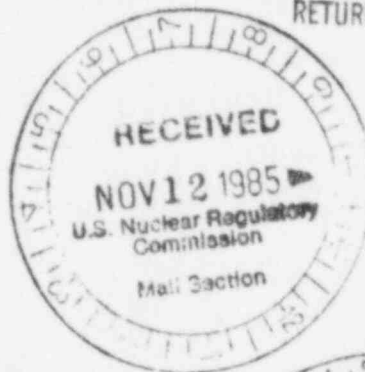
Telephone 505-722-6651

40-8728

October 24, 1985

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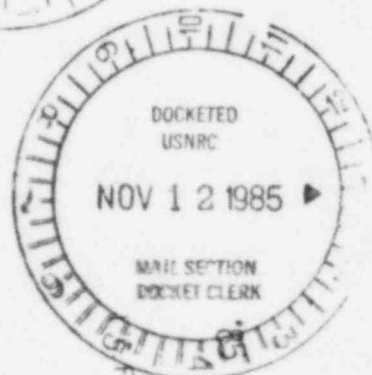
RETURN ORIGINAL TO PDR, HQ.



Mr. Dale R. Smith
Branch Chief
U. S. NUCLEAR REGULATORY COMMISSION
Uranium Recovery Field Office
P. O. Box 25325
Denver, Colorado 80225

and

Mr. Roy Speers
District I Supervisor
DEPARTMENT OF ENVIRONMENTAL QUALITY
Land Quality Division
122 West 25th Street
Cheyenne, Wyoming 82002



RE: SOURCE MATERIAL LICENSE SUA-1373
DOCKET NO. 040-8728, RESEARCH AND
DEVELOPMENT LICENSE 2RD, NOW
COMMERCIAL PERMIT NO. 522

RECEIVED
NOV 25 P1:33
U.S. N.R.C.
FREE MOBILE BRANCH

Gentlemen:

In accordance with the referenced License SUA-1373, Condition No. 35, UNC Teton joint venture partners submits their twenty-third quarterly report covering the third quarter of 1985 for the Leuenberger In Situ Operation located in Converse County, Wyoming. Routine site activities during the quarter included site security, monthly in-plant radon sampling and quarterly environmental radon sample collection. The site was visited and inspected by a representative of the Wyoming State Inspector of Mines on September 19, a safety inspection was conducted by the U. S. Nuclear Regulatory Commission team on September 23 and 24, and an annual inspection conducted by the Wyoming Department of Environmental Quality personnel also on September 24, 1985. Attached copies of the site visitation log reflect these and other site visitors during the quarter. The remainder of the site activities during the quarter were related to decontamination and decommissioning of the site in accordance with

DESIGNATED ORIGINAL

8512050212 851024
PDR ADOCK 04008728
C PDR

Certified By Mary E. Ford

074

the plan submitted May 1, 1985 and the resultant license amendment nos. 13 and 14 and are briefly described as follows:

1. Solar Evaporation Ponds

The water contained in the north solar evaporation pond was pumped into the south pond and all water was then treated with Barium Chloride to reduce radium concentration to below the 5 pCi/liter discharge limit. The water was discharged from the south pond after receiving written permission to discharge from the Water Quality Division of the Wyoming Department of Environmental Quality. Copies of the analytical results of pond water analysis after Barium Chloride treatment and correspondence regarding the discharge are attached for your files.

The north solar evaporation pond was then dismantled by removing the pond liner, sludge, and blow sand in the pond bottom to the Petrotomics Shirley Basin facility for disposal. Earthen material under the pond liner was surveyed with a gamma scintillometer and material showing above background readings was also removed to disposal. All materials hauled to disposal were transported in plastic lined ten yard dump trucks which were covered with tarps per the decommissioning plan. Sludge and pond solids were kept wet during loading and handling to abate dust, potential worker inhalation and scattering of the material.

2. Wellfield

Sixty-four of the sixty-six wells on site were plugged and abandoned in accordance with the requirements of the Wyoming Department of Environmental Quality regulations and the Wyoming State Engineer's Office. Copies of the letters dated July 31 and August 14, 1985 initially reporting the abandonments are attached. A complete report will be filed with the State Engineer's Office after decommissioning is completed.

Well MR-1 was worked over during the quarter by removal of the screened section, under reaming and reinstallation of new well screen in the same manner and interval as the original. The well was then pump developed and sampled for arsenic. Water samples were split with the Department of Environmental Quality and UNC's preliminary results show the arsenic levels to be below the .05 restoration goal.

2. Wellfield (continued)

All buried lines and the sump tank in the wellfield which contain residual radioactive contamination were uncovered and removed to the disposal facility. This included the last section of buried trunk lines to the plant. All ditched trenches and pits have been surveyed with a gamma scintillometer and areas of above background readings sampled for radium in the soil. Analytical results of these samples are not yet available.

3. Plant Building and Equipment

All process related equipment tankage tools and accessories from the Leuenberger operation were purchased from UNC by Kerr McGee Sequoyah Fuels. Three small tanks used for Barium Chloride water treatment and the wellfield trailer containing stored parts and equipment which still may be needed for decommissioning purposes are all the process equipment remaining on site. The ion exchange skid, precipitation skid and other major equipment have been removed to the Sequoyah Fuels Bill Smith mine facility. The remaining items will be transported to that facility once they are no longer of use to the decommissioning effort. The process plant building is now empty. Buried lines and drains from the plant have been uncovered and removed to disposal. Ditches have been surveyed and sampled for radium in the soil.

4. Radiation Safety

The Radiation Safety Program implemented per the decommissioning plan was audited once during the quarter and as previously mentioned, records were inspected by the U. S. Nuclear Regulatory Commission in September. All contractor personnel working on site were given radiation protection training and are required to sign in and off site each day. They are checked at the end of each day for alpha contaminants and individual record sheets maintained.

Gross alpha air samples in the plant and down wind from the pond have been maintained on a biweekly basis and during work activities in the area.

4. Radiation Safety (continued)

Items removed from the site to locations other than licensed facilities for disposal or future use were surveyed for removable alpha contamination and released in accordance with the Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for By Product, Source or Special Nuclear Material (Annex "C").

Items removed from the site to the Sequoyah facility for future use were surveyed for alpha contamination prior to handling them. They were then removed from the plant, loaded onto flat bed trucks for transportation and the truck load surveyed for beta gamma radiation prior to transport.

Pond liner, sludge, soil material and scrap hauled to the Petrotomics disposal facility were loaded into dump trucks and the truck loads surveyed for beta gamma radiation prior to leaving the site.

A bill of lading system has been established to account for all materials leaving the site. This includes a separate bill of lading for each truck load of material or equipment hauled. This information will be summarized and submitted to the U. S. Nuclear Regulatory Commission once decommissioning is completed. Current records are available on site or from the Radiation Safety Officer files located in Casper. UNC Teton has arranged to dispose of remaining contaminants on site at the Rocky Mountain Energy Company Bear Creek mining facility 34 miles north of the Leuenberger site. Contractor equipment used on site to load trucks and the trucks themselves are for the exclusive use of UNC Teton until decommissioning is completed or if removed prior to that time are surveyed for removable alpha contamination and released per (Annex "C") decontamination guidelines.

Very little contamination has been encountered to date. Results of the radiation sampling program during the quarter are attached for your files.

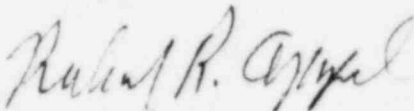
5. Decommissioning Activities Remaining

The following items remain to be accomplished in order to complete the decontamination and decommissioning plan at the the Leuenberger site.

- a. Dismantle and dispose of pond liner, waste, and any contaminated soils from south evaporation pond.
- b. Complete soil sampling program for radium in soils of ponds open trunklines and drain ditches in wellfield and around plant, remove any contaminated soil material and backfill the excavation upon approval of sample results or field check by U. S. Nuclear Regulatory Commission.
- c. Final surface soil surveys on disturbed areas and general site surface survey and sampling for radium in soil.
- d. Final decontamination survey of plant building.
- e. Complete MR-1 well sampling program and pending satisfactory results plug well.
- f. Transport, parts trailer and remaining equipment to Sequoyah Fuels site.
- g. Contour topsoil and reseed disturbed area per surface reclamation plan.
- h. Draft and submit final decommissioning reports to applicable State and Federal agencies.

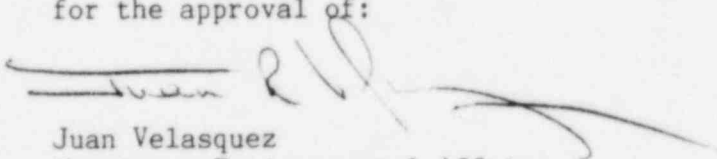
All remaining decontamination and decommissioning work will be accomplished as soon as possible, however, it should be noted that fall weather at the site could cause delays and schedule changes.

Report prepared for UNC Teton Exploration Drilling, Inc. by:



Richard R. Appel
Permit Coordinator

for the approval of:



Juan Velasquez
Manager - Environmental Affairs
UNC TETON EXPLORATION DRILLING, INC.
P. O. Box 8480
Santa Fe, New Mexico 87504

RRA/my
Enclosures

cc: NRC - five copies
DEQ - one copy

DATE	INDIVIDUAL	COMPANY	TIME IN	TIME OUT
6/29/85	C. MAIER	ENERGY LABS	00:00	09:05
			12:42	17:05
			19:40	28:06
6/30/85	C. MAIER	ENERGY LABS	01:13	10:55
			13:35	17:25
7/1/85	R. GARLING	ENERGY LABS	10:20	14:30
	C. MAIER	" "	10:20	14:30
			16:20	20:35
7/2/85	R. GARLING	ENERGY LABS	10:00	15:00
7/9/85	R. Appel	Contractor	07:00	17:00
	Steven Mundorf	Casper Mud Service	10:30	12:00
7/12/85	Roy Spears	Wyo. DIED	15:00	16:00
6/29/85	Thomas A. Shepherd	West Waterland	07:00	12:00
8/29/85	MARK J. REUBEN		2:00	2:21
8/29/85	Richard F. Clement, Jr.		2:00	2:21
8/29/85	Sandra L. WASTLER		1:20	2:00
8-29-85	Long Oliver		1:20	2:00
8/29/85	Ed Hawkins		1:20	2:00
8/29/85	Dale Smith		1:20	2:00
9/4/85	Tam Shepherd	WWL	11:00 A	7:00 P
9/4/85	Michael R. [unclear]	HYDRO-ENG	9:30	17:42
9/5/85	Tam Shepherd	WWL	7:30 A	2:20 P
9/5/85	Steve Tong	WNL	1:00 P	2:30 P
9/11/85	Joseph Strickland	Valentine	11:30	

OUT
BUSINESS PURPOSE

Pond Process Operation- No Building exposure

"

"

"

"

Pond Process Operation- Mud moving

"

"

FINAL POND PROCESSING - POND Sampling

Initiated Well Plugging and Worker Contractor Personnel Record under the RSD's Radiation Protection Program.

Individual Regularly on site From this point will Log in and out on individual Radiation protection plan Forms each day.

Checked initial plugg mud Viscosity, in Well Field, No plant exposure.

Site call No plant exposure.

on site to Look at MR-1.

URI Visitor

" "

NRC Project Manager

URI Visitor

NRC

"

MR-1 Consultant

SETUP + MT 4 WEEKS

MR-1 Consultant

URI

1 12

DATE	INDIVIDUAL	COMPANY	TIME IN	TIME OUT
Sept. 13, 1985	Ernie Orrell	Sequoia Fuel Lines	11:10	
Sept. 13, 1985	DALE ALBERTS	" " "	"	
9-17-85	Ken Hulman	" " "	09:20	10:50
9/17/85	Thomson May	" " "	0930	1050
" " "	Ernie Orrell	" " "	0930	1050
" 17 "	Robert Valentine	" " "	11:09	6:40 PM
17	Art Bergan	Valentine	5:00	6:00 PM
18	Art Bergan	"	9:30	10:50
18	Don Stauffer	"	3:00	
9/24/85	LISA A. GEESEY	DEQ/LAND	9:24	
9/24/85	Betty M'barty	DEQ/LAND	9:24	
9/24/85	GEORGE PANICORN	US NRC	9:24	
9/24/85	Randy Brich	USNRC-DENVER	9:24	
9/25/85	PATRICK CHATISS	DEQ-LQD	0900	1630
9/25/85	VINCENT FONG	UNC	1:30 PM	1440
9/26/85	DALE ALBERTS	Sequoia Fuels		11:15
✓	WALT KANT	LANC (11:15)	10:30	11:15
	Dick Decker	Aux		11:15
10/1/85	MARVIN FREEMAN	SEQUOIA FUELS	10:45	
	Ernie Orrell	✓	✓	
10/4/85	Jim	VALENTINE CONET.	11:00	12:00
10/7/85	Jim	" "	11:15	
10/9/85	JUAN VELASQUEZ	UNC	10:30	11:00
	R.R. Appel	CONSULTANT	09:40	11:00
	ROY SEBERS	WY-DEQ LQD	09:40	11:00
	R.A. GARLING	ENERGY LABS	09:40	11:00
10/11	George Hoffman	Hydro-Eng.	10:20	11:00
10/16	R.A. GARLING		10:20 - 2400	
10/17	R.A. GARLING		24:00 - 01:30	10:30 - 17:00
10/25	Pat Chatiss	DEQ-LQD	0900 - 1100	

BUSINESS PURPOSE
EXAMINE PULCH EQUIP.

mechanics work on generator repair only. ~~RAH~~
" " " " " " "
Mice for the first

DRILL HOLE INSPECTION

VISIT JIC APP 1

REMOVE CLEARED PATLORDER
SERVICE KATO GENERATOR
SALIT SAMALING - MR. 1

"

"

"

Pick-up Pump Trailer

Pass

"

Pick up SURFACE DAYS.

ENERGY LABORATORIES, INC.
P.O. Box 3258 254 North Center
Casper, WY 82602 307 235-0515

RADIOLOGICAL SURVEY - URANIUM MINE SITES

AIR SAMPLING - LONG HALF LIFE RADIONUCLIDES

LOCATION: UNC Resources Leuenberger

DATE: 7/26/85

SURVEYOR: RRA

SAMPLE LOCATION	COLLECTION						ANALYSIS								$\times 10^{-1}$
	TIME		Total Time Minutes	FLOW RATE CPM LPM		Total Volume In ML $\times 10^3$	COUNT TIME		TTL. CNT. Time Minutes	Gross Counts	CPM	BKG	Corrected Counts CPM-BKG	Activity $\mu\text{Ci/ml}$	
	From	To		Initial	Final		From	To							
1. ASV-6 Restricted Area upwind boundary	13:17	14:17	60	58	55	3540	7/27 15:20	15:30	10	10	1.0	0	1.0	2.76	
2. Evaporation ponds downwind	14:38	15:38	60	60	58	3480	15:40	15:50	10	10	1.0	0	1.0	2.81	
3. Plant internal elution skid	11:57	12:57	60	58	58	3390	15:10	15:20	10	27	2.7	0	2.7	7.79	
4. Plant internal desk	09:51	11:07	76	55	58	4294	15:00	15:10	10	17	1.7	0	1.7	3.87	
5.															
6.															

☒ ROUTINE ☐ SPECIAL (If special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

background gross alpha

samples counted prior to Th/Rn equilibrium

INITIAL FLOW + FINAL FLOW + 2 = AVERAGE FLOW

AVERAGE FLOW X TOTAL TIME = TOTAL VOLUME

VOLUME $\text{ft}^3 \times 2.83 \times 10^4$ VOLUME IN ml

VOLUME L $\times 10^3$ = VOLUME IN ml

$\frac{(\text{CPM} - \text{BKG})(4.5 \times 10^7 \mu\text{Ci/dpm})}{(\text{EFF})(\text{VOLUME IN ml})} = \mu\text{Ci/ml}$ 2" FILTER & 4" FILTER

$\frac{(\text{CPM} - \text{BKG})(4.5 \times 10^7 \text{Ci/dpm})(4)}{(\text{EFF})(\text{VOLUME IN ml})} = \mu\text{Ci/ml}$ 4 CUT TO 2"

SAMPLE PUMP ID. No. RAS-1 Col. DATE Man Col. Cor. Man

1. AIR SAMPLE COLLECTION MINIMUM OF 3000 LITRES
OR 106 Cu. Ft.

2. SAMPLE COUNT & BKG COUNT MINIMUM OF 50
MINUTES

3. ANALYSIS MINIMUM OF 24 HOURS AFTER COLLECTION

4. CALIBRATION CHECK
THORIUM 230 STANDARD ID. No. 11123
1 Min. COUNT DPM 15310
GROSS COUNTS (CPM) 7043

CPM
DPM $\times 100 = \% \text{ EFF}$ EFFICIENCY = 46.00 %

ENERGY LABORATORIES, INC.

P.O. Box 3258 254 North Center

Casper, WY 82602 307 235-0515

RADIOLOGICAL SURVEY - URANIUM MINE SITES

AIR SAMPLING - LONG HALF LIFE RADIONUCLIDES

LOCATION: UNC Resources Leuenberger

DATE: 7/29/85

SURVEYOR: RAG

SAMPLE LOCATION	COLLECTION						ANALYSIS							
	TIME		Total Time Minutes	FLOW RATE Initial	CFM LPM Final	Total Volume In- Mil X 10 ³	COUNT TIME		TTL. CNT. Time Minutes	Gross Counts	CPM	BKG	Corrected Counts CPM-BKG	Activity μCi/ml
	From	To					From	To						
1. Plant internal elution skid	09:00	12:05	185	60	60	11,100	7/30 13:20	13:30	10	377	37.7	0	37.7	3.31
2.														
3.														
4.														
5.														
6.														

☐ ROUTINE

☒ SPECIAL (If special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

recheck of plant internal air background sample

sample counted prior to Rn-Th equilibrium

INITIAL FLOW + FINAL FLOW + 2 = AVERAGE FLOW

AVERAGE FLOW X TOTAL TIME = TOTAL VOLUME

VOLUME ft.³ X 2.83 X 10⁴ VOLUME IN ml

VOLUME L X 10³ = VOLUME IN ml

$\frac{(CPM - BKG)(4.5 \times 10^7 \mu Ci/dpm)}{(CEFF)(VOLUME IN ml)} = \mu Ci/ml$ 2" FILTER & 4" FILTER

$\frac{(CPM - BKG)(4.5 \times 10^7 Ci/dpm)(4)}{(CEFF)(VOLUME IN ml)} = \mu Ci/ml$ 4' CUT TO 2"

SAMPLE PUMP ID. No. RAS-1 Col. DATE Man Col. Cor. Man

1. AIR SAMPLE COLLECTION MINIMUM OF 3000 LITRES OR 106 Cu. Ft.

2. SAMPLE COUNT & BKG COUNT MINIMUM OF 50 MINUTES

3. ANALYSIS MINIMUM OF 24 HOURS AFTER COLLECTION

4. CALIBRATION CHECK

THORIUM 230 STANDARD ID. No. 11123
1 Min. COUNT DPM 15310
GROSS COUNTS (CPM) 7054

$\frac{CPM}{DPM} \times 100 = \% EFF$ EFFICIENCY = 46.07 %

ENERGY LABORATORIES, INC.
P.O. Box 3258 254 North Center
Casper, WY 82602 307 235-0515

RADIOLOGICAL SURVEY - URANIUM MINE SITES

AIR SAMPLING - LONG HALF LIFE RADIONUCLIDES

LOCATION: UNC Resources-Leuenberger

DATE: 8/12/85

SURVEYOR: RAG

SAMPLE LOCATION	COLLECTION						ANALYSIS							
	TIME		Total Time Minutes	FLOW RATE $\frac{\text{CFM}}{\text{LPM}}$		Total Volume in ML	COUNT TIME		TTL. CNT. Time Minutes	Gross Counts	CPM	BKG	Corrected Counts CPM-BKG	Activity $\mu\text{Ci/m}$
	From	To		Initial	Final		From	To						
1. North Pond berm	11:30	14:30	180	63	63	$\times 10^3$ 11,340	8/13 12:11	12:16	5	10	2	0	2	$\times 10^{-1}$ 1.8
2.														
3.														
4.														
5.														
6.														

☒ ROUTINE

☐ SPECIAL (If special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

pond decommissioning loading activities

sample counted prior to Rn-Th equilibrium

INITIAL FLOW + FINAL FLOW + 2 = AVERAGE FLOW

AVERAGE FLOW X TOTAL TIME = TOTAL VOLUME

VOLUME $11.3 \times 2.83 \times 10^4$ VOLUME IN ml

VOLUME $L \times 10^3$ = VOLUME IN ml

$\frac{(\text{CPM} - \text{BKG})(4.5 \times 10^7 \mu\text{Ci/dpm})}{(\alpha\text{EFF})(\text{VOLUME IN ml})} = \mu\text{Ci/ml}$ 2" FILTER & 4" FILTER

$\frac{(\text{CPM} - \text{BKG})(4.5 \times 10^7 \text{Ci/dpm})(4)}{(\alpha\text{EFF})(\text{VOLUME IN ml})} = \mu\text{Ci/ml}$ 4 CUT TO 2"

SAMPLE PUMP ID. No. RAS-1 Cal. DATE Man Cal. Cor. Man

1. AIR SAMPLE COLLECTION MINIMUM OF 3000 LITRES
OR 105 C.F.

2. SAMPLE COUNT & BKG COUNT MINIMUM OF 50
MINUTES

3. ANALYSIS MINIMUM OF 24 HOURS AFTER COLLECTION

4. CALIBRATION CHECK
THORIUM 230 STANDARD ID No. 11123
1 Min. COUNT DPM 15310
GROSS COUNTS (CPM) 6766

$\frac{\text{CPM}}{\text{DPM}} \times 100 = \% \text{ EFF}$ EFFICIENCY = 44.19 %

ENERGY LABORATORIES, INC.
P.O. Box 3258 254 North Center
Casper, WY 82602 307 235-0515

RADIOLOGICAL SURVEY - URANIUM MINE SITES

AIR SAMPLING - LONG HALF LIFE RADIONUCLIDES

LOCATION: UNC Resources-Leuenberger

DATE: 8/16/85

SURVEYOR: RRA

SAMPLE LOCATION	COLLECTION						ANALYSIS							
	TIME		Total Time Minutes	FLOW RATE Initial	CFM LPM Final	Total Volume In ML	COUNT TIME		TTL. CNT. Time Minutes	Gross Counts	CPM	BKG	Corrected Counts CPM-BKG	Activity μCi/ml
	From	To					From	To						
1. Leuenberger Plant east IX skid	09:15	10:45	90	70	60	5850×10^3	13:15	13:33	18	1442	80.1	21	59.1	1.01×10^{-1}
2.														
3.														
4.														
5.														
6.														

☒ ROUTINE

☐ SPECIAL (If special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

air sample in plant during clean out and moving of parts and equipment from plant and laboratory
area-material moved to Pilcher trailer on site.

sample counted prior to Rn-Th equilibrium

INITIAL FLOW + FINAL FLOW + 2 = AVERAGE FLOW

AVERAGE FLOW X TOTAL TIME = TOTAL VOLUME

VOLUME $11.3 \times 2.83 \times 10^4$ VOLUME IN ml

VOLUME L $\times 10^3$ = VOLUME IN ml

$(\text{CPM} - \text{BKG}) (4.5 \times 10^7 \mu\text{Ci/dpm}) = \mu\text{Ci/ml}$ 2" FILTER & 4" FILTER

$(\text{CPM} - \text{BKG}) (4.5 \times 10^7 \text{Ci/dpm}) (4) = \mu\text{Ci/ml}$ 4' CUT TO 2"

SAMPLE PUMP ID. No. RAS-1 Cal. DATE Man Cal. Cor. Man

1. AIR SAMPLE COLLECTION MINIMUM OF 3000 LITRES
OR 106 Cu. Ft.

2. SAMPLE COUNT & BKG COUNT MINIMUM OF 50
MINUTES

3. ANALYSIS MINIMUM OF 24 HOURS AFTER COLLECTION

4. CALIBRATION CHECK
THORIUM 230 STANDARD ID. No. 11123
1 Min. COUNT DPM 15310
GROSS COUNTS (CPM) 6887

CPM X 100 = % EFF EFFICIENCY = 44.98 %

ENERGY LABORATORIES, INC.

P.O. Box 3258 254 North Center

Casper, WY 82602 307 245-0515

RADIOLOGICAL SURVEY - URANIUM MINE SITES

AIR SAMPLING - LONG HALF LIFE RADIONUCLIDES

LOCATION: UNC Resources-LeuenbergerDATE: 8/20/85SURVEYOR: RRA

SAMPLE LOCATION	COLLECTION						ANALYSIS							
	TIME		Total Time Minutes	FLOW RATE		Total Volume in ML	COUNT TIME		TTL. CNT. Time Minutes	Gross Counts	CPM	BKG	Corrected Counts CPM-BKG	Activity $\mu\text{Ci/ml}$
	From	To		Initial	Final		From	To						
1. North Pond east downwind	13:47	15:27	90	60	60	5400 ₃ $\times 10^3$	8/20 15:30	15:38	8	3323	415	5	410	7.46×10^{-1}
2.							8/21 10:20	10:24	4	114	29	5	24	4.37×10^{-1}
3.														
4.														
5.														
6.														

☒ ROUTINE☐ SPECIAL (If special, indicate reason for initiation of survey below)☐ CORRECTIVE ACTION TAKENpond decommissioning-loading activitiesinitial sample counted prior to reaching equilibrium with short half lived daughters of Rn & Th

INITIAL FLOW + FINAL FLOW + 2 = AVERAGE FLOW

AVERAGE FLOW X TOTAL TIME = TOTAL VOLUME

VOLUME $11.3 \times 2.83 \times 10^4$ VOLUME IN mlVOLUME L $\times 10^3$ = VOLUME IN ml
$$\frac{(\text{CPM} - \text{BKG})(4.5 \times 10^7 \mu\text{Ci}/\text{dpm})}{(\alpha \text{EFF})(\text{VOLUME IN ml})} = \mu\text{Ci}/\text{ml} \quad 2'' \text{ FILTER \& 4'' FILTER}$$
$$\frac{(\text{CPM} - \text{BKG})(4.5 \times 10^7 \text{ Ci}/\text{dpm})(4)}{(\alpha \text{EFF})(\text{VOLUME IN ml})} = \mu\text{Ci}/\text{ml} \quad 4' \text{ CUT TO } 2''$$
SAMPLE PUMP ID. No. RAS-1 Cal. DATE man Cal. Cor. man1. AIR SAMPLE COLLECTION MINIMUM OF 3000 LITRES
OR 106 Cu. Ft.2. SAMPLE COUNT & BKG COUNT MINIMUM OF 50
MINUTES

3. ANALYSIS MINIMUM OF 24 HOURS AFTER COLLECTION

4. CALIBRATION CHECK

THORIUM 230 STANDARD

ID. No. 11123

1 Min. COUNT

DPM 15310GROSS COUNTS (CPM) 7011
$$\frac{\text{CPM}}{\text{DPM}} \times 100 = \% \text{ EFF} \quad \text{EFFICIENCY} = \underline{45.79} \%$$

ENERGY LABORATORIES, INC.
P.O. Box 3258 254 North Center
Casper, WY 82602 307 235-0515

RADIOLOGICAL SURVEY - URANIUM MINE SITES

AIR SAMPLING - LONG HALF LIFE RADIONUCLIDES

LOCATION: LEWISBURGER
DATE: 8/2/75
SURVEYOR: RAG

SAMPLE LOCATION	COLLECTION					ANALYSIS									
	TIME		Total Time Minutes	FLOW RATE		CFM LPM Final	Total Volume In ML	COUNT TIME		TTL. CNT. Time Minutes	Gross Counts	CPM	BKG	Corrected Counts CPM-BKG	Activity $\mu\text{Ci}/\text{ml}$
	From	To		Initial	Final			From	To						
1. ASV-6 BACK GROUND	12:14	13:00	54	6.5	6.5	3510 103	8/30 13:01	13:06	5	42	8.4	5	3.4	2.72 10-13	
2. PLANT - ELUTION AND STORAGE	08:40	10:05	85	6.5	6.5	5525 103	8/30 13:15	13:20	5	76	15.2	5	10.2	1.83 10-12	
3. WELFIELD - WRR-1 AREA	10:21	11:50	89	6.5	6.5	5785 103	8/30 13:20	13:25	5	67	11.4	5	6.4	1.11 10-12	
4.															
5.															
6.															

☐ ROUTINE ☐ SPECIAL (if special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

Action / Acceptable Level = 2.5×10^{-4}

INITIAL FLOW + FINAL FLOW + 2 = AVERAGE FLOW

AVERAGE FLOW X TOTAL TIME = TOTAL VOLUME

VOLUME $11.3 \times 2.83 \times 10^4$ VOLUME IN ml

VOLUME $L \times 10^3 =$ VOLUME IN ml

$(\text{CPM} - \text{BKG}) \left(\frac{4.5 \times 10^7 \mu\text{Ci}/\text{dpm}}{(\text{dLFF}) (\text{VOLUME IN ml})} \right) = \mu\text{Ci}/\text{m}^3$ 2" FILTER & 4" FILTER

$(\text{CPM} - \text{BKG}) \left(\frac{4.5 \times 10^7 \text{ CI}/\text{dpm}}{(\text{dLFF}) (\text{VOLUME IN ml})} \right) = \mu\text{Ci}/\text{m}^3$ 4" CUT TO 2"

SAMPLE PUMP ID. No. 845-1 Col. DATE 8/2/75 Col. Cor. STAD

1. AIR SAMPLE COLLECTION MINIMUM OF 3000 LITRES OR 106 CU. FT.

2. SAMPLE COUNT & BKG COUNT MINIMUM OF 50 MINUTES

3. ANALYSIS MINIMUM OF 24 HOURS AFTER COLLECTION

4. CALIBRATION CHECK THORIUM 230 STANDARD ID No. 1123
1 MIN. COUNT DPM 15310
GROSS COUNTS (CPM) 6865

CPM X 100 = % EFF EFFICIENCY = 44.24 %

ENERGY LABORATORIES, INC.
P.O. Box 3258 254 North Center
Casper, WY 82602 307 235-0515
RADIOLOGICAL SURVEY - URANIUM MINE SITES

LOCATION: LEWENBERGER SITE
DATE: 9/12/85
SURVEYOR: AGC/LSM/RRR

AIR SAMPLING - LONG HALF LIFE RADIONUCLIDES

SAMPLE LOCATION	COLLECTION					ANALYSIS								
	TIME		Total Time Minutes	FLOW RATE Gallons Per Minute	CFM (LPM) Final	Total Volume in ML	COUNT TIME		TTL. CNT. Time Minutes	Gross Counts	CPM	BKG	Corrected Counts CPM-BKG	Activity $\mu\text{Ci/ml}$
1. <i>WIND TOWER PLANT</i>	From	To					From	To						<i>2.87</i> <i>4</i> <i>10-12</i>
2. <i>Wind Tower Downwind</i>	From	To					From	To						<i>3.84</i> <i>4</i> <i>10-12</i>
3.														
4.														
5.														
6.														

☐ ROUTINE ☒ SPECIAL (If special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

Survey prior to moving plant process equipment

INITIAL FLOW + FINAL FLOW + 2: AVERAGE FLOW

AVERAGE FLOW X TOTAL TIME = TOTAL VOLUME

VOLUME $11.3 \times 2.83 \times 10^4$ VOLUME IN ml

VOLUME $L \times 10^3 =$ VOLUME IN ml

$(\text{CPM} - \text{BKG}) (4.5 \times 10^7 \mu\text{Ci/dpm}) = \mu\text{Ci/ml}$ 2" FILTER & 4" FILTER

$(\text{dEFF}) (\text{VOLUME IN ml})$

$(\text{CPM} - \text{BKG}) (4.5 \times 10^7 \text{ CI/dpm}) (4) = \mu\text{Ci/ml}$ 4" CUT TO 2"

$(\text{dEFF}) (\text{VOLUME IN ml})$

SAMPLE PUMP ID. No. 245-1 Cal. DATE 9/14/85 Cal. Cor. none

1. AIR SAMPLE COLLECTION MINIMUM OF 3000 LITRES OR 106 Cu. Ft.

2. SAMPLE COUNT & BKG COUNT MINIMUM OF 50 MINUTES

3. ANALYSIS MINIMUM OF 24 HOURS AFTER COLLECTION

4. CALIBRATION CHECK THORIUM 230 STANDARD ID. No. 11123
1 Min. COUNT OPM 15310
GROSS COUNTS (CPM) 7011

CPM X 100 = % EFF EFFICIENCY = 45.7%

ENERGY LABORATORIES, INC.
P.O. BOX 3258 254 North Center
Casper, WY 82602 307 235-0515
RADIOLOGICAL SURVEY - URANIUM MINE SITES

AIR SAMPLING - LONG HALF LIFE RADIONUCLIDES

LOCATION: Leadville, CO
DATE: 1/23/55
SURVEYOR: A.A.A.

SAMPLE LOCATION	COLLECTION				ANALYSIS					
	TIME	Flow Rate	CPM	Total Volume	COUNT TIME	Gross Counts	CPM	BKG	Corrected Count	Activity $\mu\text{Ci}/\text{ml}$
1. <u>Plant Building Entrance</u>	From To	l/min	CPM	ML	From To					
2. <u>SOIL SURFACE</u>	10:45 11:51	0.2	6.2	76.74	10:55 11:00	27	3.4	3	0.4	4.98
3.										15.14
4.										
5.										
6.										

☒ ROUTINE ☐ SPECIAL (if special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

As plant air sample while erect new collection tank shield out of building

INITIAL FLOW + FINAL FLOW ± 2 = AVERAGE FLOW

AVERAGE FLOW X TOTAL TIME = TOTAL VOLUME

VOLUME $\text{ft}^3 \times 2.83 \times 10^4$ = VOLUME IN ml

VOLUME L $\times 10^3$ = VOLUME IN ml

$(\text{CPM} - \text{BKG}) (4.5 \times 10^7 \frac{\mu\text{Ci}}{\text{dpm}}) = \mu\text{Ci}/\text{ml}$ 2" FILTER B 4" FILTER

$(\text{CEFF}) (\text{VOLUME IN ml})$

$(\text{CPM} - \text{BKG}) (4.5 \times 10^7 \frac{\text{CI}}{\text{dpm}}) (4) = \mu\text{Ci}/\text{ml}$ 4" CUT TO 2"

$(\text{CEFF}) (\text{VOLUME IN ml})$

SAMPLE PUMP ID. No. 345-1 Col. DATE 1/24/55 Col. Cor. 71.5A

1. AIR SAMPLE COLLECTION MINIMUM OF 3000 LITRES OR 106 Cu. Ft.

2. SAMPLE COUNT B BKG COUNT MINIMUM OF 50 MINUTES

3. ANALYSIS MINIMUM OF 24 HOURS AFTER COLLECTION

4. CALIBRATION CHECK

THORIUM 230 STANDARD

1 MIN. COUNT

GROSS COUNTS (CPM) 2020

$\frac{\text{CPM}}{\text{DPM}} \times 100 = \% \text{ EFF}$ EFFICIENCY = 45.20 %

ID No. 11122

DPM 15360

ENERGY LABORATORIES, INC.
P.O. Box 3258 254 North Center
Casper, WY 82602 307 235 0415

RADIOLOGICAL SURVEY - URANIUM MINE SITES
AIR SAMPLING - RADON DAUGHTERS

CLIENT: URS CORP.
LOCATION: LEADVILLE
DATE: 6/21/85
SURVEYOR: AMG

SAMPLE LOCATION	COLLECTION				ANALYSIS										
	TIME		Total Time Minutes	FLOW RATE LPM		Total Volume In Liter	COUNT TIME		TEL. CNT. Time Minutes	Gross Counts	CPM	BKG CPM	Corrected Counts CPM-BKG	% ADJ Fact	UNC. MAX AL
1. PLANT - ELECTRIC ROOM STAIRWAY	10:05	10:10	5	2.0	2.0	10	10:54	10:57	3	12 13	12	0	12	97	0.006
2. WELLFIELD - BACKSIDE	11:50	11:55	5	2.0	2.0	10	12:30	12:42	3	14 15	5	2	3	99	0.005
3. PLANT - BACKSIDE	13:00	13:15	5	2.0	2.0	10	13:58	14:04	3	11 21 16	16	5	11	99	0.005
4.															
5.															
6.															

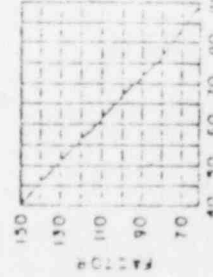
☐ ROUTINE ☒ SPECIAL (if special, indicate reason for initiation of survey below)

Radon - Filtered - 10 min

☐ CORRECTIVE ACTION TAKEN

$$\frac{C_2 - C_3}{2C_1 + (C_2 - C_3)} \times 100 = \% \text{ SELF-ABSORPTION}$$

C₁ = COUNTS FILTER FACE UP
C₂ = COUNTS FILTER BACKSIDE UP
C₃ = COUNTS FILTER FACE UP - COVERED



CORRECTED COUNTS (CPM-BKG)
(EFF) (100-EFF) ANS (ACTUAL VOLUME LITERS) = WL

1. AIR SAMPLE COLLECTION EXACTLY 5 MINUTES THROUGH 47mm. FILTER
2. ANALYSIS MINIMUM OF 40 MINUTES AFTER COLLECTION COUNT FOR 1 MINUTE
3. CALIBRATION CHECK
THORIUM 230 STANDARD
1 MINUTE COUNT
GROSS COUNTS (CPM) 4665 ID. No. 11123
DPM 13300

CPM x 100 = % EFF EFFICIENCY 44.54 %

SAMPLE PUMP ID. No. MSA-5 CAL DATE 6/26/85 CAL COR

RADIOLOGICAL SURVEY - URANIUM MINE SITES
AIR SAMPLING - RADON GAS

CLIENT: UNC RESOURCES
LOCATION: LEUBENBERGER
DATE: 8/27/85
SURVEYOR: R.A. GUBLING

SAMPLE LOCATION	Time of Collection	COUNT TIME		TTL. CNT. Time Minutes	Chamber Background CPM	Gross Counts	CPM	Corrected Counts CPM-BKG	Response Factor	Equilibrium Factor	MPC 3×10^{-8} $\mu\text{Ci}/\text{ml}$
		From	To								
1. PLANT- ELUTION 3ND STAIRWAY	10:10	12:50	13:00	10	1.0	68	6.8	5.8	3.560	1	1.63×10^{-9}
2. WEF - MR-1 AREA	11:55	14:08	14:18	10	1.4	41	4.1	2.7	3.601	1	1.5×10^{-10}
3. ADV-6 BACKGROUND	13:13	15:15	15:25	10	1.8	15	1.5	-	3.801	1	$< 3 \times 10^{-12}$
4.											
5.											
6.											

☐ ROUTINE ☒ SPECIAL (If special, indicate reason for initiation of survey below) ☐ CORRECTIVE ACTION TAKEN

RADON / THORIUM DAUGHTER DECAY TEST

RESPONSE FACTOR = 6.0×10^9 CPM per $\mu\text{Ci}/\text{ml}$ FOR CS-6
RESPONSE FACTOR = 2.4×10^9 CPM per $\mu\text{Ci}/\text{ml}$ FOR CS-5

MINUTES BETWEEN TRANSFER & COUNTING	5 to 10	11 to 20	21 to 50	51 to 80	81 to 119	120 to 300
FACTOR OF EQUILIBRIUM	0.5	0.6	0.7	0.8	0.9	1.0

CORRECTED COUNTS (CPM-BKG)
(EQUILIBRIUM FACTOR)(RESPONSE FACTOR) = $\mu\text{Ci}/\text{ml}$

1. AIR SAMPLE COLLECTION FOR RADON GAS 1 MINUTE OF FILTERED AIR DRAWN THROUGH CHAMBER CHAMBER VOLUME 0.52 LITERS

2. ANALYSIS 2-5 HOURS AFTER COLLECTION

3. CALIBRATION CHECK
THORIUM 230 STANDARD ID. No. 1123
1 MINUTE COUNT DPM 153.0
GROSS COUNTS (CPM) 68.5

$\frac{\text{CPM}}{\text{DPM}} \times 100 = \% \text{ EFF}$ EFFICIENCY 44.84 %

RADIOLOGICAL SURVEY - URANIUM MINE SITES
AIR SAMPLING - RADON GAS

CLIENT: UNC RESOURCES
LOCATION: LEWENBERGER PLANT
DATE: 7/29/85
SURVEYOR: R.A. GARLING

SAMPLE LOCATION		Time Of Collection	COUNT TIME		TTL. CNT. Time Minutes	Chamber Background CPM	Gross Counts	CPM	Corrected Counts CPM-BKG	Response Factor $\times 10^9$	Equilibrium Factor	MPC 3×10^8 $\mu\text{Ci}/\text{mi}$ $\mu\text{Ci}/\text{mi}$
			From	To								
1. SW PLANT CORNER ppt	A	15:37	18:12	18:22	10	0.9	13 12 (25)	2.5	1.6	3.560	1	4.49×10^{-10}
2. NW PLANT CORNER rec	B	15:40	18:23	18:33	10	0.7	5 46	4.6	3.9	3.601	1	1.08×10^{-9}
3. WC PLANT Sump PIT	C	15:43	18:34	18:44	10	0.6	284	28.4	27.8	3.801	1	7.31×10^{-7}
4. EC 1x SKID	D	15:46	18:45	18:55	10	0.5	22	2.2	1.7	3.681	1	4.62×10^{-10}
5. NE PLANT CORNER MAINT BENCH E	E	15:49	18:56	19:06	10	1.0	52	5.2	4.2	3.790	1	1.11×10^{-9}
6. SE PLANT CORNER BAY DOOR	F	15:52	19:07	19:17	10	1.0	20	2.0	1.0	3.777	1	2.64×10^{-10}

☒ ROUTINE

☐ SPECIAL (If special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

RESPONSE FACTOR = 6.0×10^9 CPM per $\mu\text{Ci}/\text{mi}$ FOR CS-6
RESPONSE FACTOR = 2.4×10^9 CPM per $\mu\text{Ci}/\text{mi}$ FOR CS-5

MINUTES BETWEEN TRANSFER & COUNTING	5 to 10	11 to 20	21 to 50	51 to 80	81 to 119	120 to 300
FACTOR OF EQUILIBRIUM	0.5	0.6	0.7	0.8	0.9	1.0

CORRECTED COUNTS (CPM-BKG)
(EQUILIBRIUM FACTOR)(RESPONSE FACTOR) = $\mu\text{Ci}/\text{mi}$

1. AIR SAMPLE COLLECTION FOR RADON GAS 1 MINUTE OF
FILTERED AIR DRAWN THROUGH CHAMBER
CHAMBER VOLUME 0.52 LITERS

2. ANALYSIS 2-5 HOURS AFTER COLLECTION

3. CALIBRATION CHECK
THORIUM 230 STANDARD ID. No. 75310 11123
1 MINUTE COUNT DPM 7054 15310
GROSS COUNTS (CPM) 7054

CPM
DPM $\times 100 = \% \text{ EFF}$ EFFICIENCY 0.4607 %

ENVIRONMENTAL SERVICES OF WYOMING
P.O. Box 3258 254 North Center
Casper, WY 82602 (307) 235-0515

RADIOLOGICAL SURVEY - URANIUM MINE SITES

AIR SAMPLING - RADON GAS

CLIENT: UNC MINING & MIDDY

LOCATION: Leavenworth

DATE: 8/21/85

SURVEYOR: RA61/SAG/PCA

SAMPLE LOCATION	Time of Collection	COUNT TIME	TTL CNT. Time	Chamber Background CPM	Gross Counts	CPM	Corrected Counts CPM-BKG	Response Factor $\times 10^{-9}$	Equilibrium Factor	WPC 3×10^{-8} $\mu\text{Ci}/\text{ml}$
1. <u>RECIP SKID / INK</u>	<u>11:56-11:59</u>	<u>15:15-15:25</u>	<u>10</u>	<u>0.6</u>	<u>143</u> <u>23</u>	<u>4.3</u>	<u>3.7</u>	<u>3.560</u>	<u>1</u>	<u>1.04</u> $\times 10^{-1}$ <u>1.04</u> <u>0.0104 WL</u>
2. <u>B RECOVERY TANK</u>	<u>12:00-12:03</u>	<u>16:26-16:36</u>	<u>10</u>	<u>0.4</u>	<u>21</u> <u>20</u>	<u>2.1</u>	<u>2.3</u>	<u>3.601</u>	<u>1</u>	<u>6.37</u> $\times 10^{-10}$ <u>6.4</u> <u>0.0064 WL</u>
3. <u>C Sump</u>	<u>12:04-12:06</u>	<u>15:38-15:48</u>	<u>10</u>	<u>0.8</u>	<u>24</u> <u>20</u>	<u>5.0</u>	<u>4.2</u>	<u>3.801</u>	<u>1</u>	<u>1.80</u> $\times 10^{-1}$ <u>1.10</u> <u>0.011 WL</u>
4. <u>D IX-TANK</u>	<u>12:08-12:11</u>	<u>15:54-16:04</u>	<u>10</u>	<u>1.0</u>	<u>12</u> <u>23</u>	<u>3.5</u>	<u>2.5</u>	<u>3.681</u>	<u>1</u>	<u>6.79</u> $\times 10^{-10}$ <u>6.8</u> <u>0.0068 WL</u>
5. <u>E WORK BENCH</u>	<u>12:12-12:15</u>	<u>16:07-16:17</u>	<u>10</u>	<u>0.8</u>	<u>44</u> <u>52</u>	<u>10.3</u>	<u>9.5</u>	<u>3.790</u>	<u>1</u>	<u>2.51</u> $\times 10^{-1}$ <u>2.5</u> <u>0.025 WL</u>
6. <u>F OVERHEAD DOOR AREA</u>	<u>12:17-12:20</u>	<u>16:20-16:30</u>	<u>10</u>	<u>0.6</u>	<u>19</u> <u>28</u>	<u>4.7</u>	<u>4.1</u>	<u>3.111</u>	<u>1</u>	<u>1.07</u> $\times 10^{-1}$ <u>1.1</u> <u>0.011 WL</u>

☒ ROUTINE ☐ SPECIAL (if special, indicate reason for initiation of survey below)

MONTHLY - RADON GAS

☐ CORRECTIVE ACTION TAKEN

$$\frac{\mu\text{Ci}}{\text{ml}} \times 10^6 \frac{\mu\text{Ci}}{\text{ml}} \times 10^3 \frac{\text{ml}}{\text{L}} = \frac{\mu\text{Ci}}{\text{ml}} \times 10^9 = \frac{\mu\text{Ci}}{\text{L}}$$

1. AIR SAMPLE COLLECTION FOR RADON GAS 1 MINUTE OF FILTERED AIR DRAWN THROUGH CHAMBER CHAMBER VOLUME 0.52 LITERS

2. ANALYSIS 2-5 HOURS AFTER COLLECTION

3. CALIBRATION CHECK
THORIUM 230 STANDARD
1 MINUTE COUNT
GROSS COUNTS (CPM) 4680
ID. No. 1123
DPM 15300

$\frac{\text{CPM}}{\text{DPM}} \times 100 = \% \text{ EFF}$ EFFICIENCY 44.99 %

RESPONSE FACTOR = 6.0×10^9 CPM per $\mu\text{Ci}/\text{ml}$ FOR CS-6
RESPONSE FACTOR = 2.4×10^9 CPM per $\mu\text{Ci}/\text{ml}$ FOR CS-5

MINUTES BETWEEN TRANSFER & COUNTING	7 10	11 15	21 16	31 16	81 16	120 16
	10	20	30	80	119	300
FACTOR OF EQUILIBRIUM	0.5	0.6	0.7	0.8	0.9	1.0

CORRECTED COUNTS (CPM-BKG)
(EQUILIBRIUM FACTOR)(RESPONSE FACTOR) = $\mu\text{Ci}/\text{ml}$

RADIOLOGICAL SURVEY - URANIUM MINE SITES
AIR SAMPLING - RADON GAS

CLIENT: ONE PERSONNEL
LOCATION: BEAVERCREEK
DATE: 7/2/68
SURVEYOR: Sam King

SAMPLE LOCATION	Time of Collection	COUNT TIME		TTL. CNT. Time Minutes	Chamber Background CPM	Gross Counts	CPM	Corrected Counts CPM-BKG	Response Factor $\times 10^9$	Equilibrium Factor	MPC 3×10^{-8} $\mu\text{Ci}/\text{ml}$
		From	To								
1. SW PLANT CORNER PRECIPITATION TANK	07:30	13:11	13:29	10	0.4	57	5.7	5.3	3.540	1	2.60×10^{-1}
2. NW PLANT CORNER RECOVERY TANK	07:34	13:30	13:40	10	0.5	34	3.4	2.9	3.601	1	7.44×10^{-10}
3. PLANT CENTER SWAMP PILE	07:37	13:41	13:51	10	0.3	63	6.3	6.0	3.861	1	1.66×10^{-1}
4. PLANT CENTER IX TANK	07:40	13:54	14:04	10	0.5	25	2.5	2.0	3.681	1	6.77×10^{-10}
5. NE PLANT CORNER MAINTENANCE AREA	07:43	14:05	14:15	10	0.1	36	3.6	2.9	3.790	1	7.50×10^{-10}
6. SE PLANT CORNER END DOOR	07:46	14:06	14:26	10	0.5	18	1.6	1.3	3.177	1	4.77×10^{-10}

☒ ROUTINE

☐ SPECIAL (If special, indicate reason for initiation of survey below)

☐ CORRECTIVE ACTION TAKEN

MONITORING ON 222 SURVEY

RESPONSE FACTOR = 6.0×10^9 CPM per $\mu\text{Ci}/\text{ml}$ FOR CS-6
RESPONSE FACTOR = 2.4×10^9 CPM per $\mu\text{Ci}/\text{ml}$ FOR CS-5

MINUTES BETWEEN TRANSFER & COUNTING	5 to 10	11 to 20	21 to 50	51 to 80	81 to 119	120 to 300
FACTOR OF EQUILIBRIUM	0.5	0.6	0.7	0.8	0.9	1.0

CORRECTED COUNTS (CPM-BKG)
(EQUILIBRIUM FACTOR)(RESPONSE FACTOR) = $\mu\text{Ci}/\text{ml}$

1. AIR SAMPLE COLLECTION FOR RADON GAS 1 MINUTE OF
FILTERED AIR DRAWN THROUGH CHAMBER
CHAMBER VOLUME 0.52 LITERS

2. ANALYSIS 2-5 HOURS AFTER COLLECTION

3. CALIBRATION CHECK
THORIUM 230 STANDARD ID. No. 11123
1 MINUTE COUNT DPM 12310
GROSS COUNTS (CPM) 7011

$\frac{\text{CPM}}{\text{DPM}} \times 100 = \% \text{ EFF}$ EFFICIENCY 45.77 %

ENERGY LABORATORIES, INC.
P.O. Box 1258 254 North Center
Casper, WY 82602 307 235-0515

RADIOLOGICAL SURVEY - URANIUM MINE SITES
AIR SAMPLING - RADON DAUGHTERS

CLIENT: ONE Resource
LOCATION: LEWIS & CLARK
DATE: 9/12/85
SURVEYOR: Sam/RAC

SAMPLE LOCATION	COLLECTION						ANALYSIS								
	TIME		Total Time Minutes	FLOW RATE LPM		Total Volume in Liters	COUNT TIME		FTL CNT Time Minutes	Gross Counts	CPM	BKG CPM	Corrected Counts CPM-BKG	Self Abs Fact	MPC-33 WL WL
1. <u>5th Plant Corner</u> <u>RECOVERY TANK</u>	10:03	10:08	5	2.0	2.0	10	10:52	10:54	2m	12	6	4	2	99	0.0031
2. <u>ELUTE WALL-UP</u> <u>INSIDE TANK</u>	10:10	10:15	5	2.0	2.0	10	11:00	11:02	2m	25	12.5	4	8.5	97	0.013
3. <u>INSIDE TANK</u> <u>LOW FLOW</u>	10:18	10:23	5	2.0	2.0	10	11:01	11:07	2m	188	94	4	90	97	0.140
4. <u>INSIDE BOTTOM FL.</u> <u>RECOVERY TANK</u>	10:24	10:31	5	2.0	2.0	10	11:15	11:17	2m	18032	9016	4	9012	99	14.06
5. <u>ROUND PIT</u>	10:34	10:39	5	2.0	2.0	10	11:23	11:25	2m	58	29	4	25	97	0.037
6. <u>Plant Corner</u>	09:50	10:27	11	4.5	4.2	514.5	11:27	11:29	2m	1105	552.5	4	548.5	97	0.0015

☐ ROUTINE

☒ SPECIAL (If special, indicate reason for initiation of survey below)

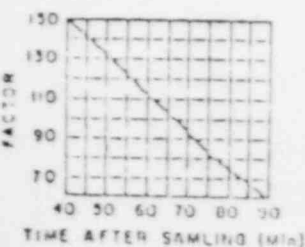
☐ CORRECTIVE ACTION TAKEN

Sample 2 Prior to Equipment Removal - Sample 3 Indicates Recovery Tank
Sample Remains Closed - No Access to Tank or Interiors Allowed per RSC -
Sample 6 Gross Flow Collected as Radon Daughters

$$\frac{C_2 - C_3}{2C_1 + (C_2 - C_3)} \times 100 = \% \text{ SELF-ABSORPTION}$$

C₁ = COUNTS FILTER FACE UP
C₂ = COUNTS FILTER BACKSIDE UP
C = COUNTS FILTER FACE UP COVERED

$$\frac{\text{CORRECTED COUNTS (CPM-BKG)}}{(\text{EFF}) (100 - \text{SELF ABS.}) (\text{FACTOR}) (\text{VOLUME LITERS})} = \text{WL}$$



- AIR SAMPLE COLLECTION EXACTLY 5 MINUTES THROUGH 47mm. FILTER
- ANALYSIS MINIMUM OF 40 MINUTES AFTER COLLECTION COUNT FOR 1 MINUTE
- CALIBRATION CHECK
THORIUM 230 STANDARD ID. No. 1123
1 MINUTE COUNT DPM 15370
GROSS COUNTS (CPM) 7011
 $\frac{\text{CPM}}{\text{DPM}} \times 100 = \% \text{ EFF}$ EFFICIENCY 45.77 %

SAMPLE PUMP ID. No. 1123-5 CAL DATE 9/12/85 CAL COR