

40-6659

00867

ENVIRONMENTAL SAMPLE DATA

2nd Quarter 1985

PETROTOMICS COMPANY
Shirley Basin, WY

8510180441 850829
PDR ADOCK 04006659
C PDR

1. STACK SAMPLES

Date collected: May 5, 1985
 Location: Yellowcake Dryer Stack
 Stack flow rate (m³/sec): 0.7495

<u>Radionuclide</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>RELEASE RATE (Ci/qr)</u>	<u>ERROR ESTIMATE (Ci/qr)</u>	<u>LLD (uCi/ml)</u>	<u>RESTRICTED %MPC</u>
U-nat	4.09 X 10 ⁻⁹	± 0.06 X 10 ⁻⁹	87.31 X 10 ⁻⁴	± 1.28 X 10 ⁻⁴	3 X 10 ⁻¹²	4,090
Th-230	3.09 X 10 ⁻¹²	± 1.66 X 10 ⁻¹²	6.60 X 10 ⁻⁶	± 3.54 X 10 ⁻⁶	6 X 10 ⁻¹³	154.5
Ra-226	1.06 X 10 ⁻¹²	± 1.03 X 10 ⁻¹²	2.26 X 10 ⁻⁶	± 2.20 X 10 ⁻⁶	2 X 10 ⁻¹²	3.5
Pb-210	7.1 X 10 ⁻¹²	± 4.3 X 10 ⁻¹²	15.16 X 10 ⁻⁶	± 9.18 X 10 ⁻⁶	7 X 10 ⁻¹²	7.1
Rn-222	6.4 X 10 ⁻⁹	± 0.7 X 10 ⁻⁹	136.62 X 10 ⁻⁴	± 14.94 X 10 ⁻⁴	4 X 10 ⁻¹⁰	21.3

Date collected: May 5, 1985
 Location: Packaging Room Scrubber Stack
 Stack flow rate (m³/sec): 0.2354

RADIONUCLIDE

U-nat	1.27 X 10 ⁻⁹	± 0.02 X 10 ⁻⁹	8.52 X 10 ⁻⁴	± 0.13 X 10 ⁻⁴	4 X 10 ⁻¹²	1,270
Th-230	2.53 X 10 ⁻¹²	± 1.03 X 10 ⁻¹²	1.70 X 10 ⁻⁶	± 0.69 X 10 ⁻⁶	5 X 10 ⁻¹³	126.5
Ra-226	1.02 X 10 ⁻¹²	± 1.26 X 10 ⁻¹²	0.68 X 10 ⁻⁶	± 0.84 X 10 ⁻⁶	2 X 10 ⁻¹²	3.4
Pb-210	1.3 X 10 ⁻¹³	± 63.0 X 10 ⁻¹³	0.09 X 10 ⁻⁶	± 4.22 X 10 ⁻⁶	4 X 10 ⁻¹²	1.3
Rn-222	3.1 X 10 ⁻⁹	± 0.5 X 10 ⁻⁹	20.79 X 10 ⁻⁴	± 3.35 X 10 ⁻⁴	4 X 10 ⁻¹⁰	10.3

1. STACK SAMPLES (CONTINUED)

Date collected: March 14, 1985
 Location: Cooler Exhaust Stack
 Stack flow rate (m³/sec): 0.2684

<u>Radionuclide</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>RELEASE RATE (Ci/gr)</u>	<u>ERROR ESTIMATE (Ci/gr)</u>	<u>LLD (uCi/ml)</u>	<u>RESTRICTED %MPC</u>
U-nat	4.11×10^{-11}	$\pm 0.27 \times 10^{-11}$	31.42×10^{-6}	$\pm 2.06 \times 10^{-6}$	3×10^{-13}	41.1
Th-230	6.83×10^{-12}	$\pm 1.12 \times 10^{-12}$	5.22×10^{-6}	$\pm 0.86 \times 10^{-6}$	8×10^{-13}	341.5
Ra-226	3.61×10^{-13}	$\pm 3.25 \times 10^{-13}$	0.28×10^{-6}	$\pm 0.25 \times 10^{-6}$	5×10^{-13}	1.2
Pb-210	1.60×10^{-13}	$\pm 26.3 \times 10^{-13}$	0.12×10^{-6}	$\pm 2.01 \times 10^{-6}$	4×10^{-12}	1.6
Rn-222	5.2×10^{-9}	$\pm 0.7 \times 10^{-9}$	39.76×10^{-4}	$\pm 5.35 \times 10^{-4}$	2×10^{-10}	17.3

2. AIR SAMPLES

Locations: Site 1 - 7800' WNW of yellowcake dryer stack.
 Site 2 - 500' S of yellowcake dryer stack.
 Site 3 - 3200' NE of yellowcake dryer stack.
 Site 4 - 11800' NNE of yellowcake dryer stack.
 Site 5 - 3000' ENE of yellowcake dryer stack.
 Site 6 - 11700' S of yellowcake dryer stack.

DATE COLLECTED:	<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> (uCi/ml)	<u>ERROR ESTIMATE</u> (uCi/ml)	<u>LLD</u> (uCi/ml)	<u>%MPC</u>
2nd Quarter 1985					
LOCATION: SITE 1	U-Nat	0.64×10^{-15}		1×10^{-16}	0.01
	Th-230	0.84×10^{-15}	$\pm 0.24 \times 10^{-15}$	1×10^{-16}	1.05
	Ra-226	0.08×10^{-15}	$\pm 0.05 \times 10^{-15}$	1×10^{-16}	0.003
	Pb-210	1.31×10^{-14}	$\pm 0.03 \times 10^{-14}$	1×10^{-15}	0.33
	Rn-222	2.59×10^{-9}	$\pm 0.16 \times 10^{-9}$	0.2×10^{-9}	86.33

DATE COLLECTED:	<u>RADIONUCLIDE</u>				
2nd Quarter 1985					
LOCATION: SITE 2	U-Nat	19.8×10^{-15}		1×10^{-16}	0.40
	Th-230	9.2×10^{-15}	$\pm 0.80 \times 10^{-15}$	1×10^{-16}	11.5
	Ra-226	2.80×10^{-15}	$\pm 0.30 \times 10^{-15}$	1×10^{-16}	0.09
	Pb-210	1.74×10^{-14}	$\pm 0.40 \times 10^{-14}$	1×10^{-15}	0.43
	Rn-222	2.41×10^{-9}	$\pm 0.15 \times 10^{-9}$	0.2×10^{-9}	80.33

2. AIR SAMPLES (CONTINUED)

DATE COLLECTED: 2nd Quarter 1985	RADIONUCLIDE	CONCENTRATION (uCi/ml)	ERROR ESTIMATE (uCi/ml)	LLD (uCi/ml)	MPC
LOCATION: SITE 3	U-Nat	3.48×10^{-15}		1×10^{-16}	0.07
	Th-230	6.60×10^{-15}	$\pm 0.60 \times 10^{-15}$	1×10^{-16}	8.20
	Ra-226	5.10×10^{-15}	$\pm 0.30 \times 10^{-15}$	1×10^{-16}	0.17
	Pb-210	1.58×10^{-14}	$\pm 0.03 \times 10^{-14}$	1×10^{-15}	0.33
	Rn-222	1.51×10^{-9}	$\pm 0.12 \times 10^{-9}$	0.2×10^{-9}	50.33
DATE COLLECTED: 2nd Quarter 1985	RADIONUCLIDE				
LOCATION: SITE 4	U-Nat	1.57×10^{-15}		1×10^{-16}	0.03
	Th-230	5.70×10^{-15}	$\pm 0.60 \times 10^{-15}$	1×10^{-16}	7.10
	Ra-226	0.22×10^{-15}	$\pm 0.08 \times 10^{-15}$	1×10^{-16}	0.007
	Pb-210	1.50×10^{-14}	$\pm 0.30 \times 10^{-14}$	1×10^{-15}	0.37
	Rn-222	1.61×10^{-9}	$\pm 0.12 \times 10^{-9}$	0.2×10^{-9}	53.67
DATE COLLECTED: 2nd Quarter 1985	RADIONUCLIDE				
LOCATION: SITE 5	U-Nat	13.9×10^{-15}		1×10^{-16}	0.28
	Th-230	6.10×10^{-15}	$\pm 0.60 \times 10^{-15}$	1×10^{-16}	7.60
	Ra-226	6.60×10^{-15}	$\pm 0.30 \times 10^{-15}$	1×10^{-16}	0.22
	Pb-210	1.98×10^{-14}	$\pm 0.03 \times 10^{-14}$	1×10^{-15}	0.49
	Rn-222	1.59×10^{-9}	$\pm 0.12 \times 10^{-9}$	0.2×10^{-9}	53.00

2. AIR SAMPLES (CONTINUED)

DATE COLLECTED: 2nd Quarter 1985	<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> <u>(uCi/ml)</u>	<u>ERROR ESTIMATE</u> <u>(uCi/ml)</u>	<u>LLD</u> <u>(uCi/ml)</u>	<u>%MPC</u>
LOCATION: SITE 6	U-Nat	0.33×10^{-15}		1×10^{-16}	0.01
	Th-230	0.09×10^{-15}	$\pm 0.06 \times 10^{-15}$	1×10^{-16}	0.11
	Ra-226	0.15×10^{-15}	$\pm 0.07 \times 10^{-15}$	1×10^{-16}	0.005
	Pb-210	0.59×10^{-14}	$\pm 0.03 \times 10^{-14}$	1×10^{-15}	0.15
	Rn-222	1.09×10^{-9}	$\pm 0.10 \times 10^{-9}$	0.2×10^{-9}	36.33

3. LIQUID SAMPLES

The following water samples were not collected for this quarter for the stated reason.

<u>LOCATION</u>	<u>TYPE OF SAMPLE</u>	<u>REASON</u>
1. RTH 2	GROUNDWATER	DRY WELL
2. RTH 3	GROUNDWATER	DRY WELL

3. LIQUID SAMPLES

Date collected: April 15, 1985
 Location: Mill Feed Pond
 Type of sample: Surface - Grab

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>LLD (uCi/ml)</u>
U-nat (Dissolved)	33.6 X 10 ⁻⁹		
U-nat (Suspended)	3.9 X 10 ⁻⁹		
Th-230 (Dissolved)	0.10 X 10 ⁻⁹	± 0.20 X 10 ⁻⁹	0.20 X 10 ⁻⁹
Th-230 (Suspended)	0.10 X 10 ⁻⁹	± 0.20 X 10 ⁻⁹	0.20 X 10 ⁻⁹
Ra-226 (Dissolved)	5.82 X 10 ⁻⁹	± 0.42 X 10 ⁻⁹	0.21 X 10 ⁻⁹
Ra-226 (Suspended)	0.64 X 10 ⁻⁹	± 0.38 X 10 ⁻⁹	0.65 X 10 ⁻⁹
Pb-210 (Dissolved)	0.4 X 10 ⁻⁹	± 1.9 X 10 ⁻⁹	3.3 X 10 ⁻⁹
Pb-210 (Suspended)	1.0 X 10 ⁻⁹	± 0.5 X 10 ⁻⁹	0.8 X 10 ⁻⁹
Po-210 (Dissolved)	0.3 X 10 ⁻⁹	± 0.3 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Po-210 (Suspended)	0.5 X 10 ⁻⁹	± 0.3 X 10 ⁻⁹	0.2 X 10 ⁻⁹

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: MILL FEED POND

SAMPLE NO.: 16631

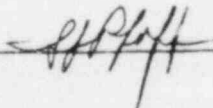
DATE: 4-15-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>0.07</u>	Manganese	<u>0.02</u>
Bicarbonate	<u>215</u>	Nickel	<u>ND(0.01)</u>
Calcium	<u>9</u>	Nitrate	<u>2.04</u>
Carbon (Organic).....	<u>NR</u>	Potassium	<u>2.0</u>
Carbonate	<u>0</u>	Sodium	<u>107</u>
Chloride	<u>2</u>	Sulfate	<u>260</u>
Copper	<u>.01</u>	Total Dissolved Solids	<u>438</u>
Fluoride	<u><0.1</u>	Total Suspended Solids	<u>20</u>
Hardness	<u>100</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>ND(0.05)</u>	Zinc	<u>ND(0.005)</u>
Lead	<u>ND(0.05)</u>	U-Nat (µg/l)	<u>font</u>
Magnesium	<u>9.0</u>	pH (Units)	<u>7.68</u>

COMMENTS: Born = ND(0.1)

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: 

Date: 7-25-85

ps:4/17/85

3. LIQUID SAMPLES

Date collected: April 15, 1985
 Location: Sand Draw
 Type of sample: Surface - Grab

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>LLD (uCi/ml)</u>
U-nat (Dissolved)	21.30 X 10 ⁻⁹		
U-nat (Suspended)	1.94 X 10 ⁻⁹		
Th-230 (Dissolved)	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.1 X 10 ⁻⁹
Th-230 (Suspended)	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Ra-226 (Dissolved)	0.69 X 10 ⁻⁹	± 0.20 X 10 ⁻⁹	0.3 X 10 ⁻⁹
Ra-226 (Suspended)	0.46 X 10 ⁻⁹	± 0.25 X 10 ⁻⁹	0.3 X 10 ⁻⁹
Pb-210 (Dissolved)	0.8 X 10 ⁻⁹	± 1.0 X 10 ⁻⁹	1.7 X 10 ⁻⁹
Pb-210 (Suspended)	0.3 X 10 ⁻⁹	± 0.5 X 10 ⁻⁹	0.8 X 10 ⁻⁹
Po-210 (Dissolved)	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Po-210 (Suspended)	1.2 X 10 ⁻⁹	± 0.5 X 10 ⁻⁹	0.4 X 10 ⁻⁹

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: SAND DRAW

SAMPLE NO.: 16632

DATE: 4-15-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>ND(0.05)</u>	Manganese	<u>0.03</u>
Bicarbonate	<u>115</u>	Nickel	<u>ND(0.01)</u>
Calcium	<u>39</u>	Nitrate	<u>0.03</u>
Carbon (Organic).....	<u>NR</u>	Potassium	<u>9.0</u>
Carbonate	<u>0</u>	Sodium	<u>100</u>
Chloride	<u>2</u>	Sulfate	<u>209</u>
Copper	<u>01</u>	Total Dissolved Solids	<u>392</u>
Fluoride	<u>40.1</u>	Total Suspended Solids	<u>1.4</u>
Hardness	<u>280</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>NR(0.05)</u>	Zinc	<u>0.011</u>
Lead	<u>ND(0.05)</u>	U-Nat (ug/l)	<u>first</u>
Magnesium	<u>22.6</u>	pH (Units)	<u>7.39</u>

COMMENTS: Boron: 0.4 mg/l

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: MPH

Date: 7-23-85

ps:4/17/85

3. LIQUID SAMPLES

Date collected: April 16, 1985
 Location: Little Medicine Bow River
 Type of sample: Surface - Grab

<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> <u>(uCi/ml)</u>	<u>ERROR ESTIMATE</u> <u>(uCi/ml)</u>	<u>LLD</u> <u>(uCi/ml)</u>
U-nat (Dissolved)	8.7 X 10 ⁻⁹		
U-nat (Suspended)	6.8 X 10 ⁻⁹		
Th-230 (Dissolved)	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Th-230 (Suspended)	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Ra-226 (Dissolved)	0.39 X 10 ⁻⁹	± 0.14 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Ra-226 (Suspended)	0.11 X 10 ⁻⁹	± 0.25 X 10 ⁻⁹	0.5 X 10 ⁻⁹
Pb-210 (Dissolved)	0.0 X 10 ⁻⁹	± 1.0 X 10 ⁻⁹	1.7 X 10 ⁻⁹
Pb-210 (Suspended)	0.9 X 10 ⁻⁹	± 0.5 X 10 ⁻⁹	0.8 X 10 ⁻⁹
Po-210 (Dissolved)	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Po-210 (Suspended)	1.6 X 10 ⁻⁹	± 0.5 X 10 ⁻⁹	0.2 X 10 ⁻⁹

3. LIQUID SAMPLES

Date collected: April 16, 1985
 Location: Little Medicine Bow River - Above
 Type of sample: Surface - Grab

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>LLD (uCi/ml)</u>
U-nat (Dissolved)	10.65×10^{-9}		
U-nat (Suspended)	4.36×10^{-9}		
Th-230 (Dissolved)	0.10×10^{-9}	$\pm 0.10 \times 10^{-9}$	0.1×10^{-9}
Th-230 (Suspended)	0.20×10^{-9}	$\pm 0.20 \times 10^{-9}$	0.2×10^{-9}
Ra-226 (Dissolved)	QNS		
Ra-226 (Suspended)	1.34×10^{-9}	$\pm 0.18 \times 10^{-9}$	0.01×10^{-9}
Pb-210 (Dissolved)	0.0×10^{-9}	$\pm 1.0 \times 10^{-9}$	1.7×10^{-9}
Pb-210 (Suspended)	0.7×10^{-9}	$\pm 0.5 \times 10^{-9}$	0.8×10^{-9}
Po-210 (Dissolved)	0.1×10^{-9}	$\pm 0.2 \times 10^{-9}$	0.2×10^{-9}
Po-210 (Suspended)	0.5×10^{-9}	$\pm 0.3 \times 10^{-9}$	0.2×10^{-9}

3. LIQUID SAMPLES

Date collected: April 16, 1985
 Location: Little Medicine Bow River - Below
 Type of sample: Surface - Grab

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>LLD (uCi/ml)</u>
U-nat (Dissolved)	3.87×10^{-9}		
U-nat (Suspended)	1.94×10^{-9}		
Th-230 (Dissolved)	0.1×10^{-9}	$\pm 0.2 \times 10^{-9}$	0.2×10^{-9}
Th-230 (Suspended)	0.2×10^{-9}	$\pm 0.2 \times 10^{-9}$	0.2×10^{-9}
Ra-226 (Dissolved)	QNS		
Ra-226 (Suspended)	0.20×10^{-9}	$\pm 0.22 \times 10^{-9}$	0.45×10^{-9}
Pb-210 (Dissolved)	0.5×10^{-9}	$\pm 1.0 \times 10^{-9}$	1.7×10^{-9}
Pb-210 (Suspended)	0.7×10^{-9}	$\pm 0.5 \times 10^{-9}$	0.8×10^{-9}
Po-210 (Dissolved)	0.1×10^{-9}	$\pm 0.2 \times 10^{-9}$	0.2×10^{-9}
Po-210 (Suspended)	0.1×10^{-9}	$\pm 0.3 \times 10^{-9}$	0.2×10^{-9}

3. LIQUID SAMPLES

Date collected: April 16, 1985
Location: Mine Shop Well
Type of sample: Groundwater - Pumped

<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> <u>(uCi/ml)</u>	<u>ERROR ESTIMATE</u> <u>(uCi/ml)</u>	<u>LID</u> <u>(uCi/ml)</u>
U-nat (Dissolved)	5.8 X 10 ⁻⁹		
U-nat (Suspended)	0.0 X 10 ⁻⁹		
Th-230 (Dissolved)	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Th-230 (Suspended)	0.2 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Ra-226 (Dissolved)	0.31 X 10 ⁻⁹	± 0.14 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Ra-226 (Suspended)	0.19 X 10 ⁻⁹	± 0.28 X 10 ⁻⁹	0.6 X 10 ⁻⁹
Pb-210 (Dissolved)	0.3 X 10 ⁻⁹	± 1.0 X 10 ⁻⁹	1.7 X 10 ⁻⁹
Pb-210 (Suspended)	0.1 X 10 ⁻⁹	± 0.4 X 10 ⁻⁹	0.8 X 10 ⁻⁹
Po-210 (Dissolved)	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Po-210 (Suspended)	0.2 X 10 ⁻⁹	± 0.3 X 10 ⁻⁹	0.2 X 10 ⁻⁹

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: MINE SHOP WELL

SAMPLE NO.: 16636

DATE: 4-16-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>ND(0.05)</u>	Manganese	<u>0.02</u>
Bicarbonate	<u>183</u>	Nickel	<u>ND(0.01)</u>
Calcium	<u>8</u>	Nitrate	<u>0.08</u>
Carbon (Organic).....	<u>ND(0.1)</u>	Potassium	<u>6.0</u>
Carbonate	<u>0</u>	Sodium	<u>193</u>
Chloride	<u>4</u>	Sulfate	<u>290</u>
Copper	<u>0.05</u>	Total Dissolved Solids	<u>554</u>
Fluoride	<u>40.1</u>	Total Suspended Solids	<u>0.7</u>
Hardness	<u>100</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>0.06</u>	Zinc	<u>0.016</u>
Lead	<u>0.02</u>	U-Nat (µg/l)	<u>first</u>
Magnesium	<u>14.2</u>	pH (Units)	<u>7.54</u>

COMMENTS: Boron = 2.4 mg/l
As = ND (0.005) "
Se = ND (0.002) "
Mo = ND (0.05) mg/l

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: [Signature]

Date: 7-23-85

ps:4/17/85

3. LIQUID SAMPLES (CONTINUED)

Date collected: April 15, 1985
 Location: Well RTH-1
 Type of sample: Groundwater - Bailed

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>LLD (uCi/ml)</u>
U-nat	25.2 X 10 ⁻⁹		
Th-230	0.2 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.1 X 10 ⁻⁹
Ra-226	2.23 X 10 ⁻⁹	± 0.26 X 10 ⁻⁹	0.1 X 10 ⁻⁹
Pb-210	1.7 X 10 ⁻⁹	± 1.0 X 10 ⁻⁹	1.6 X 10 ⁻⁹
Po-210	0.3 X 10 ⁻⁹	± 0.3 X 10 ⁻⁹	0.2 X 10 ⁻⁹

Date collected: April 15, 1985
 Location: Well RTH-4
 Type of sample: Groundwater - Bailed

<u>RADIONUCLIDE</u>			
U-nat	6.5 X 10 ⁻⁹		
Th-230	0.1 X 10 ⁻⁹	± 0.1 X 10 ⁻⁹	0.1 X 10 ⁻⁹
Ra-226	1.27 X 10 ⁻⁹	± 0.20 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Pb-210	0.0 X 10 ⁻⁹	± 0.9 X 10 ⁻⁹	1.6 X 10 ⁻⁹
Po-210	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: R+h-1

SAMPLE NO.: 16625

DATE: 4-15-85

	mg/l		mg/l
Ammonia	<u>0.73</u>	Manganese	<u>2.3</u>
Bicarbonate	<u>188</u>	Nickel	<u>0.07</u>
Calcium	<u>270</u>	Nitrate	<u>0.12</u>
Carbon (Organic).....	<u>ND(0.1)</u>	Potassium	<u>20.0</u>
Carbonate	<u>0</u>	Sodium	<u>57</u>
Chloride	<u>505</u>	Sulfate	<u>1240</u>
Copper	<u>ND(0.01)</u>	Total Dissolved Solids	<u>2790</u>
Fluoride	<u><0.1</u>	Total Suspended Solids	<u>216</u>
Hardness	<u>2040</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>0.09</u>	Zinc	<u>0.037</u>
Lead	<u>0.11</u>	U-Nat (µg/l)	<u>font</u>
Magnesium	<u>63.0</u>	pH (Units)	<u>6.86</u>

COMMENTS: Boron = ND(0.1)
As = ND(0.002) mg/l
Se = ND(0.002) mg/l
Mn = ND(0.05) mg/l

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: SPH

Date: 7-23-85

ps: 4/17/85

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: RTH 4

SAMPLE NO.: 16626

DATE: 4-16-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>NR</u>	Manganese	<u>0.66</u>
Bicarbonate	<u>81</u>	Nickel	<u>NR</u>
Calcium	<u>NR</u>	Nitrate	<u>0.24</u>
Carbon (Organic).....	<u>ND(0.1)</u>	Potassium	<u>NR</u>
Carbonate	<u>0</u>	Sodium	<u>22</u>
Chloride	<u>4</u>	Sulfate	<u>405</u>
Copper	<u>0.01</u>	Total Dissolved Solids	<u>642</u>
Fluoride	<u>NR</u>	Total Suspended Solids	<u>608</u>
Hardness	<u>440</u>	Vanadium	<u>NR</u>
Iron	<u>0.06</u>	Zinc	<u>NR</u>
Lead	<u>ND(0.05)</u>	U-Nat (µg/l)	<u>front</u>
Magnesium	<u>NR</u>	pH (Units)	<u>7.21</u>

COMMENTS: As = ND (0.002) mg/l

Se = ND (0.002) "

Mo = 0.14 mg/l

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: [Signature]

Date: 7-23-85

ps:4/17/85

3. LIQUID SAMPLES (CONTINUED)

Date collected: April 17, 1985
 Location: Well RTH-5
 Type of sample: Groundwater - Grab

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>LLD (uCi/ml)</u>
U-nat	5.8 X 10 ⁻⁹		
Th-230	0.1 X 10 ⁻⁹	± 0.1 X 10 ⁻⁹	0.1 X 10 ⁻⁹
Ra-226	1.41 X 10 ⁻⁹	± 0.21 X 10 ⁻⁹	0.1 X 10 ⁻⁹
Pb-210	1.4 X 10 ⁻⁹	± 1.0 X 10 ⁻⁹	1.6 X 10 ⁻⁹
Po-210	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹

Date collected: April 17, 1985
 Location: Townsite
 Type of sample: Groundwater - Pumped

<u>RADIONUCLIDE</u>			
U-nat	4.8 X 10 ⁻⁹		
Th-230	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.1 X 10 ⁻⁹
Ra-226	0.35 X 10 ⁻⁹	± 0.13 X 10 ⁻⁹	0.2 X 10 ⁻⁹
Pb-210	0.0 X 10 ⁻⁹	± 0.9 X 10 ⁻⁹	1.6 X 10 ⁻⁹
Po-210	0.1 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.2 X 10 ⁻⁹

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: RTH 5

SAMPLE NO.: 16627

DATE: 4-17-85

	mg/l		mg/l
Ammonia	<u>NR</u>	Manganese	<u>0.02</u>
Bicarbonate	<u>195</u>	Nickel	<u>NR</u>
Calcium	<u>NR</u>	Nitrate	<u>0.08</u>
Carbon (Organic).....	<u>ND(0.1)</u>	Potassium	<u>NR</u>
Carbonate	<u>0</u>	Sodium	<u>14</u>
Chloride	<u>4</u>	Sulfate	<u>290</u>
Copper	<u>ND(0.01)</u>	Total Dissolved Solids	<u>560</u>
Fluoride	<u>NR</u>	Total Suspended Solids	<u>32,843</u>
Hardness	<u>420</u>	Vanadium	<u>NR</u>
Iron	<u>0.08</u>	Zinc	<u>NR</u>
Lead	<u>ND(0.05)</u>	U-Nat (µg/l)	<u> </u>
Magnesium	<u>NR</u>	pH (Units)	<u>7.13</u>

COMMENTS: As = ND(0.002) mg/l
Se = ND(0.002) mg/l
Mo = ND(0.05) mg/l

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: [Signature]

Date: 7-23-85

ps:4/17/85

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: TOWNSITE

SAMPLE NO.: 16628

DATE: 4-17-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>NR</u>	Manganese	<u>NR</u>
Bicarbonate	<u>124</u>	Nickel	<u>NR</u>
Calcium	<u>NR</u>	Nitrate	<u>0.02</u>
Carbon (Organic).....	<u>ND(0.1)</u>	Potassium	<u>NR</u>
Carbonate	<u>0</u>	Sodium	<u>163</u>
Chloride	<u>10</u>	Sulfate	<u>178</u>
Copper	<u>ND(0.01)</u>	Total Dissolved Solids	<u>370</u>
Fluoride	<u>NR</u>	Total Suspended Solids	<u>1.4</u>
Hardness	<u>240</u>	Vanadium	<u>NR</u>
Iron	<u>0.08</u>	Zinc	<u>NR</u>
Lead	<u>ND(0.05)</u>	U-Nat (µg/l)	<u>Just</u>
Magnesium	<u>NR</u>	pH (Units)	<u>7.34</u>

COMMENTS: as = ND(0.002) mg/l

se = ND(0.002) "

mo = 0.21 mg/l

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: [Signature]

Date: 7-23-85

3. LIQUID SAMPLES (CONTINUED)

Date collected: April 17, 1985
 Location: Well 1-AC
 Type of sample: Groundwater - Bailed

<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> <u>(uCi/ml)</u>	<u>ERROR ESTIMATE</u> <u>(uCi/ml)</u>	<u>LLD</u> <u>(uCi/ml)</u>
U-nat	106.5 X 10 ⁻⁹		
Ra-226	1.31 X 10 ⁻⁹	± 0.21 X 10 ⁻⁹	0.1 X 10 ⁻⁹

Date collected: April 15, 1985
 Location: Collection Well
 Type of sample: Groundwater - Pumped

<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> <u>(uCi/ml)</u>	<u>ERROR ESTIMATE</u> <u>(uCi/ml)</u>	<u>LLD</u> <u>(uCi/ml)</u>
U-nat	44.1 X 10 ⁻⁹		
Ra-226	0.3 X 10 ⁻⁹	± 0.2 X 10 ⁻⁹	0.4 X 10 ⁻⁹

Date collected: April 15, 1985
 Location: Well 3-SC
 Type of sample: Groundwater - Bailed

<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> <u>(uCi/ml)</u>	<u>ERROR ESTIMATE</u> <u>(uCi/ml)</u>	<u>LLD</u> <u>(uCi/ml)</u>
U-nat	78.4 X 10 ⁻⁹		
Ra-226	4.06 X 10 ⁻⁹	± 0.36 X 10 ⁻⁹	0.2 X 10 ⁻⁹

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: 1-AC

SAMPLE NO.: 16637

DATE: 4-17-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>0.90</u>	Manganese	<u>16.18</u>
Bicarbonate	<u>0</u>	Nickel	<u>0.54</u>
Calcium	<u>270</u>	Nitrate	<u>0.17</u>
Carbon (Organic).....	<u>LR</u>	Potassium	<u>9.0</u>
Carbonate	<u>0</u>	Sodium	<u>28</u>
Chloride	<u>8</u>	Sulfate	<u>1750</u>
Copper	<u>0.04</u>	Total Dissolved Solids	<u>2178</u>
Fluoride	<u>0.43</u>	Total Suspended Solids	<u>743</u>
Hardness	<u>1320</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>0.60</u>	Zinc	<u>0.239</u>
Lead	<u>0.22</u>	U-Nat (ug/l)	<u>157.30</u>
Magnesium	<u>120.6</u>	pH (Units)	<u>3.90</u>

COMMENTS: Boron = ND(0.1)

$Ra_{226} = 1.31 \pm .21 \text{ pci/l}$ $9.7 \times 10^{-11} \text{ LLD}$

$U\text{-nat} = 106.5 \text{ } \mu\text{Ci/ml} \times 10^{-9}$

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: GRoff

Date: 7-23-85

ps:4/17/85

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: collection Well

SAMPLE NO.: 16642

DATE: 4-15-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>308.37</u>	Manganese	<u>186.6</u>
Bicarbonate	<u>0</u>	Nickel	<u>3.4</u>
Calcium	<u>13</u>	Nitrate	<u>0.76</u>
Carbon (Organic).....	<u>NR</u>	Potassium	<u>9</u>
Carbonate	<u>0</u>	Sodium	<u>341</u>
Chloride	<u>585</u>	Sulfate	<u>17,600</u>
Copper	<u>1.53</u>	Total Dissolved Solids	<u>24,706</u>
Fluoride	<u><0.1</u>	Total Suspended Solids	<u>260</u>
Hardness	<u>5000</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>81.0</u>	Zinc	<u>9.1</u>
Lead	<u>0.5</u>	U-Nat (µg/l)	<u>65.07</u>
Magnesium	<u>78.5</u>	pH (Units)	<u>2.7</u>

COMMENTS: Boron = ND (0.1) mg/l
Ra-226 = 0.3 ± 0.2 pCi/l LLD = 0.4 pCi/l
U nat = 44.1 × 10⁻⁴ µCi/ml

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: [Signature]

Date: 7-23-85

ps:4/17/85

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - LEQ

WATER

SAMPLE SITE: 3-SC

SAMPLE NO.: 16640

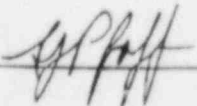
DATE: 4-15-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>12.45</u>	Manganese	<u>67.72</u>
Bicarbonate	<u>27</u>	Nickel	<u>1.33</u>
Calcium	<u>250</u>	Nitrate	<u>15.0</u>
Carbon (Organic).....	<u>NR</u>	Potassium	<u>50.0</u>
Carbonate	<u>0</u>	Sodium	<u>441</u>
Chloride	<u>420</u>	Sulfate	<u>4480</u>
Copper	<u>0.07</u>	Total Dissolved Solids	<u>6326</u>
Fluoride	<u>1.03</u>	Total Suspended Solids	<u>1106</u>
Hardness	<u>6200</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>0.12</u>	Zinc	<u>0.167</u>
Lead	<u>0.22</u>	U-Nat (ug/l)	<u>115.83</u>
Magnesium	<u>210</u>	pH (Units)	<u>6.8</u>

COMMENTS: Boron = 0.3 mg/l
Radium = $4.06 \pm .36$ pCi/l 2.0×10^{-10} LD
U-nat = 78.4×10^{-9} μ Ci/ml

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: 

Date: 7-23-85

ps:4/17/85

3. LIQUID SAMPLES (CONTINUED)

Date collected: April 15, 1985
 Location: Well 4-SC
 Type of sample: Groundwater - Bailed

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/ml)</u>	<u>ERROR ESTIMATE (uCi/ml)</u>	<u>LLD (uCi/ml)</u>
U-nat	10.6 X 10 ⁻⁹		
Ra-226	15.37 X 10 ⁻⁹	± 0.69 X 10 ⁻⁹	0.16 X 10 ⁻⁹

Date collected: April 15, 1985
 Location: Well 40-SC
 Type of sample: Groundwater - Bailed

<u>RADIONUCLIDE</u>			
U-nat	3.9 X 10 ⁻⁹		
Ra-226	0.31 X 10 ⁻⁹	± 0.13 X 10 ⁻⁹	0.19 X 10 ⁻⁹

Date collected: April 15, 1985
 Location: Well 41-SC
 Type of sample: Groundwater - Bailed

<u>RADIONUCLIDE</u>			
U-nat	66.7 X 10 ⁻⁹		
Ra-226	0.89 X 10 ⁻⁹	± 0.17 X 10 ⁻⁹	0.15 X 10 ⁻⁹

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ WATER

SAMPLE SITE: 4-5C

SAMPLE NO.: 16641

DATE: 4-15-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>0.07</u>	Manganese	<u>8.6</u>
Bicarbonate	<u>39</u>	Nickel	<u>0.56</u>
Calcium	<u>230</u>	Nitrate	<u>2.5</u>
Carbon (Organic).....	<u>NR</u>	Potassium	<u>20.0</u>
Carbonate	<u>0</u>	Sodium	<u>260</u>
Chloride	<u>910</u>	Sulfate	<u>2600</u>
Copper	<u>0.03</u>	Total Dissolved Solids	<u>5804</u>
Fluoride	<u>1.07</u>	Total Suspended Solids	<u>1479.2</u>
Hardness	<u>3560</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>0.05</u>	Zinc	<u>0.67</u>
Lead	<u>0.12</u>	U-Nat (ug/l)	<u>15.73</u>
Magnesium	<u>25.0</u>	pH (Units)	<u>5.2</u>

COMMENTS: Boron = 0.5 mg/l
As = ND (0.002) mg/l
Se = ND (0.002) "
Radium = 15.37 ± .69 pCi/l 1.6 x 10⁻¹⁰ d/d
U-Nat = 10.6 x 10⁻⁹ µCi/ml.

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: [Signature]

Date: 7-25-85

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: 40-SC

SAMPLE NO.: 16638

DATE: 4-15-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>0.06</u>	Manganese	<u>ND(0.01)</u>
Bicarbonate	<u>54</u>	Nickel	<u>ND(0.01)</u>
Calcium	<u>1.0</u>	Nitrate	<u>0.22</u>
Carbon (Organic).....	<u>NR</u>	Potassium	<u>6.0</u>
Carbonate	<u>0</u>	Sodium	<u>26</u>
Chloride	<u>6</u>	Sulfate	<u>54</u>
Copper	<u>ND(0.01)</u>	Total Dissolved Solids	<u>120</u>
Fluoride	<u>40.1</u>	Total Suspended Solids	<u>531</u>
Hardness	<u>80</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>0.10</u>	Zinc	<u>ND(0.005)</u>
Lead	<u>ND(0.05)</u>	U-Nat (ug/l)	<u>5.72</u>
Magnesium	<u>5.0</u>	pH (Units)	<u>6.6</u>

COMMENTS: Boron = 0.3 mg/l

As = ND(0.002) "

Se = ND(0.002) "

Ra₂₂₆ = 0.31 ± 13 pCi/l 1.9 x 10⁻¹⁰ L/L

U-nat = 3.9 x 10⁻⁹ pCi/ml

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

Reviewed by: SPH

Date: 7-13-85

PETROTOMICS ENVIRONMENTAL LABORATORY

ANALYTICAL REPORT - DEQ

WATER

SAMPLE SITE: 41-SC
 SAMPLE NO.: 16639
 DATE: 4-15-85

	<u>mg/l</u>		<u>mg/l</u>
Ammonia	<u>ND(0.05)</u>	Manganese	<u>0.05</u>
Bicarbonate	<u>178</u>	Nickel	<u>0.08</u>
Calcium	<u>330</u>	Nitrate	<u>0.90</u>
Carbon (Organic)	<u>NR</u>	Potassium	<u>10.0</u>
Carbonate	<u>0</u>	Sodium	<u>169</u>
Chloride	<u>515</u>	Sulfate	<u>1450</u>
Copper	<u>0.02</u>	Total Dissolved Solids	<u>3136</u>
Fluoride	<u><0.1</u>	Total Suspended Solids	<u>1229</u>
Hardness	<u>1850</u>	Vanadium	<u>ND(0.05)</u>
Iron	<u>0.09</u>	Zinc	<u>0.020</u>
Lead	<u>0.08</u>	U-Nat (µg/l)	<u>98.67</u>
Magnesium	<u>154.5</u>	pH (Units)	<u>7.0</u>

COMMENTS: Boron = 0.3 mg/l
Ra₂₂₆ = .89 ± .17 pci/l 1.5 x 10⁻¹⁰ LLD
U_{nat} = 66.7 x 10⁻⁹ µCi/ml.

NR = Analysis Not Required

ND = Not Detected at Level Given
in Parenthesis

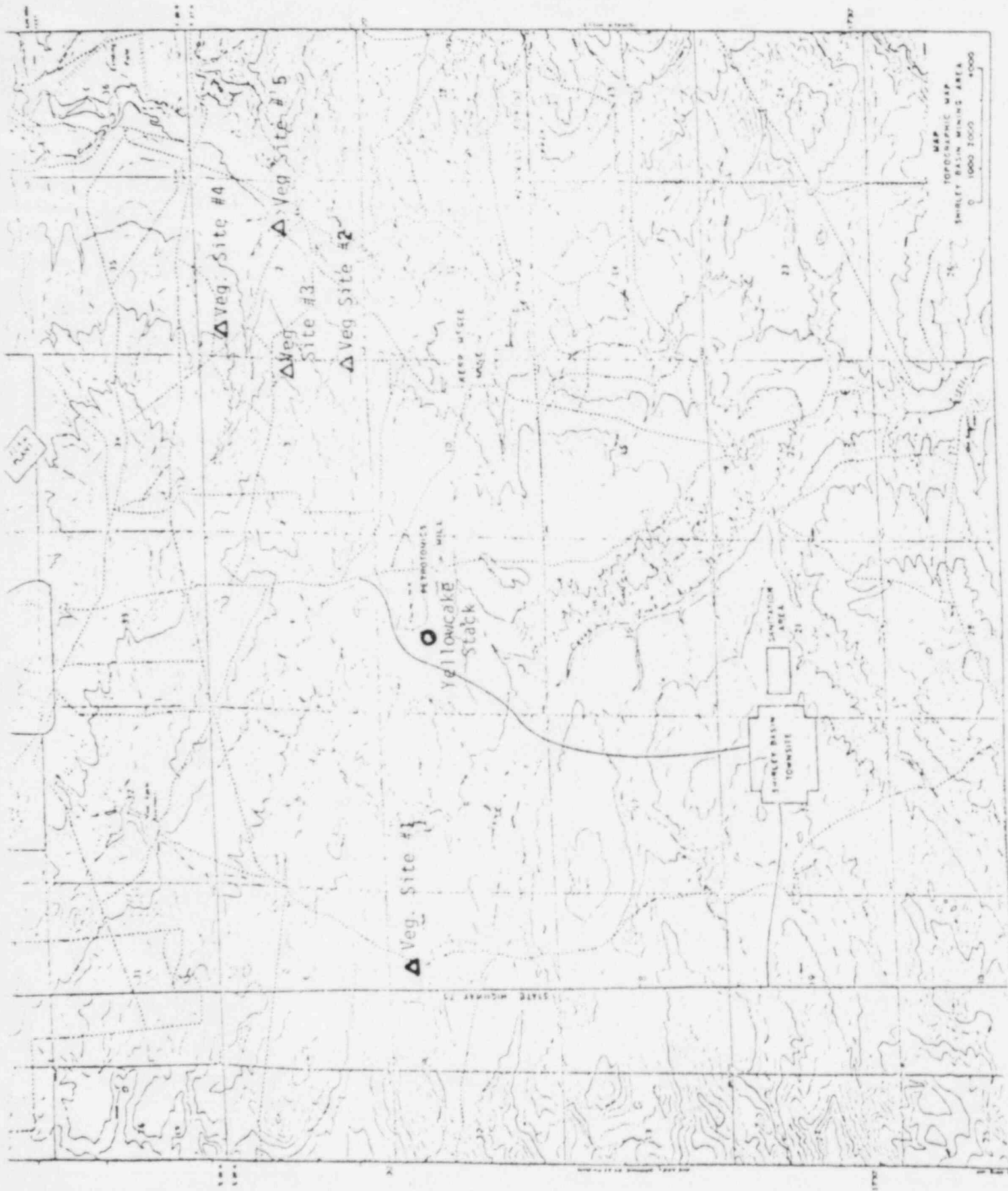
Reviewed by: [Signature]

Date: 7-23-85

ps:4/17/85

4. VEGETATION LOCATIONS

SITE 1 - 9,000 FT. WNW OF YELLOWCAKE STACK
SITE 2 - 8,750 FT. ENE OF YELLOWCAKE STACK
SITE 3 - 6,500 FT. NE OF YELLOWCAKE STACK
SITE 4 - 11,000 FT. NE OF YELLOWCAKE STACK
SITE 5 - 11,000 FT. ENE OF YELLOWCAKE STACK



4. VEGETATION, FOOD, AND FISH SAMPLES

Date collected: June 24, 1985
 Location: Site #1
 Type of sample: Vegetation

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/kg WET)</u>	<u>ERROR ESTIMATE (uCi/kg)</u>	<u>LLD (uCi/kg)</u>
Ra-226	32×10^{-5}	$\pm 3 \times 10^{-5}$	5×10^{-8}
Pb-210	77×10^{-5}	$\pm 2 \times 10^{-5}$	1×10^{-6}

Date collected: June 24, 1985
 Location: Site #2
 Type of sample: Vegetation

<u>RADIONUCLIDE</u>			
Ra-226	41×10^{-5}	$\pm 3 \times 10^{-5}$	5×10^{-8}
Pb-210	39×10^{-5}	$\pm 2 \times 10^{-5}$	1×10^{-6}

Date collected: June 24, 1985
 Location: Site #3
 Type of sample: Vegetation

<u>RADIONUCLIDE</u>			
Ra-226	150×10^{-5}	$\pm 7 \times 10^{-5}$	5×10^{-8}
Pb-210	174×10^{-5}	$\pm 3 \times 10^{-5}$	1×10^{-6}

4. VEGETATION, FOOD, AND FISH SAMPLES (CONTINUED)

Date collected: June 24, 1985
 Location: Site #4
 Type of sample: Vegetation

<u>RADIONUCLIDE</u>	<u>CONCENTRATION (uCi/kg WET)</u>	<u>ERROR ESTIMATE (uCi/kg)</u>	<u>LLD (uCi/kg)</u>
Ra-226	124×10^{-5}	$\pm 5 \times 10^{-5}$	5×10^{-8}
Pb-210	108×10^{-5}	$\pm 3 \times 10^{-5}$	1×10^{-6}

Date collected: June 24, 1985
 Location: Site #5
 Type of sample: Vegetation

<u>RADIONUCLIDE</u>			
Ra-226	32×10^{-5}	$\pm 3 \times 10^{-5}$	5×10^{-8}
Pb-210	61×10^{-5}	$\pm 2 \times 10^{-5}$	1×10^{-6}

5. SOILS AND SEDIMENTS

No samples taken this quarter.

6. DIRECT RADIATION MEASUREMENTS

<u>LOCATION</u>	<u>EXPOSURE RATE</u> <u>(mr/gr)</u>	<u>ERROR ESTIMATE</u> <u>(mr/gr)</u>
Site 1	46.3	± 12.4
Site 2	59.3	± 11.2
Site 3	57.2	± 12.4
Site 4	44.2	± 5.7
Site 5	60.3	± 13.5
Site 6	39.0	± 9.3

LOCATIONS: Site 1 - 7800' WNW of yellowcake dryer stack.
 Site 2 - 500' S of yellowcake dryer stack.
 Site 3 - 3200' NE of yellowcake dryer stack.
 Site 4 - 11800' NNE of yellowcake dryer stack.
 Site 5 - 3000' ENE of yellowcake dryer stack.
 Site 6 - 11700' S of yellowcake dryer stack.