UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DEC 2 8 1989

MEMORANDUM FOR: Glen L. Sjoblom, Acting Chief
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety

FROM: R. Davis Hurt
Advanced Fuel and Special
Facilities Section
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety

SUBJECT: MEETING WITH KERR-MCGEE ON CUSHING AND CIMARRON

On December 1, 1989, the NRC staff met with representatives of Kerr-McGee Corporation concerning the Cushing, Oklahoma and Cimarron, Oklahoma sites. The meeting was organized by the Division of Industrial and Medical Nuclear Safety, but also attended by staff members from the Division of Low-Level Waste Management and Decommissioning, the Office of the General Counsel, Region III, and Oak Ridge Associated Universities, an NRC contractor. The attendees are listed on Enclosure 1.

1. Cushing

The Cushing site is located about halfway between Oklahoma City and Tulsa. The Kerr-McGee representatives made a presentation on the history and features of the site, and explained its present disposition. Uranium and thorium were chemically processed at Cushing between 1962 and 1966 in a building near the edge of a large oil refinery (see Enclosure 2 for maps). In 1966 the nuclear processing building and its immediate surroundings were decontaminated in accordance with practices of the time, with mildly radioactive wastes being buried in trenches on the Cushing property and higher activity wastes being sent to the Cimarron site for burial. The Atomic Energy Commission surveyed the processing site, found it to be adequately decontaminated, and terminated the Cushing licenses. In 1972 Kerr-McGee decided to close the oil refinery within which the now-decommissioned nuclear processing building was situated, and in that connection did some additional surveys for radioactivity. Based on these surveys, some additional soil was removed from around the processing building and dumped into a large sludge pit (known as Pit 4) on another part of the refinery site. Some of the radioactive wastes buried in trenches at Cushing in 1966 were disinterred in 1972 and also placed in Pit 4. Between 1979 and 1982 Kerr-McGee carried out additional decontamination activities at the site, further cleaning up the processing building, and digging up some more contaminated soil and previously buried trash. As before, the mildly contaminated materials were

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1/1

reburied elsewhere at Cushing, and the more highly radioactive materials were packaged and sent off the site, in this case to commercial low-level waste burial grounds.

The Kerr-McGee staff has recently done a new radiation survey at Cushing, and a team of our contractors from Oak Ridge Associated Universities has made a scoping survey for the NRC. It appears that most of the radioactivity on the site at this point is in Pit 4. Kerr-McGee has done some surveying and sampling; more will probably have to be done. Kerr-McGee is already dealing with the U.S. Environmental Protection Agency and the State of Oklahoma on disposition of the entire Cushing refinery site, and the sludge pits seem to be the major topic of concern. We agreed to meet again in the fairly near future to talk about Pit 4, and maybe learn more about the activities and interests of the other parties. With regard to the building and its surroundings, Kerr-McGee has identified some soil contamination in excess of Branch Technical Position Option 1 levels and has found some small areas of contamination in the building. Kerr-McGee's intention is to take any steps necessary to bring the building area contamination below current release standards. We told the Kerr-McGee staff that we will do a confirmatory survey once they think the building area is clean.

2. Cimarron Plutonium Facility

The second subject discussed was the Cimarron Plutonium Facility, located just north of Oklahoma City. Kerr-McGee has nearly finished decontaminating the building and hopes to terminate the license soon. Our contractors from Oak Ridge Associated Universities agreed that the building cleanup is going well. Some uncertainty remains concerning the identity of alpha-emitters in the Plutonium Facility yard. If this turns out to be plutonium, it will have to removed before termination of the license; if it turns out to be uranium as the Kerr-McGee staff suspects, the yard could be transferred to the Uranium Facility license and dealt with as part of that larger issue. We confirmed that Kerr-McGee does not need to request a license renewal since the new decommissioning rule makes a renewal unnecessary for licensees whose sole activity is decommissioning. Their license for the Plutonium Facility bears an expiration date of December 31, 1989.

DEC 2 8 1989

Glen L. Sjbolom

3. Cimarron Uranium Facility

The Kerr-McGee representatives briefly reviewed the situation at the Cimarron Uranium Facility and their proposal for dealing with the large quantity of contaminated soil they believe is present. We expressed the opinion that the gamma survey data upon which the contamination estimates are based are not meaningful, i.e., the gamma count rates measured do not show an identifiable correlation with uranium concentrations in the soil. After considerable discussion, this opinion was accepted by all parties present. We suggested that the true extent of uranium contamination could be determined by a core sampling program, and encouraged Kerr-McGee to pursue this approach on a test scale. We offered to meet again with Kerr-McGee representatives in the near future to discuss progress in core sampling, or to consider whatever other method of estimating the extent of contamination Kerr-McGee might devise. In the meantime, we will review the hydrology portion of Kerr-McGee's application for license amendment.

Original Signed by

R. Davis Hurt
Advanced Fuel and Special
Facilities Section
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety

Enclosure 1: List of Meeting Attendees
Enclosure 2: Handout Prepared by Kerr-McGee

Distribution: Docket 70-925, 70-1193, 70-712, 40-1478

NRC File Center	PDR	NMSS R/F	IMSB R/F	IMAF R/F
RDHurt		JSwift	FBrown	Beveridge/Cornell 1-23
GFrance RIII		JBerger, ORAU	GComfort	DSollenberger, LLWM
JStarmer, LLWM		JParrott, LLWM	EShum, LLWM	RBangart, LLWM
JSurmeier, LLWM		FRoss, LLWM	DSreniawski, RIII	
RBernero		RCunningham		

(DH/MTG WITH KERRMCGEE)

OFC	:IMAF	:IMIF	:IMAF	:IMAF	:IMSB
NAME	:RDHurt:jc	:FBrown	:GComfort	:JSwift	:GSjgblom
DATE	:12/27/89	:12/ /89	:12/27/89	:12/27/89	:12/28/89

OFFICIAL RECORD COPY

MEETING WITH KERR-MCGEE

DECEMBER 1, 1989

ROCKVILLE, MD

ATTENDEES	AFFILIATION
Glen Sjoblom	NRC/NMSS
Don Sreniawski	NRC/RIII
Dennis Sollenberger	NRC/NMSS
Davis Hurt	NRC/NMSS
Edward Shum	NRC/NMSS
Jack Parrot	NRC/NMSS
Gary Comfort	NRC/NMSS
R. John Starmer	NRC/NMSS
John Surmeier	NRC/NMSS
Richard Bangart	NRC/NMSS
Robert Fonner	NRC/OGC
Jim Berger	ORAU
Laurie Friedman	ORAU
Scott Munson	Kerr-McGee
Edwin T. Still	Kerr-McGee
John Stauter	Kerr-McGee
Wayne Norwood	Cimarron Corp.

AGENDA

CIMARRON AND CUSHING BRIEFING
KERR-McGEE CORPORATION
1 DECEMBER 1989

9:00 A.M. Introduction of Attendees

9:15 A.M. Cushing Status - J.C. Stauter (Lead)
- Operational History
- Licenses/Termination
- Post - Closure Activities
- Current Situation

10:00 A.M. Cimarron Matters - J.C. Stauter (Lead)
- Plutonium Facility
- Uranium Facility
  - Disposal Application Review
  - Soil Involved
  - Status of Soil Cleanup
  - Basis for Classifying Soil
    Screening Technique
  - Basis for Final Disposition
    Confirming Technique
  - Decisions
    Timing Critical
    Approval as requested / in-situ & relocation
    Agreement on Adequacy of Sorting Procedure
    License Termination Milestones

3:00 P.M. Adjourn

0078s

SOURCE MATERIAL LICENSE

License No. SMB-664 Docket No. 40-1478

License Issued - 11/07/62 Terminated - 07/25/66

- Authorized possession of normal and depleted uranium and natural thorium in unlimited quantities and in a variety of chemical forms
- Uranium received as UF6 or mill concentrates
- Thorium received as concentrates
- Typical products were oxide or carbide metals of uranium and thorium at various ratios

SPECIAL NUCLEAR MATERIAL

License No. SNM-695 Docket No. 70-712

License Issued - 04/23/63 Terminated - 07/25/66

- Authorized possession of enriched uranium of any enrichment up to a maximum quantity of 1,000 kg of uranium
- Uranium received as UF6, other chemical compounds, or unirradiated scrap fuel elements
- Operation converted uranium received to other compounds suitable for nuclear fuels (eg. UO2, UO3, uranium carbide, uranium sulfate, uranium nitrate, uranium tetrafluoride and U3O8)

TERMINATION OF LICENSES

- 06/09/66 — Licensee requests termination of both source and special nuclear licenses
- 06/10/66 — Contamination limits sent to licensee
- 07/06/66 — "Close out" survey conducted
- 07/25/66 — Licensee notified that the licenses are terminated

CLEANUP OPERATIONS (1966)

- Processing site was decontaminated
- Decommissioning waste shipped to Cimarron Facility
- Lower concentration waste buried in several trenches on the Cushing property
- Kerr McGee surveyed the processing site for radioactivity and found that the release criteria had been met
- AEC surveyed the processing site, found the levels to be acceptable and terminated both licenses

CLEANUP OPERATIONS (1972)

- Property surveyed for radioactivity in conjunction with the closing of the oil refinery
- Removed soil in the area where thorium process wash water had been discharged and placed into pit 4
- Removed soil around the edge of the blending pad at the location of the thorium processing building and placed into Pit 4
- Five cubic feet of radioactive trash from the "Old Globe Property Dump" was removed and placed into Pit 4
- Covered material placed into Pit 4 with about four feet of clean topsoil

CLEANUP OPERATIONS (1979-82)

- Additional decontamination performed at the following sites:

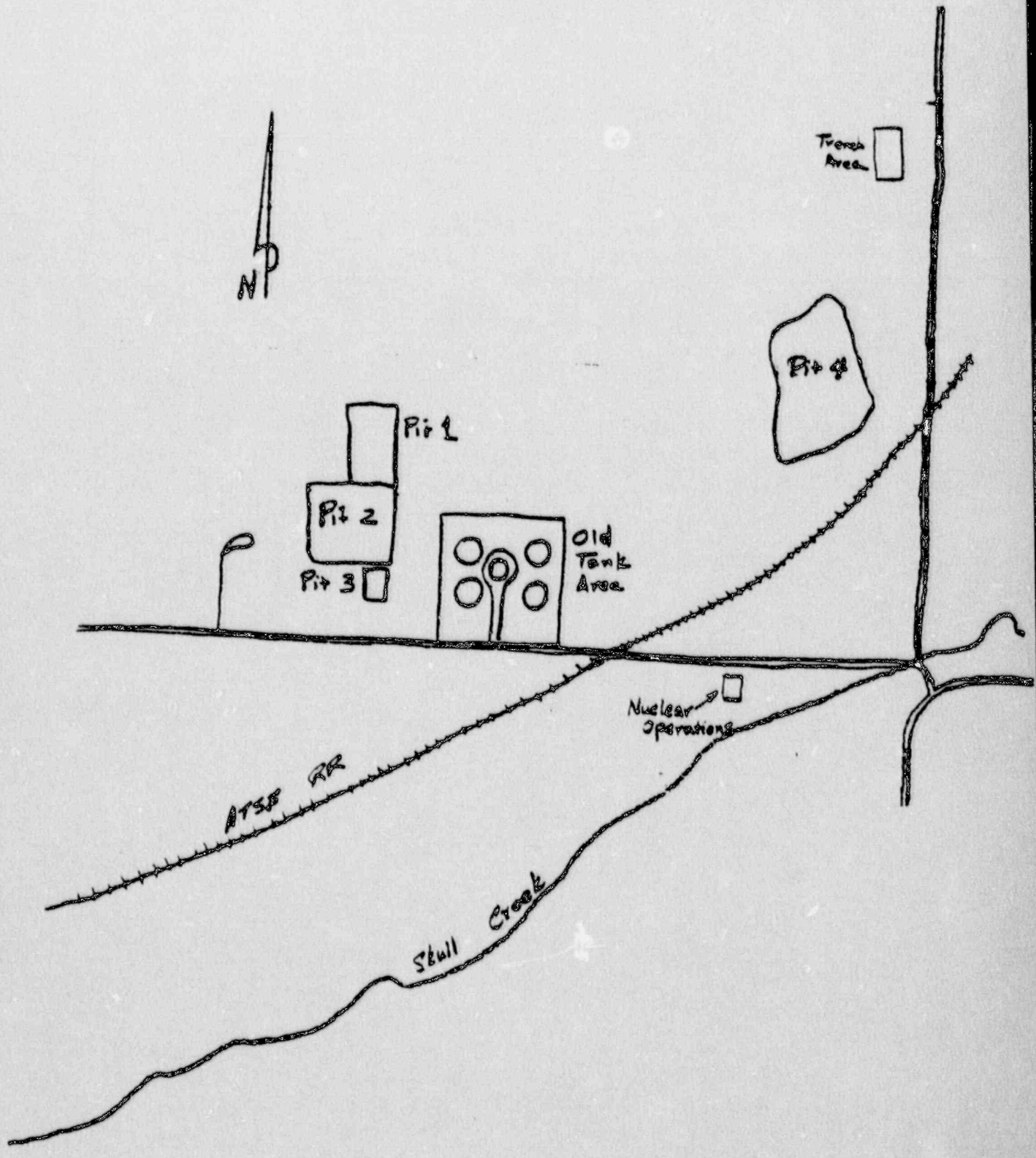
  Harris Property
  - ▸ Processing building and dock
  - ▸ Access Road
  - ▸ Creek bank and concrete channel drainage ditch

  Kerr McGee Property
  - ▸ Refinery junk dump site, northwest area of tank farm acreage
  - ▸ Lower triangle, south of Atchison Topeka and Santa Fe railroad track
  - ▸ Northeast area of tank farm acreage

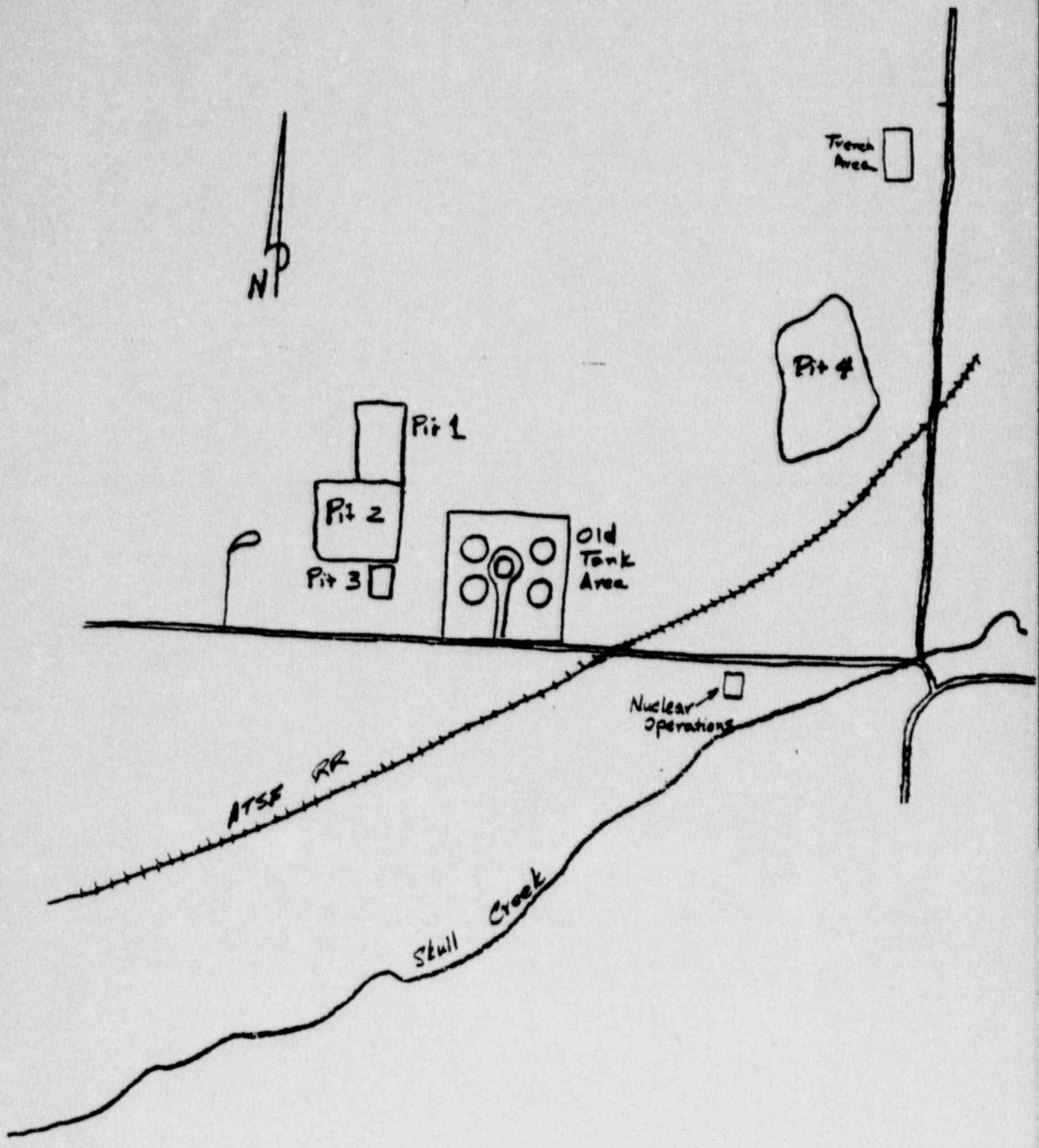
- Soil and waste with exposure rates exceeding 50 uR/hr was drummed and sent to the Cimarron Facility with ultimate disposal at licensed LLW disposal sites in Beatty, Nevada and Barnwell, South Carolina

- Soil with exposure rates between 30 and 50 uR/hr was buried at the Cushing property

Kerr McGee Cushing Refinery Site
Cushing, Oklahoma



Kerr McGee Cushing Refinery Site
Cushing, Oklahoma

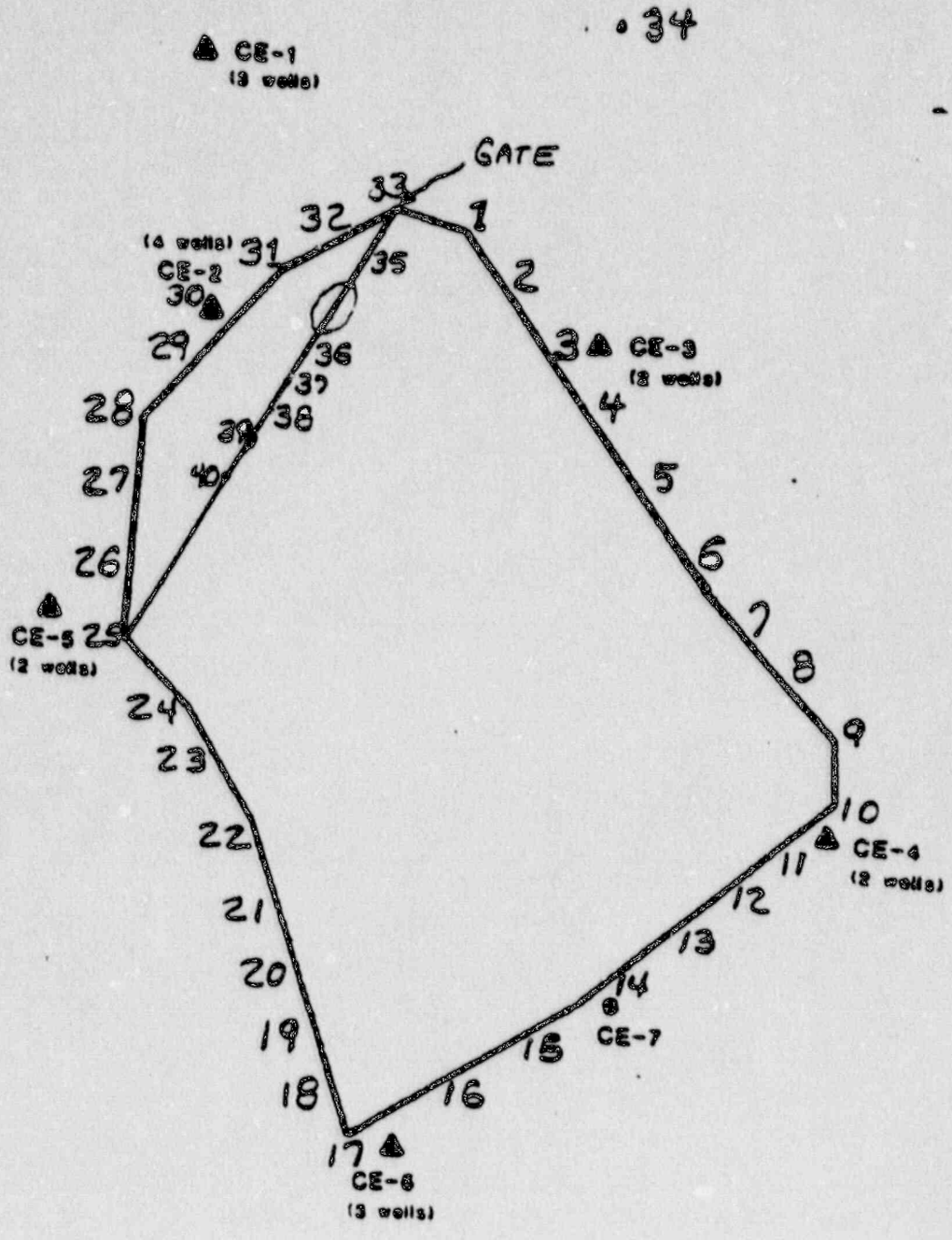


Survey of East Disposal Area (Pit #4)
Conducted by E&E Personnel May 29, 1986

Station No.	Instrument Readings: Ludlum 19 (Micro R Meter) gamma only ur/hr	Instrument Readings: Victoreen, Thyiac III alpha, beta, & gamma mr/hr
1	17	.03 - .05
2	16	.03 - .05
3	13	.03 - .05
4	13	.03 - .05
5	13	.03 - .05
6	13	.03 - .05
7	12	.03 - .05
8	10	.02 - .05
9	10	.02 - .05
10	10	.02 - .05
11	10	.02 - .05
12	10	.02
13	10	.02
14	10	.02
15	10	.02
16	10	.02
17	10	.02
18	10	.02
19	10	.02
20	10	.02
21	14	.02
22	12	
23	13	
24	25	.05
25	20	.03
26	21	.03
27	17-19	.04 - .05
28	19-20	
29	26	.05 - .06
30	28-30	
31	15	
32	18	
33	17	
34	30	
35	24	.04
36	24-26	.04 - .06
37	43-46	
38	65	
39 (Sample #8)	55-60	
40	34	

0617E

MAP OF THE CUSHING EAST IMPOUNDMENT
SHOWING THE LOCATIONS OF GROUNDWATER MONITOR WELLS



N

No Scale Intended

● Single Monitor Well

▲ Cluster of Two or More Monitor Wells Completed to Different Depths

35 RADIOLOGICAL MONITORING POINT

2 foot intervals

↓

CUSHING - SLUDGE PIT #4 CORE SAMPLES
COLLECTED: SEPTEMBER 18, 1986
Results Reported As Received, pCi/g

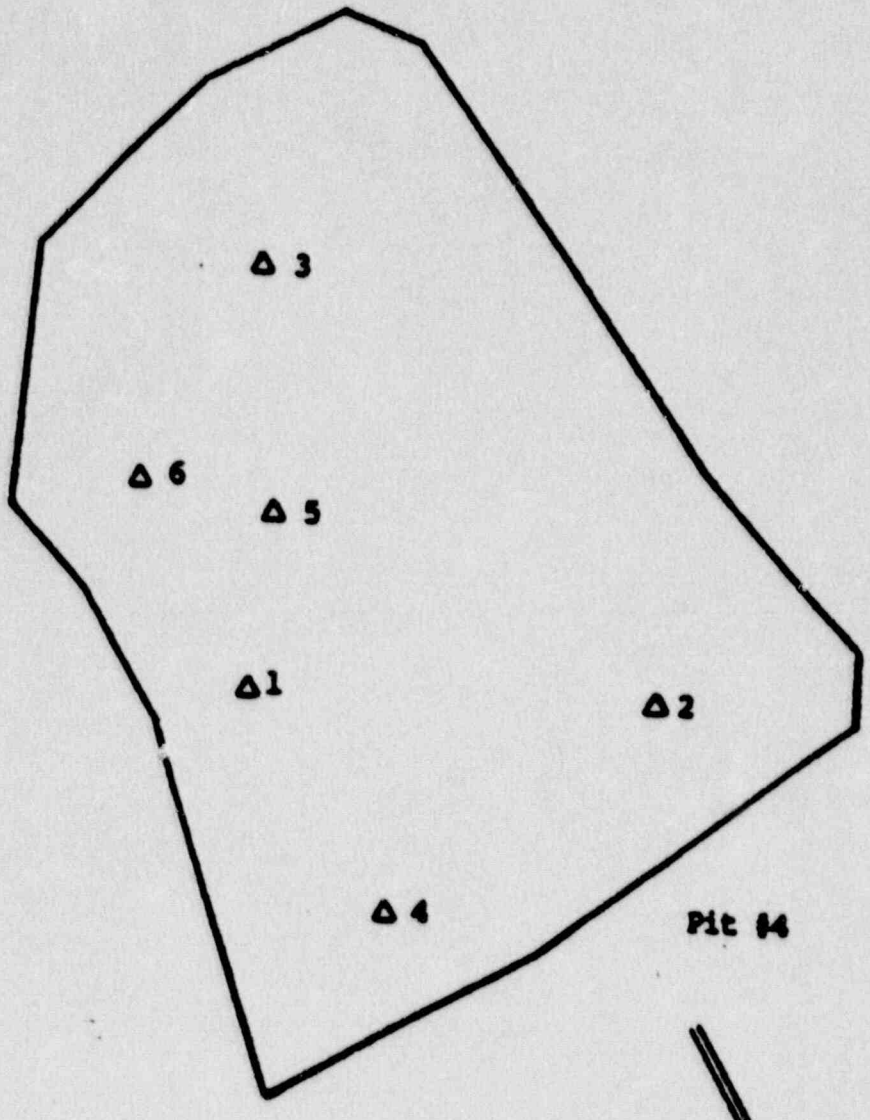
Location	Ac-228	Bi-212	Bi-214	Pb-212	Pb-214	Th-234	Tl-208	U-235	U-238*	Th-232*	Th-228*	Ra-226*	Ra-226*
4-1													
0-2'	<1.1	<1.2	<0.35	0.44	0.48	0.69	<0.17	<0.21	0.58	0.44	0.44	<1.1	0.48
2-4'	<0.57	<0.67	0.31	0.36	0.28	<0.78	0.13	<0.089	<0.78	0.37	0.37	<0.57	0.28
4-6'	<0.48	<0.54	<0.14	0.17	0.17	<0.66	<0.073	0.084	0.66	0.17	0.17	<0.48	0.17
4-2													
0-2'	0.54	<6.5	0.44	0.49	0.43	<0.77	0.15	<0.086	<0.77	0.49	0.47	0.54	0.43
2-4'	<0.27	<0.33	<0.082	<0.066	<0.083	<0.39	<0.044	<0.046	<0.39	<0.27	<0.07	<0.27	<0.09
4-6'	<1.10	<0.020	0.090	<0.041	0.088	<0.23	<0.027	<0.027	<0.23	<0.10	<0.041	<0.10	0.088
6-8'	<0.20	<0.32	0.16	<0.09	<0.09	<0.68	<0.06	<0.07	<0.66	<0.20	<0.09	<0.20	<0.09
8-10'	<0.24	<0.28	<0.08	<0.056	<0.08	<0.33	<0.037	<0.039	<0.33	<0.24	<0.056	<0.24	<0.08
10-11.5'	<1.1	<1.1	<0.32	<0.24	<0.64	<0.68	<0.16	<0.20	0.66	0.24	0.24	<1.1	0.64
4-3													
0-2'	<1.7	<1.8	<0.49	1.68	1.09	<3.4	0.81	0.13	<3.4	2.04	2.04	<1.7	1.09
2-4'	76.1	63.9	<1.3	89.0	<1.8	<18	30.0	<0.89	<18	87.7	91.6	76.1	<1.8
4-6'	28.7	23.6	<0.5	44.6	0.62	<4.7	12.0	<0.28	<4.7	36.2	38.7	28.7	0.62
6-8'	8.62	7.29	<0.3	13.8	<0.27	<2.7	3.88	<0.14	<2.7	11.2	12.1	8.62	<0.27
4-4													
0-2'	<0.64	<0.72	0.86	0.61	0.83	<0.91	0.24	<0.12	<0.91	0.66	0.66	<0.64	0.83
2-4'	<0.091	<0.098	<0.020	0.018	<0.026	<0.20	<0.014	<0.019	<0.20	0.018	0.018	<0.091	<0.026
4-6'	<0.28	<0.32	<0.088	0.036	<0.079	<0.68	<0.044	<0.058	<0.68	0.036	0.036	0.28	<0.079
6-8'	<0.27	<0.33	0.14	<0.065	0.13	<0.38	<0.044	<0.046	<0.38	<0.27	<0.066	<0.27	0.13
8-10'	<0.21	<0.26	<0.066	0.026	<0.060	<0.47	<0.032	<0.048	<0.47	0.026	0.026	<0.21	<0.060
10-12'	<0.20	<0.24	0.11	0.063	0.12	<0.30	<0.033	<0.033	<0.30	0.063	0.063	<0.20	0.12
4-5													
0-2'	<1.6	<1.9	1.14	1.30	1.37	3.28	0.60	<0.28	3.28	1.88	1.88	<1.6	1.37
2-4'	<0.80	<0.89	<0.25	0.63	0.39	<1.8	0.30	<0.15	<1.8	0.63	0.63	<0.80	0.39
4-6'	<0.24	<0.39	0.15	0.13	0.19	<0.47	<0.053	<0.052	<0.47	0.18	0.13	0.24	0.19
6-8'	<0.26	<0.30	0.20	0.20	0.16	0.61	0.078	<0.044	0.61	0.20	0.20	<0.26	0.16
8-10'	<0.21	<0.43	0.24	0.19	0.21	<0.52	<0.058	<0.059	<0.52	0.19	0.19	<0.21	0.21
10-12'	<0.29	<0.34	<0.090	<0.088	0.088	0.22	<0.048	<0.063	0.22	<0.29	<0.085	<0.29	0.085
12-13'	<1.1	<1.2	0.91	0.60	0.14	<1.6	<0.16	<0.17	<1.6	0.60	0.60	<1.1	1.14
4-6													
0-2'	<1.2	<1.3	<0.38	0.41	0.70	<2.6	<0.19	<0.22	<2.6	0.41	0.41	<1.2	0.70
2-4'	<0.31	<0.29	<0.10	0.13	<0.10	<0.46	<0.051	<0.050	<0.46	0.13	0.13	<0.31	<0.10
4-6'	<0.26	<0.29	<0.084	0.058	<0.088	<0.59	<0.041	<0.086	<0.59	0.088	0.058	<0.26	0.058

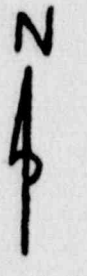
* Calculated

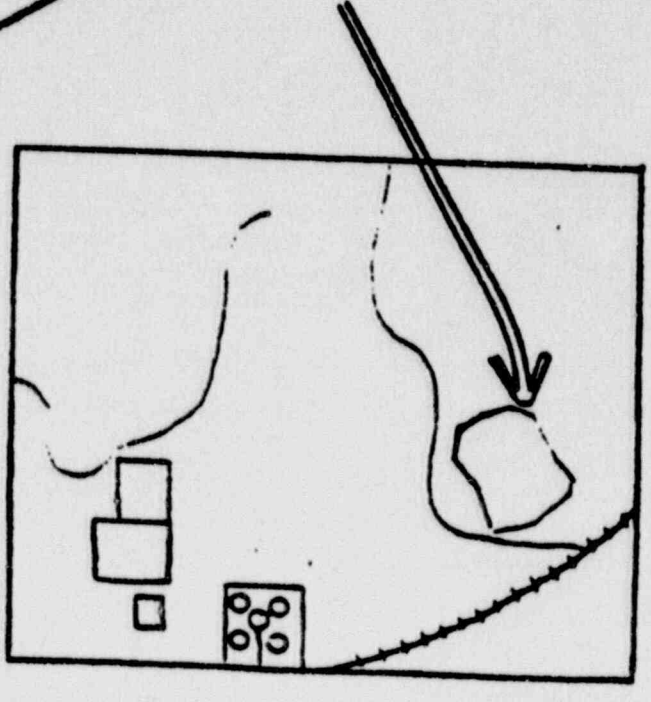
0630C

CUSHING EAST IMPOUNDMENT

Core Sample Locations
September 18, 1986







Δ - Core Sample

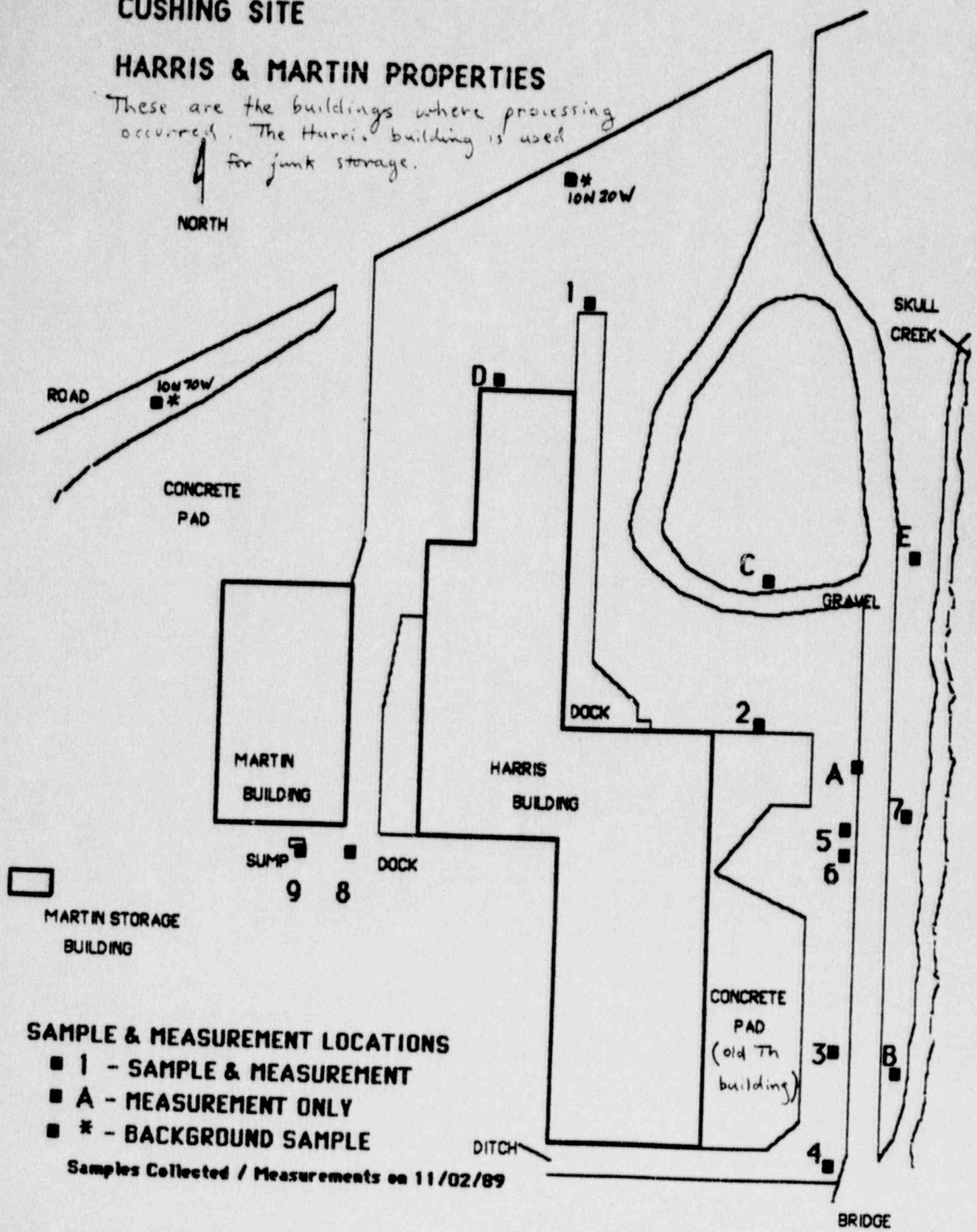
ATTACHMENT 4

CUSHING SITE

SLUDGE PIT SAMPLING

PARAMETER	Pit #1	Pit #2	Pit #3	Pit #4
Neutralization (mg KOH/g)	15-35	11-432	26-37	12-749
Sulfate (mg/Kg)	1008-11116	346-293,640	52-1014	2718-439,520
Chloride (mg/Kg)	2-27	16-350	100-2751	11-244
Fluoride (mg/Kg)	3-7	3-319	< 5	4-249
pH (units)	<1	1-6	2-4	1-4
Flash Point (^{o}F)	No Flash	No Flash	82-85^{o}F	No Flash
EP Leach Test				
Arsenic (mg/L)	<0.05	<0.05	<0.05	<0.05
Barium (mg/L)	0.07-0.08	0.05-2.8	1.7-3.4	0.4-17
Cadmium (mg/L)	<0.01	<0.01-0.01	<0.01	<0.01-0.01
Chromium (mg/L	<0.05	<0.05-0.77	<0.05	<0.05-0.95
Lead (mg/L)	<0.05	<0.05-0.28	<0.05	<0.05-0.42
Mercury (mg/L)	<0.002	<0.002	<0.002	<0.002
Selenium (mg/L)	<0.01	<0.01	<0.01	<0.01
Silver (mg/L)	<0.05	<0.05	<0.05	<0.05
No. of Samples	2	7	2	11

FIGURE 1


CUSHING SITE
HARRIS & MARTIN PROPERTIES
These are the buildings where processing occurred. The Harris building is used for junk storage.
NORTH
10N 20W
1
D
SKULL CREEK
ROAD
10N 70W
CONCRETE PAD
C
E
GRAVEL
DOCK
2
MARTIN BUILDING
HARRIS BUILDING
A
7
5
6
SUMP
DOCK
9
8
MARTIN STORAGE BUILDING
CONCRETE PAD (old Th building)
3
B
DITCH
4
BRIDGE
SAMPLE & MEASUREMENT LOCATIONS
■ 1 - SAMPLE & MEASUREMENT
■ A - MEASUREMENT ONLY
■ * - BACKGROUND SAMPLE
Samples Collected / Measurements on 11/02/89

PLUTONIUM FACILITY

Decontamination (1979 - Oct 1989)

Waste Shipped

- TRU Waste (> 100 nCi/g): 9035 ft3
- LSA Waste (< 100 nCi/g): 15,713 ft3
- Pu Removed: 9213 g

Survey Documentation (45 Books)

NRC Verification Survey Completed During OCT 1989

License Expiration (December 31, 1989)

Issue:

License Termination re Expiration Date

OPTION 2 BTP REQUEST - KEY EVENTS
CIMARRON FACILITY

NOV 1985 - Met with NRC at Region III Office

JUN 1987 - Met with NRC and ORAU at Cimarron Facility

JUL 1987 - Met with NRC at Region III Office

SEP 1987 - Written Option 2 Request Submitted to NRC

DEC 1987 - NRC Questions Concerning SEP 1987 Submittal

MAR 1988 - Response to DEC 1987 Questions from NRC

JUN 1988 - Additional Information Provided to NRC

AUG 1988 - Meeting with ORAU, OSDH and NRC at Cimarron Facility

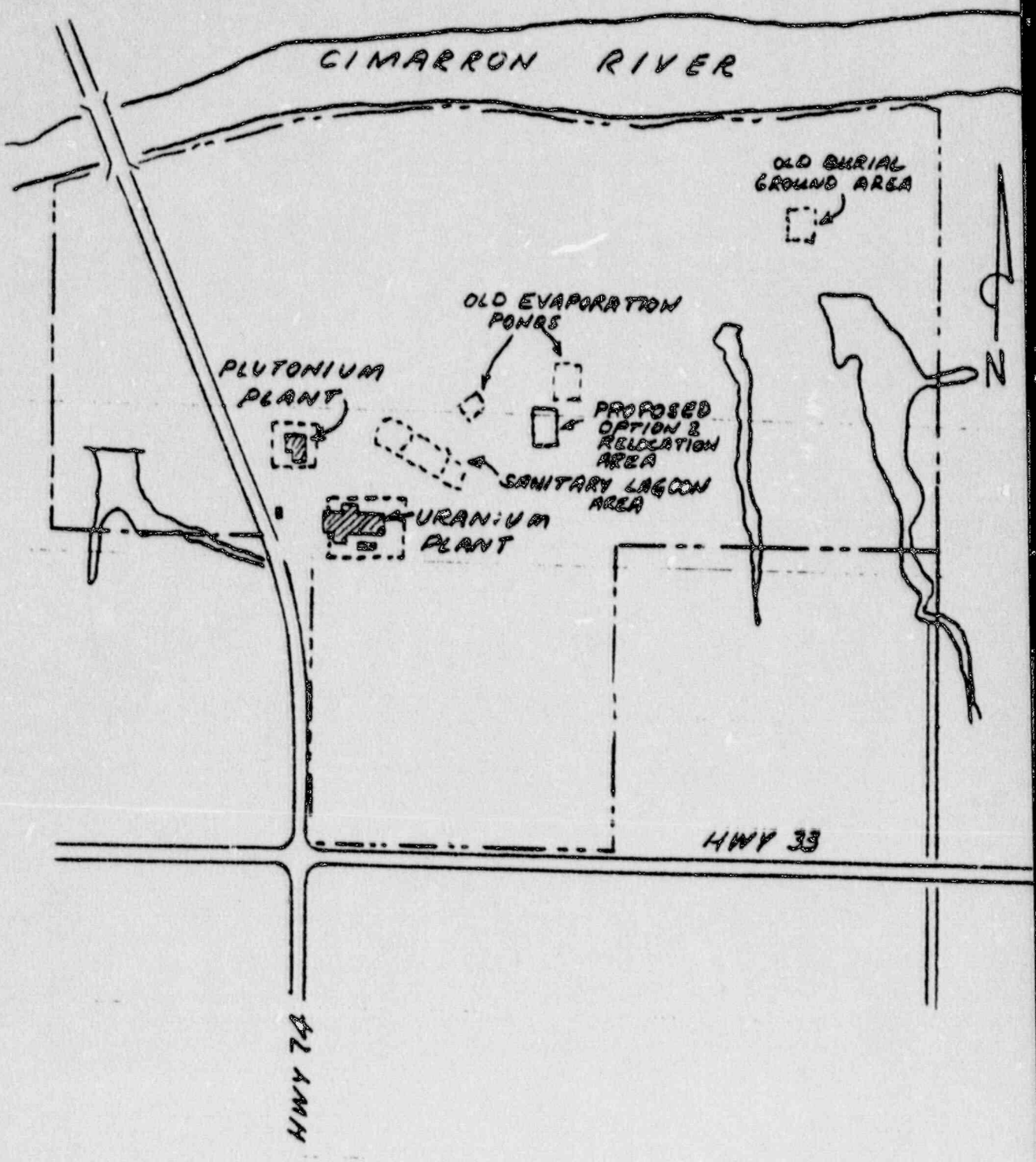
AUG 1988 - Survey of Old Burial Ground and Pu Plant by ORAU

OCT 1988 - Letter of Understanding Written Between NRC/State

FEB 1989 - NRC/State of Oklahoma Questions

APR 1989 - Meeting with NRC/State Representatives in Oklahoma City

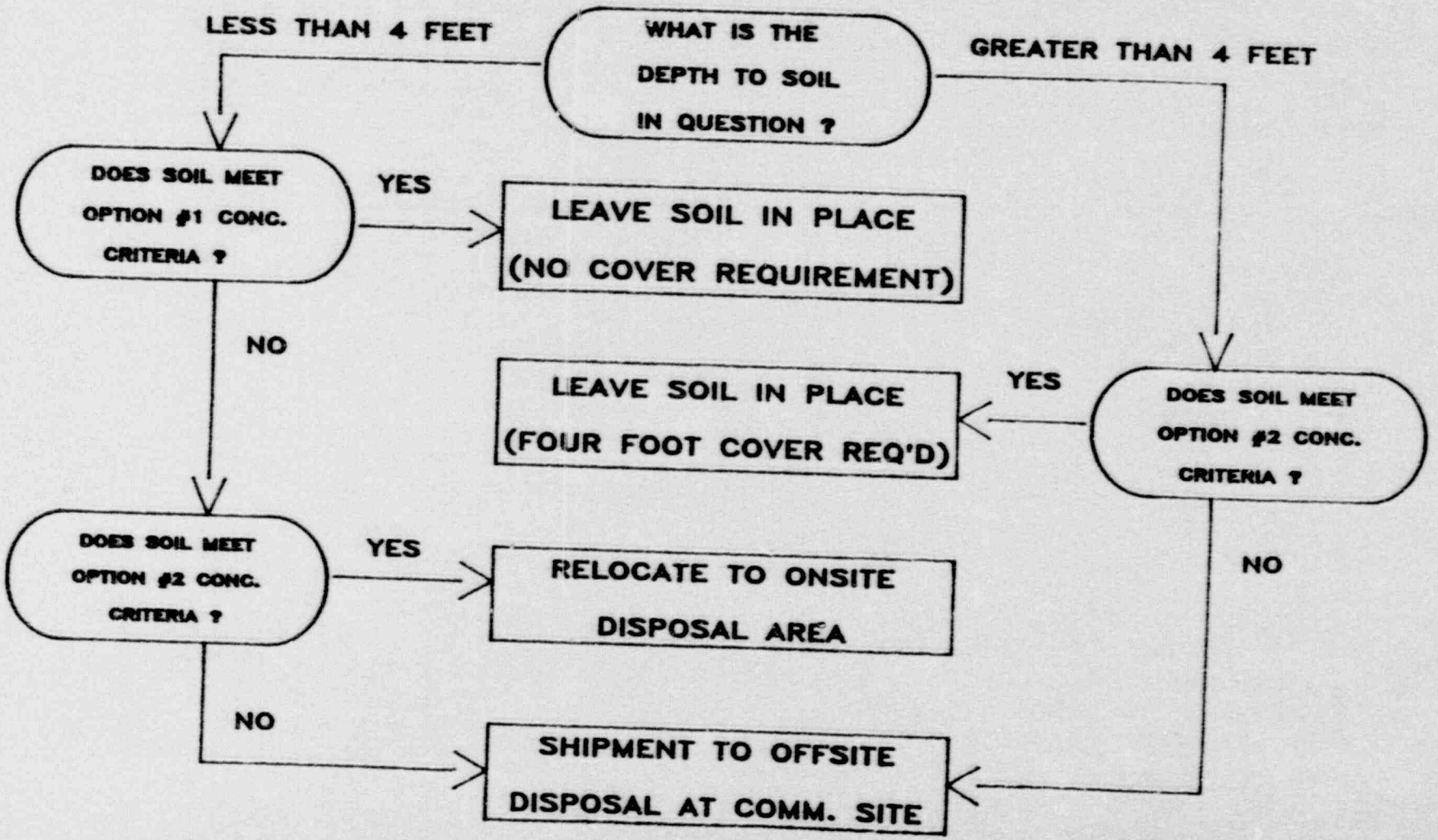
OCT 1989 - Response to FEB 1989 Questions from NRC/State



CIMARRON FACILITY

SOIL EVALUATION PROCEDURE

ON-SITE SOIL DISPOSITION
CIMARRON URANIUM PLANT



POTENTIALLY CONTAMINATED AREAS
CIMARRON FACILITY

U-Plant Yard Area

Sanitary Lagoon Area

Pipeline Areas to Ponds/River

Old Evaporation Pond Areas

Old Burial Ground Area

Pu-Plant Yard Area

STATUS OF U-PLANT YARD AREA

Removal of Soil Above Option 2 Levels in Progress

Gamma Logging Used as Screening Tool

Confirmatory Soil Samples Collected

Final Release Based on Soil Sampling

Soil Volume Removed to Date

- Commercial Disposal Site: 750 yd3
- Onsite Storage: 1800 yd3

STATUS OF SANITARY LAGOON AREA

Lagoon Sediments Removed During 1986 & 87

Some Soil/Sediment Requiring Removal Remains

Must Remove Water Prior to Completion

Final Release Based on Soil Sampling

Soil Volume Removed to Date

- Commercial Disposal Site: 1613 yd3
- Onsite Storage: 370 yd3

Samples of Remaining material were all < Option 2 Levels
(Maximum U-total Activity was 40 pCi/g)

STATUS OF PIPELINE AREAS

Decontamination Completed in 1985

Final Release Based on Soil Sampling

Soil Volume Removed

- Commercial Disposal Site: 425 yd3
- Onsite Storage: 555 yd3

STATUS OF OLD EVAPORATION POND AREAS

Decontaminated and Backfilled in 1978

NRC Letter Dated July 10, 1978, authorized the "return of these areas to normal topography and usage."

Letter from Oklahoma State Department of Health dated March 2, 1978, released pond areas for unrestricted use

STATUS OF OLD BURIAL AREA

Waste and Soil Removal from Trench Areas Completed during 1986 - 88

Verification Survey and Sampling By ORAU Completed during August 1988

Awaiting Authorization from NRC to Backfill Trenches

Soil Volume Removed

- Commercial Disposal Site: 2400 yd3
- Onsite Storage: 590 yd3

GAMMA LOGGING

Purpose

- Screening Tool to Identify Suspect Areas

Volume and Location Information

- Best Available Information
- With Aid of Computer Model Provided Basis for Estimation of Volume and Location

Calibration

- Relationship of Sample Analysis/Logging Results

EXCAVATION SURVEY PROCEDURE

Use gamma logging results to identify areas requiring excavation.

Excavate and/or sample material from suspect areas.

As excavation is in progress, will use gamma logging probe technique to sort material.

Samples from piles of sorted material analyzed by gamma spec. analysis at Cimarron Facility.

Evaluate analysis results and determine soil disposition.

FINAL RELEASE SURVEY PROCEDURE

Divide Areas Into Grid Pattern

Select Statistically Significant Number of Sampling Locations from Each Area

Use a Random Selection Process to Select Specific Sampling Locations

Collect Samples Using Standard Soil Sampling Techniques

Analyze Samples Using Cimarron Facility Gamma Spec. Analysis System (Located in Emergency Building)

Evaluate Results

- Comparison to Criteria

- QA/QC Sample Analysis by Radiochemical Techniques

Documentation of Results by Area

KEY DECISIONS

1. Timing
2. Application Approval
3. Agreement on Adequacy of Sorting Procedure
4. License Termination Milestones