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MEMORANDUM FOR: A. B. Beach, Director
 Division of Radiation Safety and Safeguards, RIV

FROM: John E. Glenn, Chief
 Medical, Academic, and Commercial
 Use Safety Branch
 Division of Industrial and
 Medical Nuclear Safety, NMSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST; REQUEST FROM CORE LABORATORIES
 FOR AUTHORIZATION TO BURY RADIOACTIVE SOIL PURSUANT TO SECTION
 20.302, 10 CFR PART 20

This refers to your Technical Assistance Request dated September 25, 1989, concerning Core Laboratories request for authorization to bury (on site) soil contaminated with scandium-46 which resulted from a liquid (gel) spill at a well site located on federal lands in New Mexico. After receipt, we referred the request to the Division of Low-Level Waste Management and Decommissioning (LLWM) for further evaluation. Enclosed is a November 30, 1989 memorandum which outlines LLWM's analysis and suggested conditions for approval of the burial. Also enclosed is a copy of Core's initial request and a letter dated October 30, 1989, LLWM received from Core which provides greater details concerning the contaminated soil and the burial site.

LLWM determined that the general criteria they are developing for frac sand disposal was acceptable in this situation. The frac sand disposal criteria is listed in their memorandum. Of the 10 items specified in the criteria, Core has failed to provide confirmation of the water table depth, that all state and local requirements concerning the disposal have been met, and they have not provided evidence of a written agreement between Core and the landowner acknowledging the burial and the period of time that administrative access controls must remain in place. Due to the lower direct gamma dose levels, LLWM has suggested that administrative access controls need to remain in place for only one year.

Because Core was conducting its operations under the reciprocity provisions of 10 CFR 150.20, and because paragraph (a) of that Section prohibits disposal except (in part) by transfer to a person specifically licensed, providing authorization for the burial presents an unique problem. We suggest that the best approach would be for Core Laboratories to apply for a specific license. Region IV could then issue a license where the only authorization would be to conduct the burial and to require Core to maintain posting and access control at the site for the period of time specified in LLWM memorandum. We also suggest that the license be issued for the normal five year period, but that you inform

B/B

Core in a cover letter transmitting the license that they could request license termination after one year provided they submit a final radiation survey report showing that surface radiation levels are not distinguishable from background levels. Note that the three deficient items identified in LLWM's memorandum will need to be resolved as part of the licensing action.

While the LLWM memorandum appears to provide general criteria for approval of frac sand burials without LLWM review, it is our understanding that the criteria and policy have not received final management approval. Therefore, Region IV should continue to coordinate any additional requests of this nature with headquarters. Apparently LLWM is actively working to obtain final approval of the criteria. Nevertheless, LLWM does expect that this general criteria will, for the most part, remain as written when it is finalized. Should the region receive another request concerning frac sand burial, or a similar request such as this one, it should ensure that the applicant provides information for each item of the criteria, as appropriate, prior to transferring the request to headquarters.

One additional item before closing, both staff in my office and in LLWM expressed some concern about the amount of information Core provided on its decontamination effort at the site. While we recognize that this incident involved a relatively small quantity of short-lived material at a remote site, we believe that it is still appropriate to expect adequately detailed information to show that the site and equipment are acceptable for release for unrestricted use in accordance with the July 1982 draft "Guidelines for Decontamination of Facilities and Equipment." Obtaining this information seems especially important considering much of the contaminated equipment was not under the control of Core Laboratories. Section 10.6.9 of draft "Well Logging Standard Review Plan for Applications for the Use of Radioactive Materials in Well Logging Operations" also details the decontamination procedures and efforts expected of well logging licensees.

If you have any questions, please contact me at FTS 492-0645 or Bruce Carrico at FTS 492-0634.

- 5 -
John E. Glenn, Chief
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Enclosures: As stated

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

30 NOV 1989

Richard E. Cunningham

MEMORANDUM FOR: Richard E. Cunningham, Director
Division of Industrial and
Medical Nuclear Safety, NMSS

FROM: Richard L. Bangart, Director
Division of Low-Level Waste Management
and Decommissioning, NMSS

SUBJECT: CORE LABORATORIES' SEPTEMBER 15, 1989, REQUEST TO
REGION IV FOR PERMISSION TO DISPOSE OF CONTAMINATED SOIL

Per your request of October 6, 1989, on the above cited subject, presented below is our analysis and recommended approval conditions for Core Laboratories to dispose of drilling mud contaminated with scandium-46 in a mud pit.

LLWM developed the following criteria for onsite disposal of fracturing sands labelled with radioactive tracers. These criteria are meant to ensure proper control of the contaminated material. They should ensure that during the control period, allowing for radioactive decay, the material will not be unintentionally excavated and spread to the environment or misused by individuals, and that there is adequate protection of usable water resources. Although not fracturing sands, the contaminated soil at the UNOCAL drilling site--Core Laboratories provided a tracer service for the fracturing operation--contains similar radioactive tracer materials. LLWM staff considers the criteria for frac sand disposal appropriate and applicable for disposal of this material.

The general criteria are as follows:

1. The radioactive tracer must be limited to iridium-192, scandium-46, gold-198, and antimony-124.
2. The total activity and concentration must be less than 4.0 millicuries and 550 pCi/gram, respectively.
3. The cover thickness must be greater than 1.2 meters.
4. The distance to groundwater must be greater than 3.0 meters.
5. The distance to nearest residence, potable water well or irrigation well must be greater than 200 meters.

6. A documented radiation survey, during and after disposal must be maintained to ensure the absence of contamination.
7. A written agreement must be documented between the licensee and the landowner or well operator prior to disposal, if the licensee and the landowner or well operator are not of the same company.
8. Administrative controls for a two-year period (if the direct gamma dose exceeds the 1 mrem per day criteria) must be documented to ensure post-burial control by the landowner or well operator. Access should be limited by posted signs indicating that no excavation is to be conducted within the area during the two-year period and that the landowner or well operator should be contacted, if necessary. If the direct gamma dose is less than 1 mrem per day, administrative controls should be imposed for a one-year period.
9. A record of disposal operations must be maintained, including a description of radioactive materials involved, half-lives, quantities and kinds of such materials.
10. All state and local requirements must be met before disposing of contaminated sands.

On October 30, 1989 Core Laboratories supplied additional information on the material to be disposed, details of the proposed disposal operation and made commitments requested by LLWM staff. Core Laboratories' submittal states that (1) the total activity in the pile is 0.588 millicuries or less of scandium-46; (2) the volume of the contaminated soil pile was estimated to be 720 cubic feet at 100 pounds per cubic foot; (3) the highest concentration of the six soil samples analyzed was 18 picocuries per gram; (4) the reserve pit on site is about 100 feet x 60 feet x 12 feet deep, the site is on top of a mesa and the bottom of the pit remained dry after it was dug, and that the water table is believed to be greater than 10 feet below the bottom of the pit; (5) a pit depth of 7 feet will be considered for placement of contamination-free soil; (6) a cover thickness greater than 4 feet (1.2 meters) will be used for contaminated soil; (7) the site is located several miles from the nearest residential or business water supply; (8) a radiation survey will be conducted over the pit area, the area where the soil had been stored, the area between, and adjacent areas to ensure that radiation levels are within 10 micro roentgens per hour above background levels; (9) a report of the procedures and results of the final radiation survey will be submitted to Region IV; and (10) administrative controls will be imposed over the pit area for a one-year period, including the posting of a sign to prevent excavation.

In summary, Core Laboratories wants permission to bury a small amount of soil (720 cubic feet (20.4 cubic meters)) contaminated with scandium-46. The amount (0.588 millicuries) and concentration (18 pCi/gram) of scandium-46 are well below the LLWM criteria above. The calculated direct gamma dose for soil contaminated with 18 pCi/gram is less than 1 mrem per day and therefore, the one-year administrative control period, proposed by Core Laboratories is acceptable.

Core Laboratories does not provide confirmation for the assertion in item number 4 above that the bottom of the pit remained dry after it was dug, and therefore, the water table is believed to be greater than 10 feet (3 meters) below the bottom of the pit. Core Laboratories should confirm the assertion that the water table is greater than 10 feet (3 meters) below the bottom of the pit.

Core Laboratories has met all but two of the proposed criteria: (1) assurance that all state and local requirements have been met; (2) providing a written agreement between Core Laboratories and the landowner prior to disposal since the operator is UNOCAL and the land is owned by the Bureau of Land Management--Department of the Interior. If these remaining conditions are addressed in a satisfactory manner, in addition to the commitments made in their October 30, 1989 submittal, and confirmation is provided that the water table is greater than 10 feet (3 meters) below the bottom of the pit, we recommend that Core Laboratories be allowed to dispose of the contaminated material as they have proposed.

This action has been coordinated with Charles Cain (R-IV) and Bruce Carrico of your staff. The review was conducted by Yvonne Young of my staff who may be reached by phone on extension 23445.

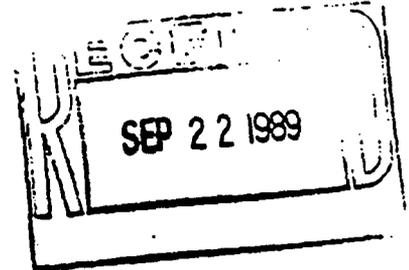


Richard L. Bangart, Director
Division of Low-Level Waste Management
and Decommissioning, NMSS



CORE LABORATORIES

September 15, 1989



Mr. Charles L. Cain
U.S.N.R.C.
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76012

Dear Mr. Cain:

At 8:35 a.m., August 22, 1989, I received a call from a Core Laboratories employee that a job site was contaminated with radioactive material. The site was approximately 35 miles east of Farmington, New Mexico. After making several phone calls to get details, I notified Bill Floyd of the New Mexico Radiation Protection Bureau. Later in the morning, I was made aware that this job site was under the jurisdiction of the U.S. Bureau of Land Management. I notified Bill Fisher of your office at 11:40 a.m.

On August 21, 1989, Core Laboratories was requested by UNOCAL to tag the fluid phase of a formation fracturing job in Rio Arriba County, New Mexico. At 8:30 a.m. the technician and equipment arrived at the Rincon Unit 240 in the Basin Fruitland Coal Field. Problems developed that delayed the fracturing operations, and consequently the tagging operation, until late afternoon. At 5:00 p.m. the technician started to set up the injecting equipment. At 6:30 he began tagging 385 barrels of fluid with 10 millicuries of Scandium 46.

During the pumping operation the fluid line to the well head vibrated so violently that the injecting tool, that is normally in the vertical position on the fluid line, started to lean. The technician informed the pumping company representative that the tool was not functioning properly and that he needed to adjust it or shut it off. The representative said that he only had 2 minutes left to complete the job and for the technician to continue to tag the fluid. At 6:37 p.m. the technician noticed a fluid leak at the tools coupling point and immediately shut off the injector. Fluid continued to escape from the fluid line for the remainder of the pumping operation. At 6:38 p.m. a 39 barrel flush was started filling the tubing with uncontaminated fluid. This operation was completed in less than one minute.

The representative requested that the injecting device remain on line until the following morning. Since the device still contained radioactive material, a radiation survey could not be made at the site of the spill. In the areas not influenced by the device's radiation, which included the rig's floor, the radiation levels were at background (.04 mR/hr). The technician left the site at 7:30 p.m.

The technician returned to the site the next morning, August 22, 1989 at 7:30 a.m. He immediately removed the injecting tool from the fluid line, then performed a survey. Radiation levels on the drillers platform was 5 mR/hr. Tools on the floor were up to 10 mR/hr. Soil around the rig and in a 30 feet by 50 feet area fanning out from the rig had radiation levels from .3 mR/hr to .5 mR/hr. The rig platform, tools and tubing were washed. Radiation level dropped to .04 mR/hr, contaminated soil was shoveled out from under the rig and placed in the already contaminated area. A bulldozer was used to remove the contaminated soil from the work area and pile it at the furthest end of the area. Fresh soil was brought in to replace the removed soil. A radiation survey indicated that all of the contaminated soil had been removed from the work area.

I arrived at the wellsite at 7:40 p.m. that evening, August 22, 1989 accompanied by Core Laboratories employees. Everyone else had departed the job site. Only two areas had radiation levels that exceeded two times background: Fluid line Tee where the injecting device was installed (3 mR/hr) and the soil near the rear tire of the drilling rig (.15 mR/hr). Both areas were decontaminated later. The highest radiation level on the pile of contaminated soil was .1 mR/hr. Six soil samples were collected at various places on the pile. The pile was then covered with large sheets of plastic and a radiation sign placed on it.

We returned to the job site the next day, August 23, 1989, and met with UNOCAL representatives. The status of the incident and required future actions were discussed.

The fluid had been pumped into the well bore at an average of 2100 psig. After the well had been closed for three hours, the well head pressure had decreased by more than half. When the logging contractor set up to log the well, an approximately 30 foot long "lubricator" was installed on the wellhead to control the well bore pressure. During the logging operation, fluid was allowed to escape from the "lubricator". I believe that during this operation, the well bore pressure forced the fluid from the tubing up and out the "lubricator".

The contaminated fluid flowed out of the top of the "lubricator" onto the outside and down the "lubricator" spilling on the rig floor and ground. Indications were that spray and run-off created the contaminated area, originating at the well (see sketch).

I returned to Houston and a gross gamma check was made on the six soil samples. The sample that exhibited the highest gamma and one that was nearest the average was sent to the Core Laboratories Analytical Section in Casper, Wyoming for a Scandium 46 analysis. Both samples were less than 20 picocuries per gram. Sample Number 1 had the highest gross gamma count and actually had only 18 picocuries per gram by count of Scandium 46 (1.8 microcuries per gram).

Since the analysis indicated that the Scandium 46 content of the soil is less than half of the maximum permissible concentration for release to an unrestricted area, and since the half-life of the isotope is 84 days, and since the job site is in a remote area away from any population, I respectfully submit the following procedure to conclude this incident:

1. The soil containing the Scandium 46 be placed in the bottom of the reserve pit that is on the job site, and
2. That it be covered with a minimum of 3 feet of Scandium free soil.

Please contact me with your concurrence or suggestions, or if you have any questions.

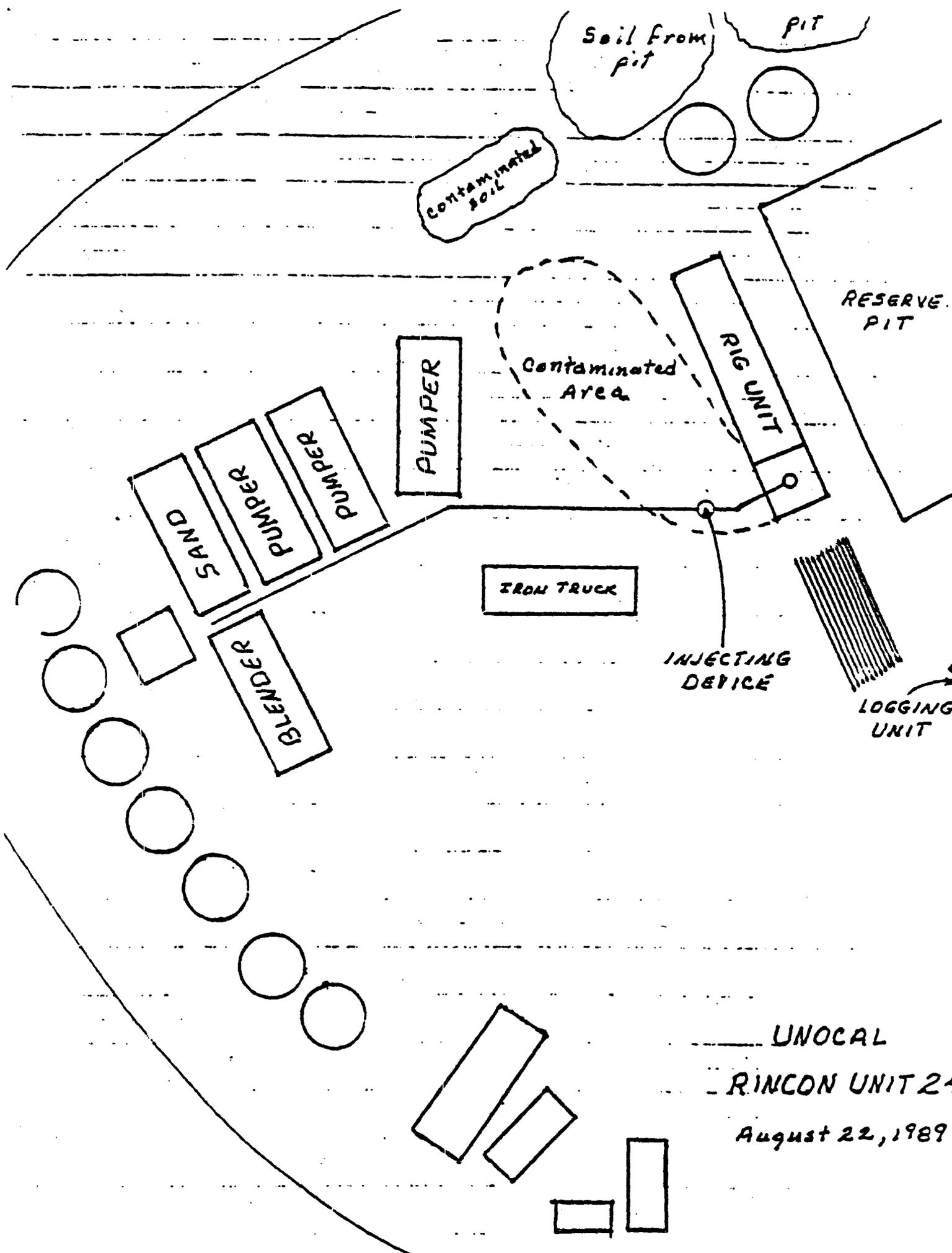
Sincerely,



E.D. Mott, RSO
Core Laboratories

EM/jt

cc. Bill Floyd - NMRPB, Santa Fe, NM
Ron Felows - BLM, Farmington, NM
Bobby Bryan - UNOCAL, Midland, TX
John Connor - Core Labs, Midland, TX



UNOCAL
RINCON UNIT 24
August 22, 1989

LABORATORY TESTS RESULTS
09/01/89

JOB NUMBER: 893042 CUSTOMER: CORE LABORATORIES - HOLLISTER ATTN:

SAMPLE NUMBER: 1 DATE RECEIVED: 08/31/89 TIME RECEIVED: 12:00 SAMPLE DATE: / / SAMPLE TIME: :

PROJECT: SAMPLE FOR SC46 SAMPLE: 1 REM:

SAMPLE NUMBER: 2 DATE RECEIVED: 08/31/89 TIME RECEIVED: 12:00 SAMPLE DATE: / / SAMPLE TIME: :

PROJECT: SAMPLE FOR SC46 SAMPLE: 5 REM:

TEST DESCRIPTION	SAMPLE 1	SAMPLE 2					UNITS OF MEASURE
SCANDIUM 46	<20	<20					pCi/gm

BY: *[Signature]*

420 West 1st Street
Casper, WY 82601
(307) 233-5741

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