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Date: April 10, 1997
Refer to: EM/ER:97-103

APR 1997

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: INTERIM ACTION REPORT FOR TA-21, PRS 21-011(k) ACTIVITIES

Dear Mr. Garcia:

Enclosed for your information please find a copy of the Interim Action Completion Report for Technical Area 21, Potential Release Site 21-011(k), stabilization activities completed in Fiscal Year 1997.

The Department of Energy has reviewed and approved this report. The approval form is attached to the report.

If you have any questions, please call Garry Allen at (505) 667-3394 or Bonnie Koch at (505) 665-7202.

Sincerely,

Jorg Jansen, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/ss

Enclosures: (1) Interim Action Report for TA-21, PRS 21-011(k)
(2) DOE Approval Form

10290

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Interim Action Report for Potential Release Site

21-011(k)

Discharge System

Field Unit 1

Environmental Restoration Project

April 1997

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

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1.0 INTRODUCTION

This report describes the interim action conducted at Potential Release Site (PRS) 21-011(k). The interim action had two objectives. The first was to remove a significant portion of a source of radioactive contamination, and the second was to install storm water control measures as a best management practice (BMP). The interim action plan specified three cleanup level options that would be assessed during the interim action: 15 000, 20 000, and 100 000 counts per minute (cpm) gross gamma activity (LANL 1996, 01-0042). The results of a post-excavation radiological survey indicate that the interim action was effective in reducing the gross gamma activity from greater than 500 000 cpm in the drainage near the outfall discharge point to less than 100 000 cpm over the entire upper drainage area. Storm water controls installed during the interim action have been inspected and approved by Los Alamos National Laboratory's (LANL's) Environment, Safety, and Health (ESH) Division and representatives from the New Mexico Environmental Department (NMED) Agreement in Principle (AIP) group. The storm water controls will require periodic inspections and maintenance to ensure their effectiveness until a final remedy is implemented.

2.0 INTERIM ACTION

Interim action field work began on September 20, 1996, with a geodetic survey. This survey established a 40-ft x 40-ft grid over an area that extended approximately 160 ft west, 280 ft east, 360 ft south, and 120 ft north of the outfall discharge point. The survey area had been previously defined as described in the interim action plan (LANL 1996, 01-0042). This area was subdivided further into 20-ft x 20-ft grid sections using a measuring tape and pin flags to mark the subdivided locations. The grid yielded 384 points (Fig. 2.0-1). Pre-excavation radiation surveys using a shielded 2 x 2 sodium iodide (NaI) probe were performed to document the levels of gross gamma activity. A micro-R-meter was used to document the exposure rates of the survey crews, and a Geiger-Müller (GM) pancake probe was used to document the combined gamma and beta activity at each survey location. The pre-excavation survey results were presented in Fig. 3.0-1 of the interim action plan (LANL 1996, 01-0042). The area of excavation is shown in Fig. 2.0-2 of this report.

To guide the excavation, the results of the pre-excavation radiation surveys were correlated to cesium-137 concentrations. To generate this correlation, soil samples were collected at 15 grid points where the results of the radiation survey indicated low, moderate, and high levels of gross gamma activity. The 15 samples were collected so that a broad range of gamma radiation

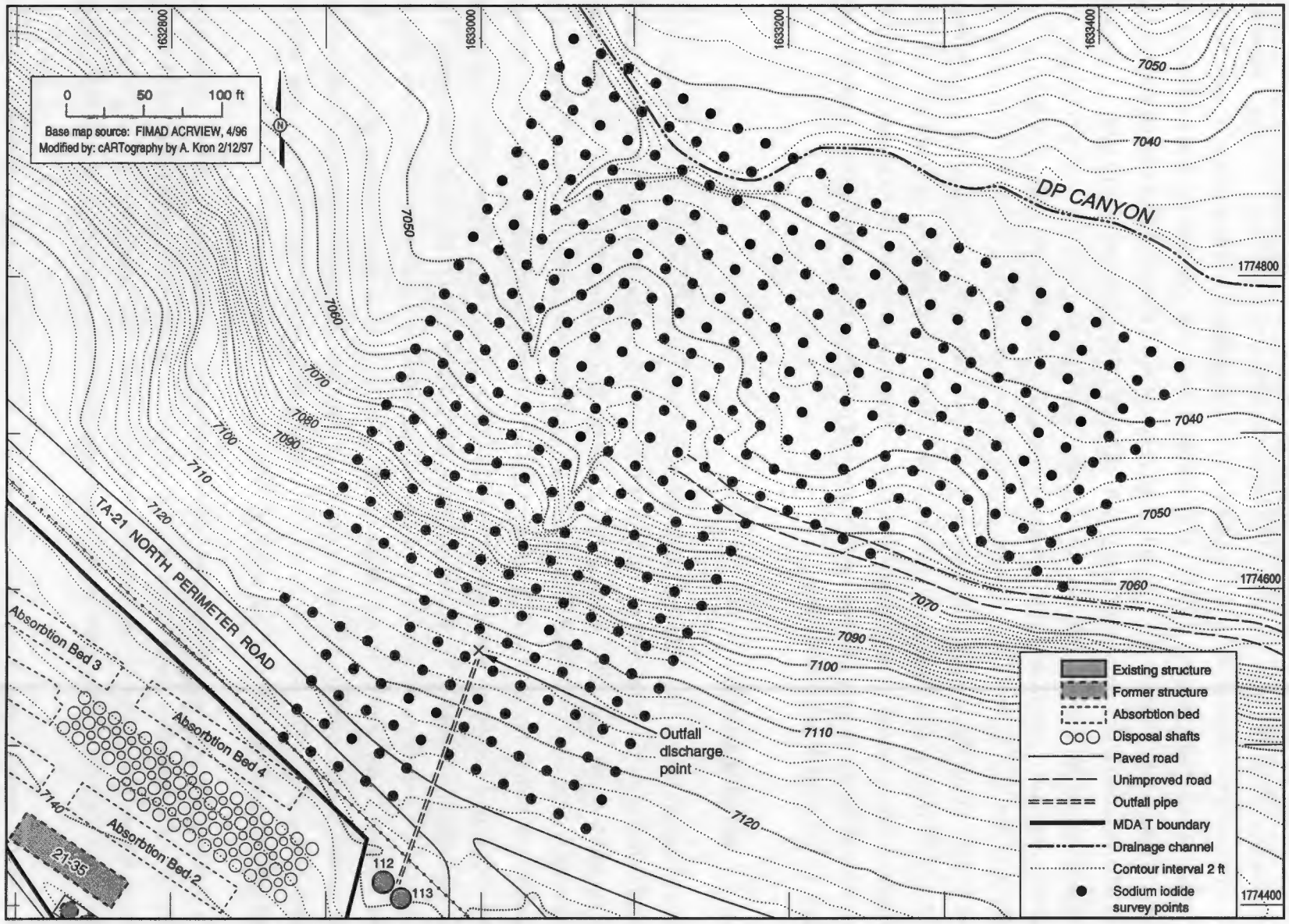

Fig. 2.0-1 Sodium iodide survey points for the pre-investigation survey at PRS 21-011(k).

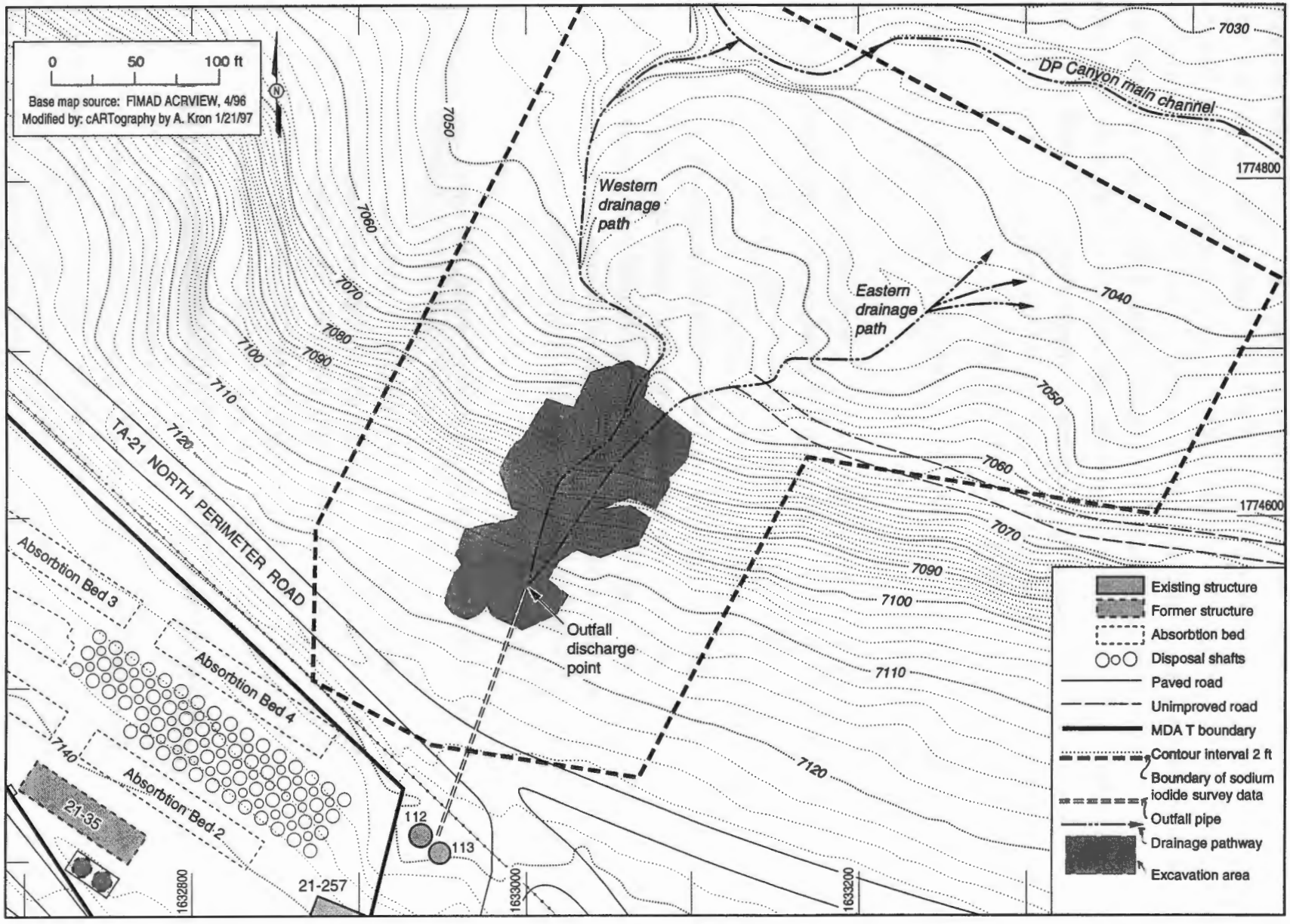

Fig. 2.0-2 Area of excavation for the PRS 21-011(k) interim action.

levels would be represented in the correlation calculation. The samples were analyzed for cesium-137 using gamma spectroscopy, and the results of these analyses (pCi/g) were plotted against the results of the radiation survey (cpm) (Fig. 2.0-3). A linear regression line was plotted, and the equation for this line was used to determine that the 100 000 cpm cleanup level corresponds to approximately 400 pCi/g of cesium-137. While cesium-137 is expected to contribute the greatest activity at this site, smaller concentrations of other radionuclides are anticipated. A calculation was performed to estimate the sum of the fractions of all contributing radionuclides to ensure that the waste acceptance criteria were not exceeded. Based on this calculation, soil having a residual concentration of less than or equal to 400 pCi/g of cesium-137 can be disposed of at an off-site disposal facility.

100,000 cpm = 399 pCi/g

The following excavation activities were performed during the first phase of contaminated soil removal in the outfall area.

- A trackhoe, a front-end loader, and two dump trucks were mobilized to the site to remove soil with gross gamma activity greater than 100 000 cpm. The area to be excavated was wider than the reach of the trackhoe. Therefore, the area was excavated in two halves, such that the trackhoe moved up the eastern side of the drainage and then down the western side. To accomplish this and to safely operate on the steep terrain, the trackhoe was used to remove contaminated soil from the hillside to create temporary benches. The trackhoe operated from these benches as it moved upgrade along the eastern boundary of the excavation area toward the outfall pipe location (see Fig. 2.0-4).

- Contaminated soil could not be loaded directly into the dump trucks because the area where the trucks could safely access the site was too far from the area where the trackhoe needed to operate. As soil was excavated from the eastern half of the excavation area it was placed in the western drainage channel where the terrain was less steep and the front-end loader could safely load the soil into dump trucks. This approach ensured that as an area was excavated, surveyed, and cleared, no contaminated soil from unexcavated areas farther upgradient could recontaminate the cleared area.

- After the trackhoe reached the top of the excavation area (near the outfall discharge point), and after mesa top areas with contamination exceeding 100 000 cpm were excavated, the trackhoe moved downgradient along the western boundary of the excavation area. As the trackhoe moved

cpm	pCi/g
4 958	0.48
6 010	0.41
6 263	0.87
6 274	1.15
6 515	0.25
8 310	8.00
11 122	12.32
16 136	59.43
19 213	31.14
31 313	69.18
66 588	268.35
150 874	96.34
329 877	1 048.10
376 121	2 053.51
476 057	2 433.99

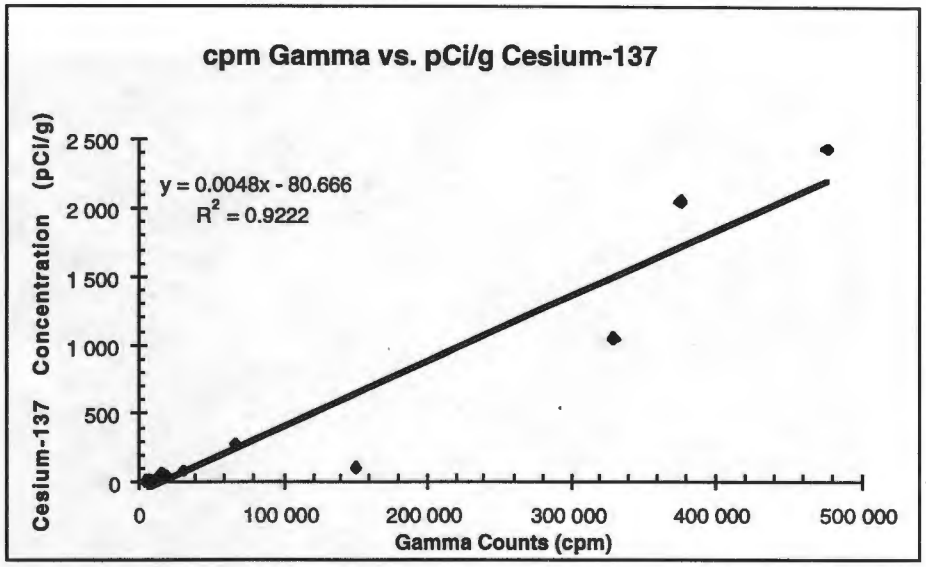

Fig. 2.0-3 Correlation of gross gamma field instrument readings and gamma spectroscopy results.

downgradient, contaminated soil excavated from the western half of the excavation was placed in the western drainage area.

- Radiation surveys were performed in all excavated areas prior to moving the trackhoe to ensure that residual gross gamma activities were below 100 000 cpm. Figure 2.0-5 shows an example of a radiation survey in an excavated area.

- While loading contaminated soil into dump trucks, additional screening was conducted to minimize the volume of soil removed and ensure that all material shipped to Technical Area (TA) 54 for disposal exceeded 100 000 cpm gross gamma activity. This precaution was taken because the steep terrain prevented the equipment from precisely controlling the depth of excavation, which could possibly have resulted in dilution of the soil stockpiled in the western drainage with soil containing less than 100 000 cpm of gross gamma activity. To ensure that dilution had not occurred, each front-end loader bucket (approximately 3 yd^3) was screened with a shielded 2 x 2 NaI probe before being loaded into the dump trucks. Large rocks and boulders (greater than 2 ft in diameter) that were mixed

Fig. 2.0-4 Southward view of the area of excavation at PRS 21-011(k) (the excavator is in the eastern drainage).

Fig. 2.0-5 Radiation survey in the eastern drainage area at PRS 21-011(k).

with the contaminated soil were screened separately. Contamination appeared to be associated with the smaller grain fraction of soils in the outfall, and no larger rocks or boulders were identified as having gross gamma activities exceeding 100 000 cpm. Rocks and boulders with activities below 100 000 cpm were segregated and not loaded into the dump trucks.

The interim action plan called for a phased approach (LANL 1996, 01-0042). First, soil was removed from the site to achieve gross gamma activity levels below the 100 000 cpm clean up level option. Then current conditions were assessed to determine whether additional soil should be excavated to achieve one of the alternate options (20 000 or 15 000 cpm). The estimated volume of soil to be excavated in the 100 000 cpm option was 180 yd^3. The actual volume of contaminated material shipped to TA-54, Area G, was approximately 390 yd^3. This difference in the predicted and actual soil volumes occurred because the depth of contaminated soils was greater than anticipated. The extreme variability of the site in all dimensions made it difficult to accurately characterize the depth of contamination.

The volume of material that would have been generated by continuing to the next option (20 000 cpm gross gamma activity) was then assessed. It was determined that if work proceeded, a significant percentage (greater than 3 000 yds^3) of the LANL on-site low-level radioactive waste disposal capacity would be consumed, and other waste disposal options would have to be investigated. The interim action was therefore limited to removing soil with gross gamma activities greater than 100 000 cpm. Waste management issues are further discussed in Section 5.0 of this report.

3.0 MONITORING AND CONFIRMATORY SAMPLING

A post-excavation radiation survey was performed to confirm that residual gross gamma activity in the excavated area was less than 100 000 cpm. This survey used the same grid and radiation detection instruments described in Section 2.0. A revised map showing residual gross gamma activity in the excavation area was prepared (Fig. 3.0-1). Comparing the pre-excavation figure to the post-excavation figure shows that the area of gross gamma activity that ranged from 500 000 cpm to 100 000 cpm before the excavation has been eliminated, leaving one larger area where gross gamma activities range between 20 000 cpm and 100 000 cpm.

Decisions regarding when to stop excavating were based on the results of radiation surveys, as described in the interim action plan (LANL 1996, 01-0042).

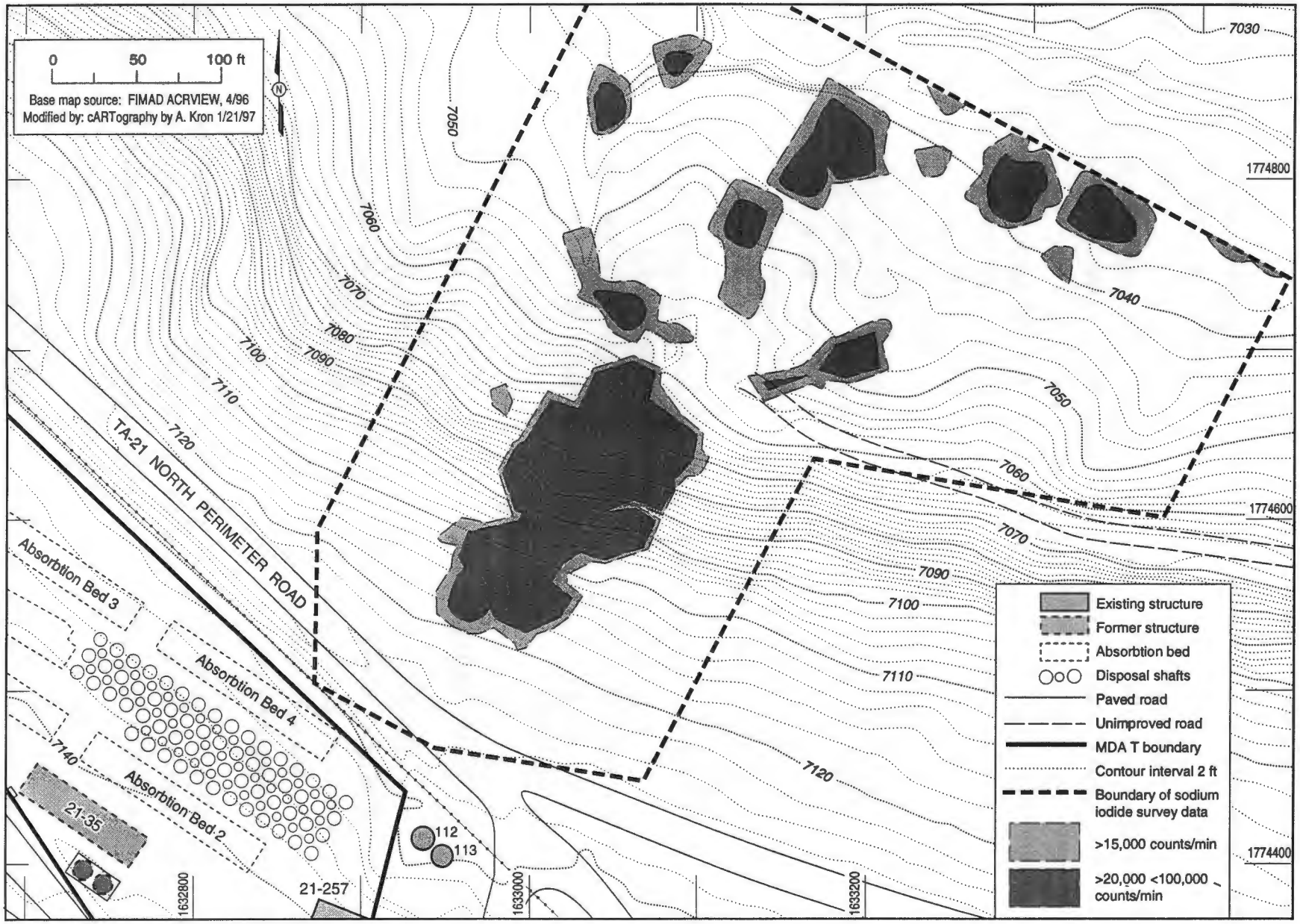

Fig. 3.0-1 Sodium iodide surface data from the post-investigation survey at PRS 21-011(k).

4.0 INSPECTION AND MAINTENANCE

The storm water control measures installed as part of the interim action have been inspected and approved by personnel from LANL's ESH Division and the NMED AIP group. The storm water control measures consisted of both run-on and runoff controls (Fig. 4.0-1). Run-on controls consist of two berms placed upgradient from the excavation area. One of the berms is constructed of sand bags, and the other is constructed of straw bales. Runoff controls consist of a series of berms, a flow dissipation area, and silt fences. Using earth berms, flows from the eastern and western drainages were redirected from their historical flow patterns onto a flat area on the canyon bottom. This flat area is intended to act as a flow dissipation area to allow storm water runoff to lose velocity and drop suspended sediments. A straw bale berm was constructed downgradient from the area were the two drainages discharge the redirected flows onto the flat area. Additional straw bale and sand bag berms were constructed around the entire area. A series of silt fences (designed to prevent silt migration) were constructed downgradient from the flow dissipation area as a final sediment trap before storm water enters the DP Canyon stream channel. Inspections and maintenance will continue under the Storm Water Pollution Prevention Plan.

An on-site waste storage area (discussed in Section 5.0) will be maintained for receiving small volumes of waste resulting from inspections and maintenance of storm water controls and will require periodic inspections in accordance with the site Waste Characterization Strategy Form, the Spill Prevention, Control, and Countermeasures Plan, and the Storm Water Pollution Prevention Plan.

5.0 WASTE MANAGEMENT

The waste characterization approach in the interim action plan called for all material in the excavation area to be characterized for waste disposal before the material was moved (in-situ). Waste characterization samples were collected and analyzed before mobilizing equipment to the site. Waste characterization sample locations are shown in Fig. 5.0-1 and analytical results are presented in Table 5.0-1.

All excavated material (approximately 390 yd^3) was loaded into dump trucks and taken to TA-54, Area G. Shipping manifests and other waste disposal documentation will be submitted to the Records Processing Facility as part of the final interim action project closure.

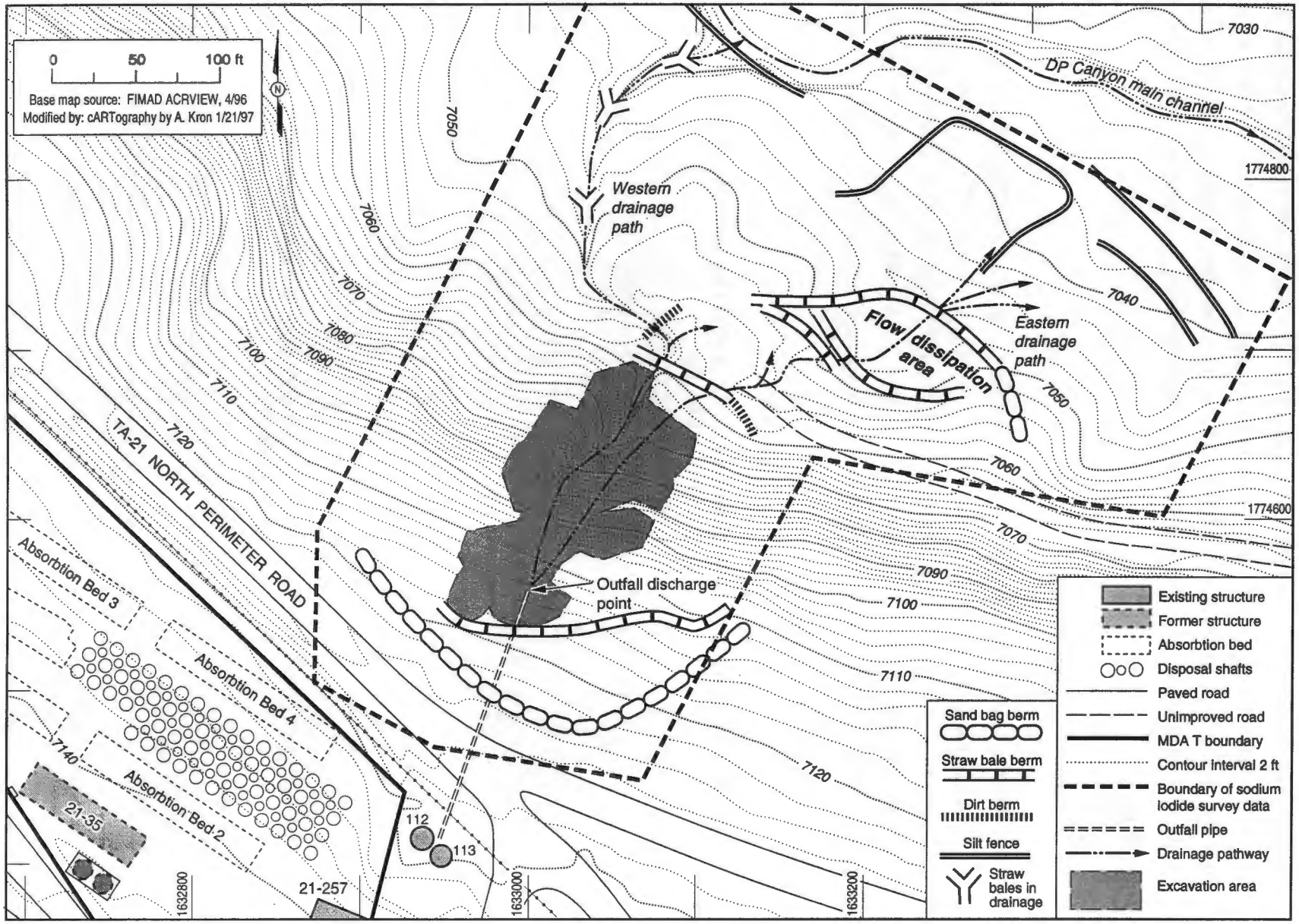

Fig. 4.0-1 Storm water control measures installed during the interim action at PRS 21-011(k).

Approximately 2 yd^3 of low-level radioactive waste remain in containers at an on-site waste storage area. These containers hold miscellaneous personal protective equipment and sampling materials. This waste area will be maintained on site to accept waste generated by continuing inspections and maintenance of storm water controls and for disposal of any residual samples. As these containers are filled, they will be disposed of according to the waste characterization strategy form.

6.0 COST AND SCHEDULE

A comparison of the actual costs and the planned costs is presented in Table 6.0-1. The actual costs are significantly lower, due in part to the nature of the action. The planned costs were based on a tiered approach that addressed progressively lower levels of contamination. The actual interim action only addressed contamination levels greater than 100 000 cpm gross gamma activity. This resulted in lower excavation, waste disposal, and site restoration costs.

TABLE 5.0-1

WASTE CHARACTERIZATION SAMPLE DATA FOR THE INTERIM ACTION AT PRS 21-011(k)

Sample ID	Location ID	Americium-241 (pCi/g)	(+/-)	Cesium-137 (pCi/g)	(+/-)	Plutonium-238 (pCi/g)	(+/-)	Plutonium-239 (pCi/g)	(+/-)	Strontium-90 (pCi/g)	(+/-)
0121-96-0311	21-04700	62	4.39	464	29.4	3.32	0.5	80.7	9.5	225	41
0121-96-0312	21-04694	162	10.5	668	42.3	21.7	3	161	19	460	83
0121-96-0313	21-04677	61.7	4.41	1360	86	2.13	0.33	39.9	4.7	342	62
0121-96-0314	21-04733	1.09	0.185	53.7	3.41	0.2	0.05	24.8	2.9	16.9	3.1
0121-96-0315	21-04734	38.2	2.59	924	58.5	3.8	0.47	53	6.2	282	51
0121-96-0316	21-04580	0.29	1	281	17.8	0.05	0.03	1.97	0.25	98	18

TABLE 6.0-1

COMPARISON OF ACTUAL AND PLANNED COSTS FOR THE INTERIM ACTION AT PRS 21-011(K)

Fiscal Year	Planned Cost	Actual Cost[a]
1996	$296 000	$50 600
1997	$133 000	$103 400
Total	$429 000	$154 000

[a] Actual costs are current through December 1996. Other costs will be incurred from inspection and maintenance of storm water controls and report preparation.

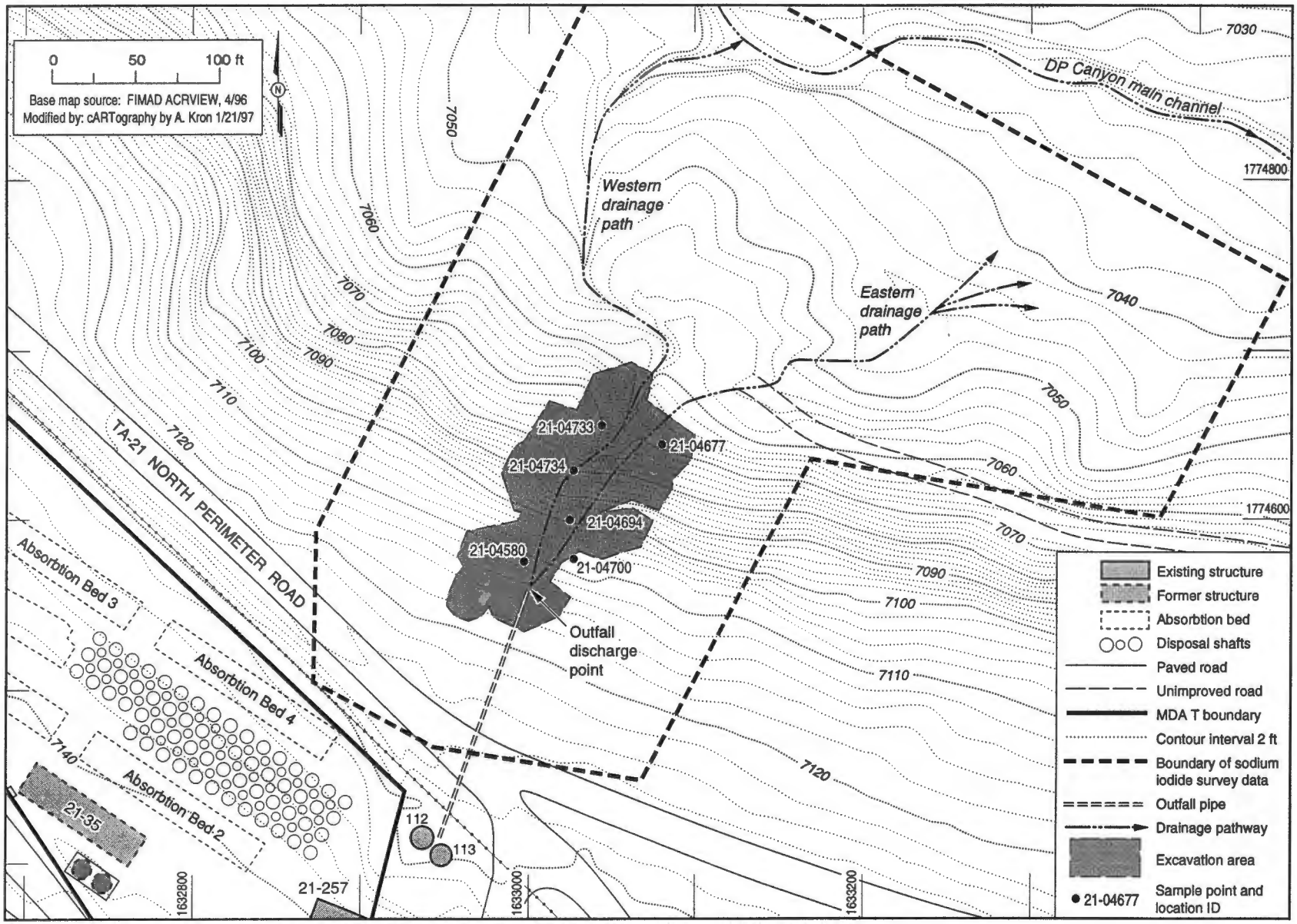

Fig. 5.0-1 Waste characterization sampling points for the interim action at PRS 21-011(k).

7.0 REFERENCES

LANL (Los Alamos National Laboratory), September 1996. "Interim Action Plan for Potential Release Site 21-011(k), Discharge System," Los Alamos National Laboratory Report LA-UR-96-1609, Los Alamos, New Mexico. (LANL 1996, 01-0042)

INTERIM ACTION REPORT
APPROVAL/DISAPPROVAL FORM

PRS(s) 21-001(k)

The undersigned have reviewed the Interim Action Report and believe that the intent and goals of the Interim Action Plan have been met.

FPL for Allen Date 3 April 97

FPC [illegible] Date 4/4/97

.....

I, Theodore J. Taylor, DOE-LAAO, **APPROVE** ✓, **DISAPPROVE** _____ the accompanying Interim Action Report for PRS(s) 21-011(k), TA-21.

The following reasons reflect the decision for disapproval:

_____

_____

_____

_____

_____

_____

_____

Signed: [illegible] for Ted Taylor Date: 4/4/97