

HSWA LANL S/P/98
REP LANL S/P/98

TA 21

MEMORANDUM

To: File

From: Barbara Toth *BT*
Environmental Specialist

Re: No-Further-Action Determination for LANL SWMUs 21-024(m)/21-027(b)

Date: 12-29-98

Enclosed documentation provides with the rationale for no-further-action determination for SWMUs 21-024(m)/21-027(b).

Attachments



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21-024(m)/21-027(b)

Because of their proximity, both PRS 21-024(m) and PRS 21-027(b) were sampled together (LANL, 1994).

Radiological contaminants of concern. Radionuclides detected in soil at levels higher than LANL background or fallout concentrations (Ryti et al., 1998) are: uranium¹ (3.5 to 5.3 $\mu\text{g/g}$; background level is 1.82 $\mu\text{g/g}$), americium-241 (0.007 to 0.041 pCi/g ; fallout level is 0.013 pCi/g), tritium (700 to 2300 pCi/L; fallout level is 760 pCi/L), and plutonium-239 (0.023 to 0.171 pCi/g; fallout level is 0.054 pCi/g). Americium-241, tritium, and plutonium-239 were detected in six of the seven samples and uranium was detected in all seven samples. The maximum soil activity concentrations of americium-241, tritium, and plutonium-239 are below their respective human health risk-based soil screening levels² of 1.9 pCi/g for americium-241, 11,000 pCi/g for tritium, and 2.5 pCi/g for plutonium-239 (EPA, 1996a). The conservatively estimated (Attachment 1) soil activity concentrations are 2.3 pCi/g, 0.09 pCi/g, and 1.8 pCi/g for U-234, -235, and -238, respectively. Except for U-238, these estimated activity concentrations are below the human health risk-based soil screening levels² of 18 pCi/g for U-234 and 0.16 pCi/g for U-235 (EPA, 1996a). The estimated level of U-238 exceeds the most stringent human health risk-based soil screening level of 0.69 pCi/g derived for U-238 and its decay daughters (EPA, 1996a), but this exceedance appears to be minimal considering the degree of conservatism associated with the estimation process.

Ecological resources are considered protected at dose rate of 0.1 rad/day (IAEA, 1992). The benchmark soil activity concentrations that would result in dose rates of 0.1 rad/day to a generic terrestrial wildlife receptor have been estimated at 19 pCi/g for americium-241 and plutonium-239, 3.4E+05 pCi/g for tritium, 20 pCi/g for U-234 and U-235, and 23 pCi/g for U-238 (Higley and Kuperman, 1996). Because these benchmark soil activity concentrations are well below the levels of radionuclides detected at the SWMUs, no health threats are anticipated to ecological receptors from these contaminant levels.

Based on these comparisons, the levels of americium-241, tritium, plutonium-239, uranium-234, -235, and -238 at SWMUs 21-024(m)/21-027(b) are not expected to pose an unacceptable risk to human health and the environment.

Inorganic contaminants of concern. Cadmium and zinc were the only inorganic chemicals detected in soil at concentrations above LANL background levels. Cadmium was detected in 6 out of 7 samples and zinc in all seven. Maximum measured concentrations were 1.1 mg/kg for cadmium (range: 0.49 to 1.1 mg/kg) and 56.6 mg/kg for zinc (range: 27 to 56.6 mg/kg). LANL

¹ U-234, -235, and -238 activity concentrations were conservatively estimated for the SWMUs using the maximum uranium concentration in soil of 5.3 $\mu\text{g/g}$ and the ratio of uranium isotopes determined for location 21-1079 (see Attachment 1 for sampling location and calculations).

² Human health risk-based radionuclide activity concentration in soil generates a one in a million (1E-06) lifetime excess cancer risk to an adult resident. These values were derived based on RAGS HHM Part B with its default exposure parameter values and the 1995 HEAST.

soil background levels are estimated at 0.4 mg/kg for cadmium and 48.8 mg/kg for zinc (Ryti et al., 1998). These cadmium and zinc soil concentrations appear to be close to the upper end of the range representing regional background concentrations for soil of about 1 mg/kg for cadmium and 50 mg/kg for zinc (EPA, 1998a). These maximum cadmium and zinc soil concentration were compared to their respective soil screening levels considered to be protective of human health and the environment under current and future land use scenarios at the sites. To address the potential for human health risks, EPA Region 9 soil screening levels for residential land use scenario were used (37 mg/kg for cadmium and 22,000 mg/kg for zinc) (EPA, 1998b). Because the SWMUs are located in close proximity to a water course, the effect range-low (ERL) sediment concentrations were selected for this comparison (1.2 mg/kg for cadmium and 150 mg/kg for zinc) (EPA, 1996b). Concentrations below the ERL should rarely be associated with adverse effects, thus, transport of cadmium- and zinc-contaminated soil into aquatic systems through storm water is unlikely to pose a threat to aquatic systems that might exist downstream from the sites.

Based on these comparisons, cadmium and zinc soil concentrations at SWMUs 21-024(m)/21-027(b) are not expected to pose an unacceptable risk to human health and the environment.

Organic contaminants of concern. Analyses were carried out for volatile organic and semivolatile organic target analytes (target analytes are listed in Tables III-2 and III-3 of the *Installation Work Plan for Environmental Restoration Program*, Appendix III of Chapter 4) (LANL, 1996). No organic compounds were detected.

References:

U.S. Environmental Protection Agency (EPA). 1996a. *EPA Region 9 Risk Comparison for Radionuclides in Soil*. December 1996.

U.S. Environmental Protection Agency (EPA). 1996b. *Ecotox Thresholds. Eco Update*. EPA 540/F-95/038. January 1996.

U.S. Environmental Protection Agency (EPA). 1998a. *EPA Region 6 Human Health Media-Specific Screening Levels*. August 1998.

U.S. Environmental Protection Agency (EPA). 1998b. *EPA Region 9 Preliminary Remediation Goals (PRGs) 1998*.

Higley Kathryn A. And Roman Kuperman. 1996. *Appendix C: Ecological Benchmarks for Radionuclide Contaminants at RFETS*. In: Final Ecological Risk Assessment Methodology. Kaiser-Hill/Rocky Flats Environmental Technology Site. August 1996.

International Atomic Energy Agency (IAEA). 1992. *Effects of Ionizing Radiation on Plants and*

Animals at Levels Implied by Current Radiation Protective Standards. Technical Report Series No. 332, IAEA, Vienna 1992.

Los Alamos National Laboratory (LANL). 1994. *Phase Report IC. TA_21 Operable Unit RCRA Facility Investigation. Outfalls Investigation.* LA-UR-94-4360. February 1994.

Los Alamos National Laboratory (LANL). 1996. *Installation Work Plan for Environmental Restoration Program.* Revision 6, Los Alamos National Laboratory report LA_96-4529. December 1996.

Ryti, R.T., P.A. Longmire, D.E. Broxton, S.L. Reneau, and E.V. McDonald: *Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory.* September 1998.

Calculation of Uranium Isotopes Ratio for Location 21-1079

	Activity conc. (pCi/g) (1)	Physical half-life (yrs)	Atomic Weight (g/mol)	Time conversion	Min	hrs	days	Act. Conv	Des/min/Ci	Ci/pCi	Ln 2	Atoms/mol	Nominator	Denominator	Mass Conc (g/g)	Ratio (ug/g)	Ratio
U-234	11.1	2.45E+05	234	525600	60	24	365	2.22	2.22E+12	1.00E-12	0.693	6.03E+23	7.425E+14	4.17533E+23	1.7784E-09	0.001778	0.00007
U-235	0.443	7.04E+08	235										8.552E+16		2.0482E-07	0.204815	0.008
U-238	8.26	4.47E+09	238										1.025E+19		2.4557E-05	24.55741	0.992
																24.764	

Mass Concentration = (Activity x Physical half-life x Atomic Weight x Time conversion x Activity conversion)/(ln2 x Atoms/mol)

Calculation of Uranium Isotopes Activity Concentrations for SWMUs 21-024(m) & 21-027(b)

	Mass conc. (g) (2)	Physical half-life (yrs)	Atomic Weight (g/mol)	Time conversion	dpm	1uCi/2.22E6 dpm	Specific Activity (pCi/g)	SWMU Uranium Conc. (pCi/g)						
U-234	3.70E-10	2.45E+05	234	525600	60	24	365	1.39E+10	4.5045E-07	1.00E+12	0.693	6.03E+23	6.243E+09	2.309797002
U-235	4.24E-08	7.04E+08	235					4802490					2163283.9	0.091723236
U-238	5.26E-06	4.47E+09	238					746831.3					336410.51	1.768711879

SWMU uranium activity concentration = Mass concentration x Specific activity

- (1) Source: Phase Report 1B. TA-21 Operable Unit RCRA Facility Investigation. Operable Unit-Wide Surface Soil, Deposition Layer and Filter Building Investigation. .
Volume 1 of 1. Environmental Restoration Program, Los Alamos National Laboratory. LA-UR-94-4390. January 28, 1994, Appendix E, page E-22
- (2) Estimated using uranium isotopic ratio determined based on soil sample from location 21-1079 and the maximum detected total uranium concentration of 5.3 ug/g

Attachment 1

Volume 1 of 1

PHASE REPORT IB

TA-21 OPERABLE UNIT
RCRA FACILITY INVESTIGATION
OPERABLE UNIT-WIDE SURFACE
SOIL, DEPOSITION LAYER AND
FILTER BUILDING INVESTIGATION

28 January 1994

ENVIRONMENTAL RESTORATION PROGRAM
LOS ALAMOS NATIONAL LABORATORY

Los Alamos
NATIONAL LABORATORY

LA-UR-93-4390

Location ID	Sample ID	Depth	Analyte	Request Number	Sample Type	Technique	Sample Value	
21-1079	AAA0239	0-1 in.	PU-239	12759	SU	RAS	22.54	PCI/G
	AAA0239	0-1 in.	U	12759	SU	DNA	24	UG/G
	AAA0240	0-6 in.	PU-238	12759	SU	RAS	0.35	PCI/G
	AAA0240	0-6 in.	PU-239	12759	SU	RAS	47.74	PCI/G
	AAA0240	0-6 in.	U	12759	SU	DNA	27	UG/G
	AAA0240	0-6 in.	U-234	12759	SU	RAS	11.1	PCI/G
	AAA0240	0-6 in.	U-235	12759	SU	RAS	0.443	PCI/G
	AAA0240	0-6 in.	U-238	12759	SU	RAS	8.26	PCI/G
21-1085	AAA0564	0-1 in.	PU-238	13127	SU	RAS	6.97	PCI/G
21-1086	AAA0565	0-1 in.	PU-238	13127	SU	RAS	50.15	PCI/G
	AAA0565	0-1 in.	PU-239	13127	SU	RAS	17.51	PCI/G
	AAA0566	0-6 in.	PU-238	13127	SU	RAS	18.66	PCI/G
	AAA0566	0-6 in.	PU-239	13127	SU	RAS	7.51	PCI/G
21-1092	AAA0567	0-1 in.	PU-238	13127	SU	RAS	1.75	PCI/G
	AAA0568	0-6 in.	PU-238	13127	SU	RAS	0.731	PCI/G
	AAA0568	0-6 in.	PU-239	13127	SU	RAS	3.63	PCI/G
21-1093	AAA0569	0-1 in.	PU-239	13127	SU	RAS	4.28	PCI/G
21-1094	AAA0570	0-1 in.	PU-239	13127	SU	RAS	2.87	PCI/G
21-1095	AAA0126	0-6 in.	PU-239	12702	SU	RAS	2.271	PCI/G
21-1096	AAA0127	0-1 in.	PU-239	12723	SU	RAS	4.98	PCI/G
	AAA0128	0-6 in.	PU-239	12723	SU	RAS	2.129	PCI/G
21-1094	AAA0570	0-1 in.	PU-239	13127	SU	RAS	2.87	PCI/G
21-1100	AAA0129	0-1 in.	PU-239	12723	SU	RAS	2.044	PCI/G
21-1103	AAA0572	0-6 in.	PU-238	13127	SU	RAS	0.932	PCI/G
21-1107	AAA0580	0-1 in.	PU-239	13127	SU	RAS	2.83	PCI/G
	AAA0580	0-1 in.	U	13127	SU	DNA	14.7	UG/G
21-1113	AAA0581	0-1 in.	U	13150	SU	DNA	10.5	UG/G
21-1115	AAA0586	0-1 in.	PU-238	13127	SU	RAS	0.494	PCI/G
21-1116	AAA0588	0-1 in.	PU-239	13127	SU	RAS	5.62	PCI/G
21-1119	AAA0135	0-1 in.	PU-239	12723	SU	RAS	17.645	PCI/G
	AAA0136	0-6 in.	PU-239	12723	SU	RAS	13.814	PCI/G
21-1122	AAA0591	0-1 in.	PU-238	13127	SU	RAS	0.474	PCI/G

see map
for location

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Airport

TA-21 OPERABLE
(ADS 110)
Los Alamos National
Los Alamos, New M

LADP-4
(675 ft)

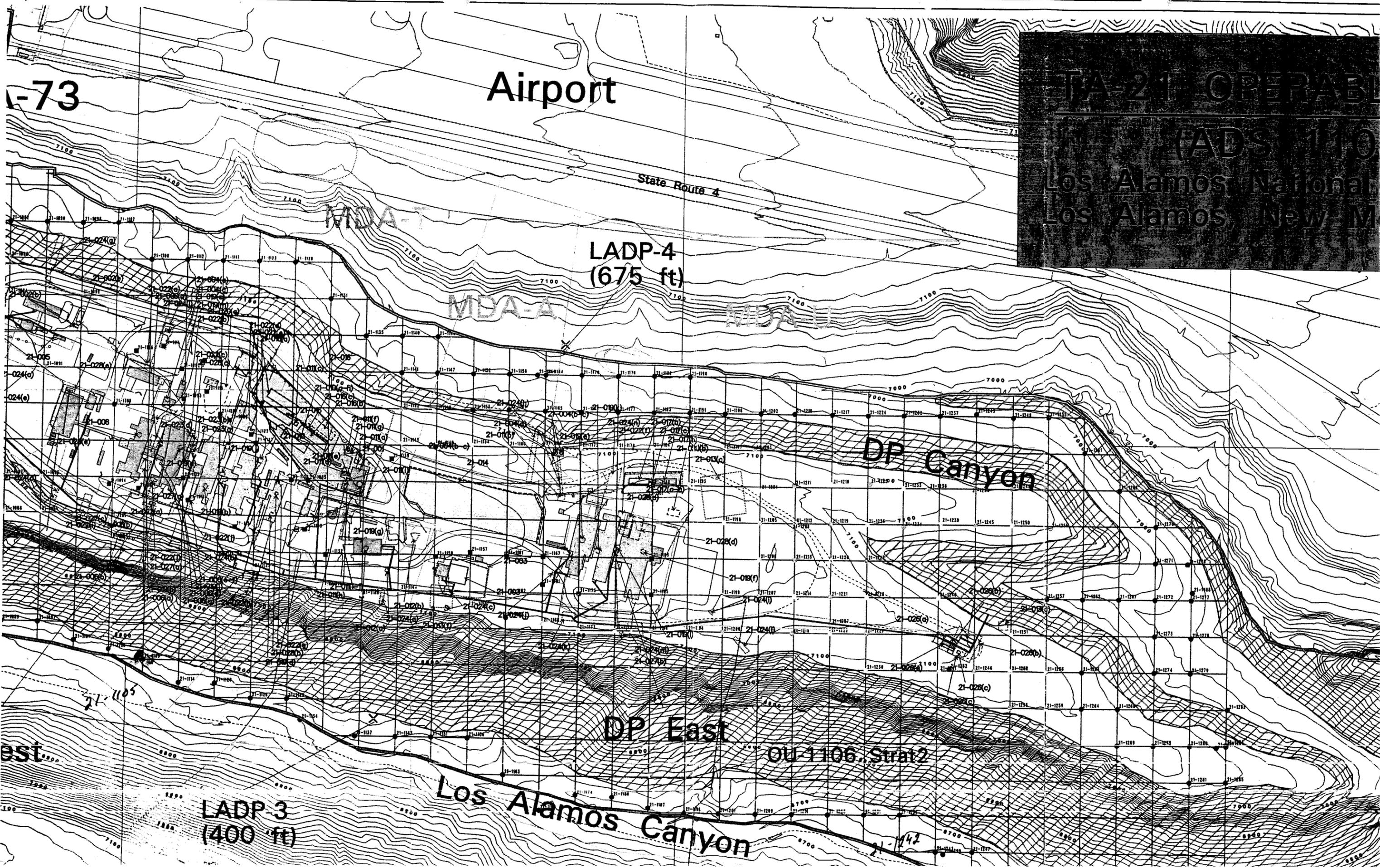
DP Canyon

DP East

OU 1106 Strat 2

LADP 3
(400 ft)

Los Alamos Canyon



TA-0

MDA-B

TA-73

P Road

TA-2

Omega West
Reactor

MDA-V

DP West

OU 1106 Strat3

21-1079

