

General



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Date: July 1, 2004
Refer To: RRES-WQH: 04-108

Ms. Waudell Strickley
Water Enforcement Branch (6EN-WC)
U. S. Environmental Protection Agency, Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

SUBJECT: SUBMITTAL OF DRAFT SITE-SPECIFIC STORM WATER MONITORING PLAN FROM LOS ALAMOS NATIONAL LABORATORY

Dear Ms. Strickley:

The Department of Energy (DOE) and the University of California's (UC) would like to submit for your review and comment the Laboratory's Draft Site-Specific Storm Water Monitoring Plan at Solid Waste Management Units and Other Areas of Concern at Los Alamos National Laboratory. This plan was prepared by the Laboratory's Water Quality and Hydrology Group (RRES-WQH) as a proposed requirement of the pending Federal Facility Compliance Agreement (FFCA). This monitoring plan addresses monitoring storm water on a SWMU-specific scale and specifically covers, sample locations, contaminants of concern, sample methodology, quality control, site drainage maps and reporting requirements. Copies of this Plan have also been sent to the New Mexico Environment Department's (NMED) Hazardous Waste Bureau and Surface Water Quality Bureau for review and comment. Please provide comments by August 1, 2004. Once comments from all parties are received, a meeting will be scheduled to discuss all issues and to arrive at a consensus on a path forward. A final draft will then be prepared and submitted to EPA Region 6 and NMED.

Please contact Mike Saladen at (505) 665-6085 or myself at (505) 667-0013, if you have questions or need additional information regarding the Laboratory's NPDES Permit Programs.

Sincerely,

Steve Veenis
Water Quality & Hydrology Group

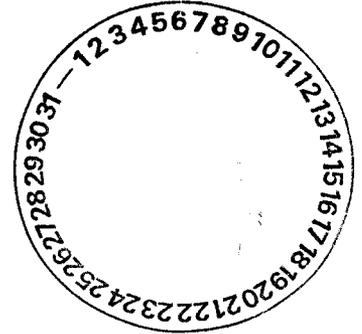
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Attachments: a/s

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RRES-WQH File, w/att., MS K497
IM-5, w/att., MS A150



DRAFT

Site Specific Storm Water Monitoring Plan

**For SWMUs and Other Areas of Concern
At Los Alamos National Laboratory**



**RRES-WQH
July 2004**

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Introduction

This site-specific storm water sampling plan addresses sampling to be conducted at 62 SWMU/AOCs at Los Alamos National Laboratory (the Laboratory) that have been prioritized for investigation in 2004. This plan provides site-specific support to the Storm Water Monitoring Plan developed for watershed scale sampling required under the Laboratory's Multi-Sector General Permit (MSGP). The storm water sampling outlined in this plan will be implemented by the Risk Reduction and Environmental Stewardship - Water Quality and Hydrology group (RRES-WQH).

The MSGP requires that quarterly grab samples be collected from storm water discharges from certain industrial activities including SWMUs (we will collect 4 total samples from separate events where sufficient flow allows). The Laboratory will use Standard Operating Procedure (SOP) 2.01 to determine which SWMUs/AOCs have essentially identical outfalls (erosion scores greater than 40) to prioritize and consolidate sampling efforts on a rotating watershed basis. Hereafter, these SWMUs and AOCs are referred to as "Sites".

The purpose of monitoring the Sites is to determine if there is a release of or transport of water pollutants or hazardous constituents within the meaning of the RCRA program, from a Site into surface water sufficient to cause an applicable water quality standard to be exceeded. Applicable water quality standards that apply to the Laboratory's canyons are the Livestock Watering and Wildlife Habitat standards as adopted by the New Mexico Water Quality Control Commission (WQCC). Per an agreement with the New Mexico Environment Department (NMED), the Laboratory will also use Acute Aquatic Life (Fisheries) Standards for evaluating storm water quality and Best Management Practice (BMP) performance at the Sites. Analytical results from the samples collected under this plan will be evaluated against these standards. Existing soil/sediment data are analyzed to identify potential pollutants at Sites as required by the MSGP. Additionally, DOE will voluntarily share radionuclide data for contaminated sites pursuant to DOE guidance dated September, 1998, entitled *Sharing Radionuclide Information* with states, and pursuant to the Agreement-in-Principle between DOE and the State of New Mexico for Environmental Oversight and Monitoring, dated, November 29, 2000.

Sample Collection

The 62 PRSs will be sampled at the 43 storm water sampling stations listed in Table 1. Sites that have common drainages have been grouped for sample collection. The sampling stations include single stage samplers, ISCO automated samplers, and existing canyon-bottom gaging stations. Storm water runoff samples will be collected at each station four times per year when precipitation produces runoff in volumes large enough to allow for sample collection.

The sample collection requirements for the ISCO automated samplers are summarized in Table 2. The single stage sampler requirements are summarized in Table 3 for the case of no volume collected from laboratory quality control (QC) samples; Table 4 includes the volumes required for laboratory QC samples. Requirements for sites that will be sampled at existing canyon-bottom gaging stations are addressed in the 2004 storm water monitoring plan (in preparation).

Sample Analysis

The storm water analytical suites required for each sampling station are summarized in Attachment 1. The analytical suites are assigned based on requirements contained in the Laboratory Multisector General Permit (MSGP) and Table IV.A.5-1, Surface Water Monitoring and Sampling Stations, of the 2002 NMED compliance order. Additionally, existing surface soil sample data sets provided by the Laboratory's Environmental Restoration Project were evaluated to identify site-specific potential pollutants. In case of insufficient sample volume collection at a site, not all analytical suites will be analyzed. In general, the following prioritization for analysis

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will be followed in the event of insufficient volume: MSGP benchmark analytes, suspended sediment concentration, TAL metals, polychlorinated biphenyl compounds, perchlorate anion, and radionuclides.

The analyte lists, analytical methods, detection limits, and required volumes, containers and preservatives for the inorganic, organic, and radionuclide suites are listed in Tables 5, 6, and 7, respectively.

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Table 1. Storm Water Sampling Sites for 2004 Priority Sites

PRS ID	Sampling Station ID	Location Synonym(s)	Station Type	Nearest Gaging Station ID	Canyon Code	MSGP Sector	Sample at Gaging Station (1)
00-011(d)	B-SMA-1	SS067	SS	E090	REN	K	
00-017	LA-SMA-1	SS0263 SS0264	SS	E030	LAC	K	
01-001(d) 01-003(e)	LA-SMA-5	SS0268	ISCO	E030	LAC	K	
01-002	P-SMA-2	E055.5	Gaging	E056	ACI	K	X
01-003(a)	LA-SMA-3	SS0266	ISCO	E030	LAC	K	
01-006(b)	LA-SMA-2	SS02625	ISCO	E030	LAC	K	
01-001(c) 01-006(c) 01-006(d) 01-006(n)	LA-SMA-4	SS0267	ISCO	E030	LAC	K	
03-009(a)	S-SMA-1	E122.2	Gaging	E122.2	SAN	K	X
03-014(c2)	S-SMA-3	SS122292	ISCO	E121	SAN	K	
03-045(b)	S-SMA-2	E121	Gaging	E121	SAN	K, O	X
03-054(e)	M-SMA-1	SS198	ISCO	E200	MOR	K	
05-001(c)	M-SMA-13	SS205	SS	E204	MOR	K	
20-002(c)	S-SMA-5	SS1245	SS	E124	SAN	K	
21-011(k)	DP-SMA-1	SS0385	SS	E039	DPC	K	
21-013(b) 21-013(g)	LA-SMA-6	SS0269	SS	E030	LAC	K	
26-001	LA-SMA-9	SS0304	SS	E030	LAC	K	
35-003(r) 35-016(l) 35-016(m)	Pratt-SMA-1	SS20142	SS	E201.3	PRA	K	
35-008 35-014(e) 35-016(e) 35-016(i)	M-SMA-10	SS2002	ISCO	E201	MOR	K	
35-016(a)	T-SMA-5	SS20138	SS	E201.5	TEN	K	
35-016(b)	T-SMA-3	SS20134	SS	E201.5	TEN	K	
35-016(d)	T-SMA-4	SS20136	SS	E201.5	TEN	K	
35-016(f)	M-SMA-9	SS2001	SS	E200	MOR	K	
35-016(h)	M-SMA-6	SS1991	ISCO	E200	MOR	K	

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Table 1. Storm Water Sampling Sites for 2004 Priority Sites, Cont'd

PRS ID	Sampling Station ID	Location Synonym(s)	Station Type	Nearest Gaging Station ID	Canyon Code	MSGP Sector	Sample at Gaging Station (1)
35-016(g) 35-016(h)	M-SMA-7	SS1992	ISCO	E200	MOR	K	
35-016(o)	M-SMA-11	SS2003	SS	E201.5	MOR	K	
35-016(p)	M-SMA-12	SS2004	SS	E201.5	MOR	K	
35-016(q)	T-SMA-6	SS20140	SS	E201.5	TEN	K	
42-001(a) 42-001(b) 42-002(a) 42-002(b) 42-002(c) 42-004	M-SMA-5	SS199	SS	E200	MOR	K	
46-004(t) 46-008(g) C-46-001	CDB-SMA-1	SS2185	SS	E218	BUE	K	
46-009(b)	CDB-SMA-2	SS2188	SS	E218	BUE	K	
48-007(c)	M-SMA-3	SS1985	SS	E200	MOR	K	
48-007(f)	M-SMA-2	SS1984	SS	E200	MOR	K	
48-010	M-SMA-4	SS1987	SS	E200	MOR	K	
50-006(a)	T-SMA-1	E201.3	Gaging	E201.3	TEN	K	X
50-006(d)	M-SMA-8	E200	Gaging	E200	MOR	K	X
53-008	LA-SMA-10	SS037	SS	E030	LAC	K	
53-012(a)	LA-SMA-7	SS0290	ISCO	E030	LAC	K	
53-012(c)	LA-SMA-8	SS0301	SS	E030	LAC	K	
53-014	S-SMA-4	SS1238	ISCO	E124	SAN	K	
54-017	CDB-SMA-3	SS2188	Gaging	E248.5	BUE	K, L	X
72-001	S-SMA-6	SS1248	ISCO	E125	SAN	K	
73-001(a)	P-SMA-1	SS058	SS	E060	PUE	K	
C-35-004 C-35-005	T-SMA-2	SS20132	SS	E201.1	TEN	K	

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Table 1 Notes:

BUE= Canada del Buey
DPC = DP Canyon
LAC = Los Alamos Canyon
MOR = Mortandad Canyon
MSGP = Multisector General Permit
PRA = Pratt Canyon
PUE = Pueblo Canyon
REN = Rendija Canyon
SAN = Sandia Canyon
SS = single stage [sampler]
TEN = Ten Site Canyon

(1) Storm water samples for the PRSs indicated will be collected at nearest gaging station under the 2004 LANL storm water monitoring plan.

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Table 2. Storm Water Analytical Suites and Required Volumes for Sites with ISCO Samplers (with quality control samples)

Analytical Suite (1)	Total Required Volume (ml) (2)	350-ml Amber Glass Bottles		1-L Wedge PE Bottles	
		Number required	Preservative	Number required	Preservative
Hg*	200	1	HNO ₃ to pH < 2	-	-
NH ₃ -N*, COD* (3)	300	-	-	1	H ₂ SO ₄ to pH<2 Cool to 4 °C
CN (Total)*	150	-	-	1	NaOH to pH> 12 Cool to 4 °C
SSC	300	-	-	1	Cool to 4 °C
TAL Metals* – total recoverable	400	-	-	1	None
TAL Metals – dissolved (4)	400	-	-	1	HNO ₃ to pH < 2
PCBs (5)	3,000	9	Cool to 4 °C	-	-
ClO ₄ (5)	100	-	-	1	Cool to 4 °C
H-3	350	1	None	-	-
Rad suites (6)	8,000	-	-	8	HNO ₃ to pH < 2
HE	2,240	7	Cool to 4 °C	-	-

Table 2 Notes:

ClO₄ = perchlorate anion
 CN = cyanide
 COD = chemical oxygen demand
 H-3 = tritium
 HE = high explosives
 Hg = mercury
 L = Liter
 ml = milliliter
 NH₃-N = ammonia [reported as nitrogen]
 PCBs = polychlorinated biphenyl [compounds]
 PE = polyethylene
 SSC = suspended sediment concentration
 TAL = target analyte list

- not applicable

* Sector K benchmark analyte(s)

- Analytical suites are listed in the order that the bottles will be filled by the automated sampler.
- Total required volume for analysis, including volume required for laboratory quality control samples.
- NH₃-N (ammonia reported as nitrogen) and COD (chemical oxygen demand) may be collected in the same container.
- Laboratory will filter a portion of the TAL Metals sample for total recoverable analysis.
- Collected as required by the site-specific sampling plan (see Table 1).
- Radionuclide suites are Am-241, gamma spectroscopy, gross alpha, gross beta, iso-Pu (Pu-238, Pu-239,240), Iso-U (U-234, U-235, U-238), and Sr-90.

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Table 3. Storm Water Analytical Suites and Required Volumes for Sites with Single Stage Samplers (no quality control samples)

Analytical Suite (1)	Total Required Volume (ml) (2)	1-Gallon Glass Bottles		1-Gallon PE Bottles	
		Number required	Preservative	Number required	Preservative
H-3	500	1	None	-	-
NH ₃ -N*, COD* (3)	200		H ₂ SO ₄ to pH<2 Cool to 4 °C	-	-
CN (Total)*	100		NaOH to pH> 12 Cool to 4 °C	-	-
TAL Metals* & Hg* – total recoverable	300	1	HNO ₃ to pH < 2	-	-
TAL Metals & Hg – dissolved (4)	300		None	-	-
ClO ₄ (5)	100		Cool to 4 °C	-	-
PCBs only (5, 6)	1,000	1	Cool to 4 °C	-	-
PAHs only (5, 6)	1,000	1	Cool to 4 °C	-	-
PCBs & PAHs (5, 6)	1,000	1	Cool to 4 °C	-	-
	1,000		Cool to 4 °C	-	-
PAHs & 4,4'-DDT (5, 6)	1,000	1	Cool to 4 °C	-	-
	1,000		Cool to 4 °C	-	-
SSC	300	-	-	1	Cool to 4 °C
Rad suites (7)	4,000	-	-	1	HNO ₃ to pH < 2

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Table 3 Notes:

ClO₄ = perchlorate anion
CN = cyanide
COD = chemical oxygen demand
H-3 = tritium
HE = high explosives
Hg = mercury
L = Liter
ml = milliliter
NH₃-N = ammonia [reported as nitrogen]
PAHs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyl [compounds]
PE = polyethylene
SSC = suspended sediment concentration
TAL = target analyte list

- not applicable

* Sector K benchmark analyte(s)

1. Analytical suites are listed in prioritization order if insufficient storm water volume is collected for glass and/or PE bottles.
2. Total required volume for analysis not including volume required for laboratory quality control samples. Storm water collected in 1-gallon bottles will be transferred to appropriate containers and preserved for shipment to laboratory.
3. NH₃-N (ammonia reported as nitrogen) and COD (chemical oxygen demand) may be collected in the same container.
4. Laboratory will filter a portion of the TAL Metals sample for total recoverable analysis.
5. Collected as required by the site-specific sampling plan (see Table 1).
6. Only one 1-gallon bottle is required to collect organic suites at each site. Storm water collected in the 1-gallon bottle will be transferred to appropriate number of 1-L containers - depending on combination of organic suites required - for shipment to laboratory.
7. Radionuclide suites are Am-241, gamma spectroscopy, gross alpha, gross beta, iso-Pu (Pu-238, Pu-239,240), Iso-U (U-234, U-235, U-238), and Sr-90.

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Table 4. Storm Water Analytical Suites and Required Volumes for Sites with Single Stage Samplers (with quality control samples)

Analytical Suite (1)	Total Required Volume (ml) (2)	1-Gallon Glass Bottles		1-Gallon PE Bottles	
		Number required	Preservative	Number required	Preservative
H-3	1,000	1	None	-	-
NH ₃ -N*, COD* (3)	400		H ₂ SO ₄ to pH<2 Cool to 4 °C	-	-
CN (Total)*	200		NaOH to pH> 12 Cool to 4 °C	-	-
TAL Metals* & Hg* – total recoverable	600	1	HNO ₃ to pH < 2	-	-
TAL Metals & Hg – dissolved (4)	600		None	-	-
ClO ₄ (5)	200		Cool to 4 °C	-	-
PCBs only (5, 6)	3,000	1	Cool to 4 °C	-	-
PAHs only (5, 6)	3,000	1	Cool to 4 °C	-	-
PCBs & PAHs (5, 6)	2,000	1	Cool to 4 °C	-	-
	2,000		Cool to 4 °C	-	-
PAHs & 4,4'-DDT (5, 6)	3,000	2	Cool to 4 °C	-	-
	3,000		Cool to 4 °C	-	-
SSC	300	-	-	1	Cool to 4 °C
Rad suites (7)	8,000	-	-	2	HNO ₃ to pH < 2

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Table 4 Notes:

ClO₄ = perchlorate anion
CN = cyanide
COD = chemical oxygen demand
H-3 = tritium
HE = high explosives
Hg = mercury
L = Liter
ml = milliliter
NH₃-N = ammonia [reported as nitrogen]
PAHs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyl [compounds]
PE = polyethylene
SSC = suspended sediment concentration
TAL = target analyte list

- not applicable

* Sector K benchmark analyte(s)

1. Analytical suites are listed in prioritization order if insufficient storm water volume is collected for glass and/or PE bottles.
2. Total required volume for analysis *not* including volume required for laboratory quality control samples. Storm water collected in 1-gallon bottles will be transferred to appropriate containers and preserved for shipment to laboratory.
3. NH₃-N (ammonia reported as nitrogen) and COD (chemical oxygen demand) may be collected in the same container.
4. Laboratory will filter a portion of the TAL Metals sample for total recoverable analysis.
5. Collected as required by the site-specific sampling plan (see Table 1).
6. Only one 1-gallon bottle is required to collect organic suites at each site. Storm water collected in the 1-gallon bottle will be transferred to appropriate number of 1-L containers - depending on combination of organic suites required - for shipment to laboratory.
7. Radionuclide suites are Am-241, gamma spectroscopy, gross alpha, gross beta, iso-Pu (Pu-238, Pu-239,240), Iso-U (U-234, U-235, U-238), and Sr-90.

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Table 5. Requirements for Inorganic Analytical Suites

Analyte	Analytical Method	Required MQL (1) (µg/l)	Required MDL (2) (µg/l)	Required Sample Volume (3) (ml)	Container	Preservative
TAL Metals (4)						
Ag	EPA 200.8	2	0.6	100	PE	HNO ₃ to pH < 2
Cd		1	0.3			
Ni		5	1.5			
Pb		5	1.5			
Sb		60	18.2			
Se		5	1.5			
Tl		10	3.0			
Al	EPA 200.7	100	30.3	100	PE	HNO ₃ to pH < 2
As		10	1.73.0			
Ba		100	30.3			
Be		5	1.5			
Ca		--	--			
Co		50	15.2			
Cr		10	3.0			
Cu		10	3.0			
Fe						
K		--	--			
Mg		--	--			
Mn		--	--			
Mo (5)		--	--			
Na		--	--			
V	50	15.2				
Zn	20	6.1				
Hg	EPA 245.1	0.2	0.06	100	Amber Glass	HNO ₃ to pH < 2
General Inorganics						
ClO ₄ (6)	EPA: 314.0	4.0	--	100	PE or Glass	None
	LC/MS/MS	0.25	--			
CN (Total)	EPA:335.3			100	PE	NaOH to pH> 12 Cool to 4 °C
COD	EPA: 410.4			100	PE	H ₂ SO ₄ to pH<2 Cool to 4 °C
NH ₃ -N	EPA:350.1			100	PE	H ₂ SO ₄ to pH<2 Cool to 4 °C
SSC	EPA 160.2			300	PE or Glass	Cool to 4 °C

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Table 5 Notes:

ClO₄ = perchlorate anion
CN = cyanide
COD = chemical oxygen demand
EPA = Environmental Protection Agency
LC = Liquid chromatography
MDL = method detection limit
µg/l = microgram per liter
ml = milliliter
MQL = minimum quantitation limit
MS = mass spectrometry
NH₃-N = ammonia [reported as nitrogen]
PE = polyethylene
SSC = suspended sediment concentration
TAL = target analyte list

1. Minimum quantitation limit (MQL) based on requirements in NPDES Permit No. NM0028355.
2. Required method detection limit (MDL) is based on NPDES Permit No. NM0028355 requirements for minimum quantitation limit (MQL), where MQL = 3.3 x MDL.
3. Required volume does not include volume required for laboratory quality control (QC) samples. Typically 2-3 times the required volume should be collected to allow for laboratory QC sample analysis.
4. TAL metals are analyzed for both dissolved (filtered) and total recoverable (unfiltered) concentrations.
5. Molybdenum has been added to the TAL metal suite to meet the requirements of the 2002 NMED Order Table IV.A.5-1.
6. Perchlorate anion (ClO₄) is analyzed by two methods: ion chromatography (EPA 314:0); and liquid chromatography/mass spectrometry/mass spectrometry (developmental). The LC/MS/MS method provides a lower detection limit than the current EPA ion chromatography method.

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Table 6. Requirements for Organic Analytical Suites

Analyte	Analytical Method	EQL (µg/l)	Required Sample Volume (1) (ml)	Container	Preservative
PAHs					
Acenaphthene	EPA:610 (HPLC)	18	1,000	Amber Glass	Cool to 4 °C
Acenaphthylene		23			
Anthracene		6.6			
Benzo(a)anthracene		0.2			
Benzo(a)pyrene		0.2			
Benzo(b)fluoranthene		0.2			
Benzo(ghi)perylene		0.8			
Benzo(k)fluoranthene		0.2			
Chrysene		1.5			
Dibenzo(a,h)anthracene		0.3			
Fluoranthene		2.1			
Fluorene		2.1			
Indeno(1,2,3-cd)pyrene		0.5			
Naphthalene		18			
Phenanthrene		6.4			
Pyrene		2.7			
PCBs					
Aroclor-1016	EPA:608	0.1	1,000	Amber Glass	Cool to 4 °C
Aroclor-1221					
Aroclor-1232					
Aroclor-1242					
Aroclor-1248					
Aroclor-1254					
Aroclor-1260					
Pesticides					
4,4'-DDT	EPA:608	0.1	1,000	Amber Glass	Cool to 4 °C

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Table 6. Requirements for Organic Analytical Suites, Continued

Analyte	Analytical Method	EQL (µg/l)	Required Sample Volume (1) (ml)	Container	Preservative
High Explosives					
Amino-2,6-dinitrotoluene [4-]	SW-846:8330	0.1	770	Amber Glass	Cool to 4 °C
Amino-4,6-dinitrotoluene [2-]					
Dinitrobenzene [1,3-]					
Dinitrotoluene [2,4-]					
Dinitrotoluene [2,6-]					
HMX					
Nitrobenzene					
Nitrotoluene [2-]					
Nitrotoluene [3-]					
Nitrotoluene [4-]					
RDX					
Tetryl					
Trinitrobenzene [1,3,5-]					
Trinitrotoluene [2,4,6-]					

Table 6 Notes:

EPA = Environmental Protection Agency
 EQL = estimated quantitation limit
 HPLC = high performance liquid chromatography
 µg/l = microgram per liter
 ml = milliliter
 PAH = polynuclear aromatic hydrocarbon
 PCB = polychlorinated biphenyl [compound]

1. Required volume does not include volume required for laboratory quality control (QC) samples. Typically 2-3 times the required volume should be collected to allow for laboratory QC sample analysis.

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Table 7. Requirements for Radionuclide Analytical Suites

Analyte	Analytical Method	Detection Limit (1) (pCi/l)	Required Sample Volume (2) (ml)	Container	Preservative
Am-241	Alpha Spectrometry	0.05	1,000	PE or Glass	HNO ₃ to pH < 2
Pu-238		0.05			
Pu-239,240		0.05			
U-234	Alpha Spectrometry	1.0	500	PE or Glass	HNO ₃ to pH < 2
U-235,236		1.0			
U-238		0.5			
H-3	LSC	50	250	Glass	None
Sr-90	GPC	0.5	1,000	PE or Glass	HNO ₃ to pH < 2
Co-60	EPA:901.1 (Gamma Spectroscopy)	8	1,000	PE or Glass	HNO ₃ to pH < 2
Cs-137		8			
K-40		100			
Na-22		10			
Np-237		50			
Gross alpha	EPA:900	3	500	PE or Glass	HNO ₃ to pH < 2
Gross beta		3			

Table 7 Notes:

EPA = Environmental Protection Agency
 GPC = gas proportional counting
 LSC = liquid scintillation counting
 ml = milliliter
 pCi/l = picoCurie per liter
 PE = polyethylene

1. Detection limits determined from a review of 2002 and 2003 LANL environmental surveillance data for storm water runoff samples.
2. Required volume does not include volume required for laboratory quality control (QC) samples. Typically 2-3 times the required volume should be collected to allow for laboratory QC sample analysis.

Attachment 2

Evaluation of Site-Specific Surface Soil Sample Data for Contaminants of Potential Concern

Site-specific surface soil sample data sets collected by the Laboratory Environmental Restoration (ER) Project at the 2004 priority potential release sites (PRSS) were evaluated to identify contaminants of potential concern (COPCs). The results of the soil COPC evaluation were used to guide the selection of analytical suites for the storm water runoff sampling stations (see Attachment 1).

COPC Evaluation

The number of surface soil samples collected at each of the 61 priority PRSS is summarized in Table 2-1, which also lists the analytical suites for which data are available at each PRS. Eighteen of the 61 PRSS have no surface soil sample data available. The decision logic flow diagram for identifying COPCs is shown in Figure 2-1. The steps in the process for evaluating and identifying COPCs are as follows.

- Sample information obtained from the ER database (ERDB) is filtered to exclude samples that are not either soil or sediment matrix; that are subsurface (top depth > 1 ft and/or bottom depth > 1.5 ft); or that have been excavated.
- The analytical data for the surface soil samples is filtered to exclude mobile laboratory, x-ray fluorescence (XRF), toxicity characteristic leaching procedure (TCLP), pH, moisture, and tritium results. Gamma spectroscopy results for samples with alpha spectrometry results for the same radionuclide are excluded. Analyte results that are not detected or that have been rejected by data validation are flagged as "Not a COPC."
- Detected analyte results are screened by analytical suite. Inorganic and radionuclide results that are less than the soil background value are flagged as "Not a COPC." Organic results that are detected are considered to be greater than background and are retained as COPCs.
- At each PRS, the frequency of detection for each analyte is calculated. If less than five surface samples were collected at a PRS for an analytical suite, there is insufficient data to identify COPCs. If five or more surface samples were collected for a given analytical suite and if the frequency of detection is greater than 25%, the analyte is identified as a COPC at the PRS.
- Polynuclear aromatic hydrocarbons (PAHs) are identified as COPCs if one or more PAHs have a frequency of detection greater than 25% and benzo(a)pyrene is also detected at the PRS. (Benzo(a)pyrene is the only PAH for which there is a water quality standard applicable to storm water runoff.)
- Detected semivolatile or volatile organic compounds are identified as COPCs only if there is an applicable water quality standard for the chemical.
- Detected pesticides are identified as COPCs only if there is an applicable water quality standard for the chemical.

The COPCs identified in surface soil samples at each PRS, grouped by sampling station, are summarized in Table 2-2.

Sampling Suite Assignment

The sampling suite assignment to each surface water sampling station is based on evaluation of requirements contained in the Laboratory Multisector General Permit (MSGP) and the 2002 NMED compliance order, Table IV.A.5-1, Surface Water Monitoring and Sampling. Additionally, the results of the COPC evaluation at each PRS are taken into consideration.

The decision logic flow diagram for sampling suite assignment is shown in Figure 2-2. The suite assignments are made by considering the following five cases in the order presented below.

Case 1: Insufficient surface soil samples associated with the sampling station.

If there are insufficient surface soil samples (none or less than five), the sampling suites are determined by the sampling location. If the storm water samples are to be collected at the nearest downstream gaging station, the suites assigned are those required by the MSGP and Table IV.A.5-1, as applicable. If the storm water samples are to be collected at the site, the MSGP Sector K benchmark suites and the storm water runoff suites required for the nearest downstream gaging station in Table IV.A.5-1, if applicable, are assigned.

Case 2: Storm water will be sampled at the nearest downstream gaging station.

If the storm water samples are to be collected at the nearest downstream gaging station, the default suites assigned are those required by the MSGP and Table IV.A.5-1, as applicable. If COPC suites that are not included in the gaging station suites are identified for the PRS(s) associated with the sampling station, then the COPC suites are also collected at the gaging station.

Case 3: Only non-HSWA PRSs are associated with the sampling station.

If only non-HSWA PRSs (i.e., areas of concern) are associated with the sampling station, only the applicable MSGP benchmark suites are assigned. At a minimum, the Sector K benchmark suites are collected.

Case 4: No COPCs are identified at the PRS(s) associated with the sampling station.

If no COPCs are identified at the PRSs associated with the sampling station, the default suites assigned are the MSGP benchmark suites and Table IV.A.5-1 required suites, as applicable, for the nearest downstream gaging station. If a potential COPC suite was eliminated at the PRS based on evaluation of five or more surface soil samples, then that COPC suite is excluded unless it is required by the MSGP.

Case 5: COPCs are identified at the PRS(s) associated with the sampling station.

If COPCs are identified at the PRS(s) associated with the sampling station, the COPC suites are compared with the sampling suites for the nearest downstream gaging station required by Table IV.A.5-1, as applicable. If site COPCs are identified that are not included in the gaging station suites, then the COPC suites in addition to the MSGP benchmark suites and the Table IV.A.5-1 required suites are assigned to the sampling station. If a potential COPC suite was eliminated at the PRS based on evaluation of five or more surface soil samples, then that COPC suite is excluded unless it is required by the MSGP.

The sampling suites assigned to each 2004 priority PRS sampling station are summarized in Attachment 1.

Table 2-1. Surface Soil Samples Collected at 2004 Priority Potential Release Sites (1)

PRS ID	Inorganics	Organics						Radionuclides					
	Metals	SVOA	VOA	PCBs	Pesticides	Herbicides	HE	Am-241	Gamma Spec	Iso-Pu (2)	Iso-Th (3)	Iso-U (4)	Sr-90
00-011(d)	15						16						
00-017	12	3	3	3	3				3	3		3	
01-001(c)	218	166	1						63	195		108	
01-001(d)	270	165	1						92	246		118	
01-002	21	16	13						14	14		14	14
01-003(a)	185	133	1						58	162		104	
01-003(e)	184	132	1						58	161		105	
01-006(b)	181	129	1						58	158		103	
01-006(c)	181	129	1						58	158		103	
01-006(d)	181	129	1						58	158		103	
01-006(n)	181	129	1						58	158		103	
03-009(a)													
03-014(c2)	28	33	22	35	27	29			21	22		22	16
03-045(b)	44			6									
03-054(e)	6	6	2	6					6	6		6	
05-001(c)	20						1		2	20		20	
20-002(c)	17						17		18			18	17
21-011(k)	24	15	28	3	3			86	99	107	2	10	106
21-013(b)	51	60	18					31	52	66	3	22	28
21-013(g)	51	60	18					31	52	66	3	26	28
26-001													
35-003(r)	5	7		7	5			3	5	17	1	17	4
35-008	6	10	1	2	1				5	5		5	
35-014(e)	4	6		2	2				5				
35-016(a)	1	2							1	3		3	

PRS ID	Inorganics	Organics						Radionuclides					
	Metals	SVOA	VOA	PCBs	Pesticides	Herbicides	HE	Am-241	Gamma Spec	Iso-Pu (2)	Iso-Th (3)	Iso-U (4)	Sr-90
35-016(b)		1	1						4	2		4	
35-016(d)	6	6	1						7	8		8	
35-016(e)													
35-016(f)		1	1										
35-016(g)	7	8							7				
35-016(h)	2	1	1						1				
35-016(i)													
35-016(l)	4	3		3					4	4		4	
35-016(m)	3	2								2		2	
35-016(o)	11	19		15					11	16		16	10
35-016(p)		2							1	2		2	
35-016(q)			1						5	4		4	
42-001(a)													
42-001(b)													
42-002(a)													
42-002(b)													
42-002(c)													
42-004													
46-004(t)													
46-008(g)	5	5	4	5									
46-009(b)													
48-007(c)		2	1	2				3	6	3	3	3	
48-007(f)	3	2	1	2				4	2	4	4	4	
48-010	12	9	9					3	12	14	12	14	9
50-006(a)	65	65	65	23				19	65	65		65	65
50-006(d)	28	26	18	10					28	28		28	28

PRS ID	Inorganics	Organics						Radionuclides					
	Metals	SVOA	VOA	PCBs	Pesticides	Herbicides	HE	Am-241	Gamma Spec	Iso-Pu (2)	Iso-Th (3)	Iso-U (4)	Sr-90
53-008	14								14				
53-012(a)													
53-012(c)													
53-014													
54-017	59			59	59			59	59	59	59	59	59
72-001	8												
73-001(a)	21	21	3	21	21				14	14			14
C-35-004													
C-35-005													
C-46-001													

Table 2-1 Notes:

Gamma spec = gamma spectroscopy [analytes]
 HE = high explosives
 PCB = polychlorinated biphenyl [compound]
 PRS = potential release site
 SVOA = semivolatile organic analyte
 VOA = volatile organic analyte

1. Blank cells indicate that no samples were collected for the indicated suite.
2. Isotopic plutonium suite: Pu-238 and Pu-239,240.
3. Isotopic thorium suite: Th-228, Th-230, and Th-232.
4. Isotopic uranium suite: U-234, U-235, and U-238.

Table 2-2. Summary of Contaminants of Potential Concern Evaluation for 2004 Priority Potential Release Sites (1)

PRS ID	Sampling Station	COPCs	Inorganics	Organics						Radionuclides				
			TAL Metals	PAHs	SVOA	PCBs	4,4'-DDT	HE	Herbicides	Am-241	Iso-Pu (2)	Iso-U (3)	Sr-90	Gamma
00-011(d)	B-SMA-1	Al, Be, Pb, Zn	Yes	-	-	-	-	No	-	-	-	-	-	
00-017	LA-SMA-1	Pb	Yes	<5	<5	<5	-	-	-	<5	<5	-	<5	
01-001(d)	LA-SMA-5	Hg, Pb, Iso-Pu, Iso-U	Yes	No	-	-	-	-	-	Yes	Yes	-	No	
01-003(e)														
01-002	P-SMA-2	Pb, Zn, Iso-Pu, Iso-U	Yes	No	-	-	-	-	-	Yes	Yes	No	No	
01-003(a)	LA-SMA-3	Hg, Pb, Iso-Pu, Iso-U	Yes	No	-	-	-	-	-	Yes	Yes	-	No	
01-006(b)	LA-SMA-2	Hg, Pb, Iso-Pu, Iso-U	Yes	No	-	-	-	-	-	Yes	Yes	-	No	
01-001(c)	LA-SMA-4	Hg, Pb, Iso-Pu, Iso-U	Yes	No	-	-	-	-	-	Yes	Yes	-	No	
01-006(c)														
01-006(d)														
01-006(n)														
03-009(a)	S-SMA-1	No data	-	-	-	-	-	-	-	-	-	-	-	
03-014(c2)	S-SMA-3	Ag, Cd, Cr, Cu, Hg, Pb, Zn, PCBs, Iso-Pu, Iso-U	Yes	No	Yes	No	-	No	-	Yes	Yes	No	No	
03-045(b)	S-SMA-2	Zn, PCBs	Yes	-	Yes	-	-	-	-	-	-	-	-	
03-054(e)	M-SMA-1	Zn, PCBs, Iso-Pu	Yes	No	Yes	-	-	-	-	Yes	No	-	No	
05-001(c)	M-SMA-13	Iso-Pu, Iso-U	No	-	-	-	<5	-	-	Yes	Yes	-	<5	
20-002(c)	S-SMA-5	Cr, Zn	Yes	-	-	-	No	-	-	-	No	No	No	
21-011(k)	DP-SMA-1	Am-241, Iso-Pu, Iso-U, Sr-90, Gamma Spec	No	No	<5	No	-	-	-	Yes	Yes	Yes	Yes	

PRS ID	Sampling Station	COPCs	Inorganics	Organics						Radionuclides				
			TAL Metals	PAHs	SVOA	PCBs	4,4'-DDT	HE	Herbicides	Am-241	Iso-Pu (2)	Iso-U (3)	Sr-90	Gamma
21-013(b)	LA-SMA-6	Be, Fe, Hg, Pb, Am-241, Iso-Pu	Yes	No		-	-	-	-	Yes	Yes	No	No	No
21-013(g)														
26-001	LA-SMA-9	No data	-	-		-	-	-	-	-	-	-	-	-
35-003(r)	Pratt-SMA-1	Cu, Hg, Zn, PAHs, PCBs, Iso-Pu, Gamma Spec	Yes	Yes	<5	Yes	<5	-	-	<5	Yes	<5	<5	Yes
35-016(l)														
35-016(m)														
35-008	M-SMA-10	Insufficient data	<5	<5		<5	<5	-	-	<5	<5	<5	<5	<5
35-014(e)														
35-016(e)														
35-016(i)														
35-016(a)	T-SMA-5	Insufficient data	<5	<5		-	-	-	-	-	<5	<5	-	<5
35-016(b)	T-SMA-3	Insufficient data	-	<5		-	-	-	-	-	<5	<5	-	<5
35-016(d)	T-SMA-4	Cu, Hg, Pb, Zn, PAHs	Yes	Yes	No	-	-	-	-	-	No	No	-	No
35-016(f)	M-SMA-9	Insufficient data	-	<5		-	-	-	-	-	-	-	-	-
35-016(h)	M-SMA-6	Insufficient data	<5	<5		-	-	-	-	-	-	-	-	-
35-016(g)	M-SMA-7	Zn	Yes	<5		-	-	-	-	-	-	-	-	<5
35-016(h)														
35-016(o)	M-SMA-11	Cu, PAHs, PCBs,	Yes	Yes	No	Yes	-	-	-	-	No	No	No	No
35-016(p)	M-SMA-12	Insufficient data	-	<5		-	-	-	-	-	<5	<5	-	<5
35-016(q)	T-SMA-6	Insufficient data	-	-		-	-	-	-	-	<5	<5	-	No

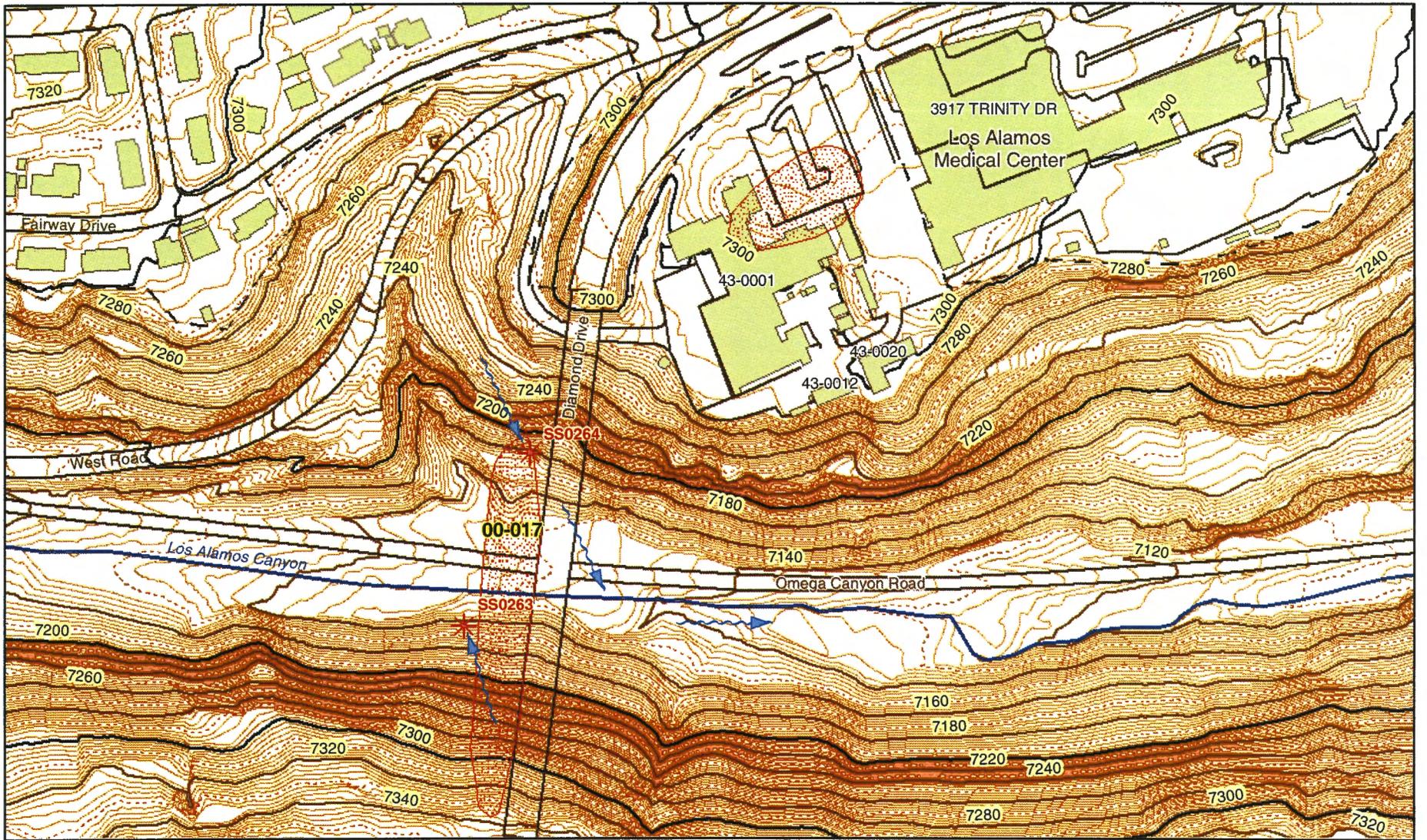
PRS ID	Sampling Station	COPCs	Inorganics	Organics							Radionuclides				
			TAL Metals	PAHs	SVOA	PCBs	4,4'-DDT	HE	Herbicides	Am-241	Iso-Pu	Iso-U	Sr-90	Gamma Spec	
42-001(a)	M-SMA-5	No data	-	-	-	-	-	-	-	-	-	-	-	-	
42-001(b)															
42-002(a)															
42-002(b)															
42-002(c)															
42-004															
46-004(t)	CDB-SMA-1	Zn, PAHs	Yes	Yes	<5	<5	-	-	-	-	-	-	-	-	-
46-008(g)															
C-46-001															
46-009(b)	CDB-SMA-2	No data	-	-	-	-	-	-	-	-	-	-	-	-	-
48-007(c)	M-SMA-3	Am-241, Iso-Pu	-	<5	<5	-	-	-	Yes	<5	<5	-	No		
48-007(f)	M-SMA-2	Insufficient data	<5	<5	<5	-	-	-	<5	<5	<5	-	<5		
48-010	M-SMA-4	Cr, Cu, Zn, PAHs, Am-241	Yes	Yes	No	-	-	-	Yes	Yes	No	No	No		
50-006(a)	T-SMA-1	Cd, PCBs, Am-241, Iso-Pu	Yes	No	Yes	-	-	-	Yes	Yes	No	No	No		
50-006(d)	M-SMA-8	PCBs, Am-241, Iso-Pu, Iso-U, Sr-90, Gamma Spec	No	No	Yes	-	-	-	Yes	Yes	Yes	Yes	Yes		
53-008	LA-SMA-10	Insufficient data	No	-	-	-	-	-	-	-	-	-	No (4)		
53-012(a)	LA-SMA-7	No data	-	-	-	-	-	-	-	-	-	-	-		
53-012(c)	LA-SMA-8	No data	-	-	-	-	-	-	-	-	-	-	-		
53-014	S-SMA-4	No data	-	-	-	-	-	-	-	-	-	-	-		
54-017	CDB-SMA-3	Am-241, Iso-Pu	No	-	No	No	-	-	Yes	Yes	No	No	No		

PRS ID	Sampling Station	COPCs	Inorganics	Organics						Radionuclides				
			TAL Metals	PAHs	SVOA	PCBs	4,4'-DDT	HE	Herbicides	Am-241	Iso-Pu	Iso-U	Sr-90	Gamma Spec
72-001	S-SMA-6	Insufficient data	No	-	-	-	-	(5)	-	-	-	-	-	-
73-001(a)	P-SMA-1	Cd, Zn, PAHs, 4,4'-DDT, Iso-Pu	Yes	Yes	No	No	Yes	-	-	-	Yes	-	-	-
C-35-004	T-SMA-2	No data	-	-	-	-	-	-	-	-	-	-	-	-
C-35-005			-	-	-	-	-	-	-	-	-	-	-	-

Table 2-2 Notes:

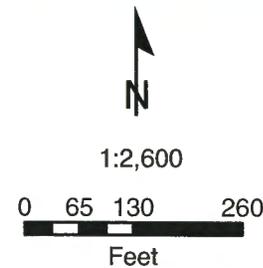
COPC = contaminant of potential concern
 Gamma spec = gamma spectroscopy [analytes]
 HE = high explosives
 PAH = polynuclear aromatic hydrocarbon
 PCB = polychlorinated biphenyl [compound]
 PRS = potential release site
 SVOA = semivolatile organic analyte
 TAL = target analyte list
 VOA = volatile organic analyte

- "<5" indicates that there is insufficient surface soil sample results for the indicated analytical suite (less than five) available for the PRS.
 "-" indicates that there are no surface soil sample results for the indicated analytical suite available for the PRS.
 "Yes" indicates that that there is sufficient surface soil sample data and that COPCs have been identified for the PRS.
 "No" indicates that there is sufficient surface soil sample data to determine that there are no COPCs identified for the PRS.
- Isotopic plutonium suite: Pu-238 and Pu-239,240.
- Isotopic uranium suite: U-234, U-235, and U-238.
- Gamma spectroscopy retained as COPC suite due to potential contribution from TA-53 lagoons.
- Field screening did not detect HE.



FFCA Monitoring Location Map at Site 00-017

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

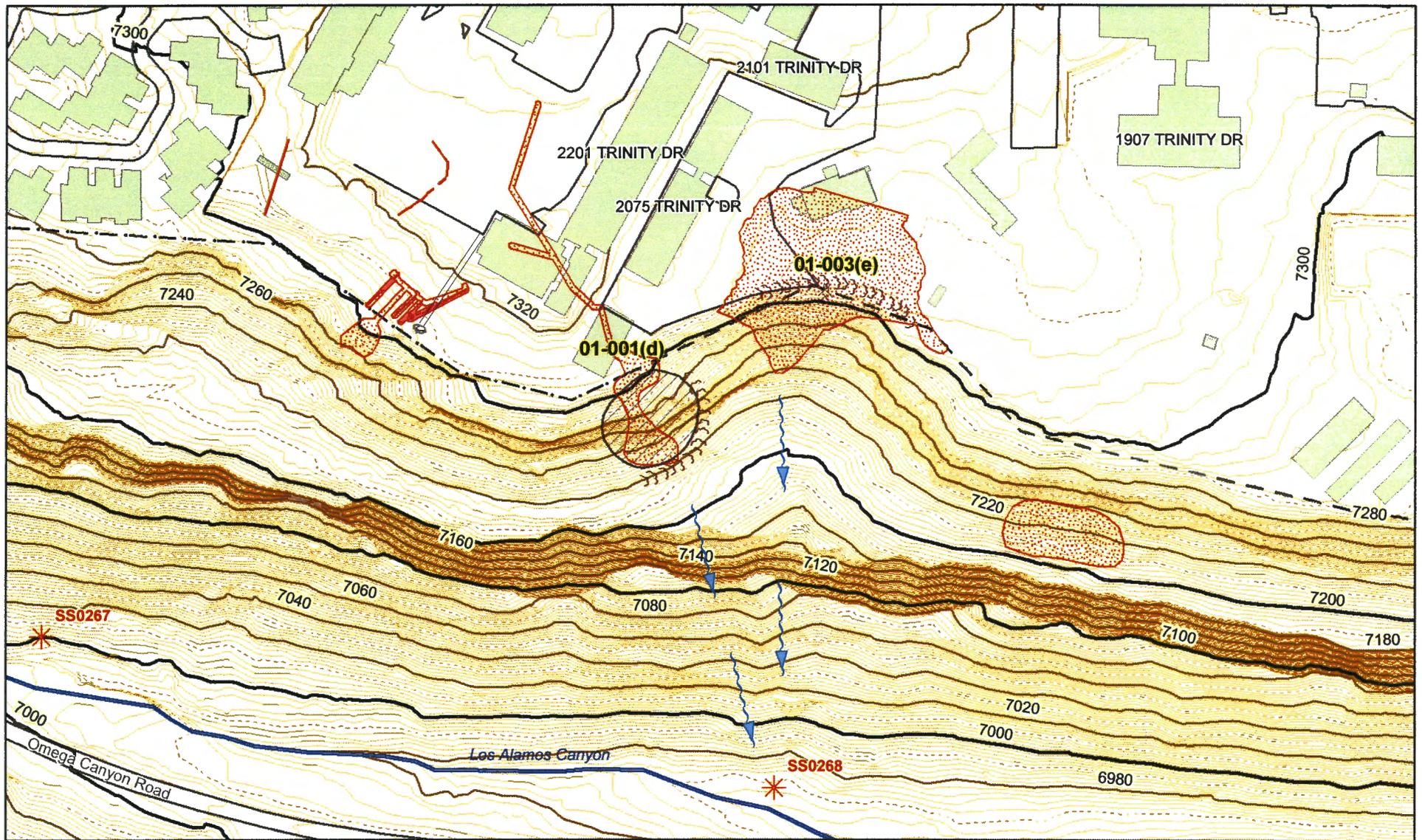


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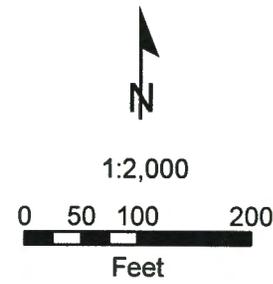
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FFCA Monitoring Location Map at Site 01-001(d) and 01-003(e)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

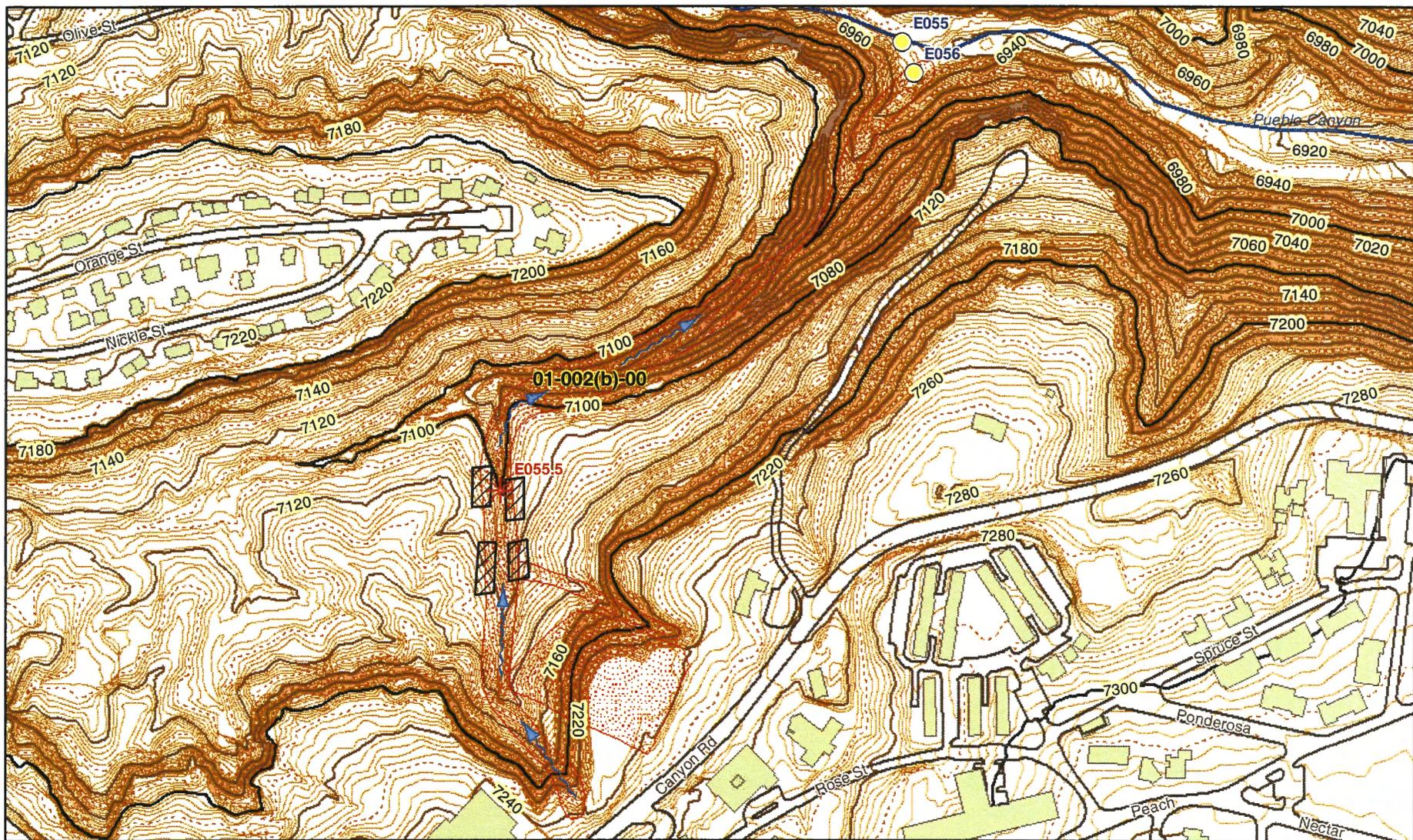


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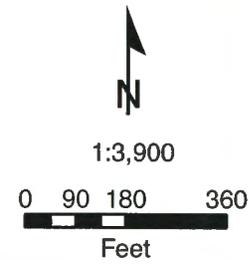
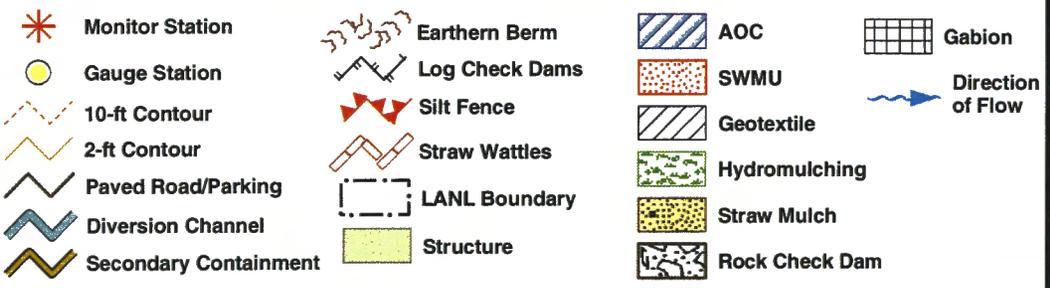


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FFCA Monitoring Location Map at Site 01-002(b)-00

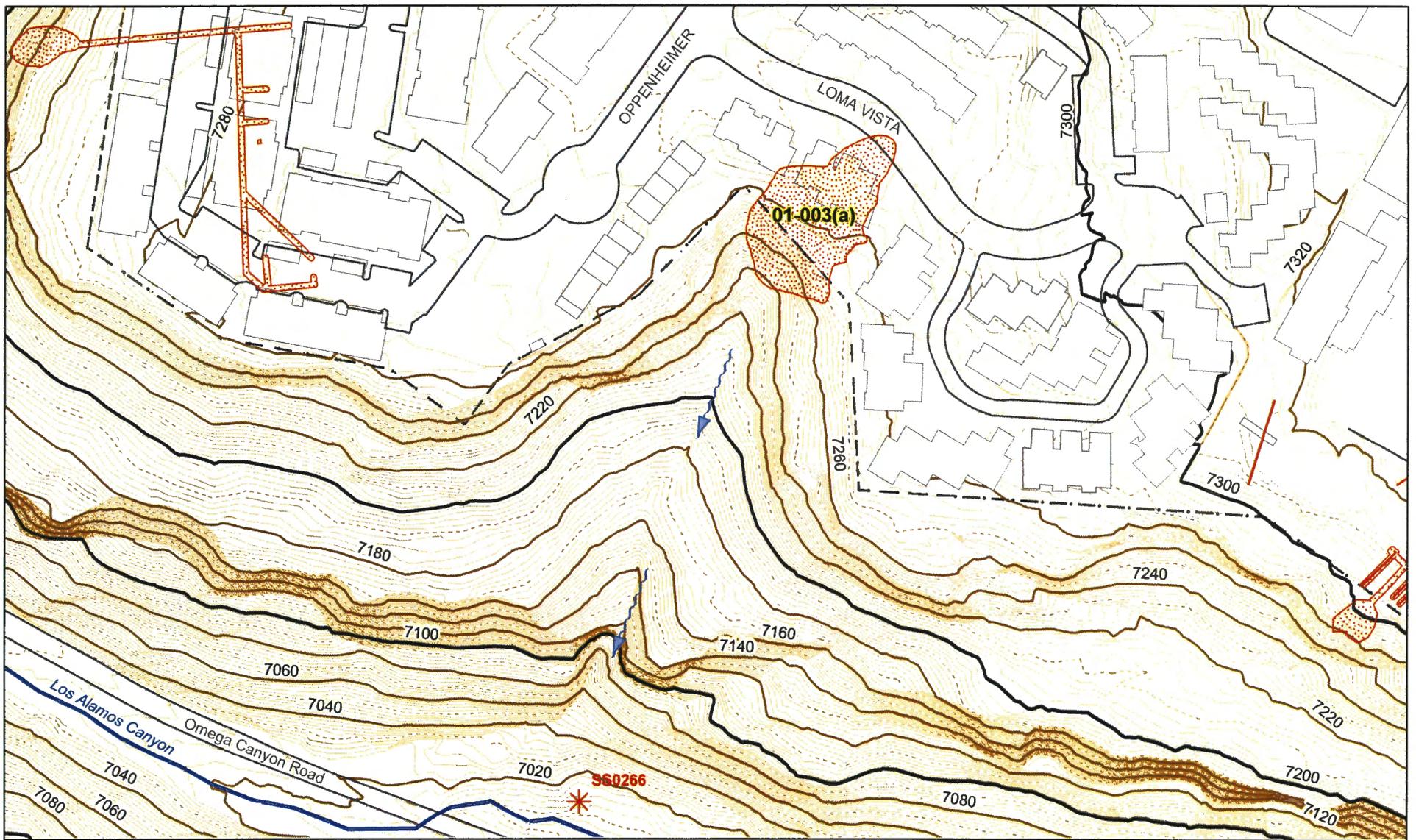


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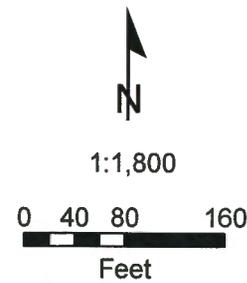
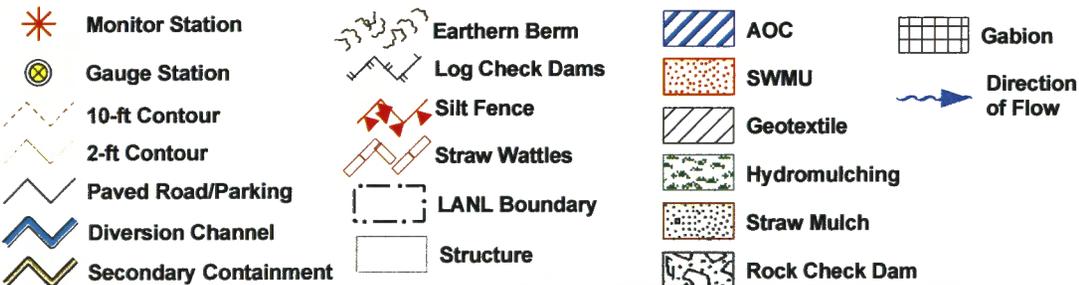
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FFCA Monitoring Location Map at Site 01-003(a)

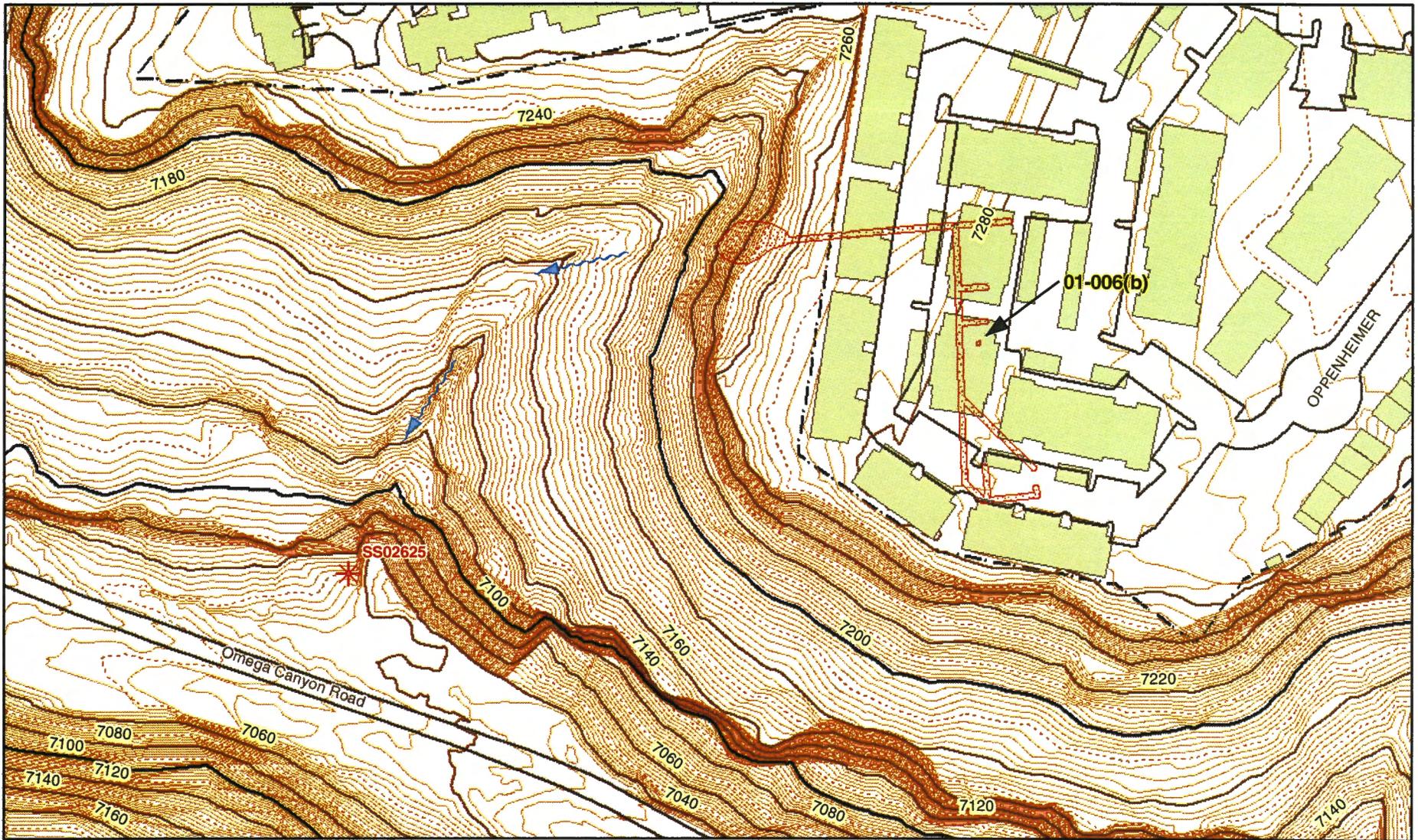


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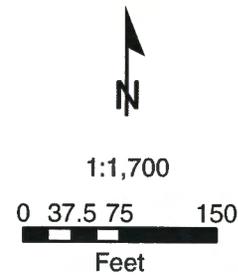
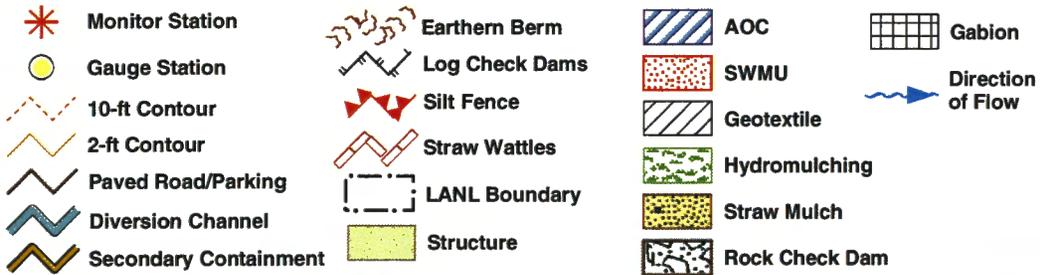


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FFCA Monitoring Location Map at Site 01-006(b)

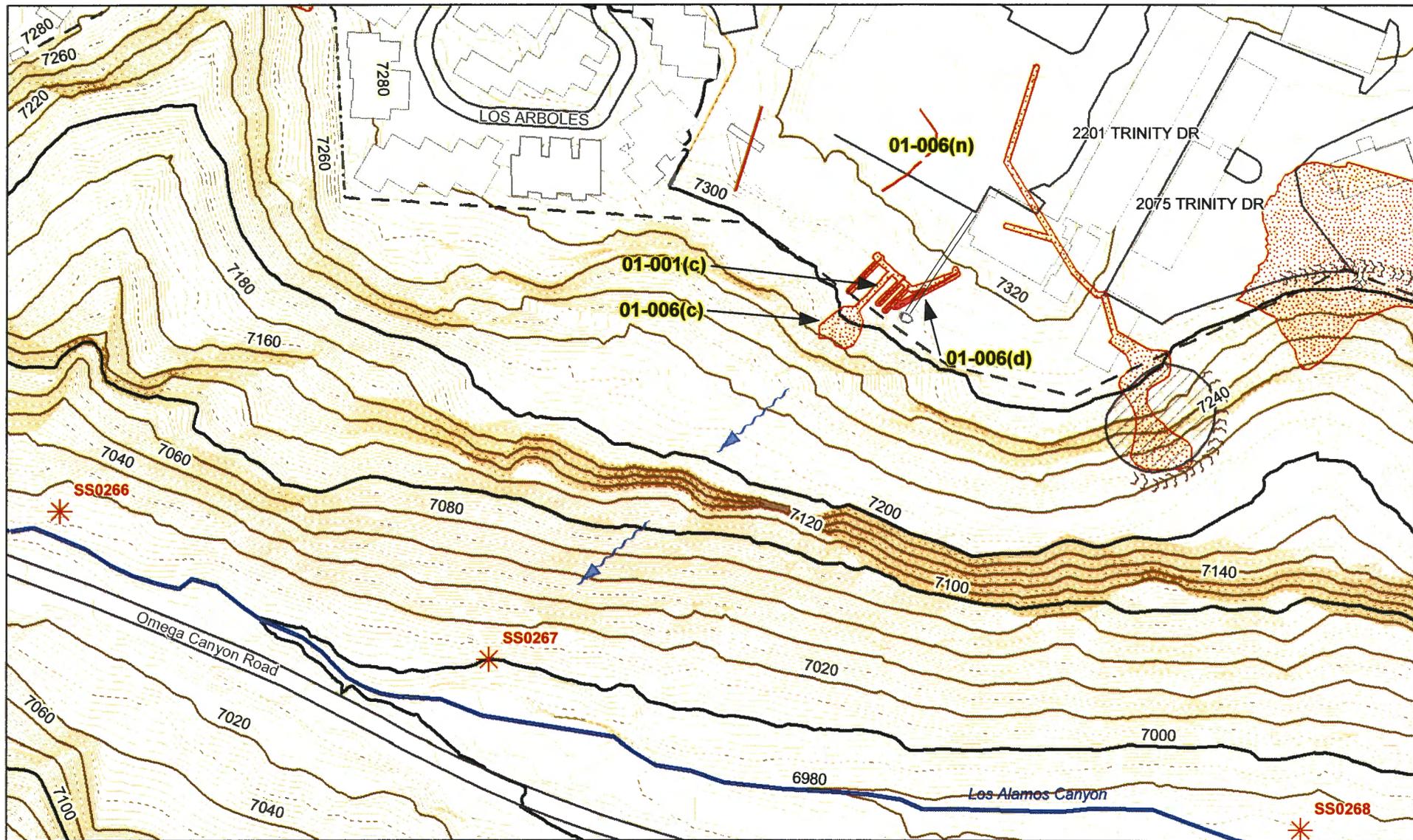


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 May 20, 2004
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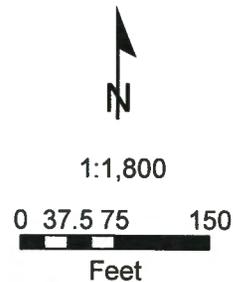
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 01-003(c), 01-006(c), 01-006(d), and 01-006(n)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

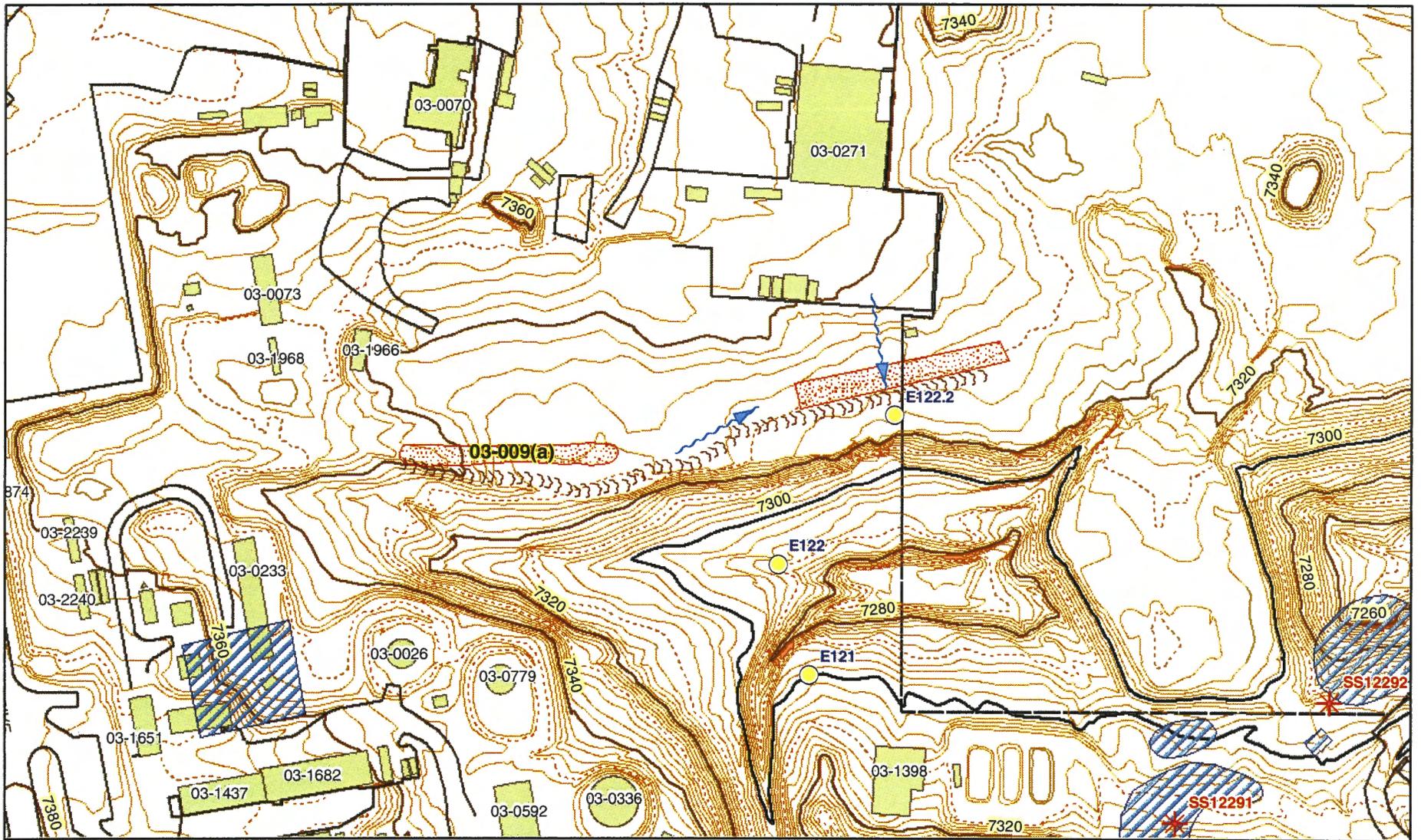


RRES-OEIM GIS TEAM
 Produced by: Woodward
 June 29, 2004
 Map Reference # 04-0005-36



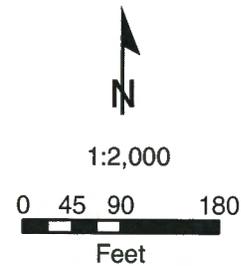
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 03-009(a)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

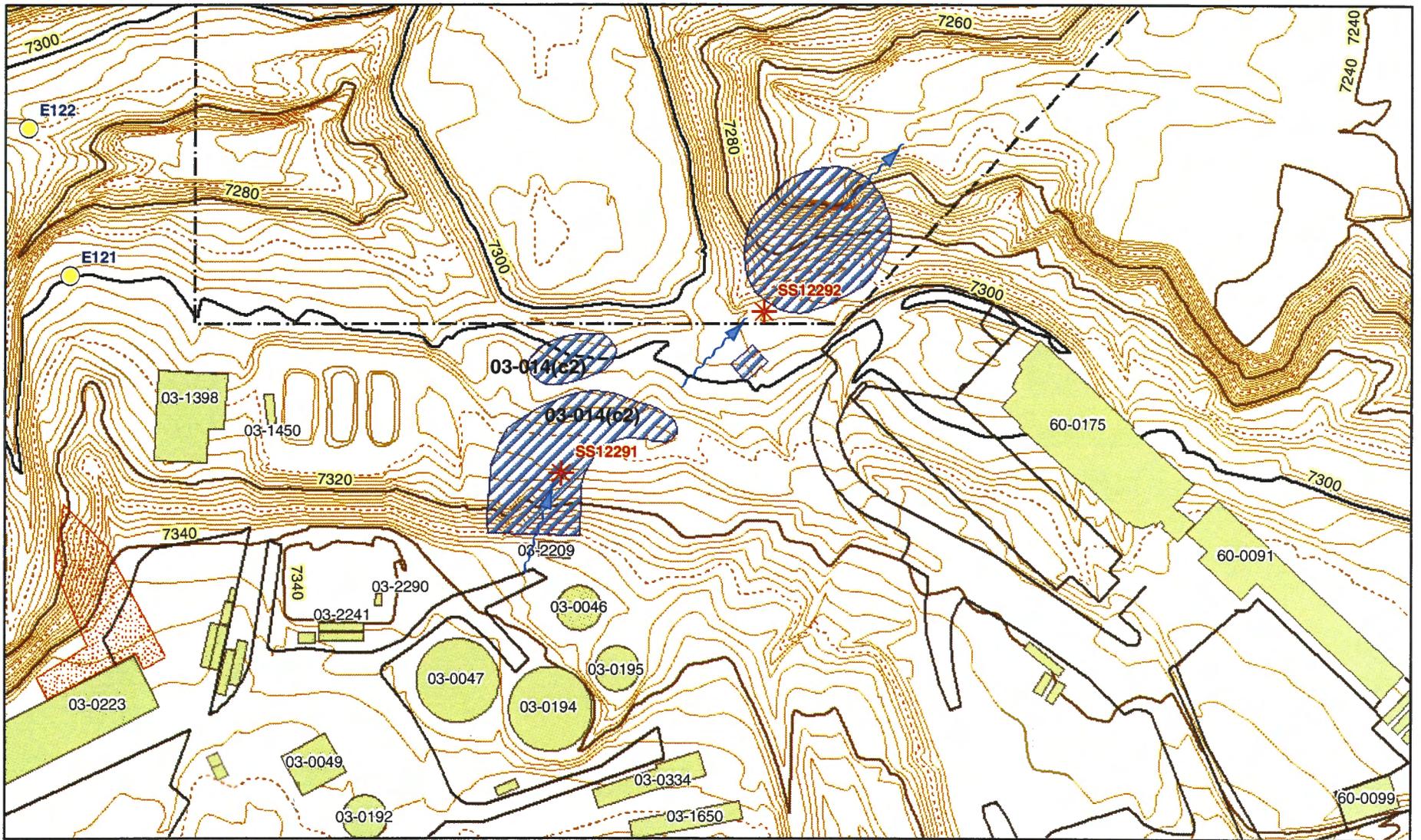


RRES-OEIM GIS TEAM
Produced by: Woodward
May 20, 2004
Map Reference # 04-0005-48



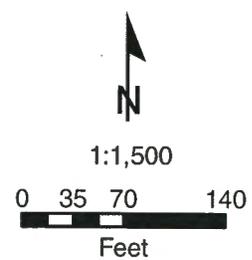
1983 North American Datum
State Plane Coordinate System
New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 03-014(c2)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

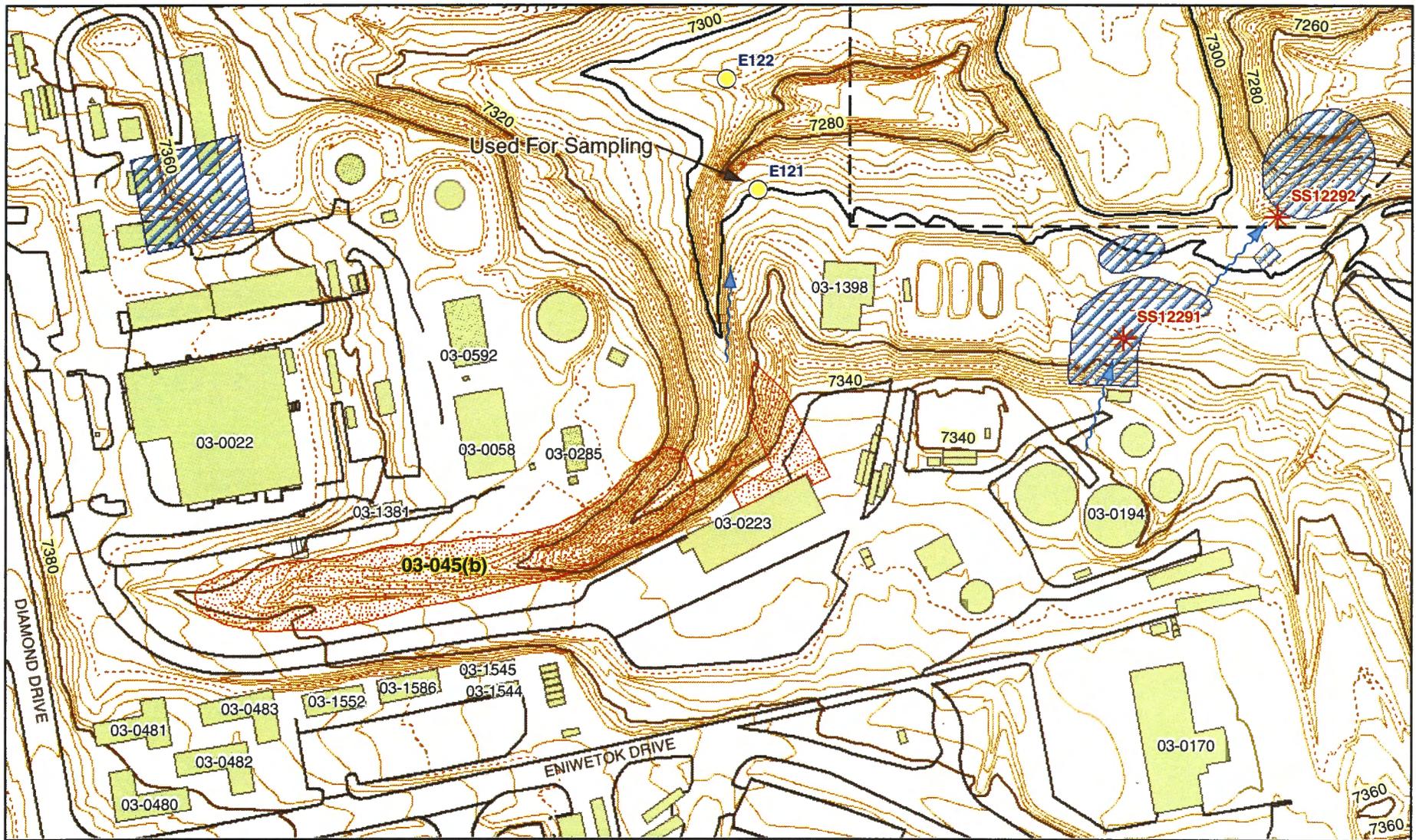


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-51

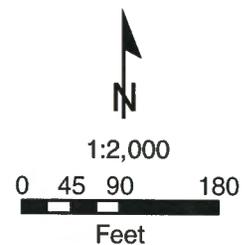
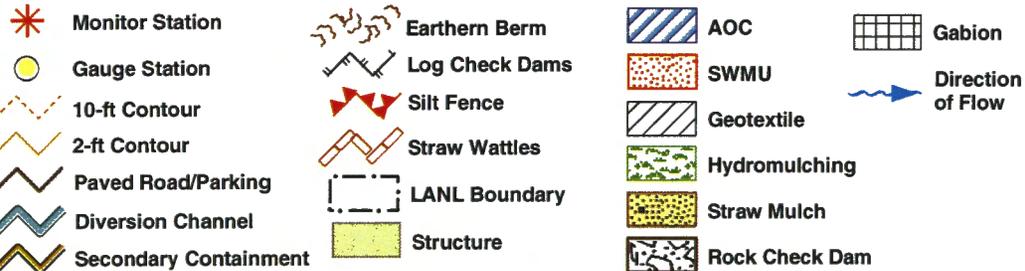
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1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 03-045(b)



RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-55



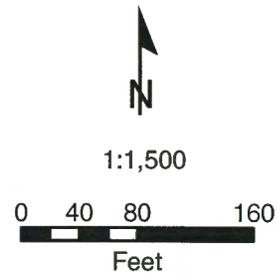
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 03-054(e)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

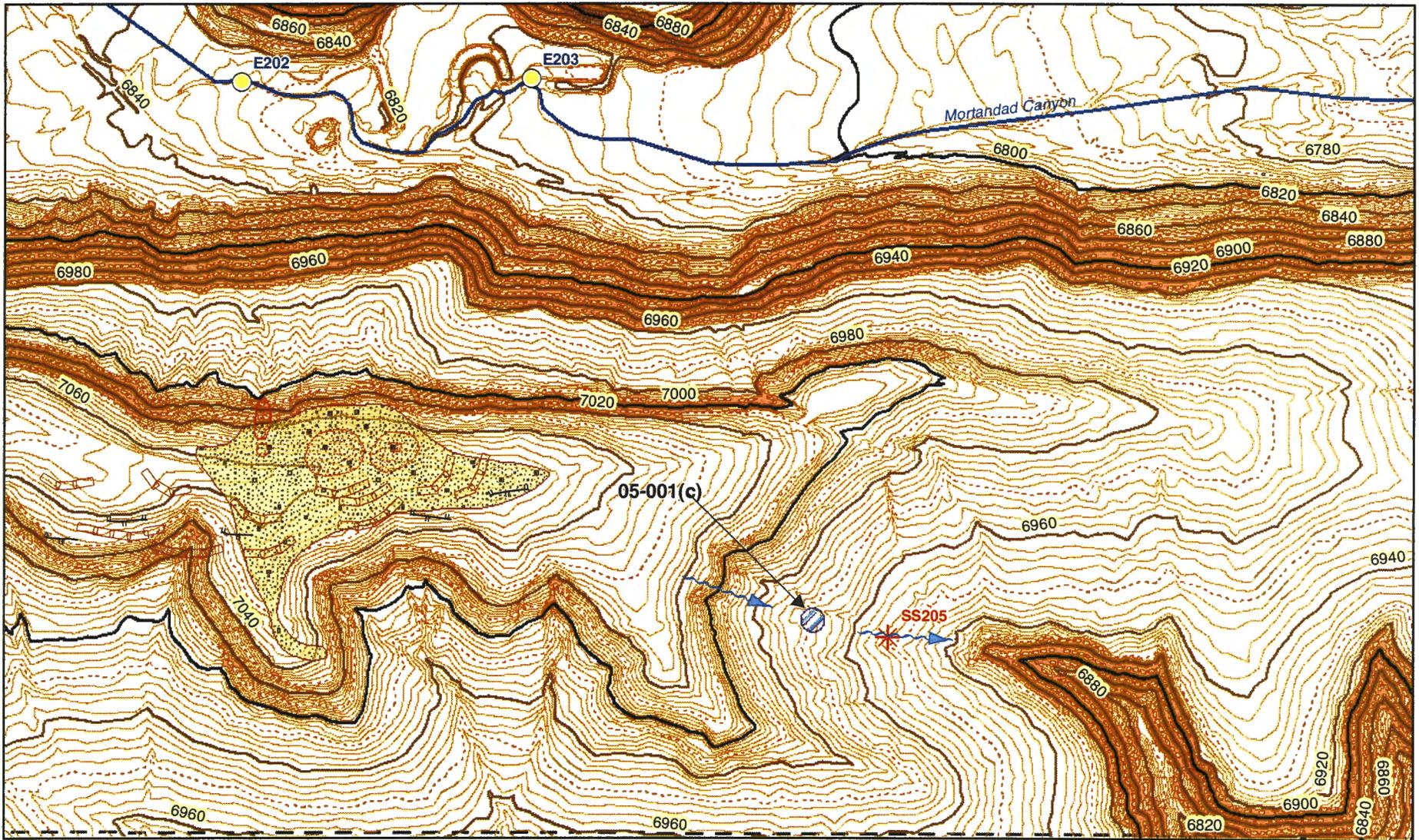


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-46



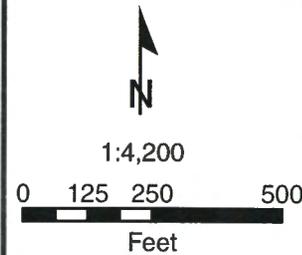
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 05-001(c)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

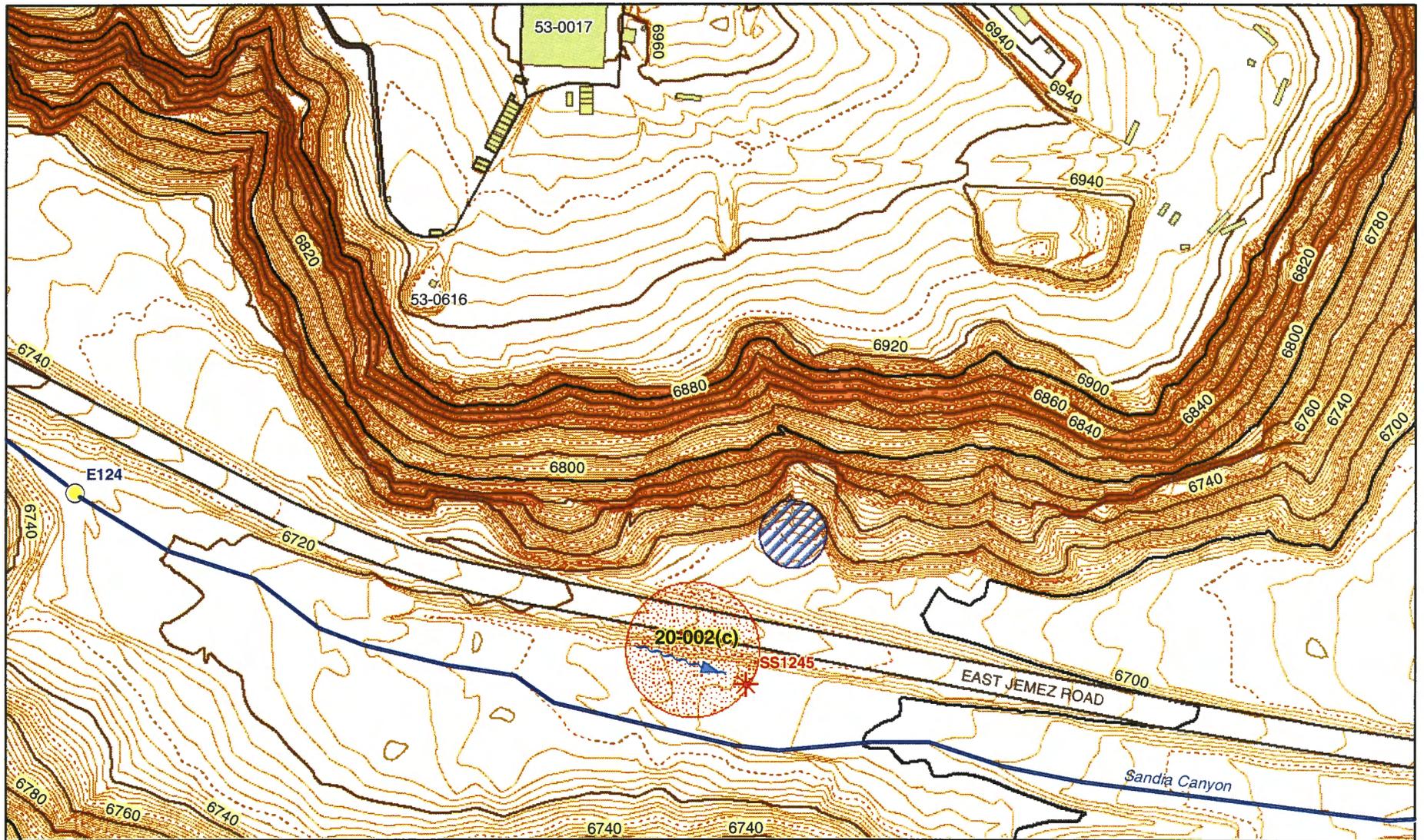


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 19, 2004
 Map Reference # 04-0005-14



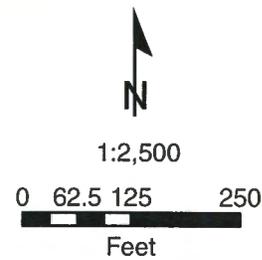
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 20-002(c)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

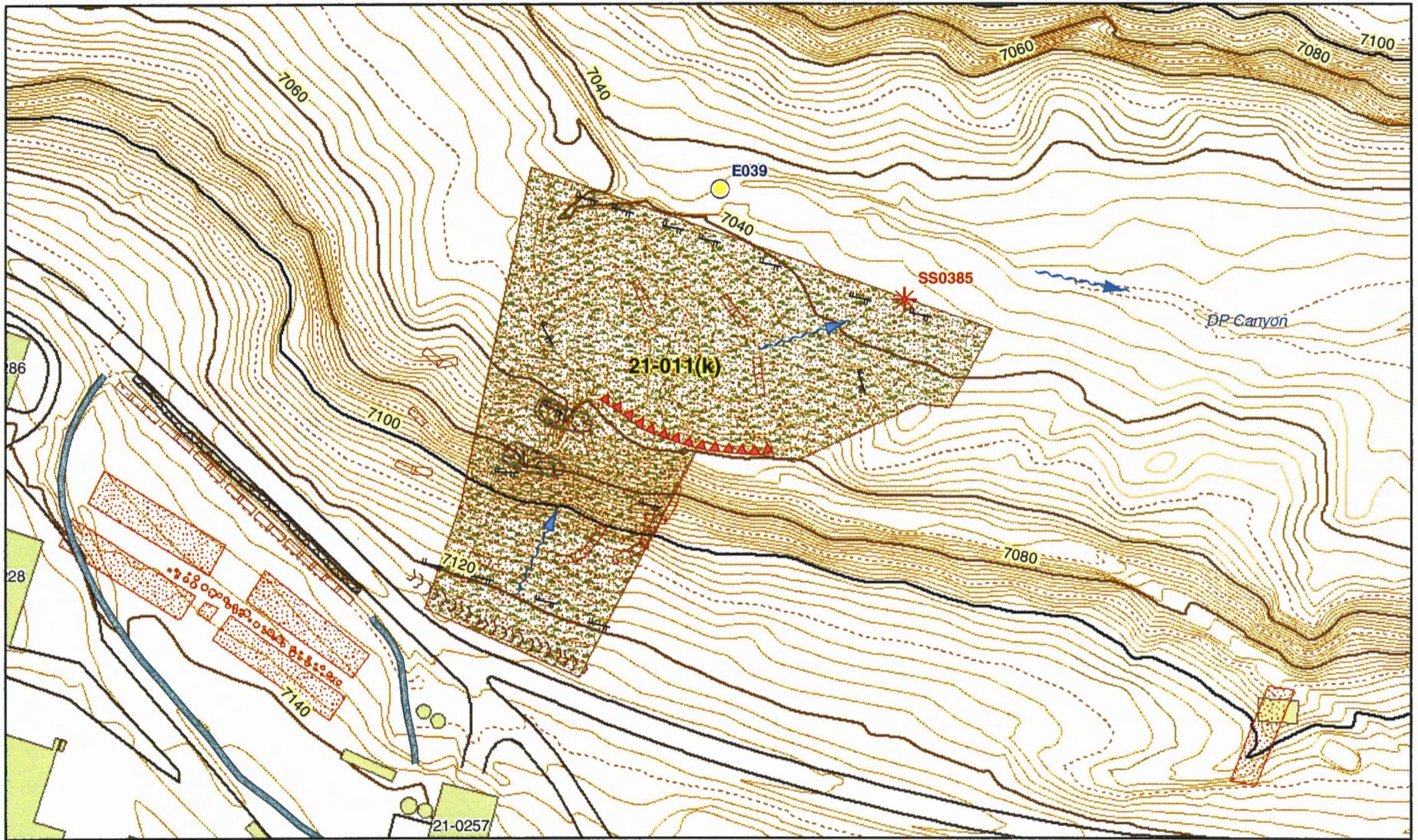


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-49

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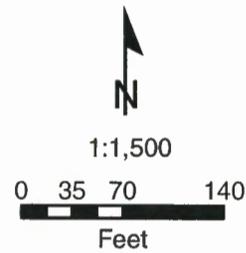
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 21-011(k)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

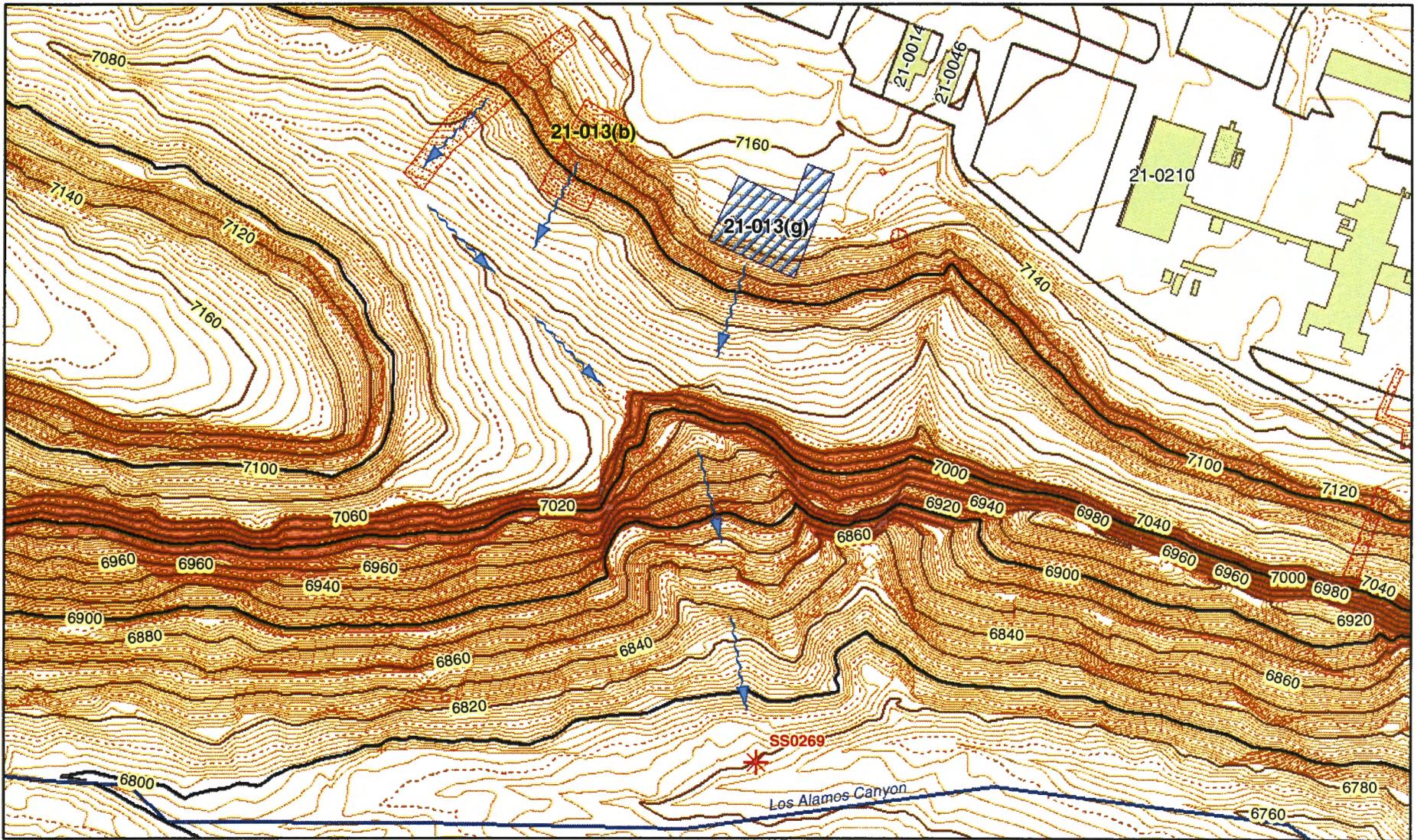


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 19, 2004
 Map Reference # 04-0005-09

1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

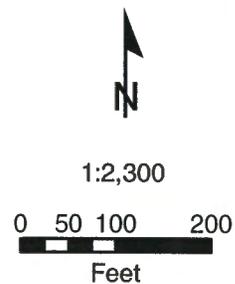


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FFCA Monitoring Location Map at Site 21-013(b) and 21-013(g)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

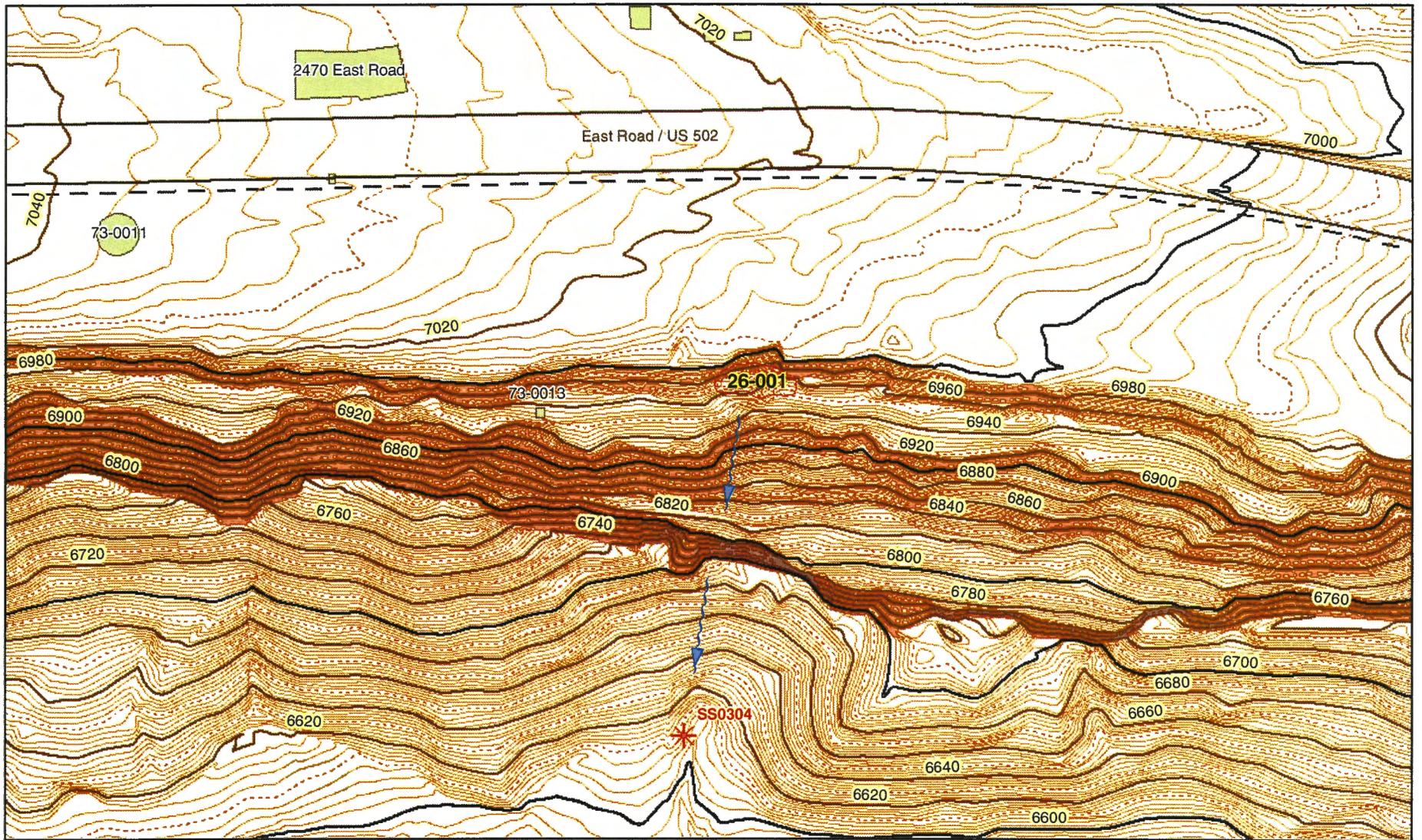


RRES-OEIM GIS TEAM
 Produced by: Woodward
 June 21, 2004
 Map Reference # 04-0005-04



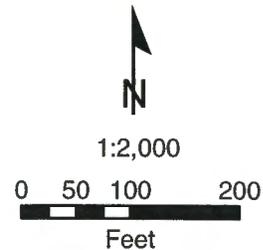
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 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 26-001

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

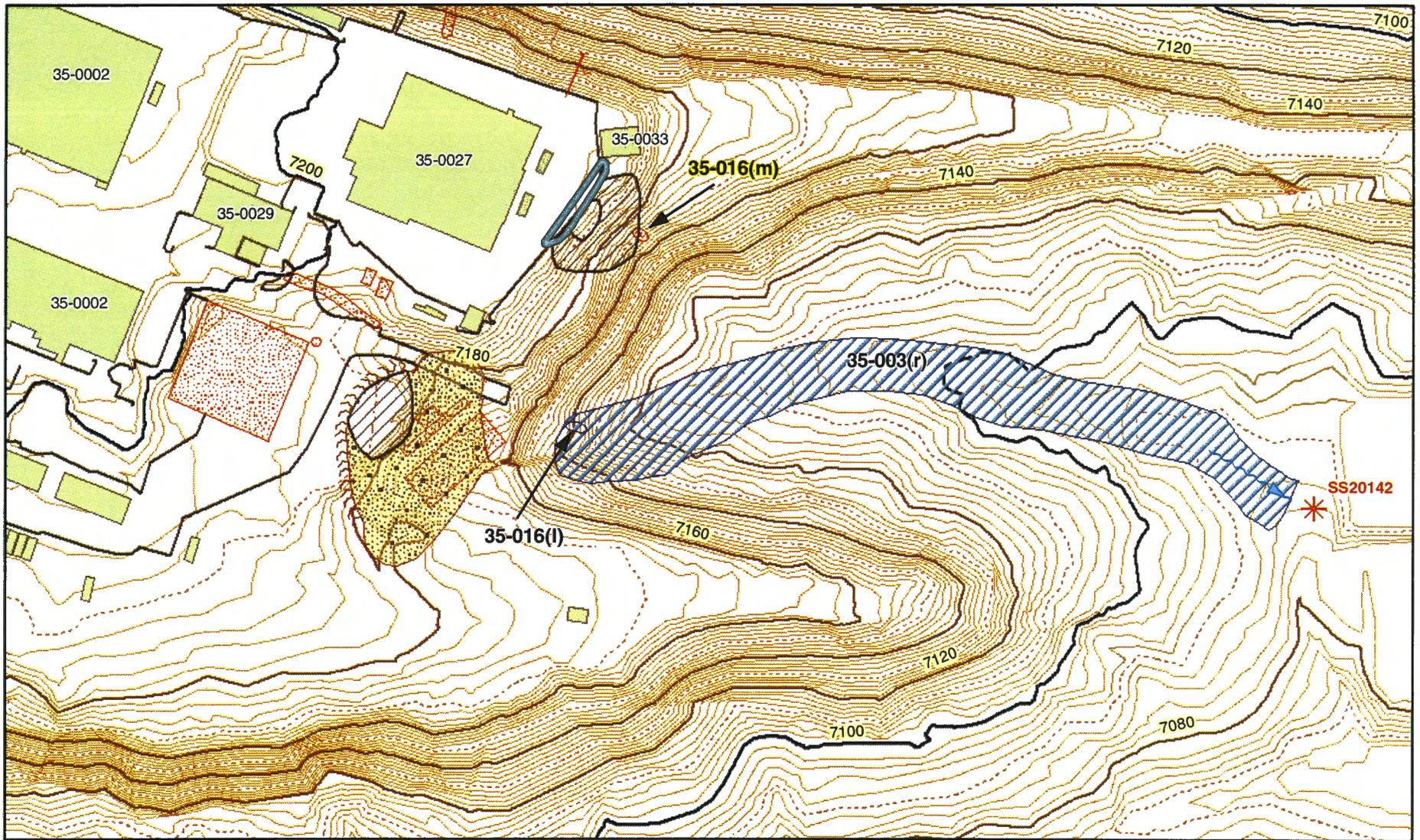


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-50



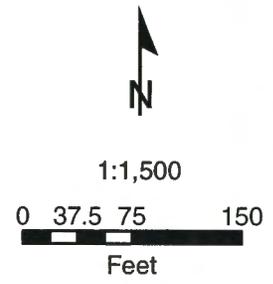
1983 North American Datum
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FFCA Monitoring Location Map at Site 35-003(r), 35-016(l), 35-016(m)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

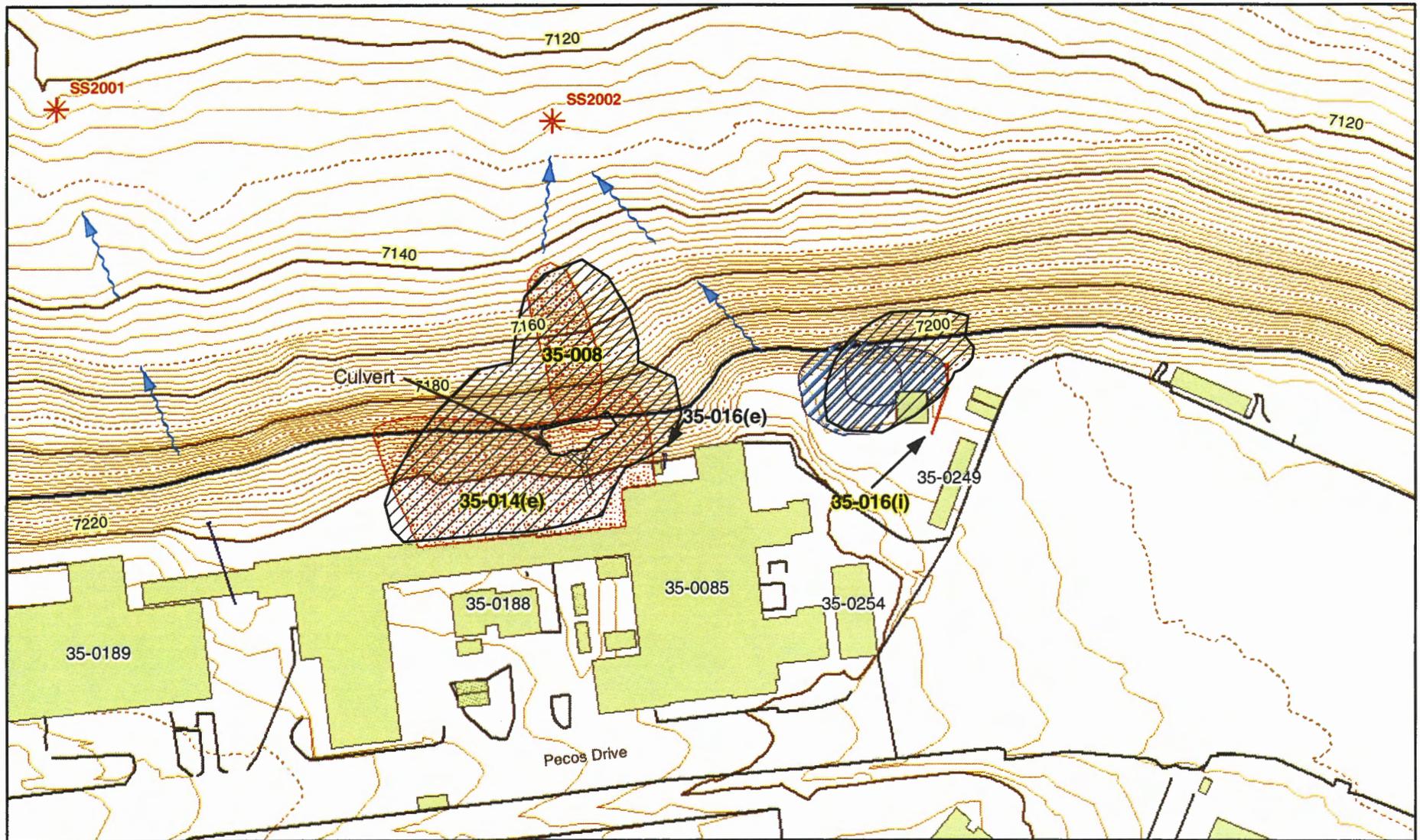


RRES-OEIM GIS TEAM
 Produced by: Woodward
 June 21, 2004
 Map Reference # 04-0005-57



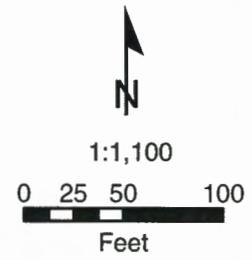
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 35-008, 35-014(e), 35-016(e), 35-016(i)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

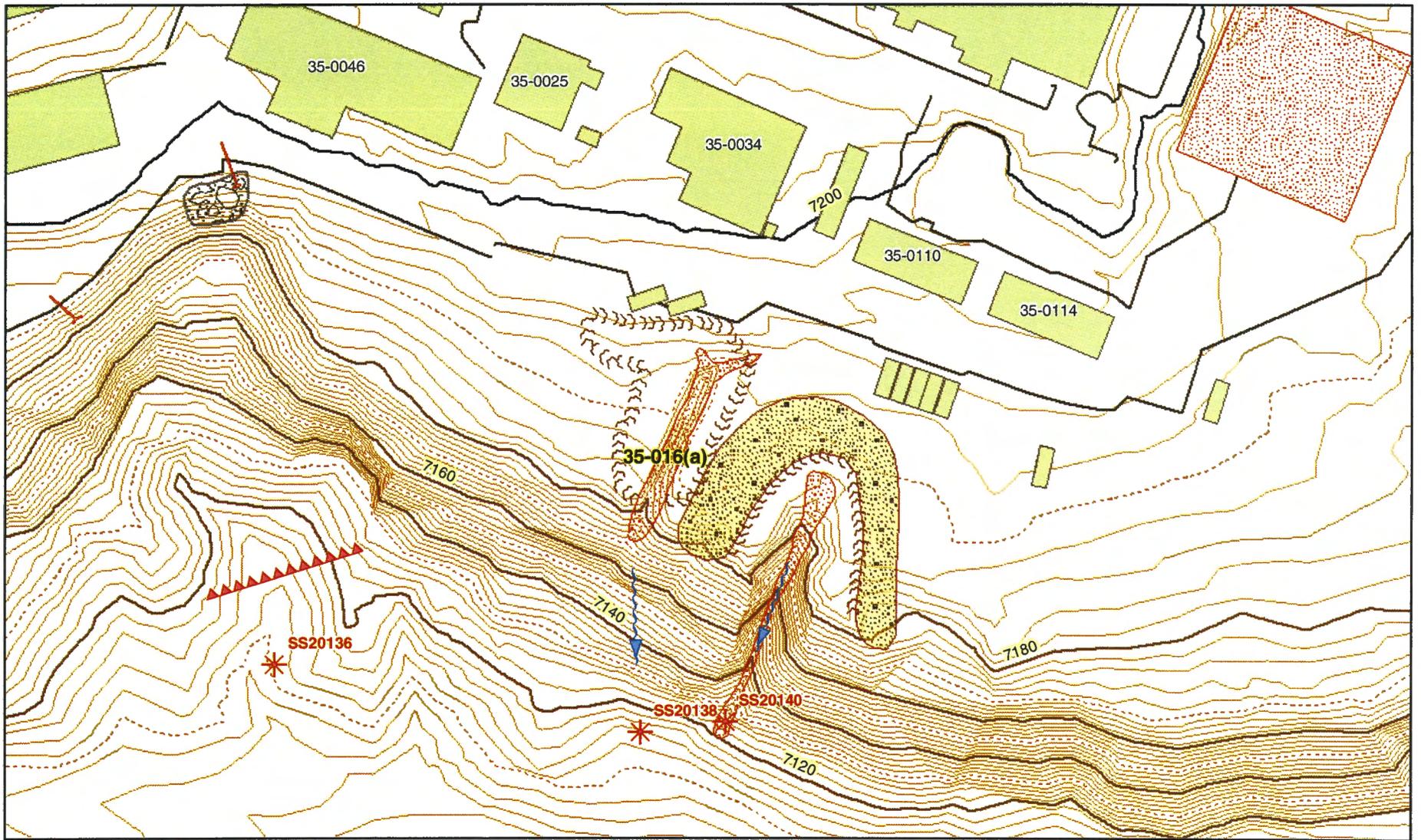


RRES-OEIM GIS TEAM
 Produced by: Woodward
 June 21, 2004
 Map Reference # 04-0005-13

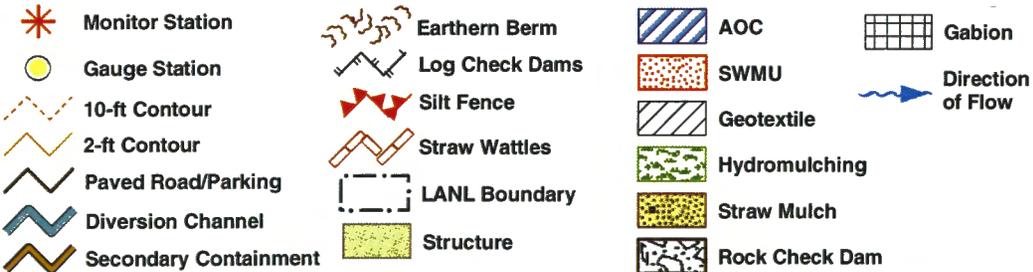
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 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 35-016(a)

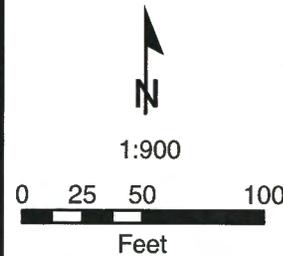


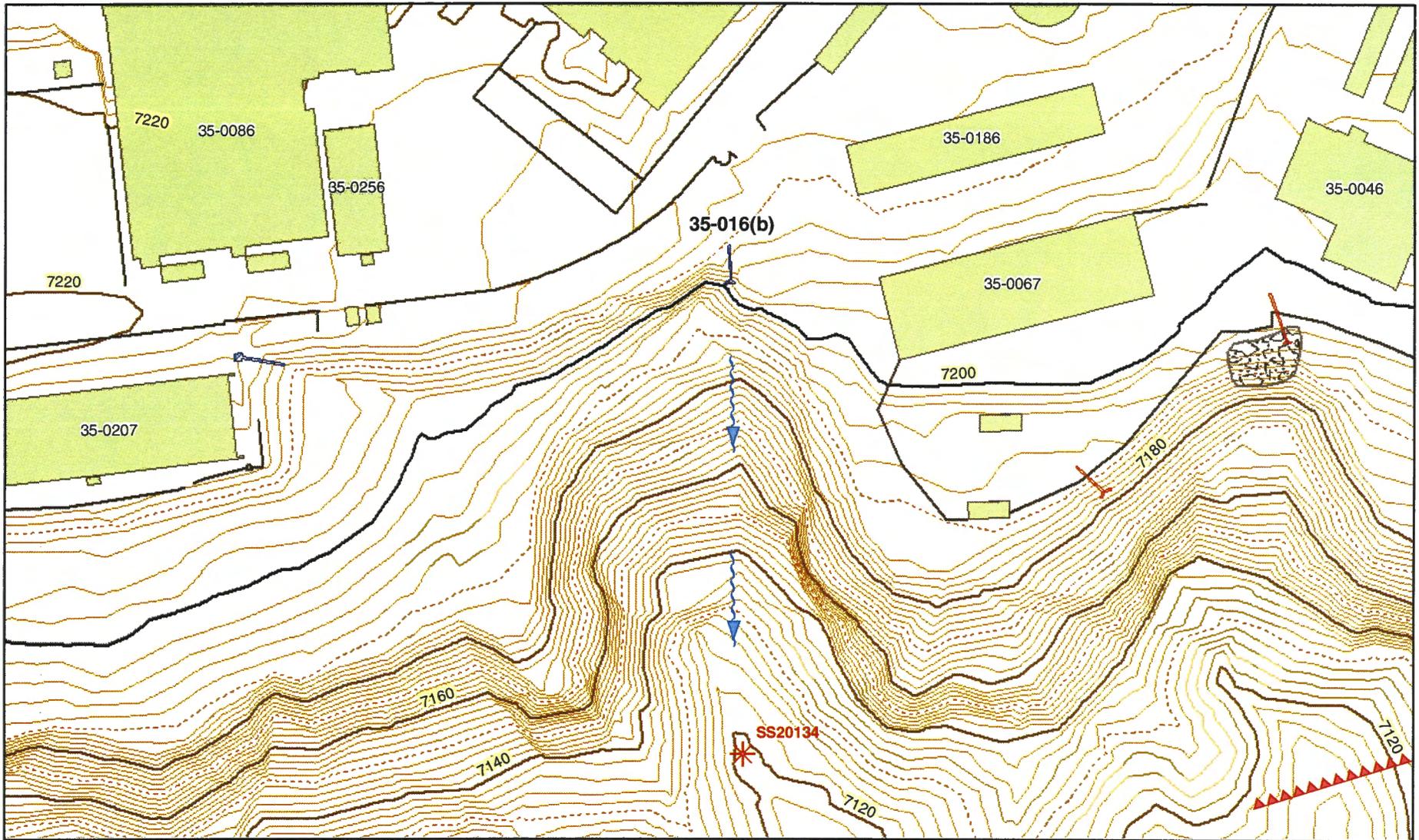
RRES-OEIM GIS TEAM
 Produced by: Chris McLean
 April 26, 2004
 Map Reference # 04-0005-34



1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

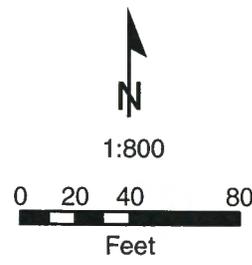
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FFCA Monitoring Location Map at Site 35-0016(b)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

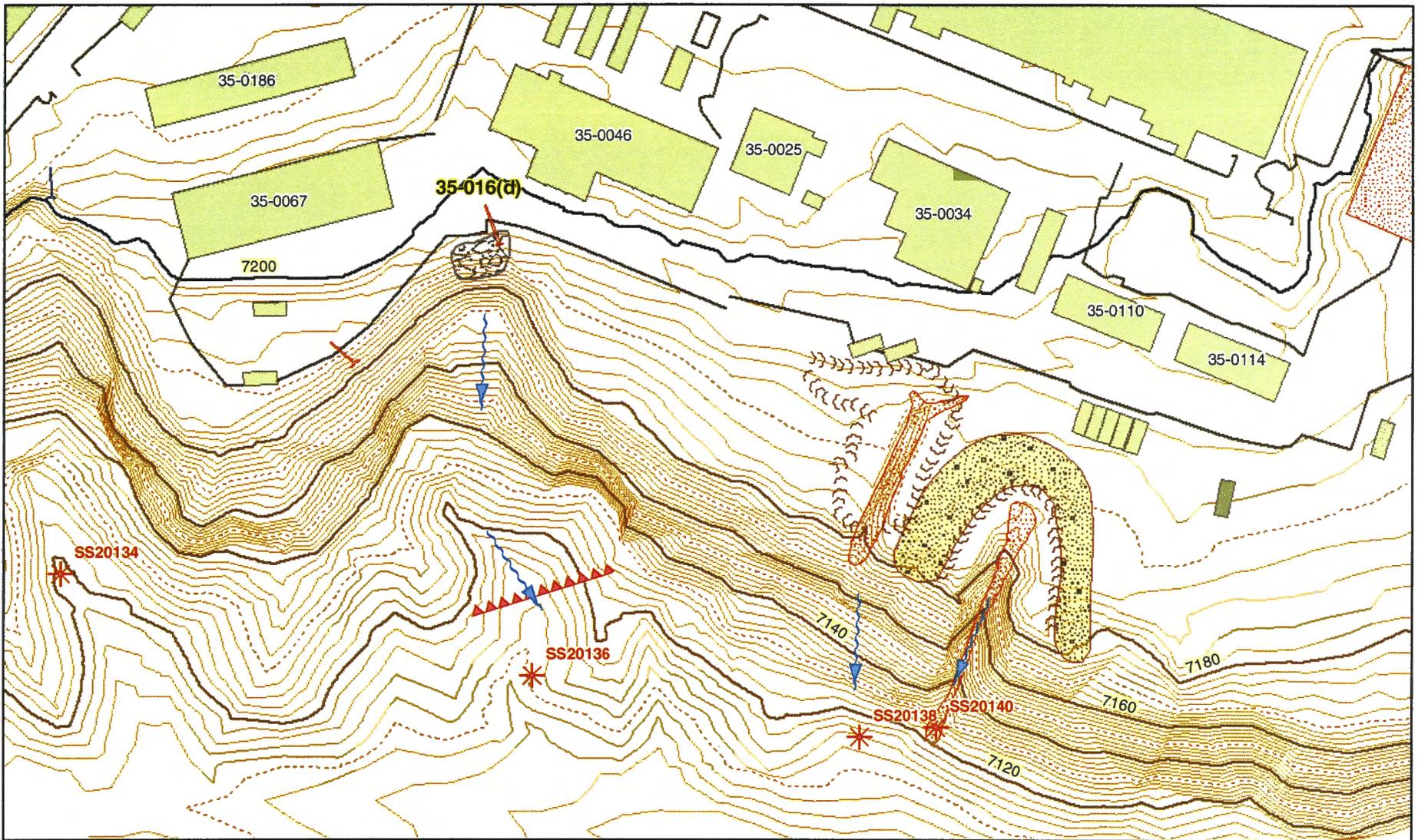


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-62



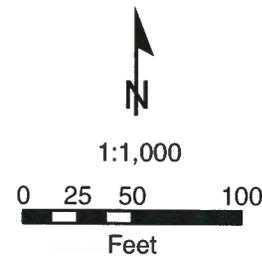
1983 North American Datum
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FFCA Monitoring Location Map at Site 35-0016(d)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

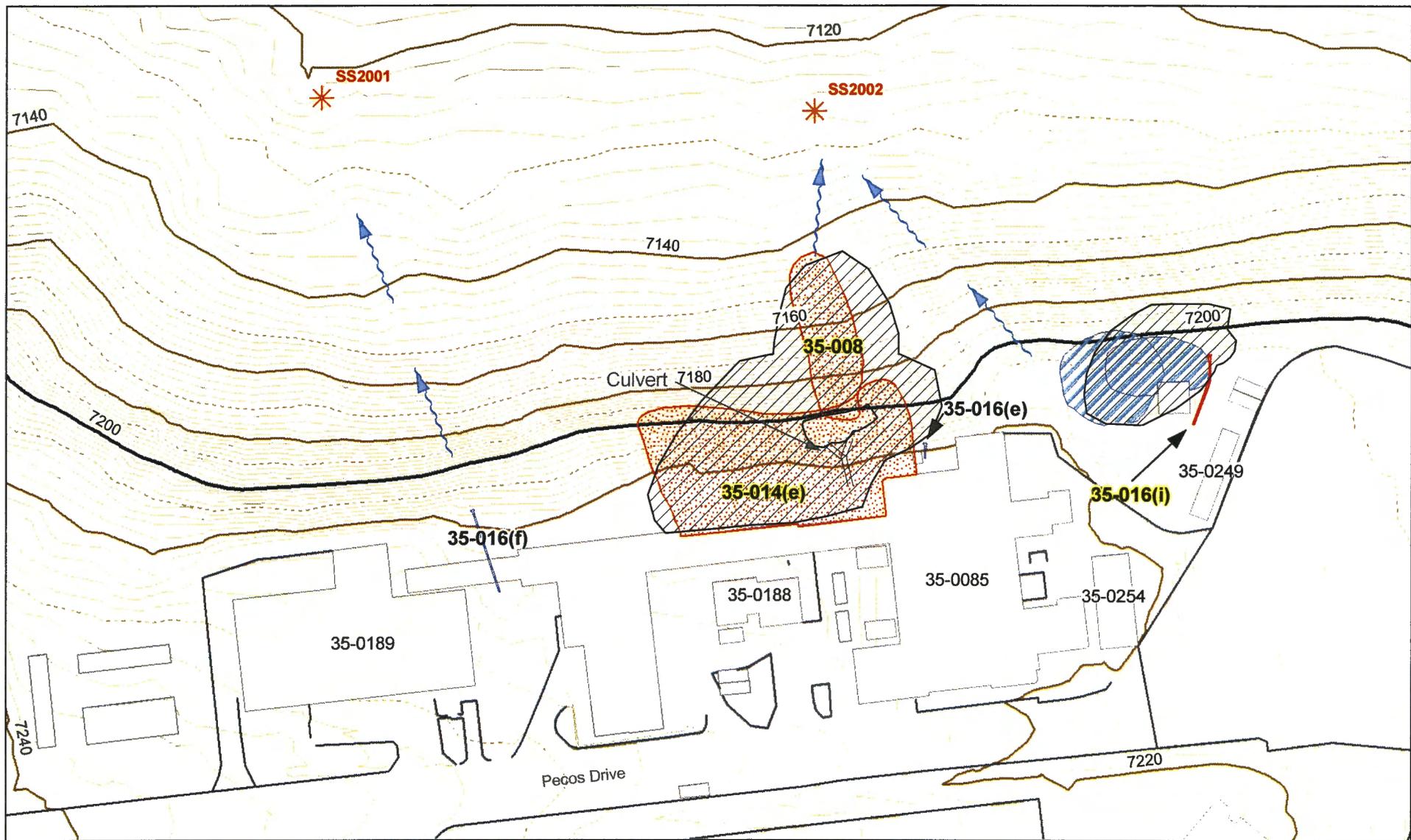


RRES-OEIM GIS TEAM
Produced by: Woodward
May 20, 2004
Map Reference # 04-0005-64



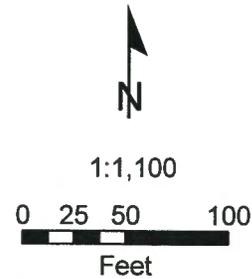
1983 North American Datum
State Plane Coordinate System
New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 35-008, 35-014(e), 35-016(e), 35-016(f), and 35-016(i)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

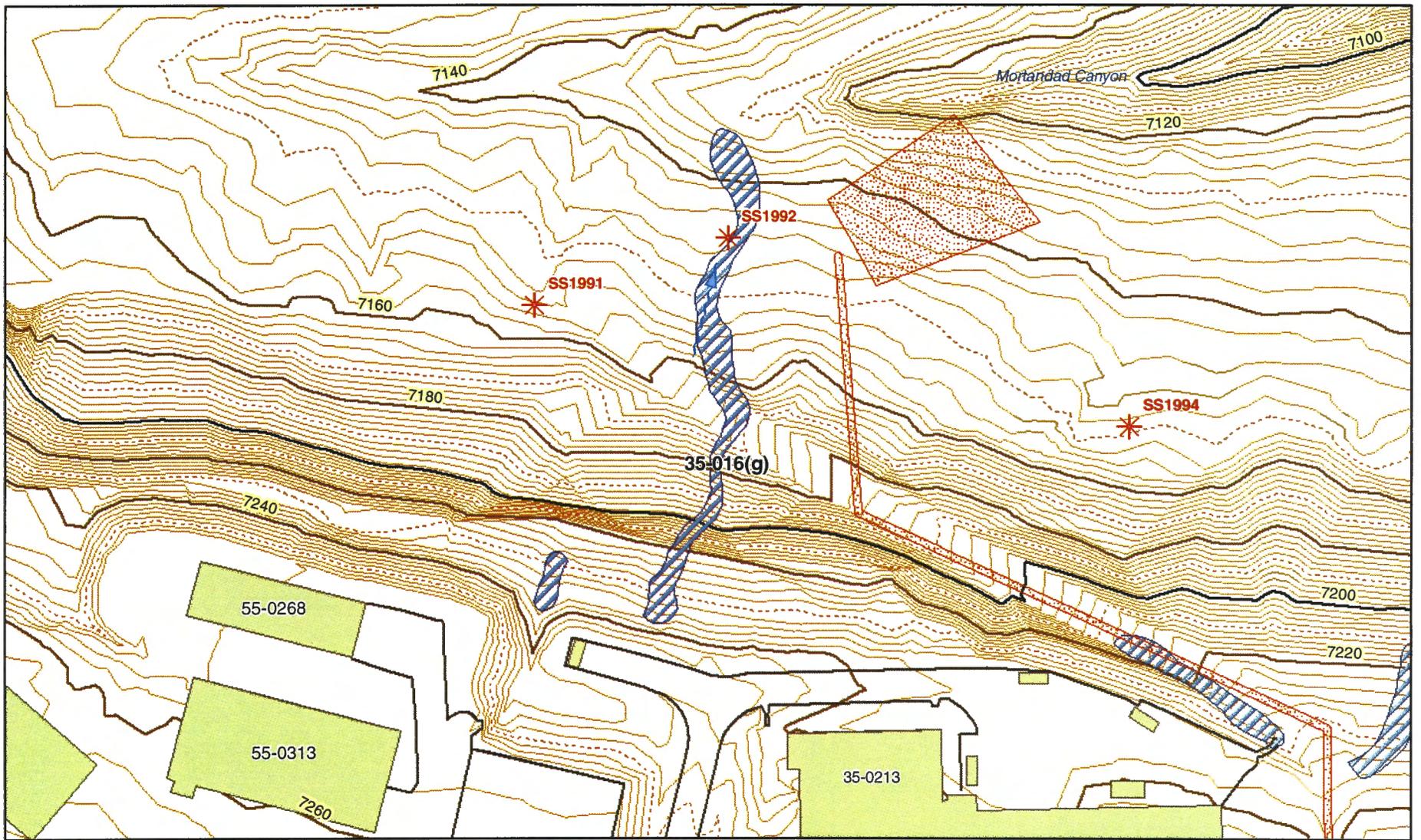


RRES-OEIM GIS TEAM
 Produced by: Woodward
 June 29, 2004
 Map Reference # 04-0005-13



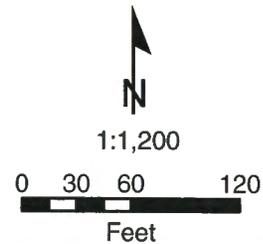
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 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 35-016(g)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

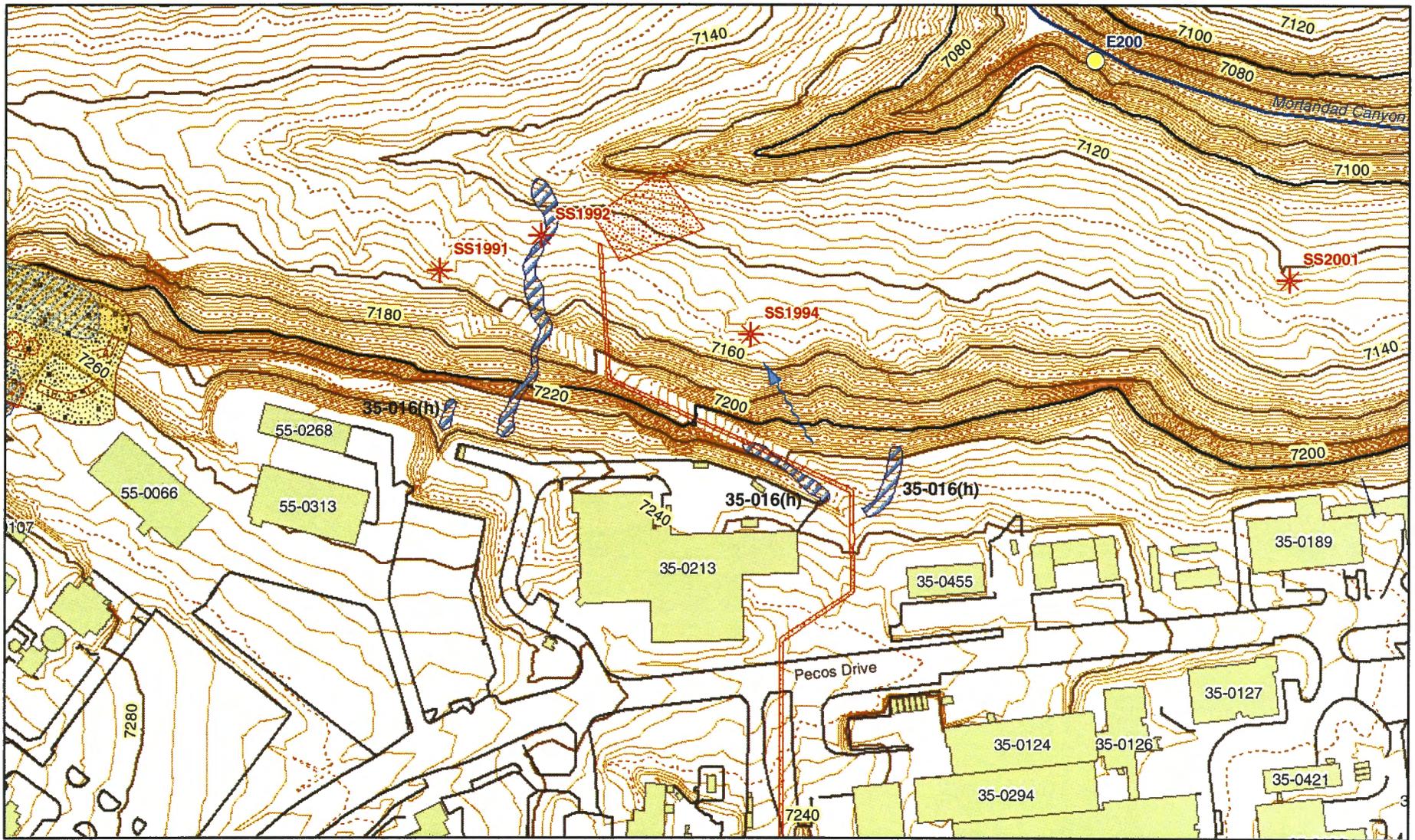


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 19, 2004
 Map Reference # 04-0005-12



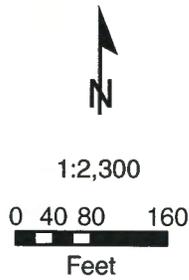
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 35-016(h)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

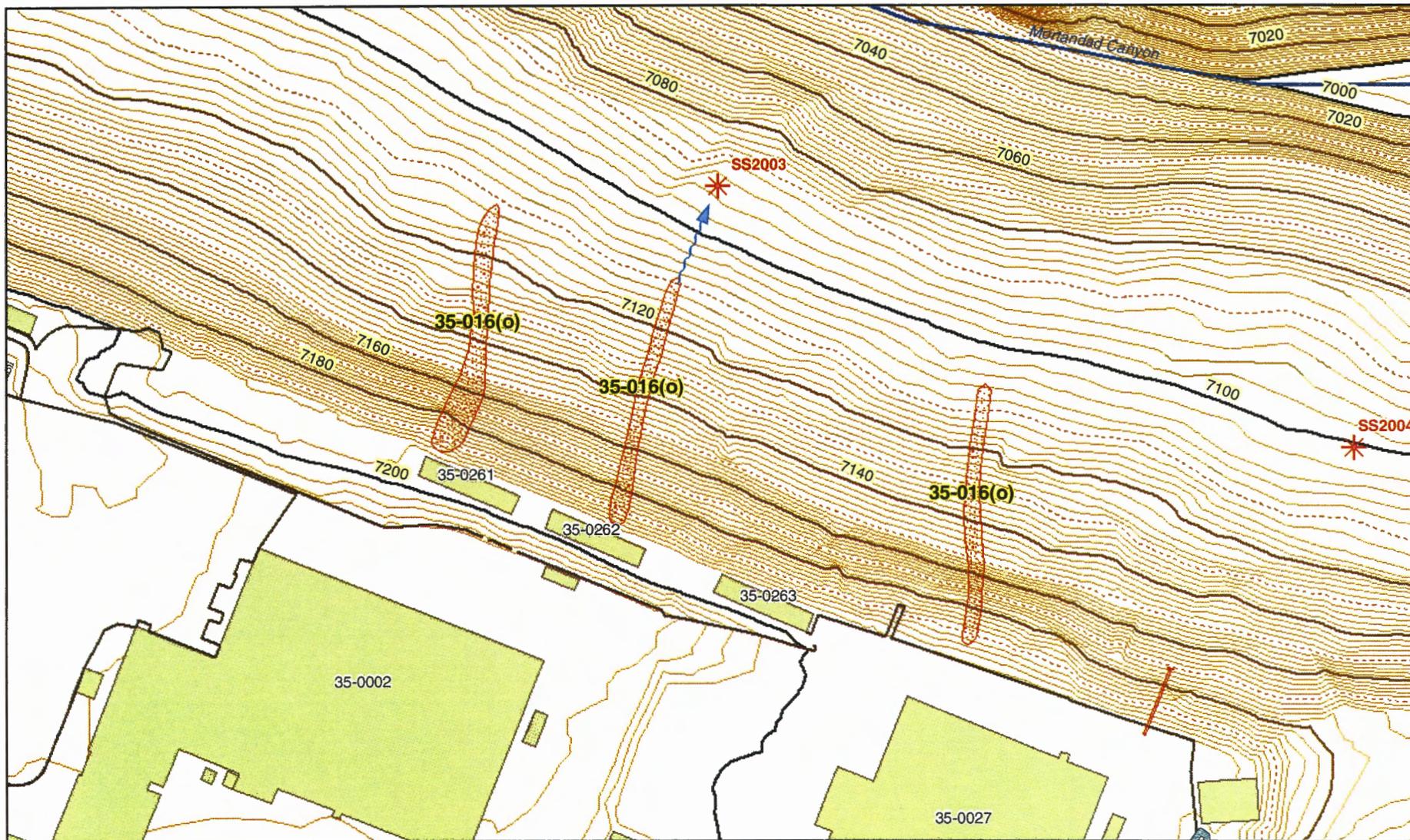


RRES-OEIM GIS TEAM
Produced by: Woodward
May 19, 2004
Map Reference # 04-0005-16



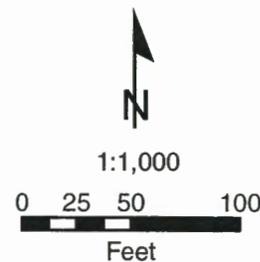
1983 North American Datum
State Plane Coordinate System
New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 35-016(o)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

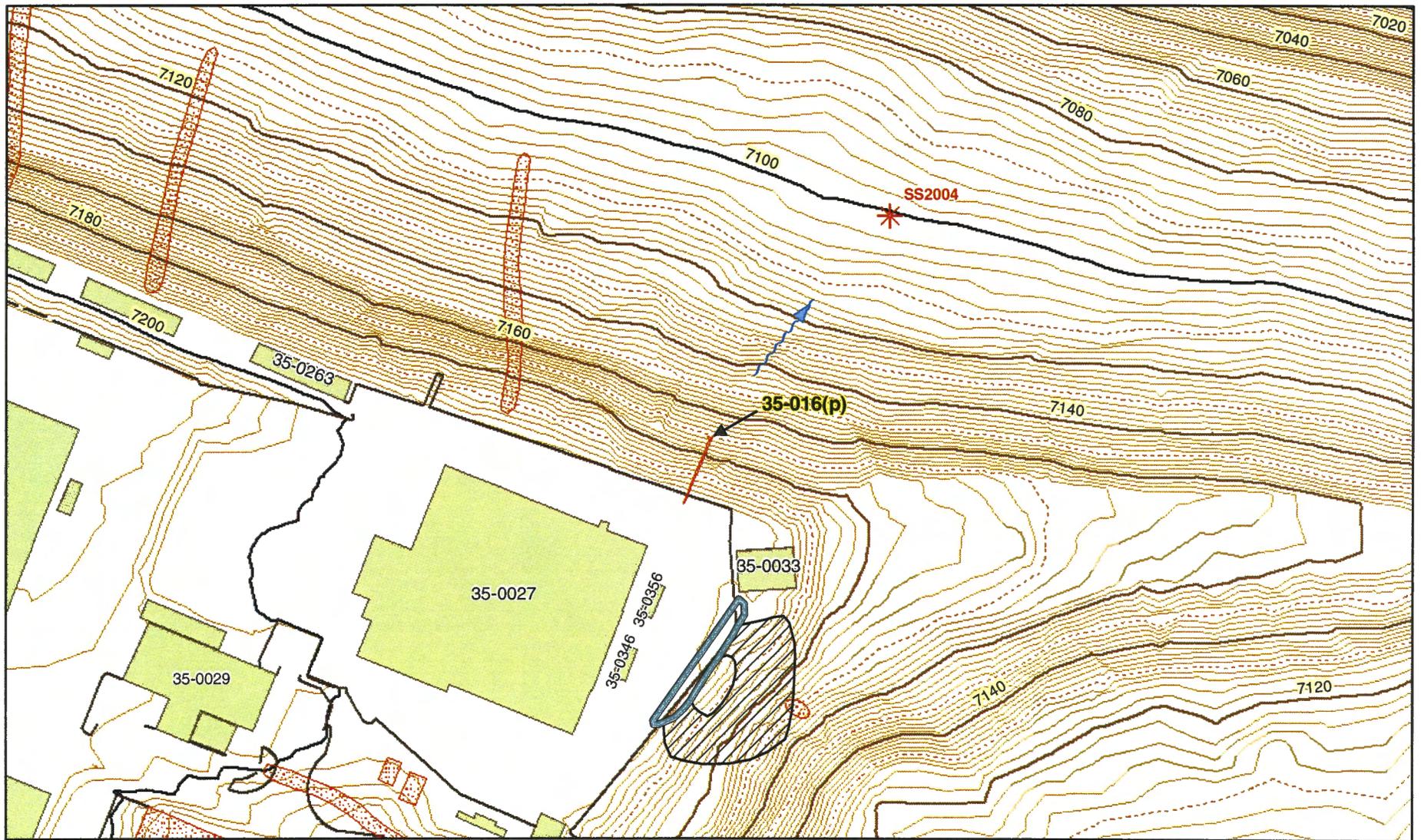


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 19, 2004
 Map Reference # 04-0005-18



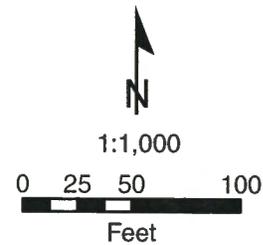
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 35-016(p)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

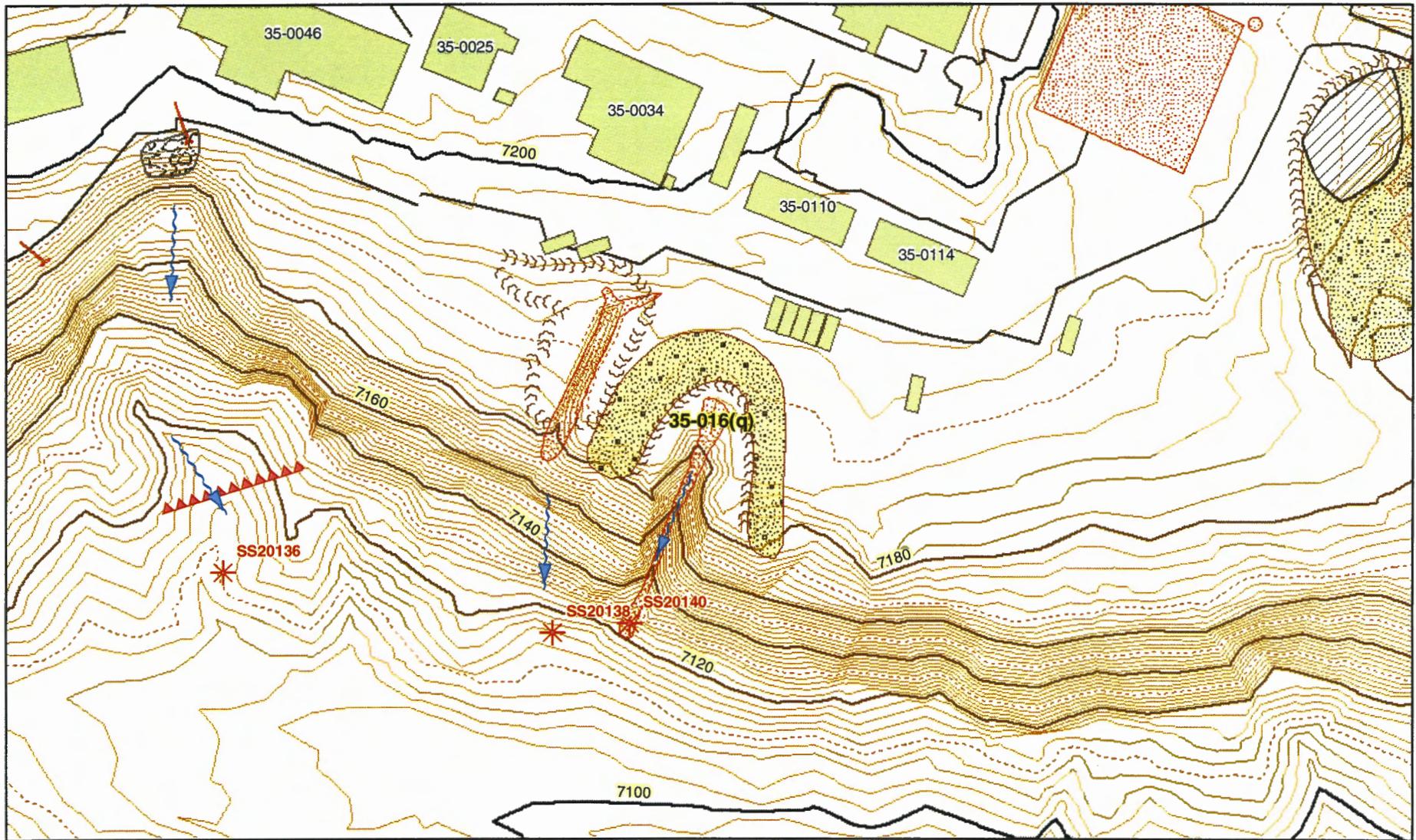


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 19, 2004
 Map Reference # 04-0005-08



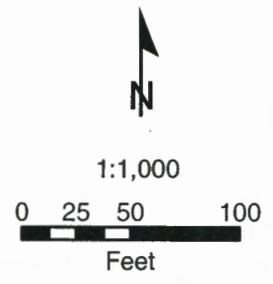
1983 North American Datum
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 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 35-016(q)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

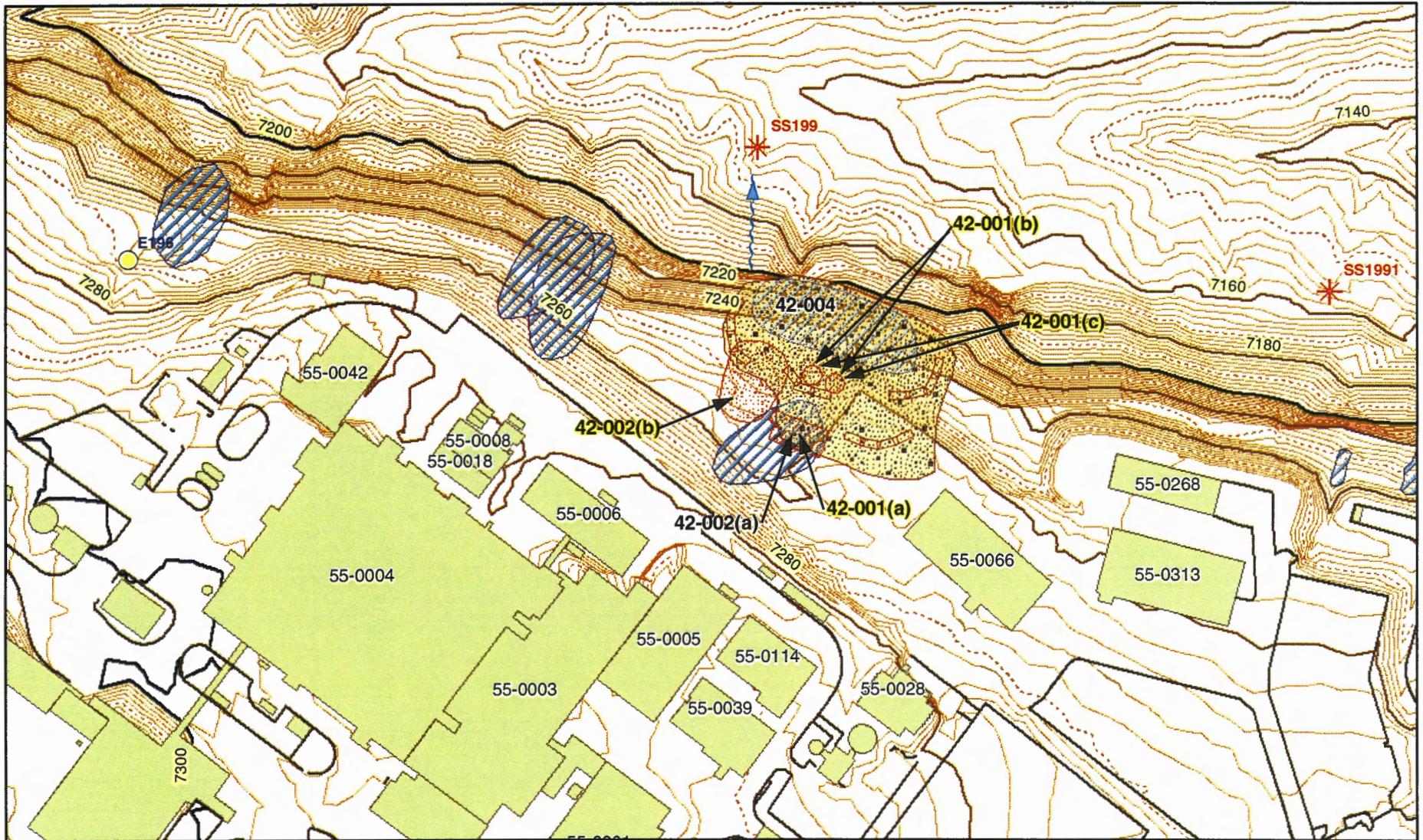


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-66

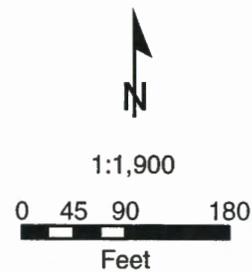
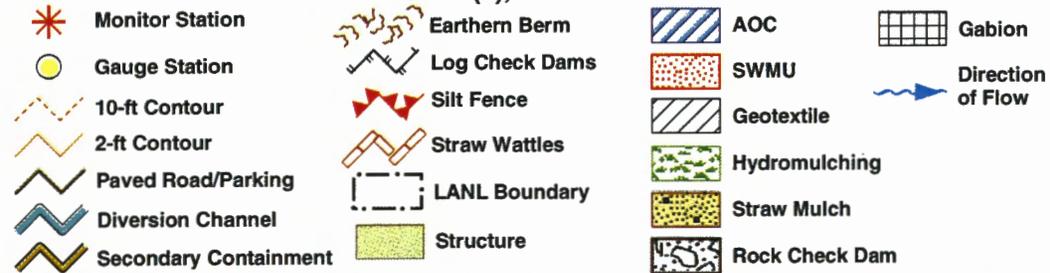
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FFCA Monitoring Location Map at Site 42-001(a), 42-001(b), 42-002(a), 42-002(b), 42-002(c), 42-004



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 Produced by: Woodward
 June 21, 2004
 Map Reference # 04-0005-11



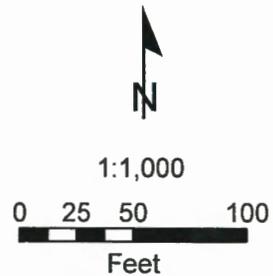
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FFCA Monitoring Location Map at Site C-46-001, 46-004(t), 46-008(g)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

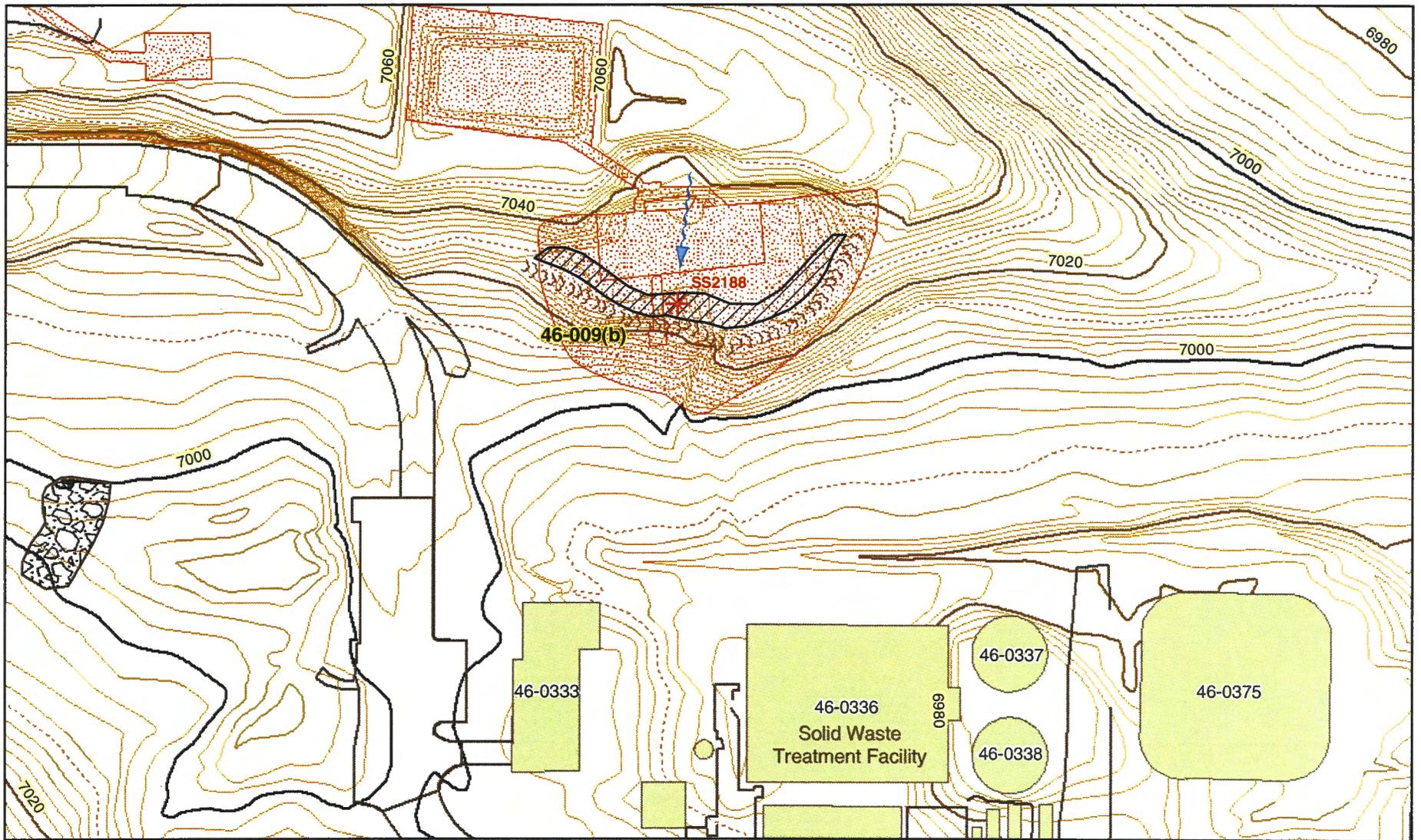


RRES-OEIM GIS TEAM
 Produced by: Woodward
 June 21, 2004
 Map Reference # 04-0005-01



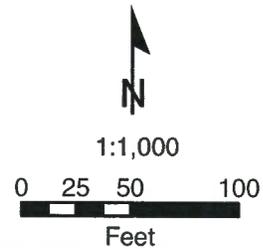
1983 North American Datum
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FFCA Monitoring Location Map at Site 46-009(b)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

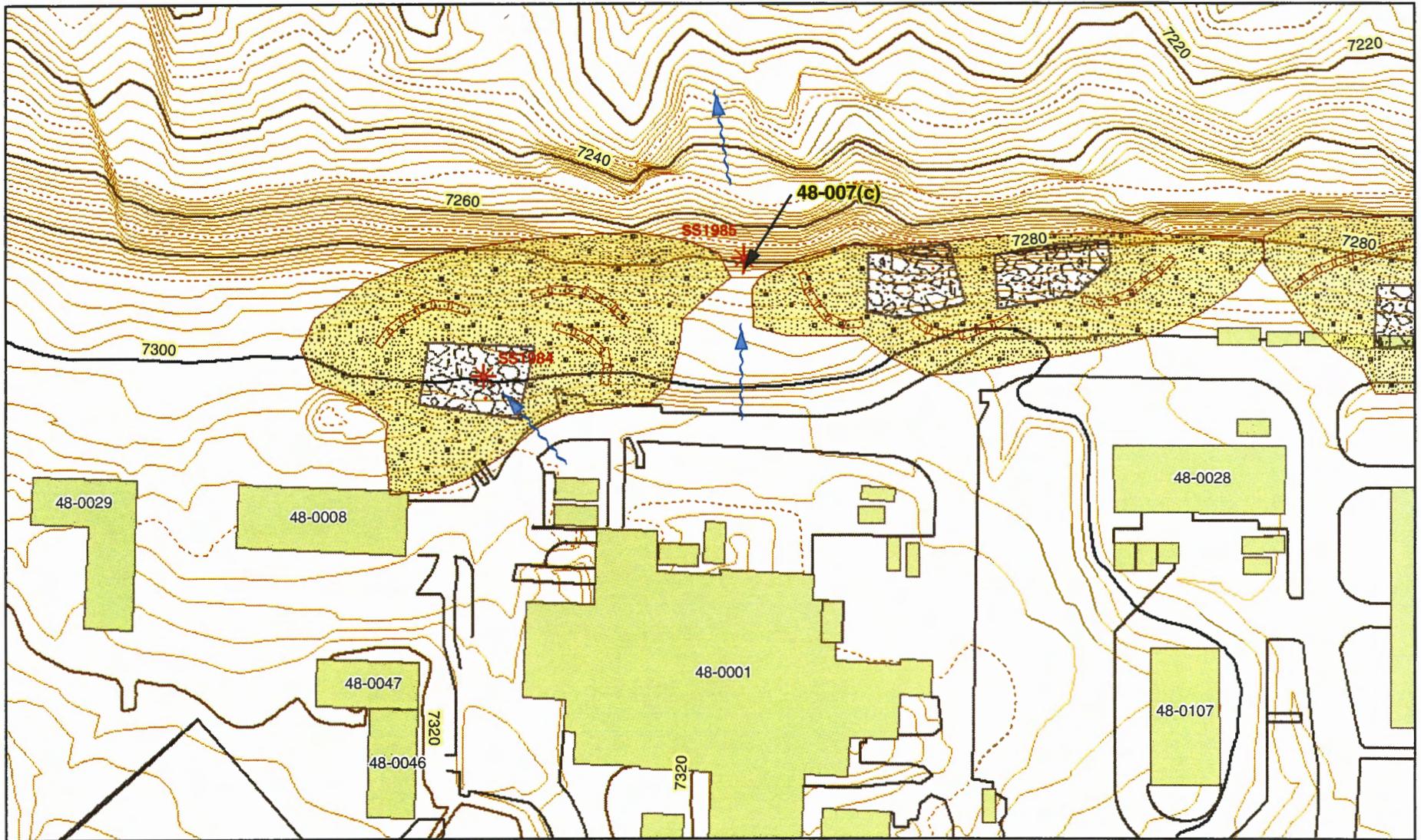


RRES-OEIM GIS TEAM
 Produced by: Wodward
 May 19, 2004
 Map Reference # 04-0005-07



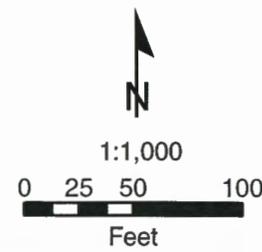
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FFCA Monitoring Location Map at Site 48-007(c)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

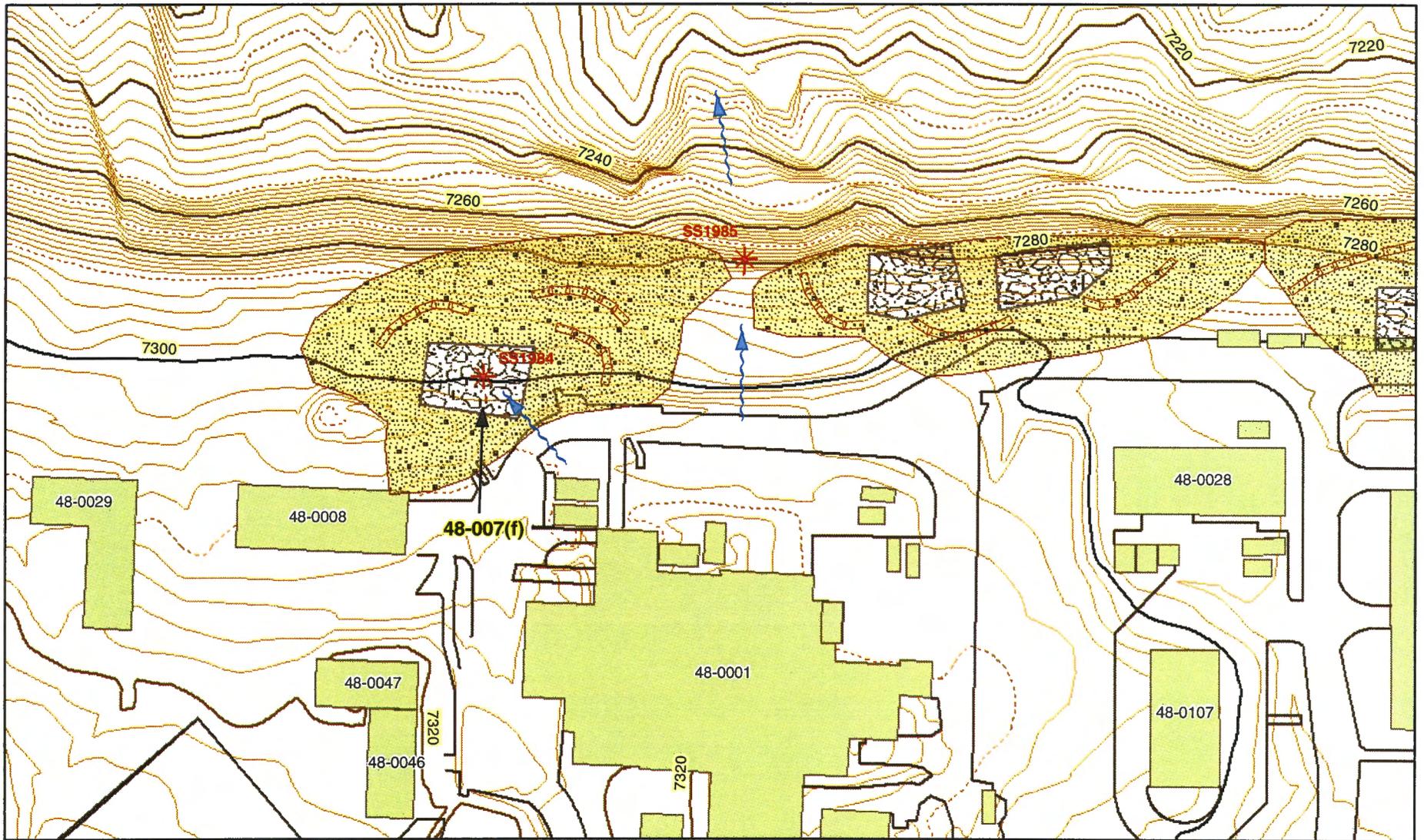


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-42



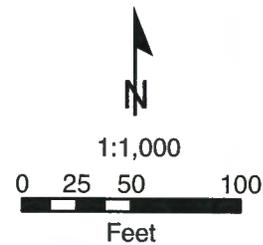
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 48-007(f)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

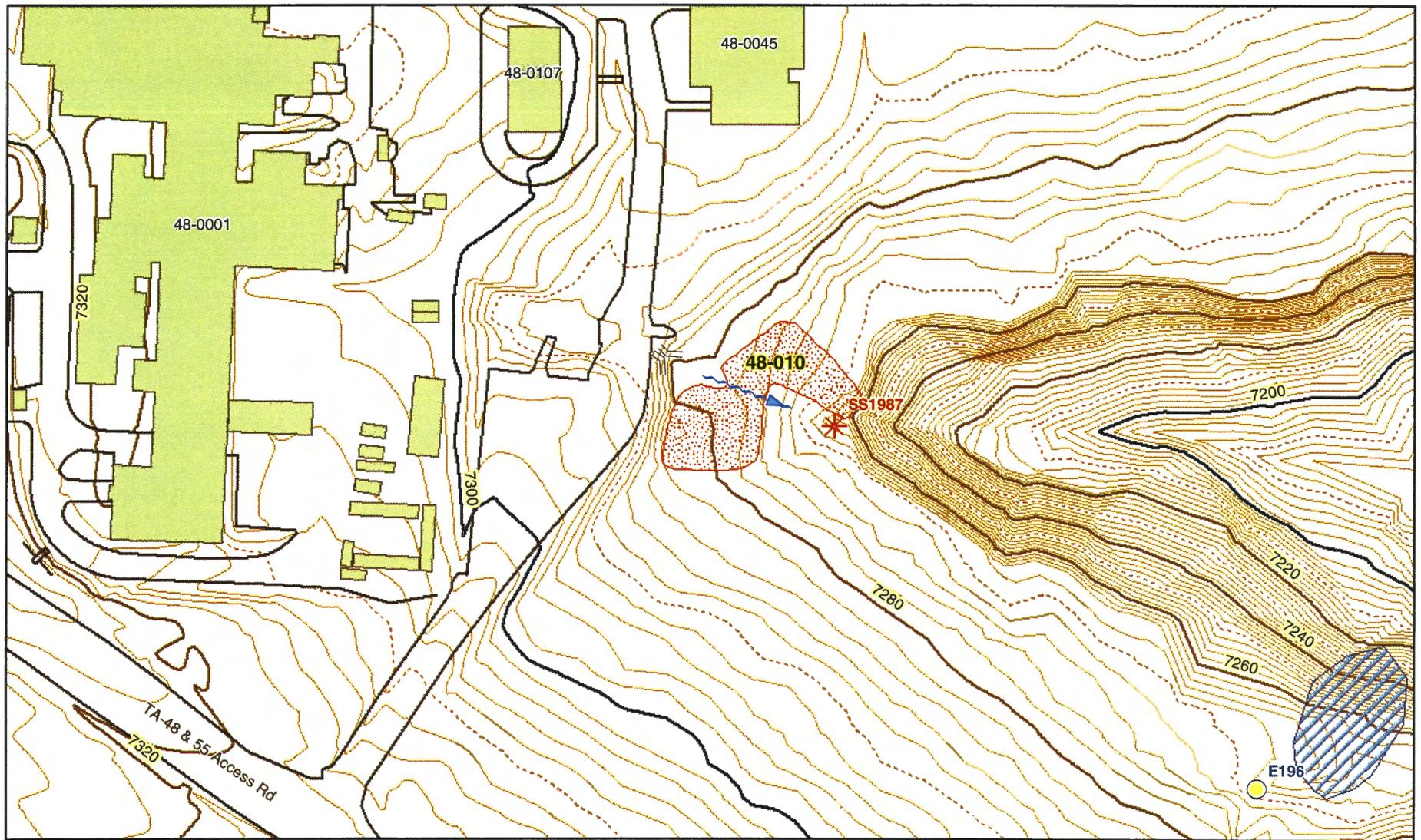


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-43

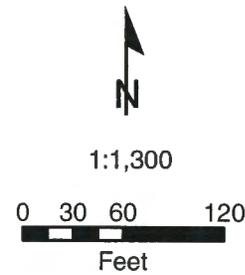
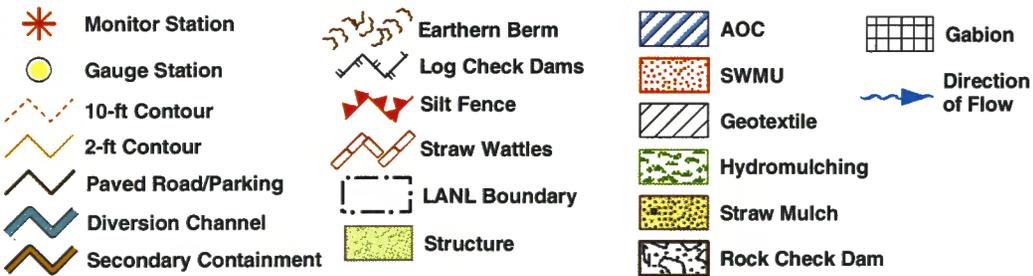


1983 North American Datum
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FFCA Monitoring Location Map at Site 48-010

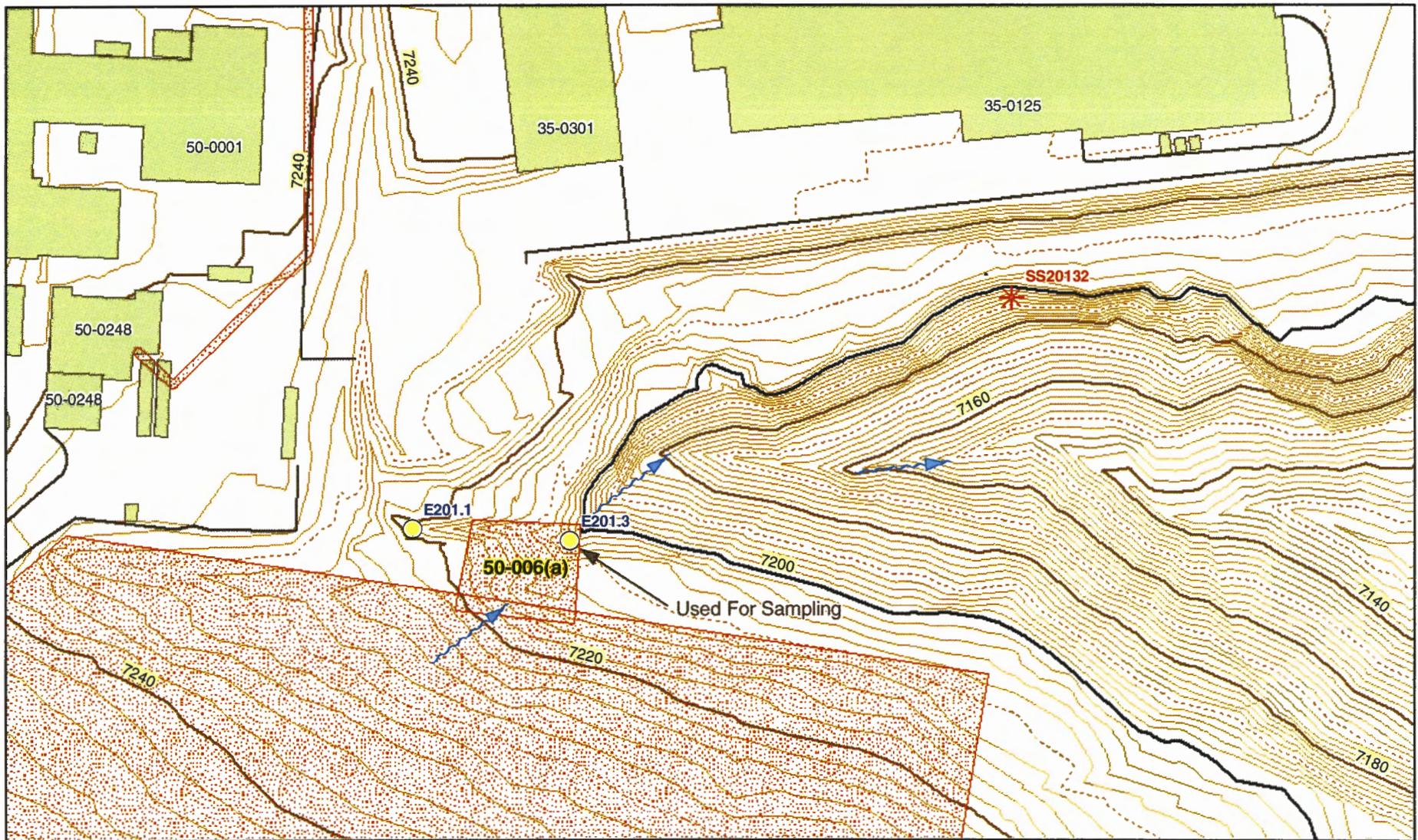


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-44



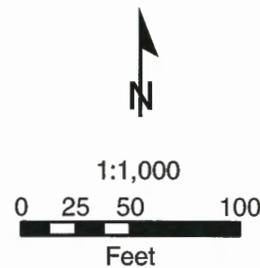
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 50-006(a)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

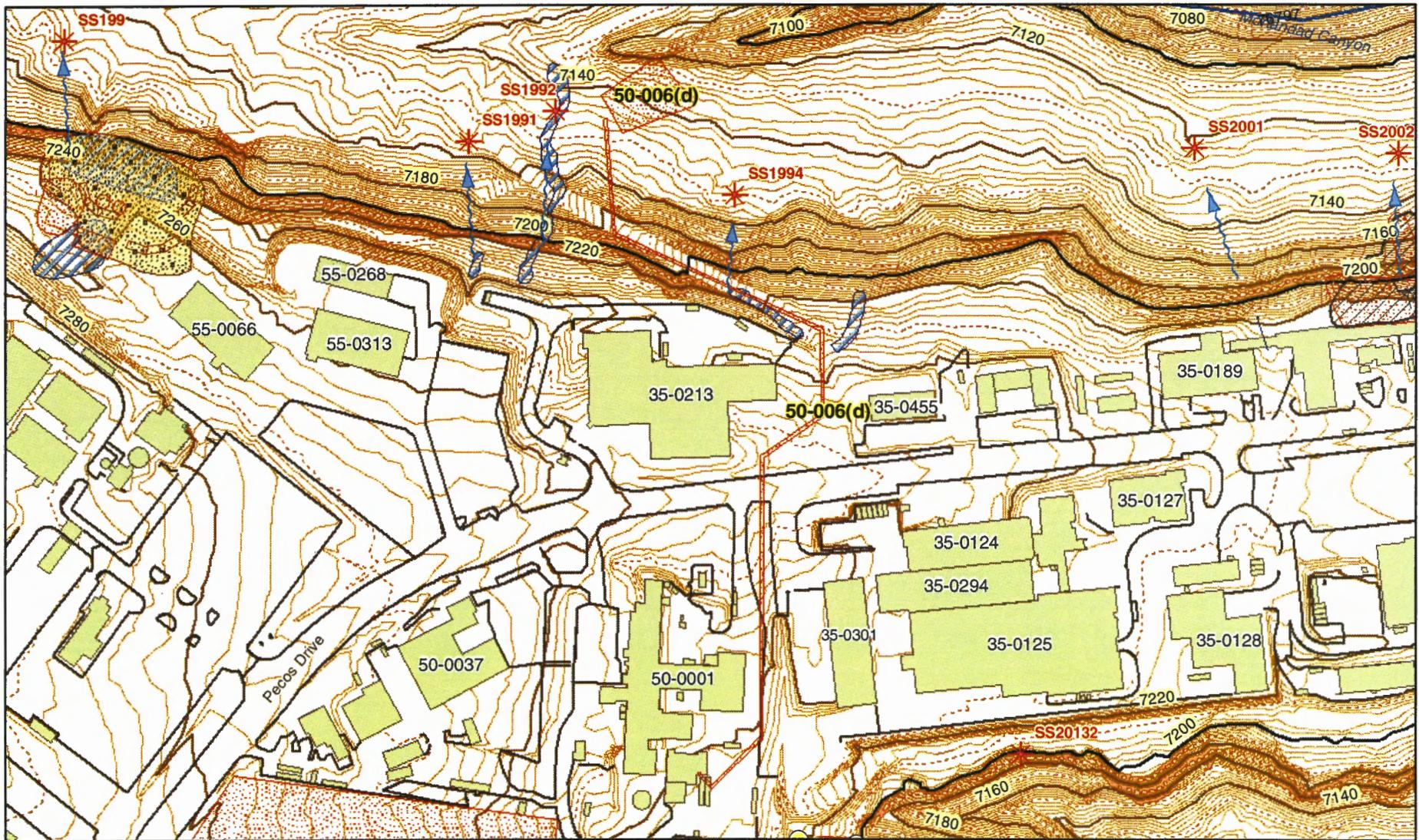


RRES-OEIM GIS TEAM
Produced by: Woodward
May 20, 2004
Map Reference # 04-0005-65

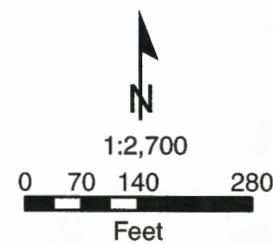
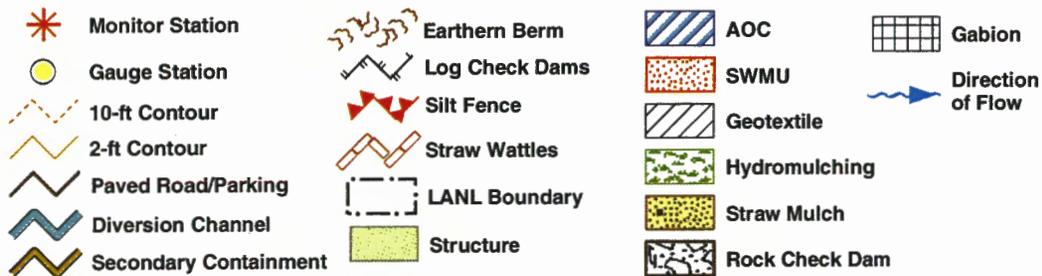


1983 North American Datum
State Plane Coordinate System
New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 50-006(d)

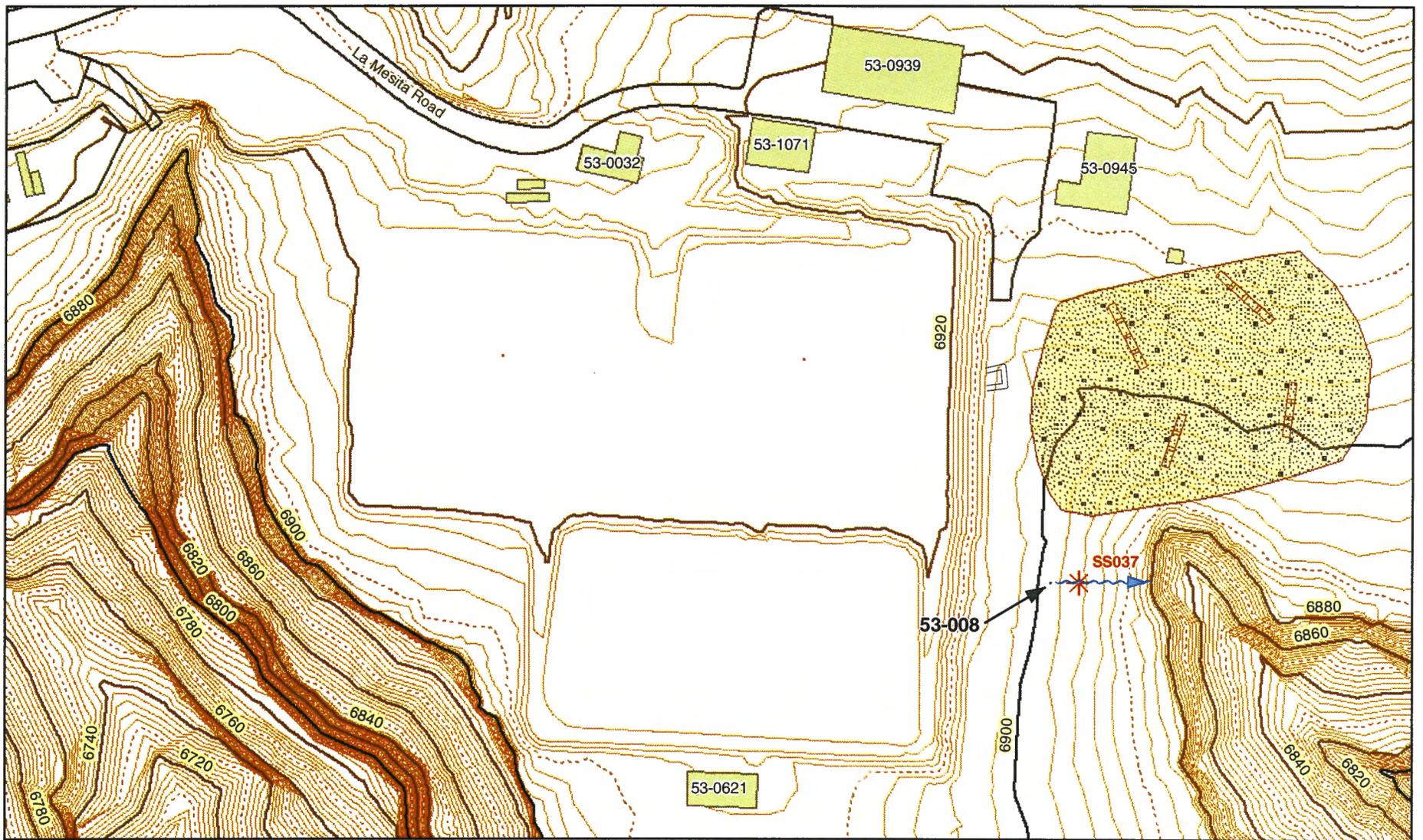


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 Produced by: Woodward
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 Map Reference # 04-0005-10

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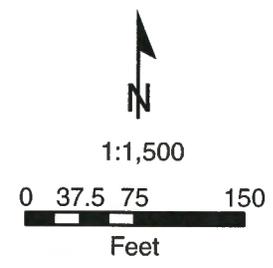
1983 North American Datum
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FFCA Monitoring Location Map at Site 53-008

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

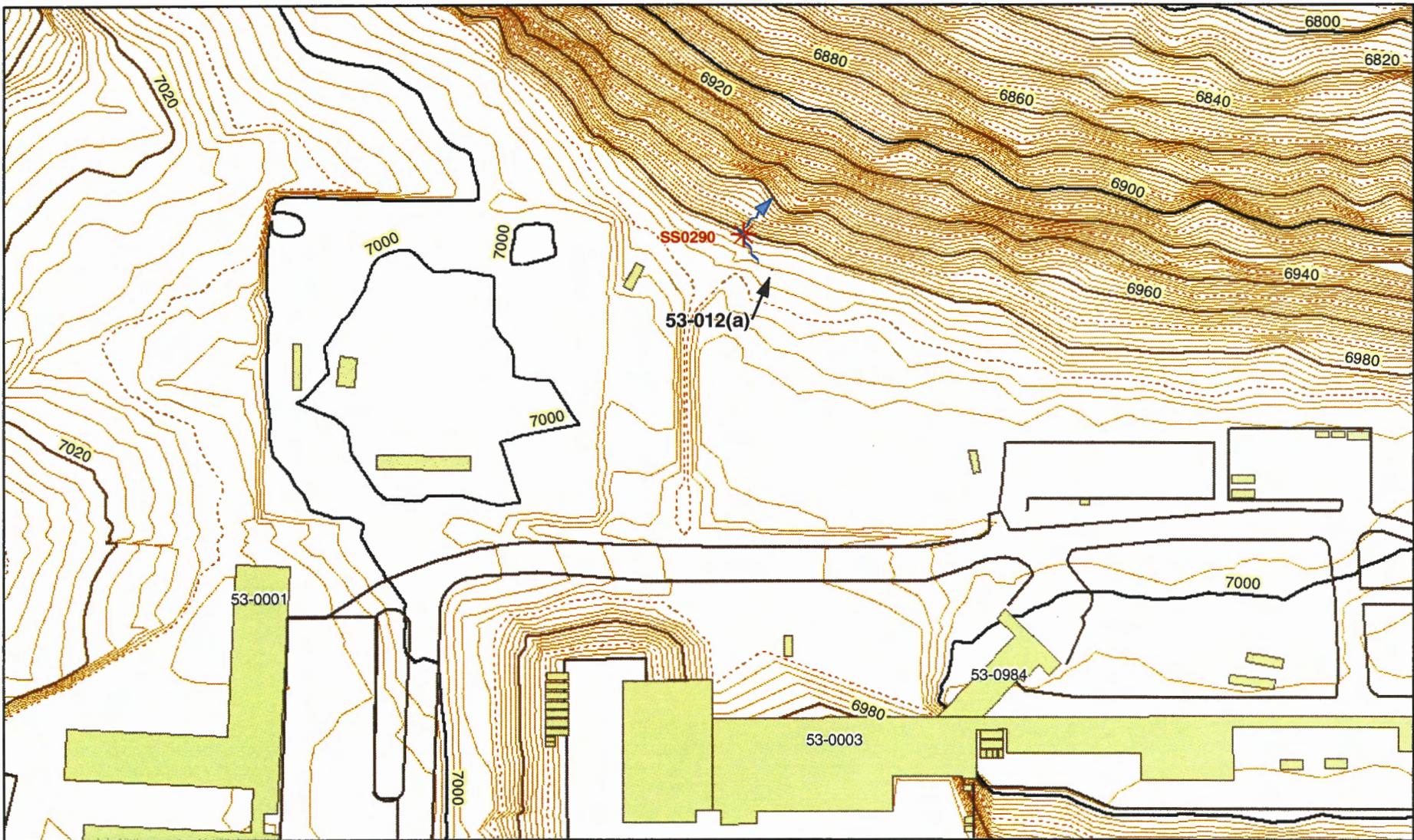


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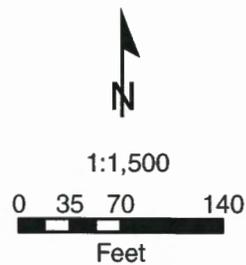
1983 North American Datum
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 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at 53-012(a)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

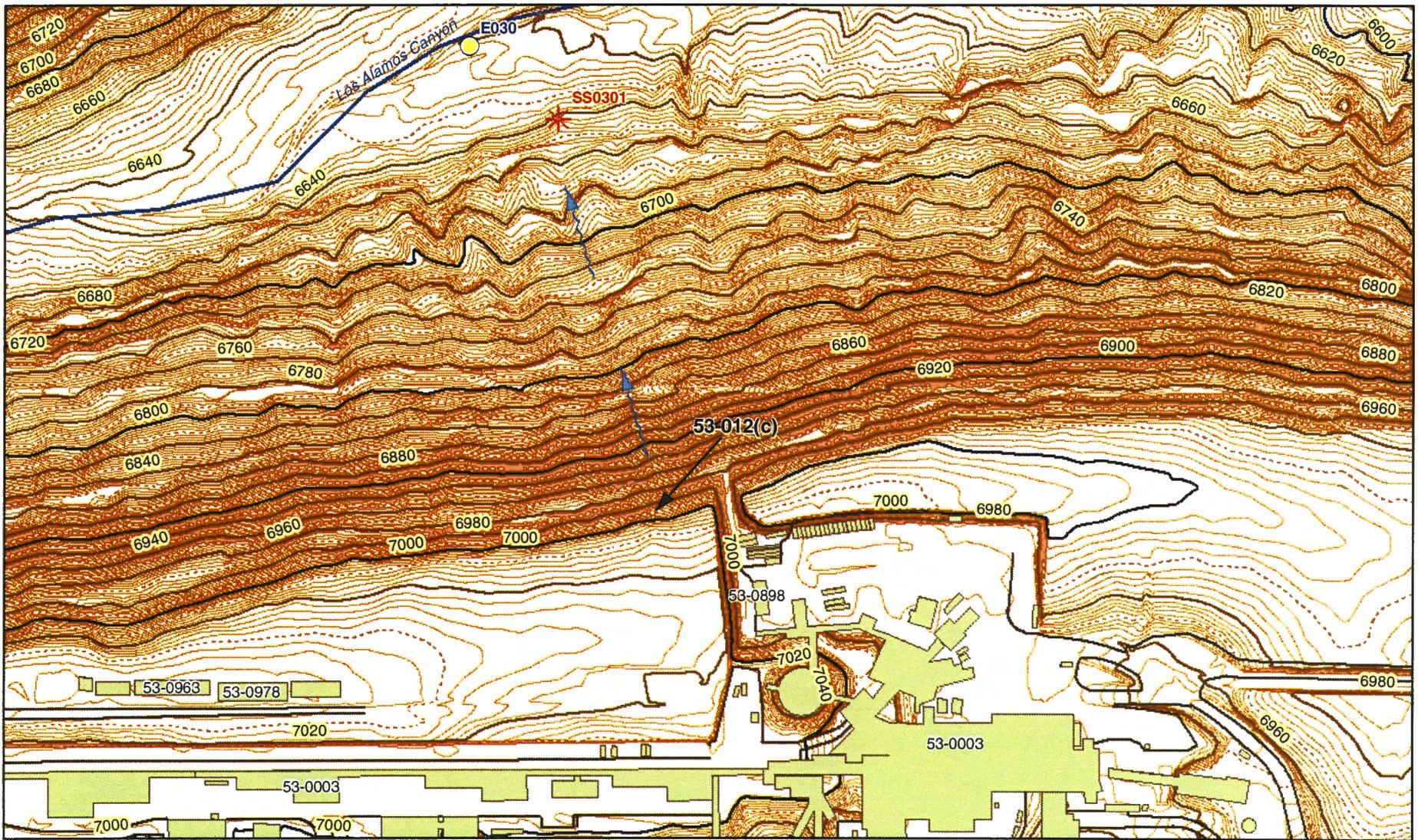


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 19, 2004
 Map Reference # 04-0005-23

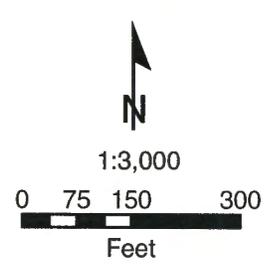
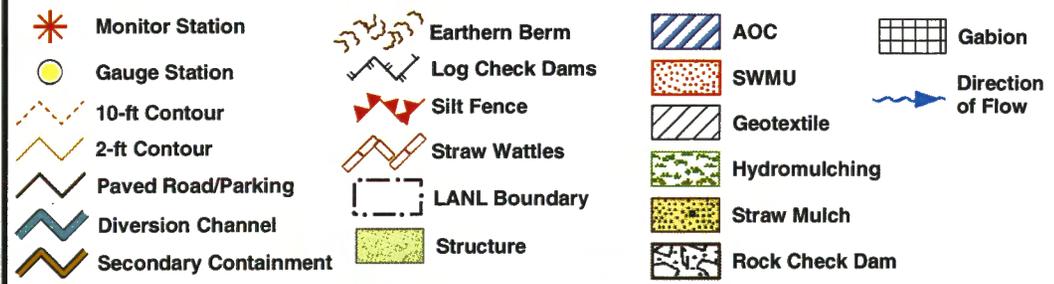
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FFCA Monitoring Location Map at 53-012(c)

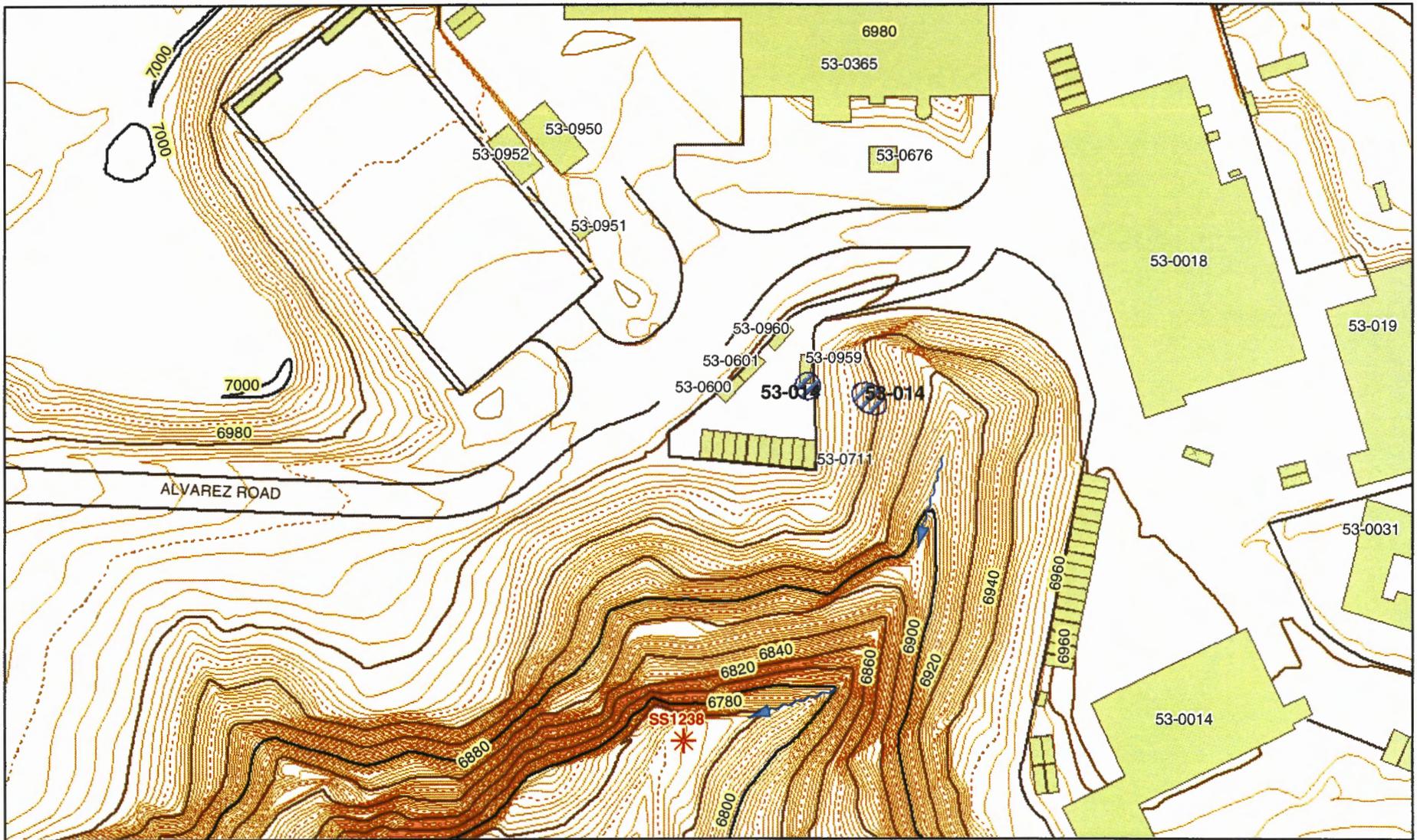


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 19, 2004
 Map Reference # 04-0005-25

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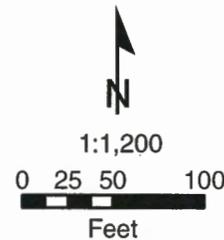
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FFCA Monitoring Location Map at Site 53-014

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

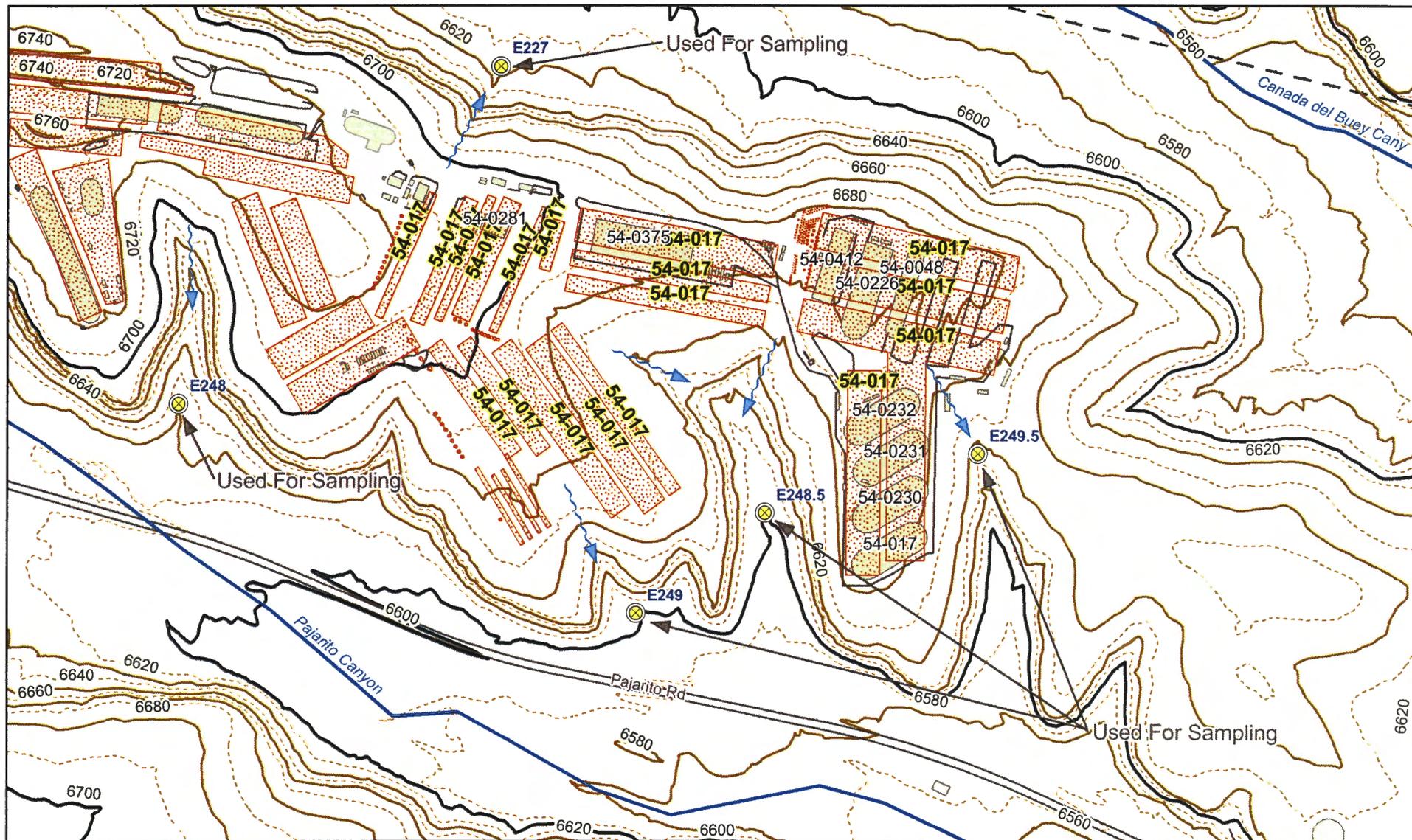


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-52



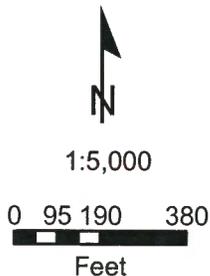
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FFCA Monitoring Location Map at Site 54-017

- | | | | | | | | |
|--|-----------------------|--|----------------|--|----------------|--|-------------------|
| | Monitor Station | | Earthen Berm | | AOC | | Gabion |
| | Gauge Station | | Log Check Dams | | SWMU | | Direction of Flow |
| | 10-ft Contour | | Silt Fence | | Geotextile | | |
| | 2-ft Contour | | Straw Wattles | | Hydromulching | | |
| | Paved Road/Parking | | LANL Boundary | | Straw Mulch | | |
| | Diversion Channel | | Structure | | Rock Check Dam | | |
| | Secondary Containment | | | | | | |

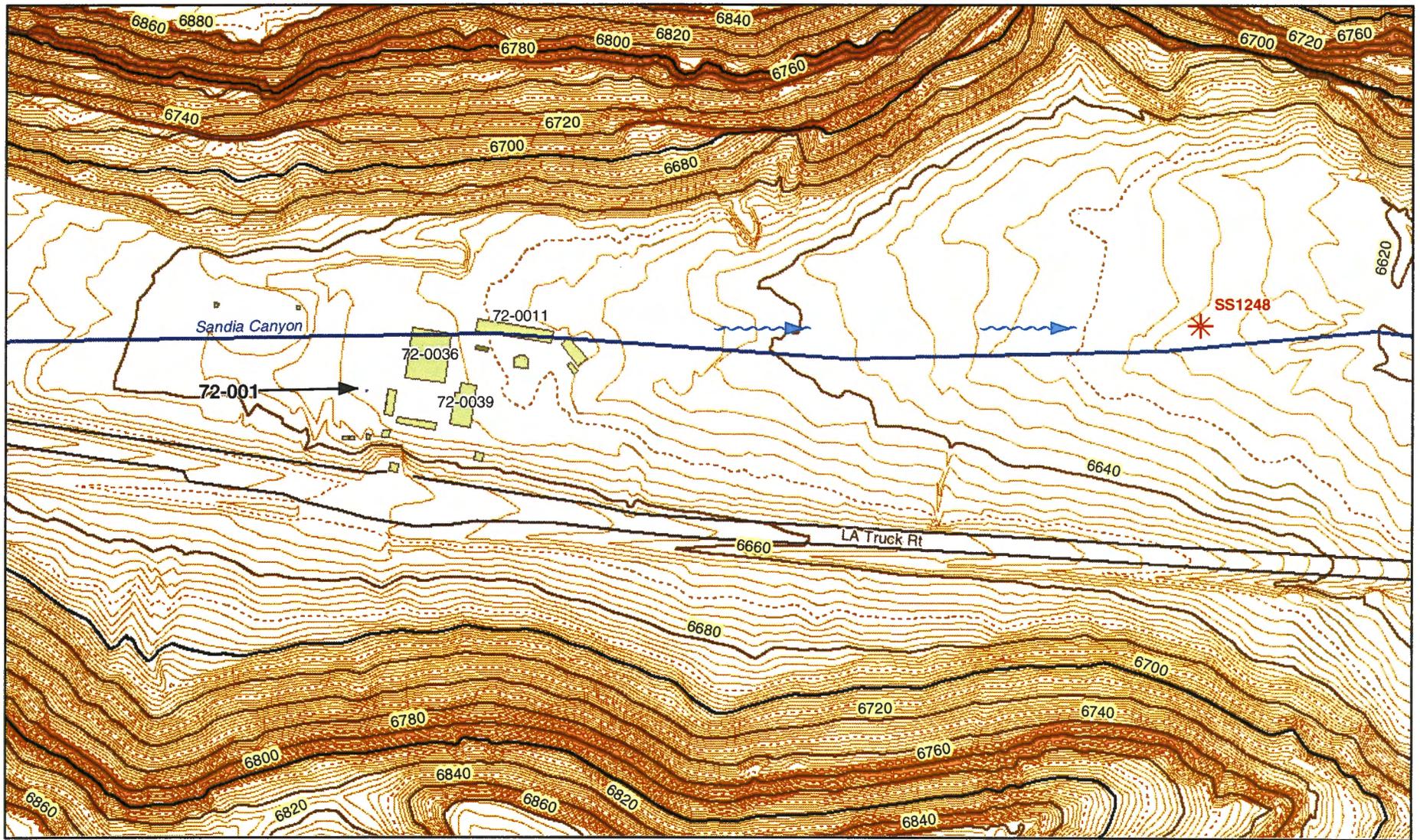


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 19, 2004
 Map Reference # 04-0005-03

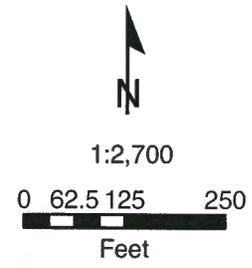
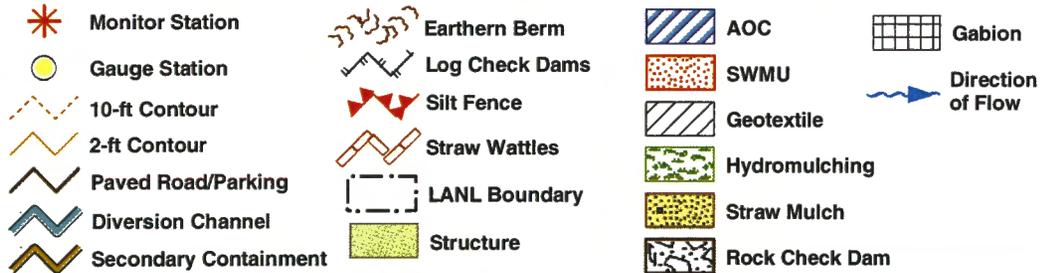


1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 72-001

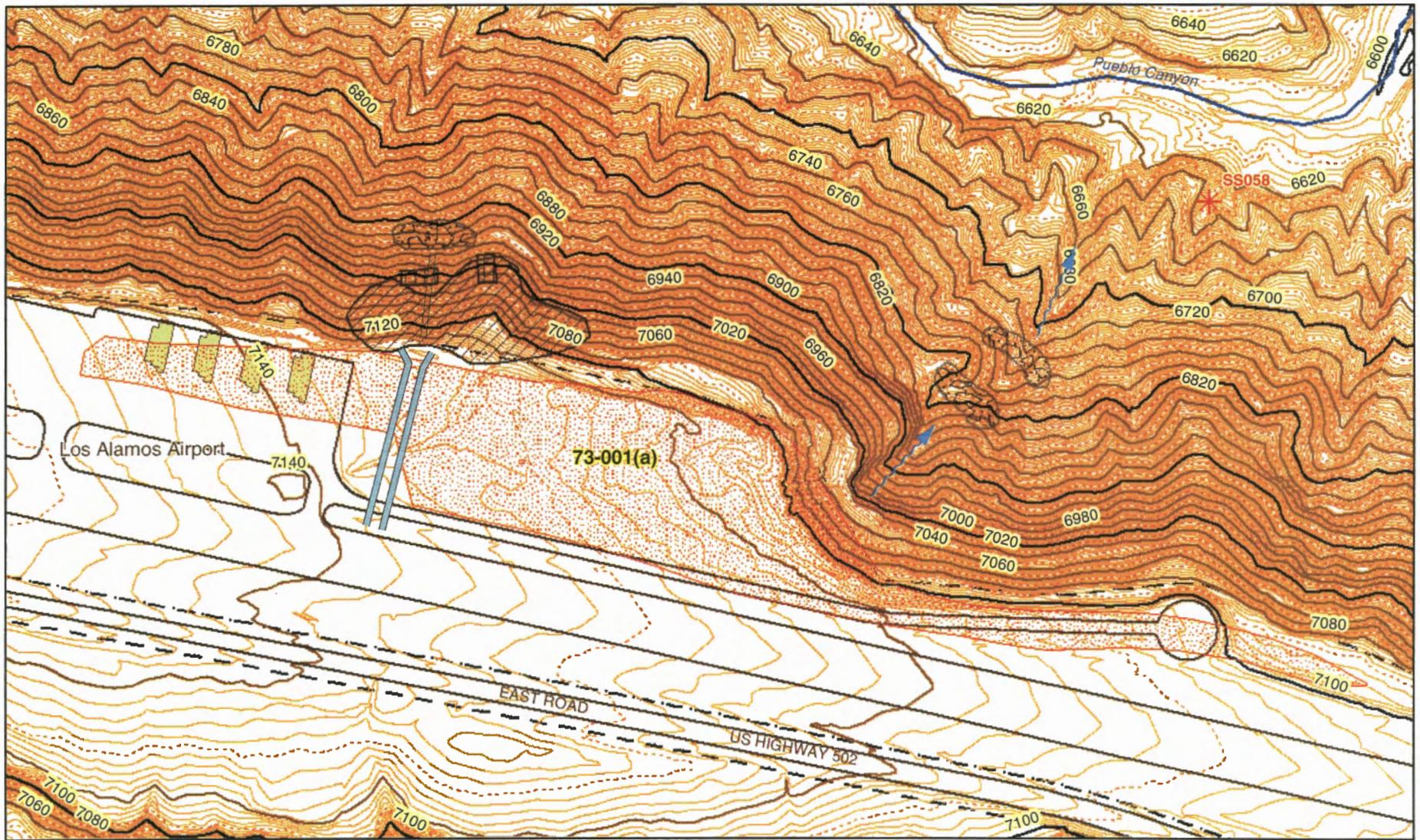


RRES-OEIM GIS TEAM
Produced by: Woodward
May 20, 2004
Map Reference # 04-0005-53



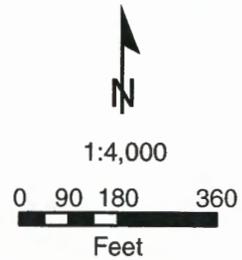
1983 North American Datum
State Plane Coordinate System
New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site 73-001(a)

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |

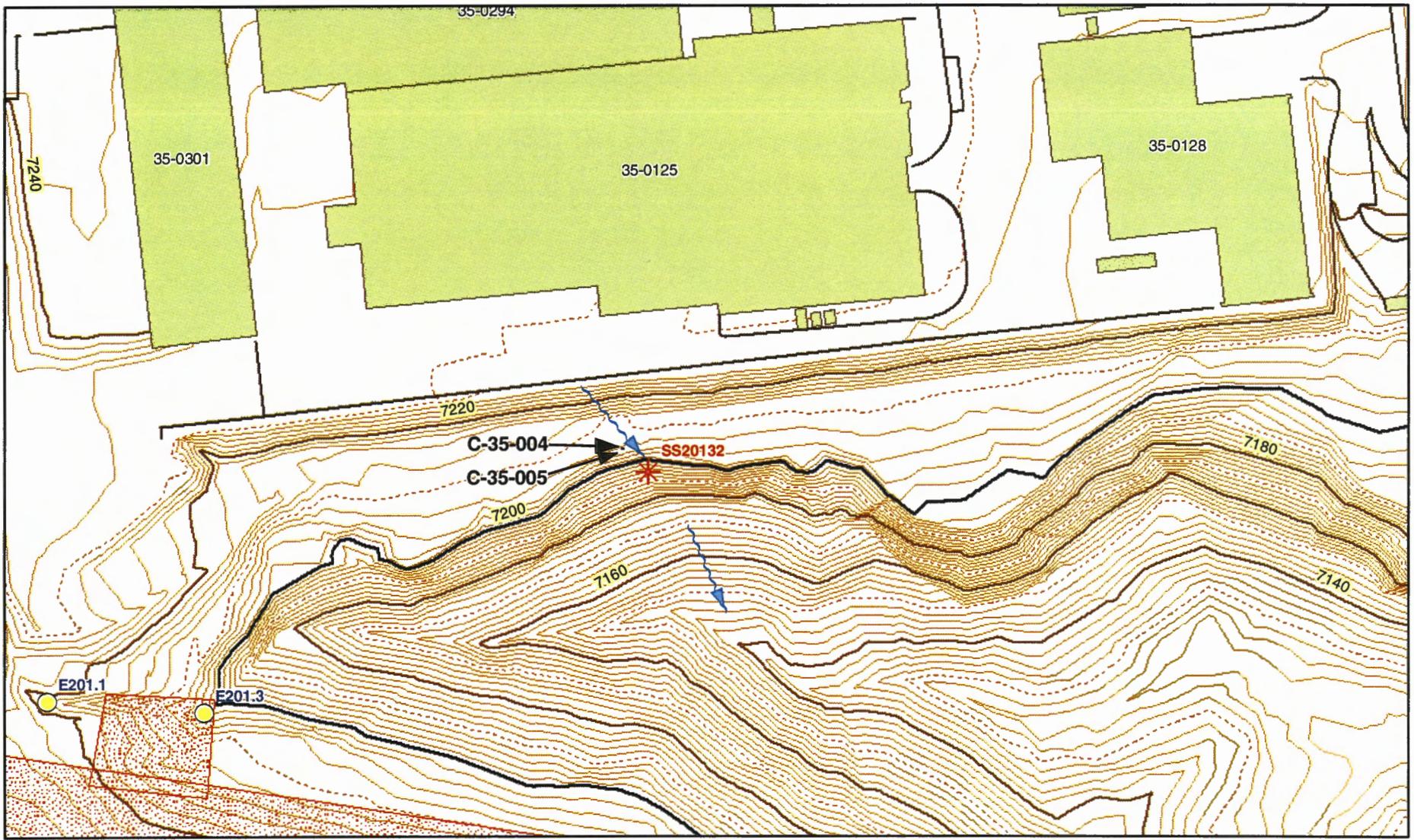


RRES-OEIM GIS TEAM
 Produced by: Woodward
 May 20, 2004
 Map Reference # 04-0005-56



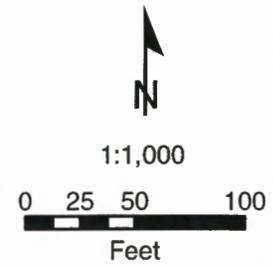
1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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FFCA Monitoring Location Map at Site C-35-004 C-35-005

- | | | | |
|-----------------------|----------------|----------------|-------------------|
| Monitor Station | Earthen Berm | AOC | Gabion |
| Gauge Station | Log Check Dams | SWMU | Direction of Flow |
| 10-ft Contour | Silt Fence | Geotextile | |
| 2-ft Contour | Straw Wattles | Hydromulching | |
| Paved Road/Parking | LANL Boundary | Straw Mulch | |
| Diversion Channel | Structure | Rock Check Dam | |
| Secondary Containment | | | |



RRES-OEIM GIS TEAM
 Produced by: Woodward
 June 21, 2004
 Map Reference # 04-0005-58



1983 North American Datum
 State Plane Coordinate System
 New Mexico, Central Zone (US Feet)

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