Appendix C

Management Plan for Investigation-Derived Waste

C-1.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

This appendix to the progress report describes how investigation-derived waste (IDW) generated during the investigation of the DP Site aggregate area corrective action solid waste management units (SWMUs) will be managed. IDW is waste generated as a result of field-investigation activities and may include, but is not limited to, drill cuttings; excavated material; purge water; contaminated personal protective equipment (PPE), sampling supplies, and plastic; fluids from decontamination of PPE and sampling equipment; and all other wastes potentially contacting contaminants. Certain field investigation activities may also displace environmental media, which is defined as naturally occurring material indigenous to the environment, including groundwater, surface water, surface and subsurface soils, rocks, bedrock, and gravel. IDW generated during the investigation of the DP Site aggregate area corrective action SWMUs/area of concern (AOC) will be managed in a way that is protective of human health and the environment, compliant with applicable regulatory requirements, and consistent with the waste-minimization goals of Los Alamos National Laboratory (the Laboratory).

All IDW generated during field investigation activities will be managed in accordance with applicable Environment and Remediation Support Services (ERSS) standard operating procedures (SOPs). These SOPs incorporate the requirements of all applicable U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department regulations, Department of Energy (DOE) orders, and Laboratory implementation requirements. ENV-ECR SOPs applicable to the characterization and management of IDW are

- LANL ERSS SOP-01.06, Management of Environmental Restoration Project Waste, and
- LANL ERSS SOP-01.10, Waste Characterization.

These SOPs are among the SOPs applicable to the investigation at the DP Site aggregate area corrective action SWMUs/AOC and are available at the following internet address: http://erproject.lanl.gov/documents/procedures.html.

Investigation activities will be conducted in a manner that minimizes the generation of waste. Waste minimization is accomplished by implementing the requirements of the ERSS Division portion of the 2004 Pollution Prevention Roadmap (LANL 2004, 88465), which is updated annually as a requirement of Module VIII of the Laboratory's Hazardous Waste Permit, ID# NM0890010515-1, issued by the EPA on May 23, 1990, and modified on May 19, 1994 (EPA 1990, 01585; EPA 1994, 44146).

The waste streams that will be generated and managed during progress-report implementation at the DP Site aggregate area include the following:

- Drill cuttings
- Excavated soil, rock, gravel, and boulders
- Septic system pipe (inlet and outlet vitrified clay pipe[VCP])
- Concrete debris (septic tanks, sumps, manholes)
- Metal debris (inlet and outlet pipes, culverts)
- Miscellaneous construction and demolition (C&D) debris (building debris: asphalt, fence posts with footers)
- Mixed vegetation debris (tree stumps, slash, and wood debris)
- PPE, plastic, and other IDW
- Decontamination fluids

All wastes will be managed in accordance with applicable Federal, State, DOE, and Laboratory requirements. Waste streams, regulatory classification, estimated amounts, and disposal pathways are shown in Tables C-1 and C-2. The volumes are estimated from Table C-3.

The characterization of waste streams will be based on previously collected samples and additional samples, as necessary. A Waste Characterization Strategy Form (WCSF) will be prepared. Existing Waste Profile Forms (WPFs) will be used or referenced for new WPFs needed for implementation of the work plan.

Historically, cast iron pipe and VCP have contained lead collars. Lead collars will be segregated, decontaminated to below free-release criteria for radionuclides, and managed as hazardous waste to minimize waste volume. In the absence of lead collars the septic system inlet and outlet piping (VCP and cast iron) will be treated as suspect low-level waste (LLW), because of the suspected presence of radionuclides.

If field activities identify a need for soil removal, then excavated soil and other IDW from the remediation activities will be managed as LLW in a Radioactive Waste Storage Area, due to the presence of radionuclides (principally plutonium-239 and -238; uranium-234, -235, and -238; tritium; strontium-90; and americium-241) in the waste streams.

Layback and Overburden Spoils. The layback and overburden spoils will consist of all material removed from above the structures that are excavated. These spoils will not have come in contact with any potential releases from the structures underneath (septic tanks and associated piping). These spoils will be screened using field instruments during the excavation process and will remain at the SWMU, either in rolloff bins or on the ground surface with appropriate best management practices, while awaiting analytical results. If field screening indicates the potential for contamination, the layback and overburden spoils will be placed in rolloff bins and sampled for a hazardous waste determination. A minimum of one direct sample will be collected every 50 yd^3 for verification purposes. Direct samples will be collected and submitted through the Laboratory's Sample Management Office (SMO) for analysis of volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs), target analyte list (TAL) metals, cyanide, nitrates, perchlorates, radionuclides (by gamma and alpha spectroscopy), isotopic plutonium, isotopic uranium, tritium, strontium-90, and polychlorinated biphenyl's (PCBs). If the layback and overburden spoils are determined to be suitable for reuse (i.e., meets residential cleanup standards as determined using New Mexico Environment Department (NMEDs) soil screening guidance), LANL will use this material to backfill DP site aggregate area corrective action excavations.

Before the start of field investigation activities, a WCSF will be prepared and approved according to the requirements of LANL ENV-ECR SOP-01.10. The WCSF will provide detailed information on IDW characterization, management, containerization, and potential volume generation. IDW characterization will be achieved through existing data and/or documentation and through direct sampling of the IDW, or sampling of the media being investigated (i.e., surface soil, subsurface soil, concrete, etc.). If waste characterization sampling is necessary, it will be described in the WCSF.

The selection of waste containers will be based on the appropriate Department of Transportation (DOT) requirements and the type and amount of IDW that is planned to be generated. Each waste container will be individually labeled as to the waste classification, item identification number, radioactivity (if applicable), and date of generation, immediately following containerization. Waste containers will be managed in clearly marked and appropriately constructed waste-accumulation areas. Waste-accumulation area postings, regulated storage duration, and inspection requirements will be based on IDW type and classification. Container and storage requirements will be described in the WCSF, based on requirements outlined in the most recent versions of the LANL Waste Management Facilities Waste

Acceptance Criteria and LANL LIRs 404-00-03, Hazardous and Mixed Waste Requirements; 404-00-04, Managing Solid Waste; 404-00-05, Managing Radioactive Waste; and 405-10-01, Packaging and Transportation. Before waste generation, the WCSF will be approved by the process detailed in LANL ENV-ECR SOP 01.10, Waste Characterization.

Transportation of IDW will comply with appropriate DOT requirements. Depending upon waste classification, disposal of solid IDW will take place either on-site at LANL TA-54, Area G, or at an approved off-site disposal facility. Liquid IDW may be processed at the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) or the TA-46 Sanitary Wastewater Systems Plant. Hazardous and/or mixed waste may be transported and stored at TA-54, Area L, before off-site disposal, or will be shipped directly to an off-site disposal facility. Transportation and disposal requirements will be detailed in the WCSF and approved before the generation of waste.

Table C-1
Waste Streams from Implementation of the DP Site Aggregate Area Investigation SWMUs

Waste Stream	Waste Type	Volume	Shipped To
Drill cuttings	Solid, low-level waste (LLW)	TBD (to be determined)	LANL, Technical Area 54 (TA-54), Area G
Soil and rock	Solid, LLW	TBD	LANL, TA-54, Area G
Sewer line	Solid, LLW	TBD	LANL, TA-54, Area G
Septic tank	Solid, LLW	TBD	LANL, TA-54, Area G
PPE, plastic, and other IDW	Solid, LLW	TBD	LANL, TA-54, Area G
Decontamination fluids	Liquid, LLW	TBD	LANL, TA-50, Radioactive Liquid Waste Treatment Facility (RLWTF)

Table C-2
Waste Streams from Implementation of the DP Site Aggregate Area Corrective Action SWMUs

Waste Stream	Waste Type	Estimated Maximum Volume	Disposal Destination
Layback and overburden spoils	Solid, non-hazardous	TBD	Reuse as clean backfill if residential SSLs and SAL are met, otherwise, dispose according to waste characterization results.
Septic tank liquids	Liquid, mixed low-level waste (MLLW)	300 gal.	Off-site disposal via LANL, TA-54
Sludge and absorbed wash waters	Solid, MLLW	10 yd^3	Off-site disposal via LANL, TA-54
Mixed Debris (tank contents and contaminated items)	Solid, MLLW	10 yd^3	Off-site disposal via LANL, TA-54
Metal piping / metal debris	Solid, low-level waste (LLW)	10 yd^3	LANL, TA-54, Area G
Drill cuttings	Solid, LLW	10 yd^3	TBD (to be determined)
Excavated soil	Solid, LLW	1500 yd^3	LANL, TA-54, Area G
Rock and gravel	Solid, LLW	400 yd^3	TBD
Sand	Solid, LLW	5 yd^3	TBD

Sewer line	Solid, LLW	16 yd^3	LANL, TA-54, Area G
Concrete septic tanks / concrete debris / VCP sewer pipe	Solid, LLW	1,000 yd^3	LANL, TA-54, Area G
Lead collars	Solid, RCRA Hazardous	1 yd^3	Off-site disposal via LANL, TA-54
C&D debris	Solid, LLW	50 yd^3	LANL, TA-54, Area G
Wood debris	Solid, LLW	6 yd^3	LANL, TA-54, Area G
Vegetation	Solid	10 yd^3	LANL, TA-54, Area G
PPE, plastic, and other IDW	Solid, potential LLW	5 yd^3	LANL, TA-54, Area G
Decontamination fluids	Liquid, potential LLW	100 gal.	LANL, TA-50 RLWTF or TA-46 Sanitary Wastewater System

Table C-3
Waste Stream Volumes Listed by SWMU (yd^3)

SWMU Number:	21-006(c)-99	21-012(b)	21-022(f)	21-022(h)-99	21-023(a)-99	21-024(a)	21-024(b)	21-024(d)	21-024(e)	21-024(g)	21-024(h)	21-024(i)	21-024(j)	21-024(k)	21-024(l)-99	21-024(n)	21-024(o)	21-026(a)-99	21-027(a)	21-027(c)	Total
Concrete/VCP																					
Blowdown pits (concrete)[1]		14.8																			14.8
Filter Beds (concrete)[2]																		55.0			55.0
Fiber Pipe[3]										0.1											0.1
Headwall[4]																0.3					0.3
Inlet Line (2" VCP)[5]										0.01											0.0
Inlet Line (4" VCP)[6]										0.13			0.09		0.03						0.3
Inlet Line (6" VCP)[7]						0.2	0.5		1.4		1.0	0.4		0.9							4.4
Inlet Line (grouted 6" VCP)[8]								4.5													4.5
Outlet Line (8" VCP)[9]																		0.8			0.8
Manhole (concrete)[10]			1.5		3.0			1.5						3.0				3.0			12.0
Outlet Line (3" VCP)[11]		0.02																			0.0
Outlet Line (24" VCP)[12]				3.9																	3.9
Outlet Line (4" VCP)[13]										0.01			0.1	0.08			0.08		0.01	0.05	0.3
Pad (concrete)[14]																		117			117.0
Outlet Line (6" VCP)[15]		0.35				0.2	0.02	0.03	0.05		0.1										0.8
Septic Tank (concrete)[16]					9.8	5.4	5.4	19.4		11.4	10.9	9.9	2.2	16.7							91.2
Storm Drain Grate[17]										0.1						0.7					0.8
Storm Drain Culvert (12' concrete)[18]																			0.2		0.2
Sump (brick)[19]	4.9		0.6												1.3						6.8
Sump (concrete)[20]		2.7																			2.7
Total	4.90	17.87	2.10	3.90	12.80	5.80	5.92	25.43	1.45	11.78	12.05	10.29	2.41	20.67	1.33	1.00	0.08	175.80	0.21	0.05	**315.8**
Metal Debris/ Cast Iron Piping																					
Inlet Line (3" CI)[21]	0.1																				0.1
Inlet Line (4" CI)[22]					0.06																0.06
Inlet Line (6" CI)[23]														0.3	0.4						0.7
Metal Apparatus (cauldron)[24]															0.1						0.1
Outlet Line (12" CMP)[25]										0.3						0.4					0.7
Outlet Line (24" CMP)[26]																			0.9		0.9
Outlet Line (3" CI)[27]	0.02																				0.0
Outlet Line (4" CI)[28]		0.8												0.02	0.05	0.1					1.0
Outlet Line (6" CI)[29]			0.4		0.3											0.4					1.1
Septic Tank (steel)[30]									1.6												1.6
Sump[31]				0.1																	0.1
Above-Ground Steel Tank - recycle[32]																					0.0
Total	0.12	0.80	0.40	0.10	0.36	0.00	0.00	0.00	1.58	0.30	0.00	0.00	0.00	0.32	0.55	0.90	0.00	0.00	0.90	0.00	**6.3**

Table C-3 (continued)

SWMU Number:	21-006(c)-99	21-012(b)	21-022(f)	21-022(h)-99	21-023(a)-99	21-024(a)	21-024(b)	21-024(d)	21-024(e)	21-024(g)	21-024(h)	21-024(i)	21-024(j)	21-024(k)	21-024(l)-99	21-024(n)	21-024(o)	21-026(a)-99	21-027(a)	21-027(c)	Total
Gravel																					
Sand[33]																		5.0			5.0
Rock, gravel and boulders[34]	139.1									133											272.1
Tile Field (sand and gravel)[35]														122							122.2
Total	139.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	133.00	0.00	0.00	0.00	122.20	0.00	0.00	0.00	5.00	0.00	0.00	**399.3**
Soil[37]																					
Soil beneath septic tanks[36]					6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2							62.0
Drainage Ditches[38]										33.0											33.0
Inlet Lines[39]	39.2				17.5	13.0	32.0	102.5	91.0	60.3	65.3	25.0	26.8	56.7	3.3						532.6
Outlet Lines[40]	6.7	82.8	28.3	27.8	82.5	14.5	5.8	1.7	3.0	2.5	7.5		31.7	14.8	34.7	66.0	24.2	38.3	17.5	14.2	504.5
Total	45.90	82.80	28.30	27.80	106.20	33.70	44.00	110.40	100.20	102.00	79.00	31.20	64.70	77.70	38.00	66.00	24.20	38.30	17.50	14.20	**1132.1**

Assumptions for Table C-3:

1 Blowdown pit is 10′ x 10′ x 2′ deep = 200 ft^3 x 2 pits = 400 ft^3 = 14.8 yd^3

2 Filter beds are 14.5′ x 23′ x 4′ & 8″ thick (4 sides, bottom, no top)

3 Fiber pipe is 180′ long (L). Outside diameter (D) is 0.33′, inside diameter (d) is 0.30′
Volume calculation for wall of cylinder or pipe = Volume Formula = $(\pi L/4)(D^2–d^2)$ = 2.7 ft^3 = 0.1 yd^3
(Everywhere after this only VF, for the cylinder formula, will be used)

4 Headwall is 2′ x 2′ x 2′ = 8 ft^3 = 0.3 yd^3

5 2″ VCP: D = 0.17′ d = 0.15′ L = 63′
Vol. of pipe wall = VF = 0.3 ft^3 = 0.01 yd^3

6 4″ VCP: D = 0.33′ d = 0.30′
Volumes of pipe walls:

SWMU 21-024(g)	L = 250′	VF = 3.7 ft^3 = 0.13 yd^3
SWMU 21-024(j)	L = 161′	VF = 2.4 ft^3 = 0.09 yd^3
SWMU 21-024(l)	L = 50′	VF = 0.7 ft^3 = 0.10 yd^3

7 6″ VCP: D = 0.50′ d = 0.40′
Volumes of pipe walls:

SWMU 21-024(a)	L = 78′	VF = 5.5 ft^3 = 0.2 yd^3
SWMU 21-024(b)	L = 192′	VF = 13.6 ft^3 = 0.5 yd^3
SWMU 21-024(e)	L = 544′	VF = 38.4 ft^3 = 1.4 yd^3
SWMU 21-024(h)	L = 392′	VF = 27.7 ft^3 = 1.0 yd^3
SWMU 21-024(i)	L = 150′	VF = 10.6 ft^3 = 0.4 yd^3
SWMU 21-024(k)	L = 340′	VF = 24.0 ft^3 = 0.9 yd^3

8 Grouted 6″ VCP: radius = r = 0.25′ L = 615′
Volume of grout and pipe wall = $\pi r2L$ = 120.7 ft^3 = 4.5 yd^3

9 8″ VCP: D = 0.67′ d = 0.57′ L = 230′
Volume of pipe wall = VF = 22.4 ft^3 = 0.8 yd^3

10 Manholes: D = 4′ d = 2.7′ L = 6′
Volumes of pipe walls:

SWMU 21-022(f) =	VF = 40.9 ft^3 = 1.5 yd^3
SWMU 21-023(a) =	VF = 40.9 ft^3 x 2 manholes = 81.8 ft^3 = 3.0 yd^3
SWMU 21-024(d) =	VF = 40.9 ft^3 = 1.5 yd^3
SWMU 21-024(k) =	VF = 40.9 ft^3 x 2 manholes = 81.8 ft^3 = 3.0 yd^3
SWMU 21-026(a) =	VF = 40.9 ft^3 x 2 manholes = 81.8 ft^3 = 3.0 yd^3

11 3″ VCP: D = 0.25′ d = 0.22′ L = 50′
Volume of pipe wall = VF = 0.55 ft^3 = 0.02 yd^3

12 24″ VCP: D = 2.0′ d = 1.8′ L = 131′
Volume of pipe wall = VF = 104.8 ft^3 = 3.9 yd^3

13 4″ VCP: D = 0.33′ d = 0.30′
Volumes of pipe walls:

SWMU 21-024(g)	L = 15′	VF = 0.2 ft^3 = 0.01 yd^3
SWMU 21-024(j)	L = 190′	VF = 2.8 ft^3 = 0.1 yd^3
SWMU 21-024(k)	L = 145′	VF = 2.2 ft^3 = 0.08 yd^3
SWMU 21-024(o)	L = 145′	VF = 2.2 ft^3 = 0.08 yd^3
SWMU 21-027(a)	L = 25′	VF = 0.37 ft^3 = 0.01 yd^3
SWMU 21-027(c)	L = 85′	VF = 1.3 ft^3 = 0.05 yd^3

14 Concrete pad is approx. 35′ x 45′ x 2′ = 3,150 ft^3 = 117 yd^3

15 6″ VCP: D = 0.50′ d = 0.40′
Volumes of pipe walls:

SWMU 21-012(b)	L = 135′	VF = 9.54 ft^3 = 0.35 yd^3
SWMU 21-024(a)	L = 87′	VF = 6.1 ft^3 = 0.2 yd^3
SWMU 21-024(b)	L = 35′	VF = 0.52 ft^3 = 0.02 yd^3
SWMU 21-024(d)	L = 10′	VF = 0.7 ft^3 = 0.03 yd^3
SWMU 21-024(e)	L = 18′	VF = 1.3 ft^3 = 0.05 yd^3
SWMU 21-024(h)	L = 45′	VF = 3.2 ft^3 = 0.1 yd^3

16 Septic tanks: Volume calculations for ea SWMU septic tank are imbedded in the Excel formula in Table 5.22-4

17 Storm drain grates: SWMU 21-024(g) = 2′ x 2′ x 1′ = 4 ft^3 = 0.1 yd^3
SWMU 21-024(n) = 3′ x 3′ x 2′ = 18 ft^3 = 0.7 yd^3

18 Storm drain culvert: D = 1.0′ d = 0.8′ L = 45′
Vol. of pipe wall = VF = 6.4 ft^3 = 0.2 yd^3

19 Sump (brick): SWMU 21-006(c) – 99
Vol. of sump = (2 x (6′ x 12′ x 0.5′)) + (2 x (6′ x 5′ x 0.5′)) +(5′ x 12′ x 0.5′) = 132.0 ft^3 = 4.9 yd^3
SWMU 21-022(f) D = 5.3′ d = 5.0′ L = 6′
Vol. of sump = VF = 16.4 ft^3 = 0.6 yd^3
SWMU 21-024(l) D = 5.0′ d = 4.7′ L ≅ 15′
Vol. of sump = VF = 34.2 ft^3 = 1.3 yd^3

20 Sump (concrete): Vol. of sump = 6′ x 6′ x 2′ = 72 ft^3 = 2.7 yd^3

21 3″ CI: D = 0.25′ d = 0.22′ L = 235′
Vol. of pipe wall = VF = 2.6 ft^3 = 0.1 yd^3

22 4″ CI: D = 0.33′ d = 0.30′ L = 105′
Vol. of pipe wall = VF = 1.56 ft^3 = 0.06 yd^3

23 6″ CI: D = 0.50′ d = 0.40′
Volumes of pipe walls:
SWMU 21-024(k) L = 340′ VF = 7.4 ft^3 = 0.3 yd^3
SWMU 21-024(l)-99 L = 123′ above ground = VF = 8.7 ft^3 = 0.3 yd^3
L = 40′ underground = VF = 2.8 ft^3 = 0.1 yd^3
Total = 0.3 + 0.1 = 0.4 yd^3

24 Metal apparatus (cauldron?): Exact dimensions unknown
Assume 0.1 yd^3

25 12″ CMP: D = 1.0′ d = 0.9′
Volumes of pipe walls:
SWMU 21-024(g) L = 49′ VF = 7.3 ft^3 = 0.3 yd^3
SWMU 21-024(n) L = 75′ VF = 11.2 ft^3 = 0.4 yd^3

26 24″ CMP: D = 2.0′ d = 1.9′ L = 80′
Vol. of pipe wall = VF = 24.5 ft^3 = 0.9 yd^3

27 3″ CI: D = 0.25′ d = 0.22′ L = 40′
Vol. of pipe wall = VF = 0.44 ft^3 = 0.02 yd^3

28 4″ CI: D = 0.33′ d = 0.30′
Volumes of pipe walls:
SWMU 21-012(b) L = 312′ VF = 22.0 ft^3 = 0.8 yd^3
SWMU 21-024(k) L = 34′ VF = 0.5 ft^3 = 0.02 yd^3
SWMU 21-024(l)-99 L = 118′ VF = 1.3 ft^3 = 0.05 yd^3
SWMU 21-024(n) L = 178′ VF = 2.6 ft^3 = 0.1 yd^3

29 6″ CI: D = 0.50′ d = 0.40′
Volumes of pipe walls:
SWMU 21-022(f) L = 170′ VF = 12.0 ft^3 = 0.4 yd^3
SWMU 21-023(a)-99 L = 495′ VF = 7.3 ft^3 = 0.3 yd^3
SWMU 21-024(n) L = 143′ VF = 10.1 ft^3 = 0.4 yd^3

30 Septic tank (steel): Volume calculation is embedded in the Excel formula in Table 25.1-3.

31 Sump: D = 3.0′ d = 2.9′ L = 6.0′
Vol. of sump = VF = 2.8 ft^3 = 0.1 yd^3

32 The above-ground steel tank will be recycled.

33 Parts of the sand pile may still be on site. Assume 5 yd^3.

34 Rock and gravel and boulders
SWMU 21-006(c)-99
Vol. of gravel = 16′ x 70′ x 1′ = 1,120 ft^3
minus 360 ft^3 for the interior brick sump
1,120 ft^3 – 360 ft^3 = 760 ft^3 = 28 yd^3 gravel
Vol. of boulders = 16′ x 70′ x 3′ = 3,360 ft^3
minus 360 ft^3 for the interior brick sump
3,360 ft^3 – 360 ft^3 = 3,000 ft^3 = 111.1 yd^3 boulders
SWMU 21-024(g)

Vol. of rock in Drainage Ditches #1 and #2
= 180′ x 5′ x 4′ = 3,600 ft^3 = 133 yd^3 rock

35 Tile field (sand and gravel)
Volume = 20′ x 30′ x 5.5′ = 3,300 ft^3 = 122 yd^3

36 Soil beneath septic tanks:
Average tank footprint = 17.5′ x 9.5′ = 166.3 ft^3
Assume 1′ soil will need to be excavated:
166.3 ft^2 x 1′ = 166.3 ft^3 = 6.2 yd^3
Assume a total of 10 septic tanks:
6.2 yd^3 x 10 tanks = 62.0 yd^3

37 Soil: In most cases, assume excavated trenches are 1.5′ wide (approx. one backhoe bucket width) and 3′ deep (actual depths will vary from near surface to more than 5′).
All excavated soil is assumed to be low-level waste. Excavated soil volumes do not include the volumes of the pipelines buried within since they are relatively insignificant by comparison.

38 Drainage ditches: Vol. of excavated ditch = 90′ in length x 5′ wide x 1′ deep
= 450 ft^3 x 2 ditches = 900 ft^3 = 33 yd^3

39	Inlet lines:	SWMU 21-006(c)-99	235′ x 3′ x 1.5′ = 1,057.5 ft^3 = 39.2 yd^3
		SWMU 21-023(a)-99	105′ x 3′ x 1.5′ = 472.5 ft^3 = 17.5 yd^3
		SWMU 21-024(a)	78′ x 3′ x 1.5′ = 351 ft^3 = 13.0 yd^3
		SWMU 21-024(b)	192′ x 3′ x 1.5′ = 864 ft^3 = 32.0 yd^3
		SWMU 21-024(d)	615′ x 3′ x 1.5′ = 2,767.5 ft^3 = 102.5 yd^3
		SWMU 21-024(e)	544′ x 3′ x 1.5′ = 2,448 ft^3 = 91.0 yd^3
		SWMU 21-024(g)	(250′ x 63′ x 49′) = 362′ x 3′ x 1.5′ = 1,629 ft^3 = 60.3 yd^3
		SWMU 21-024(h)	392′ x 3′ x 1.5′ = 1,764 ft^3 = 65.3 yd^3
		SWMU 21-024(i)	150′ x 3′ x 1.5′ = 675 ft^3 = 25.0 yd^3
		SWMU 21-024(j)	161′ x 3′ x 1.5′ = 724.5 ft^3 = 26.8 yd^3
		SWMU 21-024(k)	340′ x 3′ x 1.5′ = 1,530 ft^3 = 56.7 yd^3
		SWMU 21-024(l)-99	20′ x 3′ x 1.5′ = 90.0 ft^3 = 3.3 yd^3
40	Outlet lines:	SWMU 21-006(c)-99	40′ x 3′ x 1.5′ = 180 ft^3 = 6.7 yd^3
		SWMU 21-012(b)	(50′ x 135′ x 312′) = 497′ x 3′ x 1.5′ = 2,236 ft^3 = 82.8 yd^3
		SWMU 21-022(f)	170′ x 3′ x 1.5′ = 765 ft^3 = 28.3 yd^3
		SWMU 21-022(h)-99	167′ x 3′ x 1.5′ = 751.5 ft^3 = 27.8 yd^3
		SWMU 21-023(a)-99	495′ x 3′ x 1.5′ = 2,227.5 ft^3 = 82.5 yd^3
		SWMU 21-024(a)	87′ x 3′ x 1.5′ = 391.5 ft^3 = 14.5 yd^3
		SWMU 21-024(b)	35′ x 3′ x 1.5′ = 157.5 ft^3 = 5.8 yd^3
		SWMU 21-024(d)	10′ x 3′ x 1.5′ = 45 ft^3 = 1.7 yd^3
		SWMU 21-024(e)	18′ x 3′ x 1.5′ = 81 ft^3 = 3.0 yd^3
		SWMU 21-024(g)	15′ x 3′ x 1.5′ = 67.5 ft^3 = 2.5 yd^3
		SWMU 21-024(h)	45′ x 3′ x 1.5′ = 202.5 ft^3 = 7.5 yd^3
		SWMU 21-024(j)	190′ x 3′ x 1.5′ = 855 ft^3 = 31.7 yd^3
		SWMU 21-024(k)	89′ x 3′ x 1.5′ = 400.5 ft^3 = 14.8 yd^3
		SWMU 21-024(l)-99	208′ x 3′ x 1.5′ = 936 ft^3 = 34.7 yd^3
		SWMU 21-024(n)	396′ x 3′ x 1.5′ = 1,782 ft^3 = 66.0 yd^3
		SWMU 21-024(o)	145′ x 3′ x 1.5′ = 652.5 ft^3 = 24.2 yd^3
		SWMU 21-026(a)-99	(155′ + 75′) = 230′ x 3′ x 1.5′ = 1,035 ft^3 = 38.3 yd^3
		SWMU 21-027(a)	(25′ + 80′) = 105′ x 3′ x 1.5′ = 472.5 ft^3 = 17.5 yd^3
		SWMU 21-027(c)	85′ x 3′ x 1.5′ = 382.5 ft^3 = 14.2 yd^3

Notes: Total waste volumes presented in Table C-2 assume the following excavation expansion factors (pers. comm. R. Rager, 1/27/05):
Soil = 30%
Concrete and VCP = 200%
Therefore, the soil and concrete/VCP volumes presented in Table C-2 have been increased as shown below and the new volumes are presented in Table C-2:
Soil: 1,132.1 yd^3 + 30% = 1, 472 yd^3 (rounded up to 1, 500 yd^3)
Concrete/VCP: 315.8 yd^3 + 200% = 947 yd^3 (rounded up to 1,000 yd^3)
VCP = vitrified clay pipe
CI = cast iron
CMP = corrugated metal pipe

REFERENCES

EPA (U.S. Environmental Protection Agency), April 1990. United States Environmental Protection Agency, Region 6 Hazardous Waste Permit (Hazardous and Solid Waste Amendments). (EPA 1990, 01585)

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EPA (U.S. Environmental Protection Agency), March 13, 1996. "Use of the Area of Contamination (AOC) Concept during RCRA Cleanups," U.S. Environmental Protection Agency memorandum from M. Shapiro and S. Luftig RCRA Chiefs. (EPA 1996, 82288)