

ATTACHMENT O

Industrial and Sanitary Outfalls 2019 NPDES Permit Re-Application Outfall 051 Fact Sheet

TA-55 Facility Operations
TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF)



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INDUSTRIAL AND SANITARY OUTFALLS 2019 NPDES PERMIT RE-APPLICATION OUTFALL 051 FACT SHEET

1.0 OUTFALL LOCATION [Section I]

Outfall ID No.:	051	Outfall Location:	TA-50
Category:	Radioactive Liquid Waste Discharge	Originating Structure for the Discharge:	TA-50-1
Flow Type:	Intermittent (batch)	Receiving Stream:	Effluent Canyon, Tributary to Mortandad Canyon, Water Quality Segment 20.6.4.128 NMAC
Longitude:	106° 17' 54" W	Latitude:	35° 51' 54" N

2.0 FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES [Section II]

Outfall 051 is located at TA-50 and discharges to Effluent Canyon which is a tributary to Mortandad Canyon in Water Quality Segment 20.6.4.128 NMAC. The outfall discharges treated radioactive liquid waste effluent from that originates at TA-50-1. Attachment A provides a location map. The discharge is comprised of treated effluent from the Radioactive Liquid Waste Treatment Facility (RLWTF). Table 1 identifies the discharge source, the source location, and source composition.

TA	Buildings	Types	Transportation Mode (Piping, Truck etc.)	Discharge Source Description	Source Composition
50	1, 66, 230, 248, 250, 257, 261	Process Cooling	Piping, Truck	Radioactive Liquid Waste Treatment Facility (RLWTF)	Treated effluent from the RLWTF.
52	181, 183	Storm Water			

2.1 Process Schematic and Water Balance [II.A]

A process schematic line drawing that shows the route taken by water from intake to the discharge at Outfall 051 is provided in Attachment B. This drawing includes all operations that contribute process water to the discharge at the outfall. A water balance is also provided on the process schematic with average flows. The water balance is based upon actual data collected from operations personnel.

2.2 Water Treatment Processes [II.B]

The RLWTF receives and treats radioactive liquid waste (RLW) process, cooling, and/or storm water from various generator facilities located throughout the Los Alamos National Laboratory (LANL). All wastewater that is discharged to the facility must comply with the facility's Waste Acceptance Criteria and must have a completed and approved Waste Stream Profile Form prior to its discharge. The RLWTF consists of (a) an underground collection system (double walled piping and vaults) that conveys water to Technical Area (TA) 50 from generators at LANL; (b) structures located at TA-50 that house treatment operations and the mechanical evaporator system (MES) located at TA-50-257; and (c) Solar Evaporation Tanks (SET) located at TA-52-181 and 183. The RLWTF treatment operations are centralized at TA-50-1, which houses the treatment equipment, process tanks, analytical laboratories, and offices. Structures adjacent to TA-50-1 provide low level waste (LLW) influent and emergency storage (TA-50-250), transuranic (TRU) influent storage (TA-50-66), secondary waste storage (TA-50-248), and mechanical evaporation (TA-50-257). The treatment operations are divided into the following:

- Main LLW Treatment Process:** Consists of LLW influent collection, LLW influent storage, LLW treatment, and discharge of treated effluent water to the environment. The treatment process includes the addition of chemicals to the influent in reaction tanks, filtration, ion exchange, and reverse osmosis (RO). Treated effluent may be discharged to the NPDES Outfall 051, the SET located at TA-52, or the mechanical evaporation system (MES) located at TA-50-257. The main LLW treatment process generates solids/sludge and RO concentrate that is routed to the secondary treatment process.
- TRU Treatment Process:** Consists of influent collection, influent storage, TRU treatment, and sludge concentration, and sludge solidification. The treated effluent water from the TRU treatment process is not

discharged to the environment. Treated effluent water either receives additional treatment in the Secondary RO or it is sent to the bottoms storage tanks located at TA-50-248. Sludge from the TRU treatment process is concentrated, solidified with cement in a drum tumbler, and shipped to the Waste Isolation Pilot Plant as a solid TRU waste for disposal.

- Secondary Treatment Process:** Consists of a rotary vacuum filter to treat sludge from the main LLW treatment process, a secondary RO to treat RO concentration from the main LLW treatment process and/or effluent from the TRU treatment process, and bottoms storage tanks located at TA-50-248 for RO concentrate. Treated water is either stored as bottoms or routed back to the main LLW reaction tanks. Sludge from the rotary vacuum filter is drummed and shipped offsite for disposal as LLW radioactive solid waste. Bottoms from the storage tanks are shipped offsite in tanker trucks for disposal as LLW radioactive solid waste.

Table 2 identifies the wastewater treatment codes associated with the RLWTF. Attachment B provides a schematic of the buildings and vaults associated with the influent collection system. The vaults are monitored by radio signal and/or process logic controller at the facility to ensure that there are no leaks into the double walled piping. Photographs are provided in Attachment C.

Treatment Code	Description	Justification
1F	Evaporation	Mechanical Evaporator (MES) and Solar Evaporation Tanks (SET)
1O	Mixing	Various Storage and Reaction Tanks
1S	Reverse Osmosis (RO) (Hyperfiltration)	Primary RO Unit
1U	Sedimentation (Settling)	Sludge
2C	Chemical Precipitation	Chemical precipitation of radionuclides in reaction tanks.
2J	Ion Exchange	Removal of Perchlorate using ion exchange.
2K	Neutralization	Influent and Room 60 Neutralization
5Q	Landfill	Drums of TRU Waste
5R	Pressure Filtration	Pressure Filter
5U	Vacuum Filtration	Rotary Vacuum filter for low level waste sludge

The water treatment processes identified in Table 2 utilize chemicals to promote precipitation, adjust pH, clean membranes, and/or otherwise treat the radioactive liquid wastewater. Table 3 provides a list of the chemicals used at the RLWTF.

Source	Chemical Name	Reason for Use	Toxic Pollutant and/or Hazardous Substances Table 2C-3 or 2C-4	
Radioactive Liquid Waste Treatment Facility	EDTA	Membrane Cleaning	EDTA	2C-4
	Ferric Sulfate	Promote Precipitation/Flocculation	Ferric Sulfate Sulfuric Acid	2C-4
	Hydrochloric Acid	Membrane Cleaning	Hydrochloric acid	2C-4
	Magnesium Hydroxide	Promote Precipitation/Flocculation	NA	NA
	Magnesium Sulfate	Precipitation/Flocculation	NA	NA
	SIR-110	Ion Exchange Resin	NA	NA
	Sodium Bisulfite	Membrane Cleaning	Sodium Bisulfite	2C-4
	Sodium Hydroxide 25%	Raising pH, Promote Precipitation, Flocculation, and Membrane Cleaning	Sodium Hydroxide	2C-4
	Sulfuric Acid	pH Adjustment	Sulfuric acid	2C-4
	WEST W-126	Ionic Co-polymer used as a Flocculent	2-propanoic acid	2C-4
Bright Dyes FLT Yellow-Green Liquid	Water Line and Drain Tracing Dye	NA	NA	

Source	Chemical Name	Reason for Use	Toxic Pollutant and/or Hazardous Substances Table 2C-3 or 2C-4	
	Bright Dyes FLT Yellow-Green Tablet	Water Line and Drain Tracing Dye	NA	NA

EDTA = Ethylene Diamine Tetraacetic Acid

2.3 Discharge Rate and Frequency [II.C]

The discharge rates and frequencies for Outfall 051 are provided in Table 4.

Source ^a	Frequency		Flow Rates and Volumes				
	Days/Week	Months	Average (MGD)	Maximum (MGD)	Average Volume (GPD)	Maximum Volume (GPD)	Duration (days)
Radioactive Liquid Waste Treatment Facility	4	12	0.020	0.040	20,000	39,840	208

a. Estimated based on the operating parameters of the Effluent Storage Tanks.

GPD = gallons per day; MGD = million gallons per day

3.0 PRODUCTION [Section III]

Section III is not applicable to Outfall 051.

4.0 IMPROVEMENTS [Section IV]

Future improvements to the treatment processes at the RLWTF includes the startup of a newly constructed main low-level waste treatment facility located at TA-50-230 and 261. The new facility utilizes the same treatment/process technologies as the existing facility described in Section 2.2 (e.g., neutralization, reverse osmosis) and is expected to complete startup testing in 2019 with an estimated operational start date in 2023. A Notice of Change will be submitted for this change prior to the start of operations and impact to the outfall. The startup of the new facility is not expected to impact the outfall location, flowrates, and discharge frequency provided in Table 4. A red lined schematic and a process flow diagram for the new facility are provided in Attachment D.

5.0 INTAKE AND EFFLUENT CHARACTERISTICS [Section V]

5.1 Analytical Data [V.A, B, and C]

The analytical results provided for the Outfall 051 Permit Reapplication on the Form 2C were provided from the following sources:

- Samples collected on September 26, 2018 and shipped to an independent laboratory for analysis.
- Field samples collected and analyzed on August 26, 2018 for temperature, residual chlorine, and pH.
- Field samples collected and analyzed on February 5, 2019 for sulfite.
- Hardness = 17.3 mg/L (CaCO₃)

A discharge monitoring report summary is not provided for Outfall 051 because the effluent from the RLWTF was not discharged to Effluent Canyon between October 2014 and September 2018. Effluent from the RLWTF was routed to the MES.

5.2 Potential Pollutants [V.D]

The treatment chemicals associated with the RLWTF and the content of the wastewaters treated by the RLWTF constitute the pollutant load of the discharge to Outfall 051. Table 5 identifies the Table 2C-3 and 2C-4 pollutants by discharge source.

It also identifies those pollutants (if any) that were detected in the analytical results from the samples collected for the 2019 Permit Application.

Table 5
Potential Pollutants by Source for Outfall 051

Source Description	POTENTIAL Toxic Pollutant and/or Hazardous Substances Table 2C-3 or 2C-4		Analytical Data Results from Operational Samples Collected for Outfall 051 ^a
Effluent from the Radioactive Liquid Waste Treatment Facility (RLWTF) - Chemicals used during treatment at the RLWTF.	EDTA	2C-4	pH = 6.1 – 8.9 S.U.
	Ferric Sulfate	2C-4	Iron = 49.3 ug/L, Sulfate = 51.0 mg/L
	Sulfuric Acid	2C-4	pH = 6.1 – 8.9 S.U.
	Hydrochloric Acid	2C-4	pH = 6.1 – 8.9 S.U.
	Sodium Bisulfite	2C-4	Sulfite = 0.9 mg/L
	Sodium Hydroxide	2C-4	pH = 6.1 – 8.9 S.U.
	2-Propanoic Acid	2C-4	pH = 6.1 – 8.9 S.U.
Effluent from the RLWTF - Chemicals identified on the waste stream profile forms associated with the wastewaters discharged to the RLWTF for treatment.	1,4-Dichlorobenzene	2C-4	Not detected.
	Acetic Acid	2C-4	pH = 6.1 – 8.9 S.U.
	Acetone ^b	2C-4	Not analyzed. ^c
	Acrolein	2C-4	Not detected.
	Acrylonitrile	2C-4	Not detected.
	Ammonia	2C-4	Ammonia = 0.393 mg/L
	Ammonium Acetate	2C-4	Ammonia = 0.393 mg/L
	Ammonium Bicarbonate	2C-4	Ammonia = 0.393 mg/L
	Ammonium Bifluoride	2C-4	Ammonia = 0.393 mg/L Fluoride = 0.201 mg/L
	Ammonium Carbonate	2C-4	Ammonia = 0.393 mg/L
	Ammonium Chloride	2C-4	Ammonia = 0.393 mg/L Residual Chlorine = 0.4 mg/L
	Ammonium Fluoride	2C-4	Ammonia = 0.393 mg/L Fluoride = 0.201 mg/L
	Ammonium Hydroxide	2C-4	Ammonia = 0.393 mg/L
	Ammonium Thiocyanate	2C-4	Ammonia = 0.393 mg/L
	Benzene ^b	2C-4	Not detected.
	Benzoic Acid	2C-4	pH = 6.1 – 8.9 S.U.
	Beryllium Chloride	2C-4	Beryllium was not detected. Residual Chlorine = 0.4 mg/L
	Calcium Chloride	2C-4	Residual Chlorine = 0.4 mg/L
	Carbon Disulfide ^b	2C-3 & 2C-4	Not analyzed. ^c
	Carbon Tetrachloride ^b	2C-4	Not detected.
	Chlorine	2C-4	Residual Chlorine = 0.4 mg/L
	Chlorobenzene ^b	2C-4	Not detected.
	Chloroform	2C-4	1.5 mg/L
	Cresol ^b	2C-3 & 2C-4	Not analyzed. ^c
	Cupric Chloride	2C-4	Residual Chlorine = 0.4 mg/L Copper = 7.35 ug/L
	Dichlorobenzene	2C-4	Not detected.
	Dichloropropane	2C-4	Not detected.
	Dichloropropene	2C-4	Not detected.
	EDTA	2C-4	pH = 6.1 – 8.9 S.U.
	Ethylbenzene	2C-4	Not detected.
	Ferric Chloride	2C-4	Residual Chlorine = 0.4 mg/L
	Ferrous Ammonium Sulfate	2C-4	Iron = 49.3 ug/L, Ammonia = 0.393 mg/L, Sulfate = 51.0 mg/L
	Formic Acid	2C-4	pH = 6.1 – 8.9 S.U.

**Table 5
Potential Pollutants by Source for Outfall 051**

Source Description	POTENTIAL Toxic Pollutant and/or Hazardous Substances Table 2C-3 or 2C-4		Analytical Data Results from Operational Samples Collected for Outfall 051 ^a
	Hydrochloric Acid	2C-4	pH = 6.1 – 8.9 S.U.
	Hydrofluoric Acid	2C-4	pH = 6.1 – 8.9 S.U.
	Lead Nitrate	2C-4	Nitrate = 5.3 mg/L. Lead was not detected.
	Naphthalene	2C-4	Not detected
	Nitric Acid	2C-4	pH = 6.1 – 8.9 S.U. Nitrate = 5.3 mg/L
	Pentachlorophenol	2C-4	Not detected.
	Phosphoric Acid	2C-4	pH = 6.1 – 8.9 S.U. Total Phosphorus = 0.0692 mg/L
	Potassium Hydroxide	2C-4	pH = 6.1 – 8.9 S.U.
	Potassium permanganate	2C-4	Not analyzed. ^c
	Silver Nitrate	2C-4	Nitrate = 5.3 mg/L Silver was not detected.
	Sodium	2C-4	Not analyzed. ^c
	Sodium Fluoride	2C-4	Fluoride = 0.201 mg/L
	Sodium Hydroxide	2C-4	pH = 6.1 – 8.9 S.U.
	Sodium Hypochlorite	2C-4	Residual Chlorine = 0.4 mg/L
	Sodium Nitrite	2C-4	Nitrate = 5.3 mg/L
	Sodium Phosphate	2C-4	Total Phosphorus = 0.0692 mg/L
	Strontium	2C-3	Not analyzed. ^c
	Sulfuric Acid	2C-4	pH = 6.1 – 8.9 S.U.
	Toluene ^b	2C-4	Not detected.
	Trichloroethylene ^b	2C-4	Not detected.
	Uranium	2C-3	Not analyzed. ^c
	Uranyl Nitrate	2C-4	Nitrate = 5.3 mg/L.
	Vanadium	2C-3	Not analyzed. ^c
	Xylene ^b	2C-3	Not analyzed. ^c
	Zinc Acetate	2C-4	Zinc = 3.83 ug/L
	Zinc Chloride	2C-4	Residual Chlorine = 0.4 mg/L
	Zinc Nitrate	2C-4	Zinc = 3.83 ug/L Nitrate = 5.3 mg/L
	Zirconium	2C-3	Not analyzed. ^c

- Results are from operational samples collected from the RLWTF Effluent Tanks. These samples are representative of the effluent after final treatment and the potential discharge to Outfall 051.
- The potential pollutant was determined to not be associated with a "Listed" Resource Conservation and Recovery Act (RCRA) hazardous waste at the point of generation. This waste determination was documented with the associated waste stream profile form and in the waste characterization and tracking system database.
- The potential pollutant was not analyzed because it is not specifically called out on the Form 2C.

EDTA = Ethylene Diamine Tetraacetic Acid

The safety data sheets associated with the chemicals used to treat water at the RLWTF are provided in Attachment E.

6.0 POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS [Section VI]

Section VI is not applicable to Outfall 051.

7.0 BIOLOGICAL TOXICITY TESTING DATA [Section VII]

Whole Effluent Toxicity (WET) 48-hr acute lethality was performed on September 24, 2018 to determine the results at a critical dilution of 100% using a dilution series of 32%, 42%, 56%, 75%, and 100%. The methods used in conducting these

tests followed the guidelines established by the EPA manual “Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition” (EPA-821-R-02-012). The WET including the following criteria as required by the permit:

- Daphnia pulex, 3-hr composite, 1/3 months

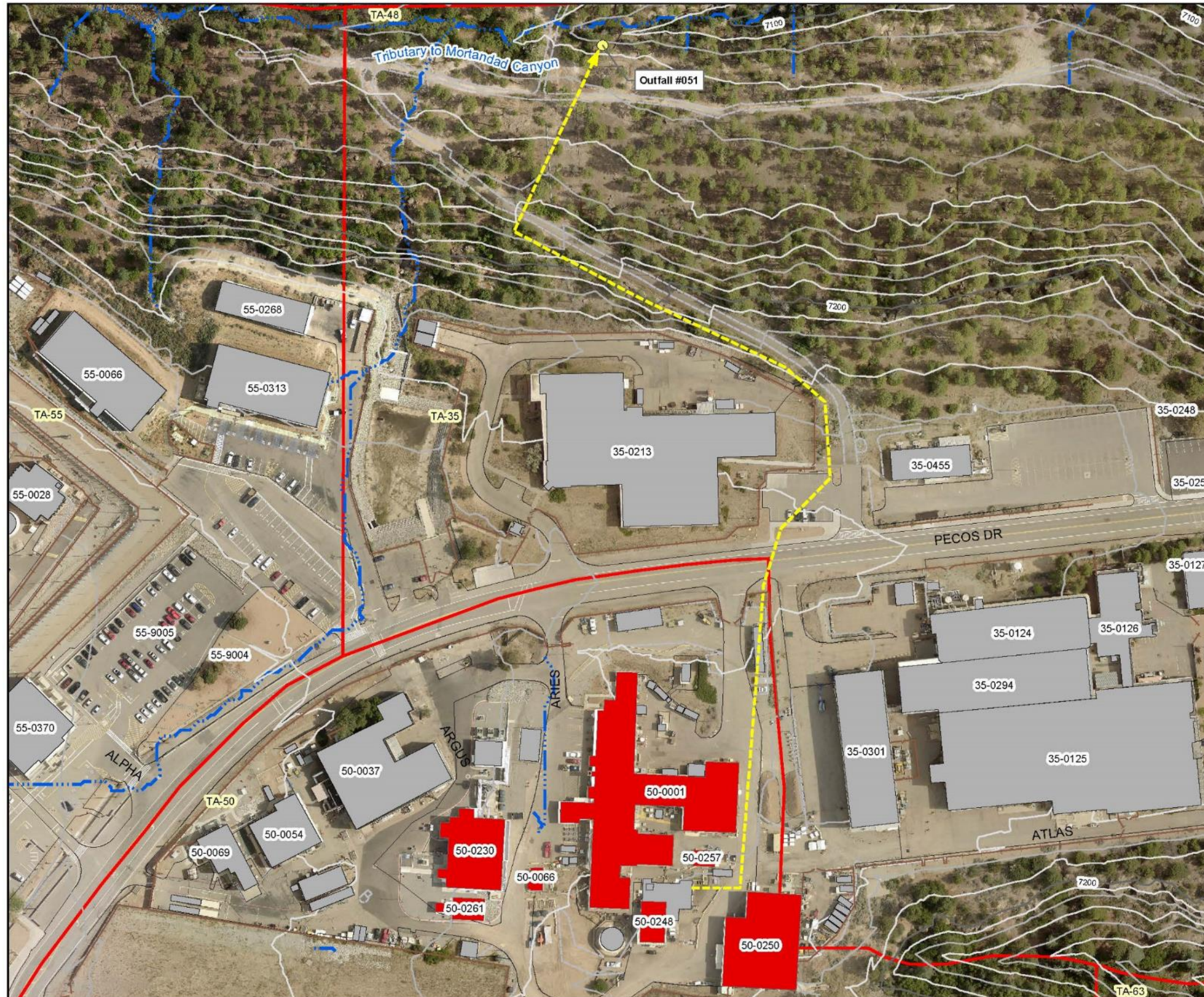
The WET test results indicated that the effluent from Outfall 051 passed the test for Daphnia pulex .

8.0 CONTRACT ANALYSIS INFORMATION [Section VIII]

Operational samples from the RWLTF effluent were collected on September 26, 2018 for the Form 2C constituents required by the permit application forms. These samples were submitted to independent laboratories as summarized in Table 6.

Laboratory Name	Address and Contact Info	Analytes
GEL Laboratories LLC	2040 Savage Road Charleston SC 29407 (843) 556-8171	Biological Oxygen Demand, General Chemistry, Pesticides, Polychlorinated Biphenyls, Radiochemistry, Semi-volatile Organic Compounds, Total Metals, Total Suspended Solids, Volatile Organic Compounds
New Mexico Water Testing Laboratory, Inc.	401 North Coronado Ave Española, NM 87532 (505) 929-4545	E.coli
Cape Fear Analytical LLC	3306 Kitty Hawk Road Suite 120 Wilmington, NC 28405 (910) 795-0421	TCDD (Dioxin)
Pacific EcoRisk	2250 Cordelia Rd. Fairfield, CA 94534 (707) 207-7760	Whole Effluent Toxicity

ATTACHMENT A: Location Maps for the Radioactive Liquid Waste Treatment Facility Buildings, Collection System and Outfall 051



**NPDES Permit Re-Application Project
TA-50 Buildings:
1, 66, 230, 248, 250, 257, 261
Outfall #051**

Legend

NPDES Outfall	Paved Roads
Springs	Source Structures
Drainages	Building Served by Source
100ft Contours	Structures
20ft Contours	LANL Boundary
10ft Contours	Technical Areas
Fences	
Dirt Roads	

0 45 90 180 270 360
Feet

0 12.5 25 50 75 100
Meters

1:1,500

State Plane Coordinate System
New Mexico, Central Zone, US Feet
NAD 1983 Datum, NGVD 1929

Map Updated By: Bethann McVicker, IF-PROG
Map #18-129-08 05 February 2019

Disclaimer: This map was created for work processes associated with the Water Quality & RCRA. All other uses for this map should be confirmed with LANL EPC-RCRA staff.