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Date: January 25, 2008
Refer To: ENV-RCRA-08-014
LA-UR: 08-0245

Mr. William Olson, Bureau Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Mr. Olson:

SUBJECT: SANITARY WASTEWATER SYSTEMS PLANT, GROUND WATER DISCHARGE PERMIT (DP-857) ANNUAL REPORT 2007

This report and enclosures are Los Alamos National Laboratory's Annual Report for the TA-46 Sanitary Wastewater Systems (SWWS) Plant's Ground Water Discharge Permit (DP-857) for 2007. In addition to satisfying the annual reporting requirements under DP-857, the report also contains the quarterly monitoring data for the fourth quarter (October, November, and December) of 2007, as required.

Please call me at (505) 667-7969 if you have any questions regarding this report.

Sincerely,

Bob Beers
Water Quality & RCRA Group

BB/lmg

Enclosures: a/s

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GROUND WATER DISCHARGE PLAN (DP-857) ANNUAL REPORT, 2007

for the

TA-46 SANITARY WASTEWATER SYSTEMS (SWWS) PLANT

Los Alamos
National Laboratory

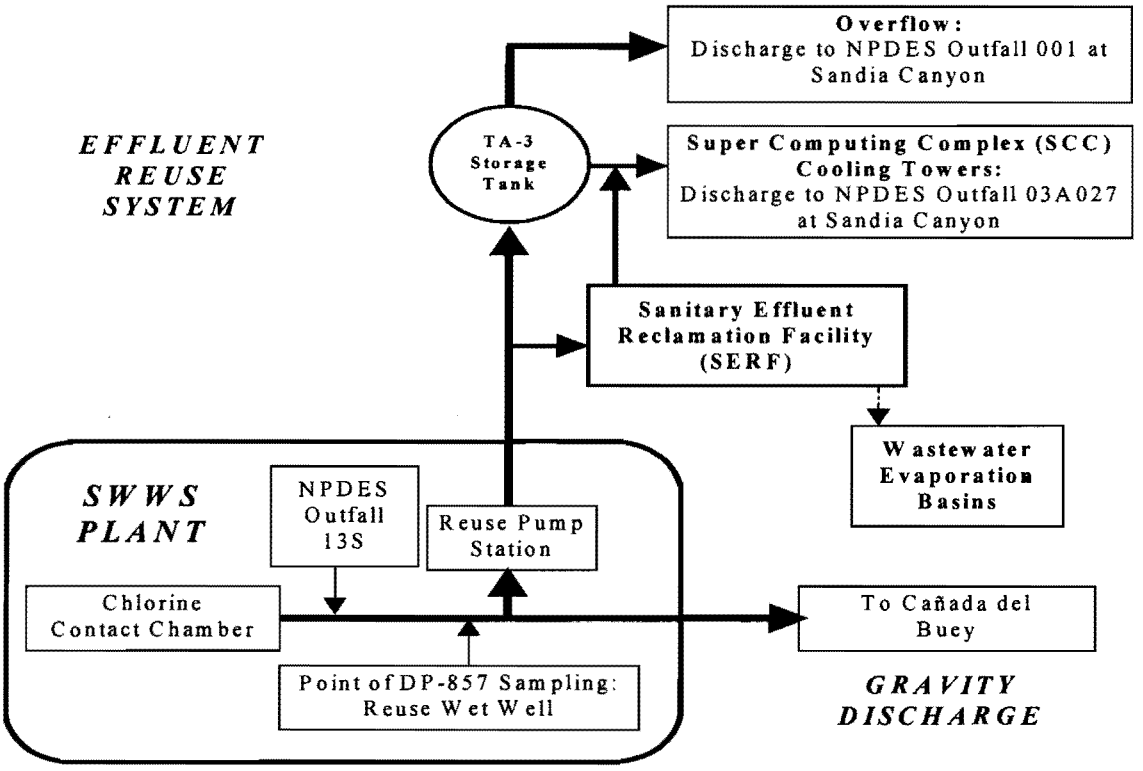
LA-UR-08-0245

January 25, 2008

INTRODUCTION

Sanitary wastewater generated at Los Alamos National Laboratory (Laboratory) is treated at the TA-46 Sanitary Wastewater Systems (SWWS) Plant. The SWWS Plant is an extended-aeration, activated sludge sanitary wastewater treatment plant with a design capacity of 0.6 million gallons per day. As shown in **Figure 1.0**, treated effluent from the SWWS Plant may be discharged through NPDES Outfall 13S by gravity to Cañada del Buey or pumped via a force main to a reuse system at TA-3. Since the SWWS Plant became operational in 1992, all treated effluent has been pumped via the force main for discharge to Sandia Canyon; no effluent has ever been discharged to Cañada del Buey. In 2007, all of the treated effluent generated by the SWWS Plant (approximately 84.8 million gallons) was pumped to TA-3 and discharged to Sandia Canyon through NPDES Outfall 001. No treated effluent was used by the SCC cooling towers during 2007 because the Sanitary Effluent Reclamation Facility (SERF) was out-of-service for the entire year.

Figure 1. Effluent Reuse System Schematic



DISCHARGE PERMIT (DP-857) RENEWAL

In accordance with New Mexico Water Quality Control Commission (NM WQCC) Regulation 3106.F NMAC, on August 27, 2002, the Laboratory submitted an application to the NMED for renewal of Ground Water Discharge Permit DP-857. The Laboratory's renewal application was submitted at least 120 days before the expiration date of January 7, 2003, as required by regulation. As of December 31, 2007, permit renewal was still pending.

EFFLUENT REUSE SYSTEM

Treated effluent was reused by the Laboratory's Power Plant for cooling and boiler make-up until November 2001. This use was discontinued due to scaling problems associated with the high silica content of the reuse water (silica occurs naturally in regional ground water). Additional treatment to remove silica was identified as a prerequisite for the reuse of SWWS Plant effluent. In November 2003, the Laboratory completed construction of a 0.14 million gallons per day reuse water treatment facility at TA-3.

The Sanitary Effluent Reclamation Facility (SERF) was designed to remove silica and total dissolved solids (TDS) from treated effluent using microfiltration and reverse osmosis (RO). The product water from the SERF is blended with treated effluent at approximately a 2:1 ratio for reuse at the SCC cooling towers and eventual discharge to NPDES Outfall 03A027. Reject water from the RO treatment unit is evaporated in solar basins to concentrate the solids.

The SERF's RO treatment unit generates approximately 8,400 gallons per day of reject water. This waste stream is discharged to a pair of solar evaporation basins on Sigma Mesa (TA-60). Each basin is double-lined with a leak collection system between the primary and secondary liners. In November 2003, the Laboratory began inspecting the leak collection standpipes monthly in accordance with the NMED's October 2002, Discharge Permit Modification (letter, Marcy Leavitt, NMED, to E. Dennis Martinez, DOE, October 1, 2002). Leak detection inspection results from the 4th quarter of 2007 are discussed below.

The SERF did not operate during 2007. No reject water from the SERF was discharged to the TA-60 evaporation basins in 2007.

SERF BASIN INSPECTION RESULTS-2007

The two Sigma Mesa evaporation basins are outfitted with four leak inspection standpipes. These inspection standpipes are monitored each quarter and the results reported in the quarterly discharge plan reports for DP-857. On March 22, 2007, the Laboratory discovered liquid in one of the leak inspection standpipes. Four punctures in the primary liner were determined to be the sources of the leak. The discovery occurred during a routine, monthly inspection. A corrective action plan was submitted to the NMED on April 19, 2007 (ENV-RCRA: 07-062). On June 13, 2007, the Laboratory completed repairs to the primary liner by heat-welding four patches to seal the punctures. The repair work was reported to the NMED in a July 13, 2007, letter (ENV-RCRA: 07-171). **Enclosure 1.0** contains photographs of the leak collection standpipes from the 4th quarter 2007 monitoring of the evaporation basins. All standpipes were dry or contained minimal amounts of condensate water during the October, November, and December 2007 inspections.

EFFLUENT IRRIGATION AT THE SWWS PLANT

During the months of April through October 2007, effluent from the SWWS Plant was re-used to irrigate approximately 1/3 acre of turf grass on the plant's grounds. The irrigated grass is within the confines of the SWWS Plant's perimeter security fence and access is restricted to Laboratory employees/contractors on official business and visitors being escorted by SWWS Plant personnel.

4TH QTR 2007 MONITORING: REUSE WATER, NPDES OUTFALLS 001 & 03A027, CDBO-6

Table 1.0 presents the analytical results from monitoring conducted at the SWWS Plant's reuse wet well, NPDES Outfalls 001 and 03A027, and monitoring well CDBO-6 during the 4th quarter of 2007. All sample results in Table 1.0 are less than New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for ground water. Copies of the analytical reports are in **Enclosure 2.0**.

Table 2.0 presents the water level in Cañada del Buey alluvial observation well CDBO-6 for the 4th quarter of 2007.

Table 3.0 presents the volume of water discharged from the following locations during the 4th quarter of 2007:

- SWWS Plant effluent (reuse water) pumped to TA-3 via the force main,
- Effluent discharge through NPDES Outfall 001,
- Reuse water used by the SCC cooling towers, and
- Effluent discharged through NPDES Outfall 03A027.

Table 4.0 presents the results from monthly monitoring of the SERF evaporation basins' leak inspection standpipes. **Enclosure 1.0** presents photographs taken during October, November, and December, 2007, of the four leak inspection standpipes. No water was present in any of the basin's four leak inspection standpipes with the exception of minimal amounts of condensate water.

2007 ANNUAL WATER QUALITY MONITORING: SWWS REUSE WET WELL AND CDBO-6

Tables 5.0, 6.0, and 7.0 present the analytical results from annual monitoring of the SWWS Plant's reuse water (sampling point: SWWS Plant reuse wet well) and CDBO-6. All sample results for inorganics, metals, volatile and semi-volatile organics, and radiological constituents were less than NM WQCC Regulation 3103 standards for ground water. Due to a sample collection error, no samples were collected from CDBO-6 during 2007 for the following analytes: CN, gross alpha particle activity, Ra-226, and Ra-226. Copies of the analytical reports are provided in **Enclosure 3.0**.

Table 7.0 presents a list of the volatile organic (VOC) and semi-volatile organic (SVOC) compounds detected in the SWWS Plant's reuse water and CDBO-6 during 2007 at concentrations greater than the analytical laboratory's Method Detection Limit (MDL).

Chloroform, bromodichloromethane, dibromochloromethane, and bromoform were detected in the SWWS Plant's reuse water. These four compounds, typically referred to as trihalomethanes, are common disinfection by-products resulting from the chlorination of effluent with chlorine compounds generated by the MIOX® system. Chloroform was detected at 28.6 µg/L; the NM WQCC Regulation 3103 standard for chloroform in ground water is 100 µg/L. Chloroform has been detected in the SWWS Plant's reuse water in the past; in 2006, chloroform was detected in the SWWS Plant's reuse water at a concentration of 16.7 µg/L. There are no NM WQCC Regulation 3103 standards for bromodichloromethane, dibromochloromethane, or bromoform.

Two semi-volatile organic (SVOC) compounds, benzoic acid and diethylphthalate, were detected in the SWWS Plant's effluent at 7.5J µg/L and 2.42J µg/L, respectively. The "J" flag indicates that the reported values are estimated. There are no NM WQCC Regulation 3103 standards for benzoic acid or diethylphthalate.

EFFLUENT OPERATIONAL MONITORING: TOTAL NITROGEN

Table 8.0 presents the Nitrate+Nitrite (as N), Ammonia (as N), Total Kjeldahl Nitrogen (TKN), and Total Nitrogen results from the Laboratory's operational monitoring of SWWS Plant effluent in 2007. Flow-weighted, 24-hr composite samples of SWWS Plant effluent are routinely collected from NPDES Outfall 13S. One sample result was outstanding at the time this report was prepared.

In 2007, all Nitrate+Nitrite (as N) operational results were below the NM WQCC Regulation 3103 ground water standard of 10 mg/L. The average Nitrate+Nitrite (as N) concentration in 2007 was 1.50 mg/L with a maximum value of 8.16 mg/L. The average Total Nitrogen concentration in the SWWS Plant's effluent during 2007 was 2.30 mg/L with a maximum value of 9.24 mg/L.

The Laboratory will no longer conduct operational monitoring of SWWS Plant effluent for Total Nitrogen beginning in January 2008. The reasons for stopping this activity are severalfold:

1. It is a voluntary activity, not a requirement of the SWWS Plant's discharge permit,
2. The SWWS Plant's operators conduct daily total nitrogen monitoring of the SWWS Plant's effluent for managing plant operations, and
3. The SWWS Plant effluent is consistently low in Total Nitrogen.

The Laboratory will continue to conduct quarterly monitoring of SWWS Plant's reuse water for Total Nitrogen, as required by DP-857.

Table 1.0 Water Quality Data: SWWS Plant Reuse Water, NPDES Outfalls 001 and 03A027, and CDBO-6. 4th Quarter, 2007.

Sampling Location	Field Prep	Sample Date	Sample ID No.	TDS (mg/L)	Chloride (mg/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)
SWWS Plant								
SWWS Plant Reuse Wet Well[1]	UF	11/16/2007	GU071100OSRW01	549	178	1.68	0.88	0.09
Sandia Canyon								
NPDES Outfall 001	UF	11/14/2007	GU071101A00102	482	136J	0.76	0.73	0.08
NPDES Outfall 03A027	UF	11/13/2007	GU071103A02701	484	18.4	1.01	1.00	0.04J
Canada del Buey								
CDBO-6	F	12/17/2007	GF071100G6DC01	169	18.7	0.01J-	0.05J-	<0.05
NM WQCC Regulation 3103 Ground Water Standards (mg/L)				*1000*	*250*	*10*	*NA*	*NA*

Notes:

[1]Water in the reuse wet well is representative of water in the reuse pond.

J means that the reported value is expected to be more uncertain than usual.

J- means that the reported value is expected to be more uncertain than usual with a potential negative bias.

UF means a non-filtered sample, F means a filtered sample.

All analytical results by General Engineering Laboratories, Inc., Charleston, SC.

NA means that no NM WQCC Regulation 3103 ground water standard exists for this analyte.

Table 2.0. Water Level in Cañada del Buey Observation Well (CDBO)-6, 4th Quarter 2007

Location	Date	Water Level† (ft)
CDBO-6	12/17/07	40.92

Notes:
† Measured in feet from the top of the well casing to the surface of the water.

Table 3.0. Discharge Volumes from the SWWS Plant and NPDES Outfall 001, and SWWS Plant Reuse Water to SCC Cooling Towers, 4th Quarter 2007 (in millions of gallons).

Month	SWWS Plant Effluent to TA-3[1]	Discharges to NPDES Outfall 001[2]	Reuse Water to SCC Cooling Towers[3] (estimated)	Discharges to NPDES Outfall 03A027[4]
Oct-2007	7.352	9.192	0	0.692
Nov-2007	6.702	8.701	0	0.692
Dec-2007	7.794	10.487	0	0.567

Notes:
[1]In the 4th quarter of 2007, all SWWS Plant effluent was pumped via a force main to TA-3 for reuse or discharge.
[2]Power plant wastewater and all SWWS Plant reuse water not used by the SCC Cooling Towers are discharged at NPDES Outfall 001.
[3]The SCC cooling towers can use potable or SWWS Plant reuse water. Table 3.0 contains the estimated volume of SWWS Plant reuse water that the SCC cooling towers used during the 4th quarter of 2007.
[4]The SCC cooling towers discharge to NPDES Outfall 03A027 at Sandia Canyon.

Table 4.0. Inspection Results, SERF Evaporation Basins, Leak Collection Standpipes.

Inspection Date	Inspection Results
10/24/07	All standpipes are dry or contain minimal amounts of water
11/20/07	All standpipes are dry or contain minimal amounts of water
12/19/07	All standpipes are dry or contain minimal amounts of water

Table 5.0 Annual Water Quality Data: Inorganics and Metals Results for SWWS Plant Reuse Water and CDBO-6.

Sampling Location	Date	Al	As	B	Ba	Cd	Cr	CN	Co	Cu	F
SWWS Reuse Wet Well[1,3]	11/16/2007	<68	18.5	73.7	61.5	<0.1	1.7J	<5.0	<1	4.8J	0.34
CDBO-6[2]	2/27/2007	215	1.6J	<35.7	78.1	<0.1	<1	NA	<1	<3	0.19
CDBO-6 Field Duplicate[2]	2/27/2007	265	1.6J	<35.1	80.2	<0.1	<1	NA	<1	<3	0.23
CDBO-6[2]	8/27/2007	437	<1.5	34J	136	1.4	1.1J	NA	3.4J	4.0J	NA
NM WQCC 3103 Ground Water Standards		*500*	*100*	*750*	*1000*	*10*	*50*	*200*	*50*	*1000*	*1.6*
Units		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*

Sampling Location	Date	Fe	Hg	Pb	Mn	Mo	Ni	Se	SO_4	Ag	U	Zn
SWWS Reuse Wet Well[1,3]	11/16/2007	<225	<0.03	<0.5	22.7	3.8J	<1	<5	13.6	<1	<0.33	85.4
CDBO-6[2]	2/27/2007	<123	<0.06	<0.5	<2	<2	0.88J	<2.5	10.4	<0.2	0.08J	5.9J
CDBO-6 Field Duplicate[2]	2/27/2007	<158	<0.06	<0.5	<2	<2	0.85J	<2.5	10.3	<0.2	0.06J	10.7
CDBO-6[2]	8/27/2007	157	NA	4.3	33.7	<2	2	<1	NA	<0.2	0.61	12.1
NM WQCC 3103 Ground Water Standards		*1000*	*2*	*50*	*200*	*1000*	*200*	*50*	*600*	*50*	*30*	*10,000*
Units		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*ug/L*	*ug/L*	*ug/L*

Notes:

[1] Nonfiltered sample.

[2] Filtered sample with the exception of Hg (nonfiltered).

[3] Water in the reuse wet well is representative of water in the reuse pond.

[4] No sample was submitted for this analyte.

J means that the reported value is more uncertain than usual.

Table 6.0. Annual Water Quality Data: SWWS Plant Reuse Water and CDBO-6, 2007.

Sampling Location	Sample Date	Gross Alpha (pCi/L)	Ra-226 (pCi/L)	Ra-228 (pCi/L)
SWWS Reuse Wet Well[1,5]	11/16/2007	0.937U (+/-0.88)[4]	1.39J (+/-0.44)[4]	1.66J (+/-0.44)[4]
CDBO-6		NA[2]	NA	NA
NM WQCC 3103 Ground Water Standards (mg/L)			*30*[3]	*30*[3]

Notes:

[1] Nonfiltered sample.

[2] NA means that no analysis was performed for this analyte.

[3] The standard applies to the combined Radium 226 & Radium 228.

[4] Total Propogated Uncertainty (TPU).

[5] Water in the reuse wet well is representative of water in the reuse pond.

Table 7.0. Annual VOC and SVOC Detections for SWWS Plant Reuse Water and CDBO-6, 2007.

Sampling Location Sample Type	Sample Date	VOC and SVOC Detections at Concentrations Greater than the Analytical Laboratory's Detection Limts	Results (ug/L)	NM WQCC 3103 GW Standard
SWWS Reuse Water				
VOC	11/16/2007	Chloroform[1]	28.6	100 ug/L
		Bromodichloromethane[1]	42.8	
		Dibromochloromethane[1]	29.5	
		Bromoform[1]	4.03	
SVOC	11/16/2007	Benzoic acid	7.50J, J-	
		Diethylphthalate	2.42J	
CDBO-6				
VOC	2/27/2007	None detected		
SVOC	2/27/2007	None detected		

Notes:

[1]By-products, called trihalomethanes, that are formed during the disinfection of SWWS Plant effluent with MIOX.

J means that the reported value is estimated.

J- means that the analyte is classified as detected but the reported value is expected to be more uncertain than usual with a potential negative bias.

B means that the analyte was detected in the associated Laboratory Method Blank and in the sample.

NA means that no NM WQCC ground water standard exists for this analyte.

Table 8.0. SWWS Plant Effluent Total Nitrogen Operational Monitoring Results, 2007[1].

Date	Sample Id	NH3-N (mg/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	Total Nitrogen[2] (mg/L)
11/15/06	06E461115	0.02	3.22	1.24	4.46
11/28/06	GU0612SSS13S01	0.18	0.38	0.76	1.14
12/13/06	GU0612SSS13S02	0.52	2.16	1.35	3.51
01/17/07	GU0701SSS13S01	0.12	0.41	0.85	1.26
02/02/07	GU0702SSS13S01	0.12	4.44	1.07	5.51
03/07/07	GU0703SSS13S03	< 0.06	1.77	0.83	2.60
03/21/07	GU0704SSS13S01	0.10	0.40	1.07	1.47
04/04/07	GU0704SSS13S03	0.18	0.55	1.14	1.69
04/11/07	GU070400TA4601	0.17	NA	0.81	0.81
04/18/07	GU070400TA4602	0.37	NA	0.89	0.89
05/02/07	GU070500TA4601	0.11	0.10	0.93	1.03
05/09/07	GU070500TA4602	0.13	0.37	0.97	1.35
05/16/07	GU070500TA4603	0.13	0.63	1.16	1.79
06/13/07	GU070600TA4601	0.10	0.31	0.97	1.28
06/20/07	GU070600TA4602	0.10	1.43	0.97	2.40
06/29/07	GU070700TA4601	0.13	1.23	0.79	2.02
07/04/07	GU070700TA4603	0.21	1.79	1.08	2.87
07/18/07	GU070700TA4604	0.12	1.25	0.72	1.97
08/08/07	GU070800TA4601	0.07	0.25	0.81	1.06
08/16/07	GU070800TA4602	0.03	0.63	0.89	1.52
08/22/07	GU070800TA4603	0.03	0.53	0.72	1.25
09/10/07	GU070900TA4601	0.09	0.01	0.70	0.71
09/13/07	GU070900TA4602	0.14	3.79	0.76	4.55
09/18/07	GU070900TA4603	0.09	0.40	0.86	1.26
10/03/07	GU071000TA4601	0.08	2.49	0.98	3.47
10/10/07	GU071000TA4602	0.06	0.83	0.67	1.51
10/16/07	GU071000TA4603	0.14	1.03	0.79	1.82
11/08/07	GU071100TA4601	0.08	0.63	0.82	1.45
11/14/07	GU071101TA4601	0.09	0.05	0.79	0.84
11/22/07	GU071100TA4602	0.12	1.53	0.90	2.43
12/4/07	GU071200TA4601	0.10	8.16	1.08	9.24
12/11/07	GU071200TA4602	0.11	1.31	0.82	2.13
12/18/07	GU071200TA4603	0.11	4.43	0.09	4.52
2007 Average Value[1]		**0.13**	**1.50**	**0.89**	**2.30**
2007 Maximum Value[1]		**0.52**	**8.16**	**1.35**	**9.24**
NM WQCC Regulation 3103 Ground Water Standards		*NA*	*10 mg/L*	*NA*	*NA*

Notes:

[1]Results pending in the 2006 DP-857 Annual Report are also included in this summary.

[2]Total N is the sum of NO3+NO2-N and TKN.

[3]Pending means that the results were not available from the analytical laboratory at the time this report was prepared.

NA means that no NM WQCC Regulation 3103 ground water standard exists for this analyte.