January 4, 2007

M E M O R A N D U M

TO: James Johnston, Region Administrator
Idaho Falls Regional Office

FROM: Jen Cole, E.I.T.
Engineering Group, Technical Services

SUBJECT: Stanley Sewer Association Wastewater-Land Application Permit Application Review -- LA-000156-03 (Municipal Wastewater)

1.0 Purpose

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400.04 (Wastewater-Land Application Permit Regulations) for issuing land application permits. It states the principal facts and significant questions considered in preparing the draft permit conditions or intent to deny, and a summary of the basis for approval or denial with references to applicable requirements and supporting materials.

2.0 Project Description

The Stanley Sewer Association (SSA) manages the municipal wastewater facility which treats municipal wastewater influent generated by both the City of Stanley and the Sawtooth National Recreation Area (SNRA). The treatment method consists of facultative lagoons with chlorine injection in addition to slow-rate infiltration land application. Currently SSA is permitted to land apply on 103 acres of United States Forest Service (USFS) land located approximately 2 miles south of the City of Stanley along Highway 75. The USFS issued SSA a special use permit for the land underlying the treatment facility and land application site in 1999. The USFS special use permit expires on 12/31/2029.

3.0 Summary of Events

SSA and SNRA operated separate wastewater facilities prior to the issuance of Permit LA-000156-02 in 2001. Due to inadequate lagoon storage capacity at both facilities, several emergency land application permit modifications were issued by DEQ. DEQ issued an emergency land application permit modifications to SNRA in 1995 and to SSA in 1989, 1995, 1996, and 1997.

In May of 1996, SSA submitted a permit application for a full-term permit. At that time, it was determined by DEQ that the site in use was not suitable for the long-term treatment needs of the City of Stanley.

In an effort to alleviate lagoon storage capacity issues, SSA and SNRA decided that the best course of action would be to combine the two systems into one wastewater treatment facility. It was determined at that time that SSA would assume managerial responsibilities for the treatment facility. On July 31, 2001, SSA was issued permit LA-000156-02 which replaced permits LA-000156-01 (SSA) and LA-000157-01 (SNRA).

4.0 Discussion

The following is a discussion of: the plan of operation, hydraulic management unit configuration, wastewater flows and constituent loading, ground water, and soils. Conclusions and recommendations are provided in Section 5 below.

4.1 Plan of Operation

The SSA treatment facility receives influent from the City of Stanley and the Sawtooth National Recreational Area (SNRA). The municipal wastewater is treated via facultative lagoons, subsequent chlorine disinfection and land application.

No waste solids have ever been removed from the lagoons at the SSA site. The type of treatment employed by SSA does not generate appreciable waste solids.[4]

Currently the SSA is permitted to irrigate 103 acres of USFS land using two (2) wheel lines. SSA also employed two (2) non-permitted hand lines to irrigate the western half of the land application site. Use of the hand lines is a violation of permit LA-000156-02.

4.2 Hydraulic Management Unit Configuration

Currently, the land application site consists of one hydraulic management unit (HMU), MU-015601. It is recommended that no changes be made to the existing HMU configuration.

4.3 Wastewater Flows and Constituent Loading Rates

Trending of wastewater flow rates and rationale for constituent and hydraulic loading rates appearing in the draft permit are discussed below.

4.3.1 Wastewater Flows

Accurate data regarding volume of influent to the SSA treatment facility are not available due to inoperable flow meters. Estimated influent flow volumes were provided in the

2003, 2004, and 2005 annual reports. The facility reported estimated flow volumes of 44.0 MG in 2003, 44.0 MG in 2004, and 36.2 MG in 2005.

It is recommended that the growing season hydraulic loading rate be substantially equal to the irrigation water requirement (IWR) of the native foliage at the land application site. Using methods outlined in the "*Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater*," the IWR was estimated to be 56.1 million gallons (MG) annually for the entire SSA land application site. Historical climatic data used in estimation of the IWR for the SSA land application site was obtained from http://www.kimberly.uidaho.edu/water/.

4.3.2 Constituent Loading Rates and Disinfection Requirements

The sections below discuss proposed constituent loading rates, including nitrogen, total dissolved solids, hydraulic, chemical oxygen demand (COD), and phosphorus. Section 4.3.2.5 specifically discusses coliform disinfection requirements.

Historical trends at the SSA site were considered during determination of constituent loading limits. Table 1 summarizes the constituent loading rates reported in annual reports from the last three years.

Table 1. MU-00156 constituent loading rates for 2003, 2004, and 2005.

Constituent	Average Loading Rate*			Guideline Loading Rate
	2003	2004	2005	
COD $(\frac{lb}{acre-day})$	3.1	1.11	0	50[1]
TDS $(\frac{lb}{acre-year})$	1121.4	431.0	0	---
Total Nitrogen $(\frac{lb}{acre-year})$	37.9	21.0	0	150% of crop uptake[1] or 50[1]
Total Phosphorus $(\frac{lb}{acre-year})$	23.1	10.1	0	100% of crop uptake[1] or 50[3]

*Facility irrigated 33.1 acres during the 2003 season, 50.0 acres during the 2004 season and did not land apply during the 2005 season.

4.3.2.1 Nitrogen Management and Loading Rates

The DEQ "*Guidance for Reclamation and Reuse of Industrial and Municipal Wastewater*" recommends the upper limit for nitrogen loading to be 150% of crop uptake. Since no crops are harvested from the SSA site, the 150% guidance limit is used in determining the actual amount of nitrogen that may be applied to the site. The SSA land application site foliage consists primarily of sage, various pasture grasses, and several

"weedy" species.[2] Using crop uptake data for "tall fescue hay," 50 lbs/ acre-year is estimated to be 150% of the crop uptake for the SSA site.

4.3.2.2 Total Dissolved Solids (TDS) Loading Rates

Total dissolved solids (TDS) loading rates from wastewater and irrigation water can have significant impacts to ground water TDS levels. The DEQ "*Guidance for Reclamation and Reuse of Industrial and Municipal Wastewater*" provides no upper limit for TDS application. Trends shown by the 2003, 2004, and 2005 annual reports indicate that SSA does not land apply a high enough volume of TDS to create soil aeration issues. Taking this fact into consideration, it is recommended that the TDS monitoring requirement be removed from this permit.

4.3.2.3 COD Loading Rates

It is recommended that the monitoring requirement for COD deposition be removed from this permit. This recommendation conforms to the DEQ "*Guidance for Reclamation and Reuse of Industrial and Municipal Wastewater*." Review of the facility's Annual Reports indicate that the facility has land applied less than 10% of the maximum in each of the past three operating years.[1]

4.3.2.4 Phosphorus Loading Rates

It is recommended that the phosphorus loading rate limit be removed from this permit. Phosphorus should still be monitored during soil monitoring events to observe trends.

4.3.2.5 Coliform Disinfection Requirements

It is recommended that SSA perform coliform monitoring twice per month during the land application season. In addition to the twice-monthly coliform sampling, it is recommended that the facility test weekly for chlorine residual during the land application season. This recommendation takes into account revised DEQ guidance documents as well as the sporadic history of sampling and monitoring at the SSA site. Table 2 summarizes the monitoring results reported in 2003, 2004, and 2005 annual reports.

To ensure consistency and laboratory results representing the maximum disinfection level, it is recommended that all effluent wastewater samples be collected at the same point within the pump housing structure, specifically at or near the irrigation pump.

Table 2. Coliform (1/100 mL) monitoring results from 2003 and 2004 annual reports.*

Reporting Month	2003	2004	Standard
May	4	No Data Reported	The median of the last five (5) samples must not exceed
June	460	No Data Reported	
July	23	No Data Reported	

August	No Data Reported	3	23/100 mL. No single sample may exceed 230/100 mL.
September	3	No Data Reported	
October	2400	3	

* No coliform monitoring data is available for 2005 since no effluent was land applied during the 2005 operating season.

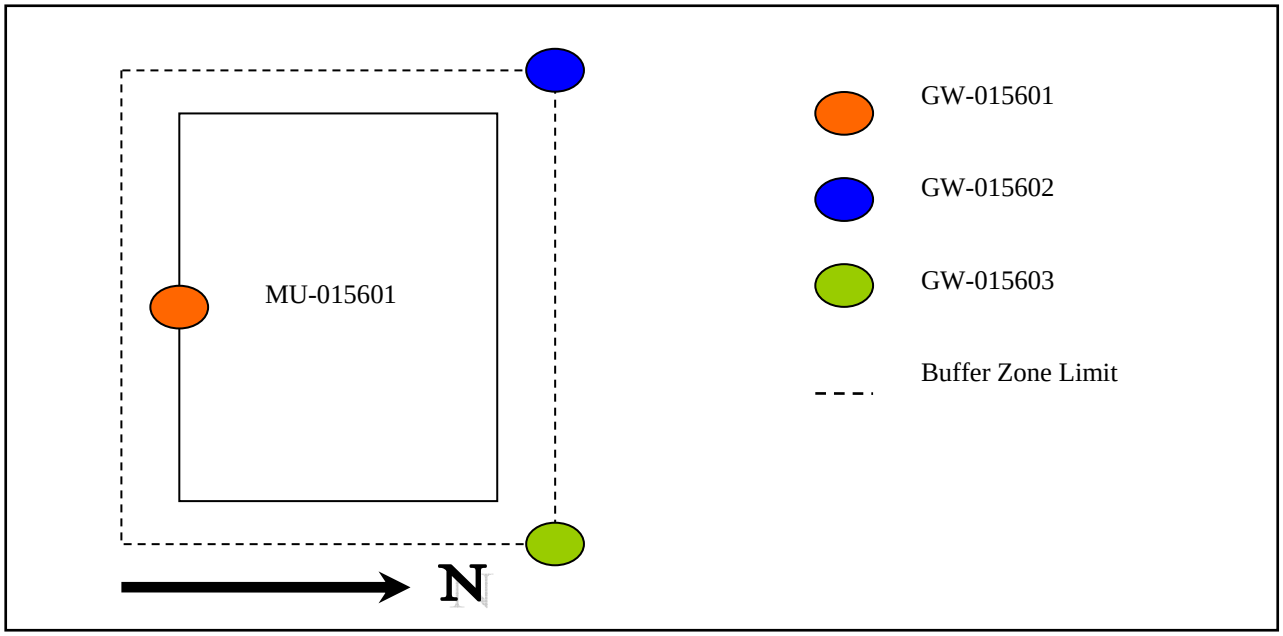
4.4 Ground Water

The static ground water elevations as reported by 2003, 2004, and 2005 annual reports are listed in Table 3. A comparison between static water levels at each well indicates that the groundwater flows in a north-to-northwestern direction. The locations of monitoring wells are shown relative to the land application site in Figure 1.

Table 3. Static water elevation at each monitoring well.

Monitoring Well Number	Monitoring Well Name	Static Water Elevation (ft)					
		2003 Spring	2003 Fall	2004 Spring	2004 Fall	2005 Spring	2005 Fall
GW-015601	Monitoring Well #1	69	69	69	69	No Data	68
GW-015602	Monitoring Well #2	26	26	25	25	No Data	25
GW-015603	Monitoring Well #3	61	62	62	64	No Data	65

Figure 1. Schematic diagram of monitoring well position relative to land application site.



4.4.1 Ground Water Impacts from Wastewater Land Treatment

No significant impacts to groundwater are anticipated during the tenure of permit LA-000156-03. The wastewater being land applied by SSA is relatively low strength. Ground water monitoring well data was reported for all three monitoring wells in 2003 and 2005. In 2004, only data from monitoring wells two (2) and three (3) were reported.

Groundwater quality standards for Iron and Manganese were exceeded in multiple monitoring wells during 2003, 2004, and 2005. The three year averages of iron and manganese in each monitoring well all exceed the standards as defined by IDAPA 58.01.11. These two constituents, both metals, are the only monitored constituents that exceeded groundwater quality standards. The ground water quality rules state that in the case that the background concentration of a secondary constituent is greater than the explicitly laid out standard, the standard is, by default, the background concentration. Assuming a northerly groundwater flow direction, GW-015601 is the up-gradient well and samples taken from this well provide appropriate background concentrations of permitted constituents. Using GW-015601 sample results for Fe and Mn, the "background concentrations" are still exceeded in samples taken from monitoring wells GW-015602 and GW-015603. It is recommended that SSA be required to monitor filtered samples for dissolved Fe and Mn in addition to monitoring total Fe and Mn. Monitoring dissolved concentrations of Fe and Mn will aid the department in assessing whether high concentrations of these elements are a result of natural site conditions or wastewater reuse activities. Table 3 summarizes the annual report monitoring well data reported in the last three annual reports submitted by SSA.

Table 3. Summary of groundwater monitoring well data from 2003, 2004, and 2005 annual reports. All data reported in units of mg/L. Values highlighted in red exceed the G.W.Q. standard.

	GW-015601		**GW-015602**		**GW-015603**		
Constituent	**Pre-season**	**Post-season**	**Pre-season[c]**	**Post-season**	**Pre-season[c]**	**Post-season**	**GWQ Std.[d]**
Fe[b]	No Data	3.59	81.25	9.69	13.14	22.38	0.30
Filtered Fe[b]	No Data	No Data	No Data	No Data	No Data	No Data	0.30
Mn[b]	No Data	0.09	0.15	0.07	0.36	0.33	0.05
Filtered Mn[b]	No Data	No Data	No Data	No Data	No Data	No Data	0.05
Nitrate N[a]	No Data	0.30	0.49	0.45	0.32	0.30	10.0
Total P	No Data	0.06	1.02	0.12	0.05	0.16	---
Cl[b]	No Data	2.00	2.00	2.63	1.00	1.00	250
TDS[b]	No Data	52.0	77.00	69.33	56.67	42.67	500

[a] Denotes primary constituent as defined by IDAPA 58.01.11.
[b] Denotes secondary constituent as defined by IDAPA 58.01.11.
[c] No pre-season data was provided for 2005 since the facility did not land apply.
[d] For secondary constituents, the background concentration is the default standard if higher than the standard specified by IDAPA 58.01.11.

4.4.2 Municipal Wells in Proximity to Facility

The facility and land application site acreage are located more than 500 feet from any private water well. This buffer distance is recommended by the *"Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater"* published by DEQ. No municipal wells are located within a quarter-mile of the SSA land application site.[4]

4.5 Soils Characterization

The soils at the treatment facility and land application site consist primarily of gravelly loam. The soil profile at the site is described in Table 4.

Table 4. Soil profile for the SSA wastewater land application site.[4]

Depth (inches)	Soil Description
0-2	Dark grayish brown gravelly loam
2-6	Brown gravelly clay loam
6-13	Brown very gravelly clay loam
13-26	Very pale brown very gravelly loam
26-34	Very pale brown very gravelly coarse sandy loam
34-60	Multicolored extremely gravelly loamy coarse sand
60+	No information available

The available water capacity (AWC) is reported as 4-6 inches.[4]

Soils data reported in 2001-2006 Annual Reports do not indicate accumulation of any constituents of concern.

5.0 Conclusion

The following recommendations fall into three major areas. They include loading rate related recommendations, ground water related recommendations, and other recommendations.

5.1 Loading Rate Related Recommendations

1) It is recommended that management units be managed and loaded hydraulically during the GS according to rates calculated for each hydraulic management unit, discussed in Section 4.3.1 of this staff analysis.

2) It is recommended that total nitrogen loading rates not exceed 150% of crop uptake which is estimated to be 50 lb/acre-year as is discussed in Section 4.3.2.1 of this staff analysis.

5.2 Hydraulic Management Unit Recommendations

It is recommended that the existing single hydraulic management unit remain intact during this permit cycle. Even distribution of wastewater over the entire land application site is recommended in an effort to extend the useful life of the site and prevent contamination of groundwater resources.

5.2.1 Hydraulic Management Unit Compliance Determination Recommendations

It is recommended that compliance with the permitted loading rates be determined based on actual acreage used in land application activities rather than the entire permitted site acreage. It is also recommended that only one wheel or hand line be used to irrigate at any one time. This recommendation is included in the current permitting action due to a site history of application to only a portion of the permitted acreage.

6.0 References Cited

[1] *"Guidance for the Reclamation and Reuse of Municipal and Industrial Wastewater."* Published by Idaho DEQ at: http://www.deq.idaho.gov/water/permits_forms/permitting/guidance.cfm.

[2] *"2003 Stanley Sewer Association Wastewater Collection System Facilities Study,"* March 2004. Galena Engineering, Inc., 680 Second Avenue North, Ketchum, ID 83340

[3] *"Northern Idaho Fertilizer Guide: Grass Pastures"*, CIS 853, University of Idaho Cooperative Extension System.

[4] *"2005 Land Application Technical Report,"* March 2006. Galena Engineering, Inc. 680 2nd Avenue North, Ketchum, ID 83340.

[5] *"Fertilizer Guide for Irrigated Clover-Grass Pastures"*, Oregon State University Extension Service, Revised May 1983.

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7.0 Appendices

7.1 Appendix – Compliance Condition CA-156-01: Plan of Operation

The following is proposed permit compliance condition CA-156-01:

Compliance Condition CA-156-01: An updated Plan of Operation (Operation and Maintenance Manual or O&M Manual) for the wastewater reuse facilities, incorporating the requirements of this permit, shall be submitted to DEQ for review and comment. The O&M manual shall be designed for use as an operator guide for actual day-to-day operations to meet permit requirements and shall include daily sampling and monitoring requirements to assess the adequacy of wastewater treatment facility operation. The Plan of Operation shall contain at a minimum all of the information required by the latest revision of the Plan of Operation Checklist in the Reuse Program Guidance. The Plan of Operation shall also include a Quality Assurance Project Plan (QAPP) for monitoring required in this permit. The plan shall cover field activities; laboratory analytical methods and other activities; data verification and validation; data storage, retrieval and assessment; and monitoring program evaluation and improvement.

Upon approval, the manual shall be incorporated by reference into this permit and shall be enforceable as a part of this permit.

7.2 Appendix – Compliance Condition CA-156-02: Lagoon Seepage Testing

The following is proposed permit compliance condition CA-156-02:

Compliance Condition CA-156-02: Submit a seepage testing plan that defines the approach and testing procedures to conduct seepage testing in accordance with methods approved by DEQ on all wastewater storage structures.

Upon approval of the plan, conduct the seepage testing of the structures in the approved plan and submit test results to DEQ. The seepage performance standard is 0.125 inches per day. If a properly tested lagoon leaks more than 0.125 inches per day, the permittee shall either:

a) Submit, for DEQ approval, a plan and schedule to either retest, repair, replace, or decommission structures not meeting this standard or

b) Develop a plan based on ground water sampling and analyses and/or modeling to determine the effect of the lagoon leakage on the local ground water.

If actual or predicted impacts do not comply with IDAPA 58.01.11 as determined by DEQ, the permittee shall comply with a) above.

7.2 Appendix – Compliance Condition CA-156-03: Irrigation Plan

The following is proposed permit compliance condition CA-156-02:

Submit an irrigation plan to DEQ for review and approval. The irrigation plan shall address the use of both wheel lines and one hand line to ensure even distribution of water across the entire land application site. No more than one line may be operated at any time.

Upon approval, the irrigation plan shall be incorporated by reference into this permit and shall be enforceable as part of this permit.

7.3 Appendix – Revised HMU and Soil Monitoring Unit Tables

Table A. Renumbering and Cross-Referencing of Hydraulic Management Units

Current Serial Number	Obsolete Serial Number	Description	Acres	Activity Status
MU-015601	NA	Two wheel Lines and one hand line	103	ACTIVE

Table B. Renumbering and Cross-Referencing of Soil Monitoring Units

Current Serial Number	Obsolete Serial Number	Description	Current Associated MU	Obsolete Associated MU	Activity Status
SU-015601	NA	Entire site acreage	MU-015601	NA	ACTIVE