April 23, 2012

M E M O R A N D U M

TO: **John Tindall, P.E., Engineering Manager**
Coeur d'Alene Regional Office

FROM: **Jennifer Wester, P.E., Staff Engineer**
Technical Services Division

SUBJECT: **Staff Analysis for Draft Reuse Permit WRU M-0006-04 (Municipal Wastewater) – Kootenai School District #274**

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1.0 Purpose

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400.05 (*Idaho Recycled Water Rules*) for processing wastewater recycled water permit applications. It states the principal facts and significant questions considered in preparing the draft permit conditions, and a summary of the basis for approval with references to applicable requirements and supporting materials.

2.0 Project Description

The Kootenai School District #274 (District) handles the collection, treatment and disposal of wastewater for an elementary, middle, and high school. All three schools share a campus. The wastewater is treated in the 0.8-acre facultative lagoon prior to disinfection in the 87,000-gallon chlorination pond and irrigation on the hay field across O'Gara Road from the schools. Currently, only 6.5 acres of the available 20 acres are irrigated with wastewater through eight stationary big gun-type sprinklers. For further description of the system, please see the "Staff Analysis" memo for the current permit (LA-000006-03). A copy of the memo is included in Appendix 7.1. A vicinity map and site map are included in Appendices 7.4 and 7.5, respectively.

3.0 Summary of Events

The facility initially received a Wastewater Land Application Permit (WLAP) on April 28, 1989. The permit was renewed on April 12, 1994 and August 13, 2003 (current permit).

The facility's wastewater lagoon overflowed in April 2008 and the District was forced to truck haul wastewater to the city of St. Maries, Idaho to lower the lagoon level. In April 2011, wastewater was truck hauled out of the lagoon to the city of Harrison, Idaho wastewater treatment plant to prevent another lagoon overflow. There are important improvements the District needs to make to the wastewater system. In 2011, the District received a wastewater planning grant administered by the Idaho Department of Environmental Quality (DEQ) to partially fund the preparation of a planning document. The facility plan preparation will be the first step towards making the necessary wastewater system improvements.

Annual Reports were submitted by the District in 2008, 2009, 2010 and 2011 and the data for all four years was used in preparing this Staff Analysis and draft permit.

The District has entered into a Compliance Agreement Schedule (CAS) with DEQ (see Appendix 7.2) to temporarily address expected permit compliance problems. The first problem, as discussed above, is that the facility's wastewater lagoon is currently undersized and in recent years the lagoon has overflowed. Wastewater from the lagoon has been hauled to another treatment system in order to avoid additional overflow events. The second problem is that the system has also experienced intermittent noncompliance events relating to its chlorine contact system, resulting in ineffective disinfection. Additionally, the CAS authorizes an extension of the April 15, 2012 lagoon seepage test requirement until after facility upgrades are completed.

4.0 Discussion

4.1 Soils

Soils on the application site have been characterized by the United States Department of Agriculture National Resource Conservation Service (USDA-NRCS) as primarily Santa silt loam, 20 to 35 percent slopes with some Santa variant silt loam, 5 to 20 percent slopes. Soil characteristics have not been altered over the last permit cycle. Refer to the previous permit Staff Analysis (DEQ, 2003) or the Soil Survey of the Kootenai County Area, Idaho (USDA-SCS, 1981) for more information.

No changes to soil monitoring were requested by the facility. However, due to a scarcity of recent monitoring data, staff recommends that the draft permit include soil monitoring in both April and October for the following soil constituents: electrical conductivity, pH, nitrate-nitrogen, ammonia-nitrogen, and plant-available phosphorus. Monitoring both before and after growing season application will show the nutrient concentrations available to crops prior to irrigation as well as those left behind after the irrigation season is over and the crop has been harvested.

4.2 Groundwater

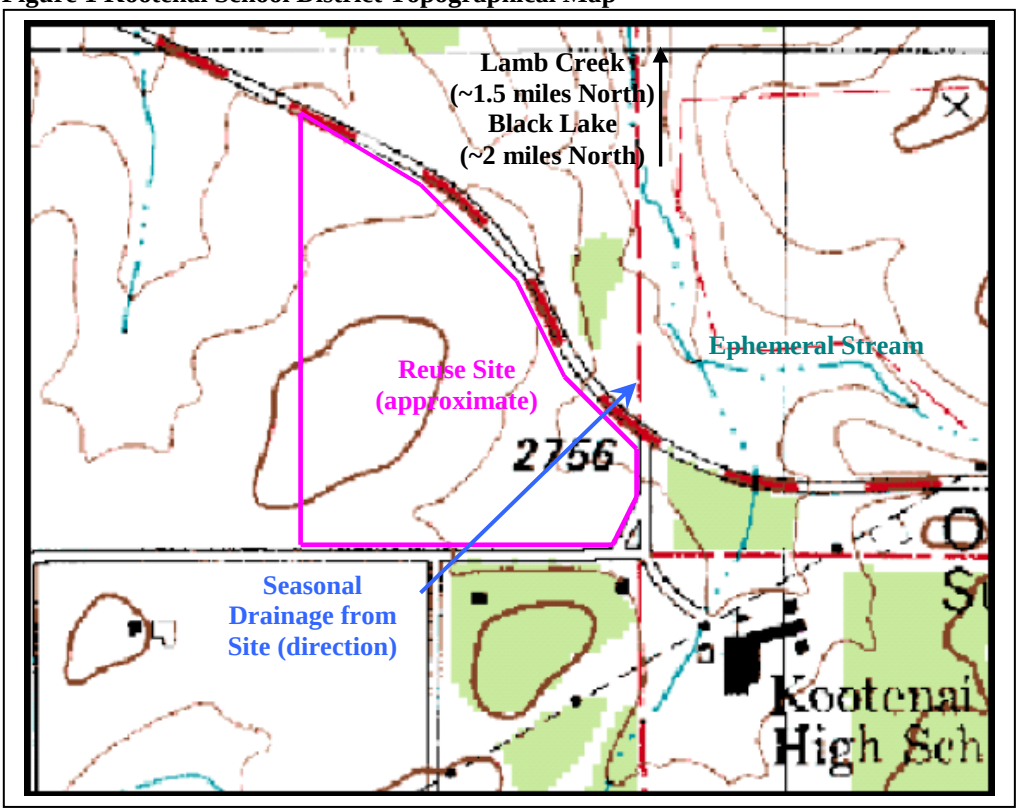
The current permit does not require groundwater monitoring at the site. Based on groundwater well logs for wells near the site, groundwater is estimated to be between 35 and 158 feet below the ground surface (bgs).

Soil monitoring of the site, as described in Section 4.1, will show whether the crop grown is able to utilize most of the nutrients added in the applied wastewater. The facility is encouraged to use the data gathered to manage the agronomic operations at the site. If the data over a long period (several years) indicates an increasing trend in soil nutrient concentrations, DEQ will consider groundwater monitoring.

4.3 Surface Water

There is one (1) seasonal drainage across the southeastern portion of the 20-acre parcel, and an ephemeral stream approximately 500 feet to the northeast of the reuse area that joins Lamb Creek; ultimately draining to Black Lake about 2 ½ miles north of the irrigation site (see Figure 1). Lake Coeur d'Alene is approximately 2 ¼ miles south by southwest of the irrigation site at the closest point.

Figure 1 Kootenai School District Topographical Map



The current permit requires monitoring of the nearest surface water in June and October of each year. The 2010 Annual Report (KSD, 2011) stated that no water was available to sample in the ephemeral stream. In the event of a lagoon overflow incident, stream monitoring above and below the lagoon would be required to monitor the impacts. Staff recommends that a detailed surface water sampling plan be required only in the event of lagoon overtopping or a large volume onsite spill. Staff recommends that the permittee prepare an Emergency Response Plan (see CA-006-03). The plan would also include strategies for preventing a lagoon overflow and procedures for public and regulatory agency notification as well as a basic surface water sampling plan.

4.4 Hydraulic Management Unit Configuration

The current site consists of a single 20-acre plot located to the northwest of the school grounds between O'Gara and Harrison Roads, as shown in Figure 1. Of the 20 acres that have been leased, only 6.5 acres have been actively used with recycled water. No changes to the current system are proposed at this time, although the facility is currently evaluating application areas, including purchase of the current site.

4.5 Wastewater Flows and Constituent Loading Rates

The wastewater flow rates and rationale for constituent and hydraulic loading rates appearing in the proposed permit are discussed below.

4.5.1 Wastewater Flows

The facility does not have flow meters on the influent lines from the three schools. No influent wastewater flow data have been reported by the facility in their annual reports and no influent flow meters were observed during recent facility inspections. A flow meter is used to monitor the volume of recycled water irrigated. Section 4.5.2.2 discusses the irrigated recycled water volumes for 2008 to 2011.

4.5.2 Loading Rates

The sections below discuss proposed constituent loading rates, including nitrogen, total dissolved solids, hydraulic, chemical oxygen demand (COD), and phosphorus. Recommended loading rates for inclusion into Section F of the renewal permit are also discussed.

4.5.2.1 Nitrogen Management and Loading Rates

According to the facility's annual reports for 2008 through 2011, the total nitrogen applied to the entire site has ranged between 12.5 pounds per acre (lbs/acre) in 2010 (KSD, 2011) and 29.8 lbs/acre in 2009 (KSD, 2010) with an average value of 30.6 lbs/acre. These loading rates are less than the current permit limit of 150% of typical crop uptake, or UI Fertility Guide. No changes to the nitrogen loading limits were requested by the facility; therefore, staff recommends that the current limit be retained in the draft permit.

Staff recommends that crop tissue sampling be collected every time the site is harvested. Tissue sample results are used to calculate the nutrient uptake of the harvest in accordance with Equation 1. Uptake values for each cutting are added together for the total uptake by the crop(s) grown during the season.

Equation 1 Formula for Crop Nitrogen Uptake Calculations

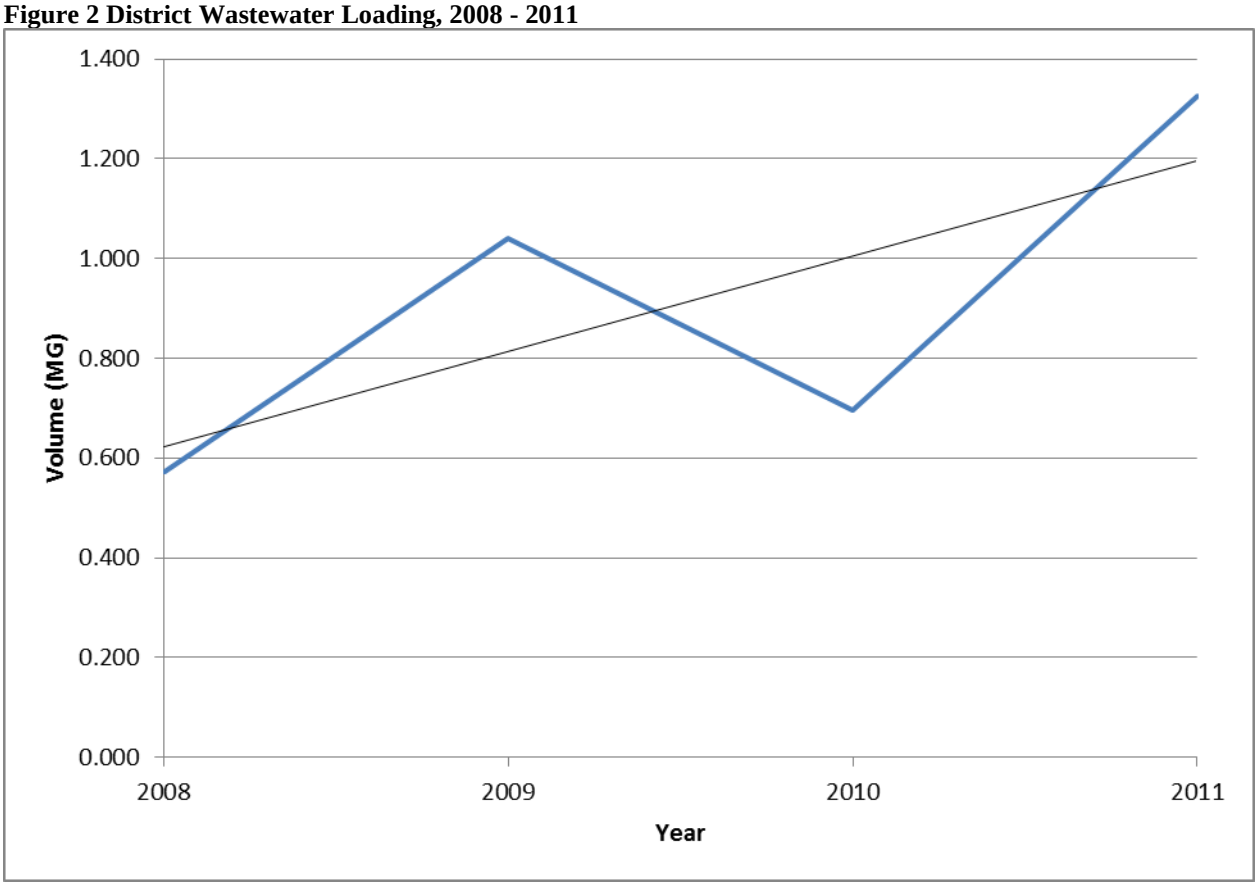
$$\left(\frac{TKN(mg/kg)+Nitrate(mg/kg)}{1000000}\right)*Yield\left(\frac{tons}{acre}\right)*2000\left(\frac{pounds}{ton}\right)=Uptake\left(\frac{pounds}{acre}\right)$$

No change to wastewater monitoring constituents was requested by the facility. Staff recommends that the facility monitor monthly when irrigating for nitrogen, phosphorus and pH in the irrigation water. All laboratory data sheets and facility calculations should be included in the annual report.

4.5.2.2 Hydraulic Loading Rates

Wastewater loading data from 2008 through 2011, as reported in facility annual reports, show variability in annual wastewater loading, from 0.574 million gallons (MG) in 2008 to 1.325 MG in 2011. With so little reported data, no trend for wastewater loading can be assumed, but the general indication is for an upward trend (See Figure 2).

Figure 2 District Wastewater Loading, 2008 - 2011



Growing season hydraulic loading should be substantially equal to the irrigation water requirement (IWR) for the crop grown on the site. Evapotranspiration (ET) data were taken from the University of Idaho Research and Extension Center at Kimberly, Idaho website (http://www.kimberly.uidaho.edu/ETIdaho/) for "Grass Hay". Due to the location of the facility, the calculated IWR is the average of data from both the Coeur d'Alene 1E (#101956) and Saint Maries (#108062) stations. The site irrigation system consists of eight solid set sprinklers on one management unit as described in Section 4.4. From Table 4-12 of the Guidance (DEQ, 2007), the irrigation system efficiency was estimated to be 60% for the sprinklers. Using these approximations, proposed facility loadings were calculated to give the sprinkler system growing season values in Table 1 for each month. For a fuller description of the process used to derive the irrigation rates, see Appendix 7.3.

Table 1 IWR[1] for Kootenai School District

	Calculated Irrigation Rates[2]	
	Acre-in/acre	**Gallons/acre[3]**
April	2.11	57,200
May	5.39	146,400
June	6.20	168,400
July	6.25	169,800
August	4.78	129,800
September	2.70	73,200
October	0.16	4,400
Total	**27.58**	**749,200**

[1] Based on precipitation deficit data from http://www.kimberly.uidaho.edu/ETIdaho/ for Coeur d'Alene 1E and Saint Maries
[2] Combined wastewater and supplemental irrigation water.
[3] Based upon conversion factor of 27,154 gallons per acre-inch.

Irrigation at the proposed maximum rates listed in Table 1 on the 6.5 acre field equates to a total of about 4.9 million gallons (MG) for the growing season. As presented above, the maximum irrigated in the past three years was approximately 1.33 MG.

Staff recommends the permittee prepare an Agricultural Management Plan (see CA-006-04). The Plan needs to detail how the recycled water will be managed in accordance with the IWR, with the majority of the water applied during the warmer summer months and smaller volumes applied at the beginning and end of the growing season.

4.5.2.3 COD Loading Rates

Recycled water permits typically include a COD permit loading rate limit of 50 pounds per acre per day (lbs/ac-day) per season. The current permit does not include a Chemical Oxygen Demand (COD) limit. Wastewater from the schools is estimated to be medium strength municipal wastewater (Metcalf, 2003). For this type of wastewater, COD concentrations are generally around 430 mg/L. The estimated loading for 2010 would be 14.25 lbs/acre-day which is significantly less than 50 lbs/acre-day. Staff therefore recommends that no COD loading limit be imposed in the draft permit and that no monitoring be required.

4.5.2.4 Phosphorus Loading Rates

The current permit does not include a phosphorus loading limit. Phosphorus loading rates are generally set by DEQ based upon either groundwater or surface water concerns. With respect to groundwater concerns, DEQ does not usually set a phosphorus loading limit where there is no groundwater/surface water interconnection (i.e. where groundwater down-gradient boundary from the irrigation site does not enter surface water). There is one ephemeral stream approximately 500 feet northeast of the site that ultimately drains north into Black Lake (see Figure 1). Coeur d'Alene Lake is approximately 3 ½ miles west and 2 ¼ miles south by southwest of the site. No sampling of surface water has been performed by the facility due to lack of flowing water in either the seasonal drainage across the southeast portion of the site or the ephemeral stream. As discussed in Section 4.2, depth to groundwater in the area is 35 to 158 feet based on a review of well logs therefore groundwater is not likely entering surface waters.

In addition, no irrigation is done during significant precipitation events as a means of minimizing runoff (and potentially phosphorus-bearing sediment runoff) to surface waters. A runoff control plan is also required as part of the Plan of Operation compliance activity in Section 3, CA-006-01 of the draft permit.

Total phosphorous (TP) loading rates have varied from 1.96 to 4.39 lbs/acre during the last four seasons (2008 through 2011). Wastewater TP concentrations have ranged from 1.51 to 4.90 mg/L during the same period. If the current trend continues, site TP loading will be between 3 and 5.4 lbs/acre at the end of the next permit cycle (2017).

Based on the information presented above, staff recommends not adding a phosphorus loading limit to the draft permit.

4.6 Buffer Zones and Site Management

It is proposed that the facility reuse water be classified as Class C. The *Recycled Water Rules* (IDAPA 58.01.17) list the uses of Class C reuse water and the disinfection requirements. In order to be considered Class C reclaimed reuse water, the median number of total coliform organisms cannot exceed twenty-three (23) colony forming units (CFU) per one hundred milliliters (100 mL), as determined from the bacteriological results of the last five (5) days for which analyses have been completed. No sample is to exceed two hundred thirty (230) CFU per 100 mL. As listed in the *Recycled Water Rules*, the following conditions apply: the point of compliance for Class C reuse water for total coliform compliance shall be at any point in the system following final treatment and disinfection contact time; and the total coliform analysis shall be based on weekly sampling during periods of irrigation.

The District currently disinfects using liquid chlorine manually added to each batch of reuse water treated in the surge pond prior to starting an irrigation run. After adding the chlorine, total chlorine residual measurements are taken and once there is adequate chlorine residual, irrigation is started and a total coliform sample is taken at the sample tap on the discharge side of the irrigation pump which is the compliance point. When the surge pond is emptied, irrigation stops.

The District's operator has historically had a difficult time complying with the permitted total coliform limit. The CAS (see Appendix 7.2) requires the District notify DEQ within 24 hours of identifying an actual or potential disinfection permit violation. Notification shall be in writing and shall include a description of all measures that have been or will be taken to minimize the environmental and health effects of the incident. In addition, the CAS requires the District to perform any additional mitigation measures requested by DEQ as soon as practicable. Future improvements will need to include an upgraded chlorine disinfection system so that the District can consistently meet the permit requirements.

Staff recommends the Class C disinfection requirements of weekly monitoring of total coliform when irrigating with recycled water with a median limit of 23 CFU per 100 mL for the last five (5) days of samples and a single-sample maximum of 230 CFU per 100 mL.

The buffer zones, as recommended in the *Recycled Water Rules* and Guidance, are as follows for a median of 23 CFU/100 mL:

- 300 feet from reuse site and inhabited dwellings
- 50 feet from reuse site and areas accessible by the public
- 100 feet from reuse site and permanent and intermittent surface water
- 50 feet from reuse site and irrigation ditches and canals
- 500 feet from reuse site and private water supply wells
- 1000 feet from reuse site and public water supply wells
- Berms and other BMPs shall be used to protect the wellhead of on-site wells.

4.7 Compliance Activities

The current permit included eight compliance activities. All of these activities were completed and implemented prior to the expiration of the current permit with the exception of CA-006-03 (perform a seepage test on the storage lagoon by the spring of 2009) and CA-006-07 (submit grazing

management plan prior to allowing grazing onsite). No seepage test has been performed on the facultative lagoon or the surge pond. The permittee will be evaluating the current system and future needs for the next permit cycle during the facility planning effort. Lagoon seepage testing is addressed in the CAS (see Appendix 7.2). No grazing has taken place on the reuse site; therefore, no grazing management plan was required.

There are six (6) compliance activities recommended for the draft permit to cover current deficiencies. The first (CA-006-01) addresses the need for a basic Plan of Operation (PO) to be prepared and focused on how the current wastewater system needs to be run until the upgrade of the wastewater system is completed. The PO will need to include the following (and be consistent with any related requirements in the CAS): a Runoff Management Plan for controlling runoff of recycled water from the irrigation site and lagoon overflows and a Quality Assurance Project Plan (QAPP) to assure that the data collected is accurate. The second (CA-006-02) addresses the need for the current responsible charge operator, Shanon Pooler, to obtain a "Land Application" wastewater license through the Idaho Bureau of Licensing so the facility will comply with the Idaho Wastewater Rules (IDAPA 58.01.16.203). The third (CA-006-03) requires that an Emergency Response Plan be prepared to deal with preventing a lagoon overflow and basic procedures to follow in the event that the lagoon does overflow. The fourth (CA-006-04) requires that an Agricultural Management Plan be prepared to maximize the uptake of nutrients from the recycled water through maximizing the crop yield. The fifth (CA-006-05) requires that a Disinfection Plan be prepared to describe the procedures to be followed for disinfecting the recycled water and meeting the total coliform disinfection permit limit. The sixth (CA-006-06) ensures that an application is submitted prior to the expiration of the permit for continued compliance with the *Recycled Water Rules*.

5.0 Conclusions

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

5.1 Loading Rate Recommendations

1. It is recommended that the nitrogen loading limit remain at 150% of typical crop uptake, as discussed in Section 4.5.2.1. See Section 4.3 of the attached draft permit.

2. It is recommended that the facility irrigate the reuse site using the IWRs in Table 1 of Section 4.5.2.2 as the maximum irrigation rates.

3. It is recommended that **no** COD loading limit be imposed by the draft permit, as discussed in Section 4.5.2.3.

4. It is recommended that **no** phosphorus loading limit be imposed in the draft permit, as discussed in Section 4.5.2.4.

5.2 Monitoring Recommendations

1. It is recommended that the facility perform soil monitoring as discussed in Section 4.1.

2. It is recommended that the facility perform wastewater monitoring as discussed in Section 4.5.2.1.

3. It is recommended that the facility monitor total coliform as discussed in Section 4.6.

5.3 Other Recommendations

1. It is recommended that the facility reuse water be classified as Class C.

2. It is recommended that the five (5) Compliance Activities discussed in Section 4.7 be included in the draft permit.

3. It is recommended that the Kootenai School District permit be issued for public comment.

6.0 References Cited

Allen, Richard G. and Clarence W. Robison, 2009. Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho: Supplement updating the Time Series through December 2008, Research Technical Completion Report, Kimberly Research and Extension Center, University of Idaho, Moscow, ID. Accessed online at http://www.kimberly.uidaho.edu/ETIdaho, March 2011.

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7.0 Appendix

7.1 Kootenai School District #274 Staff Analysis Memo for Permit LA-000006-03

March 27, 2003

M E M O R A N D U M

TO: Roger Tinkey, Engineering Manager
Coeur d'Alene, Regional Office

FROM: Gary Gaffney, Environmental Engineer – Coeur d'Alene, Regional Office
Doug Davidson, State Office of Technical Services

RE: Staff Analysis of Kootenai School District, Wastewater Land Application Permit Application LA-000006-03 (Municipal Wastewater)

PURPOSE

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400.04 for issuing wastewater land application permits.

PROCESS DESCRIPTION

The Kootenai School District (KSD) is located approximately 6 miles southeast of Harrison, Idaho on Highway 97. The legal description for the school district is listed as T47N, R03W, section 25, NENE. The land application site is located in the southeast quarter of section 23 of the same Township and Range location in Kootenai County (See map in Attachment 3). The location description was obtained from the Black Lake, Idaho 1:24,000 United States Geological Survey quadrangle. The land application site is located outside of the 100-year floodplain and is located north of the junction of Highway 97 and O'Gara Road while the school and lagoon are south of the road junction. The land application of wastewater has been used since 1986 and has provided wastewater collection and treatment for the school district since that time.

The KSD wastewater system consists of gravity flow lines from the school to a single 0.8-acre facultative storage lagoon. The maximum design treatment capacity of the system is 6,250 gallons per day based upon 250 students producing 25 gallons per person per day. The school district has an average student population of about 285 students per year (phone communication, 2003). The effluent is transferred by underground conveyance to the facultative storage lagoon. After stabilization, the wastewater is transferred to an 87,000-gallon chlorination pond where liquid chlorine is delivered to the waste stream prior to conveyance to the land application area through a 4-inch main line. The application area consists of a 1.44-acre corner of a larger 20-acre field. The irrigation setup incorporate 4 pair of solid-set sprinklers for the application of wastewater at or below agronomic rates. Only two pair are activated at a time during each irrigation event with each sprinkler having a 50-foot radius. The 1.4-acre land application site consists of Santa silt loam soil with a NRCS reported slope of 20 to 35 percent. The permeability rate is reported at 0.6 to 2 inches per hour for the 0 to 34-inch level with a much lower permeability of 0.06 to 0.2 inches per hour at the 34 to 65-inch level. This change of permeability by an order of magnitude could have a significant effect upon the soil ability to accept high volumes of water when the soil profile of the higher permeability becomes saturated. The water holding capacity is listed at 0.19 to 0.21 inches of water per inch of soil. The field has had a cropping history of alfalfa hay production. The alfalfa has since died off and the field is predominately grass. The field was used as pasture when a site visit occurred.

Figure 1. Kootenai School District Lagoon

SUMMARY OF EVENTS

The KSD had built and used the facultative lagoon as an evaporative system since 1977 but had numerous reported spills into a nearby stream. The evaporative system was determined not be applicable for this lagoon and a land application program was initiated to eliminate overflow of wastewater to surface water. The land application system started operation in 1986 with the KSD entering into a long-term agreement for land northwest of the lagoon. The KSD original permit was issued on April 28, 1989. The permit was renewed on April 12, 1994 and expired on April 1, 1999. The district is currently operating under the conditions of this permit. On October 25, 2001, DEQ personnel visited the site and met with school superintendent Ron Hill and maintenance manager Dick Stevenson. A tour of the facility was given to DEQ personnel. An application for renewal of the wastewater permit was received by DEQ on March 25, 2002.

DESCRIPTION OF WASTEWATER TREATMENT AND LAND APPLICATION SYSTEM

The KSD wastewater collection system consists of a gravity conveyance line that drains from the school to a 0.8-acre facultative lagoon. The lagoon and chlorination area is behind a cyclone-type fence that is locked from public access. After waste stabilization, the effluent is transferred to an 87,000-gallon chlorination holding pond for chlorine neutralization (Figure 2).

During the growing season, effluent is transferred from the chlorination lagoon to the land application site by a pump located in the nearby

Figure 2. Chlorination Pond

Figure 4. Safety Grate over Effluent Conduit

Actual application volumes reported in a 1992 annual report (the last year reported) are listed at 367,800 gallons applied to the 1.4-acre site. This reported value is much less than the estimated effluent flow volume of 1.4 MG calculated from the school population estimates. With an unlined lagoon located in an area of very permeable soil, it is probable that leakage from the lagoon is occurring at a very large percentage of the total flow, possibly upwards of 60 to 70 percent of the total effluent flow. Future lining or revamping of the lagoon would require treatment of effluent volumes closer to estimated total flow volume mentioned above.

SITE CHARACTERISTICS

The land application site is located about 800 feet northeast of the KSD lagoon. The site is open with the present use being a grass hay and pasture (Figure 5). The land has a rolling terrain with moderate to steep slopes. The application area is irrigated by four solid set sprinkler sets, each with 2 sprinkler heads. The sprinkler pairs are used in unison of each other with a valve at the main line juncture. The maximum hourly pumpage rate for the pump is listed at 9600 gallons per hour.

The soils for the site are of the Santa series, which is moderately well drained soil with a highly permeable layer from 0.6 to 2.0 inches per hour from 0 to 34

Figure 5. Application Field with Solid Set Sprinkler

inches. Below this layer from 34 to 65 inches is a much lower permeability from .06 to 0.2 inches per hour. The available water holding capacity is listed at 0.19 to 0.21 inches per inch of soil.

REPORTED AND ACTUAL FLOW AND APPLICATION DATA

The last annual report for the KSD was for the 1991-92 water year. In that year the KSD applied an estimated amount of 367, 800 gallons of wastewater to the 1.4-acre site. The holding capacity of the lagoon is listed at 1.04 million gallons (MG). With an average student population of 285 students (phone communication, 2003) at an average wastewater production of 25 gallons per student per day for 200 days the wastewater production total would equal over 1.4 MG annually. With the actual application of 0.37 MG while a predicted value of wastewater production occurring at 1.4 MG, an actual versus estimated volume discrepancy of over 1 MG exist. If actual water production or application amounts were known, the actual source of this discrepancy could be evaluated. Without the availability of this information, it would have to be assumed that the unlined storage lagoon is seeping upwards of 1 MG or more. Based upon earlier evaluations of evaporation in this area it was determined that precipitation values were very close to evaporation values leading to a no net gain – no net loss situation from evaporation and precipitation (DEQ Recommended Operation Plan, Appendix A, 12/1/1993). All calculations for this permit will be based upon the estimated value of wastewater produced by the average student population for a 200-day period.

In the previous permitting period, it was determined that KSD would apply the wastewater near agronomic rates for a growing grass crop. This was the most appropriate best management situation since no flow or discharge measurements are made. Application of the wastewater was reported in the annual report for 1991-92 as 0.37 MG applied over an 8-day application period split into three different events. Even with a high permeability of 0.6 to 2.0 inches/hour for the upper soil profile, the excessive application of the wastewater far exceeded the irrigation water requirement of the crop. The agronomic rates were exceeded during these irrigation events.

The scenarios listed in Table 2 include actual conditions as reported in the 1992 annual report (scenario 1) as well as conditions when full flow estimates for the estimated student population are used. Scenario 3 is minimum land requirement where hydraulic loading rate does not exceed irrigation water requirement. Scenario 4 is setting where the land application area is doubled to 2.8 acres and hydraulic loading rate is decreased accordingly.

Table 2. Wastewater Application

Scenario	Application Rate, MG	Acres Used	Days	HLR (in)	IWR (in) 214 days	Acres Required
1	0.367	1.4	8	9.65	30.22	0.4
2	1.425	1.4	214	37.48	30.22	1.74
3	1.425	1.74	214	30.22	30.22	1.74
4	1.425	2.8	214	18.74	30.22	

Using Table 3 for determining annual agronomic requirements, the application rate limit for the site may be determined for each month of the growing season.

Table 3. Irrigation Water Requirements and Limits by Month, for pasture

Month	IWR (inches)	Gallons/ac-day	Inches/ac-week
April	2.21	3791	0.51
May	4.09	7375	0.92
June	5.16	8728	1.20
July	8.38	12457	1.89
August	6.19	8521	1.40
September	3.80	4756	0.89
October	0.38	603	0.089
Total	30.22		

Assuming that application would occur over a 214-day period is not practical, the application of wastewater to the site will be limited by the agronomic rate for the specific time of year. Table 3 above describes the irrigation water requirement for each month of the growing season. The agronomic rates are listed by gallons per day and inches per week. The application season is from April to October with very limited application allowed during the first and last months. The seasonal calculations are for pasture, which is what the site was being used as during the site visit.

PROJECTED WASTEWATER QUALITY AND LOADING RATES

Approximately 1.4 MG per year of effluent will be available at the estimated quality listed in Table 4.

Table 4. Wastewater Quality

Constituent	Effluent (milligrams per liter)
Total Nitrogen (estimated)	25
Total Phosphorus (Estimated)	4

The proposed loading rates were calculated assuming 1.4 MG of wastewater is land applied over 1.74 acres. This translates to a hydraulic loading rate of 30.16 inches per year with an irrigation water requirement of 30.22 inches per year. Details on the projected permit loading rate limits are provided in Table 5 and 6.

Projected Permit Limits, Hydraulic Loading Rates

The growing season for this project is from April 1 through October 31 (214 days). Land application during the early part of the season (April) and the later (October) will be dependent upon local climatic and soil conditions. If soils are saturated or nearly saturated, application dates will need to be altered to provide time for the soils to dry. The Santa soil series has a high erosion capability and applying wastewater during times of saturation could produce high erosion conditions. Land application during the non-growing season is not proposed and should not be allowed in the permit. The following equation was used for the hydraulic loading rate for the growing season:

$IWR = [Cu - (PPT_e + \text{carry over soil moisture}) + LR]/E_i$.

IWR is the irrigation water requirement or the hydraulic loading rate for the growing season
Cu is the crop consumptive use
PPT_e is the effective precipitation
LR is the leaching rate
E_i is the irrigation efficiency

Table 5. Comparison of Proposed Loading Rates to Standard Municipal Permit Limits

Constituent	Proposed Loading Rates	Description of Standard Municipal Permit Loading Rate Limit	Projected Standard Municipal Permit Loading Rate Limit
Hydraulic Loading Rate, Growing Season	30.16 inches	Irrigation water requirement for the crop grown	30.22 inches
Hydraulic Loading Rate, Non-growing Season	None	Soil AWC[1] plus crop evapotranspiration minus NGS[2] precipitation	None Allowed
COD[3], Growing Season (214 days, April 1 through October 31)	22.8 lbs-acre/day	Seasonal average not to exceed 50 pounds per acre-day	Not Required
Total Nitrogen (Estimated)	170.8 pounds per acre	150% of crop uptake	226.8 pounds per acre
Total Phosphorus (Estimated)	27.3 pounds per acre	150% of crop uptake	38.7 pounds per acre

1. Available Water Capacity
2. Non-growing season
3. Chemical Oxygen Demand

For permit purposes, the soil carryover moisture and leaching rate are assumed to be zero in calculating the irrigation water requirement. A leaching rate of zero is used since soils in this area are not saline and need no additional hydraulic load for leaching. Data for pasture in the St. Maries area was used to estimate the irrigation water requirement for this site (Tables 6 and 7). The estimated annual hydraulic loading requirements for the growing season should be approximately 30.16 inches/acre (1.4 MG). The actual land application area of 1.4 acres will not satisfy actual hydraulic loading requirements. Increasing the application area to at least 1.74 acres will meet hydraulic requirements. Increasing the application above the 1.74 acres will provide some increased level of management options as to the application timing, early spring or late fall application or application lengths.

Table 6. Irrigation Water Requirements, by Month, for Pasture near St. Maries

Month	St. Maries Effective	Consumptive Use,	Net Irrigation	Irrigation Water

	Precipitation, inches	inches	Requirements, inches	Requirement, million gallons
April	1.57	3.22	2.21	0.10
May	1.53	4.60	4.09	0.19
June	1.42	5.29	5.16	0.24
July	0.69	6.98	8.38	0.40
August	0.80	5.44	6.19	0.29
September	0.90	3.76	3.80	0.18
October	1.57	1.86	0.38	0.02
Total	8.48	31.15	30.22	1.43

* Source: *Estimating Consumptive Irrigation Requirements for Crops in Idaho, 1983* by R.G. Allen and C.E. Brockway

Table 7. Total Irrigation Water Requirements for Pasture Grown near St. Maries

CROP	CU_1, inches	PPT_{e2}, inches	E_{I3}, %	IWR_4, inches	IWR, MGA_5
Alfalfa	31.15	8.48	75%	30.22	1.43

1. Consumptive Use
2. Effective Precipitation
3. Irrigation Efficiency
4. Irrigation Water Requirement
5. Million Gallons Annually

Doubling the application area to 2.8 acres will provide increased treatment area as well as the ability to treat sufficient effluent flow. With this being a relatively low production application site, the deficit water requirements by increasing the application site from the estimated crop consumptive use should not be a burden upon the growth of the plant life and the nutrient uptake in the application site.

Projected Permit Limits

No water quality data is available for the land application site. Estimates based upon average municipal effluent are used for this analysis. Staff recommend nutrient permit limits be set at 150% of crop uptake. Table 5 provides estimated crop uptake values for pasture site. Attachment 1 describes the calculations for the nutrient calculations in greater detail. The estimated growing season chemical oxygen demand loading rate for this site is estimated to be at 13.72 pounds acre-day. This is well below the DEQ guideline rate of 50 pounds/acre-day. The estimated values are calculated from results taken from a standard wastewater manual Wastewater Engineering from Metcalf & Eddy, 4th Edition. They state that domestic wastewater COD levels range from 250 to 900 mg/l with an average value of 430 mg/l. Due to the low potential loading rates, staff recommend chemical oxygen demand monitoring requirements and loading limits are excluded from this permit.

GROUND WATER CONSIDERATIONS

Ground water near the land application site is approximately 40 feet below ground surface (DEQ well analysis, 1993). The Santa soil series depth is 65 inches below ground surface. If effluent is applied at agronomic rates as specified in the analysis, leaching of nutrients or pathogens should not impact ground water. The school well located closer than the required 1000-foot buffer for a public supply well was determined in the well analysis in 1993 to be upgradient of the land application area and would not be impacted from land application.

SURFACE WATER CONSIDERATIONS

Buffer zones of 100 feet or more are recommended to protect natural surface waters from possible contamination. There is a drainage ditch that runs near the lagoon and also an ephemeral stream that exists in the land application site. Land application will not be allowed when water is present in the stream.

BUFFER ZONES

The permit conditions will require that the disinfecting system treat the effluent to a total coliform median level of 23/100 milliliters or less during land application with a single sample coliform maximum limit of 240/100 ml. Chlorine residual measurements will be taken at the application site during irrigation events throughout the season. The coliform values should be composed of the median of the last three sample results on a rolling basis.

KSD will disinfects effluent to a total coliform level of 23/100 milliliters or less prior to land application. The site is located in a rural area with solid set sprinklers used for land application. For this type of system, buffer zones of 300 feet or more are required between land application areas and homes. Buffer zones of 500 feet or more to private wells and 1,000 feet or more to a public water supply source are also required. Table 9 summarizes buffer zones provided by the existing system. Adequate buffers are provided at the application site.

Table 9. Buffer Zone Summary

Buffer Object	Standard Municipal Permit, feet	Actual Distance Provided, feet
Nearest inhabited dwelling	300	500
Private water supply	500	> 500
Public water supply	1,000	800
Natural surface water	100	>100

The site is fenced with a barb wire fence with a minimum of three wires. Signs need to be posted every 500 feet with a statement about site is irrigated with wastewater.

SITE SPECIFIC CONDITIONS

Monitoring of the wastewater parameters as well as soil and surface and ground water should be assigned and described to the person or business completing the task. The land application permit will describe the actual detail necessary for compliance with the requirements of the permit.

RECOMMENDATION

DEQ staff recommend issuing the attached draft permit with compliance activity requirements established. The draft permit contains standard municipal permit loading limits for nutrients, chemical oxygen demand, and hydraulic loading rates. Monitoring and reporting requirements to evaluate system performance and to determine permit compliance have been specified.

Attachment 1

CALCULATIONS

Crop Type: Pasture
Crop Yield: 3 tons/acre
Wastewater applied to land application site: 1.4 million gallons
Land application area: 1.74 acres total
Wastewater total nitrogen: 25 mg/l (estimate)
Wastewater total phosphorus: 4 mg/l (estimate)
Supplemental fertilizer applied: None

1. **Crop uptake of nitrogen** (Agricultural Waste Management Field Manual)

   Nitrogen uptake: 3 tons/acre x 50.4 pounds Nitrogen/Ton = 151.2 pounds/acre
   Phosphorus uptake 3 tons/acre x 8.6 pounds Phosphorus/Ton = 25.8 pounds/acre.

2. **Calculate the nitrogen permit limits (150% of crop uptake)**

   Nitrogen application permit limit: 151.2 x 1.50 = 226.8 pounds/acre
   Phosphorus application permit limit: 25.8 x 1.50 = 38.7 pounds/acre

3. **Nutrient loading on application site**

   Nitrogen: $\frac{30.16\text{ in}}{\text{Year}} \times \frac{25\text{ lbs Nitrogen}}{\text{million lbs WW}} \times \frac{8.34\text{ pounds ww}}{\text{gallon WW}} \times \frac{27154\text{ gal}}{\text{acre-in}} = \frac{170.8\text{ lbs Nitrogen}}{\text{acre}}$ (19 PPM)

   Phosphorus: $\frac{30.16\text{ in}}{\text{Year}} \times \frac{4\text{ lbs Phosphorus}}{\text{million lbs WW}} \times \frac{8.34\text{ pounds WW}}{\text{gallon WW}} \times \frac{27154\text{ gal}}{\text{acre-in}} = \frac{27.3\text{ lbs Phosphorus}}{\text{acre}}$ (4 PPM)

   COD: $\frac{30.16\text{ in}}{\text{Year}} \times \frac{1\text{ Application Year}}{214\text{ days}} \times \frac{430\text{ lbs COD}}{\text{million lbs WW}} \times \frac{8.34\text{ pounds WW}}{\text{gallon WW}} \times \frac{27154\text{ gal}}{\text{acre-in}} = \frac{13.72\text{ lbs}}{\text{acre-day}}$

4. **Nutrient loading compliance**

Nutrient	Permit Limit 150% of crop uptake	Amount applied	In compliance with permit limit?
Nitrogen	227 lbs/acre	170.8 lbs/acre	Yes
Phosphorus	38.7 lbs/acre	27.3 lbs/acre	Yes

Attachment 2

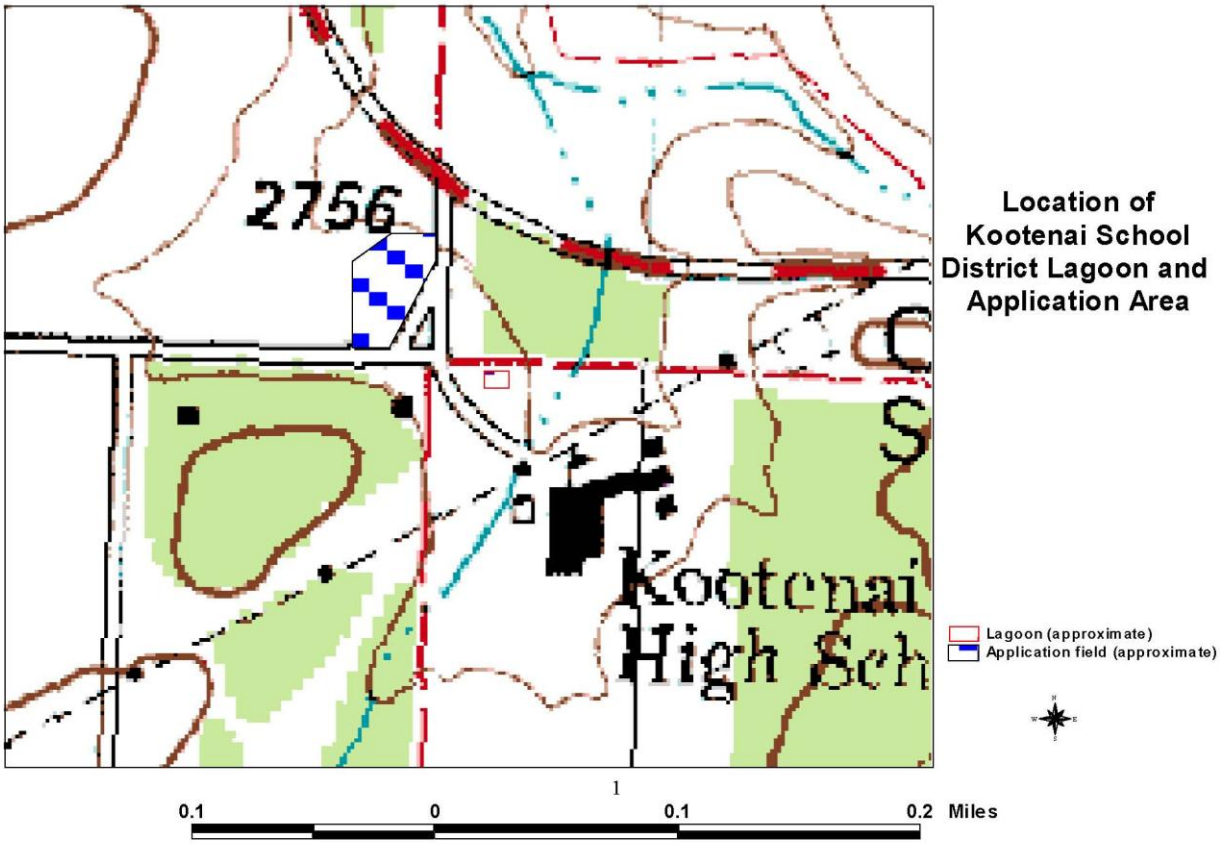
Wastewater Application Worksheet

Date	COD	TKN	Ammonia	Nitrate	Total N	Phos.	EC	TDS (1)	TN(2)	TDS(3)			
2000	430				0	4		0	25.00	NA			
					0			0			**HLR application rate (mg)**		
					0			0			NGS		
Averages	430					4.00			25.00				
	(1) TDS is estimated to be EC x 0.64							**Land Application Acreage**					
	(2)Total Nitrogen from Annual Report (not calculated)							1.7					
	(3) TDS from Annual Report (not calculated)							**Days of GS Application**			**GS WW Applied (mg)**		
Projected Loading Rates at MG Proposed Rates								214			1.425		
								Acre-Inch					
	COD, annual average			lbs/acre-day	mg/l = ppm = lbs/million lbs			27154			**NGS WW Applied (mg)**		
	COD, GS average		13.72	lbs/acre-day				**lbs/Gallon of Wastewater**					
	COD, NGS average			lbs/acre-day				8.34			**Irrigation Water Requirement**		
	Total Nitrogen		170.8	lbs/acre-year				**1 MG**			**gal/day by Month**		**in/week**
	Total Phosphorous		27.3	lbs/acre-year				1000000			April	3478	0.51533
	TDS			lbs/acre-year				**Wastewater Land Applied (mg)**			May	6235	0.92375
								1.425			June	8127	1.20411
Aceages Required			IWR = [CU-(PPTe)/0.75					**Soil AWC (in/in)**			July	12778	1.89319
	Hydraulic Loading Rate (inches)					30.16		0			August	9440	1.39859
	Irrigation Water Requirements (inches)					**30.22**		**Depth (in)**			September	5991	0.88757
	Land Application Area Requirements (Acres)					**1.74**		0			October	603	0.08933
Irrigation Requirements				y.uidaho.edu/water/appndxet/index.shtml		cc.dri.edu/summary/climsmid.html		**AWC (in)**	**GS HLR/CU Ratio %**	99.79			
Month	**IWR (in)**	**IWR (mg)**	**CU(in)**	**PPTe(in)**	**Kimberly IR (mm)**	**Kimberly CU (mm)**	**Precipitation (in)**	0	**NGS Ratio %**				
January	0.00	0.00	0.00	0.00			4.32	**NGS Loading Rate (Inches)**					
February	0.00	0.00	0.00	0.00			3.14						
March	0.00	0.00	0.00	0.00	-24.49	14.26	2.66	**GS Loading Rate (inches)**					
April*	2.21	0.10	3.22	1.57	46.50	81.9	2.24	30.16					
May*	4.09	0.19	4.60	1.53	80.29	116.87	2.19	HLR_{NGS}					
June*	5.16	0.24	5.29	1.42	95.40	134.4	2.03						
July*	8.38	0.40	6.98	0.69	161.20	177.32	0.99	ET_{NGS}					
August*	6.19	0.29	5.44	0.80	119.66	138.26	1.14						
September*	3.80	0.18	3.76	0.90	71.70	95.4	1.29	$Precip_{NGS}$					
October*	0.38	0.02	1.86	1.57	10.54	47.12	2.24						
November	0.00	0.00	0.00	0.00			3.87						
December	0.00	0.00	0.00	0.00			4.13			PPTe=P*0.7			
Total	**30.22**	**1.43**	**31.15**	**8.48**	**585.3**	**791.3**	**12.12**		*Used in Calculation				

1

Attachment 3
MAPS

Map 1 KSD Facility Site Topographic Map


2756
Kootenai
High Sch
Location of
Kootenai School
District Lagoon and
Application Area
Lagoon (approximate)
Application field (approximate)
1
0.1
0
0.1
0.2 Miles

7.2 Compliance Agreement Schedule

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

IN THE MATTER OF	)	
	)	
Kootenai School District #274	)	COMPLIANCE AGREEMENT SCHEDULE
	)	Idaho Code § 39-116A
	)	
	)	

1. Pursuant to Idaho Code § 39-116A (Idaho Environmental Protection and Health Act), the Idaho Department of Environmental Quality (Department) enters into this Compliance Agreement Schedule (CAS) with Kootenai School District #274 (KSD), a validly organized and existing body corporate and politic in the State of Idaho.

2. KSD is the owner of a wastewater treatment facility located in Kootenai County, Idaho and it collects wastewater for treatment from three (3) public schools. The facility is currently undersized and in recent years the lagoons have overflowed and wastewater from the lagoons has been hauled to another treatment system in order to avoid additional overflow events. The system has also experienced intermittent noncompliance events relating to its chlorine contact system, resulting in ineffective disinfection.

3. The Department and KSD acknowledge that KSD has been operating without a valid permit since August 13, 2008. In conjunction with this CAS, the Department is issuing Permit No. LA-000006-04. The provisions of this CAS shall, where applicable, supersede or supplement the permit provisions.

4. IDAPA 58.01.16.493.02.a, Wastewater Rules, requires that all existing lagoons be seepage tested by an Idaho licensed engineer, an Idaho licensed professional geologist, or by individuals under their supervision by April 12, 2012. KSD acknowledges that the KSD lagoons are not likely to meet regulatory seepage rate requirements and has requested an extension.

5. KSD agrees to the terms and conditions of this Compliance Agreement Schedule to achieve compliance with the Wastewater Rules as expeditiously as possible. KSD shall initiate and complete the following activities as provided below:

a. KSD shall conform all treatment activities to Permit No. LA-000006-04, as superseded or supplemented by the following terms and conditions:
   i. The Department and KSD acknowledge KSD's lagoon storage capacity is undersized for the permitted facility and, due to the undersized lagoons, KSD will be required to, from time to time, pump and haul wastewater from the lagoons to an authorized wastewater treatment facility. KSD agrees to initiate pump and haul operations, and the Department authorizes such operations, each time the lagoons reach capacity. For purposes of this CAS, a lagoon has reached capacity when lagoon freeboard is at or is less than 0.5 feet (6 inches) and the lagoons cannot be drawn down in a manner consistent with Permit No. LA-000006-04. KSD shall provide written notification to the Department in advance of

initiating each pump and haul operation, provide the name of the authorized wastewater treatment facility it plans to utilize, and provide the amount of wastewater it plans to haul. Within 24 hours of terminating pump and haul operations, KSD shall provide a written report to the Department that includes the name of the authorized wastewater treatment facility utilized and the actual amount of wastewater delivered to the facility for treatment. KSD acknowledges that pump and haul operations are not a long-term solution and agrees to upgrade the facility pursuant to this CAS in order to, among other things, resolve the lagoon capacity issue. This CAS in no way protects KSD from enforcement actions or liability associated with lagoon failure, lagoon overflows, or from any other permit violation associated with the undersized lagoons.

ii. The Department and KSD acknowledge that KSD's chlorine contact system is inadequate to consistently meet the disinfection requirements in Permit No. LA-000006-04. KSD shall notify the Department within 24 hours of identifying an actual or potential disinfection permit violation. Notification shall be in writing and shall include a description of all measures that have been or will be taken to minimize the environmental and health effects of the incident. KSD shall perform any additional mitigation measures requested by the Department as soon as practicable. KSD agrees to upgrade the facility pursuant to this CAS in order to, among other things, upgrade the chlorine contact system so that the facility can consistently meet permit requirements. This CAS in no way protects KSD from enforcement actions or liability associated with any permit limit exceedance, or from any other permit violation.

b. The Department acknowledges that KSD had been approved by the Department for a planning grant and anticipates seeking financial assistance for facility upgrades through the Department's construction loan program. The deadlines set forth herein shall be enforced in a manner consistent with the deadlines and timeframes of the grant and loan program. If the KSD construction project is not rated and ranked for inclusion on the grant and loan program's annual Priority List or, alternatively, its inclusion is not approved by the Idaho Board of Environmental Quality, the Department shall provide KSD sixty (60) days from notice of such occurrence to obtain Department agreement on an amended CAS to account for the necessity to find substitute funding for construction. This CAS shall terminate upon execution of an amended CAS or on expiration of the sixty-day deadline, whichever is earlier.

c. No later than June 1, 2012, KSD shall employ or have on contract a Responsible Charge Operator and shall designate a Substitute Responsible Charge Operator.

d. In the event that the proposed project is rated and ranked for inclusion on the Department's annual Priority List and is subsequently approved by the Idaho Board of Environmental Quality, no later than December 31, 2012, KSD shall submit a completed loan application.

e. Upon the receipt of an offer from the grant and loan program, KSD shall determine whether to accept the offer and utilize the offered funds, or provide proof of other financial means with which it will perform the necessary upgrades. Failure to either accept an offer or provide proof of other financial means (or

some combination of both) shall be cause for termination of this CAS or other relief as provided by Paragraph 12.

f. In the event KSD accepts a loan offer, KSD shall meet all deadlines prescribed by the Wastewater Rules and the grant and loan program, as well as all deadlines contained in KSD's planning documents provided to the grant and loan program. Failure to meet these deadlines shall be grounds for termination of this CAS or other relief as provided by Paragraph 12.

g. Notwithstanding any other terms or obligations arising out of this CAS, KSD agrees to complete construction of all facility improvements necessary to achieve compliance with the Wastewater Rules in accordance with approved plans and specifications, and in accordance with a permit and/or permit amendment(s) issued by the Department no later than January 1, 2016. The Department may grant reasonable extension(s) to this deadline for unforeseeable circumstances not under the control of KSD.

h. No later than sixty (60) days after completion of construction, KSD shall submit to the Department for review and approval the procedure for performing the lagoon seepage test(s).

i. No later than August 30, 2016, KSD shall complete the approved seepage test(s).

j. KSD shall submit the lagoon seepage test results within thirty (30) days of seepage test completion. If a lagoon is found to be leaking at a higher rate than is allowed by IDAPA 58.01.16.493.03.b then KSD shall prepare a schedule for completing a Leaking Lagoon Plan as required in Subsection 493.04 for Department review.

6. KSD agrees that failure to perform work as prescribed by this CAS or as prescribed by a document approved under this CAS shall be grounds for termination or other relief as provided by Paragraph 12. Any work that deviates from that prescribed in this CAS or documents approved under this CAS shall require prior written approval from the Department.

7. All correspondence required of KSD by this Compliance Agreement Schedule shall be addressed to:

Dan Redline, Regional Administrator
Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814

8. All correspondence required of the Department by this Compliance Agreement Schedule shall be addressed to:

Lynette Ferguson, Superintendent
Kootenai School District #274
13030 E. O'Gara Road
Harrison, Idaho, 83833

9. This CAS shall not relieve KSD from the obligation to comply with any relevant provisions of Idaho's Water Quality Standards, IDAPA 58.01.02, *et seq.*, Idaho's Wastewater Rules, IDAPA 58.01.16, *et seq.*, Idaho's Ground Water Quality Rules, IDAPA 58.01.11, *et seq.*, Idaho's Recycled Water Rules IDAPA 58.01.17, *et seq.*, or applicable local, state or federal law.

10. Pursuant to Idaho Code § 39-116A, the Department and KSD shall meet annually to reassess the necessity and appropriateness of this agreement.

11. This CAS shall bind KSD, its successors, and assigns until such time as the terms of the Compliance Agreement Schedule are met, and the Department provides KSD with written notice of termination.

12. In the event KSD fails to comply with any of the terms and conditions of this CAS, KSD shall notify the Department of such failure within five (5) working days of said event. KSD expressly recognizes that failure to comply with the terms and conditions of this Compliance Agreement Schedule may result in administrative or civil action for specific performance of this Compliance Agreement Schedule, civil and administrative penalties, assessment of costs and expenses, restraining orders, injunctions, attorney's fees, and other relief available under Idaho Code section § 39-108.

13. The provisions contained herein are severable. If any provision or part thereof is declared unenforceable or invalid, that shall not affect the validity or enforceability of the remaining provisions of this document.

14. The Department and KSD, through the undersigned representatives, each represent and warrant that each has the authority to enter into this CAS and to take all actions provided herein.

15. The effective date of this Compliance Agreement Schedule shall be the date of signature by the Director of the Department of Environmental Quality.

DATED this 29 day of Feb., 2012

~~Toni Hardesty~~, Director Curt Fransen
Department of Environmental Quality

DATED this 14th day of February, 2012

Lynette Ferguson, Superintendent
Kootenai School District #274

7.3 IWR Formulation Methodology

The IWR values for the District (Table 1) were derived from precipitation deficit (P_{def}) data available for "Grass Hay" from the ET_{Idaho} website (http://www.kimberly.uidaho.edu/ETIdaho/) for the Coeur d'Alene (#101956) and Saint Maries (#108062) stations. Table 2 summarizes the data taken from the ET_{Idaho} website for both stations. The irrigation water requirement is intended to serve as a maximum for the application of water to the crop during the growing season. Actual application rates are expected to be less these values, allowing for variations in yearly precipitation.

Table 2 Precipitation Deficit (P_{def}) Data

	Coeur d'Alene 1E		Saint Maries	
	mm/day	in/month*	mm/day	in/month*
January	0.01	0.012	-0.16	-0.195
February	0.04	0.044	0.02	0.022
March	0.03	0.037	0.02	0.024
April	1.07	1.264	1.07	1.264
May	3.17	3.869	2.13	2.600
June	4.45	5.256	1.85	2.185
July	5.49	6.700	0.66	0.806
August	4.73	5.773	-0.03	-0.037
September	3.09	3.650	-0.35	-0.413
October	0.96	1.172	-0.80	-0.976
November	-0.64	-0.756	-2.95	-3.484
December	-0.06	-0.073	-1.36	-1.660

* Calculated value (ET_{Idaho} data in mm/day / 25.4 mm/in ***** # days in month)

The Saint Maries station P_{def} values are for non-irrigated crops while the Coeur d'Alene values are for irrigated ones. The facility is located approximately 11 miles northwest of the City of St. Maries, but irrigates the hay crop grown on the site; therefore, the P_{def} value for the District is the average of the two stations as shown in Table 3. The irrigation water requirement is intended to serve as a limit for the application of water to the hay crop during the growing season, allowing for variations in yearly precipitation. This process of evaluation gives a positive irrigation value for October and follows the general trend of past irrigation by the District. Negative values represent months where little or no growth takes place.

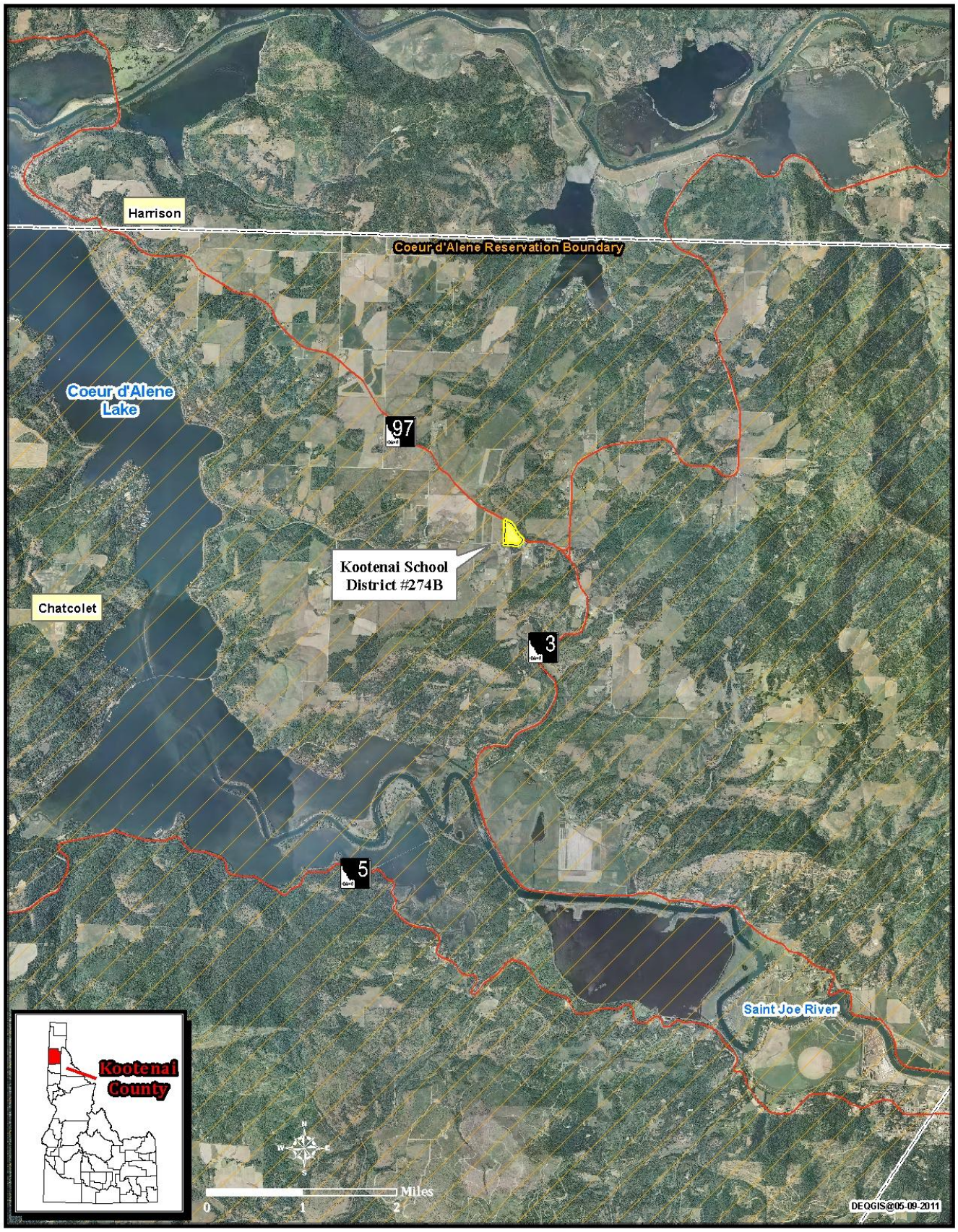
Table 3 Kootenai School District Averaged Growing Season P_{def}

Month	Averaged Irrigation Rates*
April	1.264
May	3.234
June	3.720
July	3.753
August	2.868
September	1.618
October	0.098

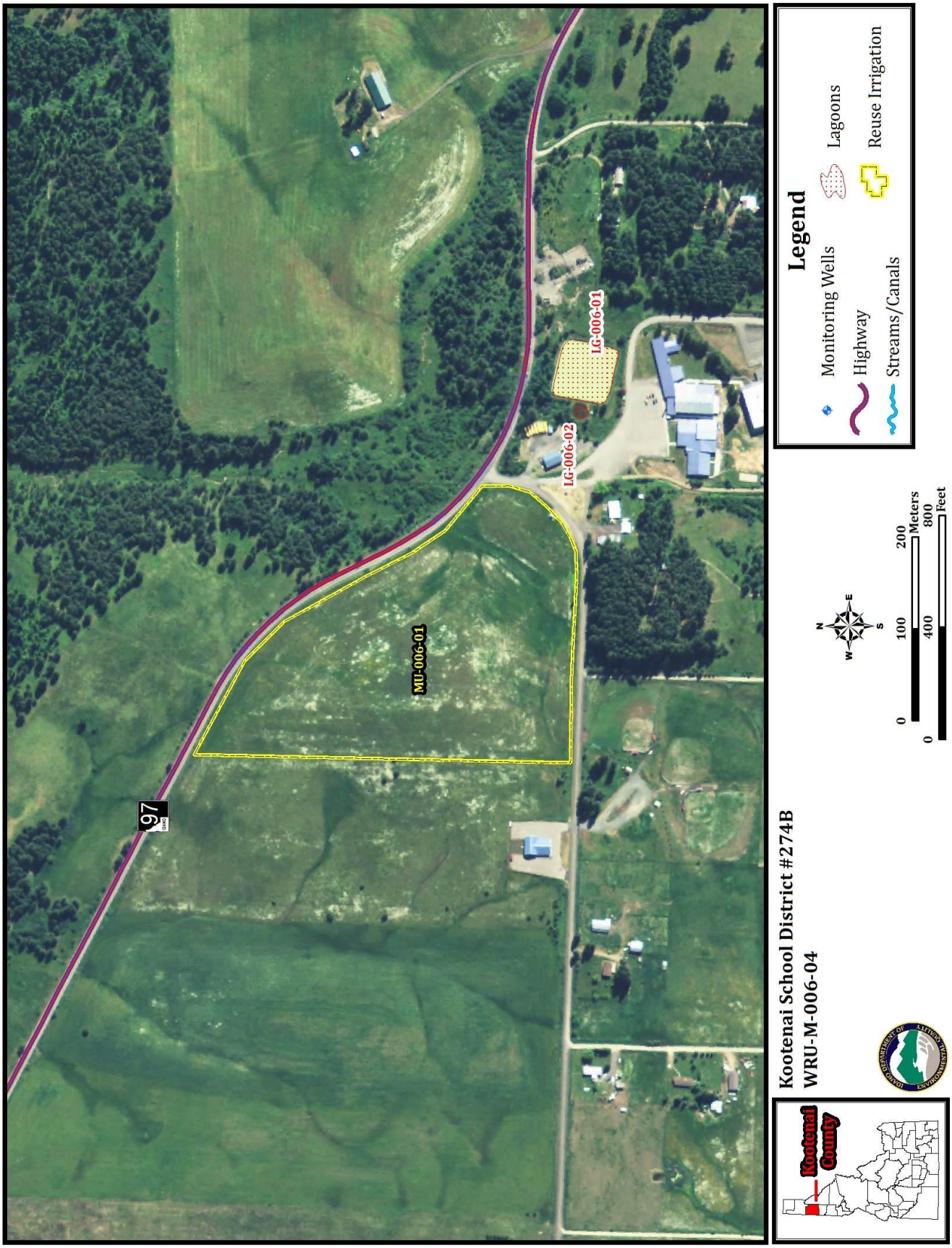
* Expressed in inches per month

From Table 4-12 of the Guidance (DEQ, 2007), the irrigation system efficiency was estimated to be 60% for solid set sprinklers. In order to represent the application system effectively, the values in Table 3 were divided by the efficiency of the distribution system and the resulting values are given in Table 1. The irrigation system is discussed in Section 2.0.

7.4 Vicinity Map



7.5 Site Map


97
MU-006-01
LG-006-02
LG-006-01
Legend
Monitoring Wells
Highway
Streams/Canals
Lagoons
Reuse Irrigation
N
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Meters
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400
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Feet
Kootenai School District #274B
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Kootenai County