Water Reuse in Idaho

Spring 2016

Electronic versions of all Water Reuse newsletters are available under "DEQ Resources" at: *http://www.deq.idaho.gov/permitting/water-quality-permitting/wastewater-reuse.aspx*. The e-version will provide access to the hot links included in the newsletter.

Water Reuse News

Creatures from the Blackwater Lagoons

Carp Eat Problem Plants

Triploid (sterile) grass carp can control aquatic plants by eating them. The City of Mountain Home utilizes a lagoon treatment system and agricultural reuse. They have used sterile grass carp to control coontail in their final lagoon (35 acres) for over a decade.

Photo from University of Michigan
http://www.fs.fed.us/t-d/pubs/htmlpubs/htm08732304/

The carp have been a worthwhile solution to their coontail problem. They have screens on the lagoon effluent to keep the carp in the lagoon and they have seen the carp grow to two to three feet long. The lagoon freezes over completely in the winter with about a foot of ice, but the carp survive.

They restocked carp a few years ago and continue to buy smaller quantities of carp to keep the population up. These carp are also known to eat filamentous algae. For more information, the US Forest Service posted an article in 2008 about the use of carp for duckweed control in wastewater lagoons (http://www.fs.fed.us/t-d/pubs/htmlpubs/htm08732304/). Sterile grass carp may be worth considering if you have an aquatic plant problem.

At the October 2015 Reuse Operator training in Coeur d'Alene, one attendee noted the use of grass carp in wastewater lagoons is a common practice in Mid-Western states.

Salamanders – A Maintenance Problem

Some reuse facilities find salamanders in their lagoons. Salamanders may be sucked into the lagoon effluent being distributed to the reuse sites.

Some sites use screens upstream of irrigation pumps to prevent salamanders from entering their recycled water distribution systems.

Class A Water Reuse

The Idaho Recycled Water Rules include requirements for reusing treated municipal wastewater.

Class A recycled water is the highest quality and can be used for many types of reuse. One of the methods of reuse is distributing the recycled water to homeowners for irrigation of lawns and landscape.

Although Class A recycled water is highly treated, it is not meant to be used as a source of drinking water. It is important that homeowners receiving Class A recycled water be informed about it use.

The state of Arizona also allows homeowner use of recycled water and has a system in Tucson that has been distributing recycled water to homeowners since the mid 1980's.

The following Arizona DEQ websites have information that may be of help for Class A systems in Idaho that distribute recycled water to homeowners or for cities that are considering this type of reuse.

https://www.tucsonaz.gov/water/reclaimed-info-packet
https://www.youtube.com/watch?v=60UcLGcDR9E

One of the most important design considerations is to prevent cross-connections between the recycled water and drinking water systems.

For example, if a subdivision has a dual irrigation system supplying both recycled water and drinking water, a DEQ-approved backflow prevention device would be necessary at each home.

Currently, Idaho has 3 Class A systems permitted for distributing recycled water to homeowners.

Ground Water Monitoring

Section 7 of the DEQ Reuse Guidance *http://www.deq.idaho.gov/media/516329-guidance_reuse_0907.pdf* provides information on all aspects of monitoring activities associated with reuse permits.

The goal of monitoring in reuse permits is to provide an assessment of wastewater treatment, recycled water operations, and to determine what impacts the operation and management of the reuse facilities are having on ground water, surface water, soil resources, and crop health.

Monitoring information provides valuable feedback to determine if treatment processes are operating as expected and achieving treatment goals. The monitoring data will also provide feedback if systems are not operating as intended and if modifications are necessary to prevent environmental impacts.

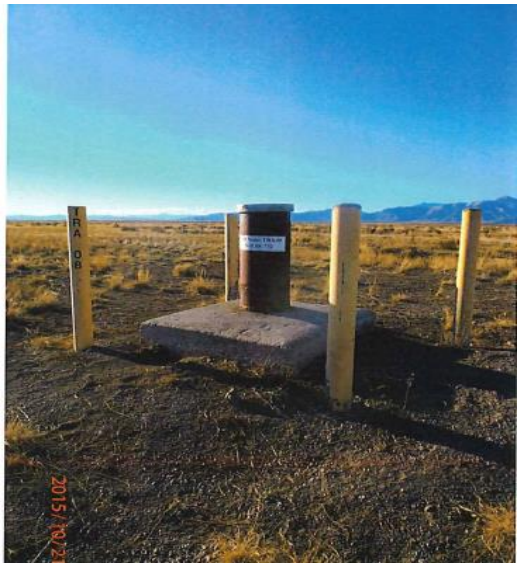
Reuse permits specify various types of monitoring and in most cases include:

- recycled water quantity and quality,
- supplemental irrigation water quantity,
- soil quality,
- ground water quality, and
- crop harvest quantity and quality.

In some permits, other types of monitoring may be specified:

- influent wastewater quality and quantity,
- supplemental irrigation water quality,
- shallow ground water depth and quality with piezometers/lysimeters, or
- meteorological (weather) data

Ground water monitoring is generally required in reuse permits. In some rare cases, the local hydrogeology may make ground water monitoring infeasible.



Monitoring well at INL Reuse Site

Ground water monitoring networks need to be designed by a qualified professional such as a hydrogeologist.

Once monitoring wells are installed, ground water quality can be tracked and if impacts from reuse operations occur, the Ground Water Quality Rule: *http://adminrules.idaho.gov/rules/current/58/0111.pdf* contains requirements for addressing various types and levels of impact.

Depending on your local hydrogeology, impacts may be evident quickly (for example, within a year or less) if the ground water is shallow and the local geology allows for fast infiltration of water. In other cases, where the ground water table is deep, impacts may not be evident for several or possibly many years.

The design professional can provide recommendations on preferred locations of monitoring wells in relation to your reuse fields and estimates of the amount of time it may take for ground water to show impacts from reuse operations.

DEQ recommends compiling ground water data in a format that allows examination of all or a suitable period of historical data in spreadsheets and graphical format. This will allow you to spot trends in data that may need to be addressed. DEQ staff can provide assistance if you have any questions.

Municipal Reuse - Agricultural Irrigation

Approximately 75% of the reuse permits in Idaho are for municipal recycled water. Of those, the majority use agricultural irrigation for the method of reuse.

Some of the municipal systems without available farm ground may lease fields and contract with a local farmer to oversee farming operations.

In this situation, it is important to know that the permittee has ultimate responsibility for the agricultural reuse operations as it is a major component of the overall treatment process.

There are important health and safety aspects of working with municipal recycled water as it can potentially contain human pathogens.

Chapter 15 of the DEQ Reuse Operator's manual provides guidance in this area: *http://www.deq.idaho.gov/media/1117548/ww-land-application-operators-study-reference-manual.pdf*

It is the permittee's responsibility to inform the contract farmer of the potential hazards of municipal recycled water and provide health & safety information when working with or handling this recycled water.

Irrigation Certification?

The Irrigation Association has a certification program in various areas of expertise. The following website has information on the program: *http://www.irrigation.org/Certification/Certification_Splash.aspx*

Certification adds credibility with your employer or customers, increases job opportunities, and demonstrates your commitment to efficient water management.

This certification is not a DEQ requirement.

What's New at DEQ

- Staff Updates
  - **Janelle Larson** is the new administrative assistant for the wastewater program. Our former assistant, Tami Golightly, accepted a job working with the drinking water and surface water programs.
  - **Drew Butler** and **Waco Holve-Burk**, interns in the wastewater program have graduated from school & DEQ. Good luck with your future endeavors.
  - New interns, **Thomas VanDerWeide and Shilynn Garcia**, recently joined the wastewater program.

Regional Office Reuse Permit Coordinators

Coeur d'Alene: Matt Plaisted, P.E., 769-1422

Lewiston: Nicolas Hiebert, P.E., 799-4886

Boise: Valerie Greear, P.E., 373-0459

Twin Falls: Jerimiah "JJ" Fenton, E.I., 736-2190

Pocatello: Scott MacDonald, E.I., 239-5018

Idaho Falls: Tom Rackow, P.E., 528-2650

State Office Contacts

- Chas Ariss, P.E., Wastewater Engineering Manager, Water Quality Division, 373-0561
- Paul Wakagawa, P.E., Water Reuse Permit Coordinator, 373-0514
- Janelle Larson, Administrative Assistant, (208) 373-0409

Water Reuse Permits in Idaho

Permit search tool: *www.deq.idaho.gov/permitting/issued-permits.aspx?records=10&type=Wastewater+Reuse&sort=effectiveDescending*

Information on municipal wastewater collection and treatment system classification can be found at: *http://www.deq.idaho.gov/water-quality/wastewater/pwws-classification-licensure/system-classifications.aspx*

2016 WateReuse Pacific Northwest Conference

May 18-19, 2016
Red Lion Hotel at the Park
Spokane, WA

The conference will feature more than 40 technical presentations, technical tours, receptions, luncheons, and an exhibit hall. The two day conference will present case studies, experiences, and solutions unique to the Pacific Northwest states.
https://watereuse.org/news-events/conferences/pacific-northwest-conference/

Reuse Permits: Municipal Recycled Water Quality

The majority of reuse permits issued in Idaho are for municipal systems utilizing agricultural irrigation.

Depending on the type of treatment system, the quality of the recycled water will vary. Two key components for agricultural reuse are the amount of nitrogen and phosphorus provided by the recycled water.

The table below provides typical water quality for various types of municipal wastewater treatment systems. The actual quality of effluent for your treatment plant may vary based on influent quality and how you operate and manage your facilities.

Treatment Process	% removal of incoming Nitrogen	Effluent Nitrogen, mg/L[1]	% removal of incoming Phosphorus	Effluent Phosphorus, mg/L[1]	N:P Ratio in effluent
Primary Treatment	~10%	32	~10%	9	3.6:1
Oxidation Ponds	20 to 90%, assume 50%	16	10-50%	7	2.3:1
Activated Sludge (w/ no enhanced nutrient removal)	~15%	30	50%	5	6:1
Activated Sludge (w/ denitrification)	~85%	5	50%	5	1:1
Activated Sludge (w/ denitrification and phosphorus reduction) [2]	~90%	3	~80%	2.5	1.2:1
Activated Sludge (w/ denitrification, phosphorus reduction) and chemical addition (alum or ferric) [2]	~90%	3	~95%	0.5	6:1
Above plus multimedia filtration[2]	~95%	2	~98-99%	0.1-0.2	10:1

1. Effluent quality based on the following influent quality: Total nitrogen - 35 mg/L, Total phosphorus - 10 mg/L
2. This level of treatment is generally associated with systems that discharge to surface water. For agricultural reuse, it is usually preferred to leave nutrient concentrations at higher levels for fertilization of crops/vegetation.

In the last column, the ratio of nitrogen to phosphorus (N:P) is shown for the effluent from different types of municipal wastewater treatment systems.

The N:P ratio is important in horticulture. All crops have an optimum N:P ratio that will match their nutrient requirements during the course of the growing season.

For example, a typical wheat crop will use 100 pounds of N/acre and 20 pounds of P/acre, or a N:P ratio of 5:1. A typical silage corn crop will use 225 pounds of N/acre and 35 pounds of P/ace, or a N:P ratio of 6.4:1.

From the previous table, note that the effluent from an activated sludge treatment system has a N:P ratio of 6:1 and would approximately match the nutrient requirements for most crops.

However, for a stabilization pond system, the effluent has a N:P ratio of 2.3:1. If the effluent from this type of system was used to meet the nitrogen requirement a crop such as wheat or silage corn, an excess of phosphorus would be applied.

For example, assume the following:

- A wheat crop requiring 100 pounds of nitrogen/acre and 20 pounds of phosphorus/acre
- Facultative lagoon with an effluent quality of 16 mg/L total nitrogen, 7 mg/L total phosphorus, and an annual recycled water volume of 8 million per year applied
- 10 acre field

1. Calculate the pounds of nitrogen and phosphorus available in the recycled water on an annual basis:

   lbs nitrogen/yr = 8 million gallons/yr * 8.34 lbs/gallon * 16 lbs N/million lbs of recycled water
   = 1,068 lbs of nitrogen/year

   lbs phosphorus/yr = 8 million gallons/yr * 8.34 lbs/gallon * 7 lbs P/million lbs of recycled water
   = 467 lbs of phosphorus/year

2. Calculate the loading rate of nitrogen and phosphorus on the 10 acre field

   Nitrogen loading rate = 1,068 lbs nitrogen ÷ 10 acres
   = 106.8 lbs N/acre

   Phosphorus loading rate = 467 lbs phosphorus ÷ 10 acres
   = 46.7 lbs P/acre

3. Compare the loading rates to the crop requirements

   Nitrogen

   106.8 lbs N/acre applied versus crop uptake of 100 lbs N/acre. The typical reuse permit limit for nitrogen is 150% of crop uptake, so application of all of the recycled water would be in compliance with the permit limit.

   Phosphorus

   46.7 lbs P/acre applied versus crop uptake of 20 lbs P/acre. Applying recycled water to meet the nitrogen requirements will result in applying more phosphorus than crop uptake (20 lbs P/acre).