Chapter 25
Greywater
Pathogens Protection
Tank Access

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Greywater Definition

- Greywater is untreated wastewater that has not been contaminated by any toilet discharge and does not present a threat from contamination by unhealthy processing, manufacturing, or operating wastes.
- Greywater includes wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines (unless soiled diapers are serviced), laundry tubs, and kitchen sinks

Greywater

- Reuse of greywater requirements are based on Chapter 21 – Reuse of Treated Wastewater.
- In Chapter 21, there are three classes of treated wastewater
  - Class A
  - Class B
  - Class C

Greywater

- Class A – less than 2.2/100 ml fecal coliform
- Setbacks
  - 30 foot setback for surface irrigation
  - No setback for subsurface irrigation
- Uses
  - Irrigation of land with low to high potential for public exposure
  - Irrigation of crops for direct and indirect human consumption (shall not be harvested for 30 days after application of treated wastewater)

Greywater

- Class B – 2.2 to 200/100 ml fecal coliform
- Setbacks
  - 30 foot setback for surface irrigation
  - No setback for subsurface irrigation
- Uses
  - Irrigation of land with low to moderate potential for public exposure
  - Irrigation of crops for direct and indirect human consumption (shall not be harvested for 30 days after application of treated wastewater)

Greywater

- Class C – 200 to 1000/100 ml fecal coliform
- Setbacks
  - 30 foot setback for surface irrigation
  - 30 foot setback for subsurface irrigation
  - 100 foot setback to potable water wells
- Uses
  - Irrigation of land with low potential for public exposure
  - Irrigation of crops for indirect human consumption

Greywater – page 651 of Critical Review

Table 1—Characteristics of individual graywater streams in the United States. (Data compiled from Casanova et al., 2001; Gerba et al., 1995; Mayer and DeOreo, 1999; Rose et al., 1991; Siegrist et al., 1976).

		Graywater streams							
					Laundry machine				
Contaminant	Mixed graywater	Garbage disposal	Kitchen sink	Dish-washer	Wash	Rinse	Bath/ Shower	Hand washing basin	Shower and laundry
Volume, L/capita-day	127–151	—	18–20	4	40–57	38–49	20	—	
pH	6.7–7.5	—	—	—	—	—	—	—	6.5
Temperature, °C		21.7	26.7	38.3	32.2	28.3	29.4	—	
Turbidity, NTU	64	—	—	—	39–296	14–29	28–96	—	76
TSS, mg/L	40–43	1490	720	440	280	120	120	—	—
TVSS, mg/L	—	1270	670	370	170	69	85	—	—
COD, mg/L	65	—	—	—	—	—	—	—	—
BOD_5, mg/L	35–120	1030	1460	1040	380	150	170	—	—
TOC, mg/L	—	690	880	600	280	100	100	—	—
TN, mg/L	—	60	74	40	21	6	17	—	1.7
NH_4-N, mg/L	—	0.9	6	4.5	0.7	0.4	2	—	0.7
NO_3-N, mg/L	1.8	0	0.3	0.3	0.6	0.4	0.4	—	1
TP, mg/L	—	12	74	68	57	21	2	—	9
PO_4-P, mg/L	—	8	31	32	15	4	1	—	—
Sulfate, mg/L	60	—	—	—	—	—	—	—	23
Chloride, mg/L	21	—	—	—	—	—	—	—	9
Fecal coliform, CFU/ 100 mL	5.6×10^5–$\times10^6$	—	—	—	1400–6300	25–320	220	—	—
Total coliform, CFU/ 100 mL	6.3×10^6–2.5×10^8	—	—	—	18 000	56–5300	1100–1.0×10^5	—	2.8×10^7
Fecal Streptococci, CFU/100 mL	240	—	—	—	210	75	44	—	1.8×10^6–7.9×10^6
Total bacterial, CFU/ 100 mL	8.0×10^7	—	—	—	1×10^7–1×10^8	1×10^7–1×10^8	1×10^7–1×10^8	—	6.1×10^8

Greywater

- Limited data available for pathogens in greywater
- Pathogens found in Greywater
  - Giardia
  - Cryptosporidium
  - Salmonella
  - P. aeruginosa
  - Staphylococcus aureus
  - Legionella pneumophila

Greywater

The requirement to disinfect greywater for surface irrigation is based on:

- High fecal coliform counts
- Presence of pathogens
- High exposure risk in urban area
- Chapter 21 – Reuse of Treated Wastewater Class B

Greywater

- Nebraska
  - All greywater must go to the onsite wastewater system
- Montana
  - Permit Required
  - Excludes kitchen sink and soil diaper washing
  - Subsurface irrigation only
  - Can be used irrigate crops for human consumption

Greywater

- Idaho
  - Permit required
  - Excludes kitchen sink, water softener, dishwasher, and laundry water from soiled diapers
  - Subsurface irrigation Only
  - Not to be used for food production

Greywater

- Utah
  - Permit Required
  - Subsurface irrigation only
  - Can be used for vegetable garden, must not come in contact with edible portion
- Colorado
  - In the process of developing

Greywater

- Arizona
  - First and foremost, avoid human contact with greywater, or soil irrigated with greywater.
  - Do not irrigate food crops
  - Surface and subsurface irrigation

Greywater – WWAB Comments

- Concern with the length and complexity of Section 16/Can some of the requirements be move to the design package?
  - Greywater is a component of wastewater. All wastewater treatment and disposal must be designed by a PE. The requirements in Section 16 are need for the development of a design package by DEQ to eliminate the need for the landowner to hire a PE.
  - DEQ is currently evaluating the components and configuration section to determine what could be moved to the design package.

Greywater – WWAB Comments

- Concern that the requirement for disinfection would discourage the use of greywater.
  - Disinfection of greywater is needed because of the high fecal coliform counts, the presence of pathogens and the high exposure in urban areas.
  - DEQ is currently evaluating larger setbacks for rural lots to eliminate the requirement for disinfection.
  - Avoid human contact with greywater and soil irrigated with greywater to protect public health would need be added to this section due to larger setbacks.

Greywater – WWAB Comments

- Examine the possibility of restricting greywater from problem sources, in a effort to make the regulation more appealing.
  - DEQ has evaluated the source for greywater which include laundry (70%), bath (13%), and kitchen (17%). They all have shown to have high fecal coliform counts and tested positive for pathogens.
  - Refer to table 1 on slide 7

Greywater – WWAB Comments

- Clarify the requirements for subsurface and surface irrigation to eliminate confusion
  - DEQ has revised the subsurface irrigation section to included that “It is not a requirement to disinfect greywater used for subsurface irrigation.”
  - The surface irrigation section states the disinfection is required.

Greywater – WWAB Comments

- Occupant calculation is overly complicated
  - DEQ agrees and the calculation will be based on 2 occupants per bedroom.

Greywater – WWAB Comments

- The setbacks for greywater systems are inconsistent with setbacks elsewhere in the chapter and are overly restrictive.
  - The setbacks for surface application of greywater are more restrictive because the greywater at the surface is a high risk of exposure compared to subsurface application of wastewater.
  - The setbacks are based on the requirements of Chapter 21 – Reuse of treated wastewater.

Pathogens

- The pathogen definition includes a broad category of coliform.
  - DEQ has reviewed EPA definition for pathogens for drinking water. DEQ has revised the examples to eliminate coliform bacteria.

Pathogens

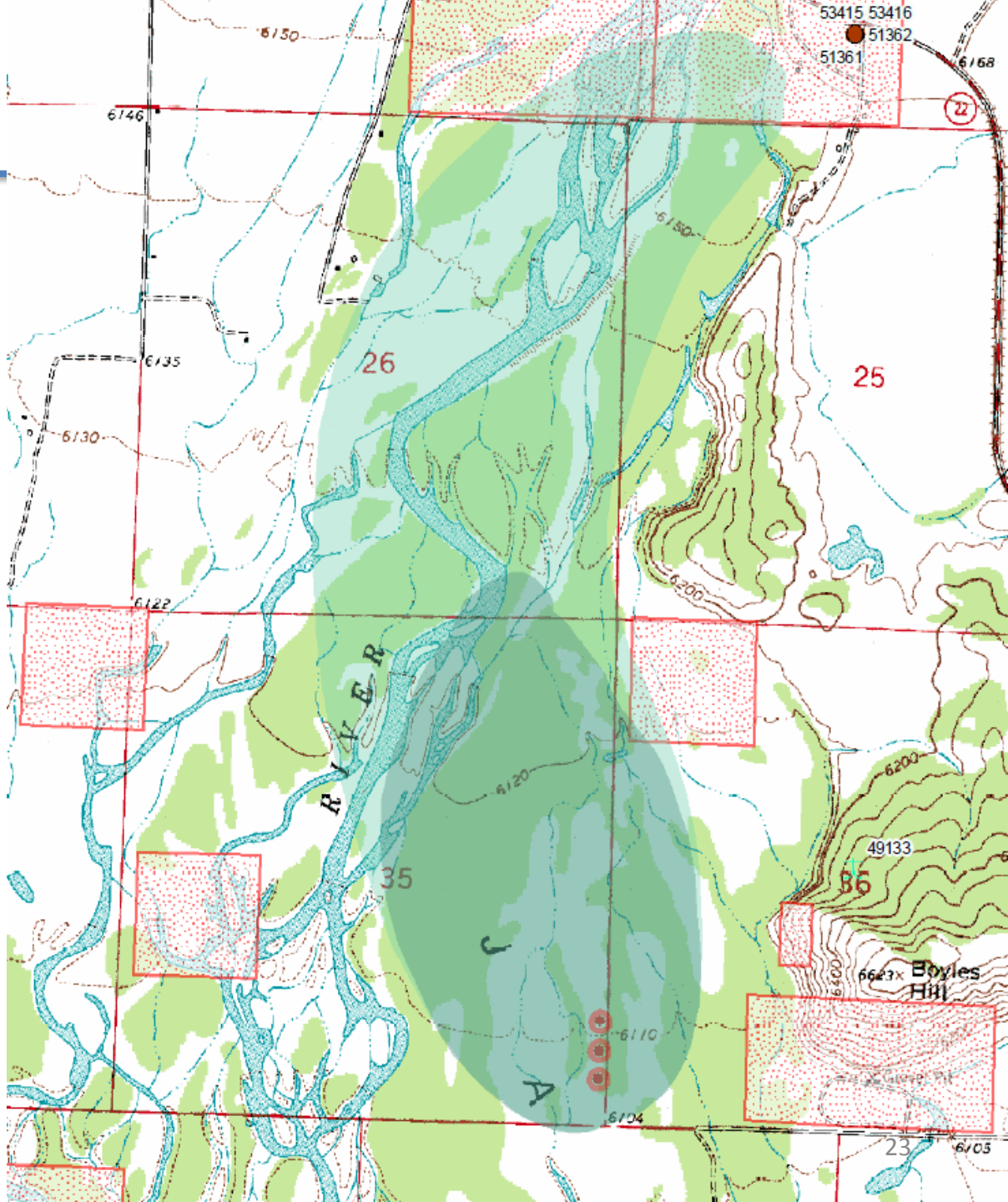
- Is pathogen necessary in subscript 2 of Table 4 in Section 6.
  - Purpose of subscript 2 is to protect public water wells from contamination.
  - The requirement for pathogen removal is based on the Wyoming Wellhead Protection Plan
  - The plan established three zones of protection

Pathogens

- Zone 1 – sanitary protection zone (50 to 100 ft)
  - Highly protected area around a wellhead
- Zone 2 – attenuation zone (2 year travel time)
  - Established to protect a well from contact with pathogenic microorganisms which can emanate from sources (e.g. septic systems, etc) located close to the well. This is consistent with Chapter 23 - Subdivisions
- Zone 3 – remedial zone (5 year travel time)
  - Designed to protect the well from chemical contaminants.

Pathogens

Zone 2



Access Ports for Septic Tanks

- DEQ has reviewed the various manufacturers of septic tanks on DEQ approved list to determine if a uniform size is use.
  - 52% of tanks have 20-inch access ports
  - 4% of tanks have 21 to 23-inch access ports
  - 41% of tanks have 24-inch access ports
  - 3% of oblong access ports
- Requiring a 24-inch access port would require the majority of the manufactures to modify their fabrication processes.

Access Ports for Septic Tanks

- EPA Onsite WW System Manual - 18 to 24 inch
- Louisiana – 20 inch square or 24 inch round
- Nebraska – 12 inch
- Tennessee – 20 inch
- Utah – 18 inch
- South Dakota – 20 inch
- Idaho – 20 inch
- Montana – 21 inch
- Colorado – 20 inch

Questions

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