Comment letter: Idaho DEQ Docket 58-0117-2601 (Recycled Water Rules)

October 2, 2026

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Re: Docket No. 58-0117-2601, IDAPA 58.01.17 (Recycled Water Rules): comments on the proposed revision to Section 300.04 and related issues for the periodic review

Dear Dr. Nelson:

The Citizens Allied for Integrity and Accountability (CAIA), submit these comments on the negotiated rulemaking for IDAPA 58.01.17. We are submitting by the October 2, 2026 deadline shown on DEQ's docket page. DEQ's September 18 presentation states that comments on the proposed changes were taken through September 25 and that comments on other issues would be welcome through October 2. To the extent the earlier date applies to Part I, we ask that these comments be considered.

CAIA supports efficient permitting. We do not oppose a streamlined renewal for permits that meet clear criteria. Whether reclaimed water can be used safely for irrigation depends on what "properly treated and managed" requires, for persistent chemicals as well as for pathogens. Our position is that **any streamlined process should carry forward monitoring and characterization that reflect current scientific knowledge of the risks.** Administrative streamlining should not waive the substantive review needed to establish that characterization, monitoring, treatment, and exposure assessments remain current.

Part I addresses the proposed change to Section 300.04. Part II follows the water through a traditional Idaho homestead and names the exposure routes the rules do not systematically evaluate, with a chemical and a pathogen example for each. Part III sets out where current science and the current rule diverge, and why compliance with the rules as written cannot be assumed. We ask DEQ to take up Parts II and III in the periodic review of this chapter. The References list our sources, most of which are publicly available. The reference repository is available at https://drive.google.com/drive/folders/11Cahxta9ZPvt6WSTOt69ZVvqHiUteddX?usp=drive_link.

Part I. The proposed revision to Section 300.04

What is proposed. Rule Draft 1 made available by DEQ contains the existing Section 300.04, which refers generally to application content for "permits." It does not contain the proposed additions described in the presentation. As described in DEQ's September 18 presentation, the proposed revision would allow application content for new, modified, or renewing permits to be clarified at a pre-application conference, potentially resulting in omission of items listed in Subsection 300.03. As described in the presentation, the proposed wording would expressly identify new, modified, and renewing permits and make clarification discretionary. Because the existing exception already refers generally to "permits," we ask DEQ to explain how the amendment would change its existing treatment of renewal applications. Because Section 300 applies to all reuse permits and the language is not limited to industrial permits, we understand it could affect municipal permit renewals. This also matters because industrial wastewater is often received by municipal wastewater facilities. **We ask DEQ to confirm the exact proposed text and whether municipal reuse permits are affected.**

Why it matters. The items that may be omitted under Section 300.04 include those that carry public-health and groundwater protection: - 300.03.i, the physical, chemical, and biological characteristics of the recycled water; - 300.03.j, the climatic, hydrogeologic, and soil characteristics of the site; - 300.03.f, the map of wells, drinking-water sources, and dwellings; and - 300.03.m, the statement and supporting documentation that the activity will comply with the Ground Water Quality Rule. Omitting an application item does not itself waive applicable permit conditions or substantive water-quality requirements (Sections 300.01 and 500); our concern is whether the remaining application record will adequately demonstrate compliance with them. The application-content exception in Section 300.04 is distinct from the waiver provision in Section 940.

A permit may have a fixed term of up to ten years (Section 600.02); its terms and conditions may also be administratively continued when the requirements of Section 400.08 are met. Renewal is therefore an important routine point for refreshing these items, although Section 700 also provides for permit modification. The wastewater itself changes over that time: for example, municipal wastewater "may contain industrial wastewater" (Section 010.10), and the chemicals and organisms it carries change. DEQ's own February 2026 FAQ states that the Recycled Water Rules "were developed primarily to address pathogen control and typical municipal wastewater parameters." Section 300.03.i is therefore where any characterization of what current science identifies as relevant should occur. Finally, Section 300.02 makes a pre-application conference mandatory only for new applicants, so we ask DEQ to explain the conference process it intends to use for renewal-related omissions.

Renewal should test current protective efficacy, not past approval. A renewal application that matches the previously approved permit shows consistency, but not that the permit reflects current knowledge. Compliance records reflect only the parameters that

were monitored (under Section 601, total coliform, turbidity, and related conventional parameters), so a clean record, while admirable, cannot show the absence of risks that were never measured.

For example, DEQ's FAQ points to precedent: it states that DEQ has previously determined that commingling Class A recycled water with surface water in canals is consistent with water quality standards for agricultural use, and that similar precedents exist. We ask that eligibility for streamlined renewal turn on whether the permit's requirements reflect current conditions and current scientific knowledge of the threats and the exposure routes (Parts II and III), not on whether the permit resembles earlier ones.

Our requests for Section 300.04.

1. **Items that may not be omitted.** For any streamlined renewal, Sections 300.03.f (a current map of wells, drinking-water sources, and dwellings, with the geographic scope clarified as requested in Part II), 300.03.i (current recycled-water characteristics, including the microbial and chemical characterization described in Part III.A–B), 300.03.j (unless documented unchanged), and 300.03.m (Ground Water Quality Rule compliance documentation) should still be required.

2. **A written record.** Any omitted item, and the reason, should be identified in the staff analysis (Section 400.04) and in the draft permit notice (Section 400.05.b).

3. **Specific eligibility criteria.** We suggest at minimum: an inventory and certification that wastewater sources, process chemistry, treatment, and reuse or recharge methods are unchanged; current characterization submitted with the renewal, including updated sampling that addresses the hazards and methods identified in the current-science review, rather than reliance on sampling from any point in the prior permit term; and a compliance and groundwater-monitoring record showing no degradation (necessary but not sufficient, because it reflects only what was monitored). This no-degradation criterion is our proposed condition for streamlined eligibility, not a description of a universal prohibition in the existing groundwater rule. That rule provides for action on degradation deemed significant even below a numerical standard, but also allows limited degradation under specified conditions (IDAPA 58.01.11, Section 400.02). Canal and dedicated-recharge permits should receive a full substantive review at every renewal; any streamlining should be limited to administrative steps and should not replace that review. Other permits should receive a full substantive review at least every five years, including a midterm review when the permit term exceeds five years.

4. **A current-science condition.** Eligibility for streamlined renewal should require a documented review of whether the permit's monitoring and treatment requirements reflect current scientific knowledge of microbial and chemical risks (Part III.A–B), including monitoring beyond the point of compliance where water is stored or conveyed before use. This condition applies even where the facility itself is unchanged, because the science may have changed.

5. **Triggers for full review,** including: detection of PFAS or other persistent contaminants in effluent, groundwater, or nearby drinking-water wells; detection of protozoan pathogens or opportunistic pathogens beyond the point of compliance; new industrial contributors to municipal influent; any new discharge to an irrigation canal, new recharge, or new or extended conveyance or discharge point; repeated noncompliance with the reuse permit or any related discharge permit (Part III.F); and new federal or state standards.

6. **Public notice and comment for renewals** under Section 400.05.b should be preserved for streamlined renewals.

7. **Scope.** If municipal renewals are affected, DEQ should say so in the rule notice and explain why the same criteria are appropriate for municipal effluent, which often reflects industrial waste received in municipal influent.

Part II. The exposure routes the rules do not systematically evaluate

The Recycled Water Rules address exposure in part by controlling access to a use site: notice and signs ("Caution: Recycled Water – Do Not Drink" for Classes A and B; perimeter "Do Not Enter" signs for Classes C and D; a physical barrier or another DEQ-approved measure preventing public access for Class E), purple pipe, and buffer distances (Sections 603 and 604). That model fits a park, a golf course, or a posted field. It does not fit water that leaves the treatment facility's control and moves through an irrigation canal and its laterals, because canals and laterals often travel many miles over public or private property, and their water is used by people who never see a sign and may not be shareholders in the canal. The rules themselves define a beneficial use by actual use, including domestic water supplies, agricultural water supplies, recreation in and on the water, and wildlife habitat (Section 010.01). The common-sense question is: where does the water actually go, and who encounters it?

Exposure-route overview

Exposure route	Who could be exposed	What the rules examine today
1. Drinking water from shallow wells	Households on wells; neighbors	Map extending one-quarter mile beyond facility limits (300.03.f); travel-time review is separately described in the DEQ FAQ
2. Garden and orchard produce	Households; neighbors; market customers	Food-crop use classes (Section 602); no systematic persistent-chemical crop-uptake assessment
3. Livestock and poultry; milk, eggs, meat	Households; customers	Pasture classes distinguish milk-producing animals (602); no specified contaminant-transfer assessment for milk, eggs, or meat
4. Soil, mud, and dust carried into the home	Young children especially	No specific household soil-and-dust exposure assessment identified

Exposure route	Who could be exposed	What the rules examine today
5. Direct contact: wading, play, pets	Children; pets; recreationists	Signs at a use site (Section 603); canal/lateral application unclear
6. Spray, mist, and aerosol	Neighbors; workers; children	Irrigation method as a buffer factor (604.02.b); Class A spray protections for drinking and eating facilities (603.01.d)
7. Ponds, fish, and wildlife	Anglers; households with ponds	Landscape-impoundment restrictions (010.07) and unlined-feature groundwater protection (605.03.b); no specified fish-contaminant assessment
8. Downstream and neighboring users	Other water users, tail water recipients; other farms and homes	Downstream users considered qualitatively in the staff analysis (DEQ FAQ)
9. The sum of all of the above	The same household	No required combined household exposure assessment identified

The rules provide treatment, use-category, well-inventory, and site-management protections. The gap identified here is the absence of a required, systematic evaluation of actual downstream uses, relevant contaminants, and combined household exposures once the water leaves a controlled use site.

Why canal delivery needs clarification. As discussed in Part III.E, DEQ's January 2020 response on a canal-delivery permit treated Class A water as no longer recycled water once discharged into the canal and stated that the rules had not considered a canal as a distribution system. We ask how the protections apply after that point (DEQ, 2020).

To illustrate what this question entails, we follow the reused water through a traditional Treasure Valley homestead and, for each exposure route, consider threats not systematically evaluated by Class A standards. We use examples of persistent chemicals (PFAS) and one or two pathogens (*E. coli* O157:H7, and *Cryptosporidium* or *Cyclospora*), and, where we have evidence, endocrine-disrupting chemicals. We chose PFAS because Class A does not contain PFAS-removal standards (Section 601.01 specifies treatment, coliform, turbidity, and conventional chemical requirements but no PFAS-specific numerical standard), and because PFAS persist. We chose *E. coli* O157:H7 because nationally, canal water has been implicated in a severe outbreak, and this pathogenic strain of enterobacteria is spread via fecal matter from infected humans. *Cryptosporidium* is included as a representative protozoan because it tolerates chlorine: the chlorine option for Class A requires a contact-time product of 450 mg-min/L based on total chlorine residual, with a modal contact time of at least 90 minutes at maximum day flow; alternatively, filtration combined with disinfection must have been demonstrated to achieve 5-log virus removal/inactivation (Section 601.01.a.i). For comparison, CDC's

recommended value for 99.9 percent inactivation of Cryptosporidium with free chlorine is 15,300 mg-min/L (CDC, 2008; Shields et al., 2008). Idaho specifies total chlorine residual, whereas that comparator specifies free chlorine for Cryptosporidium inactivation; these differently specified criteria should not be read as a direct ratio of equivalent treatment performance.

What the PFAS exposure literature says. Reviews of human PFAS exposure identify diet and drinking water as the predominant pathways for the general population, with household dust and indoor air also contributing, and with large variation among people, environments, and PFAS compounds. Household dust and soil tracked indoors are significant routes for infants and young children (U.S. EPA, 2017; MDH, 2022); in communities with contaminated water, drinking water can account for up to 75 percent of exposure (Sunderland et al., 2019).

Wastewater treatment plants are among the sources linked to PFAS in U.S. drinking water (Hu et al., 2016). On an Idaho homestead connected to canal water, drinking-water and food exposures, together with household dust and air exposures, can be influenced by that water: the well, the garden, the hens, the ducks, the beef and dairy cattle, the soil.

Endocrine-disrupting chemicals. Endocrine-disrupting chemicals (EDCs) mimic or block hormones, and they can act at very low concentrations. The Endocrine Society's second scientific statement concluded that low-level exposures during early development, especially in prenatal and early postnatal life and at puberty, can cause lasting changes to the endocrine system, and that these are periods of high sensitivity (Gore et al., 2015; see also Vandenberg et al., 2012 on low-dose and nonmonotonic responses).

PFAS are also endocrine disruptors. EPA's 2024 drinking-water rule found that PFHxS exposure is likely to cause thyroid and developmental immune effects, based mainly on animal studies (U.S. EPA, 2024), and meta-analyses report associations of PFOA and PFOS with thyroid and sex-hormone levels, although the human results are mixed across studies (Kim et al., 2018; Li et al., 2024). However, we report PFAS under their own "PFAS:" heading in each exposure route, and the "Other endocrine disruptors:" lines that follow cover the other endocrine-active chemicals measured in Treasure Valley wastewater effluents considered for reuse, such as estrogens, alkylphenols, and flame retardants.

These sampled contaminants should not be understood as the complete set of endocrine disruptors: a UN and WHO assessment counted close to 800 chemicals known or suspected to interfere with hormone systems, found that only a small fraction had been tested in whole organisms, and said that the vast majority of chemicals in current commercial use have not been tested at all (Bergman et al., 2013). What we report below is what a municipal wastewater facility measured in its treated effluent in 2020.

The data we draw on

We use two sets of measurements from two Treasure Valley municipal wastewater facilities that, like many Idaho facilities, also accept industrial influents. We also use a comparison set taken from a canal considered as a Class A wastewater receiver from these facilities. They are not comments on any pending permit; they illustrate what the rules do not ask. The records, with site names, are available to DEQ on request.

- **The canal (baseline).** In May 2020 a city facility (Plant 2) sampled an irrigation canal, at a point several miles downstream of where it was considering a Class A discharge, on three dates (PFAS by EPA Method 537.1, reporting limit 2.0 ng/L).
- **Plant 1 (2026).** A small suburban sewer district with no Class A treatment today tested influent and effluent on five dates between March 5 and May 14, 2026, by EPA Method 1633, which measures 40 PFAS (reporting limits 3.6 to 9.9 ng/L).
- **Plant 2 (2020).** A large urban facility with no Class A treatment tested its influent and effluent on three dates in May 2020, with PFAS included on two of these, by the same laboratory and method as the canal.

A study of small and large U.S. municipal wastewater plants found limited PFAS removal (Kim et al., 2024), so primary and secondary treatment should not be assumed to capture or destroy PFAS adequately. Class A's required treatment steps are oxidation, filtration, and disinfection (Sections 601.01 and 602), typically requiring tertiary treatment; Class A classification does not establish PFAS removal. We use treated effluent concentrations as a first approximation of what Class A water from these two Treasure Valley plants would carry.

ng/L unless noted	Canal (3 samples, 2020)	Plant 1 effluent (5 samples, 2026)	Plant 2 effluent (2020)
PFOA	not detected (below 2.0)	5.2–7.3 (5 of 5; four estimated)	7.8 (both dates)
PFHxA	not detected	6.5–8.6 (5 of 5)	17 (both dates)
PFOS	2.7 (one date)	not detected; reporting limits 7.7–9.9 (detection limits 3.9–5.0) in four of five	2.0–2.2
PFOSA	not analyzed	**8.1–22.9 (4 of 5); not detected in influent**	not analyzed
N-alkyl sulfonamide precursors	not detected (N-MeFOSAA, N-EtFOSAA only)	one sample: 2.0–9.8 (estimated)	not detected (N-MeFOSAA, N-EtFOSAA only)
Sulfamethoxazole	not detected	not analyzed	1,200 (3 of 3)
Iohexol	not detected	not analyzed	1,200–4,300

ng/L unless noted	Canal (3 samples, 2020)	Plant 1 effluent (5 samples, 2026)	Plant 2 effluent (2020)
4-nonylphenol (semi-quantitative)	not detected	not analyzed	490–1,200
Sucralose	not detected	not analyzed	12,000–38,000
Trace organic compounds per date	3, 6, 3	PFAS only	38, 43, 40

Plant 2's effluent contained 41 compounds that were not detected in the comparison canal samples, including pharmaceuticals, antibiotics, alkylphenols, flame retardants, iohexol, and artificial sweeteners. The recycled-water rules set numeric limits for coliform, turbidity, chlorine residual, nitrogen, BOD5, and pH, and none for any of these compounds, although a permit may limit recycled-water composition case by case (Section 600.03.a). The Groundwater Quality Rule (IDAPA 58.01.11, effective July 1, 2026) sets listed numerical groundwater standards for chloroform (2 µg/L) and total trihalomethanes (100 µg/L), both reported in the utility sampling; Plant 2's effluent carried 0.56 µg/L of each on the one date they were detected. These are groundwater standards, not automatically effluent limits. The groundwater-compliance showing in Section 300.03.m applies to reuse applications generally, subject to Section 300.04; Section 608.01 also expressly links industrial permits to the groundwater rule. For contaminants without listed numerical standards, Section 200.02 provides a narrative groundwater-quality standard: contaminant concentrations, alone or in combination with other contaminants or properties, may not cause groundwater to be hazardous, deleterious, carcinogenic, mutagenic, teratogenic, or toxic. When applying that standard, specific numerical levels must be based on the best scientific information currently available on adverse effects, protection of a beneficial use, or practical quantitation levels when those exceed the levels identified under the preceding alternatives. The issue is what characterization, assessment, and monitoring are required to apply that standard to the contaminants and exposure routes described here.

The 2020 panel covered about 100 trace organic compounds. Of those detected in Plant 2's effluent, the ones with recognized endocrine activity (apart from the PFAS reported above) were estrone (31, 31, and 44 ng/L), 4-nonylphenol (0.49 to 1.2 µg/L, semi-quantitative), and 4-tert-octylphenol (0.23 to 0.36 µg/L), with the flame retardants TCPP (0.69 to 0.82 µg/L), TDCPP (0.12 to 0.16 µg/L), and TCEP (up to 73 ng/L); of these, TDCPP has been reviewed as endocrine-active (Wang et al., 2020). None was detected in the canal. Bisphenol A was found in the canal once (10 ng/L) and was not detected in the effluent. At a reporting limit of 10 ng/L, estradiol, estriol, ethinylestradiol, and bisphenol A were not detected in the effluent. That limit, however, is higher than concentrations that have affected fish: a whole-lake experiment with ethinylestradiol at 5 to 6 ng/L collapsed a fathead minnow population after two summers of additions (Kidd et al., 2007), so "not detected" at 10 ng/L does not rule out concentrations that may harm fish. Plant 2's influent,

sampled on May 20 and 21, 2020, was reported at much higher limits because of matrix dilution (for example 4,000 and 10,000 ng/L for nonylphenol, and 100 and 250 ng/L for estrone), so it neither shows nor rules out an increase across that plant.

PFOSA. The most abundant PFAS measured at Plant 1, PFOSA (perfluorooctane sulfonamide), has no federal drinking-water limit, nor is it among the 16 PFAS reported under EPA Method 537.1 in the 2020 analyses, nor in the 25 analytes of EPA Method 533 (U.S. EPA, 2019), so a test of a well or a public water system by those methods would not find it. Nonetheless, PFOSA is a precursor of PFOS, for which the federal drinking-water limit discussed in this letter is 4 ng/L.

In a greenhouse study with PFOSA spiked into soil, soil microbes converted it to PFOS, wheat roots and earthworms took it up more readily than PFOS, and both organisms converted it to PFOS (Zhao et al., 2018). PFOSA has been used to repel grease and water in consumer applications such as food packaging, and it is a degradation product of several sulfonamide-containing precursors (as summarized in Zhao et al., 2018); we do not know its source at Plant 1.

Studies of wastewater plants found FOSA, other sulfonamides, and PFOS forming during activated-sludge treatment, with FOSA appearing only in secondary and final effluent and not in influent (Schultz et al., 2006), and short-chain acids such as PFPeA and PFHxA increasing (Kim et al., 2024). The pattern at Plant 1, with PFOA, PFHxA, and PFOSA detected in effluent but almost never detected in influent, is consistent with that literature, although paired grab samples cannot prove formation. Laboratory studies in zebrafish embryos and rat neural cells report PFOSA toxicity at low concentrations and, in some comparisons, greater toxicity than PFOS, through a different mechanism (*ES&T*, 2022; *Toxics*, 2025). Like the vast majority of the more than 10,000 forms of PFAS, we have limited knowledge on PFOSA's impacts on human biology; however, its degradation product PFOS has been associated with numerous negative health outcomes that led to its CERCLA listing. The laboratory quantified PFOSA with its own isotope-labeled standard, recovered at 66 to 88 percent in every sample.

Four features of these data bear on the rules.

1. Reporting limits decide what "not detected" means. The canal and Plant 2 were analyzed to a reporting limit of 2.0 ng/L, which shows that limits below EPA's 4 ng/L are achievable in effluent. At Plant 1, however, the reporting limit for PFOA and PFOS was much higher: 7.7 to 9.9 ng/L in four of five samples (detection limits 3.9 to 5.0), so "not detected" for PFOS does not show that the effluent was below 4 ng/L, and an increase over a canal baseline below 2.0 ng/L could not have been seen. The one sample run at lower limits (3.6 and 1.8 ng/L) is the one that found three precursors the others could not have detected.

2. Neither method alone is sufficient. EPA 537.1 reached low limits but omits PFOSA, PFBA, PFPeA, and some sulfonamide precursors covered by the broader 2026 panel. EPA

1633 includes them but, at the limits reported, could not show PFOS or PFOA below 4 ng/L. A permit should require both properties: the full analyte list of the specified method and low reporting limits.

3. The results are consistent. PFOA in effluent was 7.8 ng/L in 2020 and 5.2 to 7.3 ng/L in 2026: two Treasure Valley wastewater facilities, two laboratories, two methods, six years apart, of the same order of magnitude and above EPA's 4 ng/L drinking-water limit. The repeated findings show occurrence at two plants and raise the possibility of wider occurrence across the Treasure Valley and other urban and suburban settings in Idaho; they do not establish regional prevalence. The drinking-water limit is a comparison value here, not an effluent standard.

4. Dilution is not an answer to accumulation. Utilities commonly note that mixing with canal water dilutes concentrations. Mixing does not eliminate the discharged mass. How much reaches particular soils, wells, crops, or downstream diversions depends on flows, routing, and retention. Persistent chemicals can accumulate in environmental compartments over years (Brusseau et al., 2020; Jahn et al., 2023; MDH, 2022), and dilution does not resolve the question of transformation after delivery. The share of reuse water in a canal can also change with the season and with proposals to extend the irrigation season, so that dilution factors can vary, sometimes dramatically, in the same augmented system.

How to read the route examples: the local records describe chemical occurrence in sampled effluent and comparison canal water; the routes connect those observations with the cited pathway evidence, not measurements of household exposure. "Not detected" means below the applicable analytical threshold, not absent; "not analyzed" means occurrence is unknown. The May 2020 canal samples were collected several miles downstream of the proposed discharge point, as described above, and are comparison data rather than a complete seasonal or current baseline for both plants.

The routes in detail

1. Drinking water from shallow wells. In the Treasure Valley, the pattern of settlement largely followed the irrigation canals, and drinking water wells traditionally tapped the abundant shallow aquifers charged by those canals. Canal seepage and irrigation infiltration supply roughly 87 to 94 percent of recharge (Bartolino, 2019), private domestic wells draw mostly from the shallow aquifers that seepage feeds (Petrich, 2004), and tracer data showed post-1950s canal water had moved down to about 200 feet by about 1999 (Hutchings & Petrich, 2002). Nationally, most drinking-water wells are domestic wells drilled to shallow depths, where modern groundwater is most common (Thaw et al., 2022).

PFAS: they persist, and Class A classification does not establish their removal; EPA's 2024 drinking-water limits for PFOA and PFOS are 4 parts per trillion each, and EPA's May 2026 proposal would leave them unchanged and only let systems request until 2031 to comply (U.S. EPA, 2024; 2026). They may also take years to arrive, because soil holds PFAS for decades, so early non-detects are not evidence of absence (Brusseau et al., 2020).

Pathogen: Cryptosporidium oocysts are resistant to chlorine and have a low infective dose (CDC, 1994). DEQ's review relies on travel times and attenuation; a shallow well fed by canal seepage, or one with a poor surface seal, is a plausible exposure route for pathogens not adequately attenuated over the relevant travel time (Petrich, 2004).

Other endocrine disruptors: we know of no measurements of these compounds in Treasure Valley wells. The laboratory study described in Part III.B found that persistence in aquifer material depended on oxygen conditions and varied by compound, while strong alkylphenol sorption could slow transport (Ying, Kookana & Dillon, 2003). Those findings make the conditions beneath a particular canal or recharge site relevant; they do not establish what reaches a Treasure Valley well. Estrone, the estrogen found in the effluent, was not tested.

In Idaho data: PFOA, for which EPA's drinking-water limit is 4 ng/L, was below 2.0 ng/L in the canal on all three dates and 5.2 to 7.8 ng/L in both plants' effluent. Dilution would lower the concentration at the moment of mixing, but concentrations reaching a connected shallow well would depend on transport, retention, and the contribution of canal-fed recharge.

2. Garden and orchard produce.

PFAS: plants take up PFAS from irrigation water, and short-chain compounds accumulate most in edible parts. In lettuce and strawberry irrigated with reclaimed water spiked with PFAAs, uptake rose with the concentration in the water, and the short-chain acids PFBA and PFPeA accumulated most (Blaine et al., 2014). In a California field trial, vegetables irrigated with recycled water that carried PFAS at about 8 to 32 ng/L took up PFAS consistently, including into tomato fruit, while switching to freshwater midseason reduced accumulation for most compounds (Shi et al., 2025). Leafy vegetables accumulate the most in reviews and in a study of 20 vegetable species on farmland irrigated with treated wastewater (Xu et al., 2022; Cao et al., 2025).

Pathogen: in the 2018 national romaine lettuce outbreak, *E. coli* O157:H7 sickened 210 people in 36 states, hospitalized 96, caused hemolytic uremic syndrome, a form of kidney failure, in 27, and killed 5; FDA concluded that water from an irrigation canal where the outbreak strain was found most likely contaminated the lettuce, and that canal water may also have been used to dilute crop-protection sprays. How the canal became contaminated is unknown (FDA, 2018). We include it here to show that a canal is an effective route that can carry pathogens to produce.

Cyclospora oocysts resist common sanitizers, are shed unsporulated, and can become infectious within days to weeks on soil or plant surfaces (Gutierrez et al., 2024; Reyes et al., 2026).

Other endocrine disruptors: the evidence we found is limited and mostly reassuring at reclaimed-water concentrations. In hydroponic lettuce and collards grown for 21 days in

nutrient solution containing 14C-labeled bisphenol A, nonylphenol, diclofenac, and naproxen at 46 to 237 ng/L, which the authors describe as representative of reclaimed water, the compounds accumulated mainly in roots, nearly all the residue was non-extractable, and the authors predicted that dietary uptake by humans would be negligible (Dodgen et al., 2013). We did not find field studies of these compounds in crops irrigated with effluent.

In Idaho data: PFHxA, a short-chain compound of the kind that accumulates most in edible parts (Blaine et al., 2014), was in every effluent sample at Plant 1 (6.5 to 8.6 ng/L) and at 17 ng/L at Plant 2, and was not detected in the comparison canal samples. Plant 2's effluent also carried sulfamethoxazole at 1.2 µg/L and other antibiotics, which reviews say crops may take up from soil water (Christou et al., 2017). In the spiked-soil greenhouse study, wheat also took up PFOSA through its roots, moved it to the shoots, and converted it there to PFOS, PFHxS, and PFBS (Zhao et al., 2018).

3. Livestock, poultry, and what they produce.

PFAS: in a study of 118 home-produced eggs from the Netherlands and Greece, PFAS (mostly PFOS) were found in most Dutch yolks, at a median of about 3 ng/g and up to 31 ng/g, while all but two of 53 supermarket egg samples were below the 0.5 ng/g quantification limit. The authors attributed the difference mainly to hens consuming PFAS-contaminated soil, worms, and insects, and concluded that the levels would not exceed the European tolerable daily intake (Zafeiraki et al., 2016). Colorado's health department advises a different water source for hens if the water is contaminated and says levels fall within weeks once the source is removed (CDPHE, n.d.). Maine's agriculture department lists poultry drinking water and soil-dwelling insects as exposure sources, and the Dutch national institute advised against eating backyard eggs after finding high PFAS, with the highest levels in free-range hens that roam outdoors with earthworms a likely source, while commercial eggs are monitored and lower (Maine DACF; RIVM, 2025).

In feeding trials, cows fed contaminated feed secreted PFOS into milk (about 14 percent of intake in one trial), while PFOA and PFBS barely reached milk. Silage was the main intake route on one dairy farm studied (Kowalczyk et al., 2013; Vestergren et al., 2013); however, a survey of 13 U.S. farms found no legacy PFAS in milk from regions of concern (Hill et al., 2021). At Penn State's Living Filter, corn silage and tall fescue grown for dairy feed carried PFAS that were more than 84 percent short-chain compounds, and the authors estimate that dairy cows fed those crops consume about 2.5 to 7.7 mg of PFAS per year, two to three orders of magnitude below the dose in the Kowalczyk feeding trial; PFAS also appeared in crops from the site's non-irrigated areas, and the authors call for research on meat and milk (Mroczko et al., 2022). Transfer therefore depends on the PFAS compound and the exposure.

Pathogen: Cryptosporidium infects cattle as well as people, and in the United States during 2009–2017, contact with cattle accounted for 65 of 444 reported cryptosporidiosis outbreaks (14.6 percent), and nine of the 22 foodborne outbreaks involved unpasteurized

milk (Gharpure et al., 2019). Homestead eggs, milk, and meat are not subject to commercial testing.

In Idaho data: PFOSA, found in four of five effluent samples at Plant 1 (8.1 to 22.9 ng/L), converts to PFOS in soil and earthworms and accumulated in earthworms more than PFOS did in a spiked-soil greenhouse study (Zhao et al., 2018); earthworms are a likely source of PFAS in backyard-hen eggs (RIVM, 2025).

4. Soil, mud, and dust carried into the home.

PFAS: irrigation with PFAS-containing water adds PFAS to the soil (Brusseau et al., 2020; MDH, 2022), soil can hold them for decades (Brusseau et al., 2020), and the Minnesota Department of Health notes that ingestion of PFAS in household dust can be a significant route for infants and young children. In the traditional Idaho homestead, soil and water are tracked indoors by residents and pets, where PFAS may adsorb to textiles and other surfaces.

Pathogen: oocyst-forming pathogens such as *Cyclospora* and *Cryptosporidium* survive in the environment, including on soil and crop surfaces (Reyes et al., 2026), and EPA's Exposure Factors Handbook notes that children may ingest significant quantities of soil and dust, because they play on floors and the ground and mouth their hands and objects (U.S. EPA, 2017).

Other endocrine disruptors: alkylphenols sorb strongly to sediment (retardation factors of 320 for octylphenol and 500 for nonylphenol in aquifer material; Ying, Kookana & Dillon, 2003), which supports concern about retention in soil receiving effluent that carries them. Whether they accumulate also depends on degradation, including the oxygen-dependent behavior discussed in Part III.B; we know of no measurements in Treasure Valley soils. Children's hand-to-mouth contact with soil and dust is the route of concern, with early life the most sensitive window (Gore et al., 2015).

In Idaho data: the PFOSA at Plant 1 would be converted to PFOS by soil microbes, as shown in a spiked-soil greenhouse study (Zhao et al., 2018), and a model of PFOS in soil estimates retention of decades or longer (Guo, Zeng & Brusseau, 2020; Part III.C). Nonylphenols are common in municipal wastewater, and found at Plant 2.

5. Direct contact: wading, play, and pets.

PFAS: swallowing canal water is not always incidental: children near Treasure Valley canals sometimes drink from them deliberately when thirsty, despite being warned against this, and drinking water is a major source of PFAS exposure (Sunderland et al., 2019). It is unclear how the rules' Section 603 notice requirements apply along a canal and its laterals, rather than at a controlled use site (Part III.E). Direct contact for all family members and pets is common during flood irrigation of yards and fields.

Pathogen: Cryptosporidium oocysts are resistant to chlorine and highly infectious (CDC, 1994), and treated recreational water was linked to 35 percent of the 444 cryptosporidiosis outbreaks reported in 2009–2017 (Gharpure et al., 2019). Children and ponies wade in ditches and canals and dogs swim in them.

In Idaho data: PFOA and PFHxA were detected in effluent from both plants but not detected in the comparison canal samples. Plant 2's effluent also contained antibiotics and alkylphenols not detected in those canal samples. PFOSA was detected at Plant 1, but it was not analyzed in the canal. These observations identify compounds for assessment where canal contact occurs; they do not establish a child's exposure or a single mixture from both plants. The records include no pathogen measurements.

6. Spray, mist, and aerosol.

PFAS: water that carries PFAS and is applied by sprinkler leaves the nozzle as droplets and mist. Section 604.02.b lists method of irrigation as a buffer factor, and Section 603.01.d requires protection of drinking fountains, picnic tables, food establishments, and other public eating facilities from Class A spray irrigation. The geographic reach of those protections for neighbors along a canal depends on how the permitted facility and use area are defined (Part II, below; Part III.E).

Pathogen: opportunistic pathogens such as *Legionella* and *Mycobacterium* regrow in reclaimed-water distribution systems such as pipes and spread by aerosol and other non-ingestion routes (Garner et al., 2018a); a risk assessment cited by Reyes et al. (2026) found sprinkler irrigation posed a greater risk than furrow or subsurface irrigation (Rock et al., 2019).

In Idaho data: if canal water augmented with Class A effluent is sprayed through pressurized systems, the PFOA and PFHxA found at both wastewater plants would be expected to be distributed via sprinkers as well.

7. Ponds, fish, and wildlife.

PFAS: PFOS readily bioaccumulates in fish tissue, and states have issued do-not-eat advisories after finding it in fish (Pennsylvania DEP, 2021; Maryland, North Carolina, and Arizona have issued others). None of those advisories involved reuse water; we cite them because they show that fish concentrate PFOS, so a contaminated pond or canal that holds fish is an exposure route. In Idaho, a northern pikeminnow sampled from the Payette River in 2013 near Gardena had PFOS at 4.25 ng/g and total PFAS at 4.65 ng/g (U.S. EPA, ECHO PFAS analytic tools). The source of the PFAS in this rural area is unknown, and reuse is not implicated, but the measurement documents PFOS in an Idaho fish and is consistent with the bioaccumulation pathway discussed here.

Pathogen: pond and canal water used for swimming, such as the practice of filling backyard summer 'kiddie pools', raising fish, or stock watering carries the contact and swallowing

risks in routes 3 and 5. The rules list wildlife habitat and recreation as beneficial uses (Section 010.01).

Other endocrine disruptors: white suckers downstream of a Colorado wastewater plant had intersex gonads in 18 to 22 percent of the population and fewer males than upstream (17 to 21 percent, against 36 to 46 percent). The treated effluent carried estradiol, ethinylestradiol, alkylphenols, and bisphenol A, with an estimated total estrogen equivalence of up to 31 ng/L (Vajda et al., 2008). Male fathead minnows exposed to that effluent lost male characteristics (Vajda et al., 2011). We found no comparable study in Idaho, and the Colorado effluent made up a large share of streamflow (up to about 75 to 80 percent at low flow).

In Idaho data: PFOS was 2.7 ng/L in the canal on one of three dates and not detected on the other two, and 2.0 to 2.2 ng/L in Plant 2's effluent; Plant 1's analysis could not show PFOS below 4 ng/L in most samples; PFOSA was not measured at the canal, so its conversion to PFOS there is unexamined, although PFOS was measured and was not detected there on two of three dates. Plant 2's effluent also carried estrone, nonylphenol, and octylphenol, none of them were detected in the comparison canal samples; however, no bioassay was run, so we cannot say at what concentrations the effluent would be estrogenic.

8. Downstream and neighboring users. Canal seepage and irrigation infiltration supply most of the valley's recharge, and roughly 82 to 84 percent of groundwater discharge goes to drains and rivers (Bartolino, 2019), so a large share of what leaves a canal can be expected to reappear in drains that others may divert. Downstream users include those served by laterals, while canal maintenance discharges and terminal outflows send canal water to other waters, and other users.

PFAS: persistent contaminants can move downstream in seepage and outflow. Dilution does not eliminate the discharged mass, but the amount reaching any particular user depends on flows, routing, and retention. Repeated inputs can contribute to accumulation over time (Part III.C).

Pathogen: a single canal reach can serve many users. In the 2018 romaine lettuce outbreak, the pathogenic *E. coli* O157:H7 strain was found in three samples from about a 3.5-mile stretch of one canal that delivered water to several of the farms traced in the investigation (FDA, 2018), demonstrating that canals are effective pathogen delivery systems once contaminated.

In Idaho data: persistent, water-soluble compounds detected in Plant 2's effluent but not detected in the comparison canal samples, such as sucralose (12 to 38 µg/L), are candidates for tracking where reuse water goes: sucralose resists wastewater treatment and river-bank filtration and has been used as a wastewater tracer in surface water and groundwater (Scheurer et al., 2010; Van Stempvoort et al., 2011, who recommend using several sweeteners together). Plant 2's influent held sucralose at 18 and 36 µg/L,

consistent with that persistence, whereas acesulfame-K fell from 18 and 22 µg/L in influent to 0.56 to 1.2 µg/L in effluent and is a weaker marker.

9. The sum. One traditional household can be exposed through its well, its garden, its hens, ducks, and stock, its fish, its yard and dust, its children's play, and its neighbors' spray, all from the same water. Exposure reviews find that diet and drinking water are the largest sources of PFAS, and that household dust is important for children and infants, and indoor air for some people (Sunderland et al., 2019). The point is that the exposure routes combine, and the rules do not require a systematic evaluation of the sum.

In Idaho data: the two datasets together illustrate the kinds of mixtures an exposure-route analysis should consider. Both plants had PFOA and PFHxA detections; Plant 1 had PFOSA detections, while Plant 2 had the antibiotic and other endocrine-active detections described above. They do not establish that every compound discussed here occurs in effluent from either plant, or that a household encounters the combined mixture. The relevant assessment is of each source and the routes by which its constituents could reach the same homestead.

What the rules examine instead. Subject to the application-content exception in Section 300.04, Section 300.03.f requires a topographic map extending one-quarter mile beyond the outer limits of the facility site and showing wells, drinking-water sources, dwellings, and the other specified features. Section 010.24 includes pipeline and distribution facilities and the property where the water is used in the "facility," and it is unclear whether a canal reach, its laterals, and its downstream service area are treated as part of the facility: a canal may carry water, and contribute to seepage, for many miles. Total coliform compliance is measured at the permit-defined point following final treatment and disinfection (Section 601.06). DEQ may set disinfection requirements after storage case by case and specify additional sampling locations and monitored substances under Section 600.05. The chapter does not, however, expressly prescribe the particular downstream monitoring program requested in Part III.A.3, which addresses changes in microbial quality during conveyance.

The well inventory is incomplete. The application must show public and private drinking-water sources (Section 300.03.f), and DEQ's FAQ states that private wells are evaluated through the applicant's groundwater analysis. The IDWR well database is the obvious source, but it is incomplete and imprecise: it contains most well-driller reports back to July 1987, reports were requested but not required before 1953, and many wells lack reports or accurate locations (Bartolino, 2019). Traditional wells in the shallow aquifer, the wells most exposed to canal-fed recharge, may be disproportionately unrecorded; an evaluation that treats the IDWR listing as the inventory will miss them. Moreover, the expected groundwater flow varies considerably from site to site: in the Treasure Valley shallow soils range from extremely sandy to heavy clays within close proximity.

Notification can be waived. Section 603 is one of the rule's exposure controls, but Section 940 allows case-by-case waivers only upon a full demonstration by the person requesting

the waiver that the activities will not have a detrimental effect upon existing water quality and that beneficial uses are adequately protected. Where recycled water is delivered to a canal, the people who encounter it are downstream residents who may not be shareholders in the canal; they are not visitors to an area posted as restricted or cautionary use.

Cross-connections and backflow. Another way irrigation water reaches drinking water is through plumbing. In 2018, 20 to 25 residents of an Eagle subdivision reported gastrointestinal illness after canal-fed irrigation water entered homes through a backflow device installed backward; the water company said it had seen three similar cases since 2012, each involving a device installed by an unlicensed person (KIVI, 2018). In 2012, as many as 80 residents of a west Boise neighborhood became ill after a backflow preventer failed to keep irrigation water out of the drinking-water system (Boise State Public Radio, 2012). These incidents illustrate a backflow pathway rather than measured exposure to the effluents discussed here. They show that the separation between irrigation water and drinking water depends on devices that fail and on installations that may be incorrect. When recycled water enters a canal and is no longer treated as recycled water (Part III.E), we found no provision in the Recycled Water Rules that requires notifying households that rely on these mechanical devices to reassess and test them when their irrigation-water source changes.

We ask DEQ to:

(i) require an exposure-route analysis from applicants for canal delivery, recharge, or other uses in which the water leaves the facility's control, identifying along the affected reach and recharge area the actual uses (laterals, domestic wells, including unrecorded wells found through outreach; gardens and orchards; pasture; livestock and poultry; ponds and fish; recreation and children's access; downstream diversions) and evaluating each route for persistent chemicals and for chlorine-resistant pathogens;

(ii) clarify the geographic scope of the well and dwelling inventory and extend it along the affected conveyance and canal reach, as well as its laterals and terminal outflows;

(iii) require applicants to notify households and property owners in the affected area before the application is submitted (for permit renewals, when notice of intent to renew is given), with a simple way to report drinking-water wells and a plain-language explanation of what the water is and is not safe for, including for gardens, animals, and children, and to document the outreach and the wells reported in the application and staff analysis;

(iv) require that any waiver of Section 603 notification be identified in the staff analysis, supported by the Section 940 demonstration of no detrimental effect upon existing water quality and adequate protection of beneficial uses, open to public comment, and paired with an alternative way of informing downstream users and nearby residents;

(v) require notice to drinking-water suppliers and to households with irrigation-water connections near the affected reach when recycled water is first delivered to a canal, and verification that cross-connection and backflow-prevention programs have been reassessed for the changed source;

(vi) require characterization of persistent chemicals, including PFAS, and of protozoan pathogens wherever routes 1 through 8 are present (see Part III.A–B). For PFAS this means analysis of the complete analyte list of a specified PFAS method, such as EPA 1633, reporting every analyte in that method, including its sulfonamides and precursors, not only compounds with federal limits; reporting limits at or below the relevant health-based limits (below 4 ng/L for PFOA and PFOS), with re-analysis or cleanup when matrix forces higher limits; influent as well as effluent sampling on several dates, reported to DEQ and the public; an estimate of precursor potential, for example an oxidation-based precursor assay, recognizing that neither the targeted method nor the precursor assay measures every PFAS; and treatment of unregulated compounds that convert to regulated ones as inputs to the exposure-route analysis;

(vii) include endocrine-active compounds other than PFAS (which are covered above) in that characterization, for example steroid estrogens, alkylphenols, bisphenol A, and endocrine-active flame retardants (examples, not a complete list), at reporting limits at or below the concentrations that affect fish and developing organisms (low single-digit ng/L for steroid estrogens), and require an effects-based bioassay for estrogen and thyroid activity alongside chemical analysis, because the list of endocrine-active chemicals is open-ended and chemical analysis finds only what is looked for;

(viii) update the exposure-route analysis at renewal and make a current analysis part of eligibility for any streamlined renewal; and

(ix) require, before any discharge to an irrigation canal or recharge system is permitted, a baseline characterization of the receiving water at the point of discharge on several dates across the irrigation season, using the same specified analytical panels and reporting limits required of the effluent, followed by monitoring at the point of discharge and at defined downstream points with the same panel, reported to DEQ and the public, and consider persistent, water-soluble markers that are detected in effluent but not detected in the baseline samples (for example sucralose) as indicators of where reuse water travels.

Part III. Where current science and the rule diverge (issues for the periodic review of IDAPA 58.01.17)

DEQ's presentation places this chapter in the 2026–2027 periodic review and asks whether existing requirements are "still necessary and appropriate." We ask DEQ to take up the following.

Reuse can be safe when treatment, verification, and post-treatment management match the hazards. Our concern is whether the rules require that match for the microbial, chemical, and downstream-exposure questions described in Part II. The produce-industry review's treatment assumptions and limitations are examined in Part III.A; source control and chemical transformation are addressed in Part III.B.

A. Microbial compliance rests on an indicator that current science shows to be an unreliable stand-in for pathogens, with no systematic verification required through storage and distribution.

Section 601 sets total-coliform limits for municipal recycled-water Classes A through D (Sections 601.01–.04), measured at "the point in the system following final treatment and disinfection as defined in the permit" (Section 601.06). Class E has no applicable coliform standard, general disinfection requirement, or general requirement for total-coliform sampling (Section 601.05). Class A also carries process requirements: filtration to turbidity limits and either a CT of 450 mg-min/L based on total chlorine residual, with at least 90 minutes modal contact time at maximum day flow, or filtration combined with disinfection demonstrated to achieve 5-log virus removal/inactivation (Section 601.01.a.i). These process requirements are additional to the coliform limits. Our concerns are what coliform monitoring can and cannot show; how far the filtration requirements establish protection against protozoa (item 4); the lower classes and industrial permits, where process requirements are less demanding or case-by-case (Sections 601.02–.05, 608.01); and what happens after the point of compliance.

Scope of the produce-industry review

Reuse can be safe when treatment, verification, and post-treatment management match the hazards. For persistent chemicals such as PFAS, that may mean treatment well beyond what Class A requires, because Class A has no separate step aimed at PFAS (Part II). The review most often cited for the safety of reuse, prepared for the produce industry, concludes that risk assessments show no appreciable increase in enteric-pathogen risk from irrigating produce with reclaimed water (Reyes et al., 2026). It addresses commercial produce, where the concern is food safety after production, and not the homestead, where one household drinks, gardens, and keeps animals on the same water. It also lists chemical contaminants, including PFAS, among its open gaps (below). Its conclusion is conditional in ways that matter for Idaho.

1. **The risk assessments assumed California-type treatment and considered enteric pathogens.** The assessments it relies on addressed enteric viruses, *Cryptosporidium*, *Giardia*, and *E. coli* O157:H7 on irrigated lettuce, with treatment efficacy based on facilities meeting California's standard for disinfected tertiary water (Olivieri et al., 2014; Rose et al., 2004, as described by Reyes et al., 2026). That standard requires filtration and either a chlorine contact-time product of 450 mg-min/L or a demonstrated 5-log virus reduction, and California allows contact with the edible

portion of food crops only for that class. Idaho's Class B chlorine option requires at least 1 mg/L total chlorine residual at the point of compliance after 30 minutes at peak-hour flow. An alternative disinfection process may be used if demonstrated to DEQ's satisfaction to be comparable to the specified chlorination treatment (Section 601.02.a.i). Class B does not prescribe the Class A CT or a specified numerical virus-reduction performance, yet it is permitted for food crops, including all edible food crops (Section 602). The review's own summary of Idaho finds the same gaps: it lists food crops as an allowed use of Class A and Class B water and shows virus removal as not applicable for Class B, whereas Washington limits food-crop irrigation to its Class A water, which must achieve 4-log virus removal or inactivation (Reyes et al., 2026, Supplemental Table 2). The 2.2 per 100 mL median coliform limit that Idaho's Class A and B share with California's disinfected tertiary standard was, according to the review, set on an assumption that the water would be pathogen-free, not on a risk basis.

2. **It identifies open gaps.** Regulations rarely address the more recalcitrant pathogens such as *Cryptosporidium* and *Cyclospora*, and meeting a disinfection requirement does not address all microbial hazards relevant to agriculture (and to the homestead within it, which the review does not examine). The review lists key gaps as *Cyclospora*, disinfection validation, and chemical contaminants, noting that risk assessments have found PFAS uptake into edible crops can approach public-health benchmarks (Reyes et al., 2026, citing Brown et al., 2020).
3. **It finds that treatment performance alone is not sufficient.** Post-treatment storage, conveyance, and point-of-use conditions must be considered, and reclaimed-water quality can change substantially in distribution systems (piping, canals, and lateral networks) even when the water meets compliance criteria at the entry point (Reyes et al., 2026, discussing Ajibode et al., 2013).
4. **It describes specific verification and user-management practices that differ from Idaho's framework:** testing as close to the point of use as practical and written water assessments covering distribution-system conditions (leafy-green industry programs); periodic *Giardia* and *Cryptosporidium* monitoring (Florida); coliphage and *C. perfringens* monitoring (North Carolina); enteric-virus sampling in some circumstances (Arizona); and user-level authorization, site management plans, and best-management-practice records (Colorado), which also requires higher treatment for resident-controlled and noncommercial food-crop irrigation, where practices may be less standardized (Reyes et al., 2026). Idaho already requires application site-management plans and an approved plan of operation, including the specified management, monitoring, reporting, and emergency functions as applicable (Sections 300.03.l and 300.05), as well as Class A utility user agreements and public education (Section 605.03.a.v). The comparison concerns the content, coverage, and verification required, not the absence of all planning or user-management requirements in Idaho.
5. **It calls for expanded, high-frequency monitoring and for evaluation of whether existing regulatory frameworks adequately address these emerging concerns,** which is what we ask here.

We read the review as supporting the proposition that reuse can be safe when treatment, verification, and post-treatment management match the hazards, and as identifying what the Idaho framework does not yet require. It does not address the larger problem for chemicals: new chemicals enter commerce every year, and what is known about them is small next to what is not; a UN and WHO assessment of endocrine-disrupting chemicals found that the vast majority of chemicals in current commercial use have not been tested at all (Bergman et al., 2013).

1. Indicators are inconsistent predictors of pathogens. In a year-long study of six reclamation facilities, single indicator organisms (total and fecal coliforms, enterococci, *C. perfringens*, and F-specific coliphage) failed to correlate with infectious enteric viruses, *Cryptosporidium*, and *Giardia*; the authors concluded that a suite of indicators is more likely to be predictive and that more pathogen monitoring is warranted (Harwood et al., 2005). Bacteriophages track viral pathogen persistence through treatment more closely than bacterial indicators (McMinn et al., 2017). The WateReuse Research Foundation's guidance on reclaimed-water biostability likewise reports that the absence of coliform bacteria and *E. coli* did not preclude the presence of *Legionella*, *Mycobacterium*, *Giardia*, *Cryptosporidium*, and enteric viruses (WateReuse Research Foundation, project 05-02).

2. Culture-based counts can undercount viable bacteria. Chlorination and ultraviolet disinfection can induce bacteria into a viable-but-non-culturable (VBNC) state, in which cells are alive but do not grow on routine media, and some later resuscitate. In laboratory work, initial free chlorine of 0.2–1.0 mg/L left more than 99.95 percent of *E. coli* non-culturable, with regrowth observed in effluent-influenced river water (Wang et al., 2022); continuous-flow UVC produced VBNC *E. coli* that later resuscitated (Zhang et al., 2018); and VBNC *Yersinia enterocolitica* resuscitated in nutrient-rich medium (Hu et al., 2024). These are laboratory findings, higher chlorine doses limited regrowth in one of them, and we know of no data on VBNC populations in Idaho reuse systems. But they do show that a culture-based count at the point of compliance cannot by itself demonstrate the absence of viable organisms.

3. Water quality changes after the point of compliance, and conveyance can be long. Total-coliform compliance is measured at the permit-defined point following final treatment and disinfection, but the water may then travel many miles by pipeline before it is discharged or delivered. A long pipeline behaves as a bioreactor: residence time and wetted surface area grow with its length, and disinfectant residual decays. Research sponsored by the WateReuse Research Foundation in two distribution systems found that, regardless of the initial level of treatment, microbial quality deteriorated with increased residence time; that water-based pathogens (*Legionella*, *Mycobacterium*, *Aeromonas*) were routinely found beyond the point of compliance and were able to grow in the system; that chlorine boosters reduced them only temporarily; and that fecal indicators did not correlate with them (WateReuse Research Foundation, project 08-04; Ajibode et al., 2013).

In a year-long study of four other reclaimed-water systems, bacteria regrew in reservoirs and distribution systems because disinfectant residual was lost and assimilable organic carbon was high, and opportunistic pathogens (*Aeromonas*, *Legionella*, *Mycobacterium*, *Pseudomonas*) occurred more often than indicator bacteria; the authors noted that the public-health significance is unknown (Jjemba et al., 2010). A study of four U.S. utilities sampled at the point of compliance and at five points of use found that reclaimed-water systems had distinctive chemistry and opportunistic-pathogen patterns, and noted that these organisms spread by aerosol and other non-ingestion routes (Garner et al., 2018a). At the same utilities, a sulfonamide resistance gene (sul1) was more abundant at all reclaimed points of use than in potable water (Garner et al., 2018b).

In a comparison of two full-scale reuse systems, resistance-gene abundance in a non-potable distribution system rivaled that in raw sewage, and the authors described such systems as vulnerable to regrowth of resistant bacteria, while the aquifer in the same study showed lower levels (Keenum et al., 2024). The WateReuse Research Foundation also reported that chlorination in some instances increased assimilable organic carbon and so fed downstream growth.

Biofilms are hotspots for horizontal transfer of antibiotic-resistance genes (Michaelis & Grohmann, 2023). The produce-industry review reaches the same conclusion: it reports bacteria entering a viable-but-non-culturable state and regrowing in reclaimed-water distribution systems (*E. coli* and *Salmonella* regrew by 1.8 and 0.7 log, depending mainly on residual chlorine), opportunistic pathogens and resistance genes that survive disinfection and regrow, and recovery of pathogens from open reservoirs, ponds, and canals that appeared to have been contaminated after treatment (Lin et al., 2016; Drigo et al., 2021; Haymaker et al., 2019; Sharma et al., 2020, all as reported by Reyes et al., 2026).

Section 601.06 leaves the total-coliform point of compliance to the permit ("as defined in the permit") and lets DEQ set disinfection requirements after storage case by case. Section 600.05 also allows permit conditions specifying sampling locations, monitored substances, methods, and reporting. The chapter does not expressly prescribe a monitoring program at the end of every long pipeline; our request concerns when and how that authority should be used. Where recycled water is also held in ponds or conveyed in open canals before use, a disinfectant residual should not be assumed to persist.

4. Chlorine-resistant protozoa, including *Cyclospora*. *Cyclospora cayetanensis* oocysts resist common chemical sanitizers, which makes filtration the most suitable intervention in irrigation water (Gutierrez et al., 2024). Humans are its only natural host, it has been detected in water and wastewater although methods are limited, and outbreaks have been linked to chlorinated water (Health Canada, 2012, enteric-protozoa technical document, Appendix C). Health Canada reasons that conventional coagulation and filtration should remove the larger oocysts at least as well as *Cryptosporidium*, but notes that this has not been evaluated for *Cyclospora*. Removal by filtration is not assured: in laboratory and field-scale tests with surrogate oocysts, sand filters removed about 55 percent, and sand–zero-

valent-iron filters removed more (Gutierrez et al., 2024), although these were simple filters and not tertiary wastewater filtration.

A systematic review and meta-analysis of studies of water reported a pooled *Cyclospora* prevalence of about 6.9 percent across water types, including about 17 percent in irrigation water and about 5 percent in drinking water and in wastewater, although most detections used molecular methods that do not show whether oocysts are infectious (Naganathan et al., 2021; subgroup figures as summarized by Reyes et al., 2026). Oocysts are shed unsporulated and need days to weeks to become infectious, so the absence of infectivity at discharge does not preclude risk later, in soil, on plant surfaces, or in irrigation infrastructure. Reyes et al. also note that while physical removal is presumed effective from oocyst size, studies of disinfection efficacy are limited, and that confirmed inactivation appears limited to heat above 70 °C.

The Recycled Water Rules identify filtration for Class A and Class B water in Section 602, subject to the equivalent-process language in Sections 601.01 and 601.02. Before disinfection, Class A water must meet a daily arithmetic mean turbidity limit of 2 NTU and an instantaneous maximum of 5 NTU for granular or cloth media, or 0.2 and 0.5 NTU, respectively, for membranes (Section 601.01.b). Class B must meet a daily arithmetic mean of 5 NTU and a maximum of 10 NTU before disinfection (Section 601.02.b). Section 601 controls if the Section 602 tables differ (Section 602.01). The chapter does not give "filtered" a standalone definition, expressly prescribe coagulation for every system, or set a uniform protozoan log-removal requirement; it does not mention *Giardia*, *Cryptosporidium*, *Cyclospora*, or oocysts by name.

Sections 601.01 and 601.02 provide for case-by-case approval and pilot testing or demonstration for Class A and Class B treatment systems. Section 605.03.c also addresses Class A filtration technologies, including technologies listed in California's Alternative Treatment Technology Report for Recycled Water and others approved through its specified procedure. By comparison, under EPA's drinking-water rules a conventional or direct filtration plant is credited with at least a two-log *Cryptosporidium* removal when combined filter effluent is at or below 0.3 NTU in 95 percent of measurements and never above 1 NTU (40 C.F.R. §§ 141.170 and 141.173(a)). Whether Class A filtration removes oocysts therefore depends on filter type, chemical pretreatment, and operation. The chapter does not prescribe a uniform protozoan log-removal requirement. Technology approvals and permit conditions must be examined separately to determine the requirements for a particular system; coliform monitoring alone does not establish protozoan removal.

5. Free DNA and antimicrobial resistance. Chlorine-killed bacteria release plasmid DNA, and chlorine-injured survivors can take it up: in laboratory experiments with four species, uptake was up to 550 times that of untreated cells (Jin et al., 2020), a process linked to oxidative stress (Zhang et al., 2021). Free DNA uptake is one route of gene transfer; conjugation (below) and transduction by bacteriophages are others, and we cite studies

only of the first two here. Some contaminants also raised gene transfer in the laboratory: PFOS at 2–50 µg/L increased *E. coli* conjugation up to 3.25-fold (Yin et al., 2023), and quaternary ammonium compounds promoted plasmid-mediated transfer at 0.0004–0.4 mg/L (Liu et al., 2023). Poultry-slaughterhouse wastewater carried ESKAPE bacteria and resistance genes at up to 1.48×10^6 copies per 100 mL in raw influent, and conventional treatment reduced but did not eliminate them (Savin et al., 2021). Antibiotics were present in a Treasure Valley utility's 2020 effluent (Plant 2) but not detected in the irrigation canal samples used for comparison: sulfamethoxazole at 1.2 µg/L on all three dates, amoxicillin at 0.36 to 0.43 µg/L (semi-quantitative), erythromycin at 39 to 43 ng/L, sulfadiazine at 50 to 82 ng/L, trimethoprim at 180 and 250 ng/L on two dates, and sulfamethazine and sulfathiazole on one (Part II).

A review of reclaimed-water irrigation concluded that the practice may expose agricultural soils continuously to antibiotics, resistant bacteria, and resistance genes, that antibiotics in soil pore water may be taken up by crops, and that resistance genes may spread among soil and plant-associated bacteria, which it presents as a hypothesis (Christou et al., 2017). These are laboratory and single-site findings, and no standards exist for resistance genes.

Characterization of this kind is already practiced. California recycled-water providers report annual monitoring beyond regulatory requirements for *Cyclospora*, *Giardia*, *Cryptosporidium*, *Legionella*, *Salmonella*, *Listeria*, *Campylobacter*, norovirus, enterovirus, and metals (as compiled in Reyes et al., 2026, Supplemental Table 1, from four providers' published reports).

On A.1–A.5 we ask DEQ to:

(i) require, at application and renewal, characterization of the recycled water for a suite of indicators including coliphage, and, for municipal permits serving produce irrigation, canals, or public contact, for *Cryptosporidium* and *Giardia* (and *Cyclospora* where a validated method is available);

(ii) require monitoring at the point of discharge or delivery, and at representative points along long conveyance, in addition to the compliance point, for disinfectant residual, heterotrophic bacteria or ATP, and opportunistic pathogens such as *Legionella* where aerosol exposure is possible; treat conveyance length, pipe material and diameter, estimated residence time, and any storage or booster disinfection as application items under Section 300.03; and set the trigger for end-of-pipe monitoring by estimated residence time and by conveyance length, since length adds wetted surface area and a wider range of conditions and niches;

(iii) require viability-based methods (for example viability PCR or flow cytometry) alongside culture methods in that characterization where disinfection, storage, or long conveyance makes injured or non-culturable bacteria a concern;

(iv) for permits whose sources plausibly carry antibiotic residues or resistant bacteria (for example, slaughter and rendering, municipal wastewater), include antibiotic-residue and resistance-gene markers in the characterization; we ask for data that would inform site-specific conditions, not limits, because no standards for resistance genes exist yet;

(v) for Class A and Class B permits that allow food-crop irrigation, canal delivery, or public contact, require the applicant to demonstrate protozoan removal by its filtration process (for example, by challenge testing or particle counting), using the pilot-testing and demonstration authority already in Sections 601.01 and 601.02, and consider a stricter turbidity criterion for granular or cloth media; and

(vi) make current results of (i) through (v) part of eligibility for any streamlined renewal.

B. Chemical transformation during conveyance and after delivery.

A chemical measurement at one permit-defined location does not, by itself, describe transformations during later storage, conveyance, or contact with soils. Chemical compliance locations depend on the permit and the constituents monitored; Section 010.17 expressly allows more than one point of compliance, and Section 600.05 provides for permit-specific sampling locations and monitored substances. In laboratory studies, sulfonamido precursors from firefighting foam were slowly biotransformed to PFHxS by nitrifying microorganisms in sediment microcosms (Ruyle et al., 2023), and in aerobic wastewater-sludge cultures spiked at 50 mg/L, long-chain PFAS including PFOA and PFOS were partly transformed to shorter-chain acids, with limited defluorination, while anaerobic cultures transformed none (Saifur et al., 2026).

Under anaerobic conditions nonylphenol ethoxylates can accumulate nonylphenol, and at industrial wastewater plants effluent nonylphenol and octylphenol have exceeded influent concentrations (reported in Chen & Zheng, 2025, citing Ryu et al., 2024). Persistence of estrogens and alkylphenols in aquifers depends strongly on oxygen. In laboratory studies with limestone sediment and native groundwater from a deep aquifer in South Australia, 17β-estradiol and 4-n-nonylphenol degraded within days under aerobic conditions (half-lives of about 2 and 7 days), while ethinylestradiol degraded more slowly (about 81 days). Little or no degradation of the five endocrine-disrupting chemicals was seen over 70 days in native anaerobic groundwater apart from slow loss of estradiol; bisphenol A and 4-tert-octylphenol were nearly unchanged even under aerobic conditions (Ying, Kookana & Dillon, 2003). These are laboratory findings, not measurements beneath Treasure Valley canals. Whether the water beneath a given canal or recharge site is oxic or anoxic is a site question unanswered by the current rules. This is not applicable to all chemicals: our concern about PFAS does not depend on oxygen conditions.

In bench experiments, chlorination and sunlight converted the X-ray contrast agent iohexol into iodinated disinfection by-products (Witt & Guzman, 2025), which are markedly more

cytotoxic in cell assays than their chlorinated analogues; iodoacetic acid was about 1,000-fold as cytotoxic as trichloroacetic acid in one assay (Zhang et al., 2010). The bench and microcosm results are not measurements of Idaho effluent, but the starting compounds are present in local effluent: a Treasure Valley facility's (Plant 2) 2020 sampling found iohexol at 1.2 to 4.3 µg/L, 4-nonylphenol (semi-quantitative) at 0.49 to 1.2 µg/L, and 4-tert-octylphenol at 0.23 to 0.36 µg/L in its effluent on three dates, and none of them detected in the irrigation canal samples used for comparison (Part II). That shows the precursors are present, not that by-products form.

We ask DEQ to include in the characterization, where sources make them relevant, measures of precursor potential (for example an oxidation-based precursor assay) and of alkylphenols, and to treat the results as inputs to the review at renewal. The Plant 1 PFOSA results in Part II show detection in effluent without detection in the paired influent samples, a pattern consistent with precursor transformation but not proof of formation. This should not be read as a demonstrated increase in Plant 2's alkylphenols; its higher influent reporting limits prevent that conclusion.

Source control is necessary, and it is not sufficient

We agree that the most effective long-term response to PFAS is to stop making and using them, and we support that. For the compounds discussed here, much of it has already happened. 3M announced in 2000 that it would phase out PFOS-related production, finished most of it by the end of 2002 and the rest by 2008, and EPA followed with Significant New Use Rules beginning in 2002 (ITRC, §2.4, citing 3M Company, 2000). Eight major manufacturers committed under EPA's PFOA Stewardship Program to work toward eliminating PFOA and related chemicals from emissions and products by 2015. EPA reports that PFOS manufacture was last reported to it in 2002, with some limited ongoing uses, and that PFOA manufacture and import have been phased out in the United States, although existing stocks might still be used and some imported articles might contain it (U.S. EPA, *Fact Sheet: 2010/2015 PFOA Stewardship Program*). Internationally, PFOS, its salts, and PFOSF are listed under the Stockholm Convention (2009). EPA's 2002 significant new use rule, which covers 75 perfluoroalkyl sulfonates, names PFOSA (CAS 754-91-6) among them (U.S. EPA, 2002).

Yet these compounds and their relatives remain in the environment. A 2024 study of municipal plants in the United States concluded that, despite the phase-out of PFOS, it persisted at high concentrations in wastewater (Kim et al., 2024). The effluent data in Part II, collected in 2020 and 2026, show PFOA at 5 to 8 ng/L at two plants and, at one of them, PFOSA and sulfonamide precursors.

We do not know where the compounds measured at either plant come from. Three explanations are consistent with the literature, and we offer them as reasoning, not findings: legacy consumer products and discarded materials may continue to contribute; precursors can continue converting to terminal compounds (above); and wastewater effluent, landfill leachate, and biosolids are recognized inputs to soil and groundwater

(Bolan et al., 2021). Landfill-gas studies also describe releases of volatile precursors that can contribute to environmental background, including fluorotelomer alcohols that can transform to persistent acids (Lin et al., 2024; De la Cruz et al., 2025; Khalid and Sauvé, 2026). Unlike leachate, gas emitted from a landfill does not pass through wastewater treatment, so it is not a direct wastewater source, but it adds to the background of PFAS in soil and water. What reaches one medium can return to another. The exposure literature reports declines that appear to reflect consumer-product phase-outs, while exposures from seafood and drinking water are stable or increasing in many regions (Sunderland et al., 2019).

The consequence for this rulemaking is that it cannot assume the problem is being handled upstream. Stopping new inputs does not remove what is already in products, soils, sediments, aquifers, and landfills, or what precursors continue to form from it. Source control and characterization at the point of reuse are complements, not alternatives. We ask DEQ not to treat the first as a substitute for the second: the characterization, baseline, exposure-route, and periodic-review measures requested in Parts II and III do not depend on where the chemicals came from.

C. Travel-time analysis fits pathogens, not persistent chemicals.

DEQ's FAQ states that nearby wells are evaluated through an applicant's analysis of hydrogeology, well construction, recycled-water class, and vadose and aquifer travel times. Travel time helps against organisms that die off or are removed in soil and groundwater, though some persist or go dormant, but it does not protect against persistent chemicals. Field compilations show significant PFAS retention in the vadose zone over decadal timeframes, with soil concentrations at contaminated sites often orders of magnitude above groundwater concentrations (Brusseau, Anderson & Guo, 2020).

A modeling study of PFOS transport at a fire-training-area site found that most PFOS was held at air-water interfaces, with retardation factors of roughly 150 to 1,400, and estimated that PFOS could take several decades or longer to reach groundwater (Guo, Zeng & Brusseau, 2020). Some field investigations have found long-chain PFAS tens of meters below the surface (Zeng & Guo, 2021). Retention is expected to vary with soil texture, organic carbon, moisture, depth to groundwater, irrigation method, crop, and whether the land is in production. Early groundwater non-detects therefore do not show that persistent contaminants are absent.

Penn State's Living Filter shows how this plays out over decades. Treated wastewater has been spray-irrigated on its fields since the 1960s, and the system also recharges the deeper aquifer that is a primary water source for State College and the campus. Soil cores drilled in 2014 held far more PFOS and PFOA than today's effluent concentrations can explain, and models fitted to the core data indicate that past effluent concentrations were much higher: the authors estimate 70 to 170 ng/L of PFOS and 1,000 to 1,300 ng/L of PFOA, comparable to concentrations measured in other U.S. effluents in the 1990s and 2000s. Researchers estimate that PFOA reached groundwater within about a decade of the start of irrigation

and PFOS only after about 50 years, and that most of the PFOS applied over the site's history is still stored in soil above the water table and could keep reaching groundwater for decades even though effluent concentrations are now low. Irrigation reduced the PFAS discharged to surface water, and the same retention created a potential long-term source to groundwater (Jahn et al., 2023). The breakthrough times are modeled estimates at one humid-climate site where groundwater lies 20 to 70 meters below the surface, and the authors identify assumptions that could change the timing, including preferential flow, which would make the model underestimate leaching.

The same site is operated under a state permit to keep nitrate below the drinking-water standard, and its 13 monitoring wells are sampled for nitrate under that permit. When researchers measured PFAS there in 2019 to 2021, PFOS or PFOA was detected in all 13 wells, total PFAS reached 155 ng/L against an effluent average of 88 ng/L, and concentrations rose in the direction of groundwater flow, lowest upgradient and highest in the irrigated areas that receive the accumulated flow (Mroczko et al., 2022).

Like the Recycled Water Rules, which set a numeric limit for nitrogen and none for PFAS, that permit monitored the conventional parameter, and the PFAS findings came from a research study. The lesson for a permit term of up to ten years (Section 600.02) is that a clean groundwater record during the term does not show that persistent chemicals are not accumulating above it.

We ask DEQ to: require that groundwater analyses distinguish pathogen attenuation from persistent constituents; require baseline sampling of nearby wells for persistent constituents before first delivery of recycled water to a canal or recharge site; and consider age tracers such as tritium where a connection between shallow and deep zones is in question.

D. Deep municipal wells are not demonstrably isolated from surface water.

Public statements often treat deep aquifers as protected. The record is less certain. IDWR's Treasure Valley Hydrologic Project summary states that relatively few data describe vertical hydraulic connection within the deeper regional aquifers, that limited vertical flow is "expected" from clay layers and was represented by low simulated vertical conductivities, that wells with poor surface seals or inadequate seals between aquifers can let contaminants reach deeper zones, and that recharge to the deeper aquifers begins as downward flow through coarse alluvial-fan sediments in the eastern valley and along the Boise Front, where clay zones are generally absent (Petrich, 2004). Isotope sampling found tritium-bearing, post-1950s water in several production wells, including municipal wells, and the authors described the extent of surface-water contribution to the deep aquifers as unclear (Hutchings & Petrich, 2002). DEQ's voluntary sampling has detected PFAS in several Treasure Valley public water sources, including a well serving a residential neighborhood (KTVB, 2023, citing DEQ).

In the Treasure Valley, several deep wells in one groundwater management area rose more than 50 feet between 2000 and 2025, a rise IDWR attributes likely to a combination of reduced pumping and managed recharge (IDWR, 2025, 2026), which shows how strongly deep wells respond to what happens at the surface.

Pumping pressure on the deep aquifers is growing: the valley's population more than doubled between 1990 and 2017 and is projected to reach about 1.6 million by 2065 (Bartolino, 2019). A national analysis of thousands of tritium measurements found that modern groundwater reaches deeper in heavily pumped aquifer systems (Thaw et al., 2022), and IDWR's own model found that a 20 percent increase in withdrawals would be supplied partly by increased leakage from the Boise River and reduced drain discharge (Petrich, 2004). The hydrologic project's data date from 1996 to 2001.

We ask DEQ not to rely on presumed isolation of deep aquifers in reuse or recharge evaluations without site-specific evidence.

E. Recharge and canal delivery of recycled water need consistent treatment.

The rules define ground water recharge as adding recycled water to the zone of saturation (Section 010.04) and require surface-application recharge systems to use site-specific modeling for site location and aquifer storage time, provide an approved groundwater-monitoring program near the application site, and protect beneficial uses on down-gradient properties not controlled by the system owner (Sections 607.01–.03). DEQ's FAQ states that Class A recycled water may be used for groundwater recharge, that DEQ has previously determined that commingling Class A recycled water with surface water in specific shared irrigation canals is consistent with water quality standards and that similar precedents exist in Idaho, and that both IDWR and DEQ would be involved in permitting recycled water for deep injection wells. These pathways are governed by different provisions and, for injection, by two agencies.

DEQ's position on canal delivery. In responding to comments on a draft reuse permit (M-255-01) for a project that discharges Class A water into an irrigation canal, DEQ wrote in January 2020 that once the water "meets the definition of Class A water and is discharged from the end of the pipeline and into the [canal], ***it is no longer considered recycled water.***" DEQ also stated that the rules had not considered a canal as a distribution system, substituted a public-education program for user agreements, and noted that recycled water would be at most 13 percent of the canal's flow (DEQ, 2020). Section 605.03.a.v requires operators of Class A distribution systems, including operators of systems that use a combination of Class A recycled water and other irrigation waters and operators employed by buyers of the water, including home occupants, to sign a utility user agreement stating that they understand the origin of the effluent and the concept of agronomic application rates. That subsection also requires a public-education program; it does not present education as an automatic substitute for user agreements. Section 605.03.a.iv separately addresses mixing with other irrigation water: pipe-to-pipe mixing requires approved backflow protection for both sources, and an unlined mixing pond

requires Class A water permitted for groundwater recharge, whereas pond mixing of water permitted only for irrigation requires a lined pond.

If that interpretation applies generally, DEQ should explain which downstream signage, user-agreement, distribution, and monitoring requirements continue to apply after canal discharge. The Class A treatment-system back-up requirements in Section 605.03.e address failures before release; they do not themselves establish a downstream notification or response system for water already delivered. Nor does uncertainty about the classification of a canal mixture establish that groundwater protections cease to apply. The Groundwater Quality Rule applies to activities with the potential to degrade groundwater, and Section 150.03 expressly requires that surface-water infiltration not impair groundwater beneficial uses (IDAPA 58.01.11, Sections 150 and 150.03). We found no express provision in the Recycled Water Rules specifically requiring notice to downstream users or drinking-water suppliers of a determination that canal-mixed water is no longer being treated as recycled water; we ask DEQ to identify any applicable requirement.

We ask DEQ to: explain publicly which permit governs each pathway (canal delivery, surface recharge, injection); require the same characterization of persistent constituents and microbial risk for each; evaluate canal delivery and recharge together where they affect the same aquifer or down-gradient wells; and state the legal basis for treating recycled water discharged to a canal as no longer recycled water, say whether DEQ applies that position to other permits, and explain how it fits the mixing and user-agreement provisions of Sections 605.03.a.iv–v and the groundwater–surface-water protection requirement in IDAPA 58.01.11, Section 150.03.

F. Compliance with the current requirements cannot be assumed, and failures are found late.

The rules, and every request in Parts I through III, assume that permit requirements are met. The public has little basis for that assumption, and a streamlined renewal asks it to extend its trust for up to ten more years.

The record for discharge permits. The Idaho Conservation League's ninth annual review used EPA's compliance database for January through December 2025. It found that 60 of 114 municipal plants with discharge permits (52.6 percent) violated an effluent limit at least once, for 464 violations in all (ICL, 2026). More than half of plants have done so in every year since 2007, although the share has fallen from an earlier level of about three-quarters. Eleven plants accounted for about 57 percent of the violations. Some problems last for years. One plant installed a treatment system in 2013 that has never removed enough ammonia, and its compliance agreement with EPA targets a replacement by 2030. Another reported 23, 39, and 31 violations in 2023, 2024, and 2025, serves a community in which about 43 percent of residents are low-income, and signed a compliance agreement in 2025. ICL reports that only a small handful of plants are penalized in a given year and that penalties can take a long time to finalize. Performance can also change quickly: pounds of pollutant over limits statewide rose from about 9,500 in 2023 to about 87,700 in 2024 and about 112,500 in 2025, largely because of one or two plants (ICL, 2026).

What that record does not show. It covers discharge permits and self-reported data: ICL collected no samples of its own, and it counted only discharge violations, not the operating, maintenance, reporting, and record-keeping violations that are also enforceable. *E. coli* and fecal coliform are among the pollutants ICL lists as most often exceeded, but the report gives no counts by pollutant, and its load figures cover solids, phosphorus, chlorine, BOD, and ammonia, not bacteria. It also does not measure compliance with IDEQ Reuse Permits, which ICL describes as separate from discharge permits, generally less protective, less likely to require close effluent monitoring, and only sometimes requiring soil and groundwater monitoring. IDEQ records show 41 municipal plants with Reuse Permits, 13 of which also hold discharge permits, and ICL sees a growing trend toward reuse permits (ICL, 2026). Four plants with perfect discharge records hold Reuse Permits and discharged nothing to surface water that year, so their clean record says nothing about how they met their reuse permits. We therefore cannot say how reuse permittees perform, and we do not assert that they fail at the same rate. The point is that the public cannot check.

What compliance results do—and do not—show, and when problems become known. An elevated indicator result, a treatment-barrier failure, and a permit violation are not interchangeable. Sampling frequency, laboratory turnaround, and reporting can also delay recognition and notice.

- For Class A and B, total coliform compliance is judged on the median of "the last seven (7) days for which analyses have been completed," and no sample may exceed 23 per 100 mL (Section 601). Assuming one result per sampled day, up to three results above 2.2 per 100 mL within those seven sampled days need not cause the median criterion to be exceeded, provided no individual result exceeds 23. The seven sampled days need not be consecutive calendar days. Such elevated results are not automatically permit violations or demonstrated treatment-barrier failures.
- DEQ may consider alternative total-coliform monitoring frequencies case by case upon a demonstration that the alternative protects human health and the environment (Section 601.07). The ordinary sampling frequencies are weekly for uses specifically requiring Class C and monthly for uses specifically requiring Class D (Sections 601.03.b and 601.04.b).
- Section 500.04.b requires oral reporting to DEQ within 24 hours after the permittee becomes aware of noncompliance that may endanger human health and the environment. Section 500.04.c requires a written report of any noncompliance as soon as possible, but within five days after the permittee knows or reasonably should know, unless DEQ extends that period. The specified Class A treatment exceedances in Section 605.03.e.ii must be reported immediately, as discussed below; the general 24-hour provision is not the only reporting clock. Recognition and reporting therefore depend in part on the operator's monitoring and awareness.
- We found no provision in the Recycled Water Rules that tells downstream canal users, neighboring households, or the public when noncompliance is reported (if one exists elsewhere, we ask DEQ to identify it).

- Coliform monitoring cannot show the failure of a barrier against chlorine-resistant protozoa (Part III.A.4), so some failures would not register at all.

A coliform test requires incubation, commonly about a day (18 to 24 hours for the Colilert tests that EPA approves for wastewater, 40 C.F.R. § 136.3, Table IA; Section 601 names no method), and water that has left the plant may be applied to a field, held in a pond, or used by a neighbor before a result is known. Conveyance to the first user can take days in some canals, and DEQ does not explicitly require an applicant to compare the time needed to detect a failure with the time water takes to reach its first user. Water already delivered cannot be recalled.

The rules already have failure-response features for Class A, and the public cannot see whether they work. Section 605 governs design and construction of new facilities and existing facilities undergoing material modification. Within that scope, Section 605.03.e requires Class A treatment systems to have a back-up (another permitted disposal option or diversion to adequate lined storage), redundant monitoring and automatic bypass, and sufficient standby power. The back-up activates automatically if turbidity exceeds or chlorine residual drops below the required instantaneous value for more than five minutes, or if an alternative filtration/disinfection system fails to achieve its required 5-log virus removal/inactivation for more than five minutes. The specified exceedances must be reported immediately. More than two such exceedances in a week, or failure to report them, provides sufficient grounds for DEQ to shut the system down for inspection and repair; the provision does not make shutdown automatic. Section 920 allows revocation, including emergency revocation effective on receipt when DEQ makes the findings required by Section 920.03.

These are sound provisions. We know of no public record of how often back-ups activate or whether DEQ has acted on them. The discharge-permit enforcement examples described by ICL raise a question about how DEQ applies these separate reuse-permit provisions; they do not show how often DEQ has exercised the shutdown authority described here. This chapter does not set out a parallel Class B-specific package of automatic-diversion and redundancy requirements comparable to Section 605.03.e, even though Class B is allowed on all edible food crops. General operation and maintenance duties in Section 500.01 and the applicable emergency-planning requirements in Section 300.05 still apply; Section 605 also refers to applicable Wastewater Rules. These design provisions alone do not establish the retrofit obligations of every existing facility.

Why this bears on the current-science condition. A facility that meets its permit may still fail to protect (Parts II and III). A facility that cannot meet its permit cannot be relied on to adopt new monitoring, and a funding shortfall is enough to cause that. ICL notes that low-income communities may be unable to fund upgrades through rates, and that state planning grants and construction loans are allocated by greatest need. Records also change: nine plants went from about two violations each in 2024 to none in 2025, while others went the other way (ICL, 2026). The public is being asked to rely on a permit condition it

cannot verify, at a facility whose ability to meet it can change. A current-science review at renewal means little unless the facility's compliance with its existing permit is verified, current, and public.

We ask DEQ to apply the following to canal delivery and to recharge, including surface recharge basins:

(a) make a verified compliance record, including any related discharge permit, part of eligibility for any streamlined renewal and for any new canal or recharge use, and treat repeated noncompliance as a trigger for full review (Part I, items 3 and 5);

(b) publish reuse-permit compliance data (total coliform, turbidity, chlorine residual, back-up activations, and noncompliance reports) on a regular schedule, as discharge-permit data are published;

(c) notify downstream canal users, affected households, and owners of wells near a recharge site as soon as possible, and no later than 12 hours after DEQ receives a noncompliance report involving recycled water that has already left the facility; identify DEQ as responsible for issuing or ensuring that public notice;

(d) require the applicant to distinguish failures detected by process monitoring from noncompliance or contamination detected only after sampling and laboratory analysis. For each relevant failure type, state the maximum time to detection and cutoff or diversion, and compare that time with travel to the first user or recharge entry point. Separately state laboratory turnaround, reporting, and public-notification times. Where timely detection and diversion cannot prevent delivery, require the applicant to hold the water until the relevant release results are known; public notification should follow item (c) and should not be treated as a substitute for preventing delivery;

(e) extend the Class A back-up, automatic-diversion, and immediate-reporting provisions of Section 605.03.e to any recycled water delivered to a canal or recharge basin or used on food crops, with the applicability to existing facilities stated explicitly;

(f) limit alternative monitoring frequencies under Section 601.07 for canal delivery, recharge, and food-crop use, with public notice when one is granted; and

(g) verify compliance independently, for example by periodic split samples or unannounced inspections, and report the results.

G. Keeping the rules adaptable to new knowledge: contaminants of emerging concern

In 2013 a University of Arizona publication from the Water Resource Research Center asked what should be done about chemicals and organisms that water-quality rules do not monitor, and described contaminants of emerging concern as "a contemporary and evolving issue" for which federal and state governments were still trying to formulate an

approach (Raghav et al., 2013). The term contaminants of emerging concern can sound like a list of unproven hazards. As the U.S. Geological Survey defines it, in the words that publication quotes, it covers any synthetic or naturally occurring chemical or any microorganism that is not commonly monitored but has the potential to cause known or suspected harm, including substances that have been released for a long time and went unrecognized until detection methods improved. In this letter, the concern is contaminants not covered by specified routine analytical panels or constituent-specific numerical limits, even when broader narrative protections may apply.

More than a dozen years later, the Recycled Water Rules set numeric limits for coliform, turbidity, chlorine residual, nitrogen, BOD5, and pH, and none for PFAS, pharmaceuticals, flame retardants, alkylphenols, or other contaminants of emerging concern (Part II). The groundwater rule has listed numerical standards for chloroform and total trihalomethanes, both reported in the utility sampling. It also has an operative narrative standard that covers contaminants alone or in combination and expressly provides bases for determining specific numerical levels, including the best scientific information currently available (IDAPA 58.01.11, Section 200.02). That provision does not itself prescribe the routine analytical panels or updating schedule requested here. At the federal level, EPA set drinking-water limits in 2024 for six of more than 10,000 PFAS (it has since proposed to rescind four of them) (U.S. EPA, 2024; 2026). The question is how current scientific information will be translated into characterization, permit conditions, and monitoring under both the listed numerical standards and the narrative standard.

PFAS are among these ‘emerging’ contaminants, and arguably so is every PFAS that still has no limit. These comments can address only a small fraction of the field. They discuss PFAS, endocrine-active compounds, antibiotic resistance, and a few other examples because science has studied them; for some chemical examples, the Treasure Valley measurements described in Part II also establish local occurrence. We did not search exhaustively for others. Contaminants we leave out are left out because of our limited knowledge and limited local data, not because they warrant less concern.

Two points apply across all of these contaminants. Individual-constituent standards do not by themselves address mixtures: EPA set a mixture limit for four PFAS in 2024 because chemicals that individually are not known to cause harm can pose concerns together, though the agency has now proposed to rescind it (U.S. EPA, 2024; 2026). And exposure begins before birth: EPA’s 2024 rule identifies pregnancy and early childhood as critical life stages, and the Endocrine Society identifies puberty as another (Gore et al., 2015). The state’s own groundwater standard already reaches contaminants “alone or in combination” that are “teratogenic” (IDAPA 58.01.11, Section 200.02).

The lesson we draw is about method, not about any single chemical. A fixed analytical panel or numerical constituent list cannot by itself identify every contaminant that later science makes relevant. The groundwater narrative standard already provides a route for applying current scientific information; a permit with a fixed term of up to ten years still needs

characterization and monitoring that make that protection effective (IDAPA 58.01.11, Section 200.02; IDAPA 58.01.17, Section 600.02). We therefore ask DEQ to make the application and updating of current science explicit in this periodic review. We ask DEQ, through the implementation paths discussed in Part III.H, to (i) require characterization of the contaminants discussed in Parts II and III at application and renewal, so that Idaho builds its own record where listed constituent-specific numerical standards do not yet exist and can apply the narrative standard; (ii) keep a standing list of constituents to be characterized, reviewed on a stated schedule and added to when EPA, another state, or the peer-reviewed literature identifies a contaminant of concern; (iii) publish the results, so that what is learned under one permit informs the others; and (iv) pair chemical analysis with effects-based testing, which can detect hormone-like or other biological effects from chemicals no one thought to measure.

The Living Filter example in Part III.C illustrates the concern: a creative system managed to the standards of its day accumulated persistent chemicals that became evident only when researchers measured them (Jahn et al., 2023; Mroczko et al., 2022). An Idaho permit can run for ten years, and the first sign of a delayed groundwater problem may come after it ends.

H. Authority and implementation.

We recognize DEQ's position that new statewide requirements for emerging contaminants could implicate Idaho Code § 39-107D. Many requests concern characterization, case-by-case review, and permit conditions rather than new statewide numeric standards. The existing authorities we identify for DEQ's consideration are: application content (Section 300.03, including 300.03.n, which allows DEQ to request other information needed to issue the permit), case-by-case review of Class A and Class B treatment systems with pilot testing or demonstration (Sections 601.01 and 601.02), disinfection requirements after storage set case by case (Section 601.06), permit conditions on recycled-water composition and pretreatment (Section 600.03), monitoring conditions specifying sampling locations, monitored substances, analytical procedures, and reporting (Section 600.05), modification when a pollutant not limited in the permit is discharged above a level that may adversely affect surface or groundwater (Section 700.01.d), industrial permit conditions tied to the Ground Water Quality Rule (Section 608.01), the Groundwater Quality Rule's numerical and narrative standards as a basis for identifying permit conditions (IDAPA 58.01.11, Section 150.01), its protection of interconnected groundwater and surface water (Section 150.03), and its narrative standard addressing contaminant concentrations alone or in combination and the determination of specific numerical levels from current science, beneficial-use protection, or practical quantitation levels when the specified conditions apply (Section 200.02), and the application's compliance showing (Section 300.03.m). Other requests seek explicit, generally applicable requirements, such as renewal criteria, downstream notification, and scheduled updating of characterization requirements. We ask DEQ to distinguish what it considers supportable through existing case-by-case authority from what would require rule changes or additional statutory findings. To the extent DEQ

considers any request broader than federal law, we ask that it be identified as § 39-107D(1) provides. The References list the evidence we rely on.

Summary of requests

1. Confirm the exact proposed text of Section 300.04, how it would change existing treatment of renewal applications, and whether municipal renewals are affected.
2. Keep Sections 300.03.f, i, and m required at renewal, and Section 300.03.j unless documented unchanged; record any omissions in the staff analysis and permit notice; adopt the specific eligibility criteria and triggers in Part I; and preserve public notice. Administrative streamlining should not waive substantive review: canal and dedicated-recharge permits should receive it at every renewal, and other permits at least every five years, including midterm when necessary.
3. Condition any streamlined renewal on a current-science review: a microbial characterization beyond total coliform (coliphage; protozoa where relevant), validation of protozoan removal by filtration, monitoring at the point of discharge or delivery and along long conveyance, resistance-marker characterization where sources warrant, and precursor and by-product characterization, benchmarked against the verification and post-treatment practices that the produce-industry review itself describes.
4. Examine the exposure routes: require an exposure-route analysis for canal delivery, recharge, and similar uses, covering drinking-water wells, gardens and orchards, livestock and poultry and their products, soil and dust, direct contact, spray and aerosol, ponds and fish, downstream users, and their sum; update it at renewal. Notify households in the affected area before an application is submitted (for permit renewals, when notice of intent to renew is given) so that unrecorded drinking-water wells are reported; clarify the geographic scope of the well inventory; and require that any waiver of Section 603 notification be documented, supported by Section 940's demonstration of no detrimental effect upon existing water quality and adequate protection of beneficial uses, open to comment, and paired with alternative notice. Notify drinking-water suppliers and households with irrigation connections when canal delivery begins, with reassessment of cross-connection and backflow programs. For PFAS, require the complete analyte list of the specified PFAS method (for example EPA 1633), suitable reporting limits below the relevant health-based limits, influent and effluent sampling on several dates, and complementary precursor-potential assessment; this is not comprehensive coverage of every PFAS. Separately require analysis of other endocrine-active compounds with appropriate methods and reporting limits, together with estrogen- and thyroid-activity bioassays. Before any canal or recharge discharge is permitted, require receiving-water baseline sampling and subsequent monitoring at the discharge and defined downstream points using the same specified panels and reporting limits as the effluent, with results reported to DEQ and the public.
5. In the periodic review: adapt travel-time analysis for persistent chemicals; avoid presuming deep-aquifer isolation; and clarify which permits and downstream

requirements govern canal delivery, recharge, and injection, including how the mixing and user-agreement provisions and groundwater–surface-water protections apply. Do not treat upstream source control as a substitute for characterization and review at the point of reuse, because compounds phased out decades ago still appear in wastewater.

6. Make compliance verifiable and failures quickly known: make a verified compliance record part of eligibility for administrative streamlining of renewal and for any new canal or recharge use; publish reuse-permit compliance data; and require DEQ to issue or ensure notice to downstream canal users, affected households, and owners of wells near recharge sites as soon as possible and within 12 hours after DEQ receives a noncompliance report involving water already outside the facility. Require applicants to distinguish process alarms and diversion from laboratory-result delays, compare detection and cutoff times with travel to the first user or recharge entry point, and hold water for relevant release results when timely prevention of delivery cannot otherwise be demonstrated. State reporting and notification times separately. Extend the Class A back-up, automatic-diversion, and immediate-reporting provisions to canal delivery, recharge basins, and food-crop use, with applicability to existing facilities stated explicitly; limit alternative monitoring frequencies; and verify compliance independently.
7. Keep the rules adaptable to new knowledge: require characterization at application and renewal that supports implementation of listed numerical and narrative groundwater standards; keep a standing list of constituents that DEQ reviews on a stated schedule and adds to as EPA, other states, or the literature identify contaminants of concern; publish the results; and pair chemical analysis with effects-based testing.

The question posed in 2013 was what should be done about contaminants the rules do not examine. We ask DEQ to answer it in this periodic review: by making the characterization and monitoring needed to apply current science explicit, reviewing those requirements on a schedule, and doing so in public.

We appreciate the opportunity to comment and would welcome a written response and a meeting.

Sincerely,

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