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VIA EMAIL

June 11, 2022

**To:** Meg Parish, Permits Section Manager, Water Quality Control Division, Colorado Department of Public Health & Environment.

**Cc:** Kathleen (KC) Becker, EPA Regional Administrator; Mandy Mercer, Environment Specialist, Water Quality Control Division, Colorado Department of Public Health & Environment; Lesley Dahlkemper, Tracy Kraft-Tharp, and Andy Kerr, Jefferson County Commissioners; Jim Rada, Director and Roy Laws, Environmental Engineer of Jefferson County Public Health; and Chris O'Keefe, Director and Pat O'Connell, Engineering Geologist of Jefferson County Planning and Zoning; and Russ Clayshulte, Bear Creek Watershed Association Manager.

**From:** *The Conifer & South Evergreen Community Committee.*

**Subject:** Request by Conifer Metropolitan District for a variance in permitted levels of total dissolved solids and chlorides discharged into the groundwater and surface waters of the State of Colorado.

**References:** Conifer Metropolitan District Documents: *Colorado Discharge Permit System (CDPS) COX631000 Permit Application*, dated July 22, 2021. Colorado Department of Public Health & Environment Documents: *DRAFT COX631082 Conifer MD Variance Decision, NOT FINAL COX631082 Fact Sheet, and NOT FINAL COX631082 Permit Certification.*

**Introduction:** Founded in 2018 as a community organization that promotes sustainable land-use policies within our mountain communities, the *Conifer & South Evergreen Community Committee, LLC* (the "Committee") has worked assiduously to develop practical, mountain community-oriented recommendations concerning: firefighting and fire safety; water and wastewater treatment; development site access that allows a robust emergency response as well as safe evacuation; protection for the environment and wildlife; and a broad range of other community oriented land-use decision process improvements. As a community advocacy organization, the Committee is recognized by Jefferson County to speak before the Planning Commission and the Board of County Commissioners; is composed entirely of citizen volunteers; and does not accept outside

funding, see <https://www.cosecc.org>.

The Committee submits the following comments in response to the permit application submitted to the Colorado Department of Public Health & Environment (CDPHE) Water Quality Control Division (WQCD or the "Division") by the Conifer Metropolitan District (Conifer MD or the "District") entitled *Colorado Discharge Permit System (CDPS) COX631000 Permit Application*, dated July 22, 2021 (the "Permit Application"). The Division presents its arguments for a regulatory basis, the rationale, and possible future benefits for granting the Permit Application in the WQCD document, *Draft Decision on CMD's Total Dissolved Solids (TDS) Variance*, (the "Draft Decision"). The Permit Application, if granted, would allow the District to discharge levels of total dissolved solids (TDS) at a maximum contaminant level (MCL) of 1661 mg/L - which is 1.25 x 1328 mg/L, the maximum TDS level measured by Conifer MD to-date - as well as unlimited levels of chlorides (Cl) on a monitor-only basis into the groundwater and surface water systems of the State of Colorado, significantly above the maximum contaminant level limits established by CDPHE as the department implemented the U.S. Clean Water Act.

#### EXECUTIVE SUMMARY

**Regulatory Basis, Rationale, and Benefits for Grant of Permit Application have not been Adequately Established:** In its Draft Decision, the WQCD has failed to establish a sound regulatory basis, a factual, science-based rationale, and a clear set of public benefits that would allow it to grant this Permit Application. Therefore, the Committee is adamantly opposed to any action that would allow Conifer MD to discharge TDS up to 1661 mg/L and Cl at any level under a "Monitor and Report Only" regulatory regime into a groundwater tributary to the Bear Creek watershed. If the present variance for Cl is continued and this variance for TDS is granted without understanding the cause(s) and the impact to groundwater and surface water, evidence already in the record indicates that hundreds of acres and thousands of persons will be impacted negatively in the years to come.

**Conifer MD Site Hydrogeology, Development Challenges in Mountain Areas, and the Need for a Root-Cause Analysis Study:** Through these comments, the Committee presents: 1) hypotheses regarding the hydrogeology of Conifer MD parcel and vicinity and 2) practical steps that can be taken to reduce the levels of TDS within the various, interrelated District systems, through what the Committee has termed a "Root-Cause Analysis Study of TDS and Chloride Accumulation within the Conifer MD Water Reuse System". Moreover, seeking a grant of regulatory relief without any serious attempt to understand the hydrogeology of the Conifer MD facility location as well as the nearby hydrologically connected areas is a recipe for continued worsening of the situation for many decades into the distant future.

**Conclusion and Request:** Rather than allowing an increase in TDS MCL from the currently allowable 400 mg/L to 1661 mg/L and maintaining the Cl MCL at its Monitor and Report Only status, the Committee asks that the WQCD deny this Permit Application and, instead,

require that Conifer MD immediately begin a root-cause analysis study program such as the "Root-Cause Analysis Study of TDS and Chloride Accumulation within the Conifer MD Water Reuse System" outlined in our comments below.

#### RESPONSE TO THE WQCD DRAFT DECISION

**WQCD Regulatory Basis for Granting the Permit Application:** In Section I of the Draft Decision, the Division declares a regulatory basis for granting the subject Conifer MD Permit Application, by making four arguments:

1. The sources, both external and internal, that contribute to high-levels of TDS in the local groundwater system are broad-based, persistent, and outside the control of Conifer MD.<sup>1</sup> ***Response: Conifer MD has not established an empirical basis for a claim that the high-concentrations of TDS and chlorides contained within its raw water supply and effluent discharges of are in anyway caused by sources outside the control of Conifer MD.***
2. Road salt laid down by Colorado Department of Transportation and Jefferson County trucks, are potential external TDS sources, and local property management company trucks, are potential internal TDS sources, are the primary external sources that contributing to high-levels of TDS in the local groundwater.<sup>2</sup> ***Response: Conifer MD has not established an empirical basis for a claim that the high-concentrations of TDS and chlorides contained within its raw water supply and effluent discharges of are in anyway caused by sources of road salt.***
3. Notwithstanding the fact that TDS above 1000 mg/L is known to be harmful to native riparian vegetation, agricultural crops, and aquatic life, neither the EPA nor CDPHE have developed human health-based and ecosystem-based water quality standards for TDS.<sup>3</sup> ***Response: This argue fails in that both the EPA and CDPHE have set a Secondary Maximum Contaminant Limit for TDS to 400 mg/L, presumably for good reasons. Also, it is well known in the scientific community that at TDS levels of 1000 mg/L, effluent discharged into the river system - in this***

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<sup>1</sup> See, the [Draft Decision](#), "Primary causes of high concentrations of TDS in surface water and groundwater include the natural weathering of rocks; the evaporation of shallow groundwater which concentrates dissolved solids in groundwater; groundwater pumping that can pull deep saline water upward to shallow depths; irrigation practices; and a variety of other human activities such as the use of detergents, water softeners, fertilizers, and road salts, and the generation of urban runoff and animal and human waste, which all contain elevated concentrations of dissolved solids that are delivered to groundwater by wastewater disposal, septic systems, or direct application to the land surface.", pages 1 & 2.

<sup>2</sup> See, the [Draft Decision](#), "In the Conifer WWTF area specifically, CMD has identified the application of road salts by the Colorado Department of Transportation, Jefferson County, and local property management companies as a potentially significant source of high TDS concentrations in groundwater. CMD provided that 'One road salting truck emits 13.8 times the TDS than [sic] one day of WWTP discharge.'", page 2.

<sup>3</sup> See, on page 2 of the [Draft Decision](#), the table of TDS Water Quality Standards, taken from Regulation 41.

case North Turkey Creek, a tributary to the South Platte River - aquatic life will be severely impacted, especially over time, see the table below.<sup>4</sup>

- Under Regulation No. 61 - Colorado Discharge Permit System Regulation, the Division is allowed to grant variances from control regulations under Regulation 61.12(b) if "...the benefits derived from meeting the limitation(s) do not bear a reasonable relationship to the economic, environmental, and energy impacts ... particular to the applicant." **Response: The WQCD has not established a sound foundation for such a determination: Regulation 61.12(b) must be used only as a "regulatory basis of last resort" for its regulatory actions.**

**Salinity Effects on Drinking Water, Irrigated Agriculture, and Ecosystems**

Total Dissolved Solids (mg/l)	Category	Drinking Water	Agriculture	Ecosystems
0 to 500	Fresh	EPA secondary standard	Acceptable for most crops	Acceptable for fresh-water species
500 to 1,000		Hardness; deposits; colored water; staining; salty taste	Crop yield reductions for sensitive crops	
1,000 to 2,000	Fresh to	<b>TDS = 1661 mg/L</b>  Treatment needed	Crop yield reductions for most crops	Aquatic organisms adversely affected
2,000 to 3,000	brackish		Can be used on salt tolerant crops on permeable soils	
3,000 to 5,000	Brackish		Unacceptable	Unacceptable for freshwater species
5,000 to 35,000	Saline			
above 35,000	Hyper-saline			

**SOURCE:** Table 3.1, South Platte River Salinity, January 2020, as cited.

Possible sources of TDS in the Conifer MD groundwater system have never been systematically studied - due to the fact that a system-wide, root-cause analysis has never been performed, steps taken by Conifer MD to-date to meet the TDS maximum contamination level (MCL) of 400 mg/L requirement have resulted in an on-going system-wide failure - thus, the mechanism(s) causing high-levels of TDS in both the groundwater inflow and effluent outflow systems remains the subject of speculation and conjecture. Moreover, due to the same lack of an analysis-guided approach, the Division cannot rely upon any of the conclusions with respect to the possible economic, environmental, and applicant-specific impacts resulting from the consideration of alternative treatment technologies proposed by Conifer MD. **Therefore, the Committee concludes that the WQCD has erred in its intent to use Regulation 61.12(b) as the regulatory basis granting this Permit Application.**

<sup>4</sup> See, the following study [South Platte River Salinity, January 2020](#).

**WQCD Rationale for Granting the Permit Application:** In Section II A. and B. of the Draft Decision, the Division asserts a rationale for granting this Permit Application, by presenting following five arguments, these are that Conifer MD has:

1. Explored a number of options for regulatory relief from its requirements to limit TDS and chlorides set by the original CDPS Permit COX047392 and, while the chloride MCL was previously modified to allow "Monitor and Report Only", a request by the District to have an alternative TDS MCL apply to its effluent discharge to groundwater was unsuccessful as have other its other attempts at regulatory relief.<sup>5</sup> *As a rationale for granting this Permit Application, arguments regarding attempts at regulatory relief are irrelevant in the present case.*
2. Attempted to limit sources of TDS including:
  - An investigation started in 2016 resulted in the conclusion that backwashing of water softener systems (with sodium chloride) by Conifer Town Center tenants is a significant source of TDS but that removing or reducing this source was beyond its control.
  - In 2018, a drive-through car wash was removed from service.
  - Recently the District has concluded that the majority of its TDS is sourced from toilet flushing, primarily from urine.<sup>6</sup>

*The attempts by Conifer MD to limit the sources of TDS in its raw water and wastewater treatment systems have routinely been designed to avoid determining the cause(s) of ever increasing concentrations of TDS and chlorides, thus, this argument fails.*

3. Investigated various water blending techniques that may possibly reduce the high-levels of TDS in the local groundwater system but to little effect and, additionally, has evaluated the use of reverse osmosis (RO) as a treatment technology but abandoned the technology as too costly.<sup>7</sup>

*The studies by Conifer MD of RO systems and water blending techniques in order to reduce TDS and chlorides in its raw water and wastewater treatments system were not rigorous and thorough, thus our evaluation is that they were never serious, therefore, this argument fails.*

4. Applied for regulatory relief through different points of compliance including: Discharge of its effluent into injection wells; allowing the discharge of its effluent

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<sup>5</sup> See, the [Draft Decision](#), Section II A. CMD Permit History, on page 3.

<sup>6</sup> See, the [Draft Decision](#), Section II B. Steps taken by CMD to meet TDS permit effluent limit and discussion of anticipated economic costs of meeting limit, ii. Controlling sources of TDS, on page 5.

<sup>7</sup> See, the [Draft Decision](#), Section II B. Steps taken by CMD to meet TDS permit effluent limit and discussion of anticipated economic costs of meeting limit, iii. Implementing cost-effective TDS treatment technologies, on pages 5 and 6.

into North Turkey Creek; and moving the "end-of-the-pipe" from its infiltration galleries to a different point on the property. However, each of these options were deemed to be infeasible.<sup>8</sup> [As a rationale for granting this Permit Application, arguments regarding attempts at regulatory relief are irrelevant in the present case.](#)

5. Considered eliminating the effluent discharge altogether through various means including discontinuing wastewater treatment operations; however, this was also considered infeasible.<sup>9</sup> [As a rationale for granting this Permit Application, arguments regarding attempts at regulatory relief are irrelevant in the present case.](#)

Unfortunately, from the outset none of the steps taken by Conifer MD from were designed to identify, characterize, and correct for the root-cause mechanism(s) that have created the sustained, high concentrations of TDS and chlorides prevalent in its groundwater intake and effluent discharge systems. Moreover, the rationale asserted by the Division that would ostensibly justify its grant of this Permit Application is not only insufficient in the present instance but, additionally, without a serious attempt to understand the hydrogeology of the Conifer MD facility locations as well as the related nearby areas, the grant of a permit that would routinely allow levels of TDS at 1661 mg/L to be discharged into the local groundwater, would be a recipe for continued worsening of the situation in the years and decades to come. Importantly, in the next section, the Committee presents: 1) hypotheses regarding the hydrogeology of the Conifer MD parcel and vicinity and 2) practical steps to reduce the levels of TDS within the variously related District systems. [Therefore, the Committee argues that the Division cannot reasonably grant this Permit Application in its present form. The Committee also argues that this Permit Application must be modified to incorporate a root-cause analysis study as well as requirements for the development of a plan to modify, based on analysis results, certain elements of the Conifer MD system design that may be identified by the study.](#)

**WQCD Benefits Expected From Meeting the TDS Standard:** In Section II C. of the Draft Decision, the Division discusses the benefits of holding Conifer MD to the TDS standards set forth in Regulation 41 Table 4 designed to protect the groundwater system for possible agricultural uses. However, the Division completely ignores the fact the approximately one third of the effluent produced by Conifer MD is outflow produced from to its treatment of wastewater from the Conifer Sanitation Association which is generated by commercial

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<sup>8</sup> See, the [Draft Decision](#), Section II B. Steps taken by CMD to meet TDS permit effluent limit and discussion of anticipated economic costs of meeting limit, iv. Establishing alternate points of compliance with effluent limits and v. Eliminating the discharge , on pages 6 and 7.

<sup>9</sup> See, the [Draft Decision](#), Section II B. Steps taken by CMD to meet TDS permit effluent limit and discussion of anticipated economic costs of meeting limit, v. Eliminating the discharge , on page 7.

activities at the Conifer Marketplace shopping center located nearby the junction of CO HWY 73 and U.S.-285. Under CDPS Permit COG589060 this effluent outflow, containing high concentrations of TDS and chlorides, is discharged into North Turkey Creek at a location near CO HWY 73 and Pleasant Park Road whereupon it flows downstream through the Flying J Ranch Open Space Park then into the water augmentation ponds of the South Evergreen Water District for managed release to the South Platte River via the Bear Creek Reservoir. Moreover, these high TDS and chloride-laden waters will impact downstream aquatic and plant life and will exacerbate the problem of high-salinity levels in the South Platte River, see [South Platte River Salinity, January 2020](#). *Therefore, the Committee argues that the Division cannot reasonably grant this Permit Application without first considering in detail the possible detrimental effects caused by Conifer MD discharges of high-concentration TDS and chloride-laden effluent into North Turkey Creek, a tributary to the South Platte River.*

#### CONIFER MD/CONIFER TOWN CENTER SITE CHARACTERISTICS

**Conifer MD/Conifer Town Center Site Hydrogeology:** There are two central components to the Conifer MD groundwater system:

- Interflow at the base of the regolith (in situ weathered “granite”) and the top of the underlying more or less poorly fractured crystalline (Precambrian) rocks, and
- Water contained in the fractures lying within the crystalline bedrock - these fractures decrease with depth - the overall geometry of the fracture system are sheets parallel to surface topography (sheeting, commonly called “onionskin weathering” where exposed at the surface). These sheets are then broken into smaller pieces perpendicular to the sheets.

**History of Groundwater Quality Beneath the Conifer MD Facility and Vicinity:** While a number of questions remain unanswered, the quality of the groundwater within the fractured bedrock aquifer beneath the Conifer MD facility and vicinity has been partially characterized as follows:

1. *Hydrologic Conditions and Assessment of Water Resources in the Turkey Creek Watershed, Jefferson County, Colorado, 1998-2001*, Bossong et al, 2003, see [USGS Turkey Creek Watershed Assessment 1998 - 2001](#).
2. Monitoring wells, pump tests, and first groundwater chemical analysis were reported in *The Village at Elk Crossing Water Supply Report*, Jehn, 2002 performed in conjunction with permitting process for The Village at Elk Crossing (now known as Conifer Town Center) with the Jefferson County Planning and Zoning Division, see [The Village at Elk Creek Water Supply Report](#). What was the TDS background determination made at that time, will it finally be revealed?
3. Commercial operations at Conifer MD - groundwater pumping, raw water treatment, usage within the District, wastewater treatment by the WWTP, and

then returned to the groundwater system - the present facility is an indirect potable(?) reuse system that begins operations, initially at least, in compliance with water quality standards requirements.

4. Conifer MD becomes out of compliance, at first it was Cl MCL exceedances but then TDS MCL exceedances started in 2007, continuing into the present. Now what?

**Comments Regarding 1** - Bossong et al, 2003 characterizes the predevelopment state of the Turkey Creek Watershed groundwater as follows, "Chloride is a conservative anion present in trace amounts in precipitation. In watersheds such as Turkey Creek, rock weathering contributes negligible chloride to groundwater because of a lack of chloride-bearing minerals in bedrock and soil materials. In these watersheds, the sources of chloride other than precipitation are anthropogenic, such as, ISDS's [Individual Sewage Disposal Systems] and the application of salt and dust inhibitors to roads.", see Bossong et al, 2003, p76 and "The median chloride concentration in ground water [in the Turkey Creek Watershed] was about 6.8 mg/L, and the median concentration in surface water was 64 mg/L.", see Bossong et al, 2003, p76.

**Comments Regarding 2** - In Jehn, 2002 we see that monitoring wells and first groundwater chemical analysis, that is, a background water quality determination was made in support of the Village at Elk Crossing proposed development submitted during the Jefferson County rezoning application process. As stated in the report, water sample was collected from MW #1 (Permit #238750) (this is not the current Conifer MD MW #1) near the south boundary of Conifer MD. This sample was collected at the end of a 72-hour pump test.

The Jehn, 2002 proclaims, "The quality of the groundwater is excellent, based on the preliminary results of water quality testing, and meets all State and Federal Standards for Drinking Water Quality for all parameters completed to date." Unfortunately, the actual analysis was not released. Jehn's Table 2 shows 15 analytes which include - coliform (absent), Nitrate (undetected), Nitrite (undetected), and VOCs consisting of 59 unnamed analytes (undetected). Curiously, values for SO<sub>4</sub>, Cl, and TDS were not revealed.

Jehn Water Consultants, Gina Burke, President, is still a going concern today, see [Jehn Water Consultants](#). We believe that it is highly likely that the original chemical analysis is in a project file box. It is our thought that the analysis will show a very low Cl value in line with the median of the Turkey Creek Watershed of < 10 mg/L and a TDS of < 100 mg/L. Will the staff of the WQCD make an attempt to retrieve this foundational geochemical document that establishes Background?

Additional support for a low background TDS level comes from a gravity spring discharging as interflow (from the regolith on top of crystalline bedrock) at Horse Springs (local name uncertain) located less than a mile above the junction of Light Lane and Main Street on the right descending bank of an unnamed tributary to Turkey Creek. From a pocket TDS meter,

a TDS value of 89 mg/L was obtained (see Wallack, 2022 comments sent to the WQCD regarding this Permit Application). The upgradient gathering area for the spring may contain several leach fields.

**Construction at the Conifer MD/Conifer Town Center Site:** It is ironic that, in the infrastructure construction effort at Conifer MD, the most prolific and productive water-bearing unit (the interflow zone) has been either dug away or placed behind casing in completed wells and is also used as the flow horizon for treated wastewater. Clearly, dramatic changes have been made to the surface of most of the 42-acre Conifer MD parcel starting as early as 2005:

- A gunite-covered (sprayed concrete), stepped highwall cut into bedrock and regolith along the south boundary of the Conifer MD parcel. Certainly, a significant disruption to the interflow zone aquifer. Wells drilled by David Copffer and Bill Thompson in March 2002 (Permits No. 238570 and 238571) appear to have been drilled after this highwall was cut.
- Impervious surfaces including asphalt and concrete roadways, parking lots, sidewalks, and buildings, cover significant areas of the site.
- Stormwater drains as well as the Main Street system carries runoff efficiently to the stormwater detention pond at the junction of Light Lane and Main Street. The Ebony & Vine Restaurant parking and the Starbucks (at the U.S.-285 NB exit) have stormwater drains to a detention pond below Starbucks with overflow to a culvert under U.S.-265.

The overall impact has been to create large surface areas that are impervious to recharge by precipitation into the fractured crystalline aquifer. [We argue that the application of deicers on Main Street and the parking lots of the Conifer Town Center have only a minor contribution to the TDS and chlorides levels found in the groundwater underlying the Conifer MD site.](#)

#### PROPOSED DEVELOPMENTS TO BE SERVED BY CONIFER MD

**Conifer MD Proposes to Serve Nearby Planned Developments:** In public statements by Cordes & Company, the Conifer MD court-appointed receiver, make it clear that the District intends to provide wastewater treatment to the following nearby proposed planned developments (PDs) having either granted development rights or with development applications before Jefferson County totaling 313 residential dwelling units (DUs): The Conifer Center PD, which proposes to build 188 residential DUs; the Conifer Corners PD, which proposes to build 75 DUs; and the Conifer Heights PD, which proposes to build 50 residential DUs. In addition, developers of both the Conifer Centre at Kitty Drive PD and the Red Wing PD propose large-scale developments, commercial and a residential respectively, nearby the Conifer Marketplace. [Wastewater produced at both developments would be transported by CSA to Conifer MD for treatment thereby further exacerbating the](#)

*District's high concentrations of TDS and chlorides on-site and in the effluents discharged into North Turkey Creek.*

Even though Conifer MD is not permitted by CDPHE to serve as a residential water treatment facility - the District's water decree states that water use is restricted to indoor commercial and fire protection uses only - District officials have offered legal assurances to various developers and to the Jefferson County Planning and Zoning Division that the District will be in the future fully capable of providing raw water and wastewater treatment compliant with all CDPHE standards to the developer of the proposed Conifer Center PD. *It is important that such representations to either private, commercial, or governmental entities by a state permitted metropolitan district should not be allowed under CDPHE regulations.*

**Development Challenges in Areas of Fractured Crystalline Bedrock in Colorado:** Present experience has shown that the development of large-scale commercial facilities such as shopping centers served by advanced Wastewater Treatment Plants (WWTP) are not sustainable over a period of decades without a provision for TDS treatment (removal of solids/brines using RO) when operated in the current regulatory environment wherein:

- Groundwater is assumed to be consumed at a 5% rate such that 95 % of that water must be returned to the bedrock aquifer with the consumptive use being subject to an augmentation plan and
- Colorado Water Court Divisions who issue water decrees that demand the return of used water to the fractured bedrock from which it was withdrawn.

CDPHE must recognize that, in order to solve this regulatory contradiction, the efforts and cooperation of not only the DWR (Division of Water Resources), WQCC (Water Quality Control Commission), and the WQCD but also the Colorado Water Court Divisions and, at the county level, the county geologists, health departments, planning and zoning departments, and the county commissioners.

The Committee suspects that similar situations exist with other metropolitan district WWTPs exfiltrating treated wastewater in close proximity to commercial and residential water supply wells in a fractured crystalline bedrock groundwater system. *This WQCD decision with respect to this Permit Application may be precedence setting, thus, it is worth the attention necessary to do it right.*

**DESIGN OF A ROOT-CAUSE ANALYSIS STUDY**

**Information Gathering:** As a preliminary step toward the development of a "Root-Cause Analysis Study of TDS and Chloride Accumulation within the Conifer MD Water Reuse System", the following information gathering actions should be started right away:

1. Assemble all available information for each of the wells drilled in the District and immediate vicinity:

- Cross check all the plotted well locations in the state database with orthophotos in the field and revise those locations and inform appropriate State agencies that are incorrect and file corrected locations with the State.
- Place water quality analysis data in possession of the WQCD and Conifer MD into the State well and mapping system.
- Place water analysis data into the State well and mapping system.
- Place water well depth-to-water logging data into the State well and mapping system, updating it monthly.

The purpose of placing well data into a publicly accessible location is so that community watchdog groups such as the Committee and other interested parties may examine the data, flag problems, and propose possible solutions.

2. Data gathering (both electrical conductivity (EC) monitoring and chemical analyses) are key to understanding and recording the success/failure of attempted corrective actions, therefore, the following must be performed:
  - Install monitoring equipment that will measure EC in 15-minute increments - the installation position will be at the WWTP flow point before movement of effluent into the exfiltration gallery (same point as spot sampling measurements) - so that effluent can be correlated to events within the WWTP, for example, membrane regeneration using bleach (NaClO) or for testing the hypothesis that parking lot deicer runoff makes its way into groundwater, etc.
  - Install monitoring equipment at the entrance position of the treated raw water (finished water) into the drinking water system of Conifer MD. This data will provide, by virtual that it will accessible to the public, the status of the drinking water quality at Conifer MD.
  - TDS chemical analyses can be used judiciously, especially to search for ionic species of health concern, for example, Na in regard to elevate blood pressure and Mg as an indicators of a contribution of deicers.
3. Investigate the ramifications of the statement made by the District's water quality consultant AquaWorks DBO in a 2/5/2016 memo to the Division stating that, "The water softeners installed by a number of the individual properties in the service area are effective at removing dissolved solids (hardness) from the drinking water. These units are installed inside of the individual buildings. They are privately owned and maintained - and not under the purview of..." Conifer MD.<sup>10</sup>

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<sup>10</sup> The treated drinking water from Conifer MD as supplied to tenants - and ultimately their commercial customers - is apparently not suitable for their business purposes. In response many tenants have, at their own expense, undertaken at their own expense the installation of (presumably ion exchange) water softeners to remove dissolved solids, which cause water hardness.

- The goal would be to produce a mass balance which would provide the amount by which the TDS are raised by the water softening. The WQCD must demand this of Conifer MD.
  - Conifer MD must prepare a table for all the tenants - to include make and model of the clean-up system, average daily throughput from manufacturers specifications for average "soft water" produced.
  - Evaluate and quantify all of the chemicals used in the wastewater and raw water treatment processes as to the extent that each may contribute to TDS in the system.
4. Hydrogeology Ideas and Hypotheses:
- **"New Water" Flowing into the Conifer MD Groundwater System** - Conifer MD is situated on an NNW-plunging topographic nose which terminates at the junction of Barkley Road and Highway 73. "New water" moving onto Conifer MD will flow from the topographically higher SSE. The source area is wooded and apparently covered with a thick layer of soil and regolith. We hypothesize a zone of interflow at the base of the regolith and the top of the fractured, partially weathered crystalline rock aquifer. Recharge is by snowmelt and episodic precipitation events. Flow is expected to vary seasonally and may be small to moderate. We expect chlorides and TDS to be low. Shallow wells along the southern boundary could be used to capture this flow without inducing flow from the slightly lower down-gradient exfiltration gallery. We suggest 5 ft of surface casing and then screened to a TD of 15 - 20 feet. Produced water could be used to dilute raw water before treatment.
  - **Water Flow from the Exfiltration Gallery: Where does it go?** "Synoptic measurements of water levels in wells in the fall 2001 indicate a water table surface that conforms to topography." see, Bossong et al, 2003, p1. We hypothesize the upper few 10s of feet if the crystalline bedrock at Conifer MD comprises a flow unit, as part of an interflow system. Using an as-built map of the bedrock topography, position the exfiltration gallery upon the topographic contours. Near-surface flow below the exfiltration gallery is oriented towards the NE toward Water Wells #2 and #3. Water Well #4 is along topographic strike to the WNW. Place tracers sequentially or simultaneously in the pods/arms of the exfiltration gallery and note connectivity or lack thereof with Water Wells #4 and #5.
  - **Confined Aquifer Conditions?** Within Conifer MD are areas with significant fill causing a confined aquifer condition if the main flow path is near the top of bedrock?
  - **"Old Water" Flowing out of Conifer MD?** A water-saturated zone with slow

flow, up to 3-4 feet above the stream level of the unnamed tributary to North Turkey Creek was observed in the fall of 2021 and in May 2022. The seep is located below the WWTP and there are dead aspen trees 3 to 4 inches in diameter indicate the water saturated zone formed after initial tree growth. This seep is characterized as follows: It is at almost the lowest topographic elevation of the Conifer MD property at an elevation about 8155 ft; the width of saturated zone 30 - 40 feet; the dead vegetation zone extends over to U.S.-285 fill embankment; there is no TDS information for this area; there is no FeOH precipitates noted with this seep; and there are a number of possible explanations as to the cause.

- **Several Springs are Along CO HWY 73** - along the right descending bank - from above the Conifer High School entrance stop light to 200-300 feet N of the stop light at an elevation approximately 8115 ft. The upper spring diminishes in flow rate in dry periods; there is no vegetation die-off noted, but there is a strip of older aspens which indicate a possible discharge zone at the base of the hillside along CO HWY 73. These springs are characterized as follows: They are below U.S.-285 which means they could show impact of deicer, if any were present; there is no TDS information about the area; and, again, several different explanations for these observations are possible.
- **Possible Causes of Discharge?** These various discharge situations could be the down gradient breakout to the surface of water exfiltrated hydrologically upgradient. Hopefully, a root-cause analysis study a reservoir model with water input, then a use and reuse segment and finally downstream discharge.

**Conclusion:** Rather than allowing an increase in TDS MCL from the currently allowable 400 mg/L to 1661 mg/L and maintaining the Cl MCL at its Monitor and Report Only status, the Committee asks that the WQCD deny this Permit Application and, instead, require that Conifer MD immediately begin a root-cause analysis study program such as the "Root-Cause Analysis Study of TDS and Chloride Accumulation within the Conifer MD Water Reuse System" outlined above.

Respectfully submitted,

***Conifer & South Evergreen Community Committee***