U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 8
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
STATEMENT OF BASIS
April 2017

PERMITTEE:	U.S. General Services Administration
FACILITY NAME AND ADDRESS:	Downing Reservoir Groundwater Treatment Plant One Denver Federal Center Denver, CO 80225
PERMIT NUMBER:	CO-0035033
RESPONSIBLE OFFICIAL:	Stephanie Downs, Director 303-236-8081
FACILITY CONTACT:	Dave Williams U.S. General Services Administration P.O. Box 25546 Denver, Colorado 80225
PERMIT TYPE:	Minor Industrial (New Permit)
TYPE OF TREATMENT:	Filtration and Air Stripping
FACILITY LOCATION:	One Denver Federal Center Denver, CO 80225
DISCHARGE LOCATION:	39.718333° N, 105.110555° W
RECEIVING WATER:	McIntyre Gulch, which enters Lakewood Gulch, a tributary of the South Platte River

INTRODUCTION

This statement of basis (SoB) is for the issuance of a NPDES permit to the U.S. General Services Administration (GSA), for the Downing Reservoir Groundwater Treatment Plant (GWTP). The Permit establishes discharge limitations for any discharge of water from the GWTP. The SoB explains the nature of the discharges, and the EPA's decisions for limiting the pollutants in the wastewater, as well as the regulatory and technical basis for these decisions.

The EPA Region 8 is the permitting authority for Colorado federal facilities and provides implementation of federal and state environmental laws within Colorado.

1. BACKGROUND INFORMATION

The proposed Permit is for the discharge of treated groundwater from the Downing Reservoir GWTP to McIntyre Gulch. The new GWTP will be installed and will be in addition to the current groundwater treatment plant located at Building 52A and permitted by the EPA under NPDES Permit #CO-0034860. Construction and operation of the GWTP including a trench to intercept the groundwater was completed in Fall 2017. The GWTP will discharge treated groundwater to McIntyre Gulch, which enters Lakewood Gulch, a tributary to the South Platte River.

1.1. Groundwater Contamination at the Denver Federal Center

The Denver Federal Center (DFC) campus is bordered by Kipling Street on the east, Routt Street on the west, 6th Avenue on the north and W. Alameda Parkway on the south (see Figure 1 below) in Lakewood, Colorado.

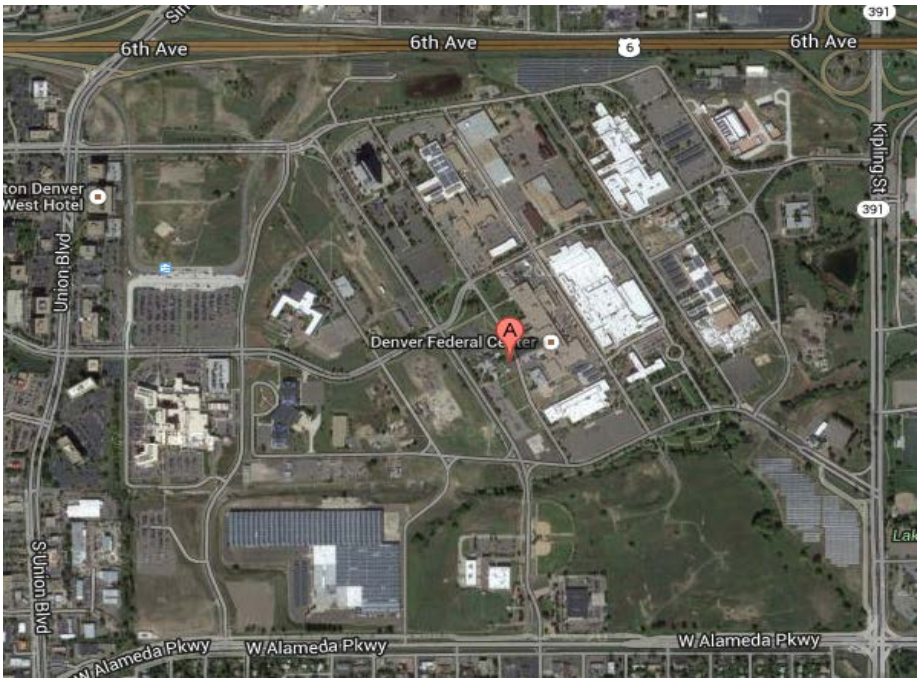


Figure 1 – Denver Federal Center Location

Most of the buildings on the DFC were constructed in 1941 for the Denver Ordnance Plant that produced ammunition in support of World War II. The DFC has since been used by more than 27 different Federal Agencies. Federal agencies have used the property for many purposes including but not limited to: pesticide and herbicide testing, animal testing, landfills (disposal of waste and construction debris), storage of hazardous materials, firing ranges, burn pits, underground storage tanks, a wastewater treatment plant, and disposal of asbestos containing material.

The Federal Highway Administration (FHWA), an agency of the United States Department of Transportation, occupies part of the DFC pursuant to an agreement with the GSA, and conducts asphalt testing in a laboratory in Building 52. In the past, FHWA had an approximately 560-gallon underground storage tank (waste tank) located east of Building 52 at the DFC. The tank was used for the storage of waste1,1,1-trichloroethane (1,1,1-TCA) and other spent solvents generated by the FHWA during asphalt testing. In 1989, tests were performed on the waste tank and results indicated that the waste tank was leaking. In 1989, FHWA drilled three holes in the vicinity of the waste tank, and soil samples were taken from those holes. Test results indicated the soil was contaminated with 1,1,1-trichloroethane at concentrations as high as 470 mg/L.

Spent 1,1,1-trichloroethane, when used as a solvent, is a listed hazardous waste with the EPA hazardous waste number F002. According to the State of Colorado 6 CCR 1007-3, Section 260.10 "disposal" means the discharge, deposit, injection, dumping, spilling, leaking or placing of any solid or hazardous waste into or on any land or water. According to Section 25-15-308(1)(b), C.R.S., no person may dispose of on-site, treat or store any hazardous waste without having either a state or federal permit or interim status for the treatment, storage or disposal of hazardous waste.

In 1991, the Colorado Department of Public Health and the Environment (CDPHE) issued the FHWA, as an operator of a hazardous waste management unit at the DFC, Compliance Order number 91-01-24-03 that cited the FHWA for violation of section 25-15-308(1)(b), C.R.S., on-site disposal of hazardous waste without a permit or interim status. On January 27, 1995, CDPHE amended Compliance Order number 91-01-24-03 with Compliance Order number 91-01-24-03a.

Information collected on past practices at the DFC and/or the Denver Ordnance Plant, documented in a December 1995 Quantalex Data Review Report, prepared by Ballofet and Associates Inc. for the GSA dated November 22, 1995, along with other documents prepared by the U.S. Army Corps of Engineers and the FHWA assessing the distribution of contaminants in soil and groundwater at the DFC, indicate that there are other sources of contaminated groundwater on the DFC, in addition to the FHWA's former underground tank.

On July 18, 1996, the GSA provided the CDPHE with a copy of the document entitled "Preliminary Assessment Denver Federal Center, May 24, 1996, (Draft) in which data on the history and past waste management activities at the former Denver Ordnance Plant and the DFC were evaluated for possible impacts to the environment. Based upon the information in “Preliminary Assessment Denver Federal Center” the CDPHE determined that there has been a release of hazardous waste and hazardous constituents into the environment from the former Denver Ordnance Plant and/or the DFC, in violation of the State of Colorado 6 CCR 1007-3, Section 265.5. The following compounds have been reported from samples taken at the DFC: 1, 1,1 - trichloroethane; trichloroethene, 1-dichloroethene; tetrachloroethene; vinyl chloride; 1,4

dichloroBenzene; N-nitrosodi-n-propylamine; 1,2,4-trichloroBenzene; 2,4-dinitrotoluene; phenol; 2-chlorophenol; 2-nitrophenol; 4-chloro-3-methylphenol; 4-nitrophenol; pentachlorophenol; acenapthene; anthracene; benzo(a)anthracene;benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; chrysene; fluoranthene; indeno(l,2,3-cd)pyrene; phenanthrene; lead and other heavy metals.

In 1997, Compliance Order number 97-07-18-01 was issued to GSA its operation of the DFC, a hazardous waste facility, without having either a state or federal permit or interim status for the treatment, storage or disposal of hazardous waste in a violation of Section 25-15-308(1)(b), C.R.S. and 6 CCR 1007-3, Section 100.10. Compliance Order number 97-07-18-01 required GSA to define, assess and remediate, if necessary, all areas of contamination which have been identified through diligent search which are either presently impacting, or may adversely impact human health and the environment. This requirement applies to contamination that originates from past or present activities at the DFC, regardless of whether it is on-site or beyond the boundaries of the DFC. In so doing, GSA shall identify, evaluate and, if necessary, remediate each specific area where solid wastes, hazardous wastes or hazardous constituents may have been disposed or released to the environment as a result of any activities conducted at the DFC and that part of the former Denver Ordnance Plant which is now the DFC, at any time, irrespective of whether the location was intended for the management
of those materials.

Since the mid-1990's, the GSA has been conducting remediation at multiple sites located at the DFC. Under Compliance Order numbers 91-01-24-03a and 97-07-18-01 GSA has been conducting various remediation efforts in order to satisfy the compliance orders. This remediation will ensure that future land development will be unrestricted and that future tenants and visitors of the DFC are safe from exposure to contaminated soil and water.

The DFC has three main solvent plumes in groundwater on the east half of the facility which have been sourced from known locations such as the FHWA leaking waste solvent tank in Building #52 and other unknown sources such as facilities that were run during the WWII era. In the southwest portion of the DFC there are several more plumes with petroleum and solvents that are also affecting the groundwater (see Figure 2 below).

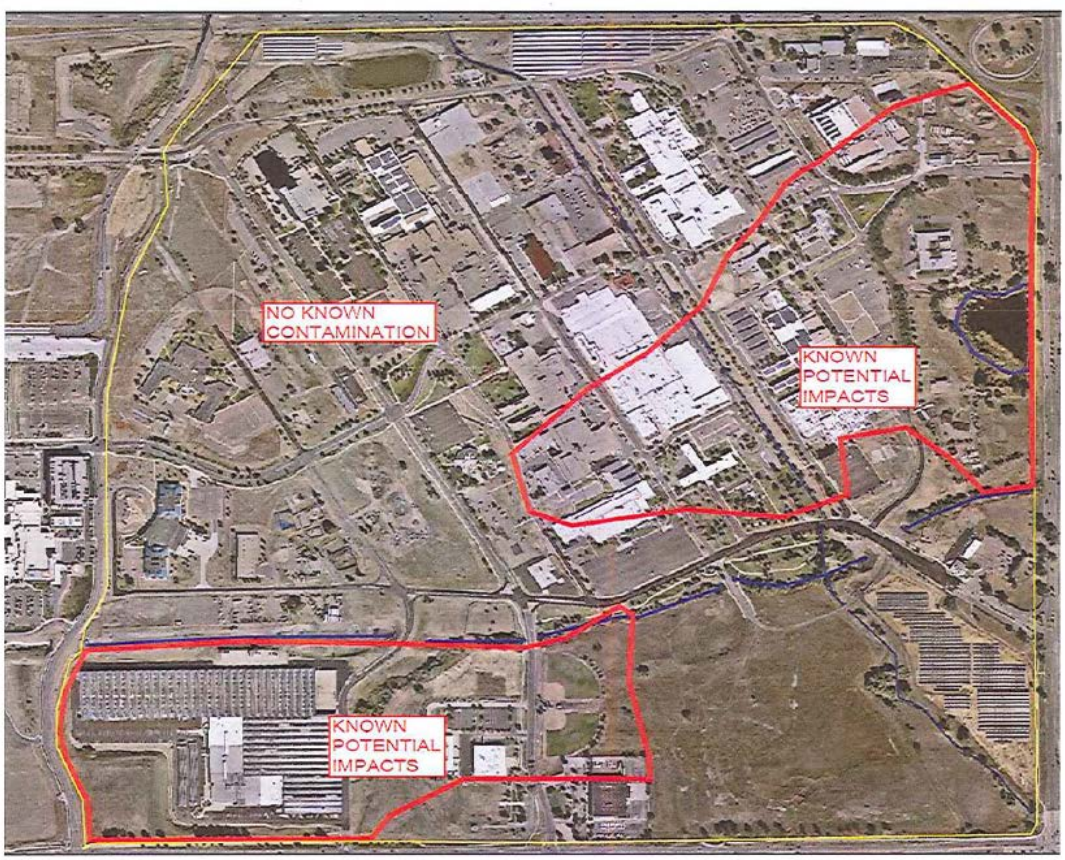


Figure 2 – Areas of Groundwater Contamination

Numerous wells have been drilled to monitor the fate and transport of groundwater contamination plumes both on and offsite of the DFC property. The locations of groundwater contamination plumes within the DFC property have been mapped by GSA per the terms of the compliance orders.

The CDPHE required the implementation of an interim measure (Interim Measure #1 or IM#1) to prevent the continued off-site migration of 1,1,1-trichloroethane and its daughter products. IM #1 was intended only as the first step in the DFC groundwater remediation process. A subsurface funnel-and-gate permeable reactive barrier (PRB) with four iron treatment gates was approved by the CDPHE and in November 1996, FHWA and GSA installed the PRB in order to comply with the interim measure. The PRB was installed along Kipling Street, with the northern end just east of the north end of Downing Reservoir and the south end just north of McIntyre Gulch. The goal of the PRB was plume containment and treatment to control offsite migration and to protect the public health and environment.

Within a few years it was determined that the IM#1 objectives were not being achieved in all areas along the length of the PRB. Several improvements and modifications were completed, but later data interpretations indicated that additional improvements would be necessary to ensure the IM#1 met its objectives.

By 2014, GSA was making plans to upgrade and improve the existing Downing Reservoir and began evaluating whether a groundwater interceptor trench could be integrated into the project to replace the aging IM#1.

In January 2015, the CDPHE approved a final corrective measure consisting of a groundwater interceptor trench that replaces the aging PRB that had become less effective in meeting its objectives. The groundwater interceptor trench is located along the upgradient (west) side of the newly reconfigured Downing Reservoir to capture impacted groundwater and convey it to a sump where it is recovered for aboveground treatment. The intercepted groundwater will be treated at the GWTP being constructed adjacent to the west side of Downing Reservoir. This NPDES permit is to regulate the discharge of treated groundwater from the GWTP.

The existing groundwater treatment plant in Building 52A was initially also an interim measure (IM #2) and was designed to capture and treat contaminated groundwater within the source area of the same groundwater plume that IM #1 treats at the eastern facility boundary. Following several improvements and modifications to IM #2, the CDPHE approved the treatment plant as a corrective measure; (i.e. the Source Area Corrective Measure (SACM)). The SACM (also called the Building 52A Treatment Plant) discharges to McIntyre Gulch under a separate EPA-issued NPDES permit CO-0034860, via the DFC's storm sewer system.

The two completely separate treatment plants (Building 52A and GWTP) will treat the same groundwater plume. The groundwater contains contaminants released by a former leaking underground storage tank in Building 52A. The tank contained waste solvent and the affected groundwater is known to contain 1,1,1-trichloroethane, trichlo roethene, 1,1-dichloroethylene, and 1,1-dichloroethane, cis-1,2-dichloroethene and 1-4 dioxane.

1.2. Proposed Treatment

Contaminated groundwater will be collected by an infiltration/interceptor trench (under Downing Reservoir) and be routed to the groundwater sump adjacent to the Downing Reservoir outlet structure. The intercepted contaminated groundwater collected in a groundwater sump will be pumped to a 2,100-gallon inlet tank internal to a Newterra® treatment system (contained within a Conex container) (Figure 3). The untreated groundwater will pass through a flow meter which will totalize the influent flow and display it on the human machine interface **(**HMI**)**. When the level in the inlet tank hits the high-level set point of elevation change, the transfer pump will pump the untreated groundwater through a set of bag filters to reduce suspended solids, and further on to an air stripper. The air stripper contains a series of trays and an air supply from a pressure blower, which helps to facilitate the separation of volatile compounds from the liquid and release the volatile compounds to atmosphere via a vent stack on the outside of the GWTP. A transfer pump will then pump the treated groundwater from the air stripper through a flow meter, which totalizes effluent flow and displays it on the HMI. A sample port (internal monitoring Outfall 001A) will also be installed at this point so the effluent from the treatment plant can be sampled without endangering worker health or safety (Figure 4) or being be diluted from a release/draw down of Downing Reservoir (see Section 6 – Monitoring for additional information).

The treated effluent water will be routed to the Downing Reservoir outlet structure where it will be discharged into the downstream portion of the outlet structure, behind the overshot gate (Figure 5).

The effluent water from the treatment system is not authorized to discharge back to Downing Reservoir. Downing Reservoir has different designated uses than McIntyre Gulch according to State of Colorado's water quality standards. The designated uses applied to Downing Reservoir include, but are not limited to, water supply which require human health based criterion be applied to the discharge permit which this permit does not include (as discussed in Section 2 below). Once the effluent is discharged into the downstream portion of the outlet structure it will flow out of the outlet structure, through a 36-inch concrete pipe and to McIntyre Gulch via Outfall 001 (Figure 6).

Figure 3 – Downing Reservoir Groundwater Treatment Plant

Figure 4 – Outfall 001A/Effluent Sampling Port

Figure 5 – Downing Reservoir Outlet Structure

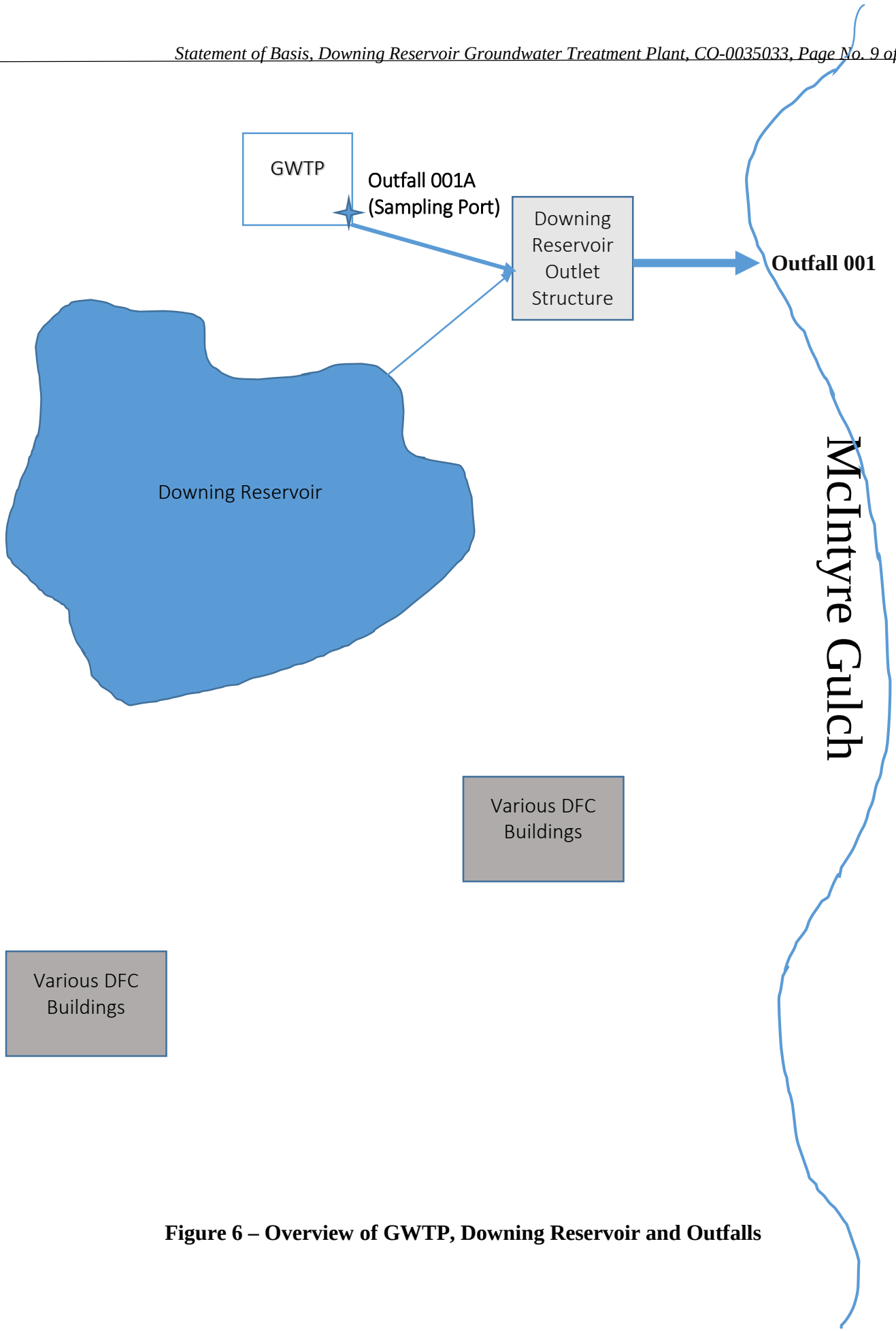


Figure 6 – Overview of GWTP, Downing Reservoir and Outfalls

2. WATER QUALITY CONSIDERATIONS

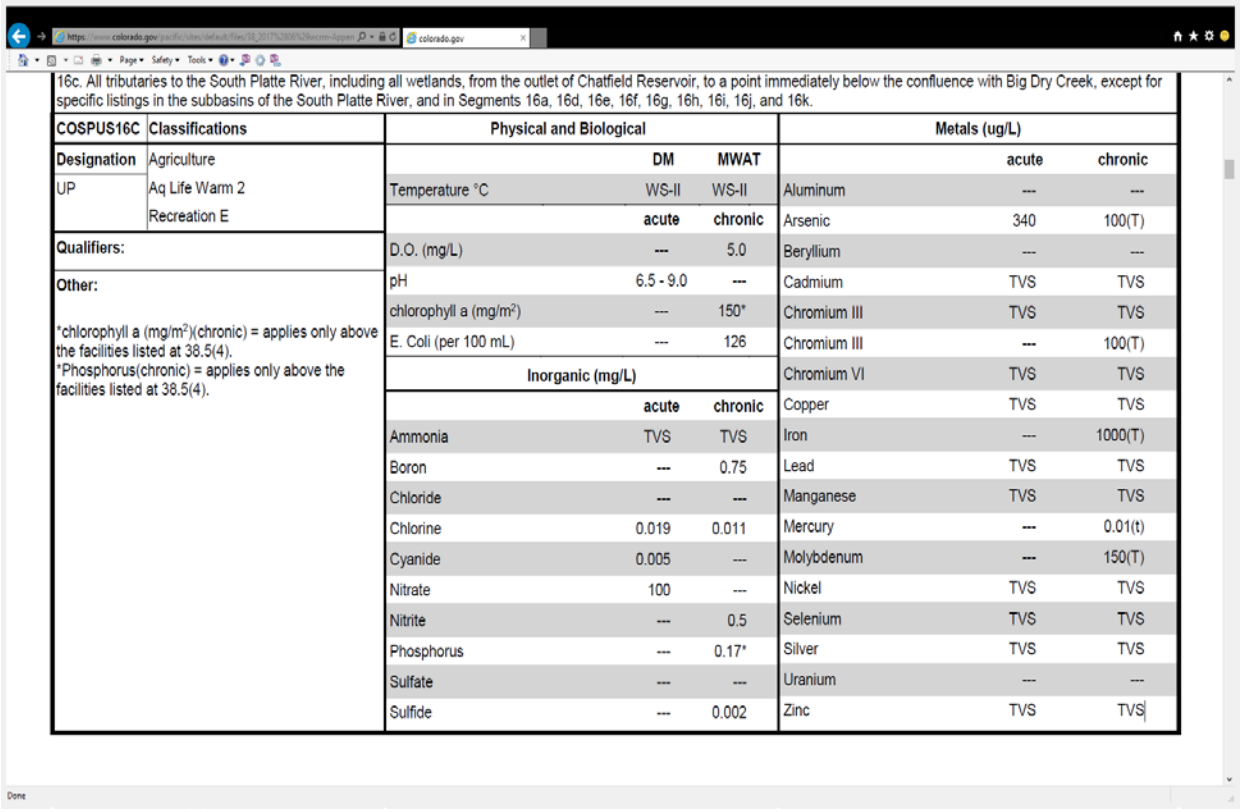
2.1. Description of Receiving Water

Treated groundwater from the GWTP will be discharged via Outfall 001 to McIntyre Gulch, which enters Lakewood Gulch, a tributary to the South Platte River. The location of Outfall 001 is 39.718333° N and longitude 105.110555° W.

Designated Uses

McIntyre Gulch flows to Lakewood Gulch (approximately 1 mile downstream from Outfall 001) which enters the South Platte River approximately 5.25 miles downstream from Outfall 001. According the State of Colorado's *Water Quality Standards for the South Platte River Basin-* Regulation 38, McIntyre Gulch is considered segment:

> COSPUS16c, described as: "All tributaries to the South Platte River, including all lakes, reservoirs and wetlands, from the outlet of Chatfield Reservoir, to a point immediately below the confluence with Big Dry Creek, except for specific listings in the sub-basins of the South Platte River, and in Segments 16a, 16b, 16d, 16e, 16f, 16g, 17a, 17b, and 17c."
>
> Uses: Aquatic Life Warm 2, Recreation E, Agriculture
>
> Designation: Use Protected



16c. All tributaries to the South Platte River, including all wetlands, from the outlet of Chatfield Reservoir, to a point immediately below the confluence with Big Dry Creek, except for specific listings in the subbasins of the South Platte River, and in Segments 16a, 16d, 16e, 16f, 16g, 16h, 16i, 16j, and 16k.

COSPUS16C	Classifications
Designation	Agriculture
UP	Aq Life Warm 2
	Recreation E
Qualifiers:	
Other:	

*chlorophyll a (mg/m^2)(chronic) = applies only above the facilities listed at 38.5(4).
*Phosphorus(chronic) = applies only above the facilities listed at 38.5(4).

Physical and Biological	DM	MWAT
Temperature °C	WS-II	WS-II
	acute	chronic
D.O. (mg/L)	---	5.0
pH	6.5 - 9.0	---
chlorophyll a (mg/m^2)	---	150*
E. Coli (per 100 mL)	---	126
Inorganic (mg/L)		
	acute	chronic
Ammonia	TVS	TVS
Boron	---	0.75
Chloride	---	---
Chlorine	0.019	0.011
Cyanide	0.005	---
Nitrate	100	---
Nitrite	---	0.5
Phosphorus	---	0.17*
Sulfate	---	---
Sulfide	---	0.002

Metals (ug/L)	acute	chronic
Aluminum	---	---
Arsenic	340	100(T)
Beryllium	---	---
Cadmium	TVS	TVS
Chromium III	TVS	TVS
Chromium III	---	100(T)
Chromium VI	TVS	TVS
Copper	TVS	TVS
Iron	---	1000(T)
Lead	TVS	TVS
Manganese	TVS	TVS
Mercury	---	0.01(t)
Molybdenum	---	150(T)
Nickel	TVS	TVS
Selenium	TVS	TVS
Silver	TVS	TVS
Uranium	---	---
Zinc	TVS	TVS

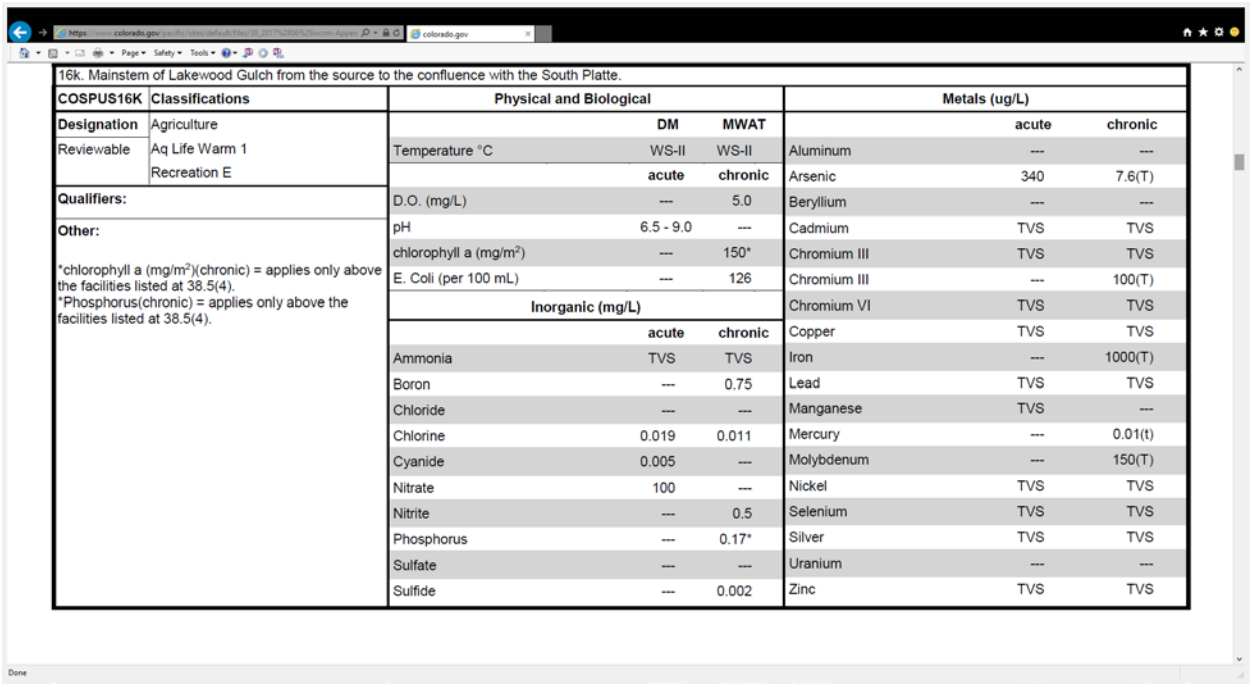
Figure 7 - CDPHE Water Quality Standards for McIntyre Gulch (COSPUS16c)

According the State of Colorado's Water Quality Standards for the South Platte River Basin, Lakewood Gulch is considered segment:

COSPUS16k described as: "Mainstem of Lakewood Gulch from the source to the confluence with the South Platte."

Uses: Aquatic Life Warm 1, Recreation E, Agriculture

Designation: **Reviewable**



16k. Mainstem of Lakewood Gulch from the source to the confluence with the South Platte.

COSPUS16K	Classifications
Designation	Agriculture
Reviewable	Aq Life Warm 1
	Recreation E
Qualifiers:	
Other:	

*chlorophyll a (mg/m²)(chronic) = applies only above the facilities listed at 38.5(4).
*Phosphorus(chronic) = applies only above the facilities listed at 38.5(4).

Physical and Biological	DM	MWAT
Temperature °C	WS-II	WS-II
	acute	chronic
D.O. (mg/L)	---	5.0
pH	6.5 - 9.0	---
chlorophyll a (mg/m²)	---	150*
E. Coli (per 100 mL)	---	126
Inorganic (mg/L)		
	acute	chronic
Ammonia	TVS	TVS
Boron	---	0.75
Chloride	---	---
Chlorine	0.019	0.011
Cyanide	0.005	---
Nitrate	100	---
Nitrite	---	0.5
Phosphorus	---	0.17*
Sulfate	---	---
Sulfide	---	0.002

Metals (ug/L)	acute	chronic
Aluminum	---	---
Arsenic	340	7.6(T)
Beryllium	---	---
Cadmium	TVS	TVS
Chromium III	TVS	TVS
Chromium III	---	100(T)
Chromium VI	TVS	TVS
Copper	TVS	TVS
Iron	---	1000(T)
Lead	TVS	TVS
Manganese	TVS	---
Mercury	---	0.01(t)
Molybdenum	---	150(T)
Nickel	TVS	TVS
Selenium	TVS	TVS
Silver	TVS	TVS
Uranium	---	---
Zinc	TVS	TVS

Figure 8 - CDPHE Water Quality Standards for Lakewood Gulch (COSPUS16k)

In other NPDES permits (CO-0034860 and CO-0034878[1]) issued by the EPA on the DFC, Lakewood Pond which is 2.5 miles downstream of Outfall 001 on Lakewood Gulch was considered a drinking water source due to it being considered stream segment COSPUS22, described as: "Lakes and reservoirs in watersheds tributary to the South Platte River from the outlet of Chatfield Reservoir to a point immediately below the confluence with Big Dry Creek, except for specific listings in the sub-basins of the South Platte River, and in Segments 16b, 17a, 17b, 17c, and 23."

However, Lakewood Pond is an impoundment and not a lake/reservoir according to the State of Colorado and is considered a water feature constructed for the Lakewood Country Club. Therefore, Lakewood Pond will be considered part of Lakewood Gulch and part of the State of Colorado's stream segment COSPUS16k, which does not have a water supply use.

[1] NPDES Permit CO-0034878 is a site-wide construction dewatering permit issued for the DFC by the EPA.

The compliance orders require that GSA establish schedules and requirements for the remediation of any and all contamination that may pose a threat to human health and the environment. CDPHE inferred this as Safe Drinking Water Act (SDWA) maximum contaminants levels (MCLs) must be met at the property boundary, which has been determined to be the compliance point for compliance orders. The compliance orders do not require a specific clean-up or "safe" level for any pollutant.

Since the compliance orders require that the contamination does not pose a threat to human health or the environment, it would not be prudent for the EPA to issue an NPDES permit which could cause a violation of the compliance orders, effectively providing conflicting standards with an order administered through another agency. The rationale for this is that contaminant plumes, although estimated to be decreasing in contaminant concentration, still exist at the DFC and contribute to contaminant loading through naturally occurring seeps into McIntyre Gulch.

The following table summarizes the pollutants of concern (POCs) identified by the EPA during the evaluation of the GWTP permit application. POCs are further evaluated for qualitative reasonable potential (RP) to cause or contribute to an excursion of the applicable water quality standard. Due to the GWTP not being in operation at the time of permit issuance, data in the permit application was taken from the Discharge Monitoring Reports from the Building #52A Treatment Plant (NPDES permit CO-0034860). In accordance with the EPA's NPDES permitting regulations under 40 C.F.R. § 122.44(d), permit limits must be included for all pollutants having RP.

Pollutant, µg/L	Estimated Daily Max	Estimated Average Daily
BTEX	5.2	5.2
Benzene	1	1
1,1- Dichloroethane	3.8	3.75
1,1- Dichloroethylene	1	1
1,1,1-Trichloroethane (1,1,1-TCA)	2.6	2.6
Vinyl Chloride	1	1
Trichloroethylene (TCE)	1	1
cis-1,2-Dichloroethylene	No Data	No Data
1,4-Dioxane	No Data	No Data

Table 1 - GWTP Pollutants of Concern (POC)

Water Quality Criterion for the POCs are found in State of Colorado's Water Quality Standards - *The Basic Standards and Methodologies for Surface Water* - Regulation 31. Table 2 illustrates the POCs and the State of Colorado criteria found in Regulation 31. Criterion is listed for Aquatic Life only because both stream segments COSPUS16c and COSPUS16k have aquatic life uses and are not designed as a water supply and therefore would not have human health based criterion applied.

Pollutant, µg/L	Aquatic Life - Acute Standard	Aquatic Life - Chronic Standard
BTEX	No Criterion	No Criterion
Benzene	5,300	No Criterion
1,1- Dichloroethane (1,1-DCA)	No Criterion	No Criterion
1,1- Dichloroethylene (1,1-DCE)	No Criterion	No Criterion
1,1,1-Trichloroethane (1,1,1-TCA)	No Criterion	No Criterion
Vinyl Chloride	No Criterion	No Criterion
Trichloroethylene (TCE)	45,000	21,900
cis-1,2-Dichloroethylene	No Criterion	No Criterion
1,4-Dioxane	No Criterion	No Criterion

Table 2 - Regulation 31 - The Basic Standards and Methodologies for Surface Water Criterion for POCs

Antidegradation Analysis

For this Permit, an antidegradation analysis is required due to the reviewable status of the Lakewood Gulch which is approximately 1 mile downstream from Outfall 001 and because this is a new discharge/load to Waters of the State of Colorado. Per the *Colorado Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance Version 1.0 December 2001,* a discharge is not considered significant if it meets one of the requirements of the four significance tests listed below:

1) Bioaccumulative Toxic Pollutant Test (31.8(3)(c)(i)); or
2) Temporary Impacts Test (31.8(3)(c)(ii)(C)); or
3) Dilution Test (31.8(3)(c)(ii)(A)); or
4) Concentration Test (31.8(3)(c)(ii)(B)).

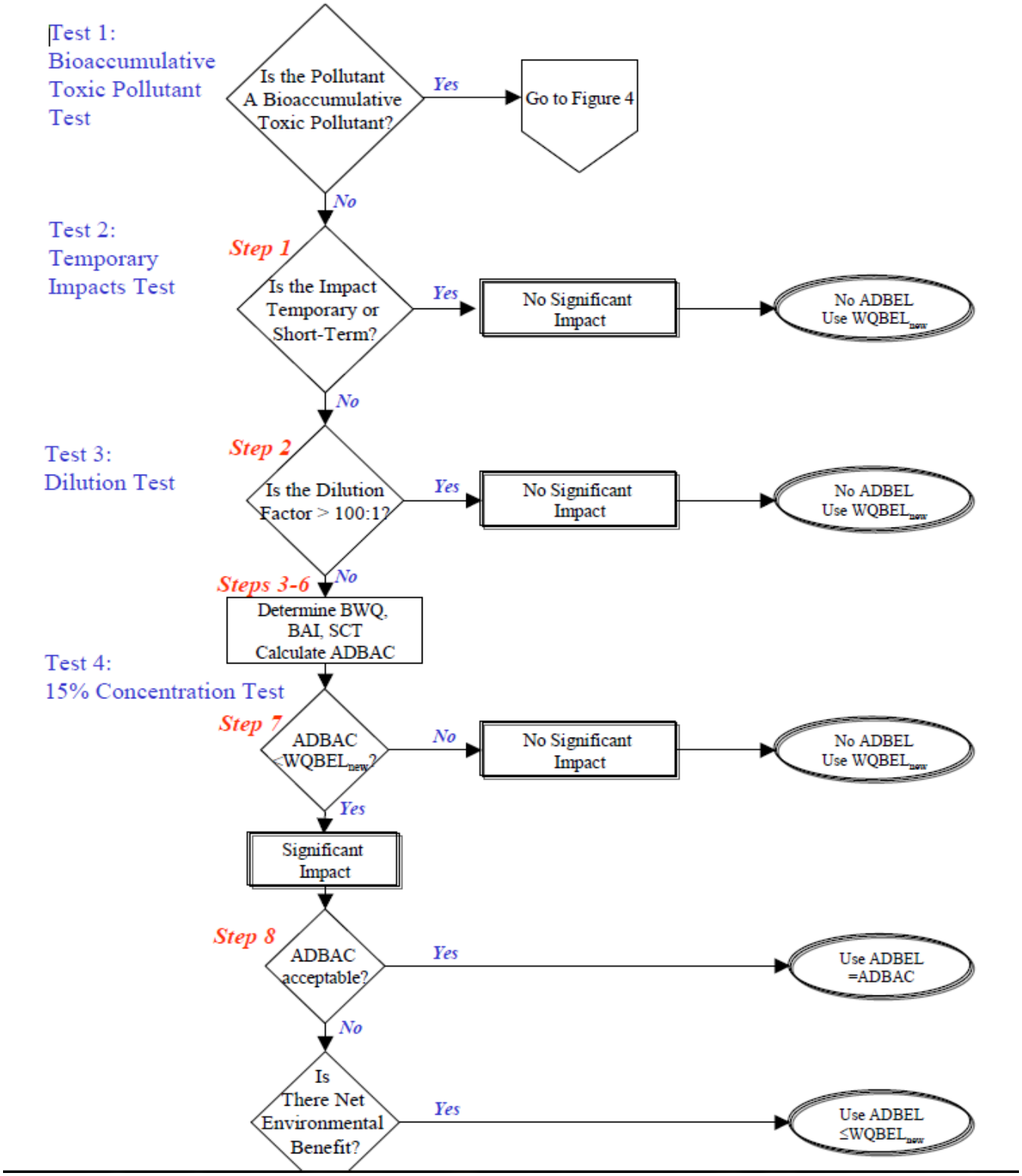


Figure 9 – State of Colorado's - Is the Impact Significant Flowchart*

* Per Colorado's Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance Version 1.0 December 2001

Regarding the Bioaccumulative Toxic Pollutant Test, none of the POCs are a Bioaccumulative Toxic Pollutant (per 31.8(3)(c)(i)) and this is therefore a non-applicable test. The GWTP discharge or impact is not temporary and therefore, does not meet the requirements of the Temporary Impacts Test. The Dilution Test requires new or increased discharge be diluted by 100 to 1 or more at critical flow (low flow) conditions to be determined to be insignificant.

As flow data for Lakewood Gulch was not sufficient for analysis, the local Water Commissioner was contacted to obtain an estimate of the low flow for this receiving water. The State of Colorado uses the 30E3 which is the chronic 30-day low flow over a 3-year period of record. Per the State of Colorado, this is a common practice in the absence of sufficient flow data. Communication with the local Water Commissioner resulted in the adoption of 0.5 cubic feet per second (cfs) as the low flow condition for Lakewood Gulch stream segment and will be used for subsequent analysis. This value is considered the 30E3 for Lakewood Gulch. The 30E3 for Lakewood Gulch is 0.5 cfs and the average daily discharge from the GWTP is estimated to be 0.07 cfs. Therefore, the discharge will not be diluted by 100 to 1 at low flow conditions and the requirements of Dilution Test are not fulfilled.

Lastly, the Concentration Test or "15 percent of the available increment test" considers the cumulative impact of discharges over a baseline condition. In order to be "insignificant", the new or increased discharge may not increase the actual instream concentration by more than 15 percent of the available increment over the baseline. The baseline condition is set at September 30, 2000. Per the Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance Version 1.0 December 2001, the baseline water quality concentration (BWQ), baseline available increment (BAI), significant concentration threshold (SCT) and antidegradation-based average concentration (ADBAC) will need to be determined (see Steps 3-6 in Figure 9). Since this is a new discharge, all pollutants identified in the proposed discharge which have corresponding applicable water quality criterion would need to meet the concentration significance threshold. As shown in Table 2 there are only two pollutants, Benzene and trichloroethylene (TCE) that have water quality criterion in Regulation 31 - *The Basic Standards and Methodologies for Surface Water*.

There is no ambient data/instream data for the POCs (i.e., volatile organics) in Lakewood Gulch. Therefore, instream data collected by GSA for McIntyre Gulch (upstream of the DFC) between 2000-2016 was used in the Concentration Test per the recommendation by the State of Colorado. McIntyre Gulch and Lakewood Gulch are similar in their nature. Both gulches flow through urban developed areas and have relatively low flows but never go completely dry.

As with Lakewood Gulch, the flow data for McIntyre Gulch was not sufficient for analysis and the local Water Commissioner was contacted to obtain an estimate of the low flow for this receiving water. Communication with the local Water Commissioner resulted in the adoption of 0.2 cfs as the low flow condition for McIntyre Gulch stream segment and will be used for subsequent analysis. This value is considered the 30E3 for McIntyre Gulch.

Instream data for McIntyre Gulch was evaluated and background pollutant concentrations were established for the period of 2000-2016. Colorado's baseline water quality for antidegradation was established as existing quality as of September 30, 2000. All of the data was used to establish baseline water quality in accordance with Colorado's Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance Version 1.0 December 2001.

The instream data for Benzene in McIntyre Gulch between 2000-2016 was all non-detect. Per the State of Colorado, non-detects are considered zero in the calculation of the background pollutant concentration. Therefore, the 85th percentile of the background concentration for Benzene is 0 µg/L.

Between 2005-2016, 62 instream samples were collected for TCE in McIntyre Gulch. All the results were non-detects except for two results of 0.2 µg/L and 0.17 µg/L. Per the State of Colorado, non-detects are considered zero in the calculation of the background pollutant concentration. Therefore, the 85th percentile of the background concentration for TCE was calculated to be 0 µg/L.

Per the State of Colorado's Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance Version 1.0 December 2001. The applicable equations needed to determine the significance test are:

$$BWQ = \frac{M_{eff}Q_{eff} + M_{u/s}Q_{u/s}}{Q_{eff} + Q_{u/s}} \qquad BAI = WQS - BWQ$$

$$SCT = (0.15xBAI) + BWQ \qquad \text{ADBAC} = M_2 = \frac{M_3Q_3 - M_1Q_1}{Q_2}$$

BWQ	=	Baseline water quality concentration
$Q_{u/s}$	=	Upstream chronic low flow (30E3)
Q_{eff}	=	2-year average of 30-day average effluent flow
$M_{u/s}$	=	Upstream background pollutant concentration (85th %)
M_{eff}	=	2-year average of 30-day average effluent pollutant concentration
BAI	=	Baseline available increment
WQS	=	Water quality standard
SCT	=	Significant concentration threshold
$WQBEL_{new}$	=	Water Quality-Based effluent limit

The following outlines the data used in the above equations for Benzene and TCE:

$Q_{u/s}$ = 0.2 cfs

Q_{eff} = 0.7 cfs

$M_{u/s}$= 0 µg/L

M_{eff}= 1 µg/L for Benzene, 1 µg/L for TCE

The resulting BWQ is 0.26 µg/L for both Benzene and TCE. Next, the BAI was calculated using the above equation and a water quality standard (WQS) of 5,300 µg/L for Benzene (acute) and WQS for TCE of 45,000 µg/L (acute), 21,900 µg/L (chronic).

For Benzene, a BAI of 5,299 µg/L was calculated. For TCE, a BAI of 21,899 µg/L was calculated. Next to determine the 15% concentration test, the Significant Threshold Concentration (SCT) was calculated. The results were 795 µg/L Benzene and 3,285 µg/L TCE.

Lastly, the ADBAC was calculated to compare to the $WQBEL_{new}$. The ADBAC for Benzene was 3,057 µg/L and for TCE was 12,671 µg/L. The $WQBEL_{new}$ for Benzene (5,300 µg/L) is greater than the ADBAC (3,057 µg/L) for Benzene. Also, the chronic $WQBEL_{new}$ for TCE (21,900) is greater than the ADBAC (12,671 µg/L) for TCE.

The following table contains the Water Quality Criterion (WQC), Baseline Water Quality (BWQ), Baseline Available Increment (BAI), SCT, and Antidegradation Based Average Concentration (ADBAC) calculations for McIntyre Gulch.

Pollutant, µg/L	Acute Water Quality Criterion (WQC)	Chronic Water Quality Criterion (WQC)	Baseline Water Quality (BWQ)	Baseline Available Increment (BAI)	Significant Concentration Threshold (SCT)	Antidegradation Based Average Concentration (ADBAC)
Benzene	5,300 a/	---	0.26	5,299	795	**3,057**
Trichloroethylene (TCE)	45,000 a/	21,900 a/	0.26	21,899	3,285	**12,671**

Table 3 - Antidegradation Values for McIntyre Gulch

a/ Per the Colorado's Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance Version 1.0 December 2001, chronic WQC shall be used unless there are no chronic WQC in which case acute WQC may be used instead. Therefore, for TCE chronic WQC was used in the antidegradation analysis, but for Benzene the acute WQC was used due to the absence of a chronic WQC.

Per Step 7 of the Significance Test (Figure 9), the discharge is determined to be significant because the ADBAC < $WQBEL_{new}$ for both Benzene and TCE. Per Step 8 in Figure 9, the ADBAC is acceptable as the antidegradation-based effluent limit (ADBEL).

3. TECHNOLOGY BASED EFFLUENT LIMITATIONS

There are no applicable Federal Effluent Limitations Guidelines and Standards for this type of wastewater discharge (i.e. groundwater remediation). Since there are no Federal Effluent Limitations Guidelines and Standards, Professional Judgment has been used to derive technology based effluent limits for organic pollutants that do not have an applicable water quality standard adopted by the State of Colorado.

As required by compliance orders, the contamination at the DFC must not pose a threat to human health and the environment. The CDPHE has inferred this as SDWA MCLs must be met at the property boundary. Table 5 outlines the MCLs for the POCs:

Pollutant, µg/L	MCL
BTEX (i.e., Benzene, toluene, ethylBenzene and xylene)	No MCL
Benzene	5
1,1-Dichloroethane (1,1-DCA)	No MCL
1,1-Dichloroethylene	7
1,1,1-Trichloroethane (1,1,1-TCA)	200
Vinyl Chloride	2
Trichloroethylene (TCE)	5
cis-1,2-Dichloroethylene	70
1,4-Dioxane	No MCL

Table 4 - MCLs for Pollutants of Concerns

Per the compliance orders, EPA is proposing the MCLs listed above in Table 4 as the technology based effluent limits for Benzene, 1,1-Dichloroethylene, 1,1,1-Trichloroethane (1,1,1-TCA), Vinyl Chloride, Trichloroethylene (TCE) and cis-1,2-Dichloroethylene. This will ensure that this permit does not cause a violation of the compliance orders, effectively providing conflicting standards with an order administered through another agency.

For BETX, the EPA's *Model NPDES Permit for Discharges Resulting From The Cleanup of Gasoline Released From Underground Storage Tanks* and *Fact Sheet, NPDES Permit Number: ID-G91-0000* recommends a total BTEX limit of 100 µg/L based on an air stripping removal efficiency of 99.5%. The treatment technology being proposed is a pump-and-treat system which employs a two-step process:

1. Filtration
2. Air Stripping

Therefore, the EPA will propse 100 µg/L as the technology based effluent limit for BTEX.

Lastly, for conventional pollutants, effluent limits are being proposed based upon State of Colorado's *Regulation for Effluent Limitations* - Regulation 62 for Total Suspended Solids (TSS) and oil and grease as shown in Table 6.

Pollutant	30-day avg.	7-day avg.	Daily Maximum
Total Suspended Solids (TSS), mg/L	30	45	N/A
Oil and Grease, mg/L	N/A	N/A	10

Table 5 - Technology Based Effluent Standards per Regulation No. 62

4. PROPOSED EFFLUENT LIMITATIONS

The proposed final effluent limits will be the more stringent application of 1) water quality based effluent limits/antidegradation limits or 2) technology based effluent limits.

The water quality based effluent limit/antidegradation limit (ADBEL) will be used to compare against the technology based effluent limit (MCLs) for Benzene and Trichloroethylene (TCE). As shown below in Table 6, the ADBEL is significantly higher than the technology based effluent limit (MCLs) for both these pollutants.

Pollutant, µg/L	Antidegradation Based Average Concentration (ADBEL)	SDWA Maximum Contaminant Level (MCL)
Benzene	3,057	**5**
Trichloroethylene (TCE)	12,671	**5**

Table 6 – Comparison of ADBEL and SDWA MCLs for Benzene and TCE

Therefore, the technology based effluent limit (MCLs) will be applied as the proposed effluent limitation since they are significantly more stringent than the ADBEL for both pollutants. Application of the MCLs will also ensure that the effluent limits are protective and do not cause antidegradation of downstream segments.

Effluent Limitations for Outfall 001 and Outfall 001A

	30-Day Average	7-Day Average	Daily Maximum
Flow, mgd a/	0.043	n/a	0.072

Total Suspended Solids, mg/L c/	30	n/a	n/a
Oil and Grease, mg/L c/	n/a	n/a	10
BTEX, µg/L d/	n/a	n/a	100
Benzene, µg/L e/	n/a	n/a	5.0
1,1 - Dichloroethylene, µg/L e/	n/a	n/a	7.0
Trichloroethylene (TCE), µg/L e/	n/a	n/a	5.0
1,1,1 – Trichloroethane, µg/L e/	n/a	n/a	200
cis-1,2-Dichloroethylene, µg/L e/	n/a	n/a	70
Vinyl Chloride, µg/L e/	n/a	n/a	2.0
The pH of the discharge shall not be less than 6.5 and shall not be greater than 9.0 at any time b/			

Table 7 – Proposed Effluent Limitations for Outfalls 001 and 001A

a/ The flow limitation is based on the GWTP design capacity.

b/ pH limits are based on the standards provided at the State of Colorado's *Water Quality Standards for the South Platte River Basin* – Regulation 38.

c/ TSS and Oil and Grease limits are based on the standards provided at the State of Colorado's *Regulations for Effluent Limitations* – Regulation 62. The daily max TSS limit of 30 mg/L correlates with the 7-day average limitation as provided in Regulation No. 62. A 7-day average limit of 45 mg/L is not being proposed as the frequency of sampling is not sufficient to provide for averaging that time period.

d/ Limits for BTEX are based on Professional Judgment using estimated pollutant concentrations for the air stripping technology and as presented in the EPA's *Model NPDES Permit for Discharges Resulting From The Cleanup of Gasoline Released From Underground Storage Tanks*, USEPA, 1989.

e/ Limits for the Benzene, 1,1 - Dichloroethylene, Trichloroethylene (TCE), 1,1,1 – Trichloroethane, cis-1,2-Dichloroethylene and Vinyl Chloride are technology based effluent limits which based upon SDWA MCLs.

After two years, if all tests for a given parameter comply with the limitations specified in this permit, the monthly sampling frequency may be reduced from monthly to quarterly for all parameters for which there were not exceedances of permit limits for twenty-four (24) consecutive tests. The permittee will have to request a reduction in monitoring frequency (from monthly to quarterly) from the EPA. These changes may be made without going to public notice. Pollutants without a discharge

limit and monitoring only (i.e. nutrients and temperature) will not be eligible for reduced monitoring since the EPA will need sufficient data set to determine RP upon permit renewal (as discussed in depth below).

Nutrients

The state of Colorado's *Nutrients Management Control* - Regulation 85 establishes technology based effluent limitations for total inorganic nitrogen and total phosphorus for certain non-domestic wastewater treatment works (i.e., industrial discharges). It also establishes monitoring requirements. The effluent limitations for non-domestic wastewater treatment works which begin discharging on or after May 31, 2013, apply to those (A) whose Standard Industrial Classification code is in the Major Group 20 and (B) any other non-domestic discharger for which the Division has determined, based on credible information that the facility is expected, without treatment for nutrients, to discharge total inorganic nitrogen or total phosphorus concentrations to surface waters in excess of the respective effluent limitations in section 85.5(1)(b).

Parameter	Parameter Limitations	
	Annual Median a/	95th Percentile b/
Total Phosphorus a/	0.7 mg/L	1.75 mg/L
Total Inorganic Nitrogen b/ c/	7 mg/L	14 mg/L

Table 8 – Nutrient Limitations in Colorado Regulation No. 85(1)(b)

a/ Running Annual Median: The median of all samples taken in the most recent 12 calendar months.

b/ The 95th percentile of all samples taken in the most recent 12 calendar months.

c/ Determined as the sum of nitrates as N, nitrite as N, and ammonia as N.

Nutrient monitoring has been added to determine if concentrations to surface waters from the GWTP will be in excess of the effluent limitations in section 85.5(1)(b). Based on available information, it appears unlikely that the concentrations of either total phosphorus or total inorganic nitrogen in the discharge from GWTP will exceed effluent limitations above. However, if subsequent monitoring indicates that effluent limitations for either nutrient are appropriate, the limitation(s) will be placed in the Permit upon renewal.

Temperature

Under the state of Colorado's *Water Quality Standards for the South Platte River Basin* - Regulation 38 both stream segments COSPUS16c (which includes McIntyre Gulch) and segment COSPUS16k (which includes Lakewood Gulch) are Warm Streams (WS), Tier II. Per the State of Colorado's Water Quality Standards - *The Basic Standards and Methodologies for Surface Water* - Regulation 31, Warm Stream Tier II rivers and streams shall meet the following limitations:

	Chronic – Temperature °C	Acute – Temperature °C
March – November a/	27.5	28.6
December - February a/	13.8	25.2

Table 9 – Temperature Limitations in Colorado Regulation No. 31

a/ Warm Stream Tier II temperature criteria apply where brook stickleback, central stoneroller, creek chub, finescale dace, longnose dace, mountain sucker, northern redbelly dace, razorback sucker, or white sucker are expected occur, and none of the more thermally sensitive species in Tier I are expected to occur.

Although the source water is groundwater and should be relatively cold in temperature even at the time of discharge, temperature monitoring is being proposed to determine if the discharge from the GWTP will have RP for the WS-II temperature limitations specified above. If subsequent monitoring indicates that effluent limitations on temperature are appropriate, the limitations will be placed in the Permit upon renewal.

Whole Effluent Toxicity

Bioaccumulation of chemicals in aquatic organisms, toxicity to these organisms, the potential for additivity, antagonism, synergism, and persistence of the chemicals in the discharge is the basis for requiring acute whole effluent toxicity monitoring. Monitoring for acute whole effluent toxicity shall be done using both *Pimephales promelas* (flathead minnow) and *Ceriodaphnia dubia*. This decision is supported by the EPA's *Technical Support Document For Water Quality-based Toxics Control,* USEPA, 1989.

5. MONITORING REQUIREMENTS

An internal outfall (Outfall 001A) has been added to this proposed permit to ensure that the effluent from the GWTP is not mixed or diluted with water from Downing Reservoir that would commingle with GWTP effluent in the Downing Reservoir outlet structure and discharge to McIntyre Gulch via Outfall 001. An internal outfall will also ensure worker health and safety during sample collection. To support this, 40 CFR § 122.45(h) states:

"(h) *Internal waste streams.*

(1) When permit effluent limitations or standards imposed at the point of discharge are impractical or infeasible, effluent limitations or standards for discharges of pollutants may be imposed on internal waste streams before mixing with other waste streams or cooling water streams. In those instances, the monitoring required by § 122.48 shall also be applied to the internal waste streams.

(2) Limits on internal waste streams will be imposed only when the fact sheet under §

124.56 sets forth the exceptional circumstances which make such limitations necessary, such as when the final discharge point is inaccessible (for example, under 10 meters of water), *the wastes at the point of discharge are so diluted as to make monitoring impracticable* (emphasis added), or the interferences among pollutants at the point of discharge would make detection or analysis impracticable."

When there is a release/draw down of Downing Reservoir (which is periodically required due to Colorado Water Rights), the effluent from the GWTP could be significantly diluted in the Downing Reservoir outlet structure. Therefore, based upon § 122.45(h)(2), internal outfall 001A (Figure 4) has been added.

5.1. Self-Monitoring Requirements - Outfalls 001A

The monitoring requirements for Outfall 001A are to be completed by the permittee and are presented below.

Parameter	Frequency	Sample Type
Total Flow, mgd a/	Daily	Instantaneous
Total Suspended Solids, mg/L	Monthly	Grab
Benzene, µg/L	Monthly	Grab
BTEX, µg/L	Monthly	Grab
1,1-Dichloroethane, µg/L	Monthly	Grab
1,1-Dichloroethylene, µg/L	Monthly	Grab
Trichloroethylene (TCE), µg/L	Monthly	Grab
1,1,1-Trichloroethane, µg/L	Monthly	Grab
cis-1,2-Dichloroethylene, µg/L	Monthly	Grab
Vinyl Chloride, µg/L	Monthly	Grab
pH, s.u.	Monthly	Grab
Oil and Grease, visual b/	Monthly	Visual
Temperature, °C	Quarterly	Grab
Total Inorganic Nitrogen, mg/L c/	Quarterly	Grab
Total Phosphorus, mg/L d/	Quarterly	Grab

Whole Effluent Toxicity, acute LC_{50} e/	Quarterly	Grab

Table 10 – Proposed Monitoring Requirements for Outfall 001A

a/ Flow measurements of the effluent should be made in a manner that the permittee can affirmatively demonstrate that representative values are being obtained. The average flow rate (in million gallons per day) during the reporting period (i.e. month) and the daily maximum flow rate observed (in million gallons per day) shall be reported.

b/ If a visible sheen is detected, a grab sample shall be taken and analyzed immediately. The concentration of oil and grease shall not exceed 10 mg/L in any sample.

c/ "Total Inorganic Nitrogen (T.I.N.)" is defined as the sum of the concentrations of total ammonia nitrogen (as N) plus total nitrate and nitrite (or nitrate and nitrite individually) (as N).

d/ "Total Phosphorus (TP)" may be determined by the analysis for total phosphorus or the analyses of the components to calculate total phosphorus.

e/ Acute WET test shall be performed on two species; *Ceriodaphnia dubia*, EPA 2000.0, as a 48-hr, static-renewal definitive test with renewals at each 24-hr interval, and *Pimephales promelas*, EPA 2002.0, as a 96-hour static-renewal definitive test with renewals at each 24-hr interval. Both test shall utilize the standard dilution series of 100%, 75%, 50%, 25%, 12.5% and a 0 control, with moderately hard synthetic laboratory water for dilutions with test temperature set at 20° degrees.

6. REPORTING REQUIRMENTS

Reporting of Monitoring Results: With the effective date of this Permit, the Permittee must electronically report monthly discharge monitoring reports (DMR) on a monthly frequency using NetDMR. Electronic submissions by permittees must be uploaded to the EPA Region 8 no later than the 28th day of the month following the completed reporting period. The Permittee must sign and certify all electronic submissions in accordance with the signatory requirements of the Permit. NetDMR is accessed from the internet at https://netdmr.zendesk.com/home.

7. ENDANGERED SPECIES CONSIDERATIONS

The Endangered Species Act (ESA) of 1973 requires all Federal Agencies to ensure, in consultation with the U.S. Fish and Wildlife Service (FWS), that any Federal action carried out by the Agency is not likely to jeopardize the continued existence of any endangered species or threatened species (together, "listed" species), or result in the adverse modification or destruction of habitat of such species that is designated by the FWS as critical ("critical habitat"). See 16 U.S.C. § 1536(a)(2), 50 C.F.R. Part 402. When a Federal agency's action "may affect" a protected species, that agency is required to consult with the FWS, depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 C.F.R. § 402.14(a)).

The U. S. Fish and Wildlife Information for Planning and Conservation (IPaC) website program was utilized to determine Federally-listed Endangered, Threatened, Proposed Threatened and Candidate Species for the DFC. IPaC Trust Resource Report findings are provided below:

Species	**Scientific Name**	**Status**
Preble's Meadow Jumping Mouse	*Zapus hudsonius preblei*	T
North American Wolverine	*Gulo gulo luscus*	PT
Canada Lynx	*Lynx canadensis*	T
Least Tern	*Sternula antillarum*	E
Mexican Spotted Owl	*Strix occidentalis lucida*	T
Piping Plover	*Charadrius melodus*	T
Whooping Crane	*Grus americana*	E
Pallid Sturgeon	*Scaphirhynchus albus*	E
Colorado Butterfly Plant	*Gaura neomexicana var. coloradensis*	T
Ute Ladies'-tresses Orchid	*Spiranthes diluvialis*	T
Western Prairie Fringed Orchid	*Platanthera praeclara*	T

Table 11 – FWS IPaC List for Denver Federal Center, Colorado

T = Threatened, E = Endangered, PT = Proposed Threatened

7.1. Conclusion

On January 29, 2018, a copy of the draft Permit and draft SoB was sent to the FWS requesting concurrence with the EPA's finding that issuance of this NPDES Permit (CO-0035033) is "Not Likely to Adversely Affect" any of the species listed as proposed threatened, threatened or endangered for DFC. On March 13, 2018, the FWS responded to EPA stating that a biological evaluation was not provided to support our determination. On March 14, 2018, EPA and FWS held informal consultation and both concluded a "No Effect" finding was a more appropriate determination than "Not Likely to Adversely Affect."

According to the IPaC, there is no critical habitat designated on or near DFC. The discharge should not impact the above listed species due to the following reasons:

Preble's Meadows Jumping Mouse: The DFC is within the Denver metropolitan area block clearance for the Preble's meadow jumping mouse. The block clearance was based on the likely absence of the Preble's within the area due to negative trapping surveys and the presence of residential, commercial, and other development.

North American Wolverine: No habitat exists on the DFC or downstream from the DFC to support this species.

Canada Lynx: No habitat exists on the DFC or downstream from the DFC to support this species.

Least Tern: No habitat exists on the DFC or downstream from the DFC to support this species.

Mexican Spotted Owl: No habitat exists on the DFC or downstream from the DFC to support this species.

Piping Plover: No habitat exists on the DFC or downstream from the DFC to support this species.

Whooping Crane: No habitat exists on the DFC or downstream from the DFC to support this species.

Pallid Sturgeon: No habitat exists on the DFC or downstream from the DFC to support this species.

Colorado Butterfly Plant: The habitat for the Colorado butterfly plant includes alluvial soils on level or slightly sloping floodplains and drainage bottoms at elevations of 5,000 to 6,400 feet. Colonies are often found in low depressions or along bends in wide, meandering stream channels, a short distance upslope of the actual channel. Given the urban nature of the soils at the DFC, as well as the lack of meandering streams, the Colorado butterfly plant is not expected to occur and has not been observed on the DFC.

Ute ladies'-tresses Orchid: The Ute ladies'-tresses orchid is supported primarily in riparian areas, which are present in the southern portion of the site. This species is not expected to occur in areas where prairie dogs are present since these animals decimate any vegetation species available. Furthermore, riparian areas at the DFC do not exhibit the terraced topography and subsurface hydrology preferred by the Ute ladies' tresses.

Western Prairie Fringed Orchid: No habitat exists on the DFC to support this species. While there is the potential for habitat downstream from the DFC for this species, the permit requires compliance with WQSs and therefore there should be no changes to the downstream habitat.

Per the informal consultation with FWS on March 14, 2018, and based upon the above biological evaluation, EPA finds that this permit action will have "No Effect" on the species listed in Table 11.

8. NATIONAL HISTORIC PRESERVATION ACT REQURIEMENTS

Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470(f) requires that federal agencies consider the effects of federal undertakings on historic properties. The U.S. National Park Service (U.S. NPS) National Register of Historic Places Focus Database was utilized to determine and evaluate resources of concern in the DFC.

Discharges and discharge-related activities would not affect a property that is listed or is eligible for listing on the National Register of Historic Places as maintained by the Secretary of the Interior. The U.S. Government purchased what is the DFC property in the early 1940s, and developed it into the

Denver Ordnance Plant. Other buildings were built after the war was over. Currently, most of the buildings constructed on the DFC have been renovated, thus making them ineligible for National Historic designation. Only two buildings have maintained enough structural and physical integrity to meet the criteria for consideration for National Register designation: the original Office of Civil Defense Building adjacent to Building 50, and Building 710. Both of these buildings are underground. The EPA does not anticipate any impacts on historic properties or cultural resources because any ground disturbance related to the installation of the GWTP or the discharge are not in the vicinity of Buildings 50 or 710. During the public comment period, the EPA will notify the State Historic Preservation Officer (SHPO) of the planned issuance of this Permit and request their input on potential effects on historic properties and the EPA's preliminary determination in this regard.

9. MISCELLANEOUS

The effective date of the permit and the permit expiration date will be determined upon issuance of the permit. The permit will be issued for a period not to exceed 5 years.

Drafted by: Amy Clark, EPA Region 8, 303-312-7014