Environmental Assessment
WCWEP Recycled Water Project
Wasatch County, Utah

U.S. Department of the Interior

Central Utah Water Conservancy District

April 2010

Contact: Sarah Sutherland
(801) 226-7147
sarah@cuwcd.com

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Chapter 1: Need for the Proposed Action and Background

1.1 Introduction

The Central Utah Water Conservancy District (CUWCD) and the U.S. Department of the Interior, Central Utah Project Completion Act Office (Interior), as Joint Lead Agencies in accordance with 43 C.F.R. 46.220 and 40 C.F.R. 1501.5, are proposing a recycled water project in Wasatch County, Utah. The project would provide for the conveyance of recycled water from the Jordanelle Special Service District's new Water Reclamation Facility (WRF) into the facilities of the Wasatch County Water Efficiency Project (WCWEP), which is part of the Bonneville Unit, Central Utah Project. The proposed project would provide an opportunity for more effective and efficient management of water, make efficient use of recycled water, and encourage the conservation and wise use of water; all of which are objectives of the Central Utah Project Completion Act (CUPCA), P.L. 102-575.

The newly constructed WRF is located on private land downstream from Jordanelle Reservoir. The WRF is scheduled to begin operations in 2010, and will provide wastewater treatment services for commercial and residential customers within the Jordanelle Special Service District and North Village Service District, as well as the Red Ledges Development in Heber City, Utah. Instead of discharging the WRF effluent to the Provo River directly or indirectly (via an infiltration pond that would be located adjacent to the WRF on private property), CUWCD and Interior propose that the treated effluent be recycled and used as irrigation water in the WCWEP system.

This Environmental Assessment (EA) has been prepared to analyze the potential effects of the proposed project in order to determine whether it would cause significant impacts to the human environment as defined by the National Environmental Policy Act (NEPA) and the Council on Environmental Quality and Department of the Interior Regulations Implementing NEPA (40 CFR Parts 1500-1508 and 43 CFR Part 46, respectively). If it is determined that significant impacts would result from the proposed Federal action, then an environmental impact statement (EIS) would be prepared. If it is determined that there are no significant effects to the human environment, a Finding of No Significant Impact (FONSI) will be made and the project will be authorized to proceed.

In addition to the Joint Lead Agencies, several other agencies are participating in the preparation and review of this EA as Cooperating Agencies:

- Bureau of Reclamation, Provo Area Office (Reclamation)
- Utah Reclamation Mitigation and Conservation Commission (URMCC)
- Utah Division of Water Quality
- Wasatch County

- Wasatch County Special Service Area #1
- Jordanelle Special Service District (JSSD)

1.2 Background

1.2.1 Central Utah Project

The Central Utah Project (CUP), authorized under the Colorado River Storage Project Act of 1956 and constructed by the Bureau of Reclamation and the Central Utah Water Conservancy District (CUWCD), is located in the central and east central part of Utah. It is the largest water resources development program ever undertaken in the State. The project allows Utah to beneficially use a sizable portion of its allotted share of the Colorado River water. Project irrigation water is provided to Utah's rural areas in the Uinta and Bonneville Basins. Water is also provided to meet the municipal and industrial requirements of the most highly developed part of the State along the Wasatch Front where population growth and industrial development are continuing at a rapid rate. Water developed by the CUP is used for municipal, industrial, irrigation, hydroelectric power, fish, wildlife, and recreation. The project also improves flood control capability and assists in water quality control.

The CUP was originally divided into six separate units, the Vernal, Bonneville, Jensen, Upalco, Uintah and Ute Indian Units, to facilitate planning and construction. The Bonneville Unit, which is sponsored by CUWCD, is the largest and most complex of the authorized units of the Central Utah Project. Greater utilization of Bonneville Basin water, made possible by the unit plan and a trans-basin diversion of water, will serve the needs of a growing population in the Bonneville Basin.

The Bonneville Unit is located in central and northeastern Utah and provides water for the following counties: Salt Lake County, Utah County, Wasatch County, Summit County, and Duchesne County. Bonneville Unit water is developed by collecting and storing excess flows of several streams (principally tributaries of the Duchesne River), purchasing water rights, using part of the existing water supply in Utah Lake, and using project return flows and high flows entering Utah Lake. The Bonneville Unit includes features that facilitate a trans-basin diversion of water from the Uinta Basin to the Bonneville Basin and development of local water resources in both basins. The completed Bonneville Unit will deliver a permanent supply of 42,000 acre feet (52,000,000 m^3) of irrigation water and 157,750 acre feet (194,580,000 m^3) of municipal and industrial water. The last component of the Bonneville Unit, the Utah Lake Drainage Basin Water Delivery System, is currently under construction.

1.2.2 Wasatch County Water Efficiency Project

The Wasatch County Water Efficiency Project (WCWEP), analyzed in a final Environmental Impact Statement published in November 1996, was planned and implemented pursuant to Sections 202(a)(3), 207, and 303(b) of the CUPCA. The Project delivers pressurized water to irrigation company service areas through pipelines extending from the Timpanogos, Wasatch and Humbug canals in the Heber Valley and serves to improve water use efficiency in nine of the 12 Heber Valley irrigation companies. Additionally, the WCWEP, in conjunction with the Daniels Replacement Project, restored flows in the upper Strawberry River that had historically been diverted by the Daniel Irrigation Company by providing water and water conveyance facilities from Jordanelle Reservoir to the existing Daniel Irrigation Company water storage facilities. The restoration of upper Strawberry River flows was a mitigation commitment for the Strawberry Aqueduct and Collection System of the Bonneville Unit.

1.3 Purpose and Need and Scope of Analysis

The **purposes** of the proposed action are to:

- Provide for more effective and efficient management of water
- Make efficient use of recycled water
- Encourage the conservation and wise use of water.

The **need** for the proposed action is to improve water management and water use efficiency consistent with the purposes and requirements of the Central Utah Project Completion Act, P.L. 102-575 (CUPCA). These requirements include a commitment associated with construction of the Utah Lake Basin Water Delivery System that calls for the District, working with Interior, and owners/operators of wastewater treatment plants, to achieve by the year 2033 the recycling of 18,000 acre-feet of water and continue to maintain that recycling effort through the year 2050.[1]

Recycled water is cleaned wastewater from homes and businesses. Water from sinks, toilets, and indoor plumbing is piped to a treatment facility where advanced treatment processes are used to remove bacteria and pollutants. Treated wastewater undergoes extensive testing to make sure that it meets strict standards set by the Utah Division of Water Quality.

Water recycling is reusing treated wastewater for beneficial purposes such as agriculture and landscape irrigation, industrial purposes, and replenishing ground water. As water demands increase, recycling water provides a sustainable, dependable, locally-controlled water supply.

The **scope of analysis** for this EA focuses on comparing the effects of using recycled water in irrigation canals, with unused water and return flows eventually entering the Provo River, to the effects of discharging that recycled water via an infiltration pond indirectly into the Provo River.

1.4 Authorizing Action, Permits, and Licenses

The proposed source of recycled water is the JSSD WRF located near Jordanelle Reservoir north of Heber City in Wasatch County, Utah. The WRF is planned to be in service in the first quarter of 2010 and has all of the required state and county permits necessary for operation. UPDES permit # UT0025747, issued November 18, 2008, allows for the discharge of WRF effluent into the Timpanogos or Wasatch Canals or the Provo River Return Canal or the Provo River (Figure 1).

[1] Department of the Interior, Record of Decision, Utah Lake Drainage Basin Water Delivery System, December 22, 2004. P. 37, commitment #54.

In order to authorize the discharge of WRF effluent into the Timpanogos and/or Wasatch Canals, CUWCD and Interior would issue a license to JSSD. In order to access the proposed discharge point directly into the Provo River, JSSD would need to obtain authorization from the Federal Government (Reclamation or URMCC) to cross Federal lands. However, instead of pursuing such authorization, JSSD has indicated that it would construct an infiltration basin on its own property to accept WRF effluent. This would not require Federal action, but would require an amendment to the existing UPDES permit.

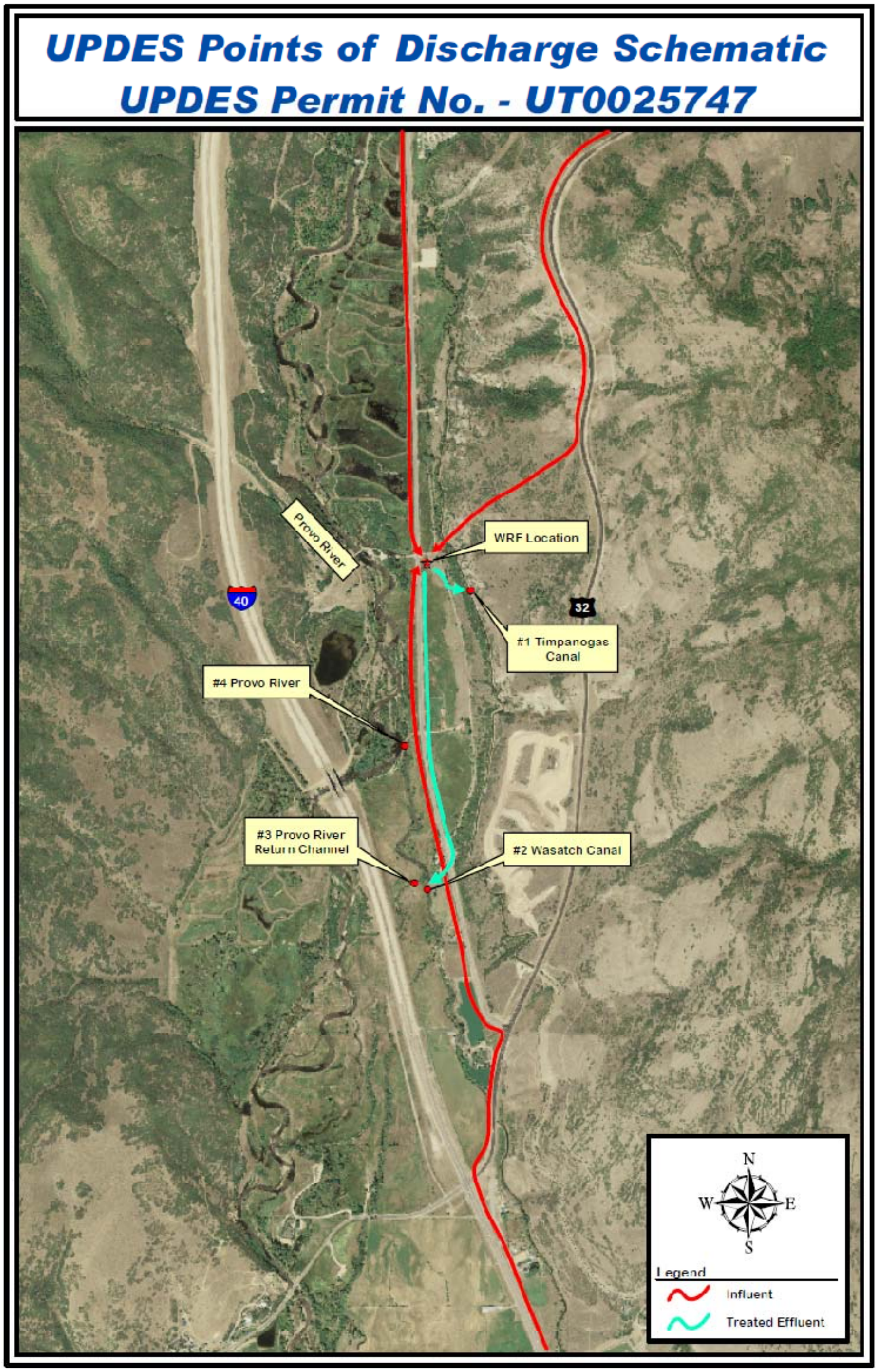

Figure 1: Authorized discharge points from the WRF under UPDES Permit

Chapter 2: Proposed Action and Alternatives

2.1 Introduction

The proposed action analyzed in this EA is the use of recycled water discharged from the JSSD WRF as CUP water in the Heber Valley area of Wasatch County, Utah. The proposal is to accept WRF discharges into the WCWEP canal system for distribution within the Heber Valley via either the Timpanogos Canal or the Wasatch Canal. Figure 2 depicts the proposed project area, including the canal system and proposed discharge points. The recycled water from the WRF would constitute 2.5% to 13% of the CUP water flow delivered for use in either canal, or 0.5% to 2.5% of the total water delivered annually in these canals.

Because all of the alternatives, including no action, will include an operational WRF, a description of that facility is provided in Section 2.2.

2.2 Description of Jordanelle Special Service District Water Reclamation Facility

The recently constructed JSSD WRF has a maximum design flow discharge rate of 1.0 million gallons per day (MGD). The facility will serve the commercial and residential developments within the Jordanelle Special Service District and North Village Service District north of Heber City, as well as the Red Ledges Development in Heber City in Wasatch County, Utah. At start up in the first quarter of 2010, discharges from the WRF will be approximately 200,000 gallons per day (GPD), which would equate to a flow of 0.31 cubic feet per second (cfs). Based on current growth projections in Wasatch County, it is expected that the full capacity discharge of 1 MGD (equating to a flow rate of 1.55 cfs) would not be reached until approximately 2029.

The JSSD WRF is a state-of-the-art water reclamation facility. The influent flow passes through fine screens to remove grit and large material. Flow then proceeds through a series of anaerobic and aerobic tanks where biological treatment occurs, similar to many other wastewater treatment facilities. This portion of the process is often referred to as activated sludge. This biological process includes removal of some phosphorus from the flow. Flow then moves through a membrane bio-reactor (MBR). The MBR includes the membrane filtration cassettes submerged in the activated sludge. Water is pulled through the membrane under vacuum pressure. The addition of chemicals allows for further phosphorous removal by the membrane filtration. The treated effluent passes through an ultra violet (UV) disinfection system and then out of the facility to the discharge waters. The discharge limits detailed in the UPDES permit are the most stringent limits for phosphorous and ammonia in the State.

The sludge remaining in the MBR is moved to an aerated solids handling basin and then to a belt press for dewatering. Water generated by the dewatering process is directed back into the treatment process. The solids generated by the dewatering process are collected and disposed at a landfill.

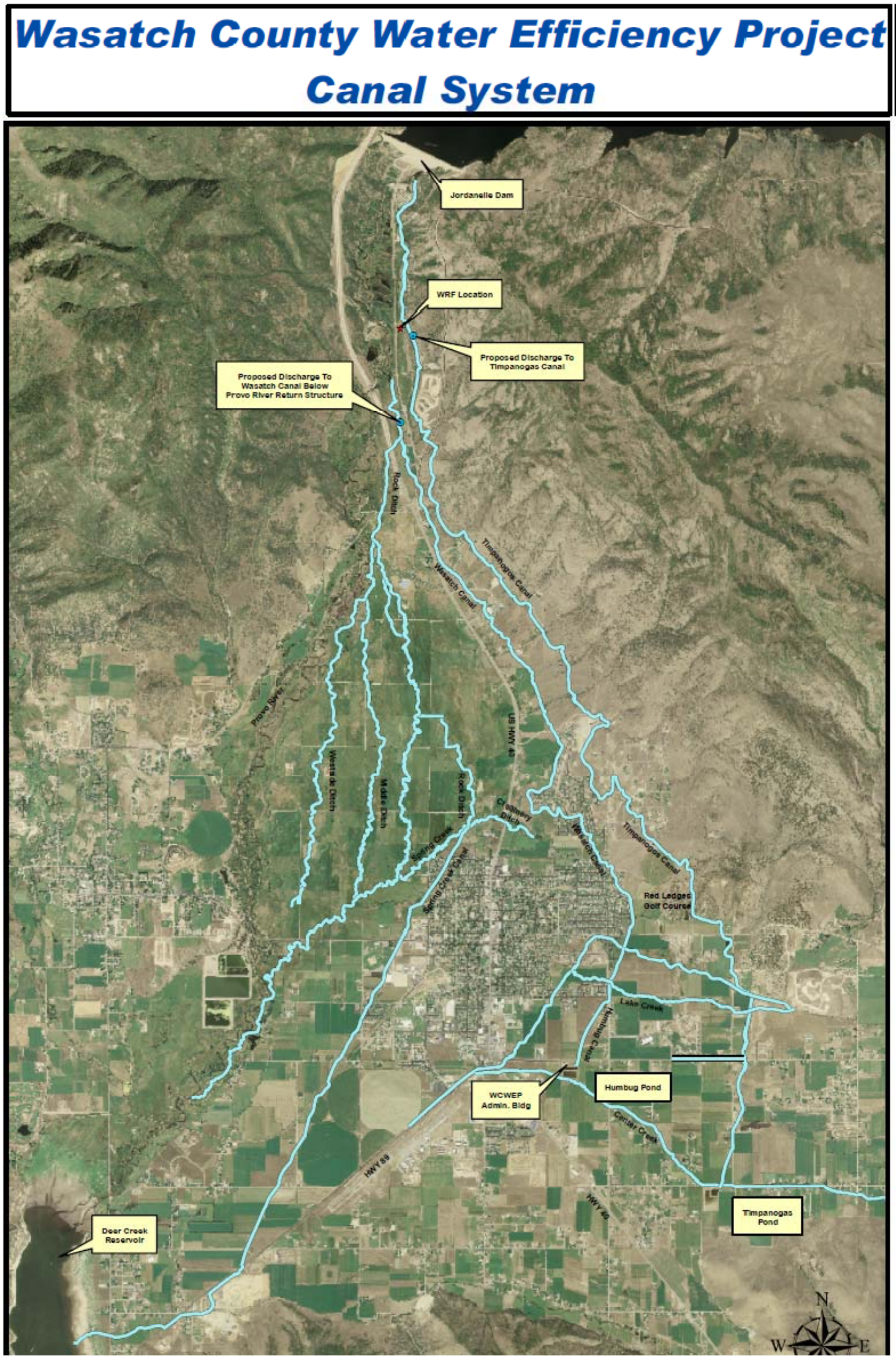

Figure 2: Map of Project Area, Showing Proposed Discharge Points and WRF Location. Canal System appears in light blue.

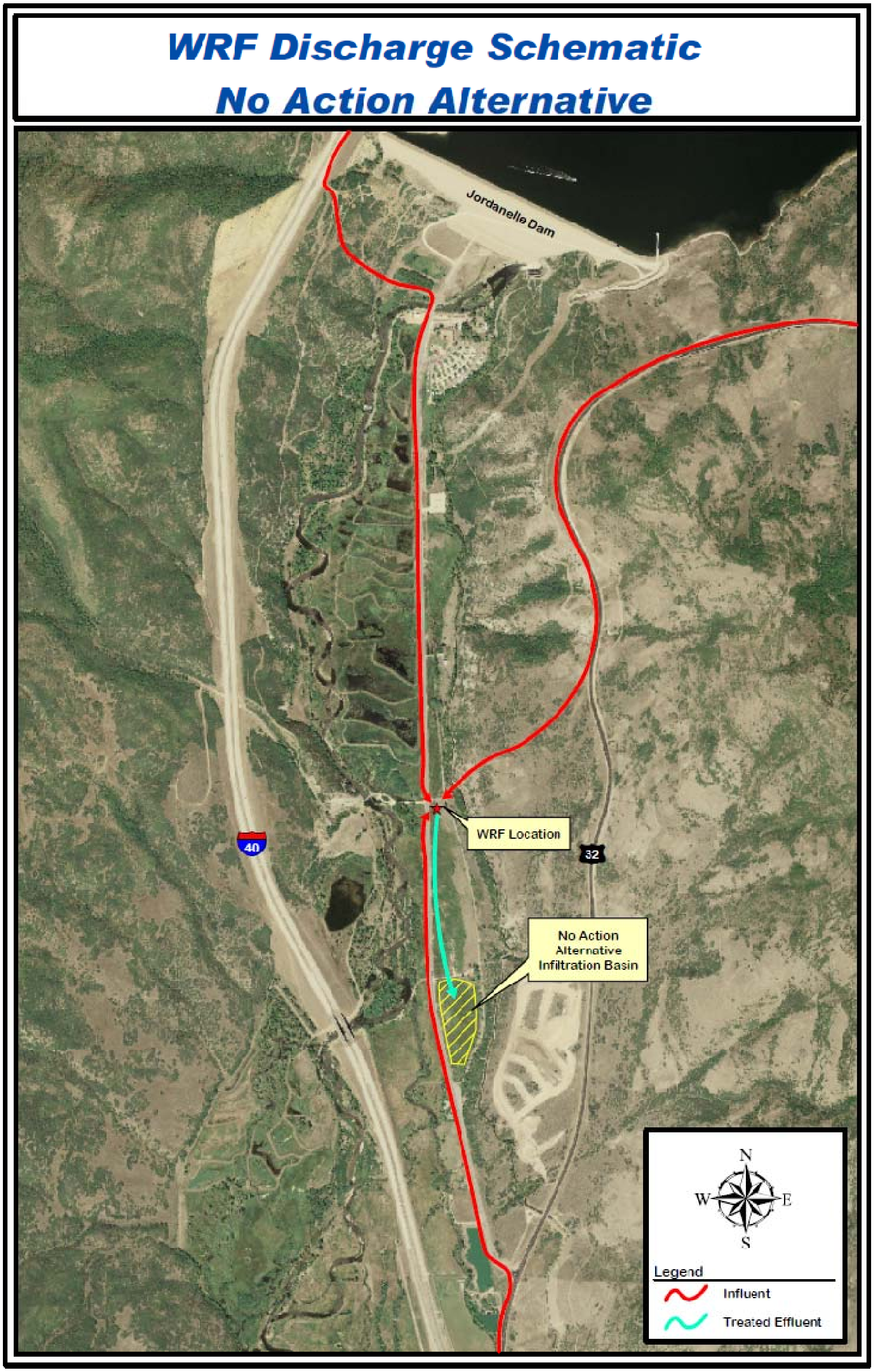

Figure 3: No Action Alternative

2.3 No Action Alternative

Under the No Action Alternative, treated effluent from the WRF would be discharged into an infiltration basin which would be constructed on JSSD property (Figure 3). The means of discharge to the infiltration basin would be an existing 20” HDPE pipe, 1900 feet long, which crosses JSSD property and a UDOT right of way. The effluent would go into the groundwater and to the Provo River via infiltration. This discharge alternative would require no Federal action, but would require that JSSD apply for a state Groundwater Construction permit and if applicable, a Groundwater Discharge permit.

Preliminary analysis indicates an infiltration rate at the proposed basin site of ½ inch per hour, which would equate to 325,000 gallons per day of infiltration. At this infiltration rate, when the full 1 MGD treatment capacity of the WRF is used in approximately 20 years, a 3-acre basin would be needed.[2]

2.4 Action Alternatives

The WCWEP discharge alternatives proposed by CUWCD and Interior would be to discharge recycled water from the WRF into either a combination of the Wasatch and Timpanogos Canals, or into the Wasatch Canal only. Please see Figure 4, WRF Discharge Schematic.

2.4.1 Combined Timpanogos and Wasatch Canals

Through a water exchange, recycled water from the JSSD WRF would be conveyed as CUP water through either the Wasatch or Timpanogos Canals throughout the irrigation season to meet the needs of the water users. Winter discharges would be made into the Wasatch Canal during months when the Timpanogos Canal freezes each year, typically December through February. Water would be exchanged through existing water rights and contracts. Conveyance pipelines from the WRF to both canals would be constructed.

The conveyance pipeline from the WRF to the Wasatch Canal would consist of approximately 3,900 feet of existing 20-inch HDPE pipe across JSSD-owned property and within public road right-of-way and approximately 500 feet of new 20-inch, HDPE pipe across public road right-of-way and UDOT-owned property. Easements are in place for the crossing of the public road right-of-way and the UDOT-owned property. The pipeline alignment would follow an existing dirt roadway to the canal. A license agreement from the United States would be needed to cross federal lands/easements and connect with the federally owned Wasatch Canal. The point of discharge is immediately below the Provo River Return Channel which can deliver water from the Wasatch Canal back to the Provo River (Figure 2 above). The pipeline is planned to be 20 inches in diameter to provide capacity for potential future expansion of the WRF so that additional pipelines and disturbance will not be required in the future. Additional treatment capacity expansion would require an amendment to the UPDES permit which would allow for public review and comment at that time. This alternative proposes initial installation of a larger-than-needed pipeline with no guarantee of future approvals for capacity expansion in the future.

[2] Email from Devin McKrola, 9 December 2009

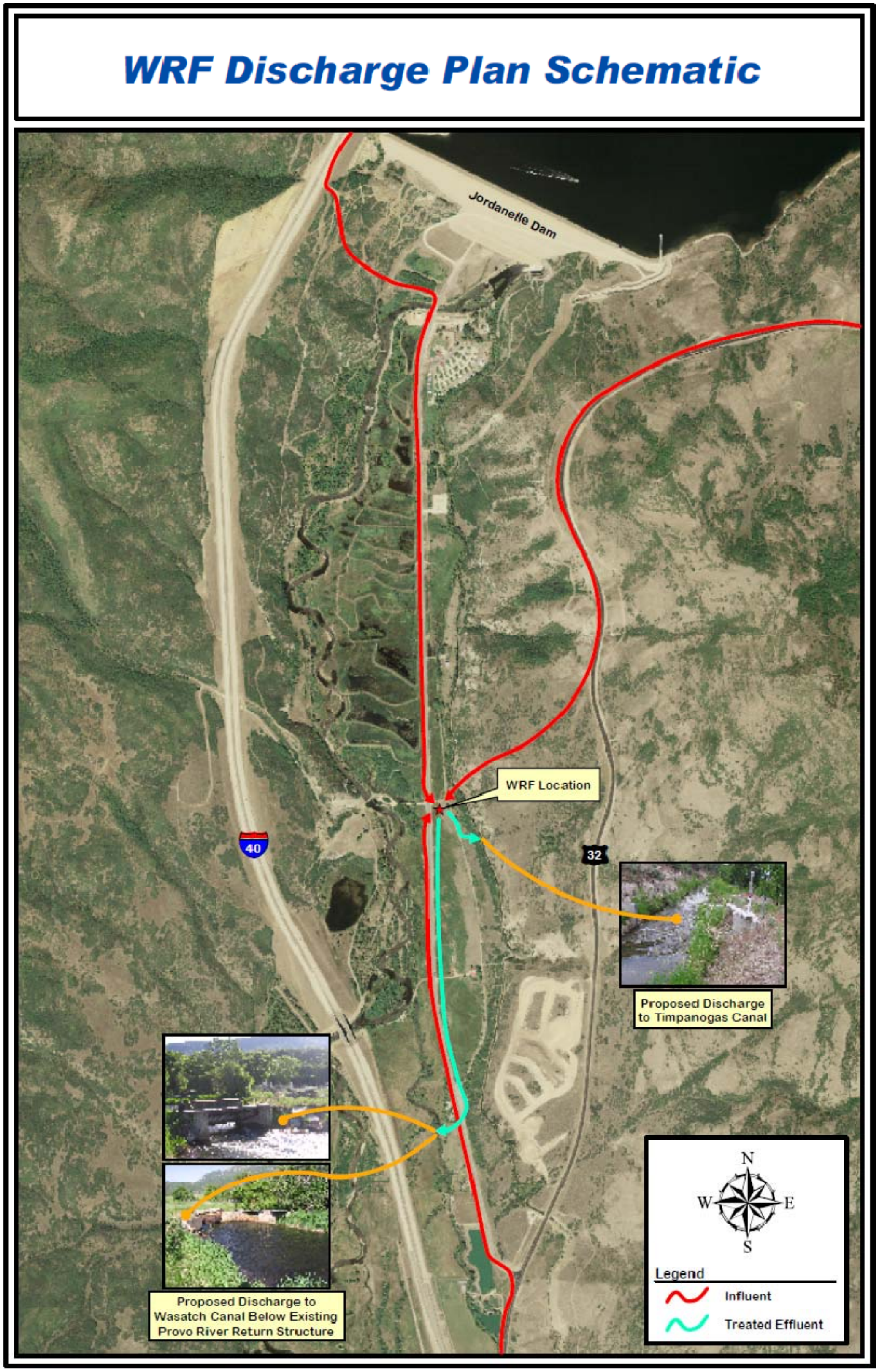

Figure 4: Action Alternatives: Combined Wasatch and Timpanogos, or Wasatch Only

The conveyance pipeline from the WRF to the Timpanogos Canal would be an approximately 500 feet long, 8-inch diameter HDPE pipe and would mainly cross JSSD-owned property, with a license agreement from the United States needed to cross federal lands/easements and connect with the federally owned canal. This pipeline has been sized based on pumping 1.0 MGD of treated effluent to the Timpanogos Canal at full capacity in approximately 20 years.

2.4.2 Wasatch Canal Only

Through a water exchange, recycled water from the JSSD WRF plant would be conveyed as CUP water through a pipeline, discharged year-round into the Wasatch Canal, and conveyed to water users via both the Wasatch Canal and the non-Federally-owned Rock Ditch distribution systems. Water would be exchanged through existing water rights and contracts. The conveyance pipeline from the WRF to the Wasatch Canal would be constructed as described in Section 2.4.1 above. Under this alternative, there would be no conveyance pipeline to the Timpanogos Canal.

2.5 Provo River Direct Discharge Alternatives Not Analyzed in this EA

As previously stated, UPDES Permit Number UT0025747 authorizes JSSD to discharge WRF effluent directly into the Provo River at two different locations. Federal action or authorization would be required for implementation of either of these alternatives because the discharge points for the Provo River Return Canal and the Provo River would require entering Federal canal easements to the points of discharge. These alternative discharge locations are not analyzed in this EA because they do not meet purpose and need. Design information for these discharge locations (previously planned by JSSD) is provided here for information purposes only.

The Provo River Return Canal point-of-discharge location is immediately upstream of the Wasatch Canal discharge location and would therefore utilize the same facilities from the WRF to the Wasatch Canal, including approximately 3,900 feet of existing, 20-inch, HDPE pipe across JSSD-owned property and within public road right-of-way and approximately 500 feet of new, 20-inch, HDPE pipe to cross public road right-of-way, and UDOT-owned property. Easements are in place for the crossing of the public road right-of-way and the UDOT-owned property. The pipeline alignment follows an existing dirt roadway to the canal. A license agreement from the United States is needed to cross federal lands/easements and connect with the federally-owned return channel. A set of valves would be added to the Wasatch Canal discharge pipeline to allow for direct flow to the Provo Return Canal rather than the Wasatch Canal. The pipeline would be 20 inches in diameter to provide capacity for potential future expansion of the WRF so that additional pipelines and disturbance will not be required in the future. Additional treatment capacity expansion will require an amendment to the UPDES permit, which will allow for public review and comment at that time. This alternative proposes initial installation of a larger-than-needed pipeline with no guarantee of future approvals for capacity expansion in the future. This discharge point would deliver treated effluent to the Provo River Return Canal which would convey the water to the Provo River.

The Provo River point-of-discharge location includes approximately 2,100 feet of existing 20-inch HDPE pipe across JSSD-owned property and within public road right-of-way and approximately 350 feet of new, 20-inch HDPE pipe along an existing gravel road across federal lands to the edge of the Provo River. A license agreement from the United States would be needed to cross federal lands/easements.

2.6 Resources Determined to be Not Affected

A review of the proposed action by resource specialists has determined that there would clearly be no effect to a number of different resources, and accordingly these resources are not discussed further in Chapter 3 of the EA. The resources clearly not affected by the proposed action are:

- Transportation
- Recreation
- Visual Resources
- Paleontological Resources
- Cultural Resources
- Geology
- Prime and Unique Farmlands
- Wild and Scenic Rivers
- Environmental Justice
- Indian Trust Assets
- Air quality

2.7 Summary of Impacts to Potentially Affected Resources

This section provides a brief summary of the effects of implementing the proposed action alternatives in comparison to the no action alternative. The complete analysis of these potentially affected resources is provided in Chapter 3.

Resource Issue	No Action Alternative	Combined Canals Alternative	Wasatch Canal Alternative
Water Resources	Minor, indirect supplement to Provo River flows	Minor benefit to the management of existing water supplies	Minor benefit to the management of existing water supplies
Water Quality	Minor, indirect effects to Provo River water quality; effluent must comply with UPDES permit.	Minor, indirect effects to water quality; effluent must comply with UPDES permit.	Minor, indirect effects water quality; effluent must comply with UPDES permit.
Water Rights	No effect	No effect	No effect
Public Health and Safety	Existing water quality shows traces of pollutants of concern; no known effect per EPA.	No effect. Federal or state definition of future pollutant limitations would require compliance under UPDES permit.	No effect. Federal or state definition of future pollutant limitations would require compliance under UPDES permit.
Socioeconomics	No effect	No effect	No effect
Wetlands and Vegetation	No effect	No effect	No effect
Threatened, Endangered, Sensitive Species	No effect	No effect	No effect

Chapter 3: Affected Environment and Environmental Effects

3.1 Introduction

This chapter describes geographic areas or resources potentially affected by the proposed action, as well as the potential effects of the proposed action alternatives in comparison to the No Action Alternative.

3.1 Affected Environment

The project area is the Heber Valley in Wasatch County, Utah, including Heber City, which is the county seat. Census figures from 2000 show the population of Wasatch County as 15,215 and the population of Heber City as 7,291. The current (2009) estimated population of Heber City is 10,000[3], while the current (2005) estimated population of Wasatch County is 18,974. In recent years, the Heber Valley has experienced a fast growing economy and has one of the lowest unemployment rates in Utah. Local developers and business leaders have said that there are not enough jobs in the city itself (as 27% of residents commute to Park City or Salt Lake City for work) and wish to improve the city's self-dependence. Average home prices in the valley doubled from 2002 to 2008 and the population has grown by 25% in that same time period.

Tourism is a year-round industry in the Heber Valley. The winter season features cross-country and downhill skiing on several trails and the nearby ski resorts of Park City. In the summer, golfing and other outdoor recreational activities are abundant. Farming was once a large force in the economy, but this has diminished slightly. The largest local employer is the Wasatch County School District.[4]

3.2.1 Water Resources

Water resources that could be affected by the project include the Provo River below Jordanelle Dam, WCWEP Canals in the Heber Valley, and surface and ground water sources immediately adjacent to the WRF plant.

3.2.2 Water Quality

Existing water quality within and near the project area was reviewed in order to determine potential effects from the action alternatives in comparison to the no action alternative. The bodies of water studied for the purposes of this EA include the WCWEP canal system, the Provo River and its tributaries, and Jordanelle and Deer Creek Reservoirs.

[3] http://www.ci.heber.ut.us/
[4] http://en.wikipedia.org/wiki/Heber,_Utah

3.2.2.1 Combined Timpanogos and Wasatch Canals

The Timpanogos and Wasatch canal systems are classified for beneficial uses along with all irrigation canals and ditches in Utah, except as otherwise designated, according to the Standards of Quality for Waters of the State, Environmental Quality (R317-2), Utah Administrative Code (UAC). These beneficial uses are:

Class 2B – Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water.

Class 3E – Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.

Class 4 – Protected for agricultural uses including irrigation of crops and stock watering.

Diversions to these systems are made below Jordanelle Reservoir. Water diverted to the canals is initially similar to the water quality of the Provo River below Jordanelle Reservoir. The water quality of the Provo River is summarized in the next section. Water quality sampling over the length of the canals has not occurred historically but changes to the initial quality could occur as cross-drainage runoff is intercepted, groundwater gains and losses occur, and diversions for irrigation and stock watering are made.

In 2009 the JSSD and CUWCD, in coordination with the Provo River Watershed Council, initiated a water quality sampling program on the Timpanogos and Wasatch Canals to collect baseline data on specific water quality parameters including total coliform, E. coli, and some pharmaceutical constituents. A map showing the locations of the canal sampling sites is shown in Figure 5. A summary of bacteria samples is shown in Table 1. The standard measure for total coliform and E. coli bacteria is colony forming units per 100 milliliters (cfu/100mL). 5.

E. coli bacteria are indicators of contamination by human and animal waste. In Utah, water quality standards for E. coli are established to protect water quality depending on the designated beneficial use(s) of the water body. E. coli standards for the Class 2B (secondary contact recreation) designated beneficial uses of irrigation canals are a 30-day average count of 206 cfu/100 mL and a single sample maximum count of 668 cfu/100 mL. These standards are recognized as protective of secondary contact recreation in water. Every sample collected from the canals and associated flows would comply with the state standard of a single sample maximum allowable bacteria count for E. coli of 668 cfu/100 mL.

Pharmaceutical samples from each site were collected in June, July, and September 2009. Results from pharmaceutical samples showed trace amounts of several constituents at every site sampled. These constituents include acetaminophen, bis phenol A (BPA), caffeine, cotinine, ibuprofen, iopromide, and triclosan. For additional information on the specific pharmaceuticals detected in the water samples, please refer to Appendix A. A summary of the pharmaceutical sampling results is shown in Table 2. The table shows the maximum concentration in the sample for each constituent at a particular location. Samples with concentrations below the detection limit are noted as ‘ND’(Non-detection). Currently the U.S. EPA and the State of Utah have not established surface water quality standards for pharmaceuticals or personal care products.

It is important to note that the concentrations of the pharmaceutical samples are reported in nanograms per liter, or one part per trillion. This is the equivalent of one second in 31,688 years. To put the results of the pharmaceutical sampling at the head of the canals in perspective, the following calculations were made using the recommended individual daily water intake of 1.9.

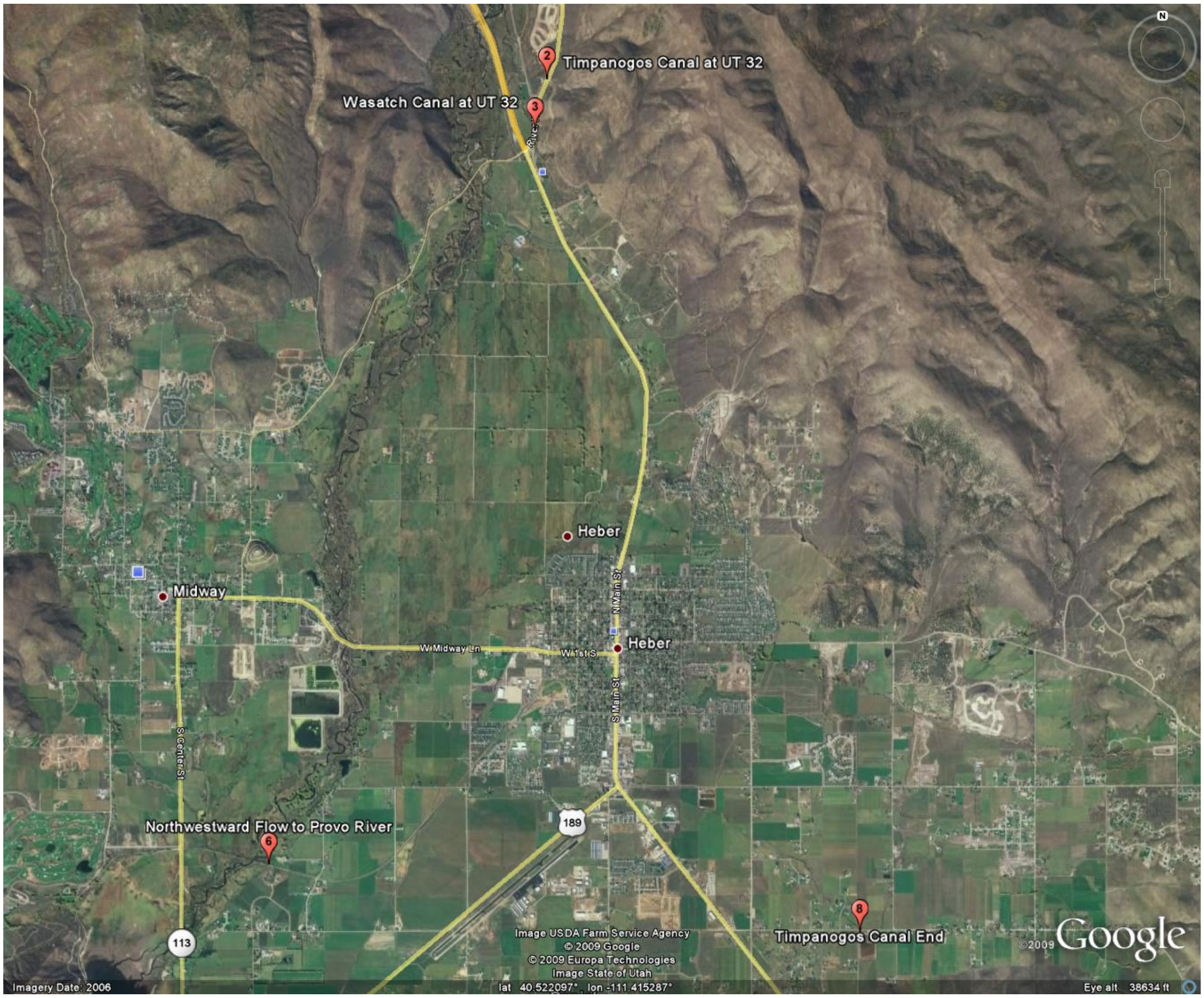

Figure 5: Heber Valley Canals bacteria and pharmaceutical sampling sites

Table 1: Heber Valley Canals baseline bacteriological data

Sample Site	Bacteria Sample (cfu/100mL)	6/3/2009	6/17/2009	7/29/2009	9/24/2009
Timpanogos Canal at UT 32	Total Coliform E. Coli	88.6 4.1	151.5 4.1	128.1 3.1	1299.7 1.0
Wasatch Canal at UT 32	Total Coliform E. Coli	206.4 4.1	104.3 3.1	135.4 5.2	1553.1 12.0
Timpanogos Canal End at 2400 S Heber	Total Coliform E. Coli	1553.1 32.3	1203.3 78.5	>2419.6 52.1	1732.9 325.5
Northwestward Flow to Provo River	Total Coliform E. Coli	1732.9 64.4	2419.6 186	>2419.6 185	1413.6 160.7

liters (64 oz.) per day: at an acetaminophen concentration of 4.9 ng/L it would take a person 96,000 years to consume the equivalent of one tablet of regular strength Tylenol (325 mg); at a caffeine concentration of 7.6 ng/L it would take a person over 25,000 years to consume the equivalent of one 8 ounce cup of coffee and almost 9,000 years to consume the equivalent of one 12 ounce can of Coca-Cola; at an ibuprofen concentration of 1.1 ng/L it would take a person over 260,000 years to consume the equivalent of one 200 mg tablet of ibuprofen.

Table 2: Heber Valley Canals baseline pharmaceuticals data

Sample Site	**Constituent Concentrations (ng/L)**						
	Acetaminophen	**Bis Phenol A (BPA)**	**Caffeine**	**Cotinine**	**Ibuprofen**	**Iopromide**	**Triclosan**
Timpanogos Canal at UT 32	ND	ND	ND	3.7	1.1	ND	5.5
Wasatch Canal at UT 32	4.9	43	7.6	1.6	ND	5.7	15
Timpanogos Canal End at 2400 S Heber	ND	17	3.8	ND	2.3	ND	6.7
Northwestward Flow to Provo River	22	27	21	5	ND	ND	24

3.2.2.2 Provo River

The Provo River and its tributaries between Deer Creek and Jordanelle Reservoirs are classified and protected by the State of Utah for the following beneficial uses in the Standards of Quality for Waters of the State, Environmental Quality (R317-2), Utah Administrative Code (UAC):

Class 1C – Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water

Class 2B – Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water.

Class 3A – Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.

Class 4 – Protected for agricultural uses including irrigation of crops and stock watering.

Beneficial use support is determined by comparing monitoring data against the water quality numeric criteria (found in UAC R317-2). Utah's 2006 Integrated Report Volume I – 305(b) Assessment indicates the Provo River from Deer Creek to Jordanelle Reservoir supports its designated beneficial uses for classes 1C, 3A, & 4 (Utah, 2006a). It was not assessed for beneficial use class 2B.

Table 3 summarizes general water quality concentrations in the river below Jordanelle Reservoir since 1993. **Table 4** summarizes trace metal sampling at the same location. In order to compute the average concentrations of water quality parameters, all samples which resulted in non-detection were assumed to have concentrations equal to the minimum detection level. In the event that all or nearly all samples resulted in non-detection the average concentration is noted as 'ND'.

Table 3: Provo River Summary of Water Quality Monitoring

PROVO R BELOW JORDANELLE RES. ON OLD US4O XING, 1993-2007				
Parameter	Number of Samples Collected	Number of Sample Non-Detects	Average Concentration (mg/L)	State Standard (mg/L)
Alkalinity, carbonate as CaCO3	119	0	74	NS[5]
Calcium	122	1	29	NS
Carbon, Total Organic	65	0	3.0	NS
Chloride	44	10	6	NS
Fluorides	3	0	0.127	1.4
Hardness, Ca + Mg	121	0	99	NS
Magnesium	122	1	7	NS
Nitrogen, ammonia as N	173	160	0.05	3
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	173	55	0.168	10
pH	289	0	8.02	6.5 - 9.0
Phosphorus as P, dissolved	163	105	0.019	NS
Phosphorus as P, total	163	87	0.027	0.05
Potassium	64	25	1.1	NS
Sodium	64	0	4	NS
Solids, Dissolved	117	0	132	1200
Solids, Total Suspended (TSS)	173	152	5	NS
Sulfate	44	4	27	NS

[5] NS = No Standard

Table 4: Provo River Summary of Trace Element Monitoring

PROVO R BELOW JORDANELLE RES. ON OLD US4O XING, 1993-2007					
Parameter	Number of Samples Collected	Number of Sample Non-Detects	Average Concentration (µg/L)	Minimum Detection Level (µg/L)	State Standard (µg/L)
Aluminum	62	45	49.5	30	750
Arsenic	66	65	[6]	1	10
Barium	66	21	64.6	100[7]	1000
Beryllium	6	6	ND	1	4
Boron	19	18	[8]	40	750
Cadmium	66	66	ND	0.1	2
Chromium	66	65	[9]	5	16
Copper	66	65	[10]	1	13
Iron	66	29	39.2	20	NS
Lead	66	65	[11]	0.1	15
Manganese	65	46	11.7	5	NS
Mercury	66	66	ND	0.2	2.4
Nickel	19	19	ND	5	468
Selenium	66	65	[12]	1	18.4
Silver	66	66	ND	0.5	1.6
Zinc	66	62	[13]	30	120

Water sampling in 2009 conducted by the JSSD and CUWCD, in coordination with the Provo River Watershed Council, included several sites on the Provo River (Figure 6). Sampling was initiated to collect baseline data on additional water quality parameters including total coliform, E. coli, and some pharmaceutical constituents. A summary of bacteria samples is shown in Table 5.

E. coli standards for the Class 1C (domestic source water) and Class 2B (secondary contact recreation) designated beneficial uses of the Provo River are a 30-day average count of 206 cfu/100 mL and a single sample maximum count of 668 cfu/100 mL. In general, bacteria counts in the Provo River are lowest below Jordanelle Reservoir and increase downstream toward Deer Creek Reservoir. All of the bacteria samples collected are below the single sample maximum limit of 668 cfu/100 mL.

[6] Single detection of 1.2 µg/L
[7] MDL of 100 µg/L since October 2003
[8] Single detection of 51.1 ug/L
[9] Single detection of 5.21 µg/L
[10] Single detection of 1.2 µg/L
[11] Single detection of 0.679 µg/L
[12] Single detection of 1 µg/L
[13] Four detections of 43, 33, 14, and 12 µg/L

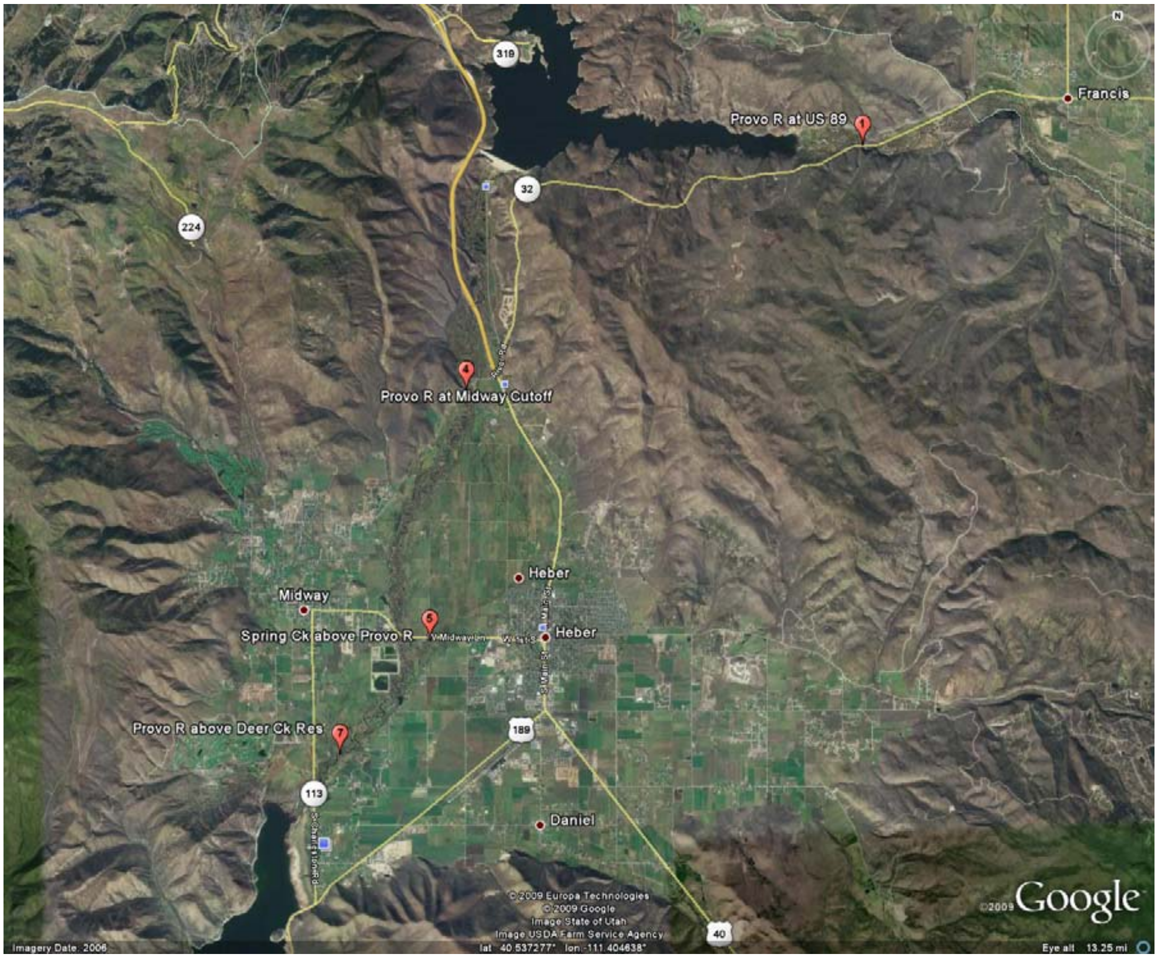

Figure 6: Provo River bacteria and pharmaceutical sampling sites

Table 5: Provo River 2009 baseline bacteriological data

Sample Site	Bacteria Sample (cfu/100mL)	6/3/2009	6/17/2009	7/29/2009	9/24/2009
Provo River at US 89	Total Coliform	1553.1	1119.9	>2419.6	1986.3
	E. Coli	35.9	59.8	73.3	35.9
Provo River Below Jordanelle Dam	Total Coliform	33.1	9.8	9.5	980.4
	E. Coli	<1	<1	<1	<1
Provo River at Midway Cutoff Rd Xing	Total Coliform	1119.9	88.0	152.9	1203.3
	E. Coli	16.9	5.2	3.0	14.8
Provo River Above Deer Creek Reservoir	Total Coliform	>2419.6	2419.6	2419.6	>2419.6
	E. Coli	62.7	135.4	113.7	108.1

Results from pharmaceutical samples resulted in trace amounts of several constituents at every site sampled. These constituents include acetaminophen, bis phenol A (BPA), caffeine, cotinine, ibuprofen, iopromide, triclosan, and tris (2-butoxyethyl) phosphate. For additional information on the specific pharmaceuticals detected in the water samples, please refer to Appendix 1. A summary of the 2009 pharmaceutical sampling results is shown in Table 6. Currently the U.S. EPA and the State of Utah have not established surface water quality standards for pharmaceutical or personal care products.

Table 6: Provo River 2009 baseline pharmaceuticals data

Sample Site	Constituent Concentrations (ng/L)							
	Acetaminophen	Bis Phenol A (BPA)	Caffeine	Cotinine	Ibuprofen	Iopromide	Triclosan	Tris (2-butoxyethyl) phosphate
Provo River at US 89	10	14	9.3	2.3	1.2	ND	12	ND
Provo River at Midway Cutoff Rd Crossing	ND	ND	3.3	ND	5.9	11	9.7	220
Provo River Above Deer Creek Dam	23	19	18	6.8	ND	ND	11	ND

It is important to note that the concentrations of the pharmaceutical samples are reported in nanograms per liter, or one part per trillion. To put the results of the pharmaceutical sampling in perspective, the following calculations were made using the recommended individual water intake of 1.9 liters (64 oz.) per day: at the highest acetaminophen concentration detected in a river sample (23 ng/L) it would take a person more than 20,000 years to consume the equivalent of one tablet of regular strength Tylenol (325 mg); at the highest caffeine concentration (18 ng/L) it would take a person more than 10,000 years to consume the equivalent of one 8 ounce cup of coffee and more than 3,000 years to consume the equivalent of one 12 ounce can of Coca-Cola; at an ibuprofen concentration of 5.9 ng/L it would take a person over 49,000 years to consume the equivalent of one 200 mg tablet of ibuprofen.

The water quality of the Provo River from Jordanelle to Deer Creek meets all of the standards established to protect its designated beneficial uses including for domestic source water, for aquatic habitat, and for agricultural use.

3.2.2.3 Deer Creek Reservoir

Deer Creek Reservoir, downstream from the proposed discharge, is classified and protected by the State of Utah for the following beneficial uses (UAC R317-2-13):

Class 1C – Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water

Class 2A – Protected for frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water.

Class 2B – Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water.

Class 3A – Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.

Class 4 – Protected for agricultural uses including irrigation of crops and stock watering.

The 305(b) report indicates Deer Creek Reservoir is partially supporting its designated beneficial uses and is included in Utah's 303(d) list of impaired water as Category 4 (Utah, 2006b). It is impaired for one or more beneficial uses, and an associated TMDL was completed and approved by the EPA on September 9, 2002 for total phosphorus (Utah DEQ, 2002).

The Deer Creek Reservoir TMDL was implemented to maintain water quality in the reservoir by focusing on reducing nutrient loads through current construction plans and assuring that new potential sources developed in the watershed will not increase nutrient loading. Several water quality targets have been identified including (Utah DEQ, 2002):

- No more than 50% of the water column to have dissolved oxygen concentrations less than 4.0 mg/L.
- In-lake total phosphorus concentrations not to exceed 0.025 mg/L
- Annual total phosphorus load not to exceed 15,300 kg/year
- August through October total phosphorus load not to exceed 560 kg/month

The TMDL recommended nine projects to achieve necessary load reductions, including cautious, responsible growth in Heber Valley and Jordanelle Basin. Future point sources from the Jordanelle Special Service District were anticipated in the TMDL document and recommendations included mechanical treatment plants with advanced wastewater treatment to reduce phosphorus to low levels (Utah DEQ, 2002).

3.2.3 Water Rights

3.2.3.1 Provo River Water Rights

Senior surface water rights in the Provo River and its tributaries are defined by the 1921 C.W. Morse Decree (Civil #2888). This decree divided the Provo River water rights into various classes and then restricted the dates when they may be diverted and specified that all senior classes must be satisfied first. There have also been a few surface water appropriations on the Provo River since the 1921 decree. The largest of these include the appropriations filed by the Bureau of Reclamation for storage in Deer Creek and Jordanelle Dams and for direct diversion at Olmsted diversion dam. All these surface water rights, excluding isolated springs, are regulated by the Provo River Commissioner. The River Commissioner collects diversion data for each water right and determines when individual water rights are in priority.

In addition to the in-basin Provo River water rights that are regulated by priority date and water right class, there are several significant import water rights within the Provo River basin. These water rights include the Ontario Drain Tunnel, Weber-Provo Diversion Canal, and Duchesne Diversion Tunnel. Because the import water under these rights represents new water to the Provo River basin, these water rights are not subject to priority cuts within the Provo River basin and can be fully consumed without impact to other water right holders.

3.2.3.2 Bonneville Unit – Jordanelle Water Rights

Bonneville Unit water is stored in Jordanelle Reservoir under Water Right Nos. 55-4494 and 43-3822, which are based on Application to Appropriate Nos. A40523 and A36639 respectively. Water Right No. 55-4494 allows up to 300,000 acre-feet of Provo River water to be stored each year in Jordanelle Reservoir to be used primarily for irrigation, power, and municipal and industrial purposes within the service area of the Bonneville Unit of the Central Utah Project. Water Right No. 43-3822 allows 500,000 acre-feet of Uintah Basin water to be collected in the Strawberry Aqueduct Collection system and transported and stored in Strawberry Reservoir. By an exchange through Utah Lake, a portion of Water Right No. 43-3822 can be transferred to Jordanelle Reservoir during dry years when Water Right No. 55-4494 would not be in priority.

Of the total allocated Bonneville Unit yield of Jordanelle Reservoir, 2,400 acre-feet has been reserved for M&I use and 12,100 acre-feet has been reserved for irrigation use within Wasatch County. A portion of this water has been contracted for by JSSD to meet the area's future water needs.

In addition to the Bonneville Unit water rights, irrigation company water rights conserved by the WCWEP are stored in Jordanelle Reservoir. This allows the water that was historically used for flood irrigation to be stored and regulated through a pressurized irrigation network in Heber Valley. The water conserved by increased efficiency of the pressurized irrigation system is accounted for and placed in a conservation pool to be released from Jordanelle Reservoir to protect water rights that require return flows for downstream water right holders. This water also provides for stream flow enhancements.

3.2.3.3 JSSD Water Rights

JSSD has a wide variety of water rights to meet the existing and anticipated future water needs within their service area currently comprised of northern Wasatch County and a small portion of Summit County. These water rights fall into four broad categories, as follows: Ontario Drain Tunnel water either owned or contracted through Metropolitan Water District of Salt Lake and Sandy (MWDSL&S), Salt Lake City (SLC), and Midway Irrigation Company; water shares of various irrigation companies; other water rights; and CUP project water. Most of these water rights are managed by priority date within the Provo River system and have return flow obligations downstream. One exception to this is the Ontario Drain Tunnel water. Because the tunnel water is imported to the Provo River drainage there are no local water rights that have return flow claims on this water, therefore 100 percent of this water can be depleted.

3.2.4 Public Health and Safety

During the public scoping period for this EA, public comments were received expressing concern over the potential for adverse effects to public safety and health from the discharge of WRF effluent into the WCWEP canals for use as irrigation water and stock water. In particular, there was concern over both direct human exposure to the irrigation water and indirect effects in using the treated effluent to water crops including hay, fruits and vegetables, as well as for watering livestock. Section 3.2.2 above describes existing water quality and relevant water quality standards for the Wasatch and Timpanogos Canals as well as in the Provo River and Deer Creek and Jordanelle Reservoirs.

According to the Environmental Protection Agency, the issue of pharmaceuticals and other contaminants in the nation's waters is not new, but is more recently receiving attention:

> PPCPs have probably been present in water and the environment for as long as humans have been using them. The drugs that we take are not entirely absorbed by our bodies, and are excreted and passed into wastewater and surface water. With advances in

technology that improved the ability to detect and quantify these chemicals, we can now begin to identify what effects, if any, these chemicals have on human and environmental health.[14]

3.2.5 Socioeconomics

The Wasatch County Water Efficiency Project has improved irrigation efficiency in Heber Valley by making it possible for irrigators to convert from flood irrigation to sprinkler irrigation. This conversion to more efficient sprinkler irrigation achieves an increase in crop yields. The water that is conserved is used to supplement existing flows in some Heber Valley streams.

Potential impacts to socioeconomics could include fewer water shortages by utilizing the same water multiple times through the recycling process, and public perception that effluent from water treatment plants is of unacceptable quality relative to established Federal and state standards.

Water quality perception seems to be a key issue with the recycled water. The potential impact is the perceived negative effect of daily use of the effluent for irrigation and livestock watering.

3.2.6 Wetlands and Vegetation

An onsite inspection conducted October 21, 2009, revealed that no wetlands exist within the proposed construction area. Most of the proposed area has been previously disturbed.

Native upland species of vegetation are found in the construction area, however a significant proportion of the vegetation consists of weed and nonnative species. The various species include big sagebrush (*Artemisia tridentata*), wormwood (*Artemisia ludoviciana*), skunkbrush sumac (*Rhus trilobata*), Oregon grape (*Mahonia repens*),yellow sweet clover (*Melilotus officinalis*); rabbitbrush (*Chrysothamnus* spp.); houndstongue (*Cynoglossum officinale*); crested wheatgrass (*Agropyron cristatum*) and western wheatgrass (*Elymus smithii*); slender wheatgrass (*Elymus trachycaulus*); Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), orchardgrass (*Dactylis glomerata*), Horsetail (*Equisetum spp*.), and wooly mullen (*Verbascum thapsus*). Weed species include Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), and cheatgrass (*Bromus tectorum*). Most of the undisturbed areas are dominated by sagebrush and Gambel's oak *(Quercus gamebelii*).

3.2.7 Wildlife Resources

Wildlife resources within the general area of the project include big game, smaller mammals, raptors, water birds, and upland game birds, with a variety of other birds, reptiles, and amphibians. These are discussed below.

Big Game--The construction areas are covered mostly with sagebrush, grass, and oak communities. The area provides big game habitat, both as summer use and as winter use, for both deer (*Odocoileus hemionus*) and elk (*Cervus elaphus nelsoni*). Large herds of deer and elk are seen wintering in the general area. Moose (*Alces alces*) are occasionally observed along stream drainages near the area. Mountain lion (*Felis concolor*) and black bear (*Ursus americanus*) are rarely seen.

[14] http://www.epa.gov/ppcp/

Smaller Mammals--Other mammals common within the area include yellow-bellied marmot *(Marmota plaviventris*), badger (*Tasidea taxus*), least chipmunk (*Eutamias minimus*), golden-mantled ground squirrel (*Spermophilus lateralis*), meadow vole (*Microtus montanus*), northern pocket gopher (*Thomomys talpoides*), deer mouse (*Peromyscus maniculatus*), porcupine *(Erethizon dorsatum*), coyote (*Canis latrans*), and striped skunk (*Mephitis mephitis*). Furbearers such as beaver (*Castor canadensis*), mink (*Mustela vison*), and muskrat (*Ondatra zibethicus*) use the wetland and riparian habitats in the vicinity of the project area. The State of Utah lists sensitive species (species of special concern) with a potential to occur within the area, including northern flying squirrel (*Glaucomys sabrinus*), ringtail cat (*Bassariscus astutus*), and river otter (*Lutra canadensis*). The Utah Division of Wildlife Resources has recently begun reintroducing the river otter in the project area by relocating individual animals trapped along the Green River in northeastern Utah.

Raptors--Birds of prey, or raptors, have been observed within or adjacent to the project area. Cottonwood trees in the vicinity of the project area provide nesting habitat for raptors such as the golden eagle (*Aquila chrysaetos*), and red-tailed hawk (*Buteo jamaicensis*) and roosting sites for the great horned owl (*Bubo virginianus*) and bald eagle *(Haliaeetus leucocephalus*). Northern goshawk (*Accipiter gentilis*) and ferruginous hawk (*Buteo regalis*) also occur in the vicinity of the project area. Winter months are the best time to view bald eagles in the area. Other raptors observed at the reservoir are the American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), sharp-shinned hawk (*Accipter striatus*), northern harrier (*Circus cyaneus*), and turkey vulture (*Cathartes aura*). Osprey are known to nest in the project area, making use of cottonwood trees, power poles, and nesting platforms.

Water Birds--Water birds use the canals. These include waterfowl, shore birds, and other wading birds typically associated with open water.

Upland Game Birds--Upland game birds known to occur in the area include the ring-necked pheasant *(Phasianus colchicus*), gray partridge (*Perdix perdix*), sage grouse (*Centrocerus urophasianus*), and mourning dove (*Zenaida macroura*). Other species that may occur in the area include the ruffed grouse (*Bonasa umbellus*), blue grouse (*Dendrapagus obscurus*), and California quail (*Lophortyx californicus*).

Other Birds--The most common birds in the area are songbirds and similar species associated with terrestrial habitats. These species include sparrows, warblers, thrushes, vireos, swallows, black birds, woodpeckers, and hummingbirds. Another group of birds frequently observed at the reservoir comprises the corvids, including jays (*Cyanocitta spp*.), the black-billed magpie (*Pica pica*), and the common raven (*Corvus corax*).

Reptiles and Amphibians--A number of reptiles occur in the general area of the project including the wandering garter snake (*Thamnophis elegans*), Great Basin gopher snake (*Pituophis catenifer*), Great Basin rattlesnake (*Crotalus viridis*), milk snake *(Lampropeltis triangulum*), smooth green snake (*Opheodrys vernalis*), and mountain king snake *(Lampropeltis pyromelana*). The tiger salamander (*Ambystoma tigrinum*), boreal chorus frog (*Pseudacris triseriata*), leopard frog (*Rana pipiens*), and Woodhouse's toad (*Bufo woodhousei*) may also occur in the area.

3.2.8 Threatened, Endgangered, Candidate, and Special Status Species

Federal agencies are required to ensure that any action federally authorized, funded, or carried out will not adversely affect a federally listed threatened or endangered species.

There are no known threatened, endangered, candidate, or special status species inhabiting the proposed construction areas. However, several of these species do occur within Wasatch County or within the Provo River Drainage near the proposed construction areas. These species are discussed below.

Ute ladies'-tresses (*Spiranthes diluvialis*) (threatened), a small orchid, is usually found along stream margins or bogs. The Canada Lynx (*Lynx canadensis*) (threatened), although they have not been seen, could possibly use forested areas and wetlands within the Provo River Drainage. The June sucker (*Chasmistes liorus*) (endangered), for which a recovery program has recently been implemented, is known to exist only within Utah Lake and its drainages, excluding refuge populations at several sites. The bald eagle (*Haliaeetus leucocephalus*) (a state of Utah species of concern and protected under the Bald Eagle Protection Act) is a winter resident of the area. This species roosts primarily in forested canyons or tall cottonwoods along streams and reservoirs. Northern goshawk (*Accipiter gentilis*) and ferruginous hawk (*Buteo regalis*) (both state of Utah species of concern) also occur in the vicinity of the project area. The spotted frog (*Rana luteiventris*) (a Utah species of concern managed under a conservation agreement) is presently found in wetlands near the proposed construction areas.

3.3 Environmental Effects of Alternatives

3.3.1 Water Resources

Because the net releases to the river under any alternative would be nearly identical in volume, water resource impacts are anticipated to be minimal to none. None of the alternatives affects operation of either Jordanelle or Deer Creek Reservoir, or the WCWEP canal system.

3.3.1.1 No Action Alternative

Under the No Action Alternative, between 0.31 cfs and 1.55 cfs of recycled water from the WRF would be discharged into an infiltration basin which would be constructed on JSSD property. This equates to a range of 0.6 acre-feet per day to 3.1 acre-feet per day, or 219 to 1,135 acre-feet per year. This water would seep into the groundwater and travel underground to the Provo River. There would be no operational changes or alterations to regular deliveries of water. The WRF effluent would become part of the available water supply for downstream use, but would not be available for reuse within the project area.

3.3.1.2 Combined Timpanogos and Wasatch Canals Alternative or Wasatch Canal Only Alternative

Under either of the action alternatives, between 0.31 and 1.55 cfs of recycled water from the WRF would be discharged as Central Utah Project water into either the Timpanogos Canal or the Wasatch Canal. By exchange an equivalent amount of CUP water would be made available to JSSD. Because this exchange occurs on a daily real time basis and because the WRF discharge equates to 0.1% to 0.57% of the average flows in the Provo River as measured at the Hailstone gauge from 1996 through 2008, there would be no significant operational changes or any alterations to regular deliveries of water.

3.3.2 Water Quality

Environmental effects on water quality are the effects the different alternatives considered will have on water quality in the Timpanogos and Wasatch Canals, the Provo River, and Deer Creek Reservoir. Due to the impaired beneficial use(s) at Deer Creek Reservoir and the TMDL for total phosphorus, environmental effects were also analyzed for the contribution of total phosphorus to the reservoir from each alternative.

Under Section 402 of the Clean Water Act (CWA) point sources must obtain a discharge permit. In Utah the UDWQ authorizes point source discharges through Utah Pollution Discharge Elimination System (UPDES) permits. These permits are made available for public review and must be renewed every 5 years. Permits regulate the amounts of pollutants that can be discharged. Limits on pollutants are determined by consideration of water quality standards including numeric criteria in the receiving waters with the objective of attainment or maintenance of the water quality standards.

UPDES permit number UT0025747 authorizes JSSD Water Reclamation Facility (WRF) to discharge from its wastewater treatment facility to four outfalls. Outfall 001 discharges to the Timpanogos Canal, outfall 002 discharges to the Wasatch Canal, outfall 003 discharges to the Provo River Return Channel, and outfall 004 discharges to the Provo River. The effluent limitations for JSSD WRF for each outfall are shown in Table 7 (taken from UPDES permit). Discharge limitations for all four outfall locations are determined such that the numeric criteria of the Provo River will not be violated. E. coli effluent limitations are more stringent than the numeric criteria of any of the Provo River's designated beneficial uses and also meet Utah's numeric criteria for primary contact recreation. Total phosphorus load from the discharge is calculated as follows:

> Yearly Total Phosphorus = total load for outfall 001*0.05 + total load for outfall 002*0.50 + total load for outfall 003 + total load for outfall 004

Monitoring of trace elements will be conducted for the influent and effluent at JSSD WRF to determine if an industrial pretreatment program is necessary. Monitoring will include sampling for arsenic, cadmium, chromium, copper, cyanide, lead, mercury, molybdenum, nickel, selenium, silver, and zinc.

Table 7: Effluent Limitations for JSSD WRF (from UPDES Permit No. UT0025747)

Parameter	Yearly Max.	90 Day Average	Monthly Average	Max. Weekly Average	Daily Min.	Daily Max.
Total Flow, MGD	NA	NA	1.0	NA	NA	NA
BOD5, mg/L	NA	NA	10	NA	NA	NA
BOD5, Minimum % Removal	NA	NA	85	NA	NA	NA
TSS, mg/L	NA	NA	10	10	NA	NA
TSS, Minimum % Removal	NA	NA	85	NA	NA	NA
E. Coli, no./100 mL	NA	NA	126	157	NA	NA
Dissolved Oxygen, mg/L	NA	NA	NA	NA	5.0	NA
TDS, mg/L	NA	NA	NA	NA	NA	1200
Total Phosphorus, mg/L (Interim)	NA	NA	NA	NA	NA	0.15
Total Phosphorus, mg/L (May-Oct) (Final)	NA	0.03	NA	NA	NA	0.08
Total Phosphorus, mg/L (Nov-Apr) (Final)	NA	0.06	NA	NA	NA	0.1
Total Phosphorus, lbs/year	91	NA	NA	NA	NA	NA
Ammonia, mg/L	NA	NA	0.8	NA	NA	NA
Oil & Grease, mg/L	NA	NA	NA	NA	NA	10
pH, Standard Units	NA	NA	NA	NA	6.5	9.0

The analyses of water quality effects for each alternative assume the JSSD WRF discharge is 0.2 MGD during the interim period and 1 MGD, or full capacity, at other times. The concentration of water quality parameters assumes the effluent limitations shown in Table 7. Average concentration limits were assumed rather than daily maximum concentration limits.

The UPDES permit was issued based on the discharge meeting water quality standards of the Provo River and protecting its designated beneficial uses. The effluent limitations on each outfall are identical because it is recognized that water discharged to the canals also eventually returns to the river or to Deer Creek Reservoir. In order for this discharge to be deemed acceptable to the downstream water uses it must meet water quality standards for the Provo River. The effluent limitations placed on the JSSD WRF by their UPDES permit will meet the water quality standards of the Provo River. If the U.S. EPA or the State of Utah established more stringent water quality standards or new water quality standards, the JSSD WRF would be required by their permit to meet all applicable federal and state standards.

3.3.2.1 No Action Alternative

The no action alternative will require construction of an infiltration basin which would be approximately 600 to 800 feet from the Provo River. Temporary water quality effects to the

Provo River could potentially result from construction activities. These effects include disturbance of soils in and surrounding the area of the infiltration basin. Applicable State and County Best Management Practices (BMPs) would be implemented during construction to reduce construction effects. Affected areas would be restored to their prior condition and monitored to assure recovery following construction. Permits necessary for the construction of the infiltration basin would need to be obtained from the appropriate local, state, and/or federal agencies.

Effects to water quality from implementation of the no action alternative assume 100% of the effluent reaches the Provo River via the infiltration basin and assume a Provo River base flow of 125 cfs which is the minimum release rate for Jordanelle Reservoir (CUWCD, 2009). Water quality effects are assumed to be most significant at base flow levels.

Phosphorus loads for the no action alternative were estimated using the UPDES discharge limits for the daily maximum allowable discharge concentration (0.15 mg/L) and a flow of 0.2 MGD during the interim period, and the 90-day average concentrations for May-Oct (0.03 mg/L) and Nov-Apr (0.06 mg/L) and a flow of 1.0 MGD at full capacity. The actual phosphorus load that would reach the river would likely be lower depending on sorption of phosphorus by sediments, flow path to the river, and other factors. JSSD would not be allowed to exceed the Total Phosphorus load of 91 lbs/year. Biochemical oxygen demand (BOD), total suspended solids (TSS), E. coli, and ammonia at effluent limitation levels would have little effect on levels of the same parameters in the Provo River and would not be greater than allowable limits of the water quality standard.

3.3.2.2 Combined Timpanogos and Wasatch Canals Alternative

The Combined Timpanogos and Wasatch Canals discharge alternative will require construction of two pipelines. Temporary water quality effects to the Provo River could potentially result from construction activities. These effects include disturbance of soils along the pipeline corridors. Applicable State and County Best Management Practices (BMPs) would be implemented during construction to reduce construction effects. Affected areas would be restored to their prior condition and monitored to confirm recovery following construction.

In the combined canal discharge alternative, effluent discharges could be made to either the Timpanogos or Wasatch Canal from March through November. From December through February, the Timpanogos Canal typically freezes. During these months the discharges would be made to the Wasatch Canal. From the point where the WRF water would be discharged into the Wasatch Canal, the Canal continues about 845 feet to its junction with Rock Ditch. During the irrigation season, water is diverted to the Wasatch Canal and Rock Ditch in amounts corresponding to their respective water rights. Water from the JSSD WRF would mix with the canal water in both the Wasatch Canal and Rock Ditch. From mid-October to mid-April each year, the Wasatch Canal is closed downstream from the junction with Rock Ditch, and Rock Ditch carries a minimum flow of 12 cfs during this time period. Therefore, during the non-irrigation season, WRF effluent would travel a short distance in the Wasatch Canal to be diverted into Rock Ditch.

Average monthly flows in the canals for the period 2002 to 2009 are shown in **Table 8** (CUWCD, 2009). During the irrigation season the JSSD WRF effluent could constitute 3% to 6% of the water diverted to the Timpanogos Canal during the months of May through

September. Please see Figure 7 which shows quantities of WRF effluent projected to be discharged into the WCWEP system at different times of year under this alternative.

Effluent could constitute up to 100% of the water in the Timpanogos Canal during the months of March and November and some parts of April and October when water diversions to the canal from the Provo River are shut down. When diversions are not made to the canal, it is not used for irrigation and any water present in the canal seeps into the ground. Over its length the Timpanogos Canal loses more than 3 cfs to seepage. There are also recharge areas along the canal which can infiltrate 5 to 7 cfs (CUWCD, 2009). During these periods, the seepage and infiltration rates would be greater than the effluent discharge rate and flows in the canal would decrease until little or no water would be flowing in the canal.

The UPDES permit limitations for the JSSD WRF effluent were established to meet the water quality standards of the Provo River. Effluent discharged to the Timpanogos and Wasatch Canals would be required to meet the permit limitations for water quality. Water in the Timpanogos or Wasatch Canal during March through November, and water in the Wasatch Canal during freezing months, would meet the water quality standards of the Provo River for phosphorus, ammonia, BOD, TSS, and E. coli. This water would be suitable for the same uses designated for the Provo River.

Water in the Timpanogos Canal could be comprised primarily of treated effluent during the non-irrigation season, if effluent were released to that canal. Effluent phosphorus limitations during March, April, and November would be 0.06 mg/L which is greater than the recreation and aesthetics water quality standard of 0.05 mg/L for the Provo River. Effluent BOD limitations would be 10 mg/L which is greater than the recreations and aesthetics, wildlife, and agriculture water quality standard of 5 mg/L for the Provo River. Effects on water quality from phosphorus and BOD would be insignificant during the non-irrigation season because water in the Timpanogos Canal would not be diverted for agricultural or secondary irrigation but would infiltrate in the canal channel and in recharge areas. Phosphorus would adsorb to soils and BOD would be broken down by bacteria in the water and soils.

Trace elements in the effluent are not expected to be found at unacceptable levels. The UPDES permit outlines a monitoring program which will determine if additional treatment or if the inclusion of effluent limitations for trace elements are necessary. Pharmaceuticals and personal care products (PPCPs) are known to be found in treated wastewater effluents. Water quality standards for these chemicals have not been established by the U.S. EPA or the State of Utah. If in the future the U.S. EPA or the State of Utah establish more stringent water quality standards, or new water quality standards, the JSSD WRF would be required by their permit to meet all applicable standards. More information on PPCPs is provided in Section 3.3.2.4.

Table 8: Average monthly canal flow, cfs

Month	Wasatch / Rock Ditch	Timpanogos
January	13	0
February	13	0
March	13	0
April	29	6
May	84	26
June	94	39
July	94	49
August	71	43
September	51	28
October	18	4
November	12	0
December	11	0

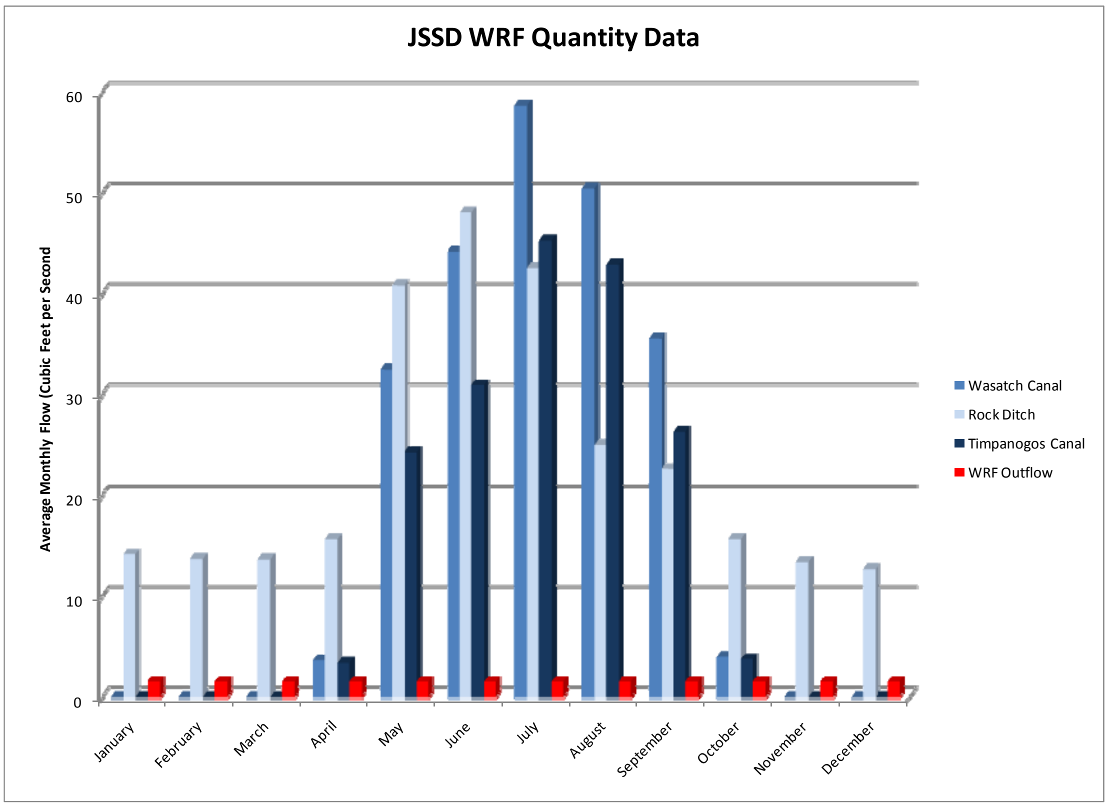

Figure 7: Projected WRF effluent quantities in WCWEP canals

Effects to the Provo River and Deer Creek Reservoir from implementation of the Timpanogos and Wasatch Canals discharge alternative assume 5% of the effluent returns to the river when discharges are to the Timpanogos Canal and 50% returns when discharges are to the Wasatch Canal and Rock Ditch. In the interim period when processes are being optimized, effluent discharge to the Timpanogos and Wasatch Canals would increase the total phosphorus load in the Provo River and Deer Creek Reservoir by up to 7 kg/year (15 lbs/year). After the JSSD WRF reaches full capacity, the total phosphorus load would be increased by up to 12 kg/year (27 lbs/year). The permit limit for total phosphorus load is 41 kg/year (91 lbs/year). BOD, TSS, E. coli, and ammonia at effluent limitation levels discharged to the canals would not exceed water standards corresponding to the Provo River's beneficial uses.

3.3.2.3 Wasatch Canal Only Alternative

The Wasatch Canal Only discharge alternative will require construction of a pipeline. Temporary water quality effects to the Provo River could potentially result from construction activities. These effects include disturbance of soils along the pipeline corridor. Applicable State and County Best Management Practices (BMPs) would be implemented during construction to reduce construction effects. Affected areas would be restored to their prior condition and monitored to confirm recovery following construction.

From the point where the water from the WRF would be discharged to the Wasatch Canal, the canal continues approximately 845 feet to where it junctions with Rock Ditch. During the irrigation season, water is diverted to either the Wasatch Canal or Rock Ditch in amounts that correspond to their respective water right at that time. Water from the JSSD WRF would augment existing canal water which would continue down the Wasatch Canal or be diverted down Rock Ditch. In the non-irrigation season, the Wasatch Canal is closed below that junction and does not receive any water from mid- October to mid-April. Rock Ditch carries a minimum flow of 12 cfs in the non-irrigation season. WRF water that is discharged into the Wasatch Canal during the non-irrigation season would travel 845 feet down the Wasatch Canal to enter the Rock Ditch.

In the Wasatch Canal discharge alternative, JSSD WRF effluent is discharged to the Wasatch Canal each month of the year. Average monthly flows in the Wasatch Canal from 2002 to 2009 are assumed in the analysis and are shown in **Table 8** (CUWCD, 2009).Effluent discharges to the Wasatch Canal during the irrigation season months of April through October would constitute 2% to 9% of the water diverted to the canal. During the non-irrigation season months of November through March, effluent discharges would constitute 12% to 14% of the water diverted to the canal.

The UPDES permit limitations for the JSSD WRF effluent were established to meet the water quality standards of the Provo River. Effluent discharged to the Wasatch Canal would be required to meet the permit limitations for water quality. Water in the Wasatch Canal would meet the water quality standards of the Provo River for phosphorus, ammonia, BOD, TSS, and E. coli. This water would be suitable for the same uses designated to the Provo River.

Trace elements in the effluent are not expected to be found at unacceptable levels. The UPDES permit outlines a monitoring program which will determine if pretreatment or effluent limitations for trace elements are necessary. Pharmaceuticals and personal care products (PPCPs) are known to be found in treated wastewater effluents. Water quality standards for these chemicals have not been established by the U.S. EPA or the State of Utah. If in the future, the U.S. EPA or the State of Utah establish more stringent water quality standards or new water quality standards, the JSSD WRF would be required by their permit to meet all applicable standards. More information on PPCPs is provided in Section 3.3.2.4 below.
Effects to the Provo River and Deer Creek Reservoir from implementation of the Wasatch Canal discharge alternative assumes 50% of the effluent discharged to the canal would eventually

return to the river. In the interim period, when processes are being optimized, effluent discharge to the Wasatch Canal would increase the total phosphorus load in the Provo River and Deer Creek Reservoir by up to 21 kg/year (46 lbs/year). After the JSSD WRF reaches full capacity, the total phosphorus load would be increased by up to 31 kg/year (68 lbs/year). The permit limit for total phosphorus load is 41 kg/year (91 lbs/year). BOD, TSS, E. coli, and ammonia at effluent limitation levels discharged to the canal would not exceed water quality standards corresponding to the Provo River's beneficial uses.

3.3.2.4 Pharmaceuticals and Personal Care Products (PPCPs)

Pharmaceuticals and Personal Care Products (PPCPs) are present in waters throughout the United States. Trace concentrations of several constituents were detected in the Provo River and Heber Valley canals (Table 2 & Table 6). Currently PPCPs in the environment are not regulated by either the EPA or the State of Utah. EPA and other institutions are making significant efforts to research issues related to PPCPs including endocrine disrupting chemicals (EDCs). Concentrations of these chemicals in the environment are very low and many have only been detected in recent years due to advances in analytical techniques, which have resulted in detection levels in the part per trillion (ppt) range. The effects on the environment are uncertain and according to EPA:

> "More research is needed to determine the extent of ecological harm and any role it may have in potential human health effects. To date, scientists have found no evidence of adverse human health effects from PPCPs in the environment." (EPA, 2009)[15]

Wastewater treatment plants are known to be sources of PPCPs in the environment but less is known about the fate and removal of PPCPs and EDCs through treatment processes. Recent studies have begun to look at the effects wastewater treatment processes have on PPCPs and EDCs (Drewes et al., 2006; Stephenson et al., 2007). These studies evaluated influent and effluent concentrations of different PPCPs and EDCs and found that secondary treatment of wastewater is effective in reducing many of the substances. One study observed that wastewater treatment utilizing membrane bioreactor technology appeared to remove EDCs more effectively than conventional processes using activated sludge (Drewes et al., 2006).

The concentrations of PPCPs in the effluent from the JSSD WRF are unknown and there are no applicable regulatory standards. Predicting the concentrations is uncertain because the final concentrations are dependent on influent concentrations and the removal efficiency of the treatment process. Voluntary programs for reducing the amount of PPCPs in influent are currently being implemented. Based on data from similar water reclamation facilities, concentrations in the effluent are predicted to remain very low, in the parts-per-trillion ranges. To be proactive the JSSD, CUWCD and the Provo River Watershed Council plan to continue monitoring for PPCPs in and around the Heber Valley. If regulatory standards are established in the future by the U.S. EPA or the State of Utah for PPCPs, the UPDES permit would be required to be reviewed by UDWQ.

[15] http://www.epa.gov/ppcp/

3.3.3 Water Rights

3.3.3.1 No Action Alternative

Under this alternative the effluent from the JSSD WRF would be discharged to an infiltration basin located adjacent to the WRF on JSSD property. Allowing, these flows to travel back to the river would satisfy any downstream obligations associated with these water rights. Therefore there should be no adverse impacts to water rights under the No Action Alternative.

3.3.3.2 Combined Timpanogos and Wasatch Canal Alternative or Wasatch Canal Only Alternative

Two possible WCWEP discharge scenarios are considered in these alternatives which include discharging recycled water just to the Wasatch Canal or discharging recycled water to both the Timpanogos and the Wasatch canals. JSSD and CUP water rights would be managed exactly the same no matter which of these alternatives is selected and impacts to down stream water rights are identical regardless of which canal is used. Therefore, both WCWEP Discharge Alternatives scenarios are treated as one scenario in the water rights analysis.

3.3.3.3 Water Rights Exchange

Discharging the WRF recycled water to the Timpanogos and Wasatch canals makes an exchange of WRF water with CUP water possible. WRF recycled water would be released into the Timpanogos and Wasatch canals and be used for CUP purposes and an equal flow of CUP water would be available to JSSD to be used for JSSD purposes. Depending on the JSSD use of this water, it could, in addition, contribute to stream flow enhancement. The WRF discharge points would be located to avoid impacts to other water users. The WRF recycled water exchanged to CUP water for use in the canals would be used in a manner consistent with authorized CUP purposes and water rights. Similarly, the CUP water made available through the exchange to JSSD for its purposes would become JSSD water as if it came directly from the WRF. This water would be used in a manner consistent with the underlying water rights.

This exchange will occur on a simultaneous real-time basis based on an average daily rate.
In order to exchange the WRF recycled water for CUP water, JSSD, CUWCD, Reclamation and DOI would need to enter into an exchange agreement and file any necessary water right applications required by the Utah State Engineer.

3.3.3.4 Water Right Impacts – WCWEP Discharge Alternatives

There would be no impact to downstream water rights by the exchange of WRF recycled water with CUP water. When JSSD reuses the WRF recycled water through exchange with CUP water, it would occur according to Utah Code 73-3c (Wastewater Reuse Act). This act requires filing a notice of reuse with the Utah State Engineer to show that the reuse is consistent with the underlying water rights and would not adversely impair other water right holders. The State Engineer would make sure that allowable depletions of the JSSD water rights are not exceeded and that the water reuse falls within the approved uses of the water rights involved. Provo River water rights are protected by the provisions of the Wastewater Reuse Act and owners of these rights would have an opportunity to express potential concerns regarding the reuse of certain water rights during the notice of reuse public review process. Through this process, Provo River water rights would be protected and not be adversely impacted by the WCWEP Discharge Alternatives.

3.3.4 Public Health and Safety

3.3.4.1 No Action Alternatie

Under the No Action Alternative, WRF effluent would be discharged in accordance with a UPDES permit issued under the authority of the Clean Water Act into an infiltration pond located on JSSD property near the WRF and would eventually migrate into the Provo River. The discharge parameters of the UPDES permit are based on Federal water quality standards established to protect public health. In comparing the quantity of effluent discharged to the baseline flows of the Provo River, and the quality of the effluent compared with existing water quality in the Provo River, there would be no effects to public health and safety under the No Action Alternative.

3.3.4.2 Combined Timpanogos and Wasatch Canals Alternative

Under the Combined Alternative, WRF effluent would be discharged in accordance with a UPDES permit issued under the authority of the Clean Water Act into both the Timpanogos and Wasatch Canals. Water from the canals would continue to be applied to crops within the project area and would migrate into the Provo River via return flows. The discharge parameters of the UPDES permit are based on Federal water quality standards established to protect public health. In reviewing the quantity of effluent as a percentage of the canal water and the quality of the effluent compared with existing water quality in the WCWEP canal system, there would be no effects to public health and safety under the Combined Canals Alternative.

As discussed in Section 3.3.2 above, there is growing concern nationally over the potential effects of pharmaceuticals and other chemicals in the water supply, but research to date has not yet revealed any effects to human health. If, in the future, Federal water quality standards are established or revised for any potential pollutant, the discharge permit for the WRF would be revised and any new standards intended to protect human health would need to be met in order to continue operation of the facility. Pending further research and information on potential adverse effects of pharmaceuticals or other pollutants of concern, continued water quality sampling within the project area can detect any future changes in water quality although it might not be possible to isolate the causes of any increased presence of pollutants of concern. Please see Section 3.2.2.2 for a general background discussion of the context of PPCPs in drinking water and how long it would take to ingest a dosage amount of specific chemicals through daily ingestion of water.

3.3.4.3 Wasatch Canal Only Alternative

Potential effects to public health and safety from implementation of the Wasatch Canal Alternative would be the same as for the Combined Canals Alternative as described in Section 3.3.4.2 above.

3.3.5 Socioeconomics

3.3.5.1 No Action Alternative

Under the No Action Alternative, there would be no change to existing economic activity involved with the Project.

3.3.5.2 Combined Wasatch and Timpanogos Canals Alternative
Under the Combined Canals Alternative, there would be no effect to the economic activity involved with the Project. Recycled water is an essential water source. As increased socioeconomic demands are placed on current water supplies, recycled water will become more important in meeting those demands.

With regard to potentially negative socioeconomic effects associated with the general perception of reusing sewer treatment plant effluent in a water supply, data related to this proposed action and available literature on the subject do not support the perception. Existing water quality data, WRF operational specifications, and UPDES permit conditions taken together indicate that the WRF effluent will be as clean as, or cleaner than, the water in the Provo River and the WCWEP canal system. The potential impact is the perceived effect of relating effluent to daily use. Given the small amount of this exchange it is anticipated that there will be no significant impact.

3.3.5.3 Wasatch Canal Only Alternative
Under the Wasatch Canal Alternative, there would be no effect to the economic activity involved with the Project. Recycled water is an essential water source. As increased socioeconomic demands are placed on current water supplies, recycled water will become more important in meeting those demands.

3.3.6 Wetlands and Vegetation

3.3.6.1 No Action Alternative
Under the No Action Alternative, no impacts to wetlands or vegetation would occur.

3.3.6.2 Combined Timpanogos and Wasatch Canal Alternative or Wasatch Canal Only Alternative
Under either of the proposed action alternatives, there would be no impacts to wetland or riparian vegetation, and insignificant impacts to native upland vegetation. Most areas within the construction zone have been disturbed previously and now have a significant portion of weed and nonnative species. All disturbed areas would be recontoured and revegetated with appropriate native species. Post-construction monitoring for and eradication of noxious or invasive plant species would occur.

3.3.7 Wildlife Resources

3.3.7.1 No Action Alternative
Under the No Action Alternative, there would be no significant effect on wildlife species or their habitat.

3.3.7.2 Combined Timpanogos and Wasatch Canals Alternative or Wasatch Canal Only Alternative
Under either of the proposed action alternatives, during construction, temporary negative impacts could occur to golden eagles and other wildlife species that use the immediate area. Impacts to golden eagles are expected to be minimal. Construction activities would be confined to periods outside their courting and breeding season which extends from January through August. Initial construction activity could possibly cause stress and discomfort to some wildlife species from noise, dust, displacement, and temporary loss of habitat, until construction was completed and

disturbed areas are revegetated. However, construction activities would be confined to a small (less than 0.5 acres) area and these species would have ample room to move into adjacent habitat during these temporary conditions.

3.3.8 Threatened, Endangered, Candidate, and Special Status Species

3.3.8.1 No Action Alternative

The No Action Alternative would result in no impacts to threatened, endangered, candidate, or special status species.

3.3.8.2 Combined Timpanogos and Wasatch Canal Alternative or Wasatch Canal Only Alternative

Under either of the proposed action alternatives there would be no effects to threatened, endangered, candidate, or special status species, nor are they known to occur within the project area itself. The June sucker exists downstream of the project area. The June Sucker Flow Workgroup as directed by the June Sucker Recovery Implementation Program continues to coordinate proper flows associated with the recovery of the June sucker. Water quality would not be negatively affected by the proposed project within June sucker habitat. Construction activities would be restricted during sensitive raptor breeding and nesting periods. Spotted frog populations exist outside of areas impacted by this project.

3.4 Environmental Commitments

3.4.1 Water Quality Monitoring

Analysis shows that implementation of the proposed action would not have a detrimental effect on water quality in the project area. However, although EPA has concluded that to date there is no basis for concern to human health or the environment, the issue of exposure through the water supply to pharmaceuticals and other pollutants remains the subject of growing public concern locally and across the nation. CUWCD, Interior and JSSD therefore commit to continuing to sample water quality in the project area, both in natural water bodies and in canals, and maintain a database of the test results regarding pollutants of concern. Whether or not the proposed action is implemented, CUWCD will continue to work with all appropriate local, state and Federal agencies on the long term need for good water quality.

Chapter 4: Public Involvement, Consultation and Coordination

This chapter provides information on the public involvement activities related to both the proposed action and this environmental assessment (EA). It also details consultation and coordination with Federal, State, and local government agencies and Native American Tribes which occurred during the process of preparing this EA. Compliance with NEPA is a federal responsibility that involves the participation of all of these entities in the planning process.

4.1 Public Involvement and Scoping

In January 2009, a public meeting was conducted by CUWCD and Interior, in coordination with JSSD, in Heber City, Utah, to inform the public of the proposed use of recycled water and solicit public input and comments on the proposal. On April 3, 2009, the preparation of this EA formally began with the publication in the *Federal Register* of a Notice of Intent to prepare this EA.[16] Comments from agencies, organizations and the interested public were solicited for a period of over 45 days, with the scoping period ending on May 20, 2009.

During the public scoping period, an open house was conducted by CUWCD in Heber City, Utah, on April 22, 2009. During the open house, information was shared with the public regarding details of the proposed action as well as the EA preparation and public review process, and attendees were encouraged to provide written comments as to analyses and issues that should be addressed in the EA, either during the open house, or by mail or email during the remainder of the public scoping period.

All comments received in response to the January, 2009 open house and the public scoping period for the EA were reviewed and analyzed prior to and during the preparation of this EA. The major issues identified by the public focused on water quality concerns related to public health and safety (in particular, pharmaceuticals and E. coli in the water and in turn in crops or in/on humans and livestock exposed to irrigation water).

This EA was made available in draft form to the interested public in print and on the internet for a 30-day public review and comment period from January 15 to February 16, 2010. All comments received were carefully reviewed and revisions to the EA were made as necessary to correct, update or clarify information. It is expected that, once all comments have been analyzed and a final EA prepared, this final EA will be published as well as a Finding of No Significant Impact and Decision Document authorizing the proposed action.

[16] *Federal Register*, Volume 74, No. 67, Thursday, April 9, 2009, p. 16230

4.2 Consultation and Coordination

During development of this draft EA, meetings and communications were conducted as necessary to provide and receive information from the cooperating agencies. In addition, letters of consultation were sent in September 2009 to the Utah State Historic Preservation Office and to the Ute Indian Tribe of the Uintah and Ouray Reservation and the Northwestern Band of Shoshoni Nation of Utah. These consultation processes verified that there would be no effect to cultural resources or issues of concern to tribes and are documented in the administrative record for this EA.

Chapter 5: Preparers of this Environmental Assessment

Name	Title	Organization	Contribution
Daryl Devey	Bonneville Unit O&M Manager	CUWCD	Water Rights
W. Russ Findlay, MS	Fish and Wildlife Biologist	Reclamation	Vegetation; Wildlife; T&E Species
Jared Hansen, PE	Project Manager	CUWCD	Water Rights
Beverley Heffernan, BA	Chief, Environmental Group	Reclamation	Project Coordinator, NEPA Compliance, Environmental Justice, Indian Trust Assets
Brian Joseph, MS	Archaeologist	Reclamation	Cultural Resources
Rafael Lopez, BA	Biologist	Reclamation	Wetlands
Devin McKrola, PE	Project Manager	CUWCD	WCWEP Operation and Management; Water Rights
Reed Oberndorfer, Ph.D.	Water Quality Director	CUWCD	Water Quality
Justin Record, PE	Civil Engineer	Reclamation	Water Rights
Sarah Sutherland, BS		CUWCD	Project Oversight
Scott Taylor, MS	Economist	Reclamation	Socioeconomics
Lisa Verzella, BS	Hydrologist	Reclamation	Water Resources
Nick Williams, MS	Environmental Engineer/Water Quality Specialist	Reclamation, Upper Colorado Region	Water Quality

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APPENDIX A

PHARMACEUTICALS AND PERSONAL CARE PRODUCTS

BISPHENOL A: INFORMATION SHEET

Discovery and Use

Background

Bisphenol A (BPA) is an important industrial chemical that is used primarily to make polycarbonate plastic and epoxy resins, both of which are used in a wide variety of applications. For example, polycarbonate is used in eyeglass lenses, medical equipment, water bottles, digital media (e.g. CDs and DVDs), cell phones, consumer electronics, computers and other business equipment, electrical equipment, household appliances, safety shields, construction glazing, sports safety equipment, and automobiles[1]. Among the many uses for epoxy resins are industrial floorings, adhesives, industrial protective coatings, powder coatings, automotive primers, can coatings and printed circuit boards.

First Synthesis of Bisphenol A

The first reported synthesis of BPA was from Thomas Zincke of the University of Marburg, Germany. Zincke acknowledged in his paper that the synthesis of BPA, from phenol and acetone, was based on chemical reactions previously reported by others as well as unpublished work (from thesis dissertations) conducted at the University of Marburg. His paper reporting the synthesis of BPA and a number of related compounds was published in 1905[2]. Zincke reported key physical properties of BPA (e.g., molecular composition, melting point, solubility in common solvents) but did not propose any application or use for BPA or the other materials he synthesized.

Commercial Production and Use of Bisphenol A

In 1953, Dr. Hermann Schnell of Bayer in Germany and Dr. Dan Fox of General Electric in the United States independently developed manufacturing processes for a new plastic material, polycarbonate, using BPA as the starting material. Polycarbonate plastic was found to have a unique combination of very useful properties, in particular optical clarity, shatter-resistance and high heat-resistance, which have made polycarbonate an important part of everyday life in a wide variety of applications. Commercial production began in 1957 in the United States and in 1958 in Europe. About this same time, epoxy resins were developed with the versatility to meet a wide range of industrial and consumer needs. Commercial production of BPA began in the 1950's when large-scale uses for polycarbonate plastic and epoxy resins were developed and has grown worldwide along with the continued growth of the uses for these materials.

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[1] Additional information on the versatility and many uses of polycarbonate plastic is available on the Internet at http://www.apme.org/polycarbonate.

[2] Zincke, T., 1905, "Mittheilungen aus dem chemischen Laboratorium der Universitat Marburg," Justus Leibigs Annals Chemie, vol. 343, pages 75-99.

NTP Finalizes Report on Bisphenol A

(Source: http://www.epa.gov/aging/press/othernews/2008/2008_0903_ons_2.htm)

U.S. Department of Health and Human Services
NATIONAL INSTITUTES OF HEALTH NIH News
National Institute of Environmental Health Sciences (NIEHS)
For Immediate Release: Wednesday, September 03, 2008

CONTACT: Contact: Robin Mackar, 919-541-0073 e-mail: rmackar@niehs.nih.gov

Current human exposure to bisphenol A (BPA), a chemical used in many polycarbonate plastics and epoxy resins, is of "some concern" for effects on development of the prostate gland and brain and for behavioral effects in fetuses, infants and children, according to a final report released today by the National Toxicology Program (NTP).

The report provides the NTP's current opinion on BPA's potential to cause harm to human reproduction or development. The conclusions are based primarily on a broad body of research involving numerous laboratory animal studies. The report is part of a lengthy review of the scientific literature on BPA and takes into consideration public and peer review comments received on an earlier draft report. The final report is available online (PDF) (321pp, 3MB, About PDF).

"There remains considerable uncertainty whether the changes seen in the animal studies are directly applicable to humans, and whether they would result in clear adverse health effects," said NTP Associate Director John Bucher, Ph.D. "But we have concluded that the possibility that BPA may affect human development cannot be dismissed."

About the impact that these findings may have on consumers, CERHR Director Michael Shelby, Ph.D., said, "Unfortunately, it is very difficult to offer advice on how the public should respond to this information. More research is clearly needed to understand exactly how these findings relate to human health and development, but at this point we can't dismiss the possibility that the effects we're seeing in animals may occur in humans. If parents are concerned, they can make the personal choice to reduce exposures of their infants and children to BPA."

The NTP, an interagency federal research program at the National Institute of Environmental Health Sciences (NIEHS), part of the National Institutes of Health, uses a five-level scale ranging from negligible to serious, with "some concern" being the midpoint.

"We are expressing this level of concern because we see developmental changes occuring in some animal studies at BPA exposure levels similar to those experienced by humans," Bucher said.

The report also expresses "minimal concern" that BPA exposure will affect development of the mammary gland or accelerate puberty in females. The NTP expressed "negligible concern" that exposure of pregnant woman to BPA will result in fetal or neonatal mortality, birth defects or reduced birth weight and growth in their offspring.

The NTP also expressed "negligible concern" that exposure to BPA causes reproductive effects in non-occupationally exposed adults and "minimal concern" for workers exposed to higher levels in occupational settings.

"The literature on experimental animal studies is large and filled with many conflicting findings. There are a number of remaining uncertainties in the scientific information on BPA," said Bucher. The report discusses many of the uncertainties, including the very limited data from studies in humans and the difficulty in relating the often subtle developmental endpoints in animal studies to human health risks.

The NTP Center for the Evaluation of Risks to Human Reproduction (CERHR) conducted the BPA evaluation. The CERHR follows a formal process for review and evaluation of nominated chemicals that includes convening panels of scientific experts to review the world's scientific literature on the chemical being studied and a peer review process, as well as numerous opportunities for public input. Summary of the NTP evaluation of BPA.

CERHR publishes monographs that assess the evidence that environmental chemicals, physical substances, or mixtures cause adverse effects on reproduction and development and provide opinion on whether these substances are hazardous for humans. Other agencies, such as the US Food and Drug Administration, apply this science in carrying out their regulatory responsibilities and in accordance with their statutory authority.

Last month, FDA released "Draft Assessment of Bisphenol A for Use in Food Contact Applications (PDF)" (105pp, 7.6MB, About PDF) for peer review and public comment. The FDA will hold a public meeting of its BPA subcommittee of the FDA Science Board on September 16 to discuss this FDA draft assessment.

"We are pleased to see the finalization of the NTP report," noted Frank Torti, M.D., M.P.H., Principal Deputy Commissioner and Chief Scientist at the FDA. "The FDA will consider this final report in our role as a regulatory agency and joins NTP in the call for additional research in this important area." Reporters interested in speaking to FDA about this issue, may contact the FDA press office at 301-827-6242.

NIEHS supports research to understand the effects of the environment on human health and is part of NIH. For more information on environmental health topics, please visit our website.

The National Toxicology Program (NTP) is an interagency program established in 1978. The program was created as a cooperative effort to coordinate toxicology testing programs within the federal government, strengthen the science base in toxicology, develop and validate improved testing methods, and provide information about potentially toxic chemicals to health, regulatory, and research agencies, scientific and medical communities, and the public. The NTP is headquartered at the NIEHS. More information about the NTP.

The National Institutes of Health (NIH) -- The Nation's Medical Research Agency -- includes 27 Institutes and Centers and is a component of the U.S. Department of Health and Human Services. It is the primary federal agency for conducting and supporting basic, clinical and translational medical research, and it investigates the causes, treatments, and cures for both common and rare diseases. More information about NIH and its programs.

Cotinine: The major metabolite (breakdown product) of nicotine. Exposure to nicotine can be measured by analyzing the cotinine level in the blood, saliva, or urine. Since nicotine is highly specific to tobacco smoke, serum cotinine levels track exposure to tobacco smoke and its toxic constituents.

Cotinine assays provide an objective quantitative measure that is more reliable than smoking histories or counting the number of cigarettes smoked per day. Cotinine also permits the measurement of exposure to second-hand smoke (passive smoking).

Cotinine is an anagram of nicotine. (The 8 letters in the word "nicotine" were rearranged to coin the word "cotinine.")

Blood Cotinine Level

(Source:
http://cfpub.epa.gov/eroe/index.cfm?fuseaction=detail.viewInd&lv=list.listByAlpha&r=188194&subtop=343)

Introduction

Environmental tobacco smoke (ETS) contains a mixture of toxic chemicals, including known human carcinogens. Persistent exposure to ETS is associated with numerous health-related disorders or symptoms, such as coughing, chest discomfort, reduced lung function, acute and chronic coronary heart disease, and lung cancer (IARC, 2004; NTP, 2002; U.S. EPA, 1992; CDC, 2005). Children are at particular risk from exposure to ETS, which can exacerbate existing asthma among susceptible children and also greatly increase the risk for lower respiratory tract illness, such as bronchitis and pneumonia, among younger children (CDC, 2005). Younger children appear to be more susceptible to the effects of ETS than are older children (U.S. EPA, 1992).

Household ETS exposure is an important issue because many people, especially young children, spend much time inside their homes. Based on data reported from the 1994 National Health Interview Survey, the Department of Health and Human Services estimates that 27 percent of children age 6 years and younger are exposed to ETS in the home (U.S. DHHS, 2000).

Exposure to ETS leaves traces of specific chemicals in people's blood, urine, saliva, and hair. Cotinine is a chemical that forms inside the body following exposure to nicotine, an ingredient in all tobacco products and a component of ETS. Following nicotine exposures, cotinine can usually be detected in blood for at least 1 or 2 days (Pirkle et al., 1996). Active smokers almost always have blood cotinine levels higher than 10 nanograms per milliliter (ng/mL), while non-smokers exposed to low levels of ETS typically have blood concentrations less than 1 ng/mL (CDC, 2005). Following heavy exposure to ETS, non-smokers can have blood cotinine levels between 1 and 10 ng/mL.

This indicator reflects blood cotinine concentrations in ng/mL among non-smokers for the U.S. population, age 3 years and older, as measured in the 1999-2000 and 2001-2002 National Health and Nutrition Examination Survey (NHANES). NHANES is a series of surveys conducted by the Centers for Disease Control and Prevention's (CDC's) National Center for Health Statistics, designed to collect data on the health and nutritional status of the civilian, non-institutionalized U.S. population using a complex, stratified, multistage, probability-cluster design. Blood cotinine also was monitored in non-smokers age 4 years and older as part of NHANES III, between 1988 and 1991. CDC's National Center for Environmental Health conducted the laboratory analyses for the biomonitoring samples. Beginning in 1999, NHANES became a continuous and annual national survey.

What The Data Show

As part of NHANES III (1988-1991), CDC estimated that the median blood serum level (50th percentile) of cotinine among non-smokers in the general U.S. population was 0.20 ng/mL. In NHANES 1999-2000, the estimated median serum level among non-smokers nationwide was 0.06 ng/mL. During the 2001-2002 survey, the estimated blood cotinine levels for the U.S. population were very similar to 1999-2000, with the median concentration actually below the limit of detection, and the geometric mean 0.06 ng/mL (see Exhibit 2-57). This marks a 70 percent decrease from levels measured in the 1988-1991 NHANES III survey—a reduction that suggests a marked decrease in exposure to ETS.

Exhibit 2-57 also shows the results of the NHANES 1999-2000 and 2001-2002 survey, for different subpopulations. Similar decreasing trends in blood cotinine levels between NHANES III (1988-1991) and the most recent 2001-2002 survey were observed in each of the population groups defined by age, sex, and race/ethnicity (CDC, 2005). These data reveal three additional observations: (1) non-smoking males have higher cotinine levels than non-smoking females; (2) of the ethnic groups presented, non-Hispanic blacks had the highest cotinine levels; and (3) on average, people below age 20 have higher levels of blood cotinine than people age 20 years and older.

Exhibit 2-58 shows the percentage of children between the ages of 4 and 17 with specified blood cotinine levels, for the total age group and by selected race and ethnicity breakdowns within the specified age group. Among the three subgroup populations presented, Mexican American children had the lowest percentage of blood cotinine levels greater than 1.0 ng/mL; this was evident for both 1988-1994 and 1999-2002 time periods (10.7 percent and 5.2 percent, respectively), which changed little for the 2001-2004 time frame (4.8 percent, data not shown). Black, non-Hispanic children had the largest decline of the three subgroups in the percentage of blood cotinine levels greater than 1.0 ng/mL, but that population also started off with the highest percentage above 1.0 ng/mL (36.6 percent) (Federal Interagency Forum on Child and Family Statistics, 2005, 2007).

ULTRAVIST (iopromide) injection

DESCRIPTION

ULTRAVIST (iopromide) Injection is a nonionic, water soluble x-ray contrast agent for intravascular administration. Each bottle is to be used as a Pharmacy Bulk Package for dispensing multiple single dose preparations utilizing a suitable transfer device. The chemical name for iopromide is 1,3-Benzenedicarboxamide,N,N'-bis(2,3-dihydroxypropyl)-2,4,6-triiodo-5-[(methoxyacetyl)amino]-N-methyl-. Iopromide has a molecular weight of 791.12 (iodine content 48.12%).

Iopromide has the following structural formula:

ULTRAVIST Injection is a nonionic, sterile, clear, colorless to slightly yellow, odorless, pyrogen-free aqueous solution of iopromide. ULTRAVIST Injection Pharmacy Bulk Package is available in three strengths: ULTRAVIST Injection 240 mg I/mL, ULTRAVIST Injection 300 mg I/mL and ULTRAVIST Injection 370 mg I/mL.

Each mL of ULTRAVIST Injection 240 mg I/mL provides 498.72 mg iopromide, with 2.42 mg tromethamine as a buffer and 0.1 mg edetate calcium disodium as a stabilizer.

Each mL of ULTRAVIST Injection 300 mg I/mL Pharmacy Bulk Package provides 623.40 mg iopromide, with 2.42 mg tromethamine as a buffer and 0.1 mg edetate calcium disodium as a stabilizer.

Each mL of ULTRAVIST Injection 370 mg I/mL Pharmacy Bulk Package provides 768.86 mg iopromide, with 2.42 mg tromethamine as a buffer and 0.1 mg edetate calcium disodium as a stabilizer.

During the manufacture of ULTRAVIST Injection, sodium hydroxide or hydrochloric acid may be added for pH adjustment. ULTRAVIST Injection has a pH of 7.4 (6.5 - 8.0) at Solutions of ULTRAVIST Injection 240 mg I/mL, 300 mg I/mL and 370 mg I/mL have osmolalities from approximately 1.7 to 2.7 times that of plasma (285 mOsmol/kg water).

CLINICAL PHARMACOLOGY

General

Iopromide is a nonionic, water soluble, tri-iodinated x-ray contrast agent for intravascular administration.

Intravascular injection of iopromide opacifies those vessels in the path of flow of the contrast agent, permitting radiographic visualization of the internal structures until significant hemodilution occurs.

Reregistration Eligibility Decision and Risk Assessment for the Pesticidal Uses of Triclosan

(Source: http://www.epa.gov/oppsrrd1/REDs/factsheets/triclosan_fs.htm)

Current as of October 2008

EPA has completed its reregistration eligibility decision (RED) for the pesticide uses of triclosan. The RED is available on EPA's website. A Federal Register Notice will announce the availability of the RED and associated risk assessment documents at the end of October 2008. At that time, the Agency will place the RED, revised risk assessments and Response to Comments document in the federal docket at: http://www.regulations.gov in docket number EPA-HQ-OPP-2007-0513. There will be a 60-day public comment period on the RED.

Sources of triclosan

Triclosan is regulated by both EPA and the U.S. Food and Drug Administration (FDA). EPA regulates the antimicrobial uses of triclosan when used as a bacteriostat, fungistat, mildewistat, and deodorizer. The FDA-registered uses include hand soaps, toothpaste, deodorants, laundry detergent, fabric softeners, facial tissues, antiseptics for wound care, and medical devices. Although these uses are not regulated under pesticide law, EPA considered these exposures in the aggregate risk assessment. EPA used population-based biological monitoring data to assess the co-occurrence of uses to develop an aggregate exposure assessment.

Use profile for triclosan when used as an antimicrobial pesticide

Triclosan (2,4,4' –trichloro-2'-hydroxydiphenyl ether) is a chlorinated aromatic compound that has functional groups representative of both phenols and ethers and is used as a synthetic broad-spectrum antimicrobial agent. EPA first registered triclosan in 1969. Currently there are 20 antimicrobial registrations. Triclosan uses include:

Summary of the findings of preliminary risk assessment

- commercial, institutional, and industrial premises and equipment;
- residential and public access premises; and
- as a materials preservative.

The use of triclosan as a registered pesticide represents a small portion of the overall use of this chemical.

Commercial, institutional, and industrial premises and equipment uses include conveyor belts, fire hoses, dye bath vats, and ice-making equipment. As a material preservative, triclosan is used in many products including adhesives, fabrics, vinyl, plastics (toys, toothbrushes), polyethylene, polyurethane, polypropylene, floor wax emulsions, textiles (footwear, clothing), caulking compounds, sealants, rubber, and latex paints (the paint use has recently been requested to be voluntarily cancelled by the registrants).

There are many residential and public access premises uses including direct application to HVAC coils (commercial use only). It also is used as a materials preservative in carpets, toys, mattresses, clothing, brooms, mulch, floors, shower curtains, awnings, tents, toilet bowls, urinals, garbage cans, refuse container liners, insulation, concrete mixtures, grouts, and upholstery fabrics.

Summary of the findings of the risk assessments

Human Health

EPA conducted a human health risk assessment for triclosan to support the reregistration eligibility decision. EPA evaluated the submitted toxicology, product and residue chemistry, and occupational/residential exposure studies as well as available open literature and determined that the data are adequate to support the RED. EPA conducted these assessments using available animal studies.

EPA conducted an aggregate assessment to evaluate the potential for co-occurrence of uses, including the uses that are regulated by the FDA (hand soaps, toothpaste, deodorants, laundry detergent, fabric softeners, facial tissues, antiseptics for wound care, and medical devices). These exposures were considered in the aggregate risk assessment using National Health and Nutrition Surveys (NHANES) biological monitoring monitoring data to assess the co-occurrence of uses. The Agency believes the NHANES data are a more accurate predictor of aggregate exposure because the data are triclosan-specific, and are based on actual consumer use of the various triclosan products as they co-occur through normal use.

Residential and occupational risks were not of concern except for paint uses. However, the registrants have requested voluntary cancellation of the paint use. Once the action to terminate the paint use is completed, any risks associated with triclosan-treated paint will be eliminated. In addition, for the occupational use of triclosan as a materials preservative in pulp and paper manufacturing, the use of a closed delivery system will be required.

However, because there are many uses of triclosan under the regulation of the FDA, for the aggregate assessment the Agency used the most protective assumptions from the NHANES data. This assessment indicates that there are no concerns for uses that are anticipated to co-occur.

Environmental Fate and Ecological Risks

Based on available data, triclosan is expected to be immobile in soil and is not expected to volatilize from soil (moist or dry) or water surfaces. In aquatic environments, triclosan is expected to adsorb to (attach to the surface of) suspended solids and sediments and may bioaccumulate, potentially posing a concern for aquatic organisms. There is also a low-to-moderate potential for bioconcentration in aquatic organisms. The majority of published studies on the occurrence of triclosan in waste water treatment plants, treatment plant efficiency, and open water measurements of triclosan suggest that aerobic biodegradation is one of the major and most efficient biodegradation pathways.

Based on monitoring data, triclosan was found in approximately 36 U.S. streams where effluent from activated sludge waste water treatment plants, trickle-down filtration, and sewage overflow appear to contribute to the occurrence of triclosan in open water.

EPA performed a qualitative environmental risk assessment using levels of triclosan found through monitoring data in waterways and toxicity values to develop risk quotients (RQs) and compare them to levels of concern (LOCs) for triclosan. LOCs were not exceeded for fish but were exceeded for aquatic plants.

In addition, the Agency performed consumer environmental modeling for triclosan. The consumer environmental modeling assumed that all triclosan used in the manufacture of the antimicrobial uses is released into surface waters. After adjustments, these models concluded that estimated concentrations of triclosan in surface water do not exceed concentrations of concern for acute risk presumptions for any of the aquatic organisms and plants (vascular and non-vascular).

Considering the low probability of triclosan being released into household wastewater and surface waters from the antimicrobial uses, the Agency also concluded that chronic aquatic risks are unlikely from consumer uses of triclosan-treated plastic and textile items. Therefore, the Agency can reasonably conclude that the antimicrobial uses of triclosan (e.g., triclosan-treated plastic and textile items in households) are unlikely to contribute significant quantities of triclosan into household wastewater and eventually to surface water.

Because it is unknown how much triclosan is released from industrial sites (where triclosan is incorporated into plastic and textile items) into the environment the Agency is requiring the technical registrants to perform environmental modeling and surface water monitoring. Depending upon the results of this modeling and monitoring effort, additional ecological effects data may be required. In addition, four studies to address bioaccumulation potential will also be required as well as one environmental fate study.

Next Steps

- The Agency recognizes that there is a considerable amount of research being conducted on triclosan. The Agency will track the progress of these studies and, as new scientific data becomes available, will review these data. The Agency will then determine what, if any, changes to the risk assessment and risk management decision are necessary.
- The Agency will also continue to participate in the Interagency Task Force on Antimicrobial Resistance and evaluate information that results from that activity.
- Further, given the rapidly developing scientific database for triclosan, the Agency intends to accelerate the schedule for the registration review process for this chemical. Currently, the Agency intends to begin that process in 2013, ten years earlier than originally planned.

Related Information

EPA's public docket: www.regulations.gov EPA-HQ-OPP-2007-0513

Triclosan

TRICLOSAN

by M. Angela McGhee, Ph.D., Biology and Marine Sciences

Triclosan, a chemical used for its antibacterial properties, is an ingredient in many detergents, dish-washing liquids, soaps, deodorants, cosmetics, lotions, anti-microbial creams, various toothpastes, and an additive in various plastics and textiles. However, the safety of **triclosan** has been questioned in regard to environmental and human health. While the companies that manufacture products containing this chemical claim that it is safe, the United States Environmental Protection Agency (EPA) has registered it as a pesticide. The chemical formulation and molecular structure of this compound are similar to some of the most toxic chemicals on earth, relating it to dioxins and PCBs. The EPA gives **triclosan** high scores both as a human health risk and as an environmental risk.

Triclosan is a chlorophenol, a class of chemicals which is suspected of causing cancer in humans. Externally, phenol can cause a variety of skin irritations, but since it can temporarily deactivate sensory nerve endings, contact with it may cause little or no pain. Taken internally, even in small amounts, phenol can lead to cold sweats, circulatory collapse, convulsions, coma and death. Additionally, chlorinated hydrocarbon pesticides can be stored in body fat, sometimes accumulating to toxic levels. Long term exposure to repeated use of many pesticide products can damage the liver, kidneys, heart and lungs, suppress the immune system, and cause hormonal disruption, paralysis, sterility and brain haemorrhages.

Dioxins, PCBs, chlorophenols and many pesticides are categorized as persistent organic pollutants. In other words, they persist in the environment and accumulate to higher and higher concentrations with each step up the food chain. Virtually, every creature on earth has a measured amount of these pollutants in its body fat. Once absorbed into the fat cells, it is nearly impossible to eliminate these compounds. **Triclosan** is among this class of chemicals, and humans are among the animals at the top of the food chain. The health risks are considerable.

Employing a strong antibiotic agent such as **triclosan** for everyday use is of questionable value. Many antimicrobial treatments are toxic and take a shotgun approach to killing all microscopic organisms to which they are applied. However, this approach includes the risk of toxicity to host organisms, that is, the plants or animals (including humans) exposed to treatment for microbial infections. Toxic exposure to living creatures can also occur when food items and objects such as utensils or hard surfaces are treated with disinfectants for microbial contamination. Additionally, the shotgun approach destroys the beneficial bacteria which occur naturally in the environment and in our bodies. These so-called friendly bacteria cause no harm and often produce beneficial effects such as aiding metabolism and inhibiting the invasion of harmful pathogens. Anti-microbial formulas and disinfectants can also cause genetic mutations resulting in drug-resistant bacterial and mutant viruses, producing new strains of harmful microbes for which the human immune system has no defence.

Triclosan has not been completely tested and analyzed for all health and environmental risks, but since it occurs in the category of the chemicals which are known to have the detrimental effects described here, do you want it added to products you use every day?

Triclosan Health Concerns Ref - http://en.wikipedia.org/wiki/Triclosan

Reports have suggested that **triclosan** can combine with chlorine in tap water to form chloroform gas (PMID 15926568), which the U.S. EPA classifies as a probable human carcinogen. As a result, **triclosan** was the target of a UK cancer alert, even though the study showed that the amount of chloroform generated was less than amounts often present in chlorinated drinking waters.

Triclosan reacts with the free chlorine in tap water to also produce lesser amounts of other compounds, like 2,4-dichlorophenol (PMID 15926568). Most of these intermediates convert into dioxins upon exposure to UV radiation (from the sun or other sources). Although small amounts of dioxins are produced, there is a great deal of concern over this effect because dioxins are extremely toxic and are very potent endocrine disruptors. They are also chemically very stable, so that they are eliminated from the body very slowly (they can bioaccumulate to dangerous levels), and they persist in the environment for a very long time.

Triclosan is chemically somewhat similar to the dioxin class of compounds. **Triclosan** production leads to small amounts of residual polychlorinated dioxins, and polychlorinated furans which are contained in small amounts, in the products that are using it.

A 2006 **triclosan** study concluded that low doses of **triclosan** act as an endocrine disruptor in the North American bullfrog. The hypothesis proposed is that **triclosan** blocks the metabolism of thyroid hormone, because it chemically mimics thyroid hormone, and binds to the hormone receptor sites, blocking them, so that normal hormones cannot be utilized.

Triclosan is used in many common household products including Clearasil Daily Face Wash, Dentyl mouthwash, the Colgate Total range, Pepsodent, Softsoap, Dial, Right Guard deodorant, Sensodyne Total Care, Old Spice and Mentadent.

Manufacturers of products containing triclosan must say so on the label. Ref - http://en.wikipedia.org/wiki/Triclosan

CI

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Contents

New Publications from the World Health Organization

Flame Retardants: Tris(2-butoxyethyl) Phosphate, Tris(2-ethylhexyl) Phosphate, and Tetrakis (hydroxymethyl) Phosphonium Salts, Environmental Health Criteria No. 218, 2000, xix + 130 pages (English, with summaries in French and Spanish), ISBN 92-4-157218-3, CHF 30.-/ USD 27.00; In developing countries: CHF 21.-, Order No. 1160218.

This book evaluates the risks to human health and the environment posed by exposure to selected flame retardants, including chemicals widely used to treat textiles. Although data were inadequate to support a full scientific evaluation, the report reaches several preliminary conclusions concerning the likelihood of risks to human health.

Compounds are covered in separate monographs. Tris(2-butoxyethyl) phosphate (TBEP) is covered in the first. TBEP is used in floor polishes and as a plasticizer in rubber and plastics. Studies of concentrations in various environmental samples show that TBEP is readily biodegradable. Most potential exposure of the general population arises from the use of TBEP in packaging materials for food and from the possible contamination of drinking-water from synthetic rubbers used in plumbing washers. The report concludes that exposure from both sources is very low. The risk to workers, exposed by the dermal route during manufacturing, was likewise judged to be very low. Studies in experimental animals indicate that the liver is the target organ for TBEP toxicity. Data on other toxic effects were judged to be weak or inconsistent.

Tris(2-ethylhexyl) phosphate (TEHP) is covered in the second monograph. TEHP is used as a flame retardant, a plasticizer for polyvinyl chloride and cellulose acetate, and a solvent. While the compound has not been detected in outdoor air, some studies have found concentrations in indoor air. The limited data on environmental fate indicate that the compound is rapidly biodegraded in natural waters. In experimental animals, the compound demonstrates low acute toxicity. Studies conducted in rats revealed no toxic effects. Although some long-term studies suggest carcinogenic potential, the report concludes that TEHP does not represent a significant carcinogenic risk to humans. In studies conducted in human volunteers, no skin irritation was reported. The report concludes that the risk to both the general population and occupationally exposed workers is very low.

The final and most extensive monograph evaluates tetrakis(hydroxymethyl) phosphonium (THP) salts.

These compounds are the major class of chemicals used as flame retardants for cotton, cellulose, and cellulose-blend fabrics. Data were considered inadequate to support an evaluation of effects on the environment. Studies conducted in animals show moderate acute toxicity and low dermal toxicity. The liver is the main target organ for toxic effects in experimental animals. The report found no convincing evidence that fabrics treated with THP salts are mutagenic or carcinogenic. Concerning possible migration from textiles, the report cites evidence that the flame retardant polymer is not released during cleaning processes that would normally be employed by consumers.

All three monographs conclude with a list of further studies needed to support a full scientific evaluation.

IUPAC

Perfluorooctane Sulfonate

Chemical Name: Perfluorooctane Sulfonate, $C_8F_{17}SO_3$

CAS Number: The perfluorooctane sulfonate anion (PFOS) does not have a specific CAS number. The acid and salts have the following CAS numbers:
acid (1763-23-1)
ammonium (NH_4^+) salt (29081-56-9)
diethanolamine (DEA) salt (70225-14-8)
potassium (K^+) salt (2795-39-3)
lithium (Li^+) salt (29457-72-5)

Properties: Solubility in water: 550 mg/l in pure water at 24-25°C; the potassium salt of PFOS has a low vapour pressure, 3.31×10^{-4} Pa at 20°C. Due to the surface-active properties of PFOS, the Log Kow cannot be measured.

Discovery/Uses: PFOS-related chemicals are used in a variety of products, including as surface-treatments of fabric for soil/stain resistance, coating of paper as part of a sizing agent formulation and in specialized applications such as fire fighting foams. The 3M Company, which started commercial production of PFOS in 1948, is the dominant producer. 3M started scaling back production in 2000. Production of PFOS by 3M is expected to decline to zero by the end of 2002

Persistence/Fate: PFOS does not hydrolyze, photolyze or biodegrade under environmental conditions. It is persistent in the environment and has been shown to bioconcentrate in fish. It has been detected in a number of species of wildlife, including marine mammals. Animal studies show that PFOS is well absorbed orally and distributes mainly in the serum and the liver. The half-life in serum is 7.5 days in adult rats and 200 days in Cynomolgus monkeys. The half-life in humans is, on average, 8.67 years (range 2.29 – 21.3 years, SD = 6.12).

Toxicity: The substance shows moderate acute toxicity to aquatic organisms, the lowest LC50 for fish is a 96-hour LC50 of 4.7 mg/l to the fathead minnow (Pimephales promelas) for the lithium salt. For aquatic invertebrates, the lowest EC50 for freshwater species is a 48-hour EC50 of 27 mg/l for Daphnia magna and for saltwater species, a 96-hour LC50 value of 3.6 mg/l for the Mysid shrimp (Mysidopsis_bahia). Both tests were conducted on the potassium salt. The toxicity profile of PFOS is similar among rats and monkeys. Repeated exposure results in hepatotoxicity and mortality; the dose-response curve is very steep for mortality. PFOS has shown moderate acute toxicity by the oral route with a rat LD50 of 251 mg/kg. Developmental effects were also reported in prenatal developmental toxicity studies in the rat and rabbit, although at slightly higher dose levels. Signs of developmental toxicity in the offspring were evident at doses of 5 mg/kg/day and above in rats administered PFOS during gestation. Significant decreases in fetal body weight and significant increases in external and visceral anomalies, delayed ossification, and skeletal variations were observed.
A NOAEL of 1 mg/kg/day and a LOAEL of 5 mg/kg/day for developmental toxicity were indicated. Studies on employees conducted at PFOS manufacturing plants in the US and Belgium showed an increase in mortality resulting from bladder cancer and an increased risk of neoplasms of the male reproductive system, the overall category of cancers and benign growths, and neoplasms of the gastrointestinal tract.

Source:
UNEP Chemicals, Regional Reports of the Regionally Based Assessment of Persistent Toxic Substances Program (2002)