

Groundwater Permit Application Technical Report

Technical Report Compiled By: Kerri Strasheim

Date: 5/24/2021

This Technical Report IS: A collection of facts that the DNRC has gathered independent of what was provided in the application materials. These data will be used later in the process to analyze criteria (85-2-311, MCA).

This Technical Report IS NOT: An analysis or discussion of whether the application meets the criteria (85-2-311, MCA).

Application Information:

Applicant(s) Name:	FLIR Systems, Inc.
Application Number:	41H 30127867
Source:	Groundwater
Purpose:	Geothermal Heating / Cooling
Flow Rate Requested:	700 GPM
Diverted Volume Requested:	831 AF
Period Of Diversion Requested:	January 1 – December 31
Place Of Use (Legal Land Description):	SWSWSE, Section 26, T1S, R5E, Gallatin County
Point Of Diversion (Legal Land Description):	Three extraction wells, all in the SWSWSE, Section 26, T1S, R5E, Gallatin County

Other: Groundwater will be extracted from three wells for geothermal heating and cooling and returned to the aquifer through four injection wells into the same source aquifer. The applicant requests three points of diversion (wells), a flow rate of 700 gallons per minute (GPM) and a volume of 831 acre-feet (AF) per year for an open loop geothermal/heat exchange system at the new facility. An open loop geothermal system uses pumping wells to pump groundwater to the heat pump which heats/cool the building, and, in this case, four injection wells return the water back to groundwater. This system is located within the Bozeman Solvent Site Controlled Groundwater Area (BSS CGWA). The building site is located just north of Costco, on the northwest side of Bozeman, MT, just west of N. 19th and just south of Valley Center Road. An interim permit to drill and test was issued on September 13, 2019.

Information that will be used for criteria analysis:

Physical Availability (ARM 36.12.1703)

DNRC Employee who compiled this section: Kerri Strasheim, Evan Norman, Melissa Schaar

Please refer to the Aquifer Test Report and Stream Depletion Report attached to this Technical Report for detailed information on physical availability of water.

GROUNDWATER

The Aquifer Test Report evaluated the 72-hour aquifer test and calculated a maximum drawdown of 77.2 feet for the West Well, 56.2 feet for the Middle Well, and 57.5 feet for the East Well for the proposed one-year pumping schedule.

The groundwater flux through the zone of influence corresponding to the 0.01-foot drawdown contour is 8,363 AF per annum. The width of the zone of influence is 18,000 feet (average in the direction of groundwater flow).

SURFACE WATER

The East Gallatin River and Catron Creek are the nearest surface water streams. This proposed project is for non-consumptive use of water. Modeling shows no surface water depletion related to the proposed appropriation.

Legal Availability (ARM 36.12.1704 and ARM 36.12.1705)

DNRC Employee who compiled this section: Kerri Strasheim, Evan Norman, Melissa Schaar

Please refer to the Aquifer Test Report and Stream Depletion Report and Appendix A attached to this Technical Report for detailed information on legal availability. The Applicant requests a non-consumptive water right for geothermal heating and cooling, with water returning to the source near the diversion location.

GROUNDWATER

The water pumped for geothermal use will be almost immediately returned to the source of supply, resulting in no net use of groundwater. No water rights are in the source aquifer within the zone that will experience drawdown greater than one foot. A listing of all water rights within the zone of influence is found in Appendix A. A groundwater flux of 8,363 AF per annum was found, and water rights within the zone of influence total 4,575.5 AF. Sixty-two of these water rights don't have a listed volume, so making a conservative estimate of 10 AF per water right, that adds 620 AF, for possible legal demands up to 5,195.5. This leaves 3,167.5 AF of groundwater legally available. This proposed use of 831 AF fits within the amount available.

SURFACE WATER

The depletion report shows no depletion to surface water.

Adverse Effect (ARM 36.12.1706)

DNRC Employee who compiled this section: Kerri Strasheim, Evan Norman, Melissa Schaar

Please refer to the Aquifer Test Report and Stream Depletion Report attached to this Technical Report.

Drawdown in nearby wells with prior water rights: The 1-foot drawdown contour contains no groundwater water rights in the same source aquifer. Appendix A contains all groundwater water rights within the 0.01-foot drawdown contour zone of influence evaluated for legal demand.

The DNRC will consider the following hydraulically connected surface waters: Catron Creek and East Gallatin River

Monthly volume that flows in hydraulically connected surface waters will be reduced: Zero net depletion is modeled for this non-consumptive groundwater use. No surface water rights are being considered for adverse effect.

Adequacy of Diversion (ARM 36.12.1707)

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The following table from the Aquifer Test Report (Table 5) includes the predicted total drawdown and the remaining available water column in the three extraction wells.

Applicant Monthly pumping schedule for all 3 wells for 1 year.									
Well	Well Total Depth	Pre-Test Static Water Level	Available Drawdown above bottom	Well Efficiency	Predicted Additional Drawdown including well loss		Predicted Additional Drawdown from Interference	Total Drawdown	Remaining Available Water Column
	<i>(ft)</i>	<i>(ft btc)</i>	<i>(ft)</i>	<i>(%)</i>	<i>theoretical</i>	<i>actual (w/well loss)</i>	<i>(ft)</i>	<i>(ft)</i>	<i>(ft btc)</i>
West	206.0	8.64	121.4	34	28.1	82.8	-5.4	77.4	43.9
Middle	181.0	9.14	110.9	51	28.1	54.7	1.5	56.2	54.7
East	181.0	8.52	121.5	45	28.1	62.3	-4.8	57.5	64.0

Beneficial Use (ARM 36.12.1801)

DNRC Employee who compiled this section: Kerri Strasheim

No information relating to the beneficial use has been compiled in addition to what was submitted on the application.

Possessory Interest (ARM 36.12.1802)

DNRC Employee who compiled this section: Kerri Strasheim

No information relating to possessory interest has been compiled in addition to what was submitted on the application.