U.S. EPA Region 8
Underground Injection Control Program
AQUIFER EXEMPTION RECORD OF DECISION

This Record of Decision provides EPA's aquifer exemption (AE) decision, background information concerning the AE request, and the basis for the AE decision.

Substantial or Non-Substantial Program Revision: Non-Substantial

This is a non-substantial program revision because it is associated with the issuance of a site-specific Class V UIC permit action, not a programmatic change or a revision with implications for the national UIC program. The decision to treat this as a non-substantial program revision is consistent with EPA's "Groundwater for Review and Approval of State Underground Injection Control (UIC) Programs and Revisions to Approved State Programs" (Guidance 34), which explains that the determination as to whether a program revision is substantial or non-substantial is made on a case-by-case basis, and with the exception of AEs associated with certain Class I wells or exemptions not related to action on a permit, AE requests are typically treated as non-substantial program revisions.

Date of Aquifer Exemption Application Request: October 11, 2022

Operator: Montalban Oil & Gas Operations, Inc
33 1st Avenue SW
Cut Bank, Montana 59427

Well Class/Type: Class V Industry-Other (5A24)

Wells/Project Name: Jody Field 34-1 and Jody Field 34-2

Jody Field 34-1:

Well Permit Number: MT52443-12513

Well API number: 25-073-21830

Well Surface Location: QtrQtr: SESW Section: 34 Township: 29N Range: 6W

Well Surface Footage Calls: 330 feet from S line; 2310 feet from W line

Well Surface Latitude: 48.222753 **Well Surface Longitude:** -112.371161

Jody Field 34-2:

Well Permit Number: MT52439-12514

Well API number: 25-073-21838

Well Surface Location: QtrQtr: NWSW Section: 34 Township: 29N Range: 6W

Well Surface Footage Calls: 2,310 feet from S line; 990 feet from W line

Well Surface Latitude: 48.228191 **Well Surface Longitude:** -112.376628

Field: Loneman Coulee

Tribal Reservation: N/A

County: Pondera **State**: Montana

PROJECT BACKGROUND INFORMATION

The Jody Field 34-1 well was initially authorized to inject into the Upper Madison Formation utilizing an aquifer exemption (AE) EPA approved on August 15, 2011. The AE was approved for the approximate depth of 3,428 to 3,496 feet, and horizontally within a radius of ¼-mile from the wellbore. The Madison Formation extends from 3,428 to 3,700 feet and consists of fine-grained dolomite with good vuggy and intergranular porosity. A workover to acidize and deepen the well was approved by the Montana Board of Oil and Gas Conservation in 2011. A workover and additional perforations were conducted in 2022. Jody Field 34-1 was deepened by 42 feet for a total open hole height of 110 feet. The well workover revealed that there was not a confining zone of less permeable layers directly beneath the bottom of the original well depth, as previously assumed during evaluation of the 2011 AE.

The Jody Field 34-2 well was initially authorized to inject into the Sawtooth and Madison formations. On March 15, 2010, EPA exempted 20 feet of the Sawtooth Formation and 13 feet of the Upper Madison Formation ¼-mile from the wellbore. After conducting additional research, the 20 feet of the Sawtooth Formation in this area was later determined to be a dense calcareous transitional deposit which is part of the Upper Madison Formation. Research included a review of well logs in the area and a review of the US Geological Survey (USGS) Produced Water Database V2.3 across the Sweetgrass Basin in Montana. The USGS Produced Water Database indicates that there are 69 oil and gas wells producing from the Sawtooth Formation within the basin. The two wells located within Pondera County indicate specifically that the Sawtooth Formation is part of the Madison Sun River Dolomite, further suggesting that this zone is transitional within the Upper Madison and not a separate USDW.

A workover to acidize and deepen the Jody Field 34-2 well was approved by the Montana Board of Oil and Gas Conservation in August 2022, and the workover was conducted in September 2022. Jody Field 34-2 was deepened by 68 feet for a total open hole height of 81 feet. Like Jody Field 34-1, the well workover revealed that there was not a confining zone of less permeable layers directly beneath the bottom of the original well depth, as previously assumed during evaluation of the 2010 AE.

In 2022, Montalban Oil & Gas Operations, Inc (MOGO) applied for two permits to convert the Class II wells into Class V wells to allow MOGO to inject wastewater from Montana Renewables generated from the pretreatment of renewable feedstocks. The renewable feedstocks may include, but are not limited to, vegetable oils (such as soybean oil and canola oil), animal fats (such as beef tallow, choice white grease, and poultry fat) distiller's corn oil, and used cooking oil. The change from Class II wells to Class V wells is required to expand the type of authorized injectate, as Class II wells are limited to wastes from oil and gas production.

As part of their application, since the upper and lower portions of the Madison Formation are likely hydraulically connected, and there is not sufficient evidence of less permeable layers within the Lower Madison Formation, they also requested vertical expansions of both AEs associated with these wells.

In 2023, EPA Region 8 proposed two separate vertical AE expansions for the Jody Field 34-1 and 34-2 wells. The Region received numerous comments during the public comment period. Some comments raised concerns about the migration of fluid outside the originally proposed ¼-mile radius boundary. Because of these concerns, the Region performed additional modeling to consider the natural hydraulic gradient. Following this additional analysis, and considering other site-specific factors, the Region is approving one aquifer exemption that encompasses injection activities from both wells. In addition to expanding the depth of the AE vertically to approximately 3,700 feet, the lateral extent of the AE is expanded to 6.6 square miles to account for the natural hydraulic gradient and accommodate at least 10,000 years of migration of injected fluids.

DESCRIPTION OF AQUIFER EXEMPTION

Aquifer Exempted

EPA Region 8 exempts a portion of the Madison Formation that extends across the entire vertical depth from the lower confining layer to the upper confining layer, a 6.6 square mile area depicted in Figure 1. All portions of this area that have not been previously exempted are being approved for exemption. The geologic top of the Madison Formation in this area is measured at a depth greater than 3,400 feet and is separated from other shallow, accessible USDWs by several hundred feet of confining layers.

Formation: The Madison Formation is a regionally extensive fine-grained dolomite of Mississippian Age, with good vuggy and intergranular porosity ranging from 9.4% to 9.7% at the Jody Field injection wells.

At Jody Field 34-1:

Top: 3,428 feet *Bottom:* 3,700* feet *Thickness:* 204* feet

At Jody Field 34-2:

Top: 3,418 feet *Bottom:* 3,700* feet *Thickness:* 249* feet

*Depth and thickness are approximate and projected, based on nearby wells (API Numbers 25-073-05439, 25-073-05440, and 25-073-21523).

Upper Confining Zone: Jurassic Ellis Group (Swift, Rierdon, and Sawtooth Formations). This group is composed of sandstone and shale (Swift Formation), marlstone (Rierdon), and siltstone (Sawtooth).

Jody Field 34-1:

Top: 3,207 feet *Bottom:* 3,428 feet

Jody Field 34-2:

Top: 3,203 feet *Bottom:* 3,418 feet

Lower Confining Zone: Mississippian Mission Canyon and Lodgepole and Devonian Three Forks and Potach Formations. These formations are composed of tight limestone and shale.

Top: 3,700 feet* *Bottom:* 4,700 feet*

*Depths are approximate and projected, based on nearby wells (API Numbers 25-073-05439, 25-073-05440 and 25-073-21523).

Total Surface Area of the Exempted Aquifer*:* As explained in the Project Background Information above, the Region performed additional modeling to consider the natural hydraulic gradient due to concerns about the 1/4-mile radius raised during the 2023 to 2024 public comment period. The approved AE expansion area is about 4,230 acres or 6.6 square miles, as shown in Figure 1. This area was determined based on use of numerical groundwater-flow modeling and particle tracking, with a 10,000-year time frame to evaluate injectate migration. In other words, the area approved for exemption includes the area of potential injectate migration over 10,000 years, according to modeling performed by EPA Region 8. The Supplemental Technical Analysis provides additional explanation on the derivation of the surface area exempted.

To ensure fluids remain within the approved aquifer exemption area shown in Figure 1, the permit for Jody Field 34-1 establishes a volume limit of 8,811,350 barrels (bbl) which accounts for the previously injected volume of 179,752 bbl into Jody Field 34-1. The volume calculation assumes a porosity of 9.4% for the injection zone, which was derived from a compensated neutron-formation density log from the Jody Field 34-1 well. Similarly, the permit for Jody Field 34-2 establishes a volume limit of 7,156,173 bbl, which accounts for the previously injected volume of 205,090 bbl into Jody Field 34-2. The volume calculation assumes a porosity of 9.7% for the injection zone, which was derived from a compensated neutron-formation density log run at the nearby well Field 1-34, located approximately 0.13 miles southeast of Jody Field 34-2. The estimated porosity derived from the Field 1-34 neutron density log falls within the range found in the literature.[1]

[1] Pasternack, Ira, Nature and Distribution of Mississippian Sun River Dolomite Porosity, West Flank of the Sweetgrass Arch, Northwestern Montana. August 16, 1988.

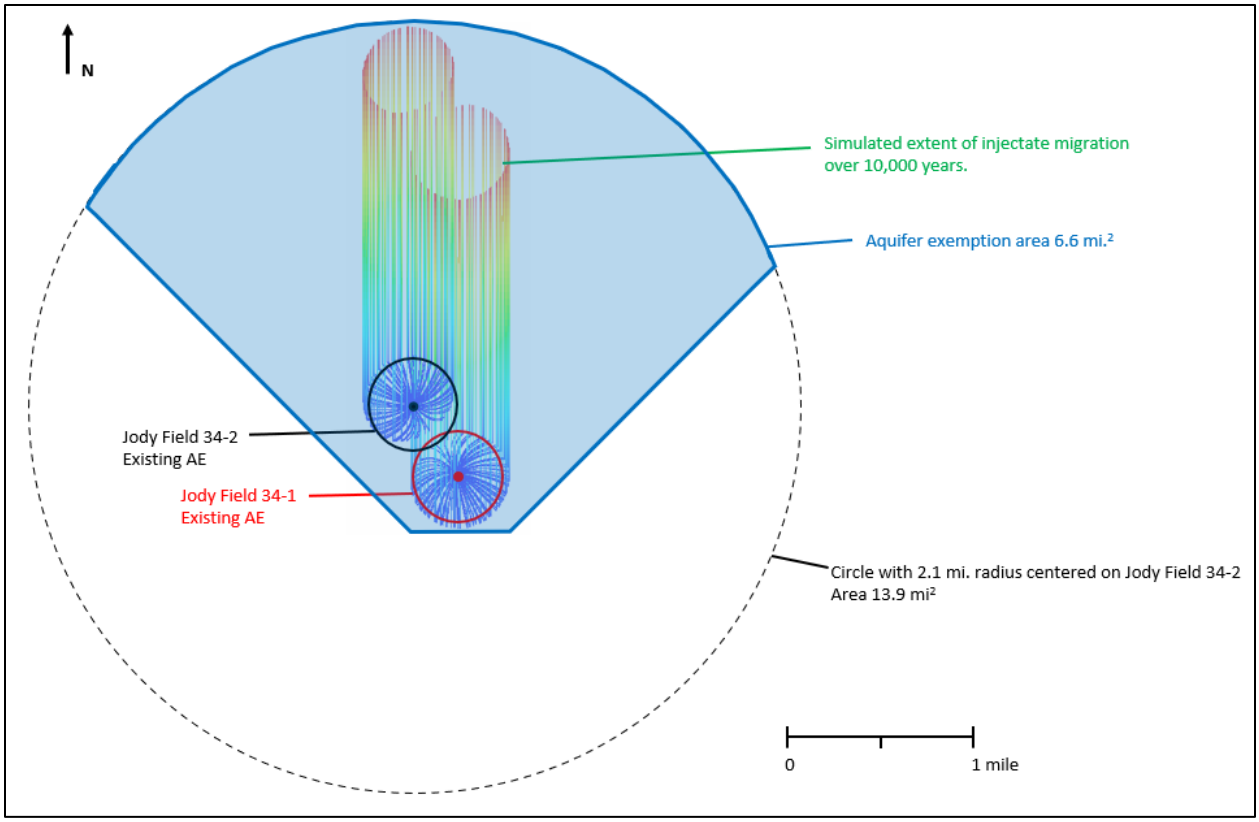

Figure 1. Simulated injectate extent and approved aquifer exemption extent for Jody Field 34-1 and 34-2 wells determined by using numerical groundwater-flow modeling and particle tracking.

WATER QUALITY DATA OF THE AQUIFER APPROVED FOR EXEMPTION

Aquifer Water Quality – TDS: *4,490 mg/L to 6,660 mg/L*

Source of WQ Data: The Montana Bureau of Mines and Geology mapped TDS concentrations in the areas immediately surrounding both wells. The data, collected from oil tests or production wells between 1920 and 1977, indicated TDS concentrations in the Sun River Dolomite ranging from around 4,490 to 6,660 mg/L and TDS concentrations in the Madison Formation ranging from around 3,240 to 7,100 mg/L (Feltis 1980).[2] A water sample collected from Jody Field 14-34 (API #25-073-21740), which is 0.18 miles away from Jody Field 34-1, reported a TDS concentration of 5,440 mg/L. A water sample collected from Jody Field 4-1 (API #25-073-21824), which is 0.45 miles away from Jody Field 34-1, indicated a calculated TDS concentration of 5,109 mg/L. A sample from this well prior to initial injection is not available. Based on review of data discussed above, it is reasonable for EPA Region 8 to assume the Madison Formation has a TDS concentration of less than 10,000 mg/L and is a USDW, requiring exemption in order for injection to be allowable.

[2] Feltis, R.D., Dissolved-Solids and Ratio Maps of Water in the Madison Group, Montana, Montana Bureau of Mines and Geology, Hydrogeologic Map 3, 1980

IDENTIFICATION OF OTHER USDWs

The uppermost USDWs are the Upper Cretaceous Two Medicine Formation and Eagle/Virgelle Sandstone. The depth of these USDWs range from surface to 664 feet below ground surface. The observed TDS values for the Two Medicine Formation and Eagle/Virgelle Sandstone are <3,000 mg/L and <5,000 mg/L, respectively.

The Upper and Lower Colorado Group separates the upper USDWs from the Lower Cretaceous USDWs, which include the Dakota Sandstone, Kootenai Formation, and Sunburst Formation. The Lower Cretaceous USDWs are located at a depth of approximately 2,539 feet to 3,135 feet and consist of mostly sandstone with observed TDS values ranging from 7,000 to 12,000 mg/L (Well MT51141-07750).

The Devonian Duperow Formation, which is separated from the Madison Aquifer by the Three Forks Formation, is considered a USDW in central Montana due to reported TDS concentrations less than 10,000 mg/L. However, there is limited data on the Devonian Duperow Aquifer in this area. Well logs drilled into the Duperow Formation approximately 5 to 6 miles east of the subject wells indicate that the Sun River Dolomite is separated from the underlying Duperow Formation by approximately 1,300 feet of confining zone (Mississippian Mission Canyon and Lodgepole Limestone and Upper Devonian Three Forks and Potlatch Formations). Review of well logs of the easternmost well depicted on the cross section (API #25-073-21523) indicate that the Duperow Formation in this area of Montana is impermeable with a permeability less than 1 millidarcy from the top of the formation to a thickness of at least 500 feet. A water quality sample from the Devonian Duperow Aquifer was observed to have a calculated TDS under 10,000 mg/L (API #25-073-21523).

INJECTATE INFORMATION

Injected fluids are limited to those composed of fluids associated with oil and natural gas production and wastewater from Montana Renewables generated from the pretreatment of renewable feedstocks.[3] The pretreatment process technology is developed and licensed by Applied Research Associates, Inc. In the pretreatment process, water and weak acid are combined with the feedstocks under high temperature and pressure, then allowed a pre-determined contact time before being cooled. The cooled mixture is processed in an electrostatic separator to yield a renewable oil stream for processing into renewable fuels. The remaining water phase, containing phosphorus, nitrogen, salts, and other impurities constitutes the non-hazardous industrial wastewater to be injected. The TDS of the injectate ranges from 3,440 mg/L to 10,800 mg/L based on water quality analyses submitted to EPA. The Final Administrative Record for the permitting decisions contains laboratory analytical results and is available on Regulations.gov at: https://www.regulations.gov/document/EPA-R08-OW-2025-0852-0002.

[3] The renewable feedstocks may include, but are not limited to, vegetable oils (such as soybean oil and canola oil), animal fats (such as beef tallow, choice white grease, and poultry fat) distiller's corn oil, and used cooking oil.

BASIS FOR DECISION

Regulatory Criteria under which the exemption is requested and approved

40 CFR § 146.4(a) *It does not currently serve as a source of drinking water;*

The Madison Aquifer does not currently serve as a source of drinking water for the area near the aquifer exemption. An August 2025 search of the Montana Groundwater Information Center (GWIC) indicated no drinking-water wells utilize the Madison Aquifer within the nine-township area surrounding the Jody Field 34-1 well. The deepest perforation for any wells used for domestic, household, and municipal purposes in this area is 310 feet, which is over 3,000 feet shallower than the top of the Madison Aquifer at the Jody Field 34-1 well (3,428 feet) and Jody Field 34-2 well (3,418 feet). At this depth, the 310-ft deep domestic well is likely completed into the Two Medicine Formation or the Eagle Formation. There are multiple confining zones in between the Madison Aquifer and the Two Medicine and Eagle Formations, including: the Colorado, Blackleaf, Bow Island, Swift, Rierdon, and Sawtooth confining zones. These provide additional separation of the shallow drinking water resources from the Madison Formation.

The closest Public Water System (PWS) is approximately 2 miles to the northwest that services Pondera Colony, a Hutterite community in Pondera County. The total depths of the wells in Pondera Colony are 140 ft and 160 ft, completed in the Two Medicine Formation. PWS wells in Pondera County are no deeper than 168 feet. The public water system for the Town of Valier is 168 feet deep and is completed into the Eagle Formation. There are no public water systems in Pondera County that use water from the Madison Formation.

40 CFR § 146.4(b) *It cannot now and will not in the future serve as a source of drinking water because:*

(2) *It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical.*

(3) *It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption.*

The Madison Aquifer at this location is not a valuable potential source of drinking water either now or in the future. The water quality is poor. As noted above, samples indicate the TDS is between 4,490 and 6,660 mg/L TDS. The Madison/Sun River Dolomite section of the Madison Group is hydrocarbon producing.[4] The oil and gas wells in this area have either been plugged and abandoned, shut-in, or converted to injection wells. However, the Jody Field 34-1 and Jody Field 34-2 wells have previously been used to inject produced water from the nearby Jody Field 14-34 well, which is completed in the Madison Formation. Generally, average oil and grease concentrations in produced water range from 2 to 565 mg/L and typical benzene concentrations

[4] Gaswirth, Stephanie B., et al, Geologic Assessment of Undiscovered Oil and Gas Resources in the Madison Group, Williston Basin, North Dakota and Montana, U.S. Geological Survey Digital Data Series DDS-69-W, 2010.

in produced water range from 32 to 778,510 ppb.[5] The generally accepted level for oil and grease in drinking water is at non-detectable levels. The maximum contaminant level for benzene in drinking water is 5 ppb. If the Madison Formation in this area were used for drinking water, significant water treatment would be required to remove the hydrocarbons and reduce TDS to acceptable levels. Based on this information, the Madison aquifer at this location is not a potential source of drinking water because it meets the criteria under (b)(3), as it is so contaminated it would be economically impractical to render this water fit for human consumption.

Water demand in the area is expected to remain low. The Jody Field 34-1 and Jody Field 34-2 wells are located in a rural area of Pondera County that supports a relatively low-density population, where agriculture remains the predominant land use. Pondera County measures 1,640 square miles and is located approximately 90 miles northwest of Great Falls, which is the third largest city in Montana with a population of 58,700. The population of Pondera County has declined steadily over the past several decades. Based on U.S. Census data, the population of Pondera County decreased by 4 percent (from 6,153 people to 5,898 people) between 2010 and 2020.

According to the 2020 census, the towns nearest to the Jody Field 34-1 and Jody Field 34-2 wells, Pondera Colony (~2-3 miles to the northwest) and New Miami Colony (~5-6 miles to the southeast), have a population of 53 and 95, respectively. The Pondera Colony water system uses two groundwater wells as their PWS and the water source is the Two Medicine Formation. Similarly, the New Miami Colony PWS sources water from one groundwater well in the Two Medicine Formation (Montana Department of Environmental Quality PWS database).

For the population near the Jody Field 34-1 and Jody Field 34-2 wells, more affordable, alternate sources of water supplies are available for current and future populations. The shallower Two Medicine Formation and Eagle/Virgelle Sandstone are sources of drinking water for current and future residents in the area. The Dakota, Kootenai, and Sunburst USDWs are below the shallow Quaternary and Tertiary aquifers that are currently used for domestic wells and above the Madison Formation.

The shallow Quaternary and Tertiary aquifers are of better water quality, shallower, and more accessible than the Madison, and would likely be preferrable sources of available drinking water. The majority of the shallow Quaternary aquifers are comprised of unconsolidated alluvial deposits from the surrounding mountains. These aquifers are primarily water-table aquifers, and groundwater movement follows the topography in a downstream direction. Recharge to the shallow alluvial aquifers is primarily through rainfall and snowmelt. Deeper Tertiary aquifers in the area range from depths of 100 to 300 feet and include coarse grained interbedded sandstones, channel conglomerates, tuffs and siltstones. Alluvial aquifers are the most used aquifers in the Great Plains region of Montana, due to their high yields and proximity to

[5] Gamwo, Isaac K., et al, Solid-Liquid Separation Technologies, Applications for Produced Water, CRC Press, 2022.

agricultural land.[6]

It would be economically impracticable to install a centralized deep well as a water source or to pipe water from that source to water users. As indicated, this area is served by small, decentralized water systems that obtain their water from the shallow alluvial aquifer system. The water quality from the shallow aquifers requires little treatment. However, installation of a well in the Madison, with a TDS concentration at approximately 10 times the secondary drinking water standard would require expensive treatment and solids handling. The cost to install a shallow domestic well is less than $10,000. AquaSource is currently drilling a well in Pondera County, 7 miles east of Valier to a depth of 100 feet at a cost of $7,000, including completion costs. Drilling and equipping of a centralized shallow public supply well is not anticipated to exceed $175,000. In contrast, the cost associated with a centralized public supply well in the Madison will likely incur the following expenses:

- Well Drilling and Completion - $1,000,000+
- Water Distribution - $1,000,000 per mile
- Water Treatment Facility - anticipated to be greater than $5,000,000, but dependent on volumes, contaminant concentrations, and selected treatment method

As part of the EPA's evaluation of the potential for the Madison aquifer at the Jody Field location to be used as a future source of drinking water, the EPA considered historical trends in the Standardized Precipitation Evapotranspiration Index (SPEI)[7], aridity data in Sanford and Selnick (2012)[8], and information in the 5th National Climate Assessment[9] and Montana State Climate Summary.[10] EPA reviewed the percentages of precipitation lost to evaporation identified during the aridity screening process in the counties within the assessment area and the relevant SPEI value which indicated a trend toward slight drought conditions from 1900 to 2020. This trend is also reflected by the decrease in precipitation from the first half of the previous century to the first two decades of the 21st century in the western portion of the division. Although offset by increases in precipitation in the central and eastern portions of the division, the balance resulted in an overall slight trend toward mild drought. The average of all available model projections of future precipitation change indicates a slight increase in precipitation within the assessment area.

In consideration of all of the factors set forth in this Record of Decision and accompanying documents, the EPA does not consider the Madison aquifer within the AE area to be a

[6] Noble, Roger A., et al, Occurrence and Characteristics of Groundwater In Montana, Volumes 1 and 2, The Great Plains Region, Montana Bureau of Mines and Geology, 1982.
[7] U.S. Env't Prot. Agency, *Climate Change Indicators: Drought*, https://www.epa.gov/climate-indicators/climate-change-indicators-drought.
[8] Sanford, W.E., and Selnick, D., 2012, Estimation of Evapotranspiration Across the Conterminous United States Using a Regression with Climate and Land-Cover Data: Journal of the American Water Resources Association (JAWRA) 49(1), pp. 217-230, https://doi.org/10.1111/jawr.12010.
[9] The Fifth National Climate Assessment, Overview. https://nca2023.globalchange.gov/.
[10] The North Carolina Institute for Climate Studies (NCICS), State Climate Summaries 2022, https://statesummaries.ncics.org/.

groundwater resource that has a potential to be used in the future as a source of drinking water. Based on the factors detailed above, including the water quality and existing contamination of this portion of the Madison; the low water demand in the area; and the construction, treatment, and operation and maintenance costs to utilize the Madison Formation relative to the availability of shallower or alternative water resources; the depth and location of the Madison Formation make recovery of water for drinking water purposes economically impractical. Therefore, the criterion at 40 C.F.R. § 146.4(b)(2) has also been met.

CONCLUSION AND DECISION

The additional vertical and lateral area being requested for exemption is not geologically confined from areas where previous oil and gas production and injection activity has occurred. Given several factors, including that this portion of the Madison is in the middle of an old production field and has high levels of contaminants due to past production and injection activity, is very deep and has documented high TDS concentrations and potential presence of hydrocarbons, and is in a remote location with low water demand that have better quality alternative drinking water sources within the shallower alluvial deposits, the Madison aquifer at this site does not have potential to serve as a source of drinking water either now or in the future.

Based on review of the entire record, EPA finds that exemption criteria 40 CFR § 146.4(a), 146.4(b)(2), and 146.4(b)(3) have been met, and EPA approves the aquifer exemption request.

SARAH BAHRMAN

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Sarah Bahrman
Acting Director
Water Division