



COLORADO

**Oil & Gas Conservation
Commission**

Department of Natural Resources

1120 Lincoln Street, Suite 801
Denver, CO 80203

MEMORANDUM

November 30, 2016

TO: Andrew Flor
Division of Water Resources

FROM: Robert P. (bob) Koehler, PhD.
Oil and Gas Conservation Commission (OGCC)

SUBJECT: Need for Hydrologic Information

The OGCC has received an application for a water injection project, summarized as follows. This will be a directional new-drill commercial disposal well.

LOCATION	COUNTY	FIELD
NWSE Section 26 Township 3 North Range 64 West, 6th P.M.	Weld	Wattenberg #90750

WELL NAME	Waste Management of Colorado Inc: BR-IW #1 (API: 123-xxxxx)	
INJECTION ZONE FORMATION	DJINJ: Lyons, Lower Satanka, Wolfcamp, Amazon, Council Grove, Admire, Virgil, Missouri and Fountain Formations	
DEPTH OF INJECTION INTERVAL	8,614-10,400 MD est.	feet
PROPOSED INJECTION PRESSURE	0-1,438	psig
FRAC GRADIENT OR PRESSURE (BHP)	TBD	psi/ft
VOLUME OF FLUID TO BE INJECTED	0-10,000 est.	bbl/day
TDS OF INJECTION ZONE FLUID	TBD est.	mg/L
TDS OF FLUID TO BE INJECTED	TBD est.	mg/L

Continued below.



WELL CONSTRUCTION DATA (PRE-DRILL-MD)								
CASING STRING	HOLE SIZE	CASING SIZE	WEIGHT /FT	CSG/LIN TOP	SET DEPTH	AMOUNT CEMENT	CEMENT BOTTOM	CEMENT TOP
Surface	13-7/8"	9-5/8"	32.75#	0'	900'	600 sks	900'	0'
Stage Cement 1st String 1	8-3/4"	7"	17#	0'	8,600'	1,100 sks	7,400'	0'
Stage Cement 1st String 2	8-3/4"	7"	17#	0'	8,600'	200 sks	8600'	7,400'
1st Liner	8-3/4"	4-1/2"	11.6#	8600'	10,400'	0 sks	NA	NA

Note that I changed the proposed well construction data somewhat. Waste Management either entered their data incorrectly or was not aware of how better to enter it. To make the 1st String cement job work I had to modify the middle rows 4 and 5 of the table. Waste Management may be planning a two Stage Cement job without a stage tool but their data entry is confusing. I think the information here is adequate for your needs.

Please furnish the OGCC with the name and depth of any aquifer in the area of injection that is a known or potential fresh water stratum. We would also like a list of the water wells within one half mile of this location. Any other information with regard to distance to streams, ditches or outcrops would be very helpful. Thank you.



COLORADO
Division of Water Resources
Department of Natural Resources

1313 Sherman Street, Room 821
Denver, CO 80203

MEMORANDUM

TO: Robert P. Koehler, PhD, Oil & Gas Conservation Commission
FROM: Andrew Flor, Hydrogeologist
DATE: December 28, 2016
SUBJECT: Water Injection Project - BR-IW #1
NWSE Section 26, T3N, R64W, 6th PM
Waste Management of Colorado, Inc., Weld County

On November 30, 2016 your office sent a memo describing a proposal by Waste Management of Colorado, Inc. to construct a new well, BR-IW #1, for injection into the interval 8,614-10,400 feet below ground surface (measured depth). This interval represents the approximate depths for the following formations; Lyons, L. Satanka, Wolfcamp, Amazon, Council Grove, Admire, Virgil, Missouri, and Fountain Formations. The BR-IW #1 well will be located in the NW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 26, Township 3 North, Range 64 West of the Sixth Principal Meridian in Weld County. The well will be located six miles north of the Town of Keenesburg.

The proposed well completion information indicates that this well will be constructed with 9-5/8-inch surface casing set from ground surface to a depth of 900 feet. 7-inch casing will extend to a depth of 8,600 feet and be cemented from 8,600 feet back up to the surface in two placements. 4-1/2-inch slotted liner will then be placed from 8,600 to a total depth of 10,400 feet MD and left ungrouted.

There are 6 water supply wells of record within $\frac{1}{2}$ mile of the proposed injection well, as shown in Table 1. There are zero water right structures within $\frac{1}{2}$ mile of the proposed wellhead, as shown in Table 2. There are 14 COGCC oil/gas wells within $\frac{1}{2}$ mile of the proposed wellhead, as shown in Table 3. A PDF output from Aquamap delineating a $\frac{1}{2}$ mile radius from the proposed injection well is attached. Water supply wells are shown with green or red circles, decreed water rights structures are shown with magenta squares, and oil & gas wells are shown in blue squares. There are 19 dams within 10 miles of this injection well. The dams and hazard ratings are shown on an attached map.

The existing water supply wells in this area produce from Quaternary age alluvial deposits at depths generally less than 30 feet or the Upper Laramie Aquifer at depths generally less than 100 feet. The Laramie-Fox Hills aquifer underlies the Quaternary sediments and extends to a depth of approximately 550 feet below ground surface. The Pierre Shale underlies the Fox Hills Sandstone at this location. Recently, the Upper Pierre Aquifer has begun to be developed as a source of fresh water in Northern Colorado. The Upper Pierre Aquifer extends to a depth of approximately 1,600 feet below ground surface. This well should not be approved for injection unless surface casing is installed and grouted to a depth of at least 1,600 feet to adequately protect the Upper Pierre Aquifer from contamination.

Due to the depth and assumed poor water quality of the injection zone formations, they are not considered to be sources of potable groundwater at this location. Based on the information provided, injection to the Lyons, L. Satanka, Wolfcamp, Amazon, Council Grove, Admire, Virgil, Missouri, and Fountain Formations through a properly constructed well should not negatively impact existing



groundwater or surface water resources in the vicinity. **The well should be constructed with grouted surface casing extending to a depth of at least 1,400 feet below ground surface to adequately protect the Upper Pierre Aquifer from contamination.** If you have any questions or require additional information, please feel free to contact me (303-866-3581 x8218)



Table 1

RECEIPT	PERMIT	WELL NAME	USE	AQUIFER	DEPTH	OWNER
0381792D	186848		Monitoring Well	Laramie Aquifer	44	Waste Services Co
0381792E	186849		Monitoring Well	Laramie Aquifer	22	Waste Services Co
0381792H	186847		Monitoring Well	Laramie Aquifer	44	Waste Services Co
0001146A	1993072-AB		Monitoring Well	All Unnamed Aquifers		Industrial Compliance
0024159A	24159-MH		Monitoring Well	All Unnamed Aquifers		Waste Services Co
0025223A	186844		Monitoring Well	Laramie Aquifer	20	Waste Services Co

Table 2

Structure Type	WDID	Associated Permits	Associated Case Numbers	Structure Name	More Info
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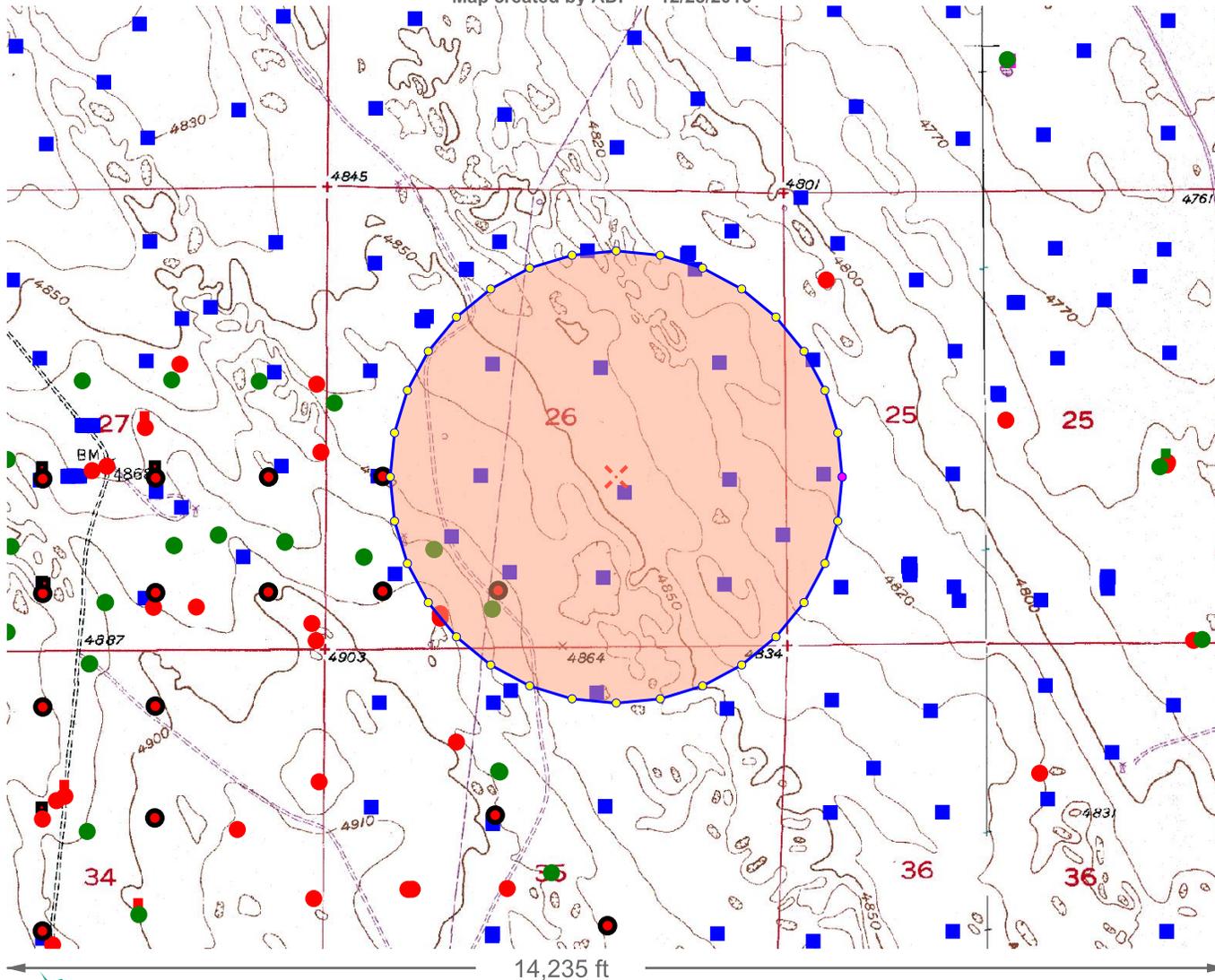
Table 3				
API_NUM	WELL_NAME	WELL_STATUS	PLSS_LOCATION	OPERATOR_NAME
05-123-16173	KARCH BLUE D 25-12	ABANDONED LOCATION	NWSW 25 3N 64W 6	GERRITY OIL AND GAS CORP
05-123-11336	HEYDE 1-26	PRODUCING	NENE 26 3N 64W 6	PDC ENERGY INC
05-123-18742	HSR-WASTE SERVICES 10-26	PRODUCING	NWSE 26 3N 64W 6	KERR-MCGEE OIL AND GAS ONSHORE LP
05-123-18971	ADAM RED D 26-11	PRODUCING	NESW 26 3N 64W 6	NOBLE ENERGY INC
05-123-18974	ADAM RED D26-14	PRODUCING	SESW 26 3N 64W 6	NOBLE ENERGY INC
05-123-19018	HSR-WASTE SERVICES 9-26	PRODUCING	NESE 26 3N 64W 6	KERR-MCGEE OIL AND GAS ONSHORE LP
05-123-19135	HSR-WASTE SERVICES 15-26	PRODUCING	SWSE 26 3N 64W 6	KERR-MCGEE OIL AND GAS ONSHORE LP
05-123-19136	HSR-WASTE SERVICES 16-26	PRODUCING	SESE 26 3N 64W 6	KERR-MCGEE OIL AND GAS ONSHORE LP
05-123-24007	WASTE MANAGEMENT 31-35	PRODUCING	NWNE 35 3N 64W 6	NOBLE ENERGY INC
05-123-25204	WASTE MANAGEMENT 22-26	PRODUCING	SESW 26 3N 64W 6	PDC ENERGY INC
05-123-25233	HEYDE 42-26	PRODUCING	SENE 26 3N 64W 6	PDC ENERGY INC
05-123-25234	HEYDE 32-26	PRODUCING	SWNE 26 3N 64W 6	PDC ENERGY INC
05-123-25391	WASTE MANAGEMENT D 26-25	PRODUCING	SESW 26 3N 64W 6	NOBLE ENERGY INC
05-123-33038	Coors Energy 14-25H	PRODUCING	SWSW 25 3N 64W 6	PDC ENERGY INC

AQUAMAP

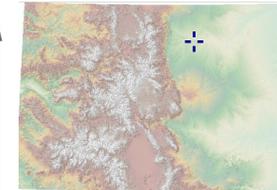
Colorado Division of Water Resources

Waste Management BRIW 1 Half Mile Radius

Map created by ADF 12/28/2016



MAP NAVIGATION



Click to create PDF
 UTM X, Zone 13: 547511
 UTM Y, Zone 13: 4126900
 Long: -104° 27' 50.4"
 Lat: 37° 17' 15.0"
 UTM and Geographic(LL) coordinates in NAD 83

DATA DISPLAY

- Background
- Counties
- Water Well Application
- Quad Maps ▼
- PLSS
- DWR Parcels
- Roads
- EPA Well Notification
- Hydrography
- Oil/Gas Well Location
- Transparency ▼
- County Parcels (No Public Access)
- Towns
- More Data

LOCATION

Section	Township	Range	Meridian
26	3	64	Sixth

PRINTING

Output Scale	Page Size	User
24,000	8.5x11	ADF

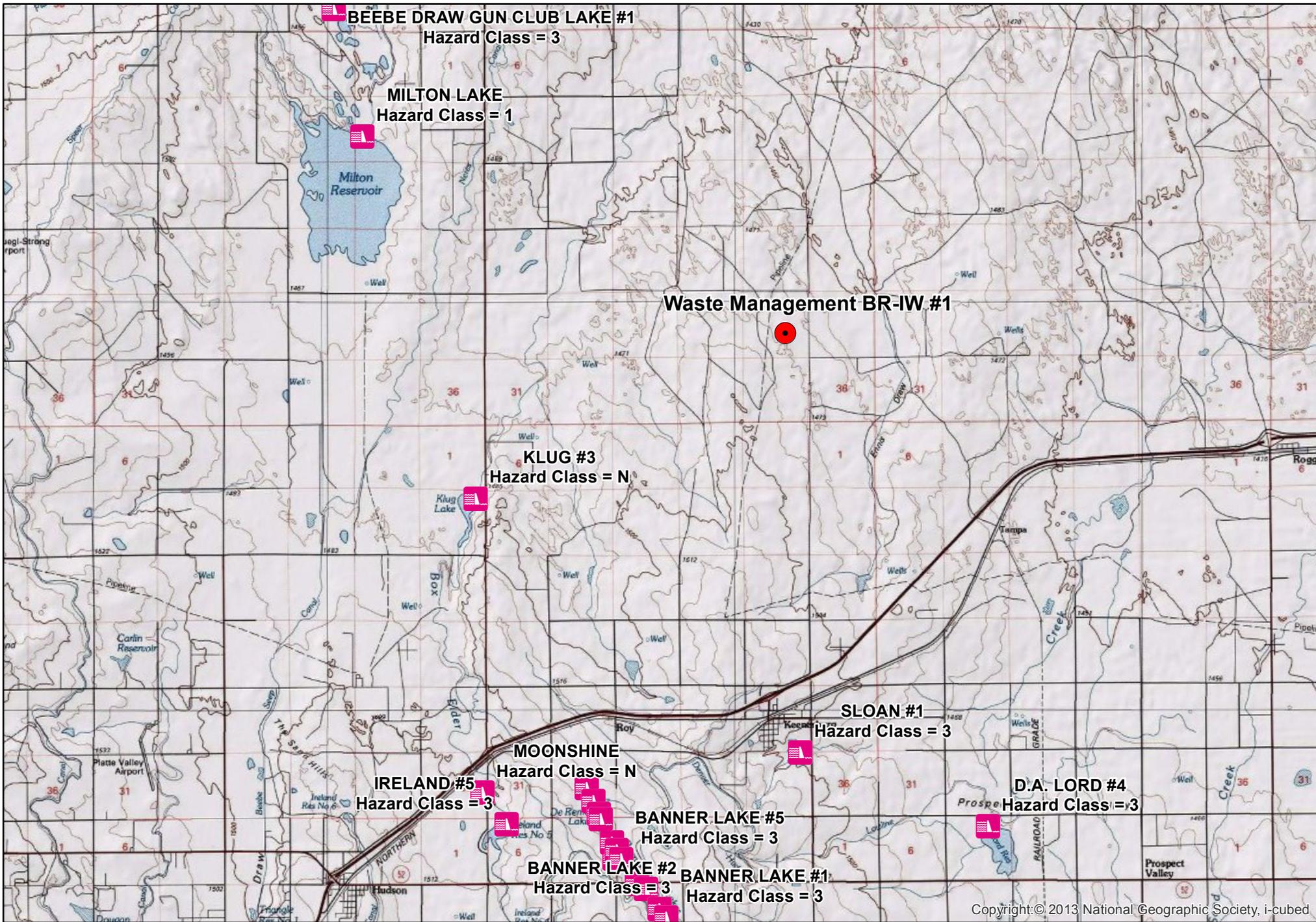
Title

Note: The well locations displayed on AquaMap are based on location information provided by well permit application forms and are only as accurate as the information provided. The actual physical locations of all wells have not been field verified and may vary from the location displayed. Refer to a copy of the original well permit file, available on the Division of Water Resources website, for well location details.



Based on work developed at <http://www.carto.net>

Address location by Bing Maps
 AquaMap Version 3.0.1 July 5, 2009



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Waste Management of Colorado Inc. BR-IW #1 Dams in the vicinity

1 inch = 10,000 feet

