



**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:** August 23, 2017

**SUBJECT:** Water Injection Project - NGL #C5B (API: 05-123-44836)  
 NE SW S29 T2N R64W, Weld County  
 NGL Water Solutions DJ LLC

On May 10, 2017 you sent a memo describing a proposal by NGL Water Solutions DJ LLC to construct a new well, NGL #C3B, for injection into the DJ Injection interval 9,280 to 11,155 feet below ground surface. This interval represents the approximate depths for the following formations: Lyons, Lower Satanka, Wolfcamp, Amazon, Council Grove, Admire, Virgil, Missouri, Fountain, Des Moines, and Atoka. The NGL #C5B well will be located in the NE $\frac{1}{4}$  of the SW $\frac{1}{4}$  of Section 29, Township 2 North, Range 64 West of the Sixth Principal Meridian in Weld County. The well will be approximately 1.5 miles east of Box Elder Creek and just over one mile northwest of the Denver-Hudson Canal. The uppermost injection formation, the Lyons, crops out approximately 40 miles west of the proposed well location.

The proposed well completion information indicates that this well will be constructed with 9-5/8 inch surface casing grouted from ground surface to a depth of 1,000 feet. 7-inch casing will extend to a depth of 9,280 feet and will be cemented from 9,280 feet back up to the surface in two stages. 4-1/2 inch slotted liner will be installed to a depth of 11,154 feet below ground surface.

There is one completed water supply well of record within  $\frac{1}{2}$  mile of the wellhead, which is completed in the Laramie-Fox Hills aquifer, as shown in Table 1. There are zero water rights structures within  $\frac{1}{2}$  mile of the proposed wellhead as shown in Table 2. There are four 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. Permitted water supply wells are shown with green circles, decreed water rights structures are shown with magenta squares, and OGCC wells are shown as blue squares. There are 28 dams within 10 miles of this proposed injection well, three of which have a high or significant hazard rating. The dams and hazard ratings are shown on an attached map.

Most of the existing water supply wells in this area produce from the shallow quaternary sediments or the Laramie-Fox Hills aquifer (KLF). The base of the KLF aquifer is approximately 900-1,000 feet below ground surface. The Pierre Shale underlies the Laramie-Fox Hills aquifer 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 at this location extends to an approximate depth of 1,900 feet below ground surface.



Due to the depth and poor water quality of the injection zone formation (est. TDS=11,000-15,000 mg/L) it is not considered to be a source of potable groundwater at this location. Based on the information provided, injection into the Lyons, Lower Satanka, Wolfcamp, Amazon, Council Grove, Admire, Virgil, Missouri, Fountain, Des Moines, and Atoka Formations through a properly constructed well should not negatively impact existing groundwater or surface water resources in the vicinity. **The well must be constructed with grout extending from surface to a depth of at least 2,000 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).





**COLORADO**  
Oil & Gas Conservation  
Commission

Department of Natural Resources

1120 Lincoln Street, Suite 801  
Denver, CO 80203

**MEMORANDUM**

May 10, 2017

**TO:** Andrew Flor Division of Water Resources  
**FROM:** Robert P. (Bob) Koehler Oil and Gas Conservation Commission  
**SUBJECT:** Need for Hydrologic Information

The Oil and Gas Conservation Commission (OGCC) has received an application for a water injection project, summarized as follows:

LOCATION	COUNTY	FIELD
Surface NESW Section 29, Township 2 North, Range 64 West, 6th P.M.	Weld	Wattenberg #90750

WELL NAME	NGL Water Solutions DJ LLC: NGL #C5B	
INJECTION ZONE FORMATION	Lyons, Lower Satanka, Wolfcamp, Amazon, Council Grove, Admire, Virgil, Missouri, Fountain, Des Moines, and Atoka Formations	
DEPTH OF INJECTION INTERVAL	9,280-11,155 est.	feet
PROPOSED INJECTION PRESSURE	2,200-2,500 est. (NGL #C5 and #C5A nearby existing wells = 1,800)	psig
FRAC GRADIENT OR PRESSURE (BHP)	0.50 at C5, 0.53 at C5A	psi/ft
VOLUME OF FLUID TO BE INJECTED	10,000-24,000 proposed est.	bbl/day
TDS OF INJECTION ZONE FLUID	Lyons & Lower Satanka = 11,000, Wolfcamp, Amazon, Council Grove, & Admire = 15,000, Virgil, Missouri, Fountain = 14,000, Des Moines & Atoka = Unknown all from NGL #C5	mg/L
TDS OF FLUID TO BE INJECTED	5,000-7,000	mg/L

WELL CONSTRUCTION DATA (Pre-drill estimates)								
CASING STRING	HOLE SIZE	CASING SIZE	CSG WT.	CSG TOP	SET DEPTH	CEMENT VOLUME	CEMENT TOP	CEMENT BOTTOM
Surface String	12-1/4"	9-5/8"	36#	0'	1000'	470 sks	0'	1000'
First String	8-3/4"	7"	26#	0'	9280'	172 sks	7950'	9280'
Stage Tool	8-3/4"	7"	23#	0'	7950'	888 sks	0'	7950'
Open Hole	6-1/8"	4-1/2"*	11.6#	9230'	11154'	None	NA	NA

\*Slotted Liner

P 303.894.2100 F 303.894.2109 www.colorado.gov/cogcc  
Commissioners: John H. Benton - Acting Chair, Ashley L. Ager, James W. Hawkins,  
Tommy Holton, Kent Jolley, Robert W. Randall, Dr. Larry Wolk

John W. Hickenlooper, Governor | Robert W. Randall, Executive Director, DNR | Matthew J. Lepore, Director



*Mr. Andrew Flor*

*May 10, 2017*

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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.

Table 1

RECEIPT	PERMIT	WELL NAME	USE	AQUIFER	DEPTH	OWNER	MORE INFO
3672813	299816		Commercial	Klf	750	NGL WATER SOLUTIONS DJ LLC	<a href="http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672813">http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672813</a>
3672532B	299646		Monitoring & Sampling	GW	15	NGL WATER SOLUTIONS DJ LLC	<a href="http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672532B">http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672532B</a>
3672532C	299647		Monitoring & Sampling	GW	20	NGL WATER SOLUTIONS DJ LLC	<a href="http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672532C">http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672532C</a>
3672532D	299648		Monitoring & Sampling	GW	25	NGL WATER SOLUTIONS DJ LLC	<a href="http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672532D">http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672532D</a>
3672532A	299645		Monitoring & Sampling	GW	20	NGL WATER SOLUTIONS DJ LLC	<a href="http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672532A">http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3672532A</a>
3669247	297725		Permit Cancelled	GW		NGL WATER SOLUTIONS DJ LLC	<a href="http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3669247">http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3669247</a>
54508	54508-MH		Monitoring & Sampling	GW		NGL WATER SOLUTIONS DJ	<a href="http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0054508">http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0054508</a>
43538	43538-MH		Monitoring & Sampling	GW		METRO WASTE WATER RECLAMATION DIST	<a href="http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0043538">http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0043538</a>

Table 2

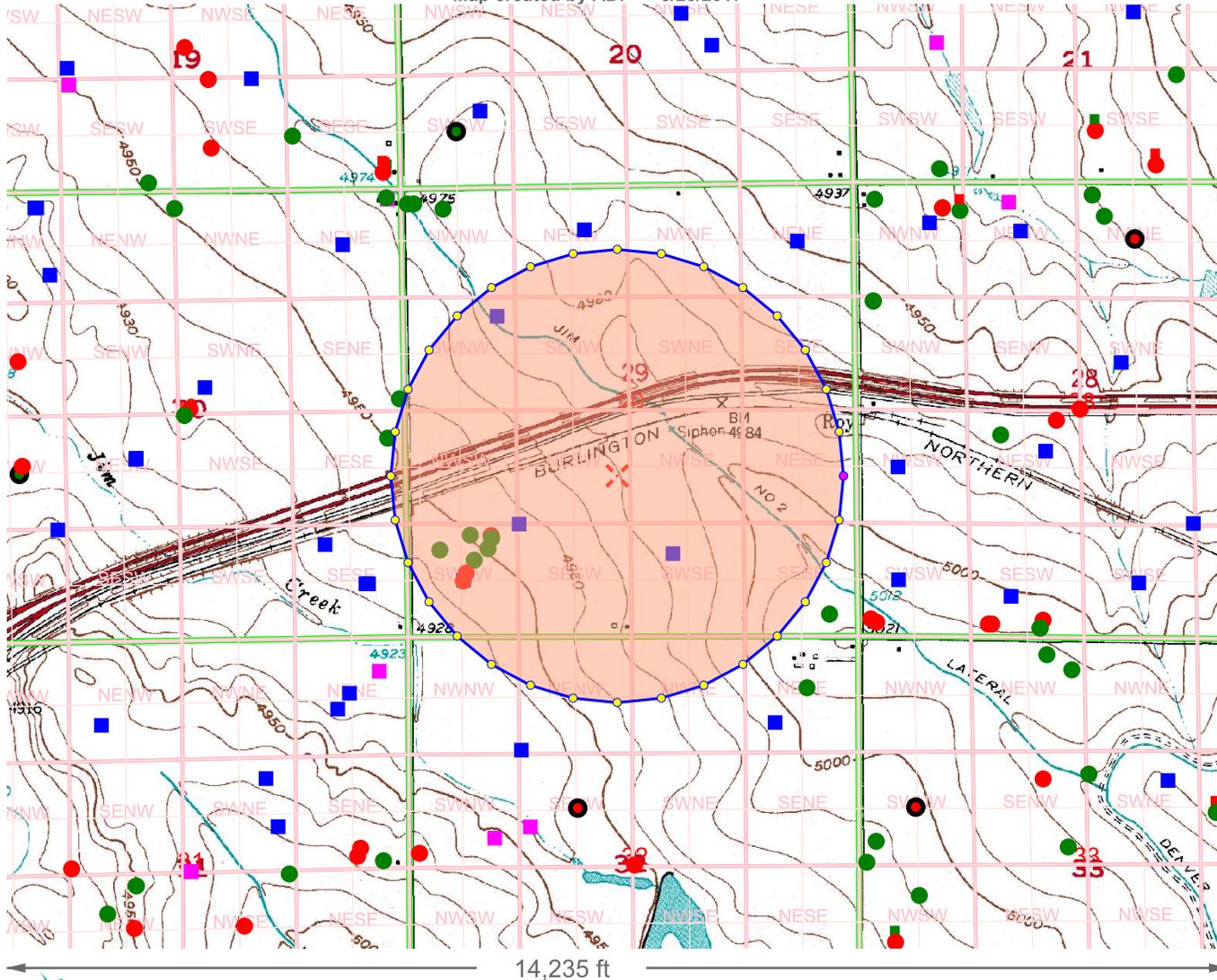
Structure Type	WDID	Associated Permits	Associated Case Numbers	Structure Name	More Info
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Table 3

API NUM	WELL NAME	WELL STATUS	PLSS LOCATION	OPERATOR NAME
05-123-14428	JIM CREEK 1-29	PRODUCING	SWSW 29 2N 64W 6	NOBLE ENERGY INC
05-123-16463	KAMINSKY 1-29	PRODUCING	SWNW 29 2N 64W 6	NOBLE ENERGY INC
05-123-20684	PARKER 29-34	PRODUCING	SWSE 29 2N 64W 6	NOBLE ENERGY INC
05-123-22653	BAUMGARTNER 14-29	PRODUCING	SWSW 29 2N 64W 6	NOBLE ENERGY INC

# AQUAMAP Colorado Division of Water Resources NGL C5B Half Mile Radius

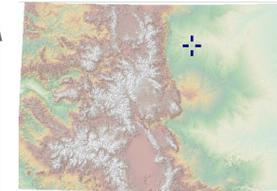
Map created by ADF 8/23/2017



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

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

## MAP NAVIGATION



Click to create PDF  
 UTM X, Zone 13: 736669  
 UTM Y, Zone 13: 4171385  
 Long: -102° 19' 1.2"  
 Lat: 37° 39' 32.9"  
 UTM and Geographic(LL) coordinates in NAD 83

## DATA DISPLAY

<input checked="" type="checkbox"/> Background	<input checked="" type="checkbox"/> Counties	<input checked="" type="checkbox"/> Water Well Application
Quad Maps <span>▼</span>	<input checked="" type="checkbox"/> PLSS	<input type="checkbox"/> DWR Parcels
<input type="radio"/> Low <input checked="" type="radio"/> High	<input type="checkbox"/> Roads	<input checked="" type="checkbox"/> EPA Well Notification
Transparency <span>▬</span>	<input type="checkbox"/> Hydrography	<input checked="" type="checkbox"/> Oil/Gas Well Location
	<input type="checkbox"/> County Parcels (No Public Access)	<input type="button" value="More Data"/>
	<input type="checkbox"/> Towns	

## LOCATION

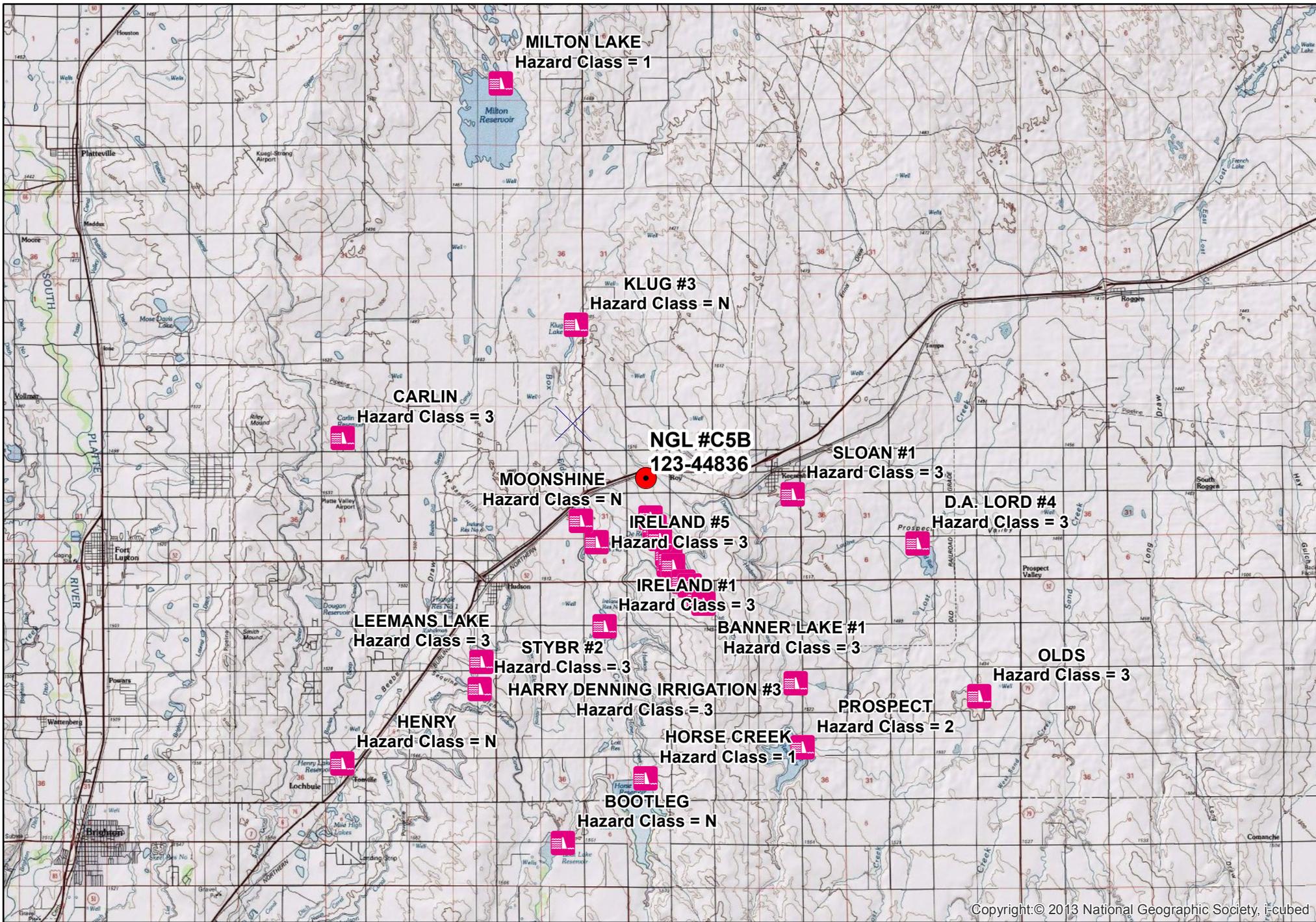
Section	Township	Range	Meridian
29 <span>▼</span>	2 <span>▼</span>	64 <span>▼</span>	W <span>▼</span>
<input type="button" value="PLSS Locator"/>		<input type="button" value="Quick Zoom"/>	<input type="button" value="Spacing"/>

## PRINTING

Output Scale	Page Size	User
24,000 <span>▼</span>	8.5x11 <span>▼</span>	ADF
Title <input type="text" value="NGL C5B Half Mile Radius"/>		

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.





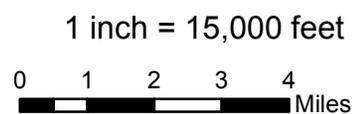
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# NGL Water Solutions DJ LLC

## NGL #C5B Dams in the vicinity



# NGL C5B Area of Review Map-COGCC

