**Oregon Water Resources Department**
725 Summer Street NE, Suite A
Salem, Oregon 97301-1271
(503) 986-0900
www.wrd.state.or.us

# Ground Water Review Form:

- ☒ **Water Right Transfer**
- ☐ **Permit Amendment**
- ☐ **GR Modification**
- ☐ **Other**

Application: T-12248 Applicant Name: Sage Hollow Ranch LLC

Proposed Changes: ☒ POA ☐ APOA ☐ SW→GW ☒ RA ☒ USE ☒ POU ☐ OTHER

Reviewer(s): Jen Woody Date of Review: 10/06/2016, supersedes reviews dated 2/25/2016 and 3/24/2016

The information provided in the application is insufficient to evaluate whether the proposed transfer may be approved because:

☐ The water well reports provided with the application do not correspond to the water rights affected by the transfer.

☐ The application does not include water well reports or a description of the well construction details sufficient to establish the ground water body developed or proposed to be developed.

☐ Other _____

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1. Basic description of the changes proposed in this transfer: T-12248 proposes to make changes to 4 certificates to use groundwater in the Ordnance Basalt Critical Groundwater Area (CGWA). It proposes to move the 2 relevant points of appropriation (POAs) from T3N/R26E-Section 4 to T3N/R26E- Sections 16 and 22.

   **Certificate 49726**: authorizes MORR 595/590 for 1.12 cfs (207.3 acres primary irrigation), the transfer proposes to change the POA to 3 new wells.

   **Certificate 55317** authorizes MORR 595/590 for 0.07 cfs (12 acres primary irrigation), the transfer proposes to change the POA to 3 new wells.

   **Certificate 49727** authorizes one well (MORR 596 was authorized, MORR 591 is used as a replacement well) for 0.84 cfs (38.4 acres primary irrigation), the transfer proposes to change the POA to 3 new wells.

   **Certificate 55316** authorizes MORR 595/590 and MORR 591 for 0.35 cfs total (85.2 acres primary irrigation), the transfer proposes to change the POA to 3 new wells.

   The certificates involved in this transfer are affected by the Ordnance Critical Groundwater Area Order (Special Order Volume 27, pp 40-86). Based on excessively declining groundwater levels, that order prohibited new allocation of groundwater from the CRBG aquifers within the Critical Area boundaries starting in 1976. Water use at MORR 595 and MORR 591 is summarized in Figure 1; average total annual use from the two wells is about 1,000 acre-feet.

2. Will the proposed POA develop the same aquifer (source) as the existing authorized POA?
☒ Yes ☐ No Comments:

The existing and proposed wells will produce from one or more water-bearing zones in the Columbia River Basalt Group (CRBG), a series of lava flows with a composite thickness greater than 10,000 feet in the Columbia Plateau (Kahle et al., 2011). Each flow is characterized by a series of internal features, which generally include a thin rubble zone at the contact between flows and a thick, dense, low porosity and low permeability interior zone. In some cases, sedimentary layers were deposited during the time between basalt flow emplacements. A flow top, sedimentary interbed (if present) and flow bottom are collectively referred to as an interflow zone. Unconfined groundwater occurs near the weathered top of the basalts, but most water occurs in interflow zones under confining conditions at the contacts between lava flows. CRBG flow features result in a series of stacked, thin aquifers that are confined by dense flow interiors. The low permeability of the basalt flow interiors usually results in little connection between stacked aquifers, which results in tabular aquifers with unique water level heads (Reidel et al., 2002).

Constructing a well that is open to multiple water-bearing zones with distinct water level heads commingles multiple aquifers. When the pump is off, water migrates through the well bore from an aquifer of higher pressure to an aquifer of lower pressure. Over time, this can depressurize the aquifer and exacerbate water level decline.

Hydrogeologic investigations by Sceva (1966) and McCall (1975) found that the same CRBG aquifers extend through the currently authorized POA location and the proposed POA locations, based on groundwater elevations and trends. Assuming the new POAs are constructed to no greater depth that the existing wells, they should encounter the same aquifer (same source).

3. a) Is there more than one source developed under the right (e.g., basalt and alluvium)?
☒ Yes ☐ No There is more than one aquifer developed within the CRBG. MORR 595 and MORR 591 are constructed with 700-800 foot open intervals in the CRBG. There are at least two CRBG aquifers within 800 feet of land surface in this area. Each aquifer has a distinct head, as evidenced by UMAT 1543 and MORR 1720 which were reconstructed with casing and seal depths that allow access to a single CRBG aquifer per well (see Figure 3) . The shallow CRBG aquifer accessed by UMAT 1543, is located above approximately 400 feet below land surface and has a current February groundwater elevation of 490-500 feet above mean sea level (amsl). Between approximately 400 and 800 feet below land surface, the aquifer accessed by MORR 1720 has a current February groundwater elevation of 260-280 feet amsl (see Figure 3). Cascading water has been documented by Department staff when measuring the water level at MORR 595. MORR 591 has 18' of seal reported on the log, leaving the well open to alluvium and multiple aquifers within the CRBG. To access the same aquifers with new wells that meet current well construction standards, it may be necessary to install multiple wells to replace MORR 595, for example.

The existing wells do not meet current well construction standards requiring single aquifer completion, based on the large open intervals and the lack of information regarding surface seals. They will need to be repaired, converted to dedicated observation wells or abandoned. The proposed APOAs are described in the application with total depth of 750-1000 feet and 150 feet of casing and seal. This will not meet current well construction standards requiring wells access a single aquifer.

b) If yes, estimate the portion of the right supplied by each of the sources and describe any limitations that will need to be placed on the proposed change (rate, duty, etc.): There is not enough available information to determine what portion of the use is from the various water bearing zones intercepted by MORR 595 and MORR 591.

4. a) Will this proposed change, at its maximum allowed rate of use, likely result in an increase in interference with **another ground water right**?
☒ Yes ☐ No Comments: The proposed POAs are about ½ mile closer to nearby basalt wells, which will increase well-to-well interference. A dedicated observation well condition is specified to protect the resource and other existing users. The CGWA order requires that all wells be equipped with water level measuring facilities, which allow monitoring of long term water level trends and the degree of well-to-well interference. Since the proposed POAs will be in use year-round, a dedicated observation well is recommended to meet that requirement.

   b) If yes, would this proposed change, at its maximum allowed rate of use, likely result in another groundwater right not receiving the water to which it is legally entitled?
☐ Yes ☒ No If yes, explain: Groundwater elevations in the deep basalt aquifer are very consistent across the CGWA. That suggests that the basalt aquifers in this area are not extensively compartmentalized, which would exacerbate well-to-well interference. Interference is expected to be slightly increased by the change in location but similar in magnitude to current conditions.

5. a) Will this proposed change, at its maximum allowed rate of use, likely result in an increase in interference with **another surface water source**?
☐ Yes ☒ No Comments: There is no significant change in surface water interference likely to result from the transfer.

   b) If yes, at its maximum allowed rate of use, what is the expected change in degree of interference with any **surface water sources** resulting from the proposed change?
Stream: _____ ☐ Minimal ☐ Significant
Stream: _____ ☐ Minimal ☐ Significant
Provide context for minimal/significant impact: _____

6. What conditions or other changes in the application are necessary to address any potential issues identified above:

References

McCall, William B., 1975, Ground-Water Conditions and Declining Water Levels in the Ordnance Area, Morrow and Umatilla Counties Oregon, State of Oregon Water Resources Department Groundwater Report No. 23, 134 p.

Oregon Water Resources Department, 1976, Special Order Volume 27, On the Determination of the Critical Ground Water Area in the Ordnance Area, Morrow and Umatilla Counties, Oregon, pp. 40-86.

Sceva, Jack E., 1966, A Brief Description of the Ground-water Conditions in the Ordnance Area Morrow and Umatilla Counties, Oregon, State of Oregon Ground Water Report No. 11, 43 p.

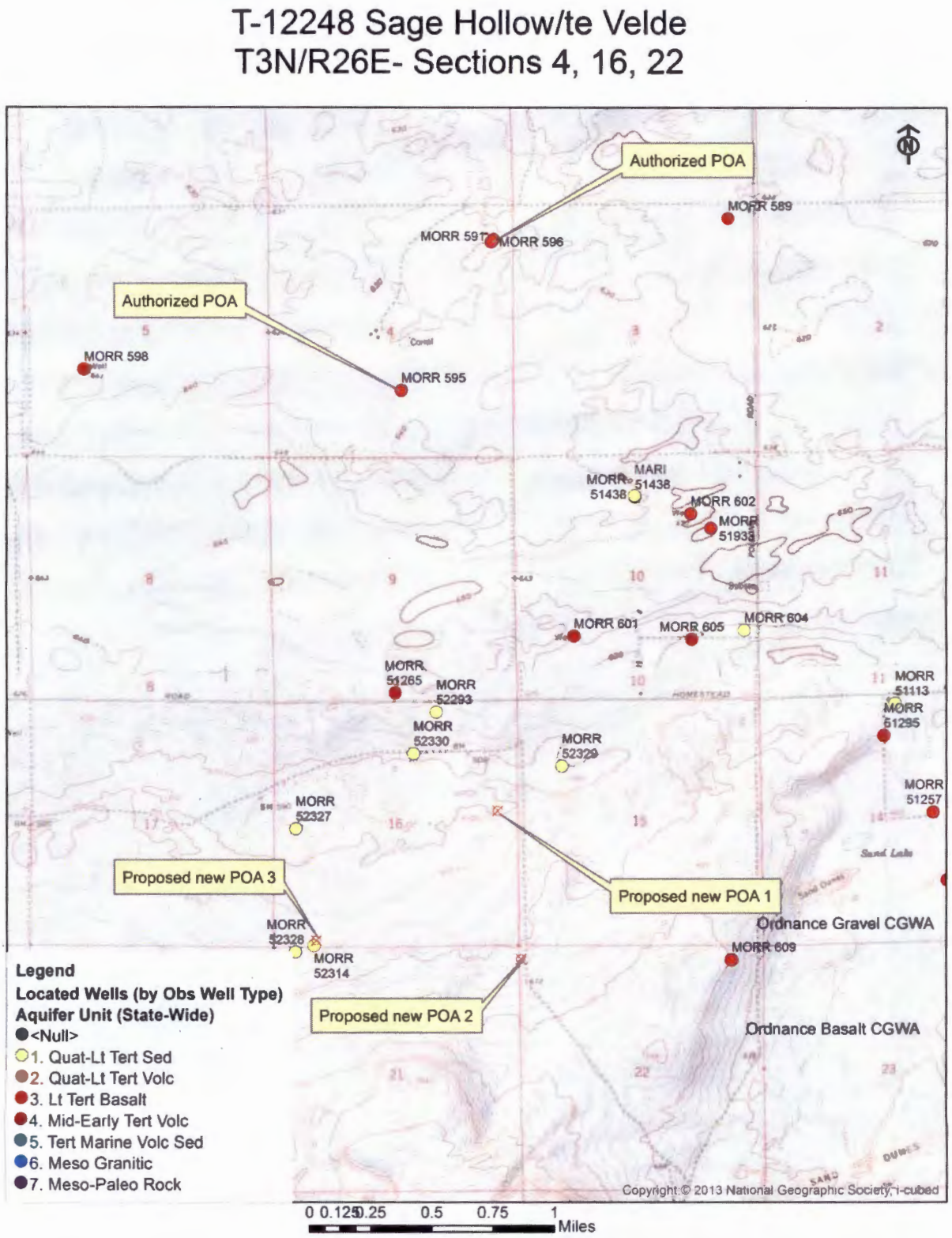
OWRD water level database, accessed 2/24/2016.

| Logid | WaterUseYear | PumpageFinalAF | PumpageFinalSource |
|---|---|---|---|
| MORR 591 | 1978 | 109.97 | FM |
| MORR 591 | 1979 | 409.08 | FM |
| MORR 591 | 1980 | 43.79 | FM |
| MORR 591 | 1981 | 402.40 | FM |
| MORR 591 | 1982 | 270.44 | FM |
| MORR 595 | 1983 | | |
| MORR 591 | 1983 | 809.72 | FM |
| MORR 595 | 1984 | 256.07 | FM |
| MORR 591 | 1984 | 174.23 | FM |
| MORR 591 | 1985 | 869.93 | FM |
| MORR 591 | 1986 | 299.20 | PM |
| MORR 591 | 1987 | 979.64 | PM |
| MORR 595 | 1988 | 680.20 | FM |
| MORR 591 | 1988 | 722.94 | FM |
| MORR 595 | 1989 | 697.63 | FM |
| MORR 591 | 1989 | 696.67 | FM |
| MORR 595 | 1990 | 692.87 | FM |
| MORR 591 | 1990 | 868.61 | FM |
| MORR 595 | 1991 | 819.06 | FM |
| MORR 591 | 1991 | 839.19 | FM |
| MORR 595 | 1992 | 772.40 | FM |
| MORR 591 | 1992 | 701.20 | FM |
| MORR 595 | 1993 | 790.99 | FM |
| MORR 591 | 1993 | 471.38 | FM |
| MORR 595 | 1994 | 677.58 | FM |
| MORR 591 | 1994 | 928.05 | FM |
| MORR 595 | 1995 | 751.85 | FM |
| MORR 591 | 1995 | 811.78 | FM |
| MORR 595 | 1996 | 570.49 | FM |
| MORR 591 | 1996 | 780.91 | FM |
| MORR 595 | 1997 | 596.27 | FM |
| MORR 591 | 1997 | 716.69 | FM |
| MORR 595 | 1998 | 616.15 | FM |
| MORR 591 | 1998 | 235.09 | FM |
| MORR 595 | 1999 | 746.05 | FM |
| MORR 591 | 1999 | 345.39 | FM |
| MORR 595 | 2000 | 587.55 | FM / 2yrs |
| MORR 591 | 2000 | 377.46 | PM |
| MORR 595 | 2001 | 587.55 | FM / 2yrs |
| MORR 591 | 2001 | 666.50 | FM |
| MORR 595 | 2002 | 852.73 | FM |
| MORR 591 | 2002 | 768.73 | FM |
| MORR 595 | 2003 | 771.19 | FM |
| MORR 591 | 2003 | 910.53 | FM |
| MORR 595 | 2004 | 703.95 | FM |
| MORR 591 | 2004 | 640.39 | FM |
| MORR 595 | 2005 | 699.21 | FM |
| MORR 591 | 2005 | 773.16 | FM |
| MORR 595 | 2006 | 631.84 | FM |
| MORR 591 | 2006 | 555.13 | FM |
| MORR 595 | 2007 | 517.75 | FM |
| MORR 591 | 2007 | 572.02 | FM |
| MORR 595 | 2008 | 517.97 | FM |
| MORR 591 | 2008 | 426.11 | FM |
| MORR 595 | 2009 | 549.32 | FM |
| MORR 591 | 2009 | 458.93 | FM |
| MORR 595 | 2010 | 532.92 | FM |
| MORR 591 | 2010 | 338.52 | FM |
| MORR 595 | 2011 | 491.96 | FM |
| MORR 591 | 2011 | 449.25 | FM |
| MORR 595 | 2012 | 711.34 | FM |
| MORR 591 | 2012 | 472.58 | FM |
| MORR 595 | 2013 | 538.28 | FM / 2yrs |
| MORR 591 | 2013 | 578.13 | FM |
| MORR 595 | 2014 | 538.28 | FM / 2yrs |
| MORR 591 | 2014 | 552.02 | FM |

FM = flowmeter

Figure 1. Water use records from flowmeters at MORR 595 and MORR 591.

Figure 2. Well locations.



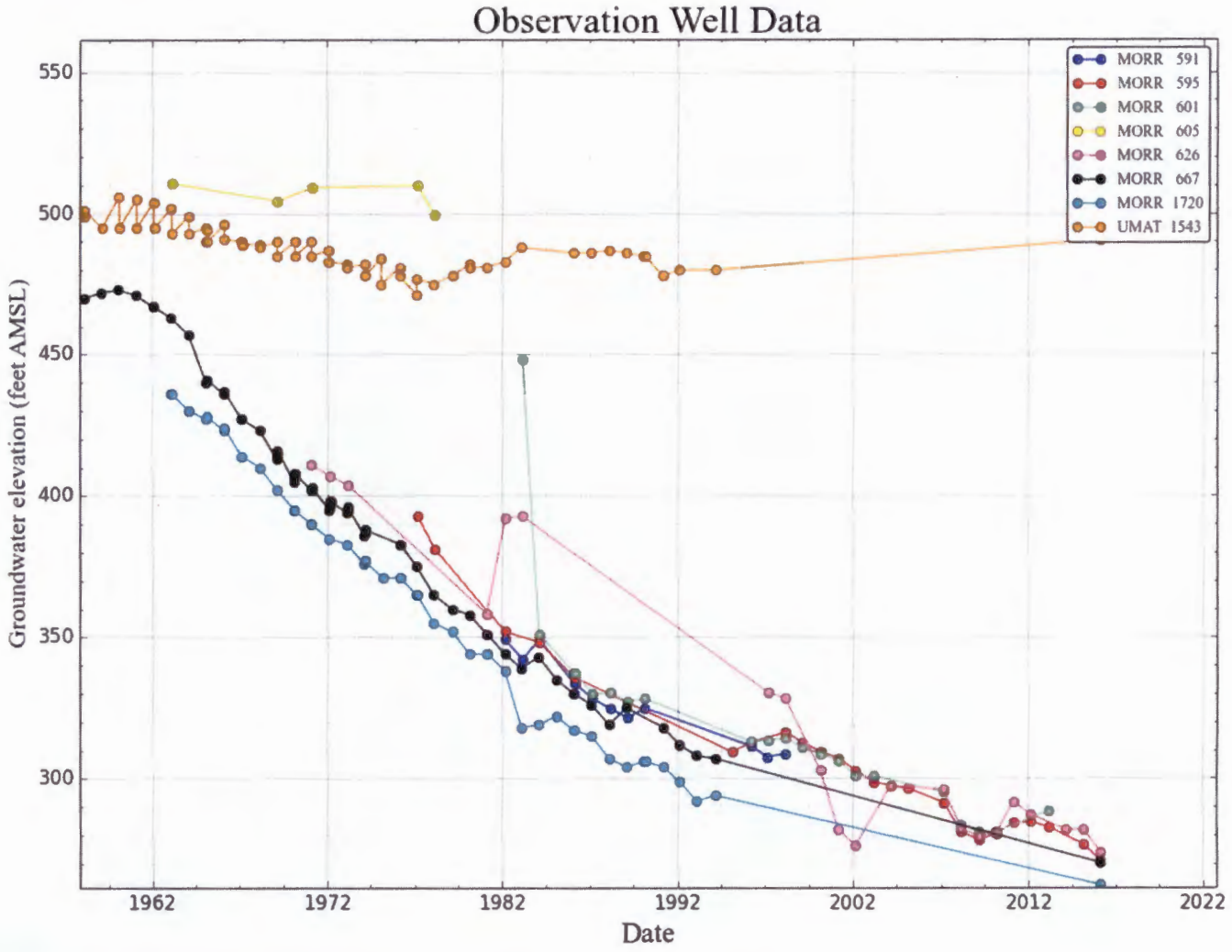



Figure 3. Water levels in wells in the Ordnance Basalt Critical Groundwater Area show two water bearing zones with distinct heads, and falling head with depth. See Figure 4 for well locations.

# T-12248 te Velde
## Location of wells in hydrograph (Figure 3)

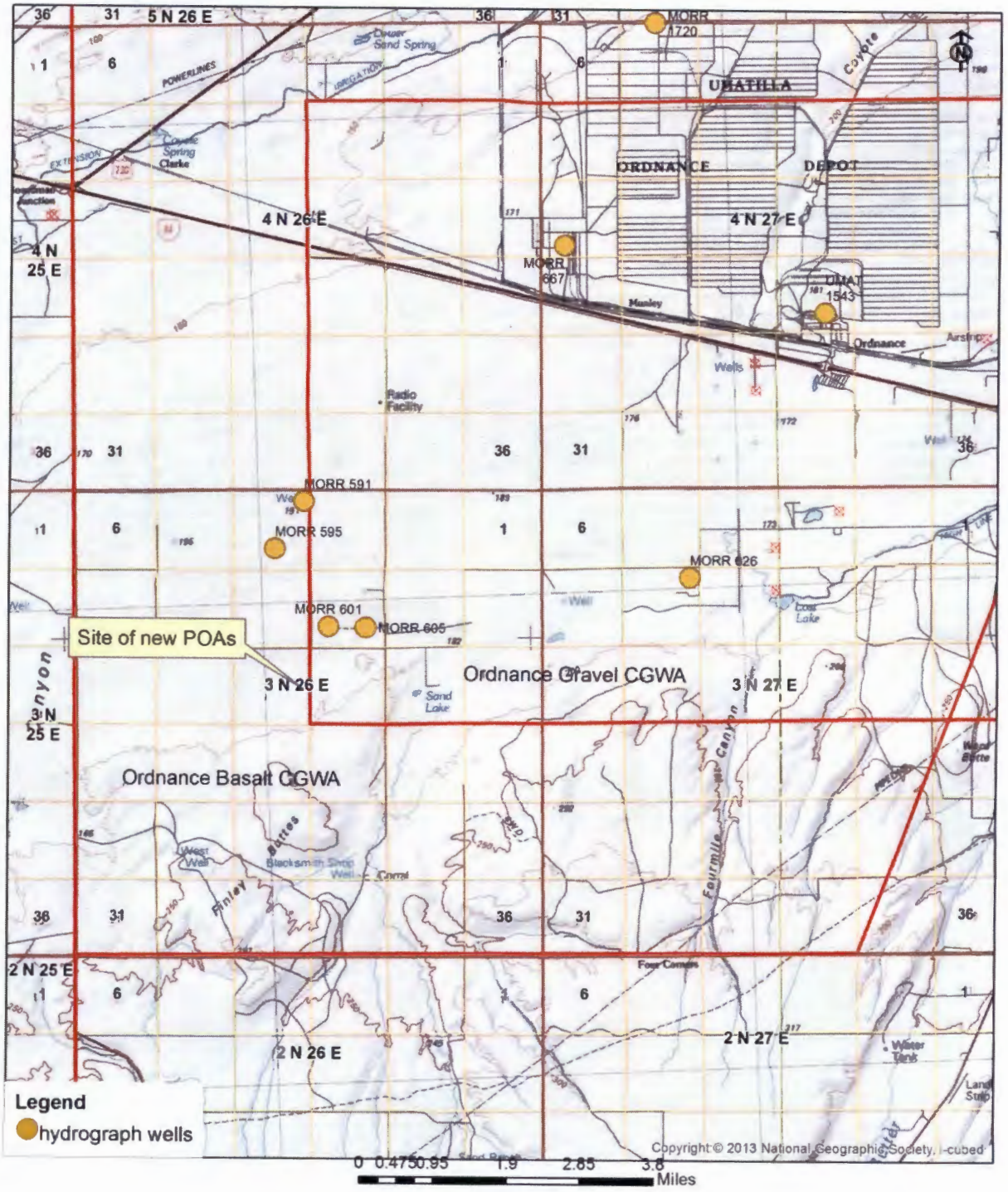



Figure 4. Location of wells with water level data depicted in Figure 3.