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west virginia department of environmental protection

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Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

20 November 2014

GreenHunter Water, LLC.  
Operator ID: 494506251  
28407 State Route 7  
Marietta, OH 45750

Re: Underground Injection Control Permit Application Notice of Deficiency Letter – 2D0855151

Dear Mr. Rick Zickefoose and Mr. Bryn Mueller:

Upon completion of the Technical Review of UIC Permit Application 2D0855151, the WVDEP Office of Oil and Gas has identified the following deficiencies in your September 29, 2014 permit application:

1. Section 4 - Applicant/Activity Request and Type:
  - a. Specify the commercial status of the proposed injection well permit application.
2. Section 6 – Construction:
  - a. Provide secondary containment volumetric calculations for all containment structures included at the proposed UIC facility. Each structure shall provide 110% of the largest tank's volume, while considering all necessary tank volume displacement.
  - b. Provide an additional and/or updated aerial schematic including API 47-085-05151 injection wellhead location and all piping associated with injection operations. Also, include the wellhead and injection facility surface elevation reported in feet AMSL.
  - c. Provide a description of all components included in the submitted aerial schematic of the proposed injection well facility. This is referencing components 13 through 20.
  - d. Provide complete well CBL/VDL including all header information and documentation of all well work performed to API well 47-085-05151 (all plug back and cement squeeze work).
3. Section 7 - Area of Review:
  - a. Provide an Area of Review assessment around the proposed injection well. All wells that are enveloped by the proposed AOR must be evaluated for their potential interaction with the proposed the injection operations. Provide an updated AOR map containing all wells within the AOR. For further guidance

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refer to Section 7 – Area of Review of the UIC Permit Application Package Class II & III.

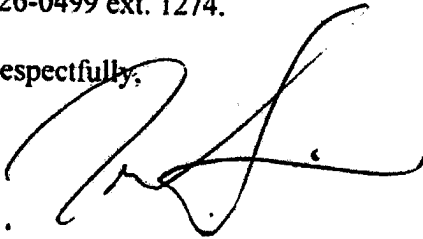
- b. After conducting a preliminary review of neighboring wells to the proposed injection well, 14 wells were located within a ¼ mile. The following wells require documentation that they either they do not penetrate in the Gordon Sandstone injection zone, have adequate cement casing through injection zone (100' above top of Gordon Ss), Affidavit of Plugging and Filling Well, and/or propose alternative corrective action:
- |                   |                    |
|-------------------|--------------------|
| i. 47-085-93373   | viii. 47-085-93369 |
| ii. 47-085-08448  | ix. 47-085-93374   |
| iii. 47-085-93371 | x. 47-085-93368    |
| iv. 47-085-05317  | xi. 47-085-07788   |
| v. 47-085-01412   | xii. 47-085-01413  |
| vi. 47-085-30990  | xiii. 47-085-05141 |
| vii. 47-085-30331 | xiv. 47-085-05460  |
- c. Provide an updated Appendix C – Wells within the Area of Review, containing all wells enveloped by the AOR radius propose by the applicant (described above).
- d. Include depths of all USDWs within the Area of Review. This shall include depths of water wells sampled, drill records from neighboring wells, and/or other USDW documentation. For further guidance, refer to Section 7 – Area of Review requirement 3 of the UIC Permit Application Package Class II & III
- e. Provide all appropriate analytical results documentation for the submitted water well samples. Provide laboratory analytical results datasheets, chain of custody, and QA/QC documents (trip blank samples) in accordance with 47 CSR 32.
4. Section 8 - Geological Data on the Injection and Confining Zone:
- a. Provide a fault and structural geological investigation covering an area that may be influenced by the proposed injection operations. This should include a local and regional (large & small scale) investigative maps and/or descriptions of all folds, faults, fractures and/or any other structurally significant features.
- b. Determine a confining layer(s)/strata(um) that will prevent upward migration of injection fluid from Gordon Sandstone injection zone. Provide a description of the confining zone including lithological names, thickness, and description of the confining properties as well as formation integrity. Also, provide a structure contour and isopach map of the proposed confining layer(s).
- c. Provide an injection fluid(s) and formation fluid compatibility assessment.
- d. Provide a groundwater use and dependence evaluation, at a minimum covering the AOR.
- e. Provide the injection well hydrostatic fluid level and/or static reservoir pressure.
5. Section 9 - Operating Requirements/Data:
- a. Provide a chemical analysis of the proposed injection fluid, testing the parameters outlined in Section 9 – Operating Requirements/Data requirement 3.
- b. Provide a description of all injection fluid additives. Your submitted application highlights the use of corrosion inhibitor and biocide additives, Section 9 – Operating Requirements/Data requirement 4.
- c. Provide the pressure differential maintained between all injection well annuli, addressing the 2 ¾" x 5 ½" & 5 ½" x 8 ¾" annuli. Also, include how well integrity failures are recognized (i.e. amount of pressure change) (requirement #5)

6. Section 10 - Monitoring :

- a. Provide an explanation on how injection operations will be adequately monitored, addressing all concerns highlighted in Section 10 - Monitoring requirement #1. This shall include how injection fluid volumes, pressures, and flow rates are adequately recorded to complete monthly WR-40 Report for Disposal Wells reports.

Satisfactory corrective response to the above named deficiencies is required to continue your consideration for a Class II Disposal UIC Permit. Please complete the requirements and submit to the Office of WVDEP - Oil and Gas within fifteen (15) days of receipt of this letter. If you require further clarification regarding this matter please contact Zachary Stevison or Thomas L. Bass at [Zachary.G.Stevison@wv.gov](mailto:Zachary.G.Stevison@wv.gov) (304) 926-0499 ext. 1646 or [Thomas.L.Bass@wv.gov](mailto:Thomas.L.Bass@wv.gov) (304) 926-0499 ext. 1274.

Respectfully,



Zachary G. Stevison  
Geologist