

Sensitive Area Determination Checklist

WPX Energy Rocky Mountain, LLC (WPX)		
Person(s) Conducting Field Inspection	Finn Whiting	08/06/2013
	Geologist	
Site Information		
Location:	GR 14-28	Time: 1300
Type of Facility:	Existing Well Pad Expansion	
Environmental Conditions	Sunny, partly cloudy, dry ground conditions, windy	
Temperature (°F)	83°	

Has the proposed, new or existing location been designated as a sensitive area?

☐ Yes ☒ No

SURFACE WATER

1. Are there any surface water features or SWSAs adjacent to or within ¼ mile of the proposed/new or existing facility?

☒ Yes ☐ No

If yes, list type of surface water feature(s), i.e. rivers, creeks, streams, seeps, springs, wetlands: Parachute Creek, a USGS identified perennial stream, Starkey Gulch a USGS identified intermittent drainage, one (1) USGS identified intermittent drainage, and one irrigation ditch.

If yes, describe location relative to facility: Parachute Creek is located 965 feet to the north, Starkey Gulch is located 469 feet to the west, and the unnamed USGS identified intermittent drainage is located 344 feet to the south southwest, and the irrigation ditch is located approximately 45 feet to the northeast of the existing facility.

2. Could a potential release from the facility reach surface water features?

☒ Yes ☐ No

If yes, describe the pathway a release from the facility would likely follow to determine if the potential to impact surface water is high or low. If a potential release were to migrate off the northeastern side of the facility flow would be directly towards and into the unnamed irrigation ditch

3. Is the potential to impact surface water from a facility release high or low?

☒ High to actual surface water features ☒ Low to actual flowing surface water

GROUNDWATER

1. Will the proposed/new or existing facility have any pits which will contain hydrocarbons and chlorides or other E&P wastes?
☐ Yes ☒ No: Fluids and cuttings will be managed on the surface
 If yes, List the pit type(s):

2. Is the site of the proposed facility underlain by an unconfined aquifer or recharge zone?
☒ Yes ☐ No

3. Is the hydraulic conductivity of the underlying soil or geologic material $\leq 1.0 \times 10^{-7}$ cm/sec?
☐ Yes ☒ No

4. Is the proposed facility located within 1/8 mile of a domestic water well or 1/4 mile of a public water supply well which would use the same aquifer?
☐ Yes ☒ No

5. Is the proposed facility located within a 100 year floodplain?
☐ Yes (*Sensitive Area*) ☒ No (*If no, proceed to question #6.*)

6. Is the depth to groundwater known?
☐ Yes (*If yes, follow instructions provided in 6(a) of this section.*)
☒ No (*If no, follow instructions provided in 6(b) of this section.*)
 - (a) If yes, could a potential release from the proposed facility reach groundwater?
☐ Yes ☐ No
 If yes, explain:

 - (b) If no:
 - (i) Evaluate surrounding soils, topography, and vegetation which may suggest the presence of shallow groundwater.
 - (ii) Gather information from surrounding well data in order to determine a depth to groundwater, i.e. State Engineers Office.

7. Is the potential to impact groundwater from the facility in the event of a release high or low?
☐ High ☒ Low

Additional Comments:

As stated in the surface water section of this sensitive area determination, there are four (4) surface water features within ¼ mile of the existing facility; Parachute Creek, Starkey Gulch, one (1) unnamed USGS identified intermittent drainage, and the irrigation ditch. The facility as it is currently proposed to be expanded, limits the direction of a potential release to the northeastern side. A potential release, if it were to migrate off the facility on the northeastern side, would flow to the northeast following the natural contours of the area directly towards and into the above noted irrigation ditch. During facility expansion, Best Management Practices (BMP'S) should be constructed in the form of an earthen perimeter berm along the graded edge of the fill slope sides. If feasible a diversion ditch should also be constructed along the toe of the fall slope sides as well to prevent any fluids from potentially impacting the irrigation ditch to the northeast. All BMP's should be monitored and maintained to ensure site containment in the event of a spill/release.

The State Engineer's Office and USGS records were reviewed and it was revealed that there is one (1) permitted monitoring well (permit number 278414) located 1,107 feet to the north of the existing facility. The well permit information notes a depth to groundwater of 25 feet. However, the well is in very close proximity to parachute Creek and at an elevation approximately 20 feet lower than that of the facility. Therefore the depth to groundwater in relation to the facility may be somewhat misleading. Further review of the State Engineer's office revealed that there are four (4) permitted monitoring wells just to the east of the Starkey compressor station which is located approximately 854 feet to the northwest of the existing facility. The elevation of the compressor station is approximately the same elevation as the existing facility. Depth to groundwater in these wells is noted to be 45-48 feet. With both facilities located at approximately the same elevation, it could be assumed that the depth to groundwater at the existing facility would be 45 feet or greater. With fluids and cuttings being managed on the surface, the potential to impact groundwater would be deemed to be low as there will be no long term storage of fluids or cuttings on the site.

Based on the information collected in the site investigation and desk top review, the greatest potential for impacts would be to the irrigation ditch located approximately 45 feet to the northeast of the existing facility. By COGCC decision the close proximity of the irrigation ditch would classify the facility as being in a sensitive area. However, as noted above, if a potential release were to migrate off the facility and impact the irrigation ditch, flow would be to the southeast to a point where the ditch enters a culvert and flows directly south between the facility and the Starkey Gulch production water storage facility. The culvert exits to the south of the Starkey production facility boundary. At this point, water flow from the ditch would migrate out into a large flat lying field. Water flow to the ditch can be controlled by a head gate located to the southwest of the facility. Therefore during drilling and completion operations, flow can be halted further reducing any potential impacts to actual flowing surface water. It is not anticipated that Parachute Creek or Starkey Gulch would be impacted by a potential release as fluids would

be contained to the irrigation ditch and flow would be to the south away from Starkey Gulch and parallel to Parachute Creek. Even if a release were to impact the flat lying field, it is not anticipated it would migrate any great distance due to the flat topography, the heavy vegetative cover, and the moderate to high infiltration rates associated with the Nihill channery loam. To further reduce the potential for impacts to the field, BMP's could also be installed at the inlet to the culvert which would contain a release to the portion of the irrigation ditch located to the northeast of the facility and prevent flow from entering the flat lying field to the south. The unnamed USGS identified drainage located 344 feet to the southwest of the facility would not be impacted by a potential release as it no longer exists due to man-made modifications to the land surface. Although the potential to impact actual surface water features would be deemed as high, the potential to impact actual flowing surface water would be deemed to be low. With the potential for impacts to both groundwater and actual flowing surface water being deemed as low, the facility can be designated as being in a non-sensitive area.

Inspector Signature(s):  Date: 3/13/2014

Mark E. Mumby, *Project Manager/RPG*
HRL Compliance Solutions, Inc.