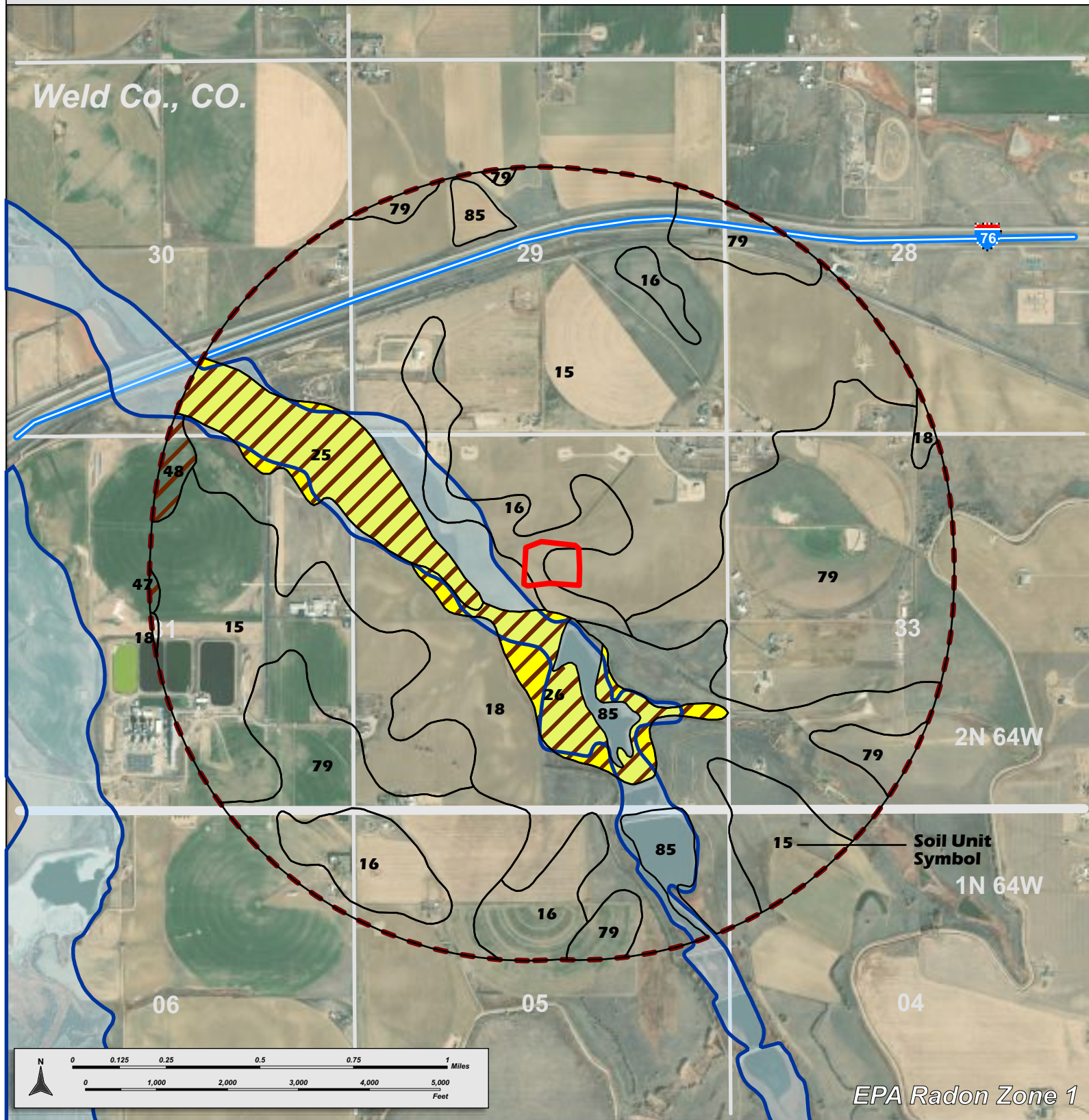


HARAMBE 2920 PAD GEOLOGIC HAZARD MAP



Geologic Hazards Summary for Harambe 2920

Location: S ½ S ½ Section 32, T2N-R64W 6th P.M.

Summary:

My name is Kurt Rucker, and I am currently employed as Senior Geologist for Verdad Resources LLC ("Verdad"). I certify that I am a Professional Geologist, satisfying the requirements of C.R.S. 23-41-208 (b). I certify that all information and assessments herein are complete, true, and correct, to the best of my knowledge and belief.

Based on this review of available geologic data comprised of experience, measurements, and published reports, I determine that hazards present within 1 mile of the proposed location are soil corrosion of concrete [1], soil corrosion of steel [1], 100-year flood plain [3], and Radon (NORM) [4]. Other examined, but absent hazards are landslides [1,2], expansive soils [1], NORM & TENORM [5], induced seismicity [6], natural rate seismicity [7], and coal mine subsidence [8]. A map summary of these findings is attached.

Corrosion to concrete is identified as a potential hazard near the proposed location. The concrete on location will serve as a combustor base. Considering the soil composition, and Verdad's facility design and management, I determine the soil corrosion to concrete hazard is insignificant.

Corrosion to Steel is identified as a potential hazard. No steel at the proposed location will be exposed to the soil because 1) all steel equipment on location will have impervious liners, and steel flowlines will have protective lining, and 2) imported gravel or roadbase will separate the natural soil from steel. Considering the primary soil on the location, and facility design and management, I determine the steel corrosion hazard from soil at the proposed location is insignificant.

The 100-year floodplain is near, but does not include the proposed location, an intentional result of our alternative location analysis. Additional protection results from anchored steel containment berms, and remote shut-in capabilities. Considering the flood plain area, and facility design and management, I determine flooding risk to be low.

Radon hazard is identified as a potential geo hazard on the map. However, there are no inhabited structures, or structures occupied throughout the working day, planned at the location. Considering the EPA radon zone, and the lack of inhabited structures, the radon hazard at the proposed location is determined insignificant

The matters described herein were devised under my direction and control. To the best of my knowledge and belief, all the matters set forth herein, my testimony and the supporting exhibits, are true, correct, and accurate.


Kurt Rucker

References:

- [1]Web Soil Survey. Natural Resources Conservation Service, 13 August 2021. United States Department of Agriculture. Web Soil Survey. Available online. Accessed [08/13/2021].
- [2]Colorado Landslide Inventory. Colorado Geologic Survey, 13 August 2021. <https://www.arcgis.com/apps/webappviewer/index.html?id=9dd73db7bc34139abe51599396e2648>
- [3]FEMA's National Flood Hazard Layer (NFHL) Viewer. Federal Emergency Management Agency Hazard and Risk Information Platform, November 11, 2021, <https://hazards-fema.maps.arcgis.com/apps/webappviewer/>
- [4]Environmental Protection Agency. (1993) EPA's Map of radon zones Colorado (Report No. EPA/402-R-93-026). U.S. Environmental Protection Agency. <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=000005WN.txt>.
- [5]Colorado Oil and Gas Conservation Commission. (2014). *Analysis of Naturally Occurring Radioactive Materials in Drill Cuttings, Greater Wattenberg Field, Weld County, Colorado* (COGCC Special Project 2136).
- [6]Petersen, M.D., Mueller, C.S., Moschetti, M.P., Hoover, S.M., Rukstales, K.S., McNamara, D.E., Williams, R.A., Shumway, A.M., Powers, P.M., Earle, P.S., Llenos, A.L., Michael, A.J., Rubinstein, J.L., Norbeck, J.H., and Cochran, E.S., 2018, 2018 One Year Seismic Hazard Forecast for the Central and Eastern United States from Induced and Natural Earthquakes: Seismological Research Letters, Volume 89, Number 3.
- [7]"Unified Hazard Tool". USGS, 13 August 2021, <https://earthquake.usgs.gov/hazards/interactive/>.
- [8]Colorado Historical Coal Mines. Colorado Geologic Survey, 25 August 2021. <https://www.arcgis.com/apps/webappviewer/index.html?id=1891e3149eda44af9dc8af81c4dc58a8>.



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Drawing Date: 11-01-21	Site Name: HARAMBE 2920
Drawn by: VG	Checked by: WKR
Surface Location: SEC 32, T 02-N, R 64-W Weld County, Colorado	Map area is within: EPA Radon Zone 1

Data Source:
Esri, Maxar, GeoEye, AeroGRID,
Earthstar Geographics,
CNES/Airbus DS, USDA, USGS,
IGN, GIS User Community

5280' Radius
from WPS

Working Pad
Surface

100 Year
Floodplain
Colorado

Corrosion of Concrete		Corrosion of Steel	
Soil Unit Symbol #	Soil Rating	Soil Unit Symbol #	Soil Rating
25, 26	Moderate	25, 26, 47, 48	High

All other soil unit numbers low or not rated