

TEP Rocky Mountain LLC

Stephen Sunnenberg

I certify that I am a Professional Geologist, having met the educational requirements and professional work experience required by C.R.S. § 23-41-208(b). I have reviewed information pertaining to this Oil and Gas Location and the surrounding area and have identified no Geologic Hazards within a 1 mile radius.”

Terra Energy Partners (TEP) has employed the services of Fox Engineering Solutions (FES) to provide a third-party evaluation of Geologic Hazards associated with our proposed WMC 24-17 pad. I have reviewed the attached documents and references prepared by FES and found them to be complete and accurate.

The COGCC references the Colorado Revised Statute (C.R.S.) § 24-65.1-103(8) definition of Geologic Hazard. C.R.S. 24-65.1-103(8) states: “Geologic Hazard” means a geologic phenomenon which is so adverse to past, current, or foreseeable construction or land use as to constitute a significant hazard to public health and safety or to property. The term includes but is not limited to:

- a) Avalanches: The Pad site has a Low avalanche probability. (GARCO)
- b) Landslides: Landslides are not a geologic hazard at this site. (GARCO & CGS)
- c) Rockfalls: Rockfall is not a geologic hazard at this site. (GARCO)
- d) Mudflows: Mudflow and debris fans are not a geologic hazard at this site. (GARCO)
- e) Unstable or potentially unstable slopes: Unstable slopes are not a geologic hazard at this site. (NCRS)
- f) Seismic effects: Seismic activity is not expected to impact the design or operations of the Pad. (CGS)
- g) Radioactivity: Radon is not expected to represent a geologic hazard at this pad.
- h) Ground subsidence: Ground subsidence is not a geologic hazard at this site. (NCRS)

Rule 304.b.(7).I Geologic Hazard Map: A map identifying any Geologic Hazards within a 1 mile radius of the proposed Working Pad Surface. For any identified Geologic Hazard that extends beyond the 1 mile radius, a second map scaled to show the extent of that Hazard in relation to the proposed Oil and Gas Location.

- TEP has prepared two maps showing the pad site in relation to all Geologic hazards within a 1 mile radius.
 - Exhibit GH-1 shows a 1-mile radius around the proposed working pad surface.
 - Exhibit GH-2 shows the extent of the CGS landslide area North of the working pad surface.
 - The landslide area located North and downhill of the proposed WMC 24-17 pad has been inactive since the last glacial period. (Yeend, 1969)

Rule 304.c.(21) Geologic Hazard Plan: If the Operator identifies any Geologic Hazards pursuant to Rule 304.b.(7).I, the Operator will submit a Geologic Hazard plan describing proposed mitigation measures.

- Neither FES nor TEP found any risk of “Geologic Hazard(s)”



Stephen Sunnenberg
Geologist

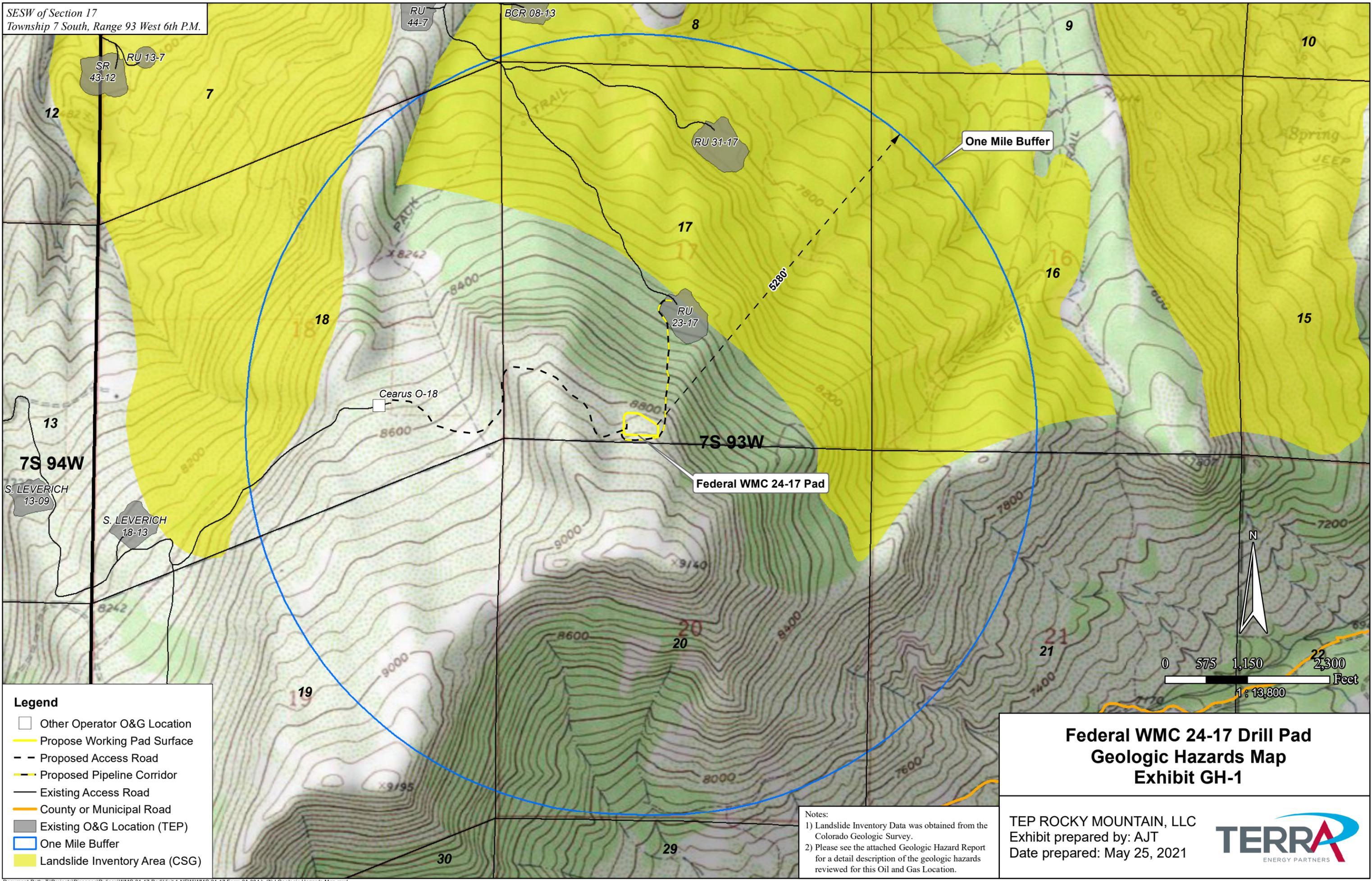
References:

GARCO: JEO Consulting Group Inc, Wright Water Engineers Inc., and Garfield County, Colorado. (August 2017), Garfield County Hazard Mitigation Plan <https://s3.amazonaws.com/online.pubhtml5.com/lcrb/zxbu/index.html>

NCRS: National Resources Conservation Service (2021). Web Soil Survey <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

CGS: Colorado Geological Survey, (2021) Hazards. <https://coloradogeologicalsurvey.org/hazards/>

Yeend, W.E., 1969, Quaternary Geology of the Grand and Battlement Mesas Area, Colorado: Geological Survey Professional Paper 617



Legend

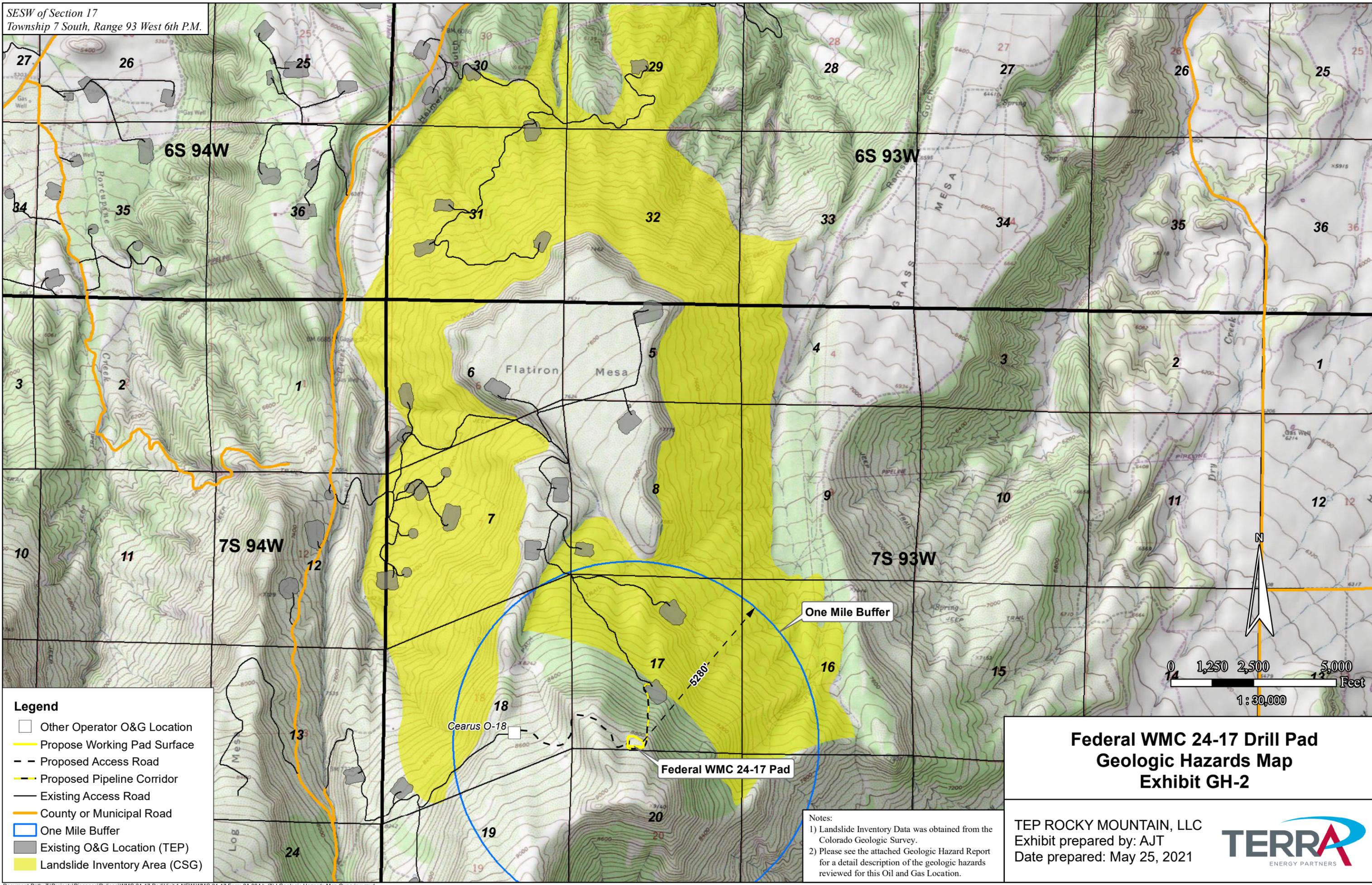
- Other Operator O&G Location
- Propose Working Pad Surface
- Proposed Access Road
- Proposed Pipeline Corridor
- Existing Access Road
- County or Municipal Road
- Existing O&G Location (TEP)
- One Mile Buffer
- Landslide Inventory Area (CSG)

Notes:
 1) Landslide Inventory Data was obtained from the Colorado Geologic Survey.
 2) Please see the attached Geologic Hazard Report for a detail description of the geologic hazards reviewed for this Oil and Gas Location.

**Federal WMC 24-17 Drill Pad
Geologic Hazards Map
Exhibit GH-1**

TEP ROCKY MOUNTAIN, LLC
 Exhibit prepared by: AJT
 Date prepared: May 25, 2021





- Legend**
- Other Operator O&G Location
 - Propose Working Pad Surface
 - - Proposed Access Road
 - Proposed Pipeline Corridor
 - Existing Access Road
 - County or Municipal Road
 - One Mile Buffer
 - Existing O&G Location (TEP)
 - Landslide Inventory Area (CSG)

Notes:
 1) Landslide Inventory Data was obtained from the Colorado Geologic Survey.
 2) Please see the attached Geologic Hazard Report for a detail description of the geologic hazards reviewed for this Oil and Gas Location.

**Federal WMC 24-17 Drill Pad
 Geologic Hazards Map
 Exhibit GH-2**

TEP ROCKY MOUNTAIN, LLC
 Exhibit prepared by: AJT
 Date prepared: May 25, 2021



STEPHEN J. SUNNENBERG

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PETROLEUM GEOLOGIST

Fifteen years of industry experience including; well-site applications, operations, development and exploration.

PROFESSIONAL EXPERIENCE

TERRA ENERGY PARTNERS

2016-Present

Petroleum Geologist

- Part of a multidisciplinary team responsible for creating opportunity for growth by evaluating resources of current position and acquisitions.
- Actively involved in planning, drilling, logging, petrophysical analysis, and production performance.
- Responsible for management, upkeep, and quality control of all geologic databases.

CAERUS OIL AND GAS

2013-2016

Petroleum Geologist

- Actively involved in planning, drilling, logging, petrophysical analysis and production performance.
- Supported operations in the Anadarko, Piceance and DJ Basins.

BILL BARRETT CORPORATION

2007-2013

Operations Geologist

- Actively involved in planning, drilling and logging.
- Supported operations in the Piceance and DJ Basins.

CHIEF WELL LOGGING

2006-2007

Well-site Geologist

- Responsible for monitoring daily drilling, collecting cuttings, evaluating samples and shows, recording logs, and preparing reports.

EDUCATION

B.S., Geology, <i>Kansas State University</i> , Manhattan, KS	2005
Kansas State University Geology Honors Society, <i>Sigma Gamma Epsilon</i>	2005
Advanced Petroleum Geology Course, School of Mines, Golden, CO	2010
Stratigraphy and Hydrocarbon Systems of the Sappington (Bakken/Exshaw) and Three Forks Formations, CSPG, Bozeman, MT	2012
Basic Well Log Analysis, AAPG, School of Mines, Golden, CO	2014
Kingdom Seismic Interpretation, IHS, Houston, TX	2014
Six Sigma White Belt Certification, Aveda Business Institute	2014
Structural and Stratigraphic Concepts Applied to Basin Exploration, GSA, Denver, CO	2016



Fox Engineering Solutions, Inc.

March 12, 2021
(Revised June 14, 2021)

Stephen Sunnenberg
Chief Geologist
TEP Rocky Mountain LLC
3050 Post Oak Blvd., #1500
Houston, TX 77056

Re: WMC 24-17 Well Pad
Geologic Hazards – COGCC 304.b.(7).I. and 304.c.(21)
SE ¼ SW ¼ Section 17, Township 7 South, Range 93 West, 6th P.M, Garfield County, CO

Mr. Sunnenberg,

As requested, Fox Engineering Solutions (“FES”) has prepared this report to address the requirements of Sections 304.b.(7).I. and 304.c.(21), of the Colorado Oil and Gas Conservation Commissions rules, effective January 15, 2021. It is FES’s understanding that TEP Rocky Mountain is proposing to construct the WMC 24-17 well pad to drill oil and gas wells and for the placement of production equipment.

COGCC Rule 304.b.(7).I. requires the Operator to submit a map identifying any geologic hazards within a 1 mile radius of the proposed working pad surface. For any identified geologic hazard that extends beyond the 1 mile radius, a second map scaled to show the extent of that hazard in relation to the proposed oil and gas location shall be submitted. If the Operator identifies any Geologic Hazards pursuant to Rule 304.b.(7).I, the Operator will submit a Geologic Hazard plan per Rule 304.c.(21) describing proposed mitigation measures.

This report summarizes FES’s investigation into potential geologic hazards associated with the WMC 24-17 proposed well pad. The purpose of the study was to review available geologic maps and reports, Colorado Geologic Survey mapping, Garfield County’s 2017 Multi-Jurisdictional Hazard Mitigation Plan, and data from a National Resource Conservation Service’s (“NRCS”) Customized Soil report.

Location and Topography

The WMC 24-17 Pad (“Pad”) will be located on a wide ridge at an elevation of 8869 ft. MSL in the SE ¼ SW ¼ of Section 17, T7S, R93W of the 6th P.M. in Garfield County, Colorado. The site sits between the Grand Mesa, 4 miles to the south, and the Colorado River, approximately 5.4 mile to the north. The Grand Mesa rises to the south to an elevation of 10,400 feet while the Colorado River to the north is at an approximate elevation of 5280 ft.

The Pad is located in a grass, sage and oak brush upland area with a downhill slope gradient to the north of about 17%. Upland or above the site, the natural grade, averaging 17%, continues south for approximately 0.3 miles before dropping into the West Mamm Creek drainage. No natural drainages are located within the facility boundary. Localized drainage is provided by sheet flow across native vegetation.

Geology

The USGS Geologic map of the North Mamm Peak Quadrangle, by John Donnell, et al, 1989, indicates that the WMC 24-17 pad is generally situated on Pediment-gravel deposits consisting of poorly sorted sub-angular to sub-rounded pebble, cobble and boulder gravels. These gravels were deposited during the Pleistocene and are derived from siltstone, claystone and marlstone from the Wasatch, Green River and Uinta formations. Mapping indicates a maximum thickness of 300 feet. (91 m).

Underlying the Pediment gravels is the Eocene Anvil Points Member consisting of massive fine to coarse grained sandstone that forms conspicuous ledges. The Member also consists of minor amounts of light gray siltstone and marlstone and a few thin oil shale beds. Maximum thickness is reported to be approximately 1000 feet.

The Colorado Geological Survey's "Surficial – Geologic Map of Parts of North Mamm Peak, Rifle and Rulison Quadrangles, Garfield County, Colorado" (Stover 1993) characterize the site vicinity as Pliocene-age debris-flow and colluvial deposits. Although the Pad is not within a landslide area, lands within a one mile radius of the Pad are identified by the Colorado Geological Survey as landslide deposits presently inactive. See Figure 1.

The adjacent landslide deposits are mapped on the USGS geologic map of the North Mamm Peak Quadrangle. Donnell describes these areas as Holocene earthflow and soil creep deposits comprised of poorly sorted boulder, cobble and pebble gravel in a matrix of greenish-gray sandy silt restricted to areas underlain by claystone units in the Wasatch Formation. "Quaternary Geology of the Grand and Battlement Mesa Area, Colorado", Geological Survey Professional Paper 617 (Yeend, 1969), confirms Donnell's claystone assessment and reports that that earth movements - earthflow and soil creep (landslides), are almost exclusively restricted to areas underlain by claystone-enriched members of the Wasatch Formation. Yeend states that earth movement of slopes underlain by weak Wasatch claystone has ceased except for local occurrences of very recent slumps and mudflows. Yeend concluded that most of the earth movement probably occurred when the climate was wetter than the present time creating pore-water pressures within the shale and clay that decreased the internal shear resistance of the bedrock.

Soils

The NRCS classifies the soil within the WMC 24-17 pad as Bucklon-Inchau complex. The Bucklon is described as colluvium over residuum weathered sandstone and shale with a depth of 10 – 20 inches to paralithic bedrock. The Bucklon has a low available water capacity of about 3.1 inches and a low to moderately high infiltration rate range of 0 to 0.28 inches per hour. The Bucklon is classified as hydrologic soil Group D - having a low infiltration rate when thoroughly wet. The typical 5 foot soil profile is 0 to 10 inches: loam; 10 – 17 inches: clay loam; 17 to 59 inches: bedrock.

The Inchau is also described as colluvium over residuum weathered sandstone and shale with a depth of 20 – 40 inches to paralithic bedrock. The Inchau has a low available water capacity of about 5.6 inches and a low to moderately high infiltration rate range of 0 to 0.28 inches per hour. The Inchau is classified as hydrologic soil Group C - having moderate infiltration rate when thoroughly wet. The typical 5 foot soil profile is 0 to 3 inches: loam; 3 – 18 inches: clay loam; 18 to 36 inches: gravelly clay loam; 36 – 59 inches: bedrock.

Geologic Hazards

Colorado Revised Statute (C.R.S.) 24-65.1-103(8) defines a Geologic Hazard as a “geologic phenomenon which is so adverse to past, current, or foreseeable construction or land use as to constitute a significant hazard to public health, safety, or to property.” Additionally, the Colorado State legislature in 1974 passed House Bill 1041 defining geologic hazards that, if present, may pose a threat to life or property. For the purposes of this report, geologic hazards, as outlined in House Bill 1041, are discussed below.

1. Radioactivity: Radon is a naturally occurring, odorless and colorless radioactive gas that is produced by the radioactive decay of radioactive minerals present in the soils and bedrock. Although no radiological or radon testing was conducted, other than the initial drilling activities, the Pad does not have buildings or areas that will be occupied throughout the work day. The potential presence of radon is not expected to represent a geologic hazard or a significant worker exposure issue that would affect the design or operations of the Pad.

2. Seismic Considerations: According to the Colorado Geological Survey, there have been 88 earthquakes in or near Garfield County between 1973 – 2017. There were no reported damages or injuries associated with these minor earthquake events. Earthquakes usually occur near fault lines. Colorado Geological Survey and Ogden Tweto’s geologic mapping indicates that there are no faults with the vicinity of the Pad. Seismic activity is not expected to impact the design or operations of the Pad.

3. Ground Subsidence: Ground subsidence is the sinking of land over human caused or natural underground voids and the settlement of native low density soils. As noted in the NRCS soils report, paralithic bedrock is located 10 to 40 inches below the surface at the Pad. No mining claims or public record of mining are associated with the Pad. The Colorado Geological Survey’s Collapsible Soils mapping indicates that the Pad is not within a collapsible soils hazard area. Ground subsidence is not a geologic hazard at this site.

4. Landslides: Figure 23 of Garfield County Multi-Jurisdictional Hazard Mitigation Plan, entitled “Landslide, Debris Flow & Rockfall” indicates that the Pad site is not within a landslide area. Landslide Inventory Mapping by the Colorado Geological Survey confirms that the Pad is not located in a potential landslide area. As shown in Figure 1, landslide potential exists in within a one mile radius of the Pad site. Yeend states that earth movement of slopes underlain by weak Wasatch clystone has ceased except for local occurrences of very recent slumps and mudflows. Yeend concluded that most of the earth movement probably occurred when the climate was wetter than the present time. Landslides are not a geologic hazard at this site.

5. Avalanche: Based on Garfield County Multi-Jurisdictional Hazard Mitigation Plan, steeply sloped areas (30 to 45 degrees) are highly subject to avalanches primarily on south exposed slopes where unstable snow conditions are likely to occur. Figure 31 of the Plan entitled “Avalanche Forecast” indicates the Pad site has a Low avalanche probability.

Additionally, the Pad is located in a grass, sage and oak brush upland area with a downhill slope gradient to the north of about 17%. Upland or above the site, the natural grade, averaging 17%, continues south for approximately 0.3 miles before dropping into the West Mamm Creek drainage. Based on site and upland slope conditions, avalanches are not a geologic hazard at this site.

6. Rockfall: Figure 23 of Garfield County Multi-Jurisdictional Hazard Mitigation Plan, entitled "Landslide, Debris Flow & Rockfall" indicates that the Pad site is not within a rockfall area. There are no rock outcroppings adjacent to or upland of the Pad site. Rockfall is not a geologic hazard at this site.

7. Flood: The Pad is located in an upland area with no natural drainages within the Pad boundary. Localized drainage is provided by sheet flow across native vegetation. The NRCS reports that the Flood Frequency for the facility location is "None", meaning that the chance of flooding is nearly 0% in any year. The site may be subject to sheet flow from precipitation events, however, storm water control measures are in place to mitigate or prevent storm water from entering the facility and disrupting operations. Flooding is not a geologic hazard at this site.

8. Mudflow and Debris Fans: Figure 23 of Garfield County Multi-Jurisdictional Hazard Mitigation Plan, entitled "Landslide, Debris Flow & Rockfall" indicates that the Pad site is not within a mudflow or debris fan area. No natural drainages are located within the facility boundary. The NRCS reports that the Flood Frequency for the facility location is "None" for the site. Mudflow and debris fans are not a geologic hazard at this site.

9. Expansive Soil and Rock: The NRCS reports the surface soil at the facility, as classified under the Uniform Soils Classification System, is CL – inorganic clays of low plasticity. The proposed uses, design and operations at the Pad are not impacted by expansive soils or rock.

10. Unstable Slopes: As noted in the NRCS soils report, paralithic bedrock is located 10 to 40 inches below the surface at the Pad. The facility is constructed on an upland site with natural side slopes of 10 to 25%. There are no severe slopes within the Pad site. Unstable slopes are not a geologic hazard at this site.

Additional Soil Considerations

NRCS reports that the risk of concrete corrosion is low for the Pad site. Corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Concrete structures or foundations are not planned within the Pad Site.

NRCS reports that the risk of steel corrosion is low for the Pad site. Corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Production equipment will be placed on gravel foundations with cathodic protection implemented on an as-needed basis.

NRCS reports that the Erosion factor K (whole soil) is 0.28 for the Pad site. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from

0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Stormwater BMPs will be implemented to control soil erosion.

NRCS mapping indicates that none of the soils within the footprint of the WMC 24-17 pad are hydric. Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. The proposed development is not impacted by hydric soils.

Conclusion

Based on FES's preliminary review of published geologic data, information obtained from the Colorado Geological Survey and Garfield County, along with NRCS soils data, it is FES's opinion that there are no known geologic hazards within the proposed site of the WMC 24-17 Pad.

Limitations

This report is intended for preliminary evaluation purposes only for geologic hazards, as contained in this report, in the project vicinity.

Respectfully submitted,



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Figure 1

