

# E&P Waste Remediation Plan

Location	
Well Name	Grizzly 03-32H (05-057-06523-00)
Facility ID	436006 (COGCC)
Location	nenw S32 T8N R80W, Jackson County, Colorado
Depth to ground water	~400 ft
Distance to surface water	300 ft to the east
Date notice provided to surface owner	05/17/15

Design Features
Berms around the location shall be sufficient to prevent stormwater run-on and run-off.
Berms shall be maintained at all times.
Precautions shall be implemented to prevent infiltration of potential contaminants in the subsurface soil and shallow ground water.
Berms preventing any communication between treatment area and surrounding location.

Operation / material handling
Drill cuttings are centrifuged out of the drilling mud during the drilling operation
Cuttings are mixed via a hopper with bioremediation medium (Eco Sponge), up to 10%.
Cuttings are moved to a containment area on location which is bermed on three sides
Material shall be turned and nutrients added during summer months (May thru Oct), based on analytical results and visual inspections.
If additional remediation is required a sundry notice to COGCC will be submitted.
Fluid accumulation shall be removed from material upon detection
Locations will be fenced
No additional waste shall be added to the material
When cuttings meet 910 specifications, they will be either used as base material on the wellsite or they will be bermed to create a visual barrier

Timing (first 3 years)
Material will not be mixed during wildlife stipulations (mm/dd/yy to mm/dd/yy)
Winter months are considered November thru March, Summer months are everything else.
Material will be mixed during summer months or whenever the material is not frozen

Final Reclamation
Will adhere to COGCC regulations regarding remediation

# E&P Waste Remediation Plan - Results

Grizzly 03-32H  
Jackson County, Colorado

## Drill Cuttings Remediation

Sample Date	ID	Loc	Analysis Attached	TPH (C <sub>6</sub> -C <sub>10</sub> ) 500 (mg/kg)	TPH (C <sub>10</sub> -C <sub>28</sub> ) 500 (mg/kg)	TPH Total 500 (mg/kg)	Conductivity <4 or 2x bg mmhos	Sodium Adsorption Ratio (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2] <12 <sup>5</sup> ratio	Notes
11/01/2014									Perimeter berm constructed just prior to winter weather.
03/15/2015									Final berm construction to contain materials before spring thaw.
04/23/2015	D70069	Cuttings	X						Cuttings were turned and bioremediation medium was added
05/06/2015	D70561	Cuttings	X	530	6,780	7,310	1.51	11.00	Cuttings were turned and bioremediation medium was added
05/18/2015	D70875	Cuttings	X	54	3,070	3,124	1.15	6.39	Visual blockage perm was compacted and surface readied for planting
05/27/2015	D71214	Cuttings	X	15		15	1.23	6.44	Cuttings were turned and bioremediation medium was added <b>(PASS)</b>
06/01/2015		Cuttings							Visual blockage berm increased in height with clean fill dirt.

## E&P Waste Remediation (Pile)

Sample Date	ID	Loc	Analysis Attached	TPH (C <sub>6</sub> -C <sub>10</sub> ) 500 (mg/kg)	TPH (C <sub>10</sub> -C <sub>28</sub> ) 500 (mg/kg)	TPH Total 500 (mg/kg)	Conductivity <4 or 2x bg mmhos	Sodium Adsorption Ratio (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2] <12 <sup>5</sup> ratio	Notes
04/23/2015	D70070	Pile	X	29.7	3,650	3,680	1.00	10.50	Pile was turned and bioremediation medium was added
05/06/2015	D70561	Pile	X	54.4	5,740	5,794	1.26	5.21	Cuttings were turned and bioremediation medium was added
05/06/2015	D70561	Pile	X	71.1	6,120	6,191	1.12	4.32	
05/18/2015	D70875	Pile	X	74.0	4,130	4,204	1.18	4.94	Fiber blending & bioremediation medium was added
05/18/2015	D70875	Pile	X						