

January 12, 2023

Colorado Springs Utilities
 1521 Hancock Expressway
 Colorado Springs, Colorado 80903

Attn: Mr. Brad Pritekel

RE: Coal Combustion Residual (CCR) Landfill Annual (2022) Inspection
 Clear Spring Ranch
 Fountain, Colorado
 Terracon Project No. 23155030

Dear Mr. Pritekel:

Terracon Consultants, Inc. (Terracon) is pleased to present this report of the Coal Combustion Residual (CCR) Landfill Annual (2022) Inspection services provided for the Clear Spring Ranch CCR landfill. Our services were provided in general accordance with Colorado Springs Utilities (UTILITIES) Work Order 3920769 received on November 2, 2022.

1.0 Project Information

1.1 Site Location

Item	Description
Location	The CCR Landfill at Clear Spring Ranch in Fountain, Colorado
Existing Improvements	An existing and active landfill containing non-volatile fly ash, bottom ash, waste salt / fly ash mixture, spent sandblasting media, flue gas desulfurization waste, sediment from the Martin Drake Power Plant’s Storm Water Ponds, and ash derived from the co-combustion of biosolids, woody biomass, or other related solid fuels. The total capacity of the 75-acre landfill is 5,220,600 cubic yards (CY). As of December 08, 2022, there is a net volume of 3,824,00 CY contained within the Landfill. This includes an estimated 555,000 cubic yards of bottom ash and about 3,269,00 cubic yards of fly ash currently in the landfill.
Import/Export Activity for 2022 (Provided by UTILITIES)	Fly Ash and Bottom Ash in 2022: <ul style="list-style-type: none"> ▪ Nixon Fly Ash: 16,889 tons ▪ Nixon Bottom Ash: 4,203 tons ▪ Bottom Ash Removed from Landfill: 6,153 tons

Item	Description
Existing Topography	The active landfill has a relatively flat top with side slopes of about 3H:1V (Horizontal:Vertical) or flatter.

1.2 Background

The Clear Spring Ranch CCR Landfill is subject to the Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities rule published by the Environmental Protection Agency in the Code of Federal Regulations - 40 CFR Parts 257 and 261, dated April 17, 2015.

In accordance with these regulations, UTILITIES must inspect the CCR landfill in accordance with the following requirements:

257.84 (b) Annual inspections by a qualified professional engineer.

(1) Existing and new CCR landfills and any lateral expansion of a CCR landfill must be inspected on a periodic basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum, include:

- (i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspections by a qualified person, and results of previous annual inspections); and*
- (ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.*

(2) Inspection report. The qualified professional engineer must prepare a report following each inspection that addresses the following:

- (i) Any changes in geometry of the structure since the previous annual inspection;*
- (ii) The approximate volume of CCR contained in the unit at the time of the inspection;*
- (iii) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and*

The source of materials approved for placement in the CCR landfill include:

- Non-volatile fly ash, bottom ash, waste salt / fly ash mixture, spent sandblasting media, flue gas desulfurization (scrubber) waste, sediment from the Martin Drake Power Plant’s Storm Water and Process Water Ponds, and ash derived from the co-combustion of biosolids, woody biomass, or other related solids fuels

We understand that the disposal of these materials at the CCR landfill are currently approved by El Paso County and the Colorado Department of Public Health and Environment (CDPHE).

2.0 Scope of Services

The following sections provide an overview of the work scope performed by Terracon.

2.1 Annual Inspection

Terracon's previous annual inspections of the CCR landfill included a review of available information regarding the status and condition of the CCR landfill and files provided by UTILITIES including results of previous inspections, land surveys, and CCR production and sales. Although not specifically required in Section 257.84b, previous geotechnical studies of the CCR landfill, performed by others, included subsurface explorations, laboratory testing, and slope stability analyses.

For our 2022 annual inspection, we performed our services in accordance with Section 257.84b and included the following activities:

- Visual observations of the CCR unit by a professional geotechnical engineer to identify signs of distress or malfunction of the CCR unit
- Observations of existing or potential structural weakness associated with the slope stability or erosion of the CCR unit in addition to existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit
- Noted changes in geometry of the CCR structure since the 2021 annual inspection
- Estimate the approximate volume of CCR at the time of the inspection based on surface information provided by UTILITIES, delivery quantities and sales.
- Review the CSR CCR Landfill weekly inspection Checklists dated between January 5, 2022 and December 28, 2022

3.0 CCR Landfill Inspection Results

The results of our 2022 annual inspection are discussed below. Selected photographs taken during the inspection and follow up inspection are included on the attached photograph log. Our services included a desktop review of the 2022 Volumetric Survey provided by UTILITIES, as well as site observations.

3.1 2022 Annual Observation of the CCR Landfill Structure Geometry

Historical Information

The CCR landfill has been active since the late 1970's and is currently being used for disposal of relatively dry ash. We were provided with the design drawing, "East Expansion of Ash Landfill", dated March 29, 2008 that indicates the intended final

geometry of the landfill (height and slope gradients). The acceptable slope gradients of 3H:1V are also based on the stability analyses presented in the November 17, 2009, Ash Landfill Slope Stability Investigation for the Clear Spring Ranch Facility, prepared by Kleinfelder.

Based on the Ash Landfill 2022 Volumetric Survey, dated December 8, 2022, the landfill varies from about 30 feet above the surrounding ground surface within the Bottom Ash area to the west and about 50 to 70 feet high at the eastern terminus. The lowest elevation at the toe of the landfill slope appears to be at the southeast corner at El. 5446. The highest elevation at the crest of the landfill also appears to be at the southeast corner of the landfill at El. 5526. The side slopes are generally at a gradient of about 3H:1V.

Site Observations

Terracon visited the site on September 28, 2022 for our annual observations of the CCR landfill surface features. The purpose of our visits included observations for erosion control measures for slopes and the perimeter road, isolated or surficial slope instability, proper soil cap thicknesses and competency, as well as understanding landfill earthwork and grading activities.

The current majority of the top of the landfill was relatively flat and sloped gently down gradient to the west (300 H:1V). The surface reportedly consisted of an approximate 1-foot thick interim cover. The landfill has the capacity to increase approximately 13 feet in height. The far southeast corner of the landfill is the only area approaching the final waste grade. Overall, the landfill ground surface was covered with a sparse to moderate amount of native vegetation.

The side slopes of the landfill also had an approximate 1-foot thick soil cap. Most of the perimeter sloped surfaces were sparse to moderately vegetated with dried-out, 6-inch to 3-foot high vegetation.

During our initial site visit, we observed a significant amount of erosion rills and gullies along a portion of the southern slope. Most of the erosion features were about 6 to 10 inches deep. The areas of erosion rills were located at the south facing slope surface in the southeast area of the fly ash portion of the landfill (see Photo Nos. 5 to 20 in the attached photography log).

We also observed significant build-up of material behind the primary containment berms at the base of the north and south slopes. In general, berms in these areas had 12 inches or more of material behind them.

Both the erosion rills and containment berms noted above were subsequently repaired, see Section 3.5 for details.

3.2 Approximate Volume of the CCR

Based on the provided Volumetric Surveys, the provided annual Net Volumes of the Ash Landfill are:

- 2013: 3,535,900 cubic yards
- 2014: 3,539,100 cubic yards
- 2015: 3,563,000 cubic yards
- 2016: 3,578,600 cubic yards
- 2017: 3,679,600 cubic yards
- 2018: 3,690,200 cubic yards
- 2019: 3,769,700 cubic yards
- 2020: 3,737,000 cubic yards
- 2021: 3,802,500 cubic yards
- 2022: 3,824,000 cubic yards

3.3 Observations of Existing or Potential Structural Weakness

Visual evidence of apparent existing and potential structural weaknesses was not observed.

3.4 Slope Stability Analysis

Slope stability analyses was beyond the scope of our services. Kleinfelder performed slope stability analyses as part of a November 17, 2009 study. The lowest presented slope stability analyses was 2.6. The January 29, 2009 State of Colorado letter indicated the slope stability analysis was acceptable. Furthermore, the State of Colorado letter indicated "in its present condition as well as proposed final configuration, the ash landfill is at a low risk to be impacted by slope stability issues." No apparent signs of global slope instability were observed during our site visit.

3.5 Recommendations

Based on our September 26, 2022 observations, we recommended to UTILITIES representatives the following mitigation of slopes and berms.

- Four areas along south facing slope and east facing slope at the southeast corner developed localized areas with rills extending up to 10 inches through the 12-inch soil cap. These areas should be regraded to establish a uniform 12-inch soil cap.
- The primary containment berms along the base of the south and north facing slopes have significant sediment build-up on the upslope side, thereby limiting future capacity associated with precipitation events. We recommend removing the sediment and reshape the berms to increase future sediment capacity.

On November 16, 2022, Terracon completed a second site visit and observed the southern slope had been regraded to fill gullies, and north and south containment berms

had been cleared and/or rebuilt. Photo Nos. 57 - 70 show the deficient areas described in the Observations Section of this report had been repaired.

Throughout the course of 2022, the Weekly Inspection Checklists were authored by six separate Qualified Inspectors. In general, the Weekly Inspection Checklists were performed every seven days. The Weekly Inspection Checklists indicated deficiencies of erosion rills on the south face and breached primary containment berms, in subsequent weekly checklists repairs were noted.

Continued observations of the landfill should occur by UTILITIES throughout the year, with particular attention to the erosion features along the slopes. Routine maintenance should be conducted, when necessary, to maintain the soil cover. We understand the grading activities are typically accomplished by tracking a bulldozer up and down the slopes. In addition, we recommended the soil berms adjacent to roadway and at the crest of the slope be repaired for continuity, as necessary.

4.0 General Comments

The observations and recommendations presented in this letter are based upon the data and information discussed in this report. This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety and excavation support are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

Sincerely,
Terracon

William A. Modrall, P.E.
Geotechnical Department Manager

Ryan W. Feist, P.E.
Senior Principal

Proposal for Geotechnical Engineering Services

Clear Spring Ranch | Fountain, Colorado

January 12, 2023 | Terracon Project No. 23155030



Attachments: Photograph Location Diagram
September 28, 2022 Photo Log
November 16, 2022 Photo Log

Photograph Location Diagram

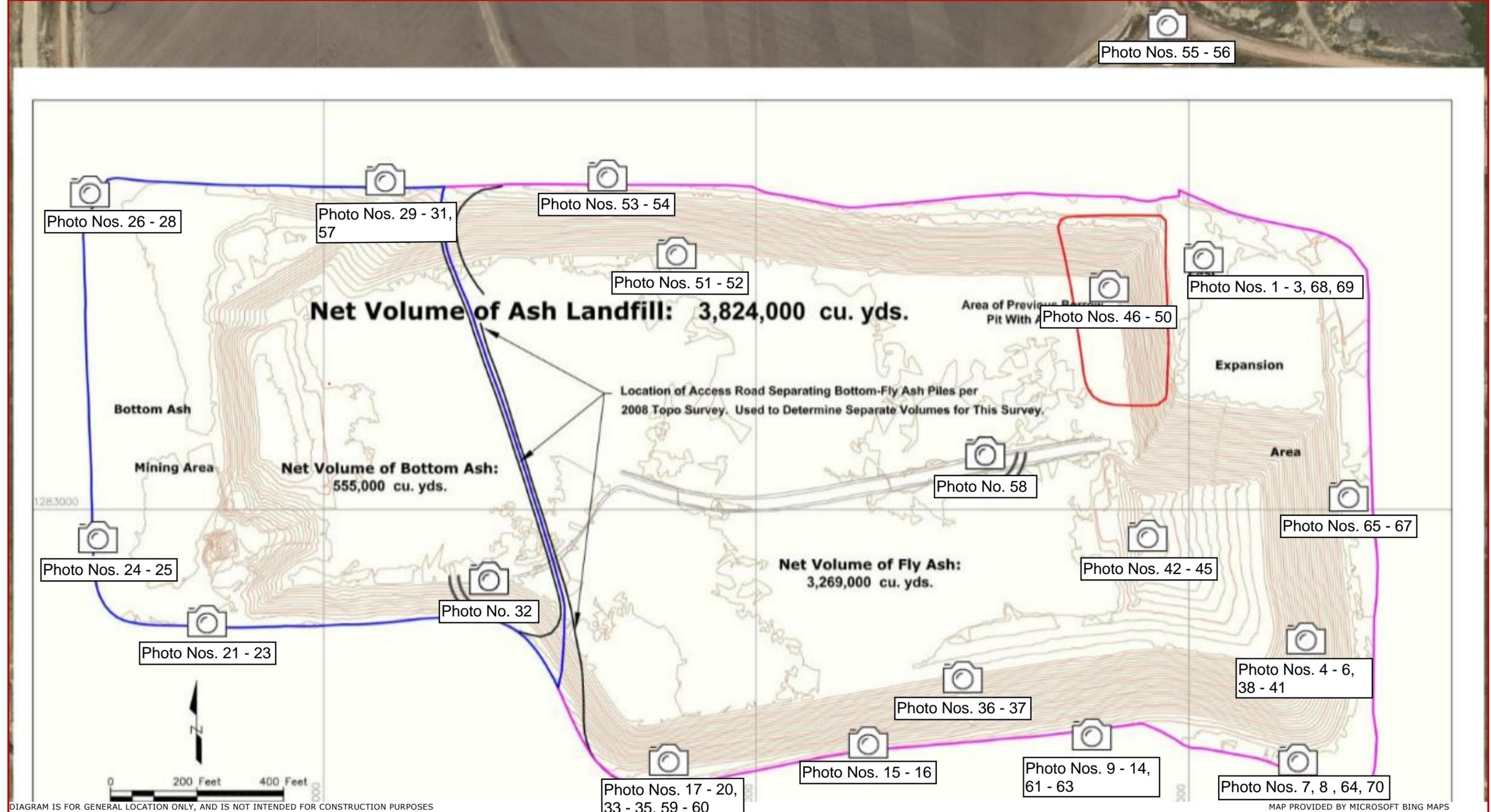


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS



Photo No. 1



Photo No. 2

Direction: S. Lat: 38.6094 Long: -104.7092

Direction: SW. Lat: 38.6094 Long: -104.7091



Photo No. 3



Photo No. 4

Direction: W. Lat: 38.6092 Long: -104.7093

Direction: W. Lat: 38.6069 Long: -104.7078



Photo No. 5



Photo No. 6

Direction: W. Lat: 38.6069 Long: -104.7078

Direction: W. Lat: 38.6070 Long: -104.7079



Photo No. 7

Direction: W. Lat: 38.6061 Long: -104.7082



Photo No. 8

Direction: N. Lat: 38.6062 Long: -104.7086



Photo No. 9

Direction: E. Lat: 38.6063 Long: -104.7100



Photo No. 10

Direction: NW. Lat: 38.6063 Long: -104.7103



Photo No. 11

Direction: N. Lat: 38.6063 Long: -104.7100



Photo No. 12

Direction: NE. Lat: 38.6063 Long: -104.7098



Photo No. 13



Photo No. 14

Direction: W. Lat: 38.6063 Long: -104.7098

Direction: N. Lat: 38.6062 Long: -104.7101



Photo No. 15



Photo No. 16

Direction: N. Lat: 38.6062 Long: -104.7117

Direction: N. Lat: 38.6062 Long: -104.7118



Photo No. 17



Photo No. 18

Direction: N. Lat: 38.6060 Long: -104.7132

Direction: N. Lat: 38.6059 Long: -104.7131



Photo No. 19

Direction: NE. Lat: 38.6060 Long: -104.7132



Photo No. 20

Lat: 38.6061 Long: -104.7133



Photo No. 21

Direction: E. Lat: 38.6070 Long: -104.7170



Photo No. 22

Direction: N. Lat: 38.6068 Long: -104.7167



Photo No. 23

Direction: NE. Lat: 38.6072 Long: -104.7176



Photo No. 24

Direction: NE. Lat: 38.6075 Long: -104.7179



Photo No. 25

Direction: NE. Lat: 38.6075 Long: -104.7180



Photo No. 26

Direction: NE. Lat: 38.6097 Long: -104.7180



Photo No. 27



Photo No. 28

Direction: E. Lat: 38.6097 Long: -104.7180



Photo No. 29

Direction: E. Lat: 38.6098 Long: -104.7159

Direction: S. Lat: 38.6097 Long: -104.7180



Photo No. 30

Direction: W. Lat: 38.6097 Long: -104.7158



Photo No. 31



Photo No. 32

Direction: S. Lat: 38.6098 Long: -104.7159

Direction: SW. Lat: 38.6073 Long: -104.7148



Photo No. 33



Photo No. 34

Direction: E. Lat: 38.6064 Long: -104.7133

Direction: S. Lat: 38.6064 Long: -104.7133



Photo No. 35



Photo No. 36

Direction: S. Lat: 38.6064 Long: -104.7133

Direction: E. Lat: 38.6067 Long: -104.7110



Photo No. 37

Direction: W. Lat: 38.6066 Long: -104.7110



Photo No. 38

Direction: N. Lat: 38.6068 Long: -104.7085



Photo No. 39

Direction: E. Lat: 38.6068 Long: -104.7086



Photo No. 40

Direction: S. Lat: 38.6069 Long: -104.7085



Photo No. 41

Direction: SW. Lat: 38.6068 Long: -104.7085



Photo No. 42

Direction: N. Lat: 38.6075 Long: -104.7095



Photo No. 43

Direction: W. Lat: 38.6075 Long: -104.7095



Photo No. 44

Direction: S. Lat: 38.6075 Long: -104.7095



Photo No. 45

Direction: N. Lat: 38.6075 Long: -104.7095



Photo No. 46

Direction: S. Lat: 38.6090 Long: -104.7098



Photo No. 47

Direction: W. Lat: 38.6091 Long: -104.7098



Photo No. 48

Direction: W. Lat: 38.6091 Long: -104.7098



Photo No. 49



Photo No. 50

Direction: N. Lat: 38.6091 Long: -104.7098

Direction: NE. Lat: 38.6091 Long: -104.7098



Photo No. 51



Photo No. 52

Direction: E. Lat: 38.6093 Long: -104.7133

Direction: E. Lat: 38.6093 Long: -104.7133



Photo No. 53



Photo No. 54

Direction: S. Lat: 38.6098 Long: -104.7139

Direction: SE. Lat: 38.6098 Long: -104.7138



Photo No. 55

Direction: S. Lat: 38.6108 Long: -104.7093



Photo No. 56

Direction: SW. Lat: 38.6107 Long: -104.7093



Photo No. 57

Direction: SE. Lat: 38.6098 Long: -104.7150



Photo No. 58

Direction: SE. Lat: 38.6081 Long: -104.7108



Photo No. 59

Direction: N. Lat: 38.6060 Long: -104.7138



Photo No. 60

Direction: E. Lat: 38.6060 Long: -104.7138



Photo No. 61

Direction: E. Lat: 38.6063 Long: -104.7099



Photo No. 62

Direction: NE. Lat: 38.6063 Long: -104.7098



Photo No. 63



Photo No. 64

Direction: N. Lat: 38.6063 Long: -104.7098

Direction: NW. Lat: 38.6061 Long: -104.7081



Photo No. 65



Photo No. 66

Direction: S. Lat: 38.6078 Long: -104.7079

Direction: W. Lat: 38.6078 Long: -104.7078



Photo No. 67



Photo No. 68

Direction: SW. Lat: 38.6078 Long: -104.7079

Direction: S. Lat: 38.6093 Long: -104.7089



Photo No. 69

Direction: SW. Lat: 38.6092 Long: -104.7088



Photo No. 70

Direction: N. Lat: 38.6061 Long: -104.7081