




**PERMIT INFORMATION**

<b>Permit Number:</b> C1981033 <b>Mine Name:</b> Bear Mine <b>Operator:</b> N/A <b>Operator Address:</b> N/A	<b>County:</b> Gunnison <b>Operation Type:</b> Underground <b>Permit Status:</b> Revoked <b>Ownership:</b> Private
	<b>Operator Representative Present:</b>  N/A
<b>Operator Representative Signature: (Field Issuance Only)</b>  	

**INSPECTION INFORMATION**

<b>Inspection Start Date:</b> May 17, 2023 <b>Inspection Start Time:</b> 14:00 <b>Inspection End Date:</b> <b>Inspection End Time:</b>	<b>Inspection Type:</b> Coal Complete Inspection <b>Inspection Reason:</b> Normal I&E Program <b>Weather:</b> Clear
<b>Joint Inspection Agency:</b>  None	<b>Joint Inspection Contacts:</b>  
<b>Post Inspection Agency:</b>  None	<b>Post Inspection Contacts:</b>  
<b>Inspector(s):</b>  Leigh Simmons	<b>Inspector's Signature:</b>  <b>Signature Date:</b>  June 15, 2023

**Inspection Topic Summary**

NOTE: Y=Inspected N=Not Inspected R=Comments Noted V=Violation Issued NA=Not Applicable

N - Air Resource Protection	R - Roads
N - Availability of Records	N - Reclamation Success
N - Backfill & Grading	N - Revegetation
N - Excess Spoil and Dev. Waste	N - Subsidence
N - Explosives	R - Slides and Other Damage
N - Fish & Wildlife	N - Support Facilities On-site
R - Hydrologic Balance	N - Signs and Markers
N - Gen. Compliance With Mine Plan	N - Support Facilities Not On-site
N - Other	N - Special Categories Of Mining
N - Processing Waste	N - Topsoil

**COMMENTS**

The Bear mine permit is revoked, the site has been reclaimed, and the required inspection frequency has been reduced to quarterly. The weather was mild and dry, however the spring had been wetter than average. Vehicle access to the site from the West Elk Mine was not possible due to flooding, however the site was accessible by foot over the bridge from Somerset.

**HYDROLOGIC BALANCE - Rule 4.05**

Drainage Control 4.05.1, 4.05.2, 4.05.3; Siltation Structures 4.05.5, 4.05.6; Discharge Structures 4.05.7, 4.05.10; Diversions 4.05.4; Effluent Limits 4.05.2; Ground Water Monitoring 4.05.13; Surface Water Monitoring 4.05.13; Drainage – Acid and Toxic Materials 4.05.8; Impoundments 4.05.6, 4.05.9; Stream Buffer Zones 4.05.18:

The area around the Bear Mine had been significantly impacted by the spring run-off of an unusually deep winter snowpack, exacerbated by a wetter than average spring. The Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture maintains an automated system of 730 snowpack sensors across the Western United States called SNOTEL (SNOW TELemetry). Three SNOTEL stations are situated on the high ground north of the mine (from west to east, Park Reservoir, Overland Reservoir and McClure Pass), shown in Figure 1. The data from each of these stations show that the snow-water equivalent (which is a proxy for snowpack depth) in 2023 peaked close to, or above, the maximum recorded since 1990, and that there was a period of rapid melting around the beginning of May (see Figures 2-4).

Impacts of the in the area include the closure of Highway 133 where it was washed out by Bear Creek, just west of Somerset; flooding in the town of Cedaredge by Surface Creek; and multiple rockslides and mudslides onto the highway in the Crystal River valley and on McClure Pass.

The USGS stream gage on the North Fork of the Gunnison at Somerset shows that streamflows were well above average at the time of the inspection. The last time peak flows exceeded 5000 cfs was in 2005, and annual peak flows have reached 5000 cfs only 14 times since 1934.

**ROADS – Rule 4.03**

Construction 4.03.1(3)/4.03.2(3), Drainage 4.03.1(4)/4.03.2(4), Surfacing and Maintenance 4.03.1(5) and (6)/4.03.2(5) and (6), Reclamation 4.03.1(7)/4.03.2(7):

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Number of Complete Inspections this Fiscal Year: 4

The temporary access road that had been constructed from the West Elk Mine in 2022 was flooded at a low spot, making it impassable. As the road gained height to the west it was clear of the flood water, but in very poor condition following the spring run-off as well as recent rain.

#### SLIDES and DAMAGE - Rule 4.12:

The pad constructed on top of the bench, and the road leading to it had eroded badly over the winter and spring. There were cracks and possible subsidence features visible on the pad, (see Figures 7-9).

A repeat of the September 14 drone survey was conducted, using an Autel Evo II 640T drone with a dual sensor (Visual and Infra-Red). Again, the imagery was processed using Pix4D Mapper software to derive various data products including a high resolution ortho-image, and a lower resolution IR reflectance raster which was symbolized to allow the identification of areas of relatively high surface temperature. The best way to view these data products is on a web map at <https://arcg.is/14enOO>, which allows the viewer to pan and zoom as well as toggle the various layers on and off. Screenshots of these products are given in Figures 10-13.

The IR reflectance rasters show relative temperatures (green is cool, red is warm). The two rasters cannot be used to compare temperature directly, but the locations of hotspots can be compared. The photo locations feature layers can be used to identify the images of interest. The raw data can be viewed at <https://drive.google.com/drive/folders/1f4a9YwdfNv5iaVKOD2PhO1jEywycUamV?usp=sharing> (May 2023) <https://drive.google.com/drive/folders/14MRiOOgo299q7gLGLCGk0mC1rCw1i1Zd?usp=sharing> (Sep 2022).

The Infra-Red images can be viewed using dedicated software called [IR\\_PCTool](#) which allows temperature measurements to be made. Figures 14-23 present several of the raw images and screen shots from IR\_PCTool. Temperatures are quoted to the nearest tenth of a degree, however the manufacturer's specifications give the sensor accuracy as +/- 3% or 3 °C, whichever is greater; in the range of temperatures measured at the Bear Mine, the measurement accuracy can be no greater than +/- 6 °F.

Although there appeared to be less smoke and steam issuing from the vents at the site, the drone data suggests that surface temperatures in May 2023 were similar to those measured in September 2022. The highest temperatures were measured at approximately the same location, from a collection of vents in the middle of the slope immediately below the pad (see Figures 16 and 17).

A second hotspot, slightly to the west of the first and lower on the slope, had increased measurably in temperature (from 98-110 °F, to 139-151 °F).

#### DOCUMENTS RECEIVED

N/A

#### OTHER (SPECIFY)

N/A

#### **ENFORCEMENT ACTIONS/COMPLIANCE**

N/A

Number of Partial Inspection this Fiscal Year: 2

Number of Complete Inspections this Fiscal Year: 4

## PHOTOGRAPHS

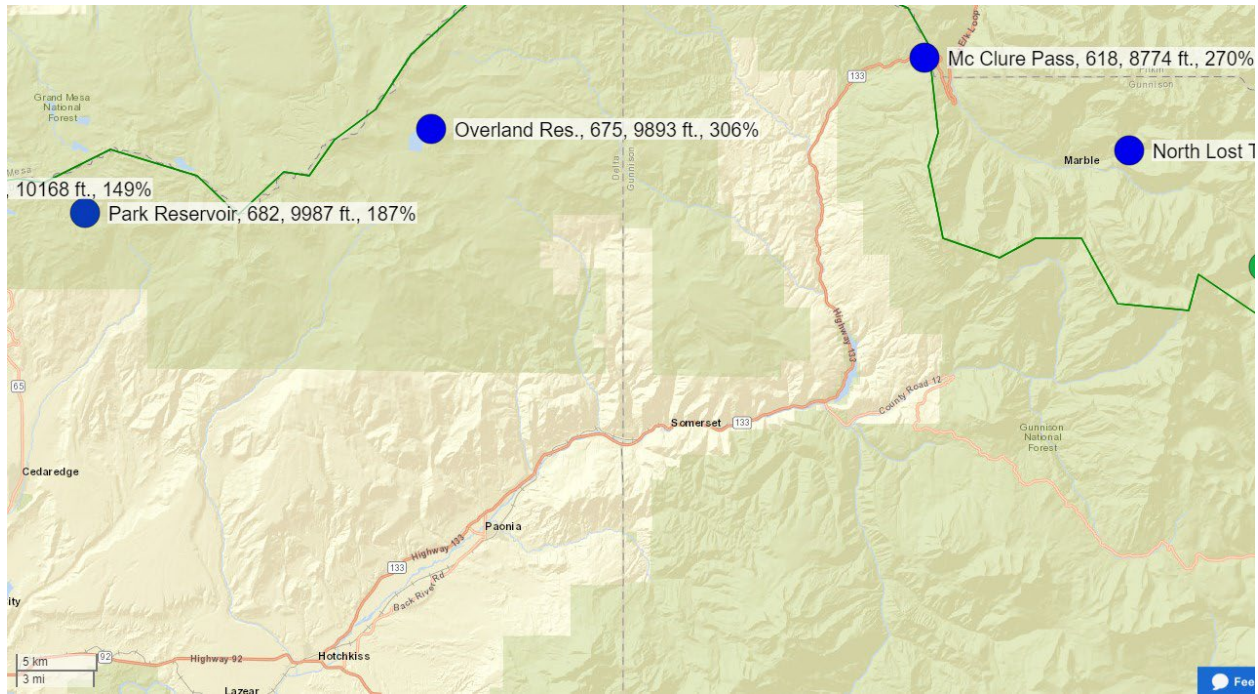


Figure 1: SNOTEL station locations

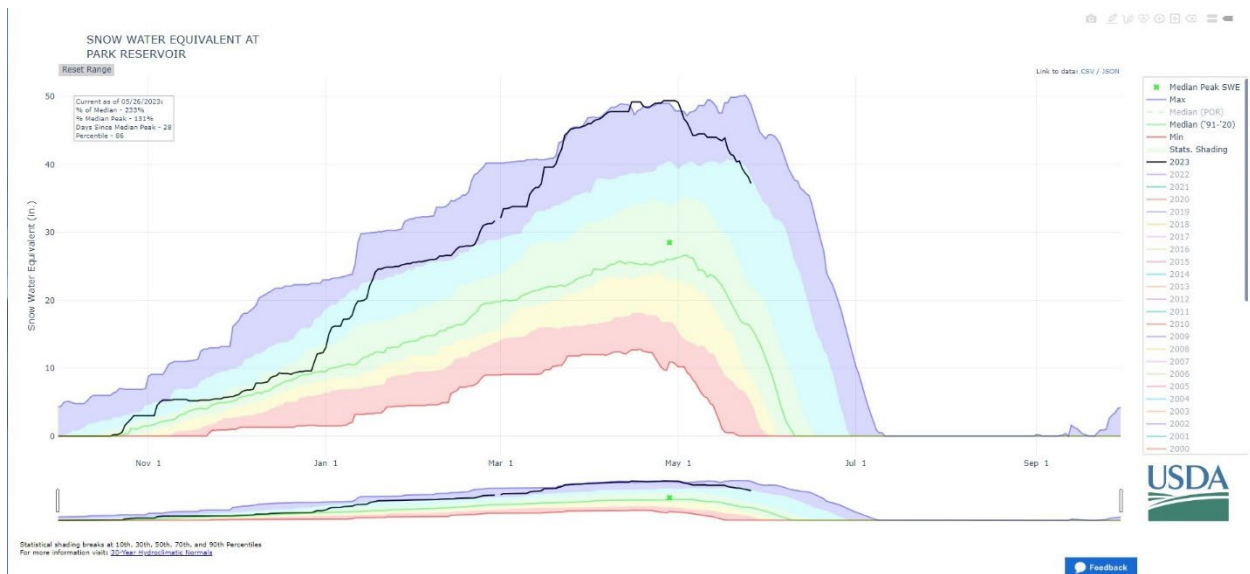


Figure 2: Snow water equivalent at Park Reservoir SNOTEL station

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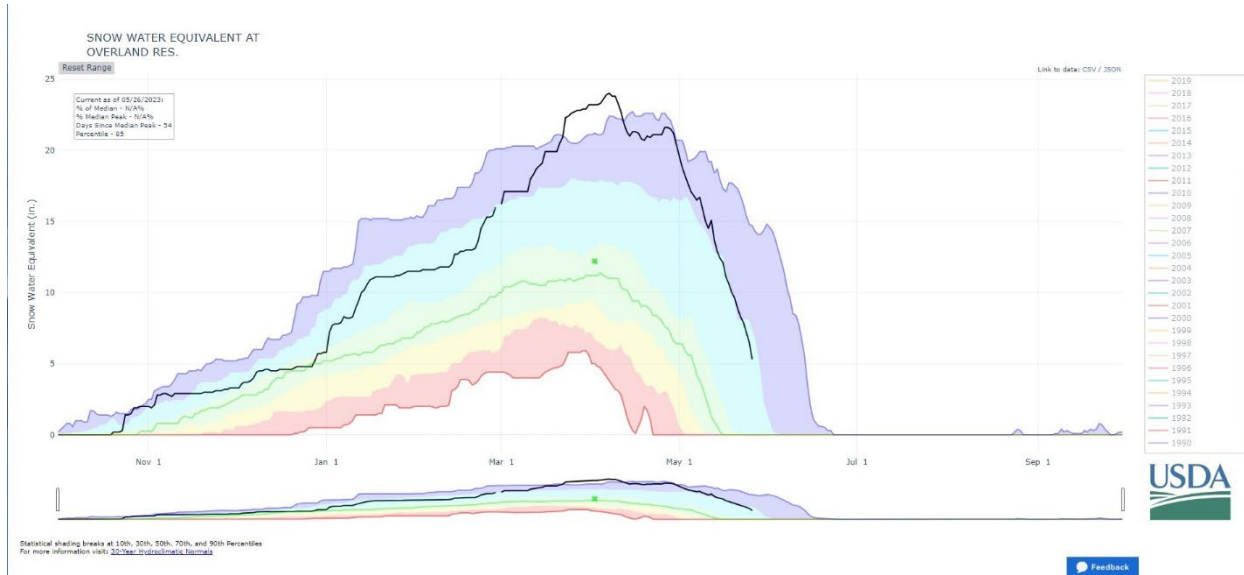


Figure 3: Snow water equivalent at Overland Reservoir SNOTEL station

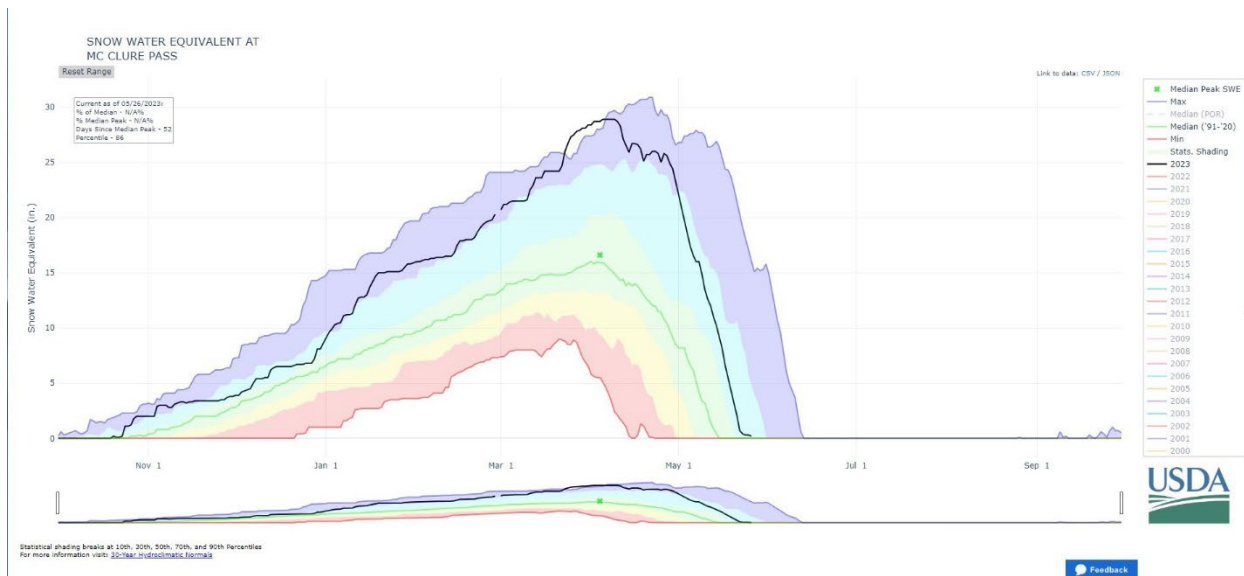


Figure 4: Snow water equivalent at McClure Pass SNOTEL station

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# North Fork Gunnison River Near Somerset, Co. - 09132500

May 12, 2023 - May 18, 2023

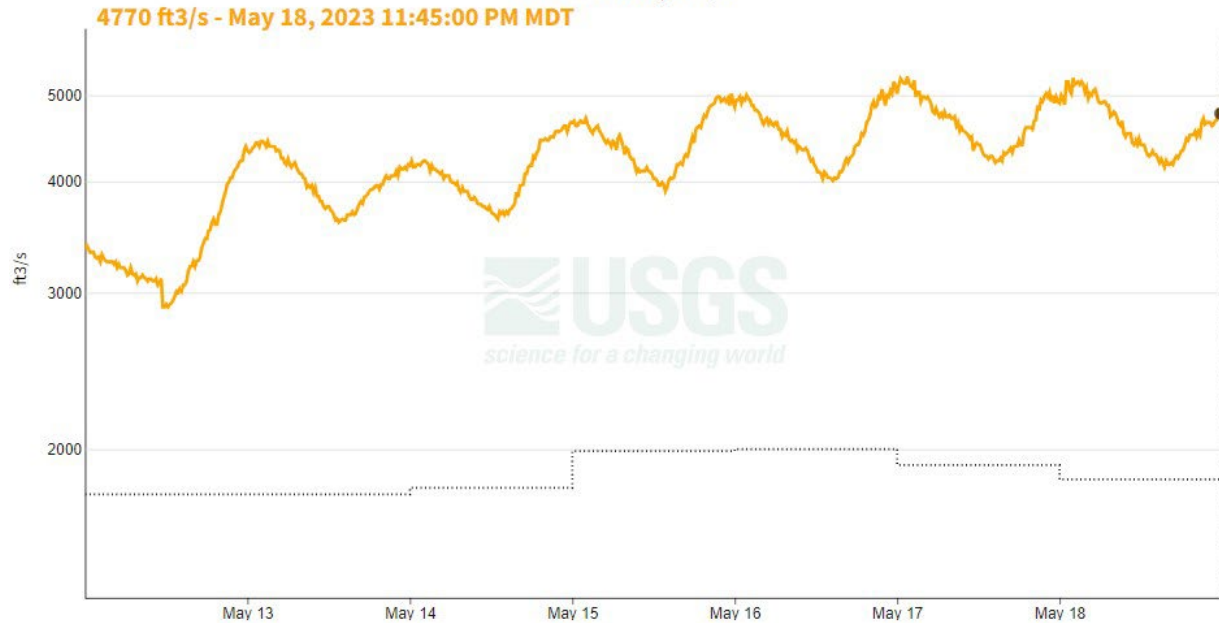
Streamflow, ft<sup>3</sup>/s ⓘ

Figure 5: Streamflow data from USGS stream gage (median streamflow shown with dashed black line)

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*Figure 6: Flooding on temporary access road from West Elk Mine*

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Number of Complete Inspections this Fiscal Year: 4



*Figure 7: Cracking on benchtop pad (1 of 2)*

Number of Partial Inspection this Fiscal Year: 2

Number of Complete Inspections this Fiscal Year: 4



*Figure 8: Cracking on benchtop pad (2 of 2)*

Number of Partial Inspection this Fiscal Year: 2

Number of Complete Inspections this Fiscal Year: 4



*Figure 9: Possible subsidence on benchtop pad*

Number of Partial Inspection this Fiscal Year: 2

Number of Complete Inspections this Fiscal Year: 4



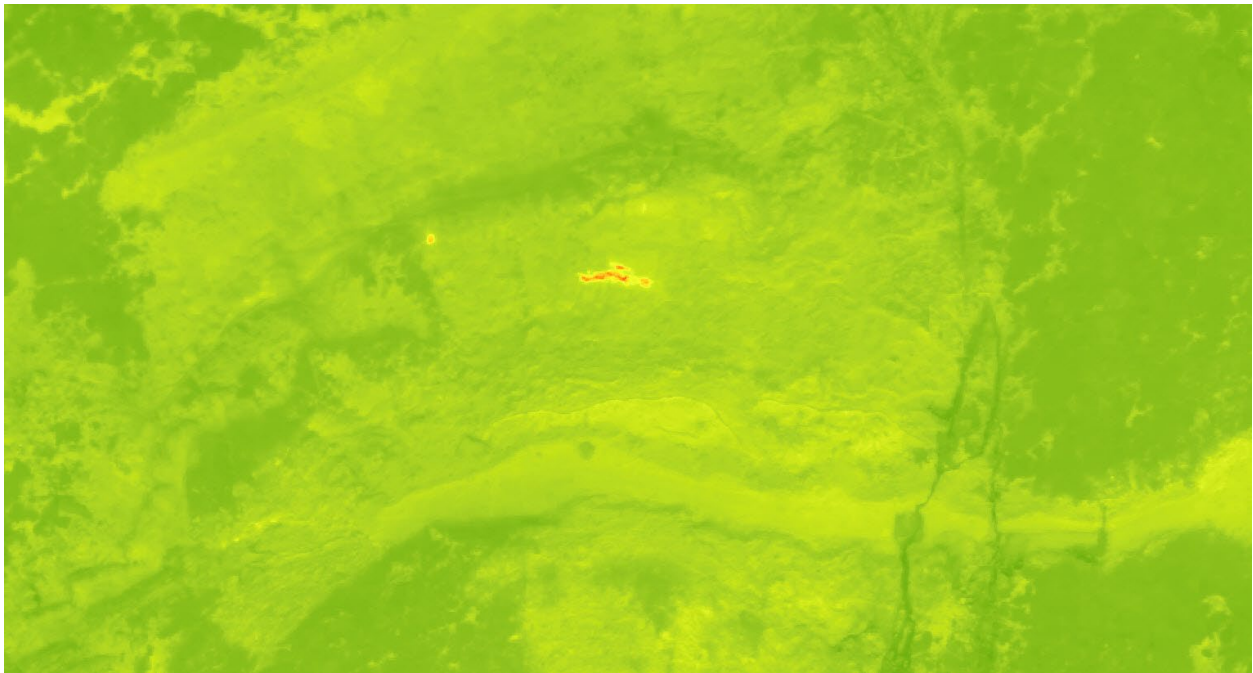
*Figure 10: Orthomosaic of the site*

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*Figure 11: Close-up of orthomosaic over area of interest*



*Figure 12: IR reflectance raster over figure 11, showing highest relative temperatures (red)*

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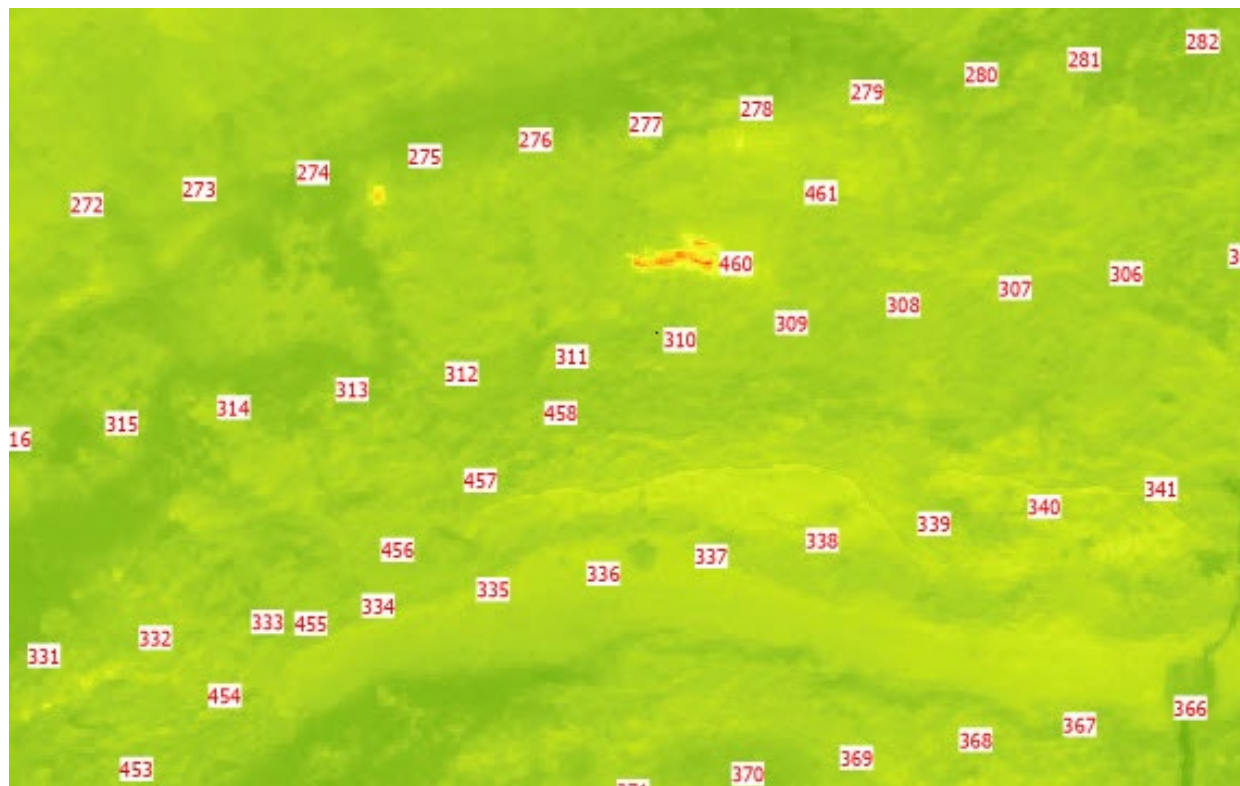


Figure 13: Closer zoom, showing photo locations

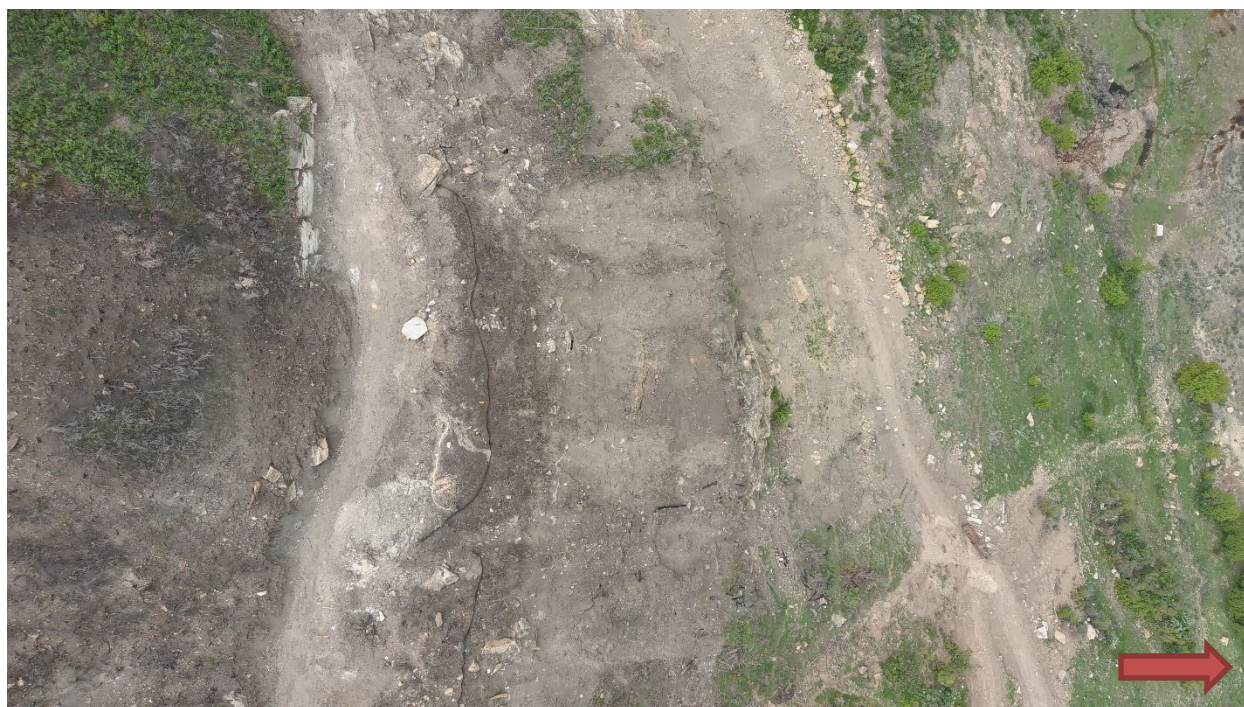


Figure 14: MAX\_0310.jpg (arrow points roughly north)

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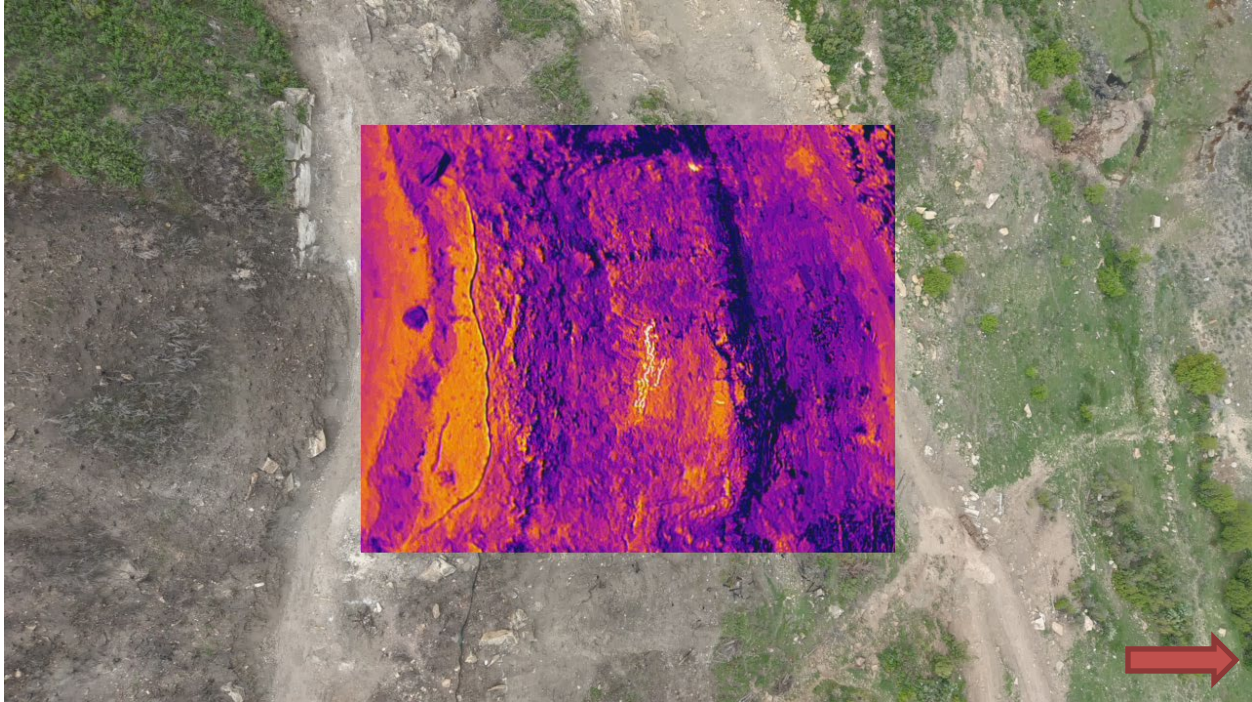


Figure 15: MIX\_0310.jpg, the inset frame shows the location of Figure 16

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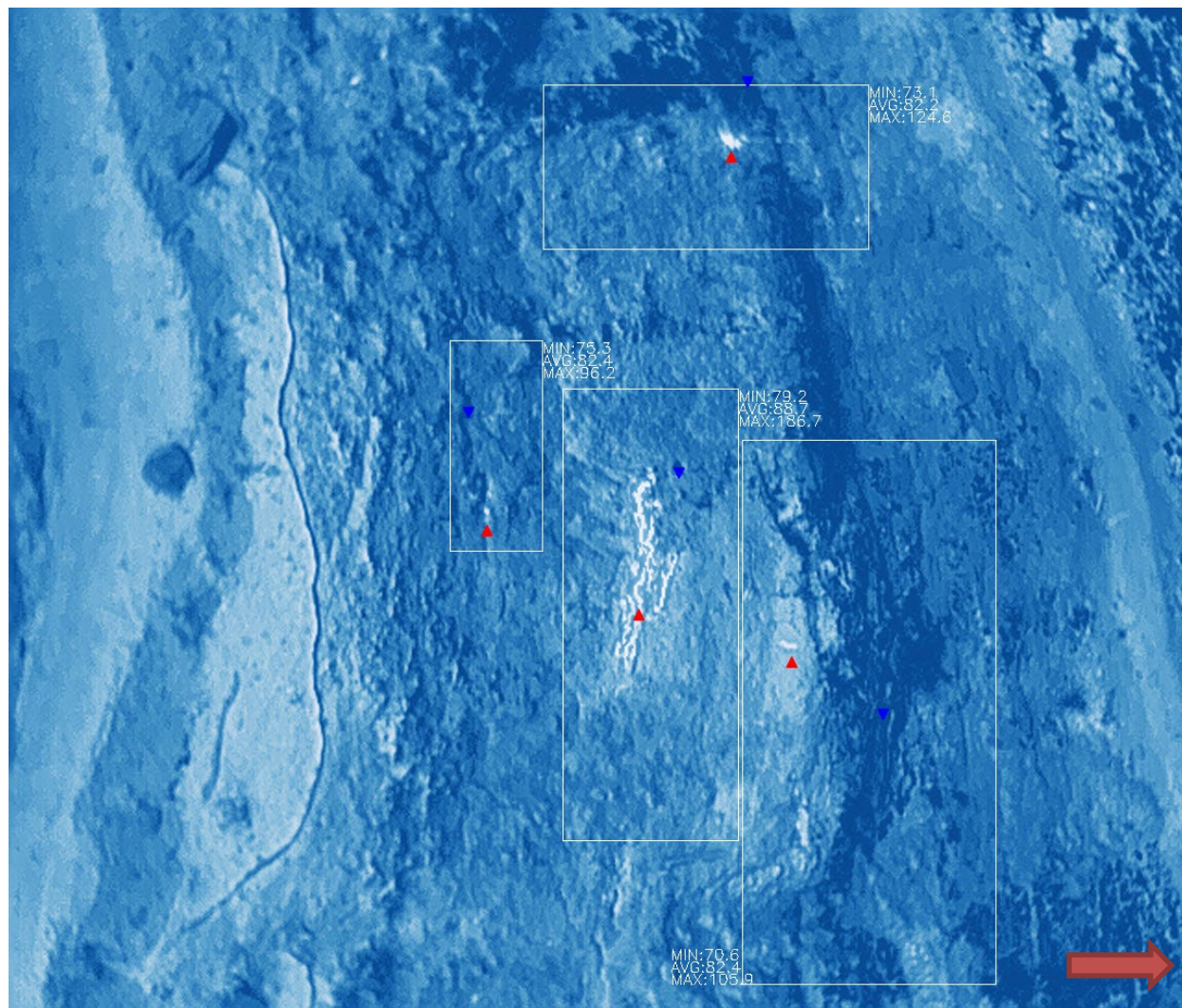


Figure 16: IRX\_0310.jpg, viewed using IR\_PCTool. The maximum temperature within each rectangle is shown with a red triangle. Temperature values in degrees Fahrenheit are given adjacent to the rectangle. The highest observed temperature was 186.7 F

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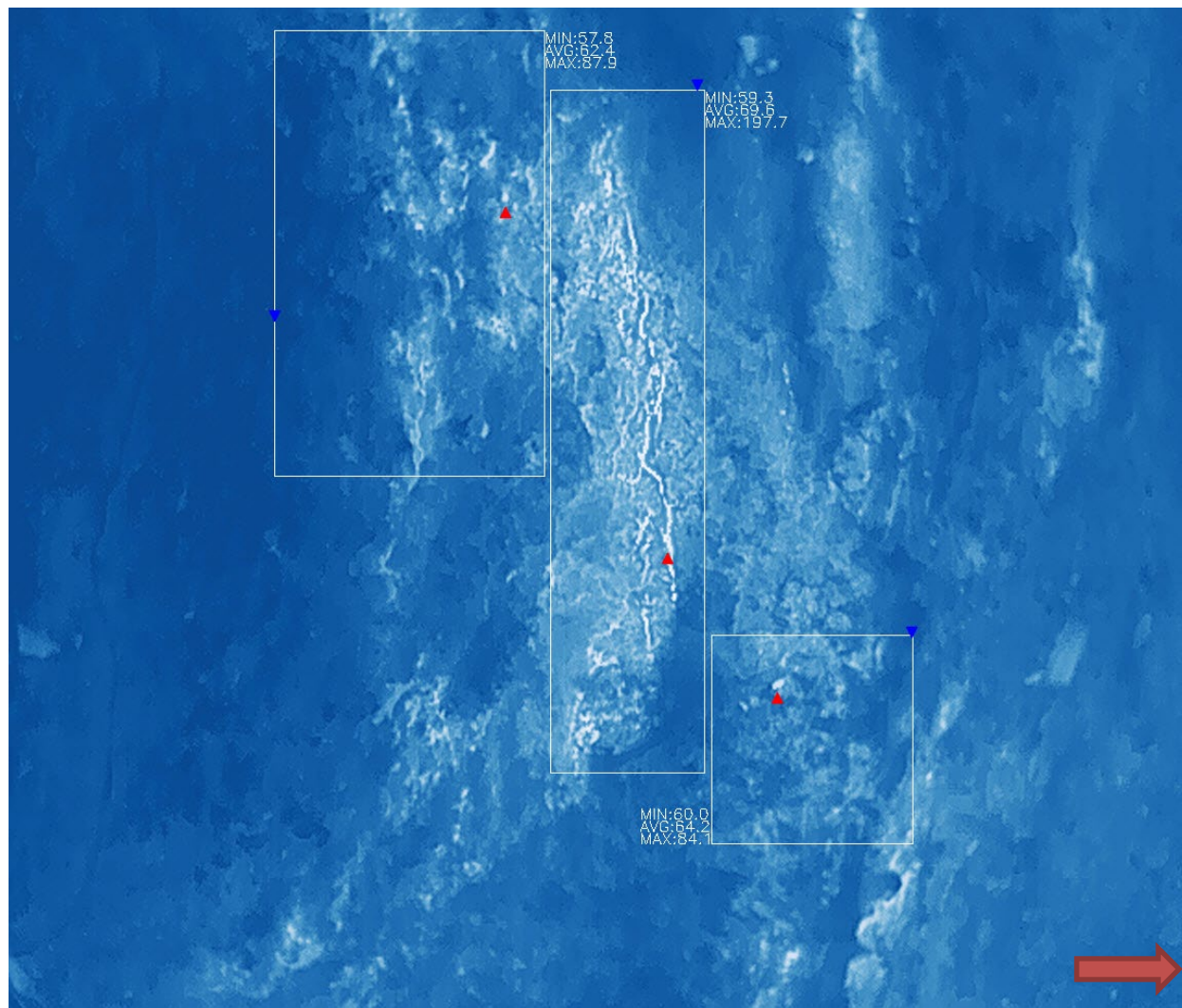


Figure 17: For comparison, IRX\_0422.jpg from September 2022. The image covers a slightly smaller area than Figure 16, but shows the same vent features. The highest observed temperature was 197.7 F, and was in a similar location.

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Figure 18: MAX\_0274.jpg (arrow points roughly north)

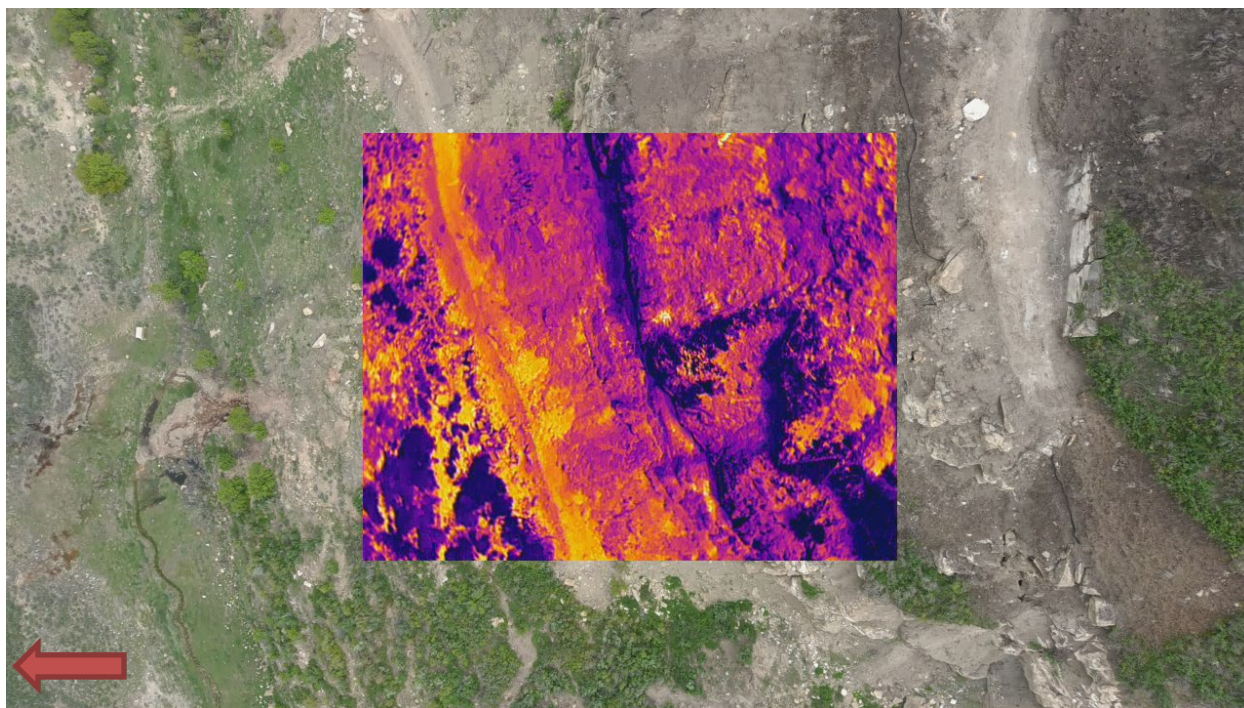


Figure 19: MIX\_0274.jpg, the inset frame shows the location of Figure 20

Number of Partial Inspection this Fiscal Year: 2

Number of Complete Inspections this Fiscal Year: 4

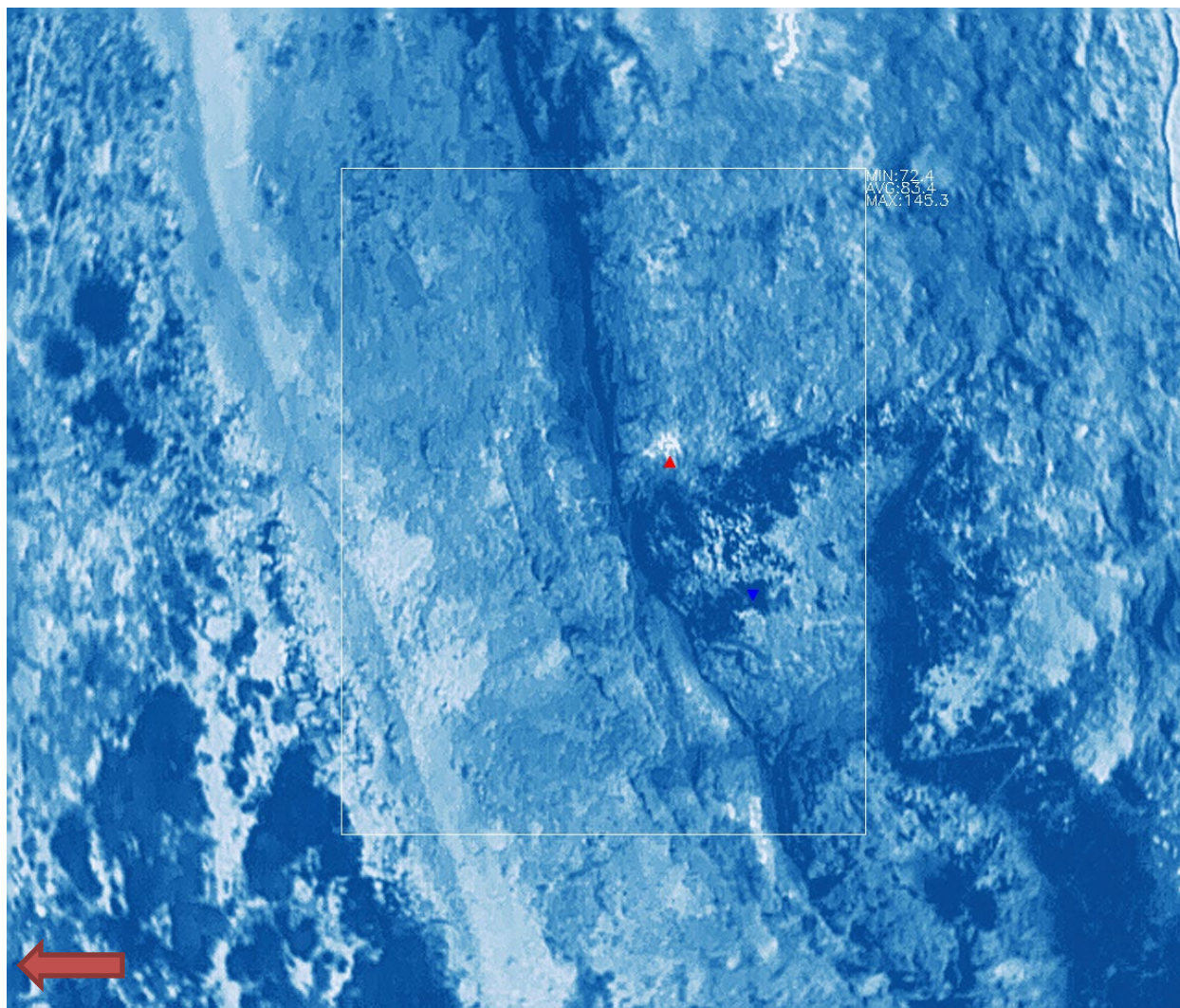


Figure 20: IRX\_0274.jpg, viewed using IR\_PCTool. The maximum temperature within the rectangle is shown with a red triangle. Temperature values in degrees Fahrenheit are given adjacent to the rectangle. The highest observed temperature in this area was 145.3 F

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Figure 21: For comparison, MAX\_0384.jpg from September 2022

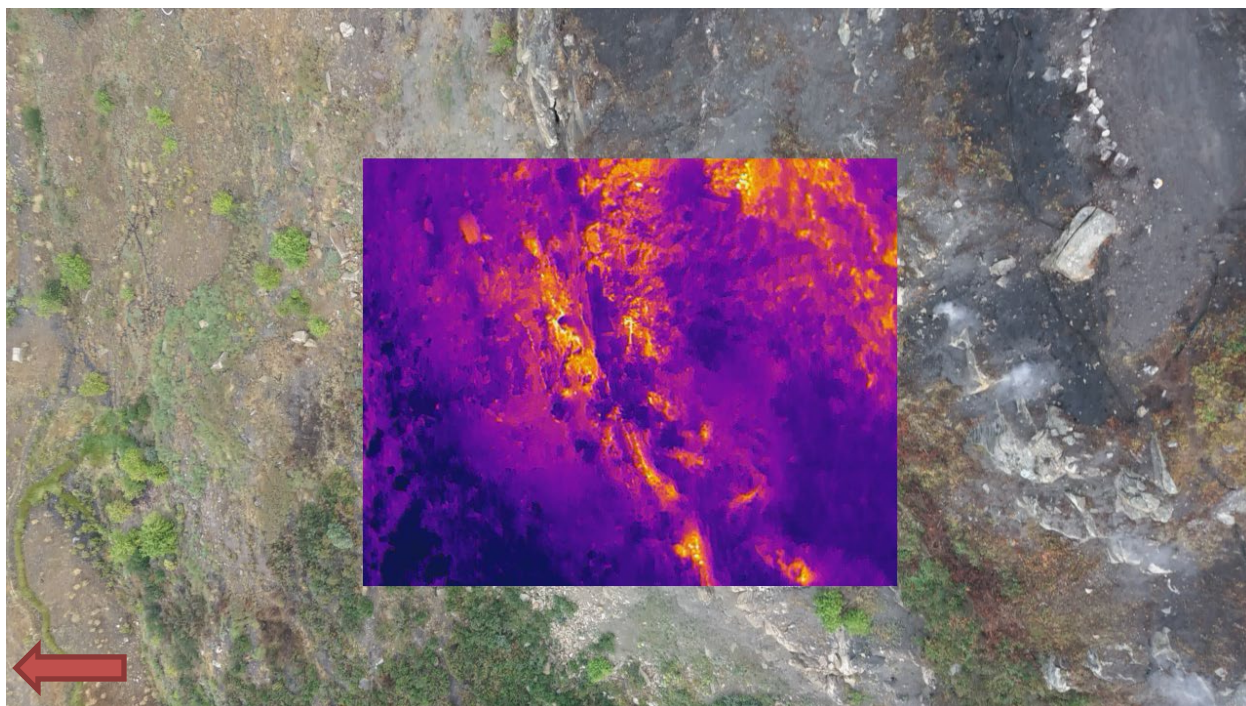


Figure 22: For comparison, MIX\_0384.jpg from September 2022. The inset frame shows the location of Figure 23

Number of Partial Inspection this Fiscal Year: 2

Number of Complete Inspections this Fiscal Year: 4

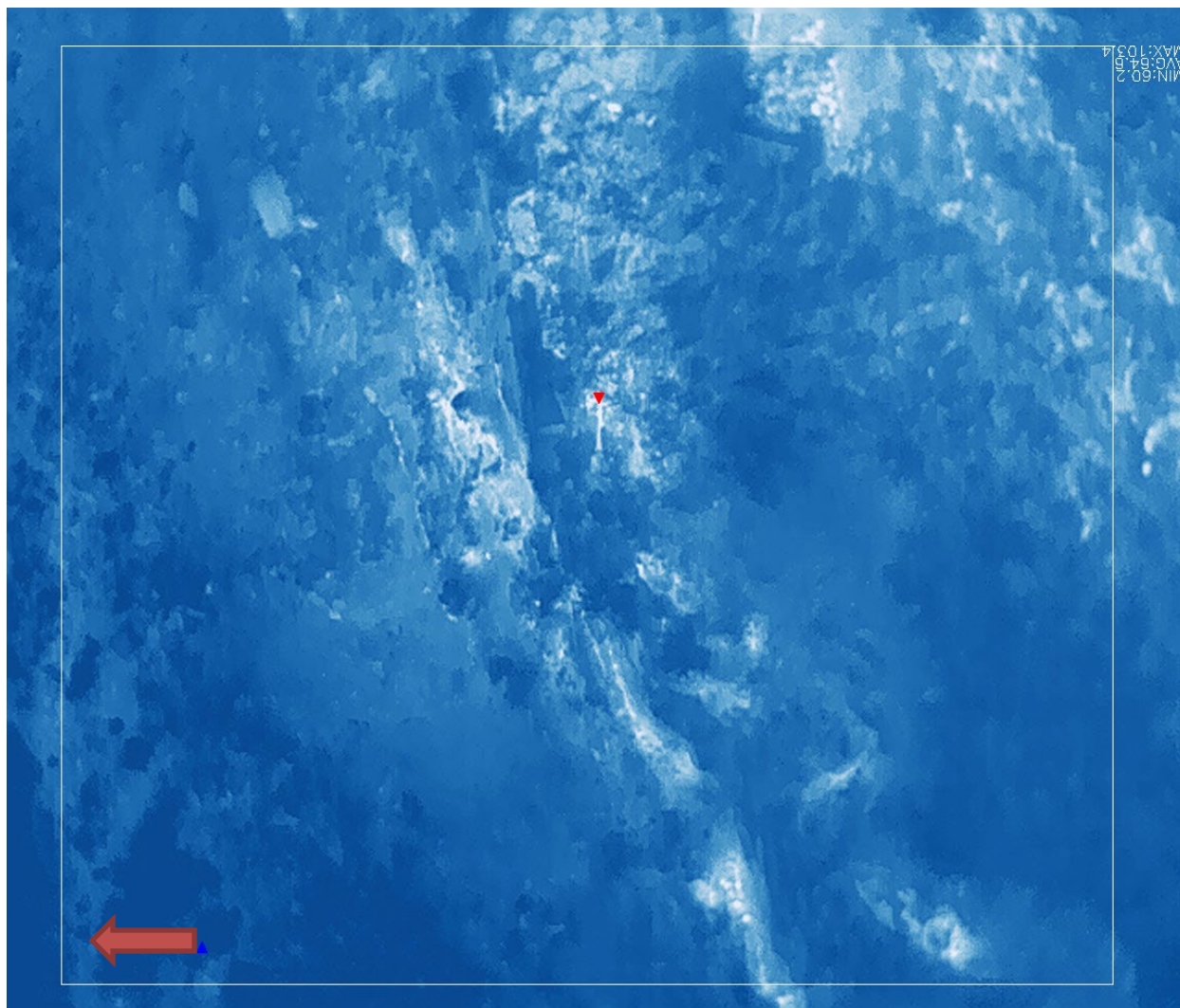


Figure 23: For comparison, IRX\_0384.jpg from September 2022. The image covers a slightly smaller area than Figure 20, but shows the same vent features. The highest observed temperature was 103.4 F, and was in a similar location.

Number of Partial Inspection this Fiscal Year: 2

Number of Complete Inspections this Fiscal Year: 4