

# Illinois Gulch Mine Water Flow Path Investigation

Willard Adit #1 – Puzzle Mine

Willard Adit #2 – Unknown Mine Operation

Cally Spring

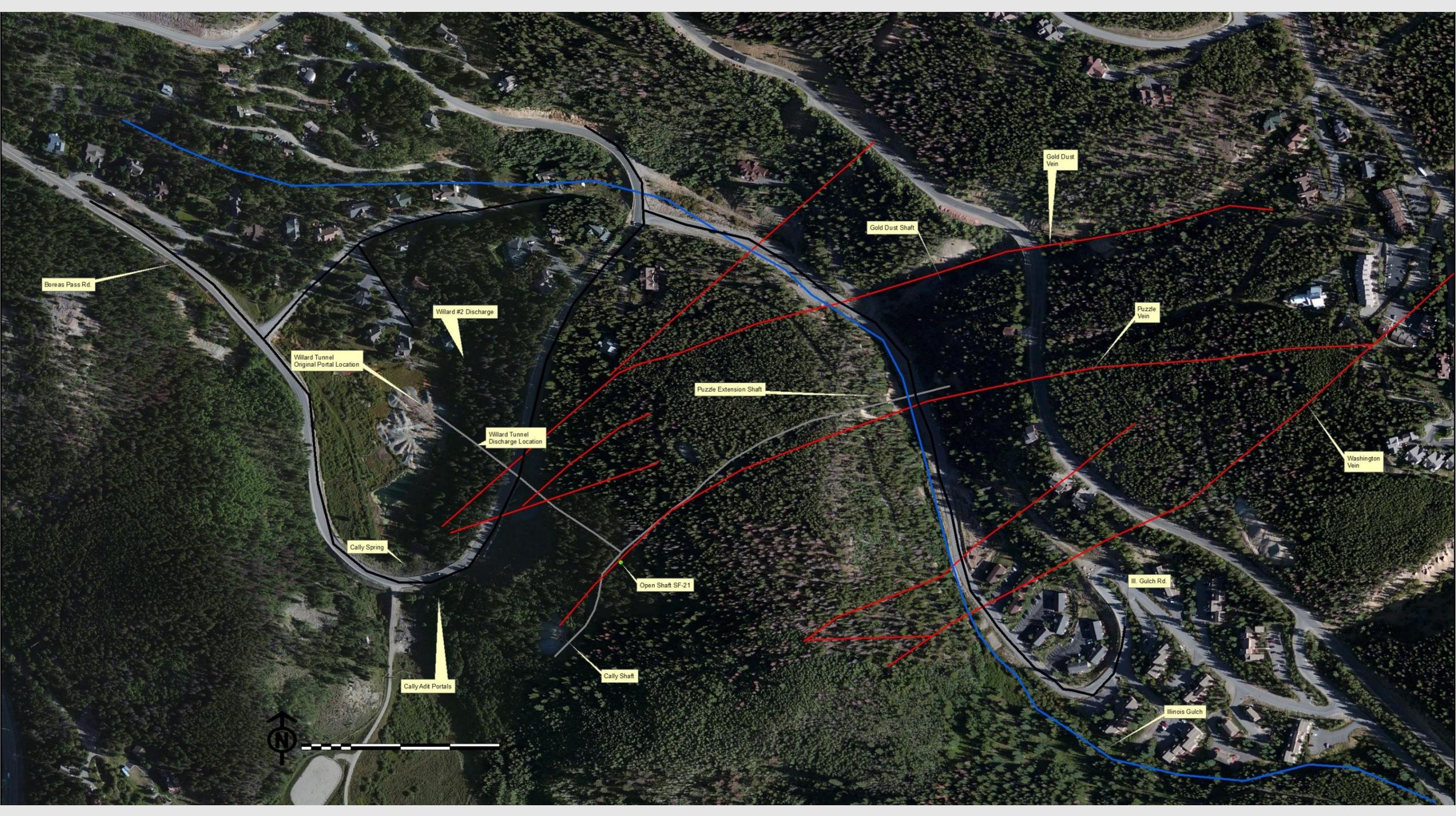
Puzzle Extension Shaft – Puzzle Mine

Cally Adits – Ouray Mine

Cally Shaft – Ouray Mine

# Locations of Mine Features

- Willard Adit
- Willard Adit #2
- Cally Adit Portals
- What about the Cally Spring?
- Puzzle Extension Shaft



Boreas Pass Rd.

Willard #2 Discharge

Willard Tunnel Original Portal Location

Willard Tunnel Discharge Location

Cally Spring

Cally Adit Portals

Open Shaft SF-21

Cally Shaft

Puzzle Extension Shaft

Gold Dust Shaft

Gold Dust Vein

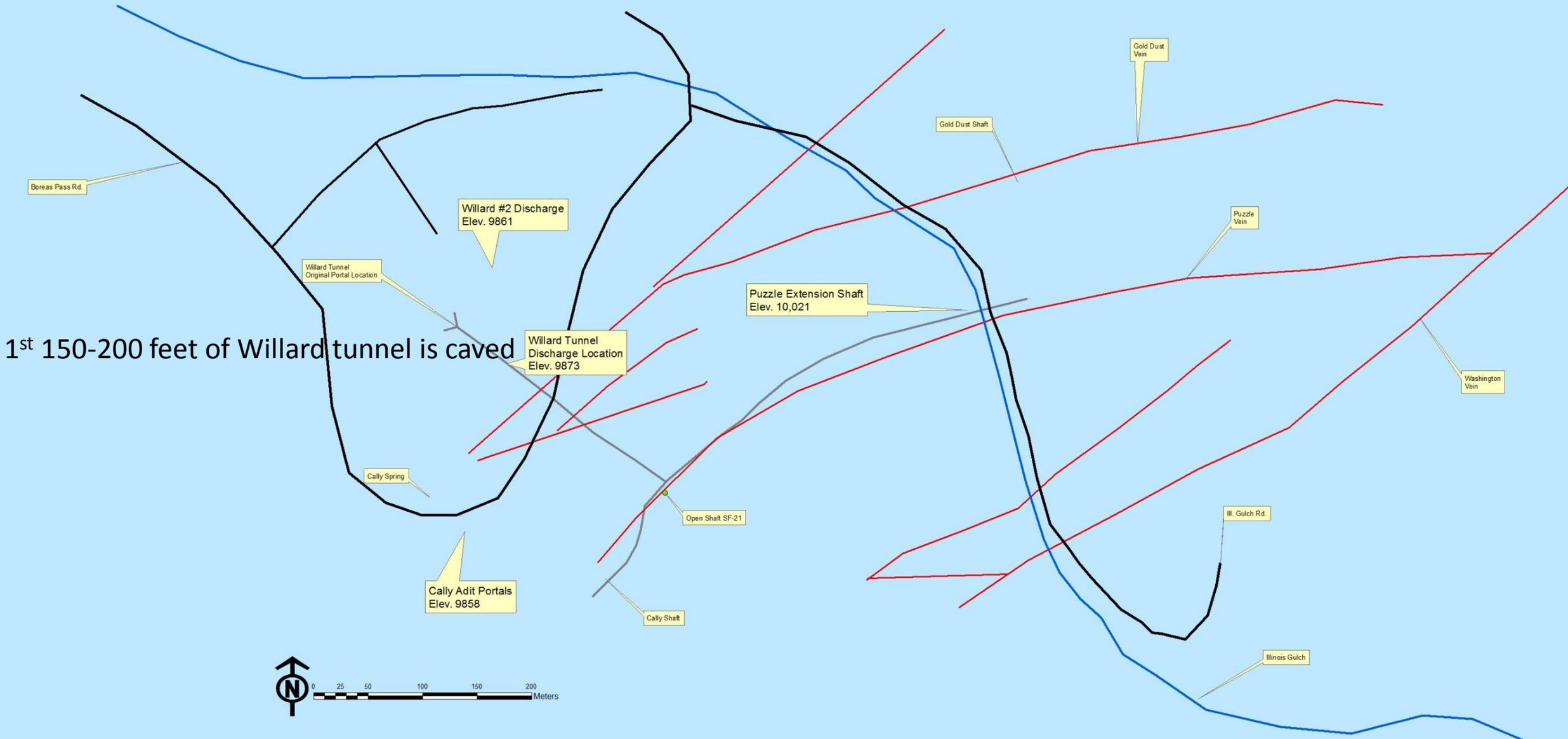
Puzzle Vein

Washington Vein

Ill. Gulch Rd.

Illinois Gulch





1<sup>st</sup> 150-200 feet of Willard tunnel is caved

Boreas Pass Rd

Willard Tunnel  
Original Portal Location

Willard #2 Discharge  
Elev. 9861

Willard Tunnel  
Discharge Location  
Elev. 9873

Puzzle Extension Shaft  
Elev. 10,021

Gold Dust Shaft

Gold Dust Vein

Puzzle Vein

Washington Vein

Cally Spring

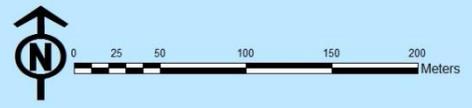
Open Shaft SF-21

Ill. Gulch Rd.

Cally Adit Portals  
Elev. 9858

Cally Shaft

Illinois Gulch



Hazardous mine openings along the  
Puzzle vein were safeguarded in 2016

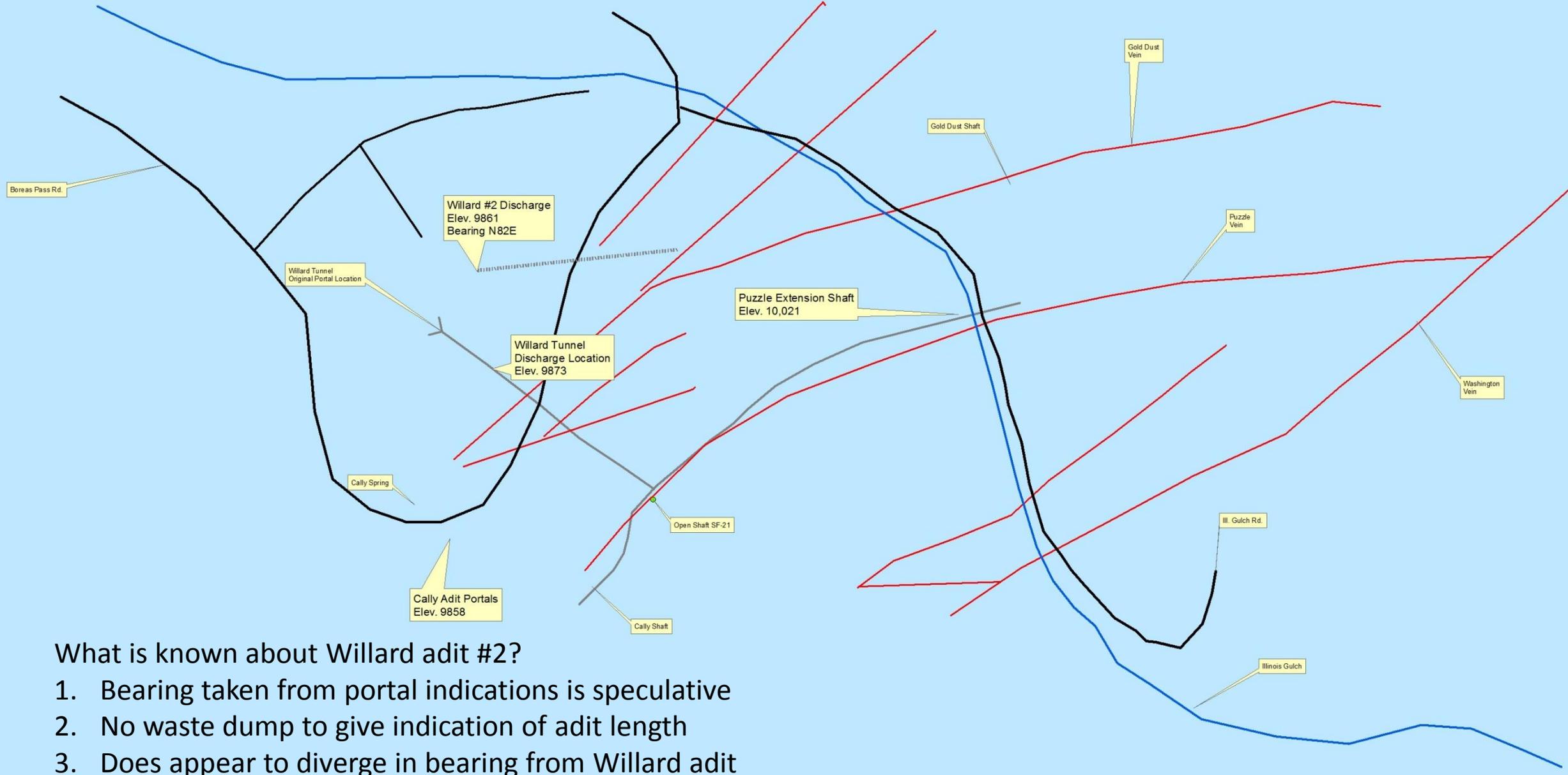




Willard adit cap timbers correspond with adit ceiling (back)

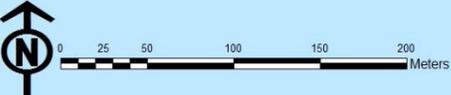
Drainage emerging six feet above cap timbers indicating that the adit is flooded





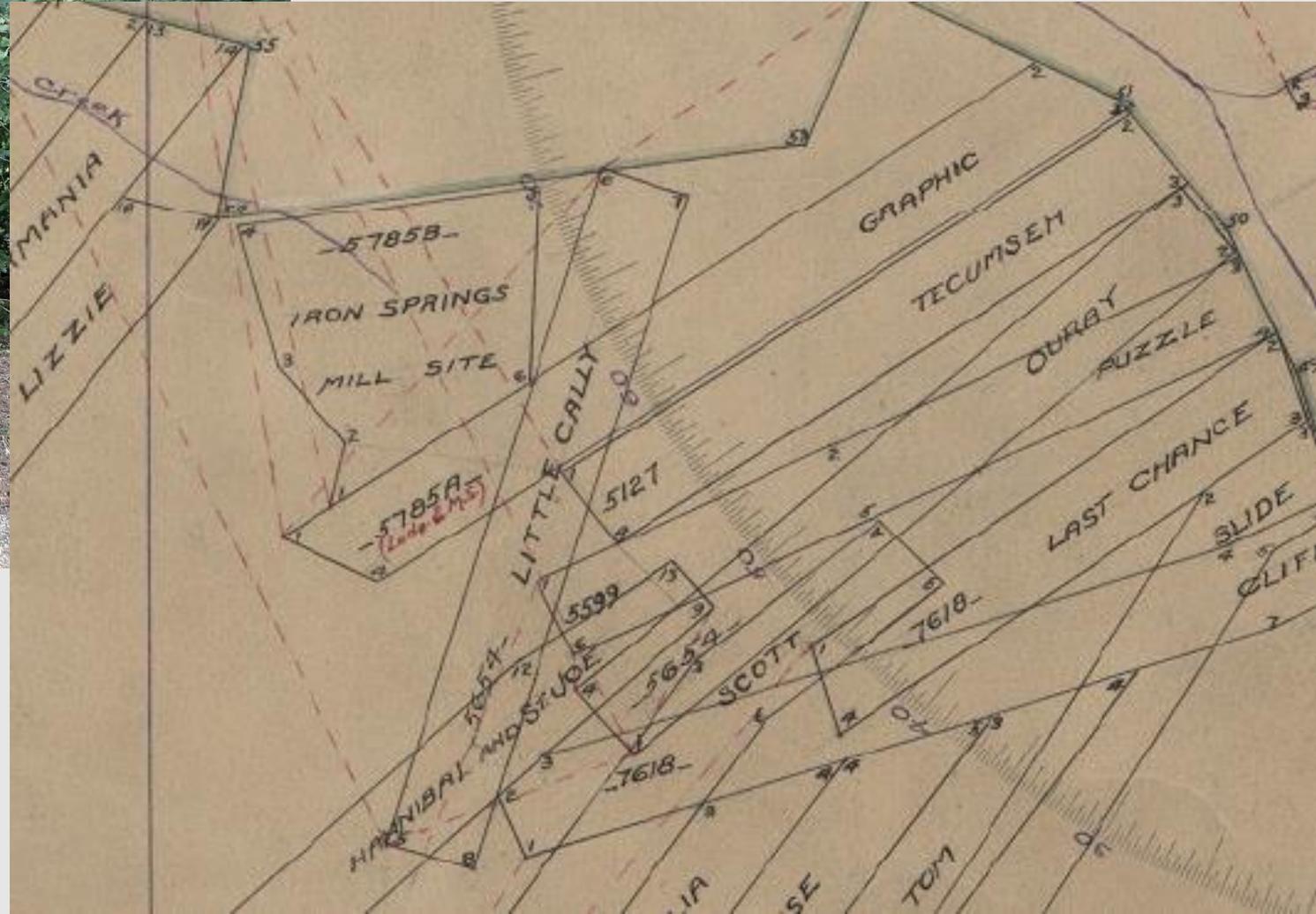
What is known about Willard adit #2?

1. Bearing taken from portal indications is speculative
2. No waste dump to give indication of adit length
3. Does appear to diverge in bearing from Willard adit





Who is Cally?



Cally adit portals are a little over 100 feet from the Cally spring

Is this the Cally spring?

“...iron is taken up by the ground water in any reaction involving the replacement of pyrite by sphalerite or galena, so that any of this water emerging as springs...is likely to be highly ferruginous, as is that of a spring near the Puzzle and Ouray mines.”

Ransome (1911) USGS Professional Paper 75, page 169

# Uranine Dye Tracer June- July 2016

Injection into  
collapsed 2-  
compartment  
Puzzle  
Extension  
shaft

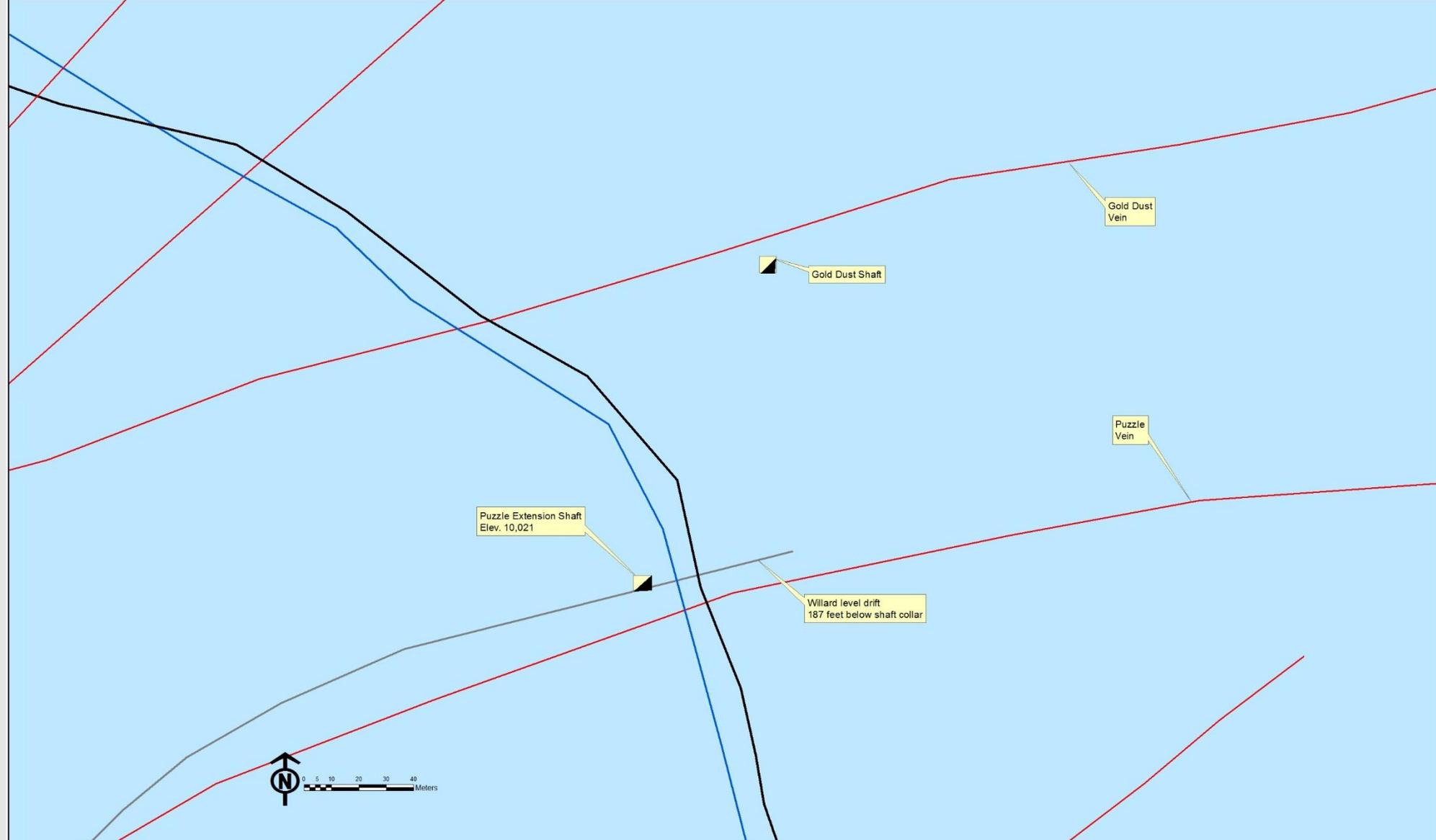


2016/06/20

Shaft is adjacent to Illinois Creek, and base of collapse craters are approx. 10-feet above creek



# Flow loss measured across Puzzle Extension Shaft Reach in October 2015

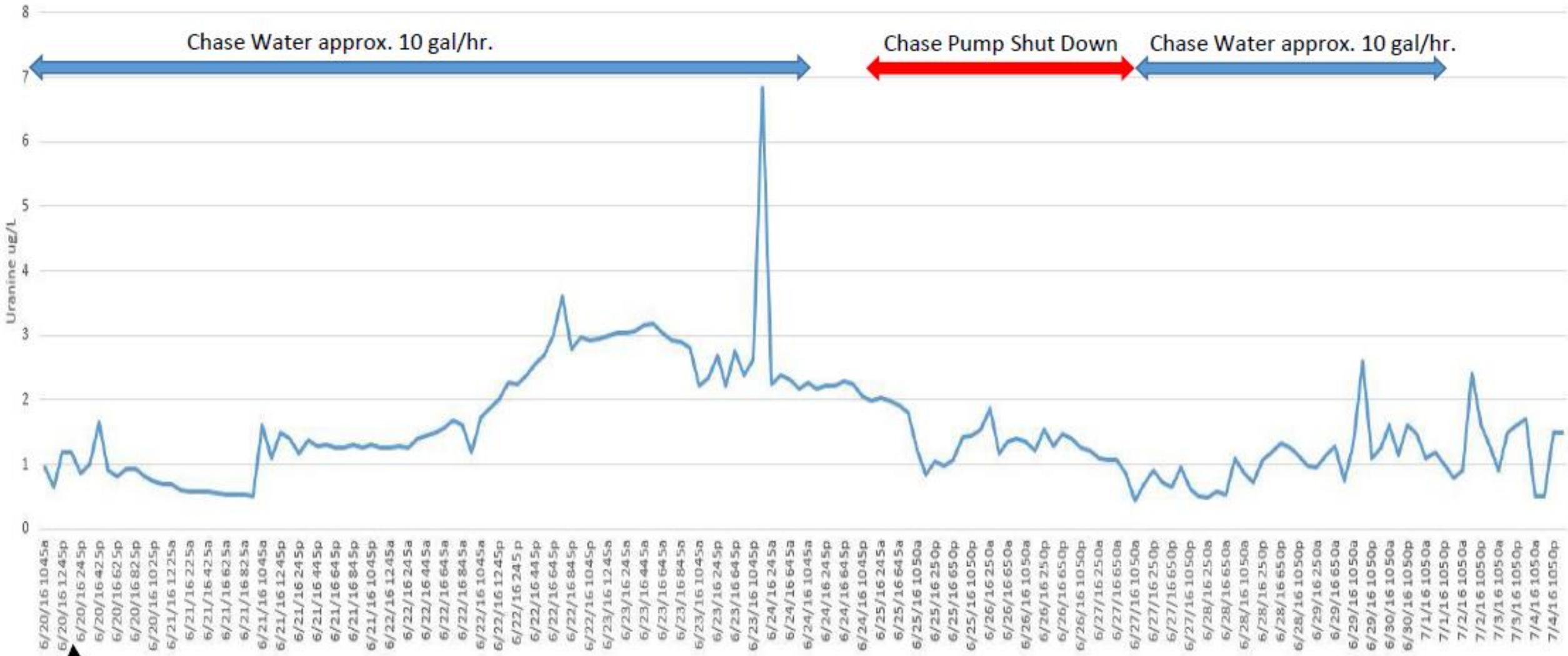


Springs entering creek from the east near the shaft

# Design and Implementation of the Dye Test

- Largely qualitative
- Two objectives:
  - Determine if creek water is flowing down the shaft and exiting to surface from adits or springs
  - Instruct the USGS quantitative salt tracer test to be conducted in August/September
- Auto-samplers at Willard #1, Willard #2, and Cally spring
- Dye concentration measured with field fluorimeter

# Willard Adit No. 1



Chase Water approx. 10 gal/hr.

Chase Pump Shut Down

Chase Water approx. 10 gal/hr.

Dye Injected

Possible detection of leading edge of dye at 20 hours  
Consistent dye detection beginning at 47 hours

# No Detection at Willard adit #2 or Cally spring

- Duration of test at Willard adit #2 was 11.5 days
- Duration of test at Cally spring was 14.5 days
- Uranine was detected at Cally spring in one sample on day 10, but there was no detection in samples 6-hours before and after this detection, indicating an unexplained false positive

## Conclusions:

Hydrologic connection of Illinois Creek and Willard adit via Puzzle mine underground workings

Gave confidence to USGS salt tracer test planned duration, at least for Willard adit #1

Completed without visual impacts to Illinois Creek or Blue River

