

# 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

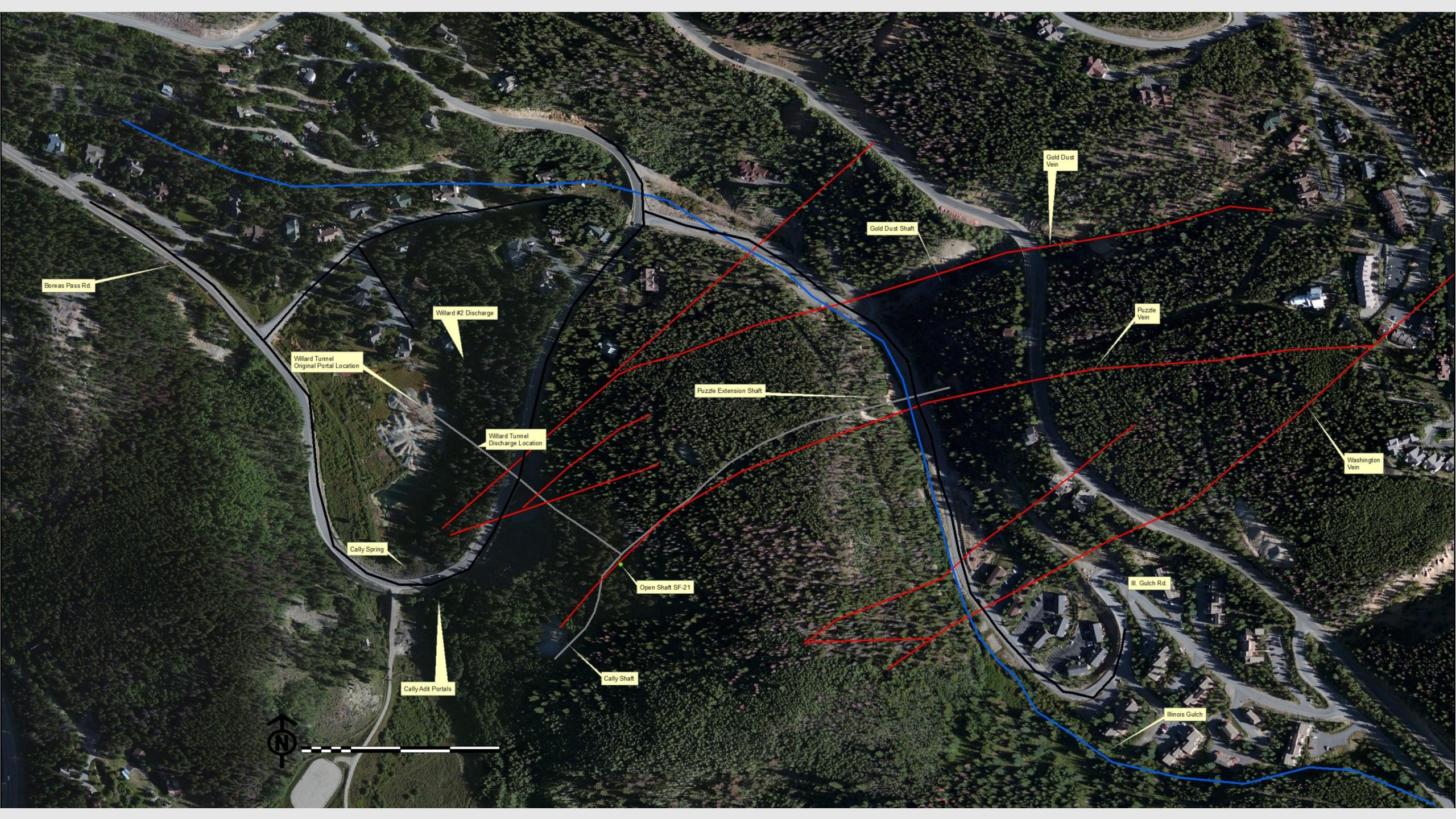
Cally Adits – Ouray Mine

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

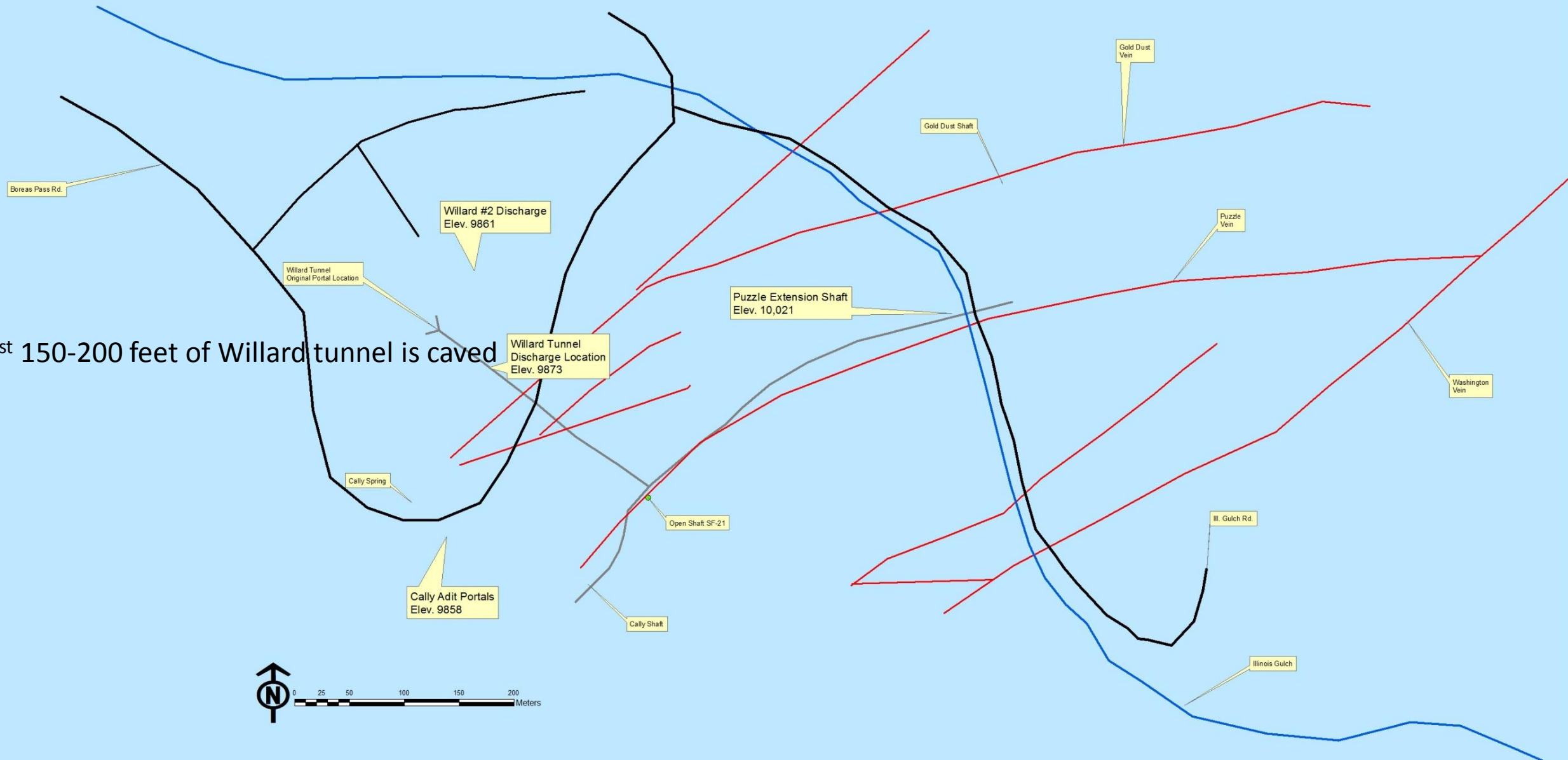
Ill. Gulch Rd

Illinois Gulch





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





Hazardous mine openings along the  
Puzzle vein were safeguarded in 2016



2016/11/08



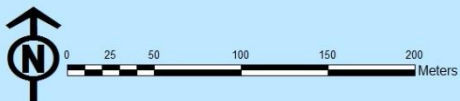
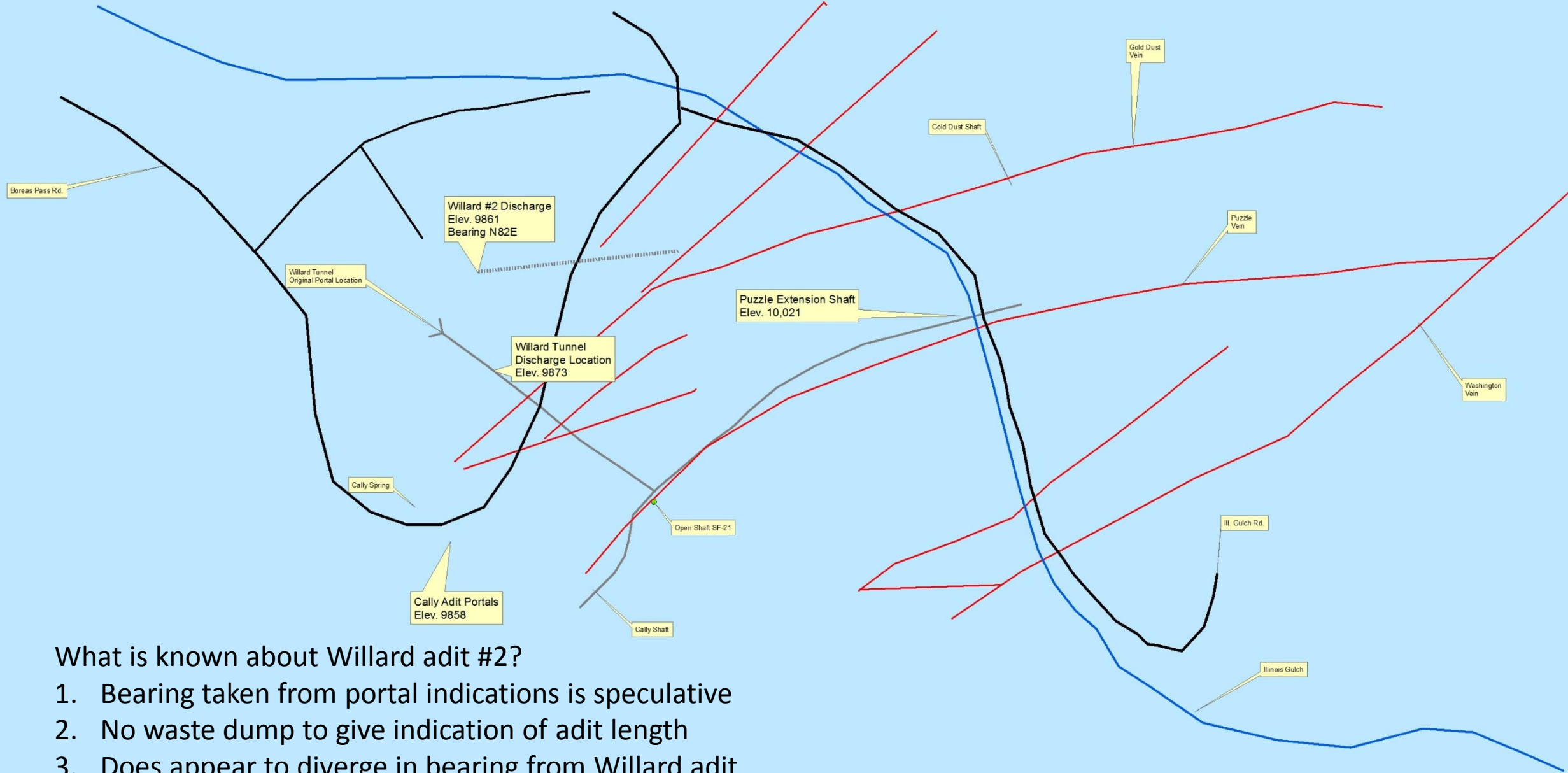


Willard adit cap timbers correspond with adit ceiling (back)

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





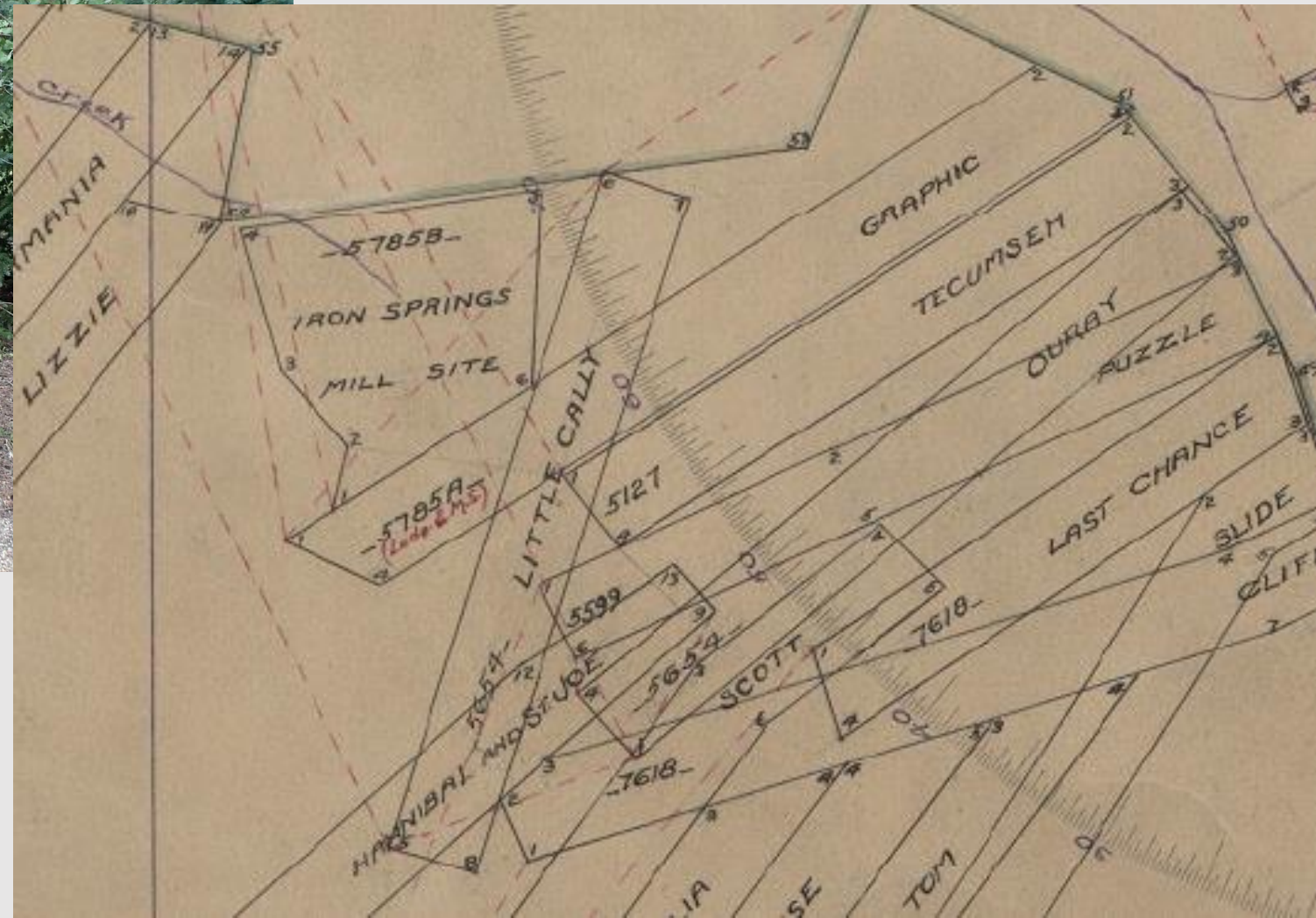






Who is Cally?

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

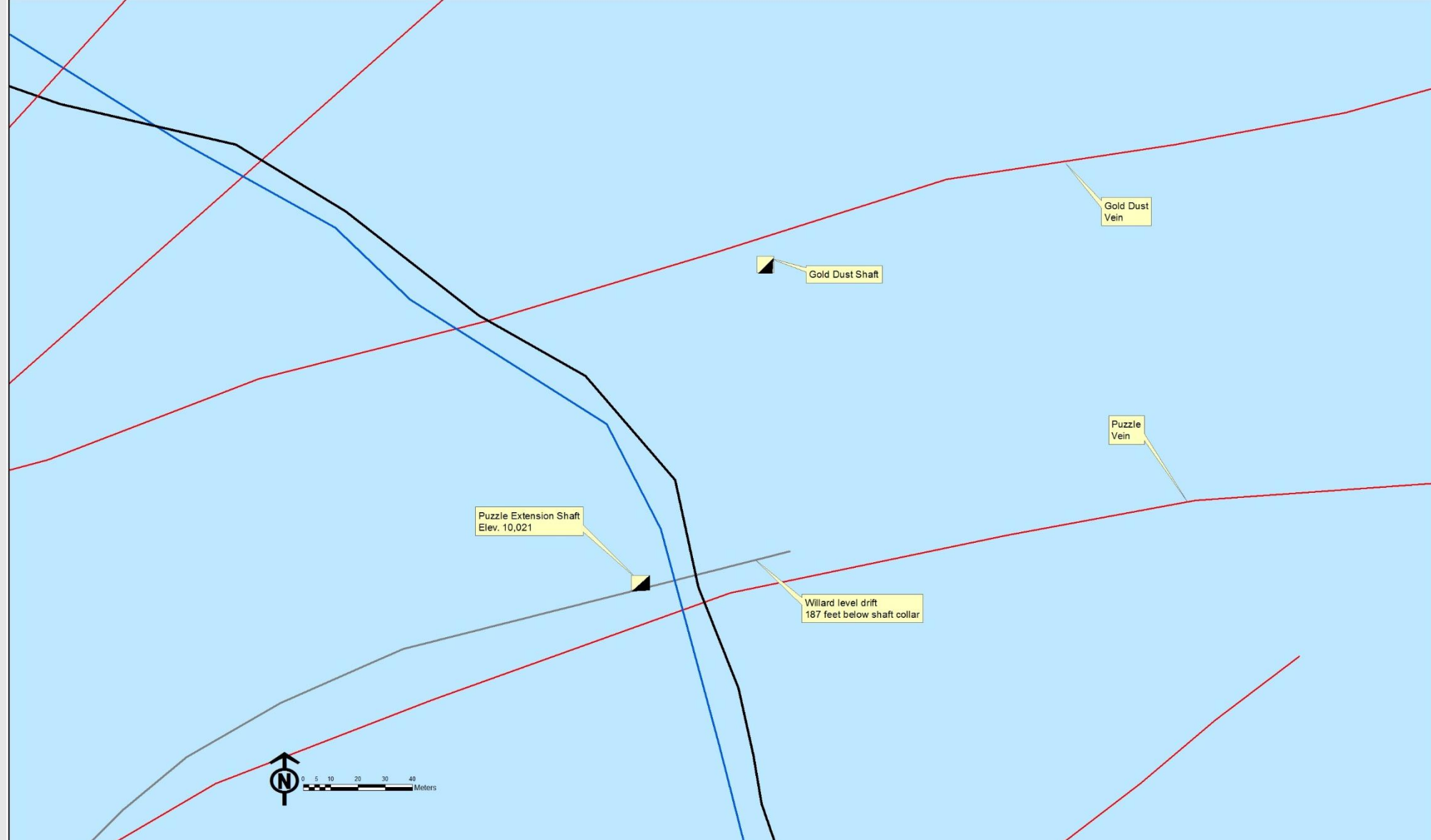


Shaft is adjacent to Illinois Creek, and base of collapse craters are approx. 10-feet above creek





Flow loss  
measured  
across  
Puzzle  
Extension  
Shaft  
Reach in  
October  
2015



Springs entering creek from the east near the shaft

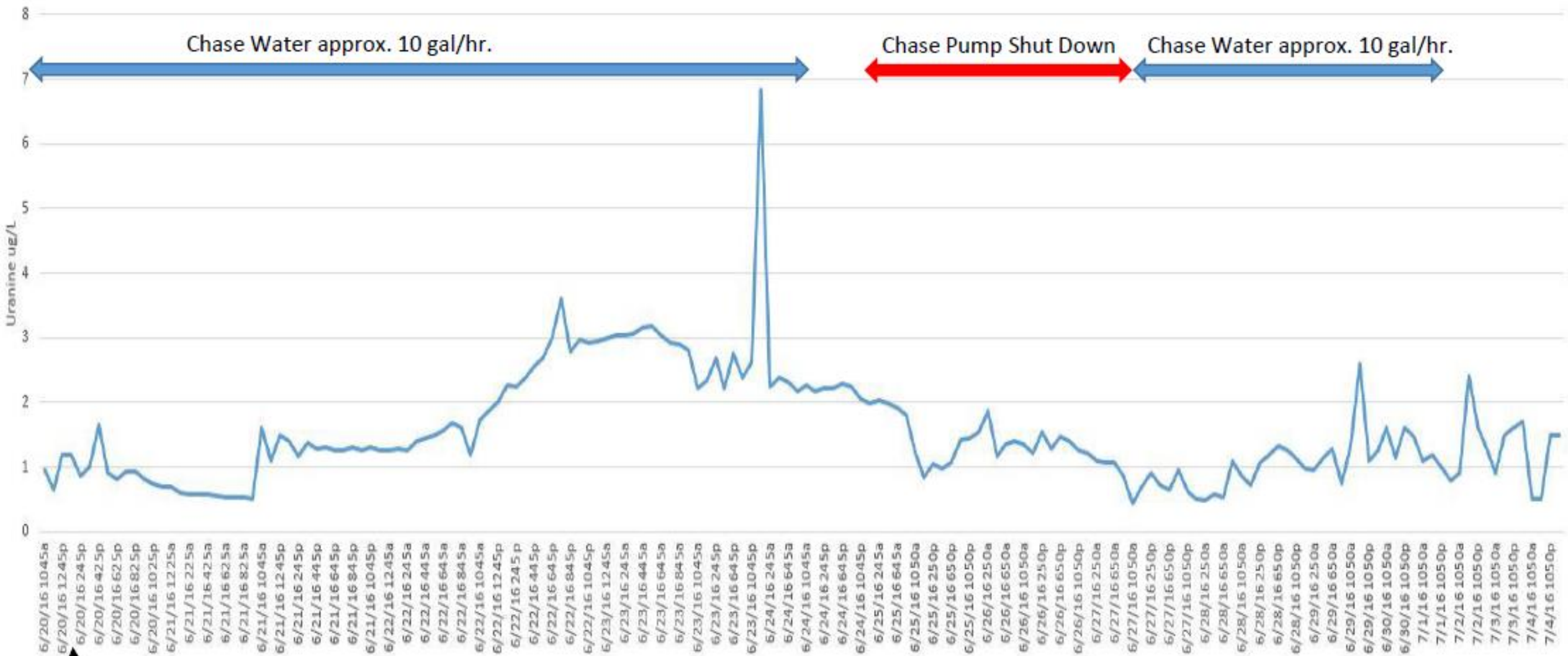


# Design and Implementation of the Dye Test

- 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



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

Dye Injected



# 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

