



CONTACT INFORMATION  
Mining Records Curator  
Arizona Geological Survey  
3550 N. Central Ave, 2nd floor  
Phoenix, AZ, 85012  
602-771-1601  
<http://www.azgs.az.gov>  
[inquiries@azgs.az.gov](mailto:inquiries@azgs.az.gov)

The following file is part of the John E. Kinnison mining collection

#### **ACCESS STATEMENT**

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

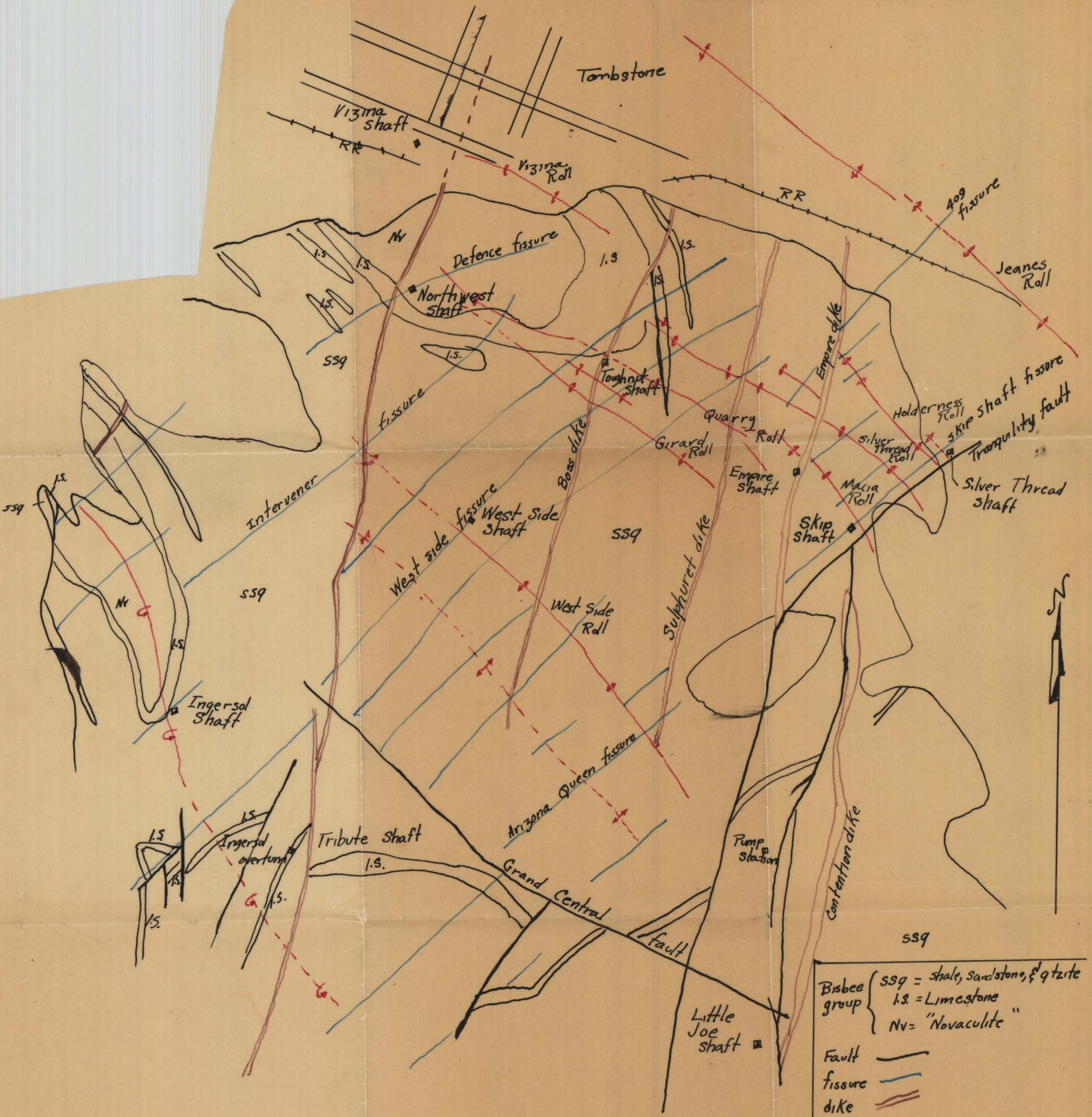
#### **CONSTRAINTS STATEMENT**

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

#### **QUALITY STATEMENT**

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.



Bisbee group {
 

- ssq = shale, sandstone, & quartzite
- l.s. = Limestone
- NV = "Novaculite"

Fault ———  
 fissure ———  
 dike ———  
 Roll ———

TOMBSTONE DISTRICT

Rocks:

Sedimentary:

Cretaceous

Bisbee group

1. Shale, sandstone, and quartzite (some ls.)
2. Blue limestone-20 to 40 ft.
3. "Novaculite-55 to 70 ft.

Carboniferous

Naco limestone

Mississippian

Escabrosa limestone

Devonian

Martin limestone

Cambrian

Abrigo limestone

Bolsa quartzite

Unconformity-----

Pre-Cambrian

- Pinal schist and pre-Cambrian  
(?) granodiorite

Igneous

Laramide

1. Rhyolite porph.
2. Uncle Sam porph.
3. Schieffelin granodiorite
4. Dikes- granodi. to diorite

Pre-Cambrian(?)

Granodiorite

Structure:

reverse

Igneous intrusives:

During the Laramide, the region was compressed in a general SW\*NE to N-S direction, resulting in folding. In places rocks broke and slipped causing faults of high angle. Breaks at right angles to the E-W folds formed and were later intruded by dikes. These probably resulted from shearing forces.

Intrusions of one general period, with Uncle Sam porph. slightly younger than the Schieffelin granodiorite. Dikes intrude the major intrusives, and follow N-S fissures and E\*W anticlines and faults.

Following intrusion, the region was broken by northeasterly trending fissures of very small displacement, said fissures being main channels for mineralizing solutions.

Following ore deposition, normal faulting occurred, causing Tranquility-Contention (ne to n) and Grand Central (nw)

Faults-- Ajax Hill horst most prominent struc. feature Bounded on north by Tombstone basin/ where most ore is found. Rolls--folds of a third order occur as corrugations of the secondary anticlines and synclines of the Tombstone basin. Bedding -plane faults numerous in highly tilted rocks along the south rim of the Tombstone basin. Some bedding faults assoc. with anti. and rolls. Tension fissures (hoodoo cracks) form along the sharp crests of the rolls, and strike // with the rolls, dip steeply, and in places appreciably displace the beds. Saddle fissures, // with bedding, due to sharp bending at the top of rolls, produces openings. N-S fissures and faults (ave N 10-15 E, dp 75-85 W), usually produce little movement. NE fissures (N 30-55 E) favorable for ore.

## Ore Deposits:

### Classified by past production:

1. Assoc with NS(dike) fissures
2. Assoc. with faults
3. Assoc. with anti. and rolls
4. associa. with NE fissures only

Deposits generally with NE fissures and some other feature

### Favorable rocks:

1. Beds of ls above the Blue ls.
2. Blue ls
3. Novaculite
4. Upper portion of Nace ls
5. Beds of lower Naco- Lucky Cuss and Bunker Hill
6. Lower Paleozoic- Emerald

Also dikes: Contention, Grand Central, and Head Center

### North-South(dike) fissures:

1. Contention-Grand Central ore zone ( follows Contention dike S. through the Head Center, Contention, Flora morrison, and Grand Central past the Brady stope. 3300 ft.
2. Emerald
3. Tombstone extension area
4. Comet ore zone( Comet and Black Eagle

### Faults:

1. Lucky Cuss fault zone( Lucky Cuss and Old Gaurd; Luck sure on the S. Herschel on the N.).  
Comprised of veins in Lucky Cuss fault, veins in NE fissures, and limestone replacement assoc. with the NE fissures.
2. Prompter fault system(Oregon-Prompter, Bunker Hill, Dry Hi Hill, Rocky Bar, and Contact 8500 ft.

### Anticlines and rolls:

1. Mineralization greatest near NE fissures and at or near the crests of anticlines. And greatest near base of the Nova. and in Blue ls. Rolls plunge with larger anti. structure.
2. From NE to SW: Empire anti. Sulphuret syncline, Sulphuret anti. Boss terrace, Ingersol overturn, and Hardup syncline.

### Fissure deposits:

1. Skip Shaft fissure
2. Arizona Queen fissure probably SW continuation of SK f
3. West Side fissure
4. Defence fissure

Scale 1" = 50' probably plot every 5'

Red - Veins and/or mineralization

blue - Fault structures

struct. - Symbols, contacts etc.

modify symbols on maps to std.

Geol 110

Tombston

$$\begin{aligned} \text{Area Plan View} &= 3358 \text{ ft}^2 \\ \text{Pillars} &= 28 \text{ ft}^2 \\ \text{Net area Plan} &= 3330 \text{ ft}^2 \end{aligned}$$

$$\begin{aligned} \text{Area Sec A-A} &= 360 \text{ ft}^2 \\ \text{Sec B-B} &= 540 \\ \text{Total} &= 900 \end{aligned}$$

$$\begin{aligned} \text{Length Sec A-A} &= 45 \text{ ft} \\ \text{Sec B-B} &= 71 \\ \text{Total length} &= 116 \text{ ft} \end{aligned}$$

$$\text{Mean height} = \frac{900}{116} = 7.76 \text{ ft}$$

$$\text{Volume slope} = 3330 \times 7.76 = 25840.8 \text{ cu ft}$$

$$\begin{aligned} \text{T.F. ore} &= 10 \\ \text{T.F. waste} &= 12.5 \end{aligned}$$

Tonnage rock mined contains 80% ore, 20% waste

$$\begin{aligned} \text{T.F. of Mined rock} &= .8 \times 10 + .2 \times 12.5 = 8 + 2.5 \\ &= 10.5 \end{aligned}$$

$$\text{Tonnage Rock mined} = \frac{25840.8}{10.5} = 2461.03 \checkmark 2461.03$$

$$\begin{array}{r} \text{Tonnage ore} = 2457.97 \times .8 = 1965.976 \checkmark \\ \text{tonnage waste} = 2457.97 \times .2 = 491.494 \checkmark \\ \hline 2457.970 \text{ ck} \checkmark \end{array} \quad \begin{array}{r} 19688.24 \\ 492.206 \\ \hline 2461.030 \text{ ck} \end{array}$$

$$\text{Value of ore} = \$32.50 / \text{ton}$$

$$\begin{aligned} \text{Total value ore} &= 1965.976 \times 32.50 = 63894.22 \\ &= \$63894.22 \\ &63894.22 \end{aligned} \quad \begin{aligned} 1968.824 \times 32.50 \\ = 63986.88 \\ 63987. \end{aligned} \quad (78)$$

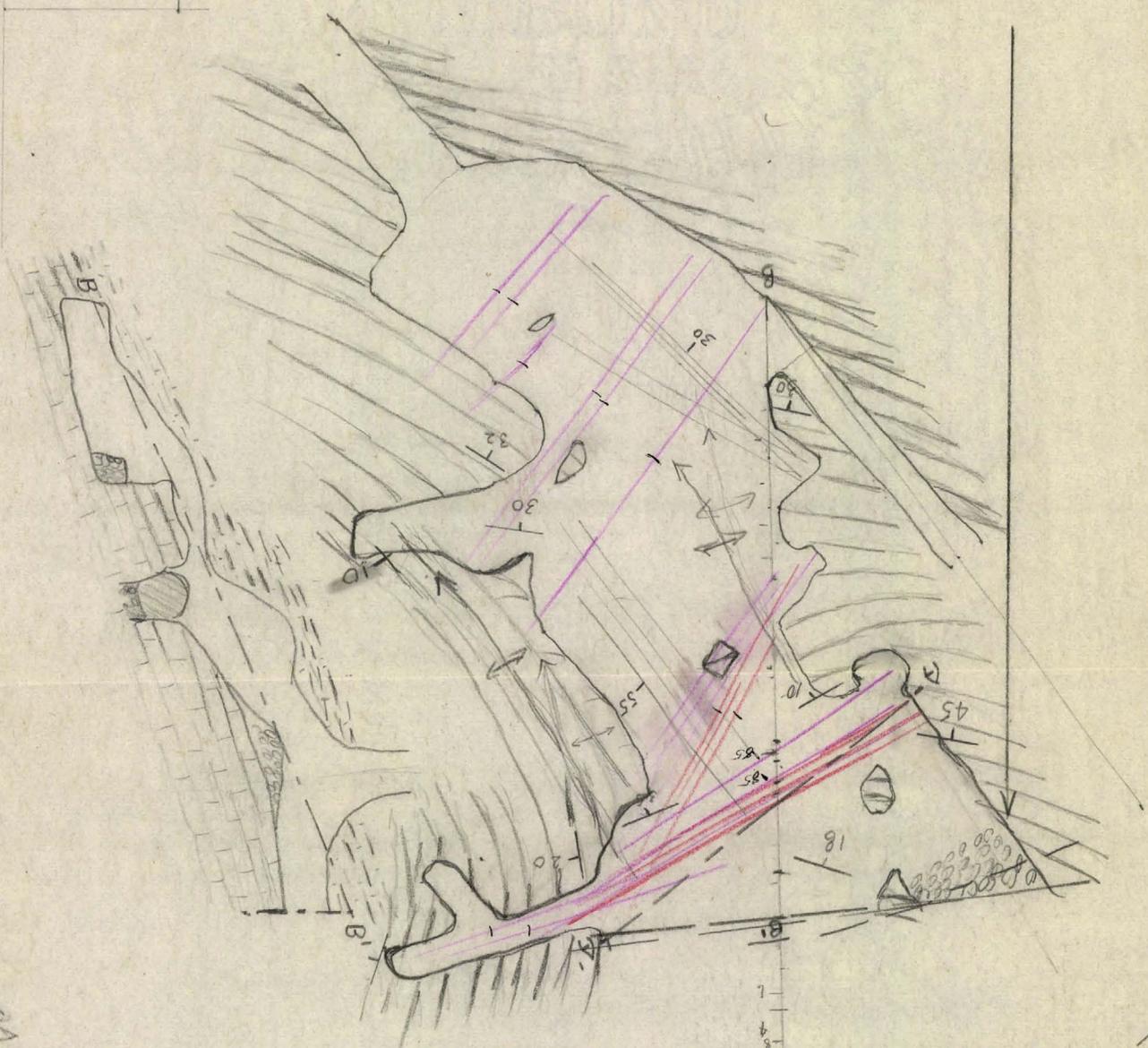
Colly Girard Slope

Field Maps  
and Abstract of Bor Mine Band.

Tombstone Maps

Geol 110

Girard  
Stofo



8700  
x 400  
33900

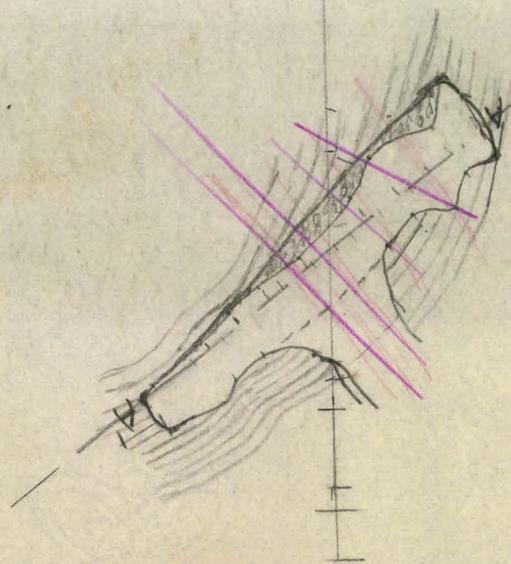
90

2743

3358

3000  
x 1000  
3000000

3400  
x 200  
680000



11

11

Schwartz  
3'  
Kinnison

N



600 Count

250 Sh.

Breccia

Dike

Lime being deposited

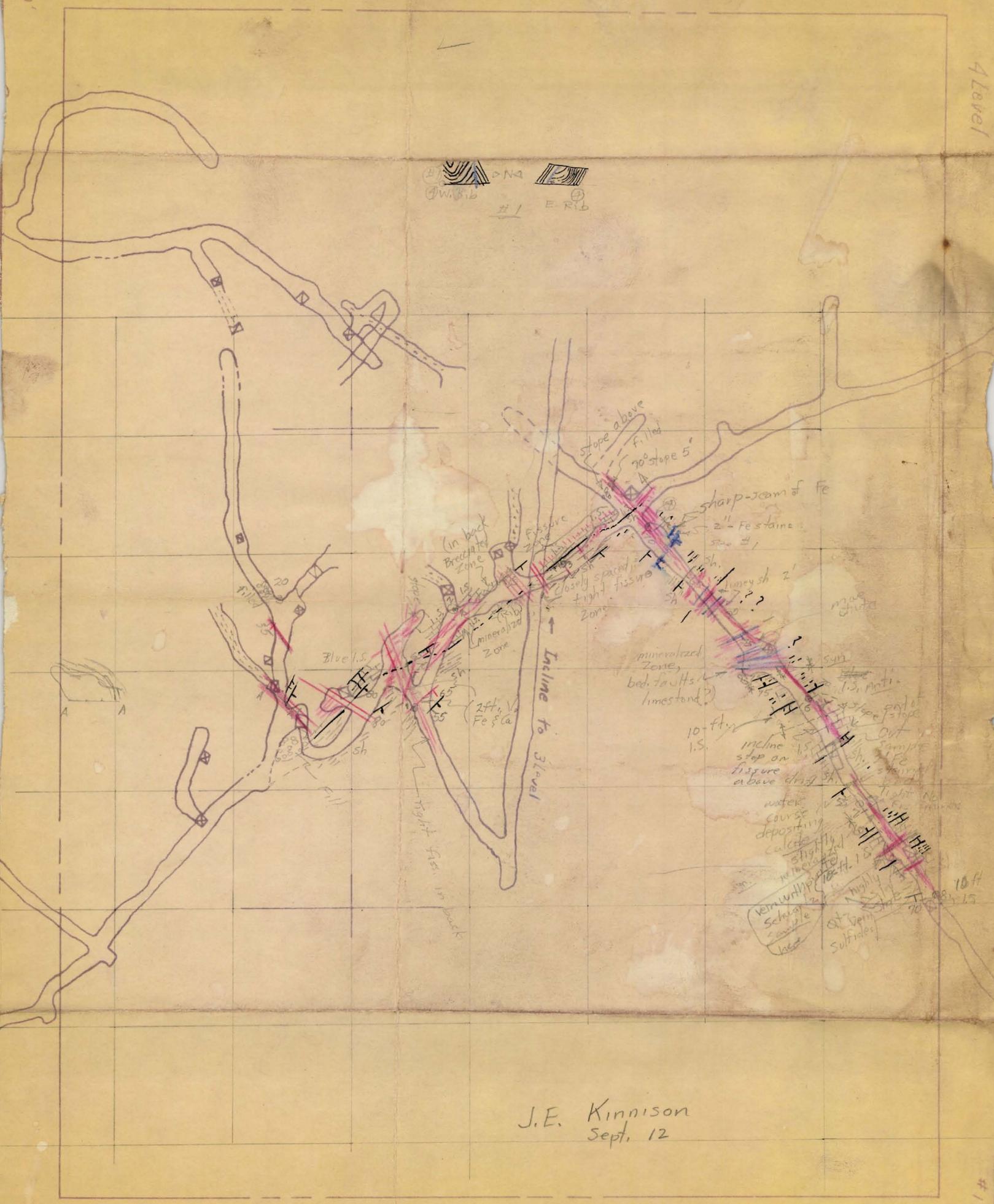
Did not map this

Empire shaft

Schwartz  
3'  
Kinnison

50'

4 level

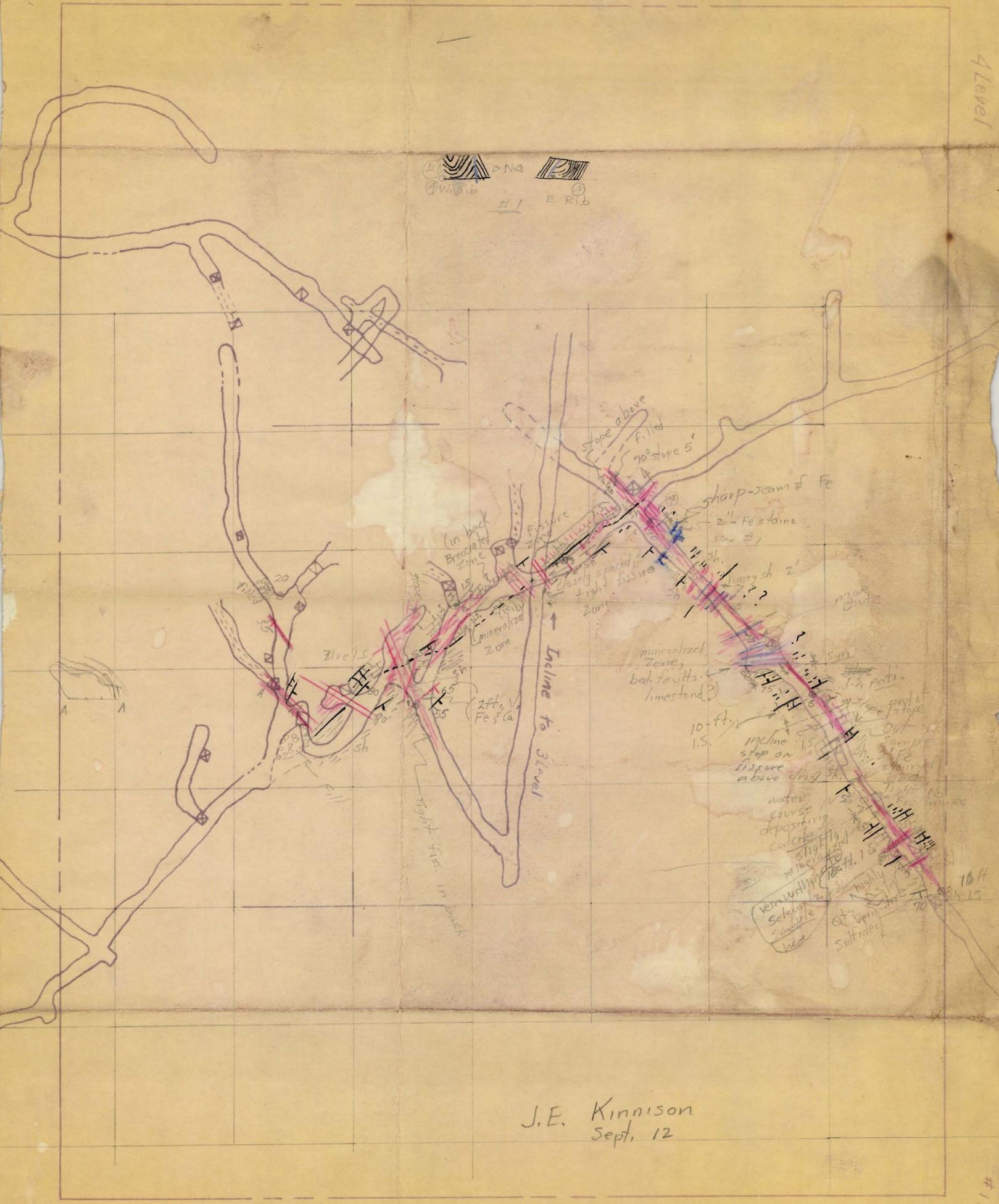
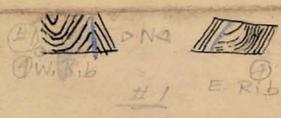


J.E. Kinnison  
 Sept. 12

#13

50

4 Level

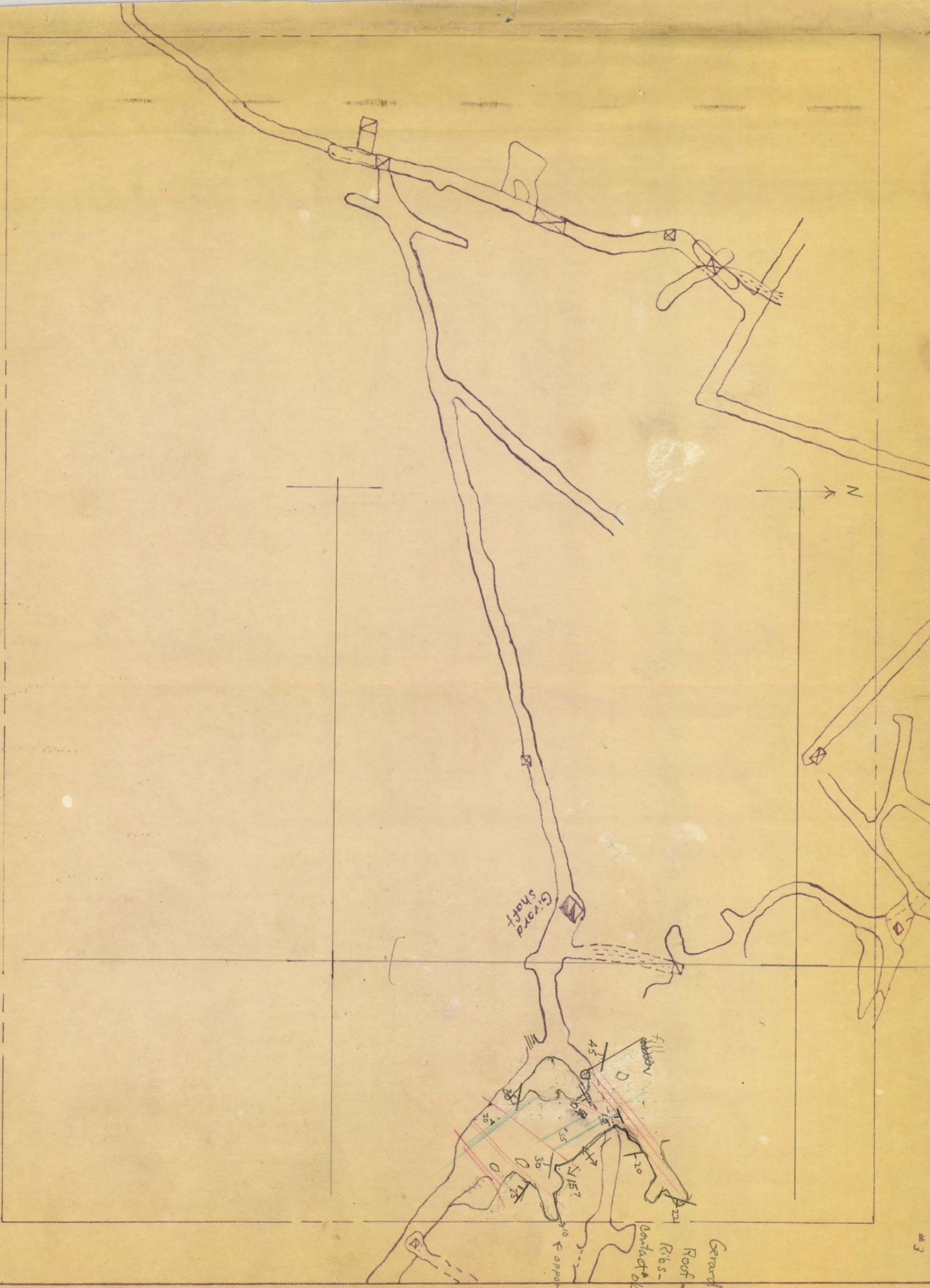


J.E. Kinnison  
 Sept. 12

#13

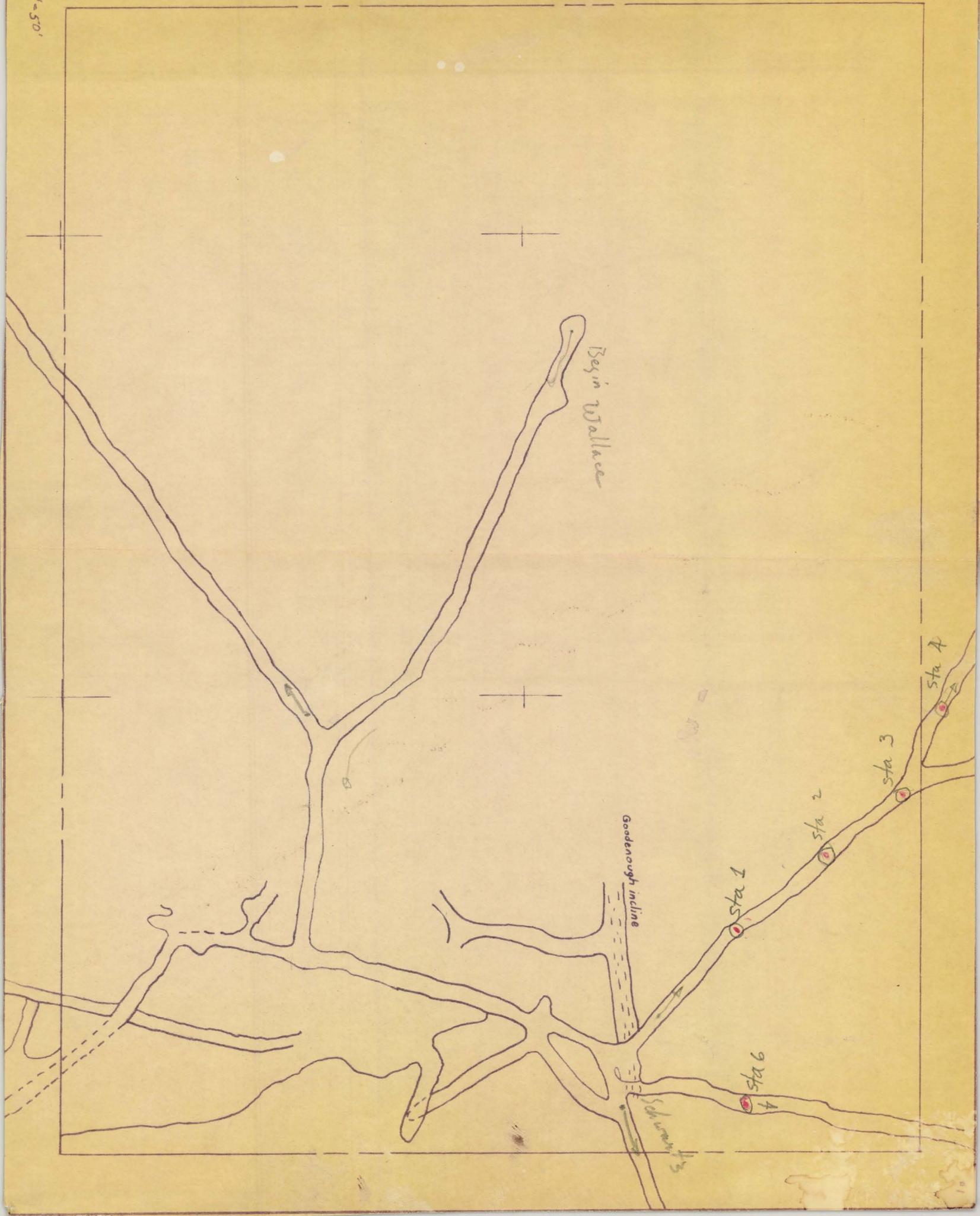


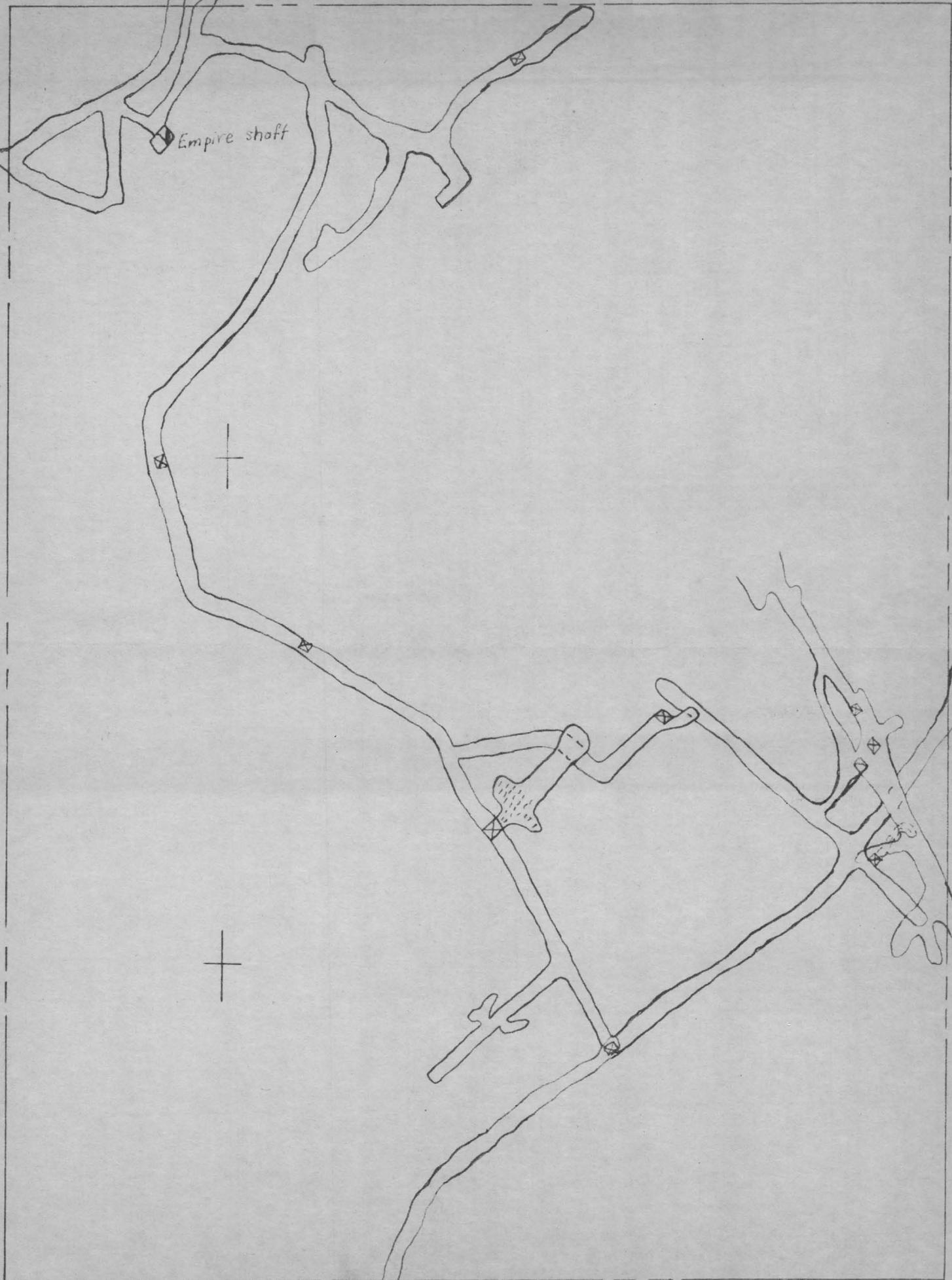
1" = 50'



Kinnison  
Schwarz

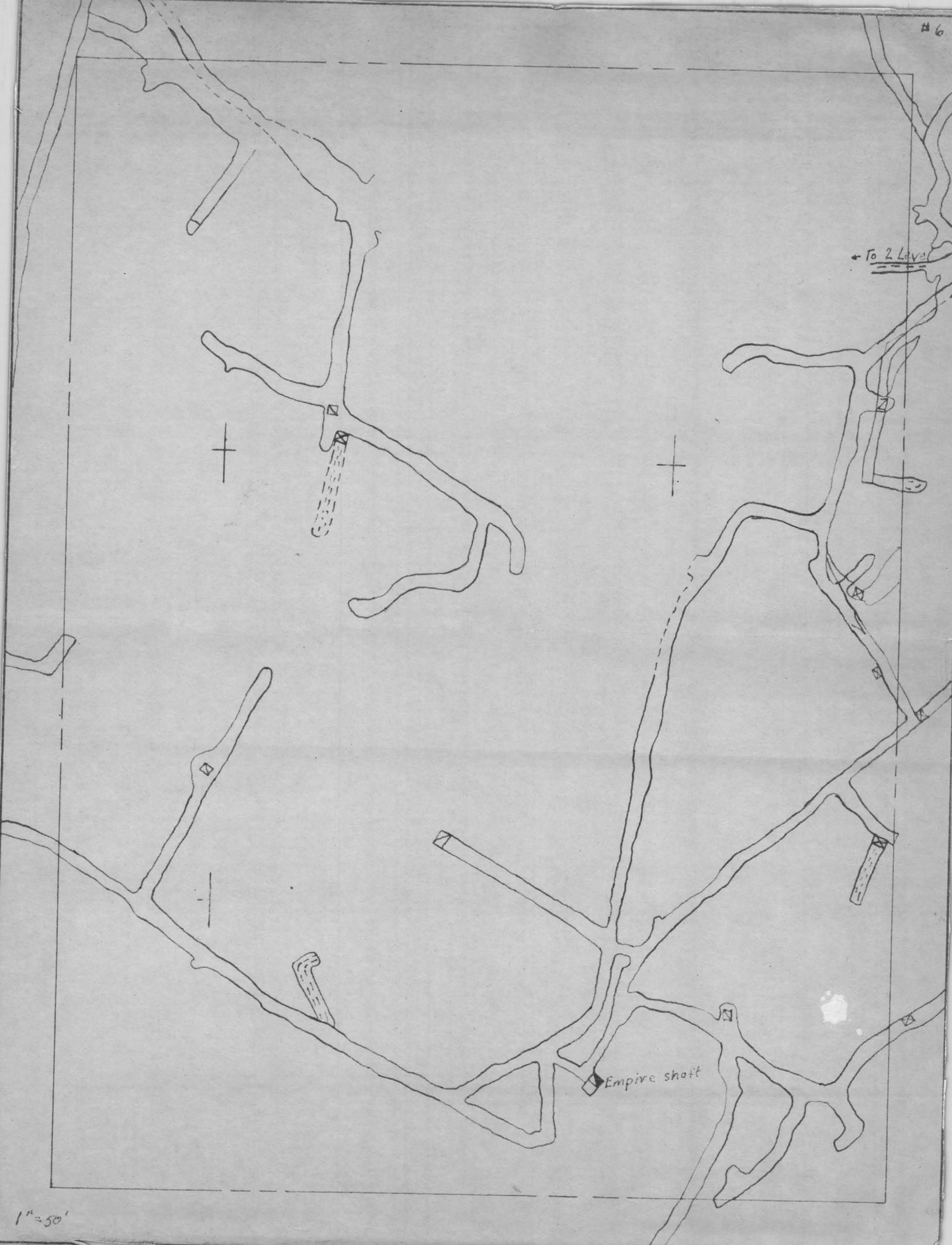
1" = 50'





1" = 50'

← To 2 Level



1" = 50'