Corinna - Circa 1998

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Site July 5th 2001

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Site - October 1, 2001

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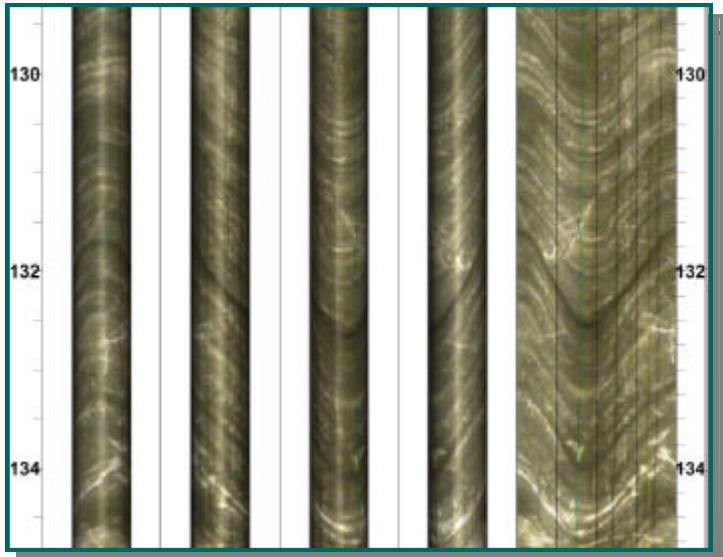
Former Eastland Woolen Mill - Bedrock Groundwater Geophysical Program



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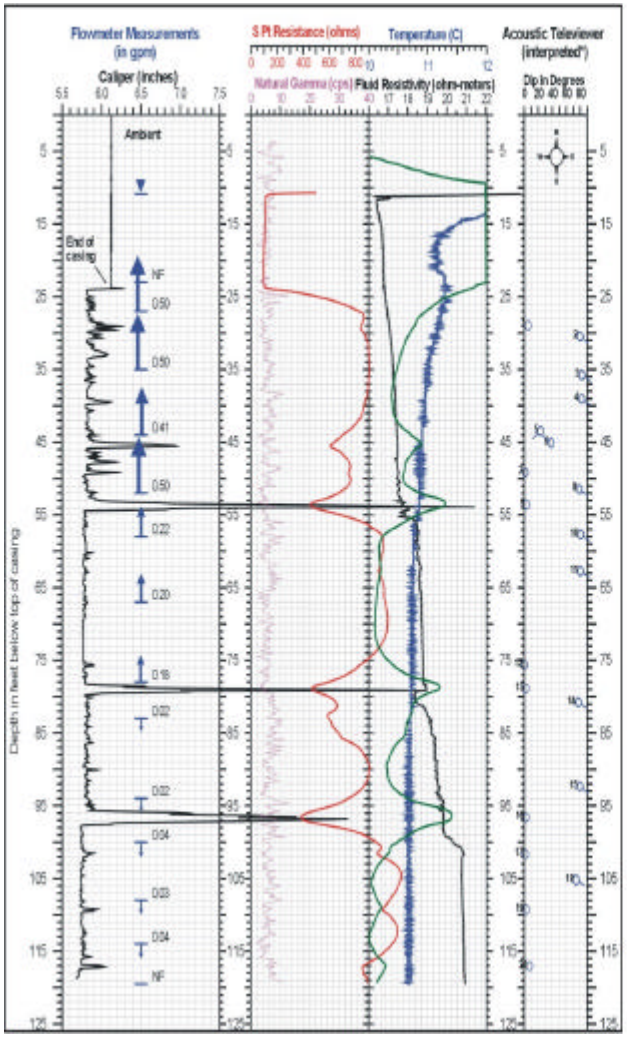
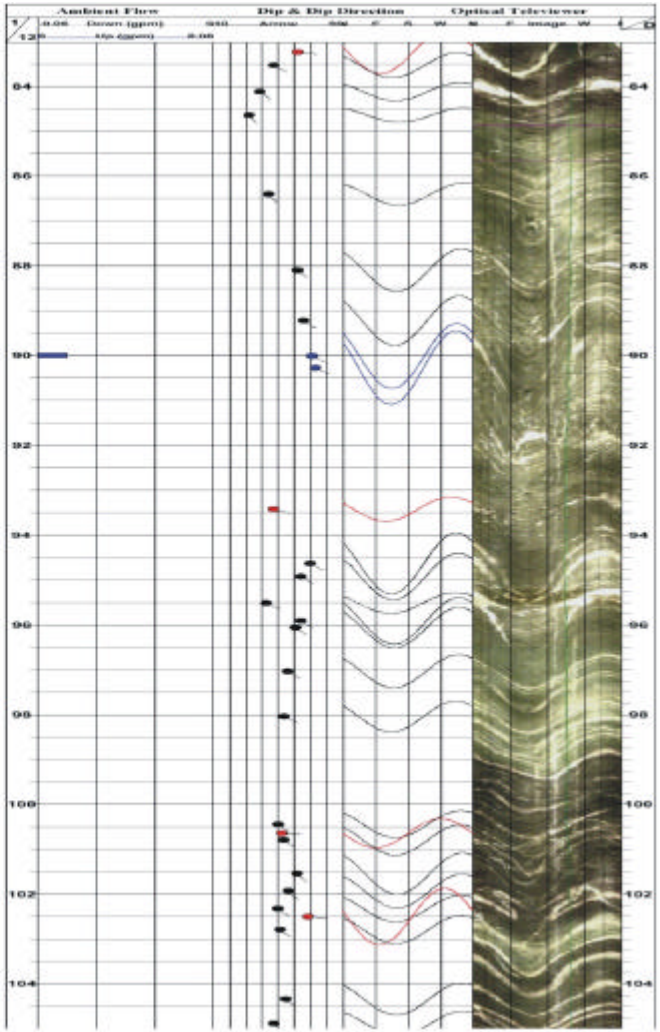
Former Eastland Woolen Mill - Bedrock Structure Summary



Geophysical Log



Optical Log

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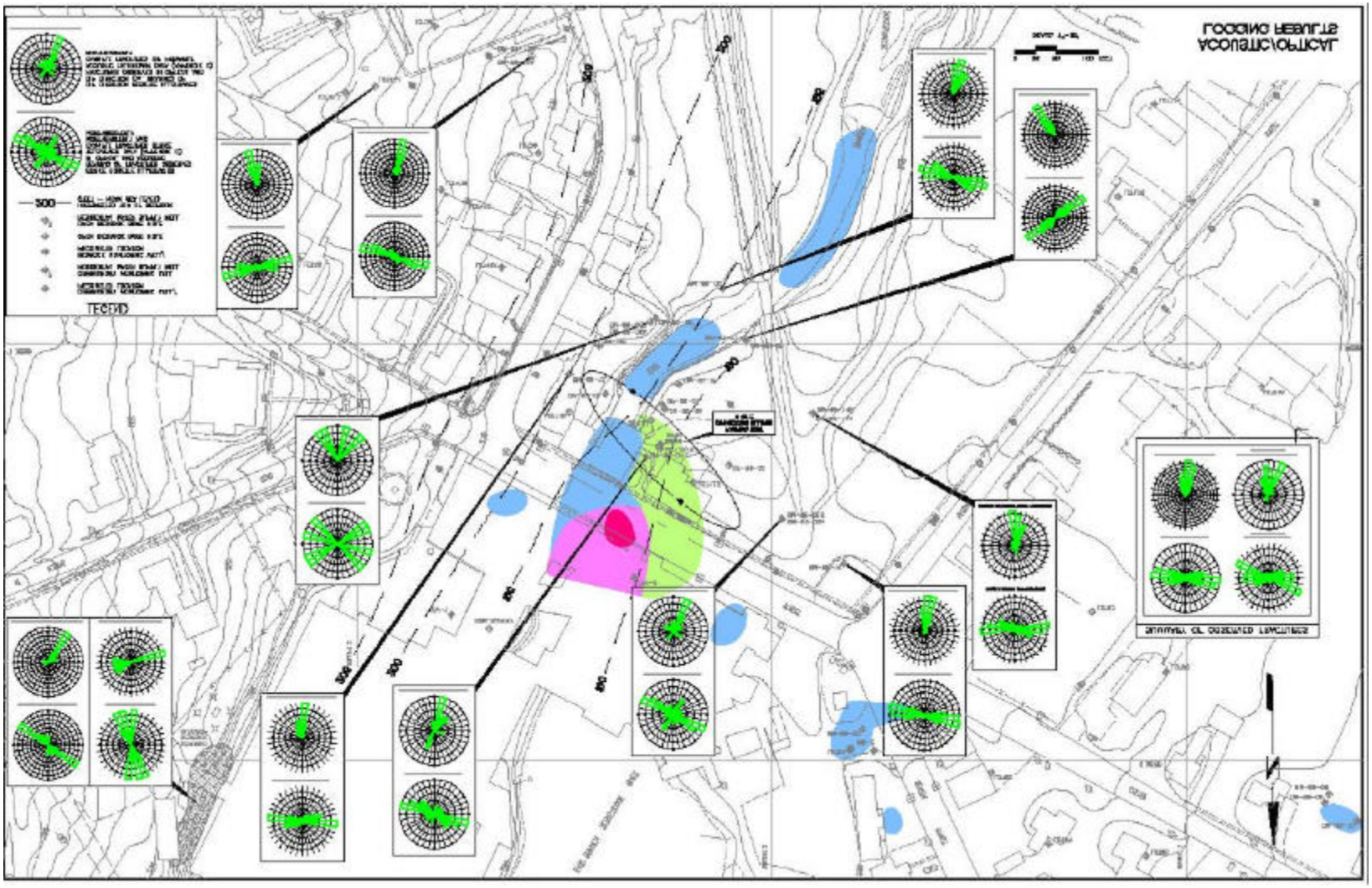
Borehole Fracture Orientation



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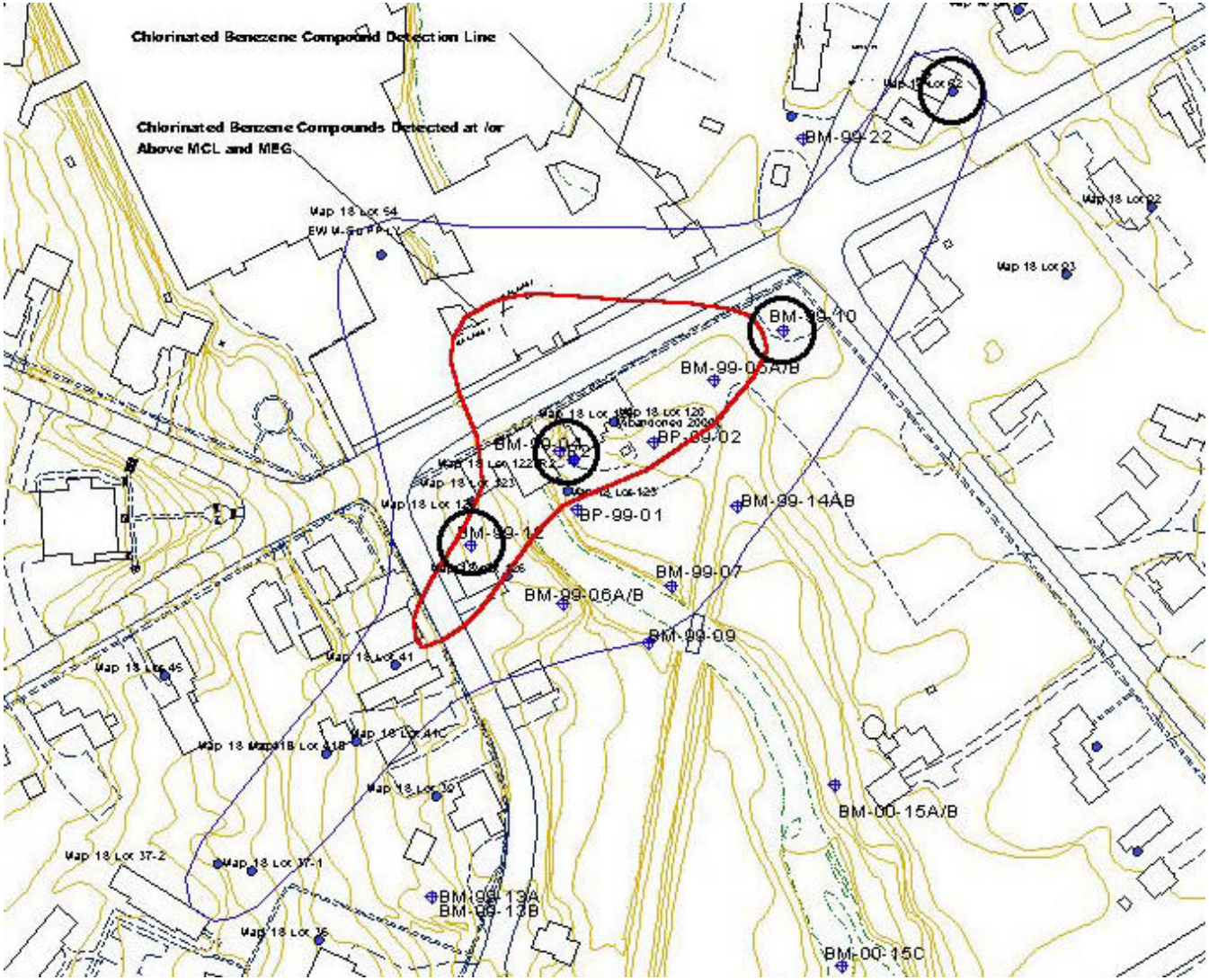
Plume and FLUTe Locations



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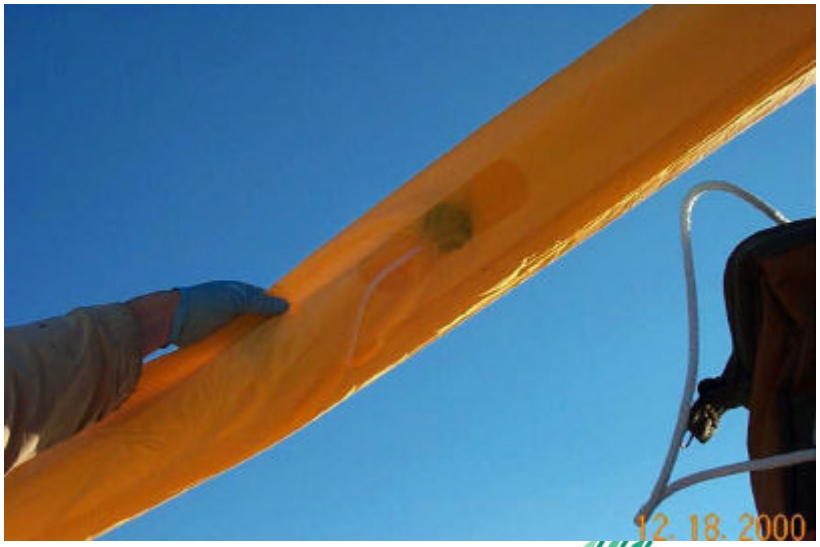
FLUTe Sampler



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FLUTe Well Head

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Bedrock GW Sampling Methods

- **Open Borehole / Residential Wells**
  - **Purge 55 gallons - Grab Sample**
- **Straddle Packer - 6” Diameter Boreholes**
  - **Low Flow - > 15 gallons removed while sampling**
- **Conventional Well - 2” Diameter PVC**
  - **Low Flow - 5-8 gallons removed while sampling**
- **Flute Liners - Multilevel Discrete Zones**
  - **Ambient flow - 0.5 gallon removed while sampling**

Bedrock Wells

Outside Plume

Method		Min	Max	Average	Geomean	stddev	avecoefdev	Count
Arsenic	ug/L	2.3	59.3	15.5	11.2	13.6	0.9	24
Cobalt	ug/L	1.3	1.7	1.4	1.4	0.2	0.1	5
Iron	ug/L	14.7	10600	1175.7	373.7	2180.0	1.9	29
Manganese	ug/L	8.5	2290	276.1	107.1	478.4	1.7	35
Nickel	ug/L	1.1	13.3	3.8	3.2	3.0	0.8	15
Zinc	ug/L	15.1	207	57.7	40.9	56.2	1.0	26

Inside Plume

Method		Min	Max	Average	Geomean	stddev	avecoefde	Count
Arsenic	ug/L	3.6	17.5	9.8	8.8	4.4	0.5	21
Cobalt	ug/L	0.72	0.72	0.7	0.7	#DIV/0!	#DIV/0!	1
Iron	ug/L	22.8	10600	1722.3	579.9	2876.1	1.7	21
Manganese	ug/L	22.5	389	80.4	59.1	81.4	1.0	26
Nickel	ug/L	1.3	21.4	4.9	3.4	5.3	1.1	16
Zinc	ug/L	3.5	1320	103.2	27.8	278.1	2.7	23

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Residential Wells

Outside Plume

Method		Min	Max	Average	Geomean	stddev	avecoefde	Count
Arsenic	ug/L	2	54.5	15.1	10.8	14.5	1.0	18
Cobalt	ug/L	2.2	3	2.6	2.6	0.6	4.6	2
Iron	ug/L	14.2	7370	1467.7	393.0	2242.7	0.7	16
Manganese	ug/L	3.4	1380	208.0	121.8	294.4	0.7	19
Nickel	ug/L	1.1	9.4	5.2	4.1	3.2	1.6	12
Zinc	ug/L	4	325	57.7	28.1	81.7	0.7	20

Inside Plume

Method		Min	Max	Average	Geomean	stddev	avecoefdev	Count
Arsenic	ug/L	3.6	40	18.8	14.4	12.2	0.6	11
Cobalt	ug/L	0.7	15.2	3.9	2.2	5.1	1.3	8
Iron	ug/L	612	5350	2493.0	1819.9	1902.2	0.8	12
Manganese	ug/L	23.6	2240	749.4	373.1	728.3	1.0	13
Nickel	ug/L	2	37.8	12.3	8.7	11.5	0.9	9
Zinc	ug/L	11.9	266	58.6	38.2	71.2	1.2	12

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FLUTe Samples

Method		Min	Max	Average	Geomean	stdde	avecoefde	Count
Arsenic	ug/L	17.3	333	120.9	84.3	98.7	0.8	11
Cobalt	ug/L	0.72	7.5	2.3	1.6	2.4	1.1	7
Iron	ug/L	249	2750	1090.2	834.2	849.5	0.8	10
Manganese	ug/L	37.6	1500	349.3	112.2	555.3	1.6	12
Nickel	ug/L	3.1	19.8	8.4	6.6	6.9	0.8	5
Zinc	ug/L	14.3	97.2	52.1	43.7	30.3	0.6	7

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BM-99-04 FLUTe

Location Name	BM-99-04	BM-99-04	BM-99-04
Field Sample ID	BM-99-04B122CX	BM-99-04C219CX	BM-99-04D283CX
Sample Date	5/2/01	5/2/01	5/3/01
Sample Type	FS	FS	FS
Lab ID	MA00R2	MA00S6	MA00T2
Method	ILM04.1	ILM04.1	ILM04.1
Arsenic	17.3		111
Cobalt	0.75		0.72
Iron	327		249
Manganese	62	57.1	44.4
Nickel			
Zinc	27.6		14.3

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BM-99-12 Flute

Location Name	BM-99-12	BM-99-12	BM-99-12
Field Sample ID	BM-99-12B145CX	BM-99-12C213CX	BM-99-12D292CX
Sample Date	5/2/01	5/2/01	5/2/01
Sample Type	FS	FS	FS
Lab ID	MA00S0	MA00S1	MA00S2
Method	ILM04.1	ILM04.1	ILM04.1
Arsenic	28.4	96.6	333
Cobalt	1.2	1.4	7.5
Iron	653	841	530
Manganese	37.6	64.3	79.8
Nickel	3.1	3.5	19.8
Zinc	30.9	46.9	73.6

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LOT 62 FLUTe

Location Name	Map 18 Lot 62	Map 18 Lot 62	Map 18 Lot 62
Field Sample ID	RW-18-62A055CX	RW-18-62B095CX	RW-18-62C132CX
Sample Date	4/30/01	4/30/01	4/30/01
Sample Type	FS	FS	FS
Lab ID	MA00P6	MA00P7	MA00P8
Method	ILM04.1	ILM04.1	ILM04.1
Arsenic	66.4	220	129
Cobalt			
Iron	938		1540
Manganese	1500	870	1350
Nickel			
Zinc			

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BM-99-10 FLUTe

Location Name	BM-99-10	BM-99-10	BM-99-10
Field Sample ID	BM-99-10A135CX	BM-99-10B191CX	BM-99-10D280CX
Sample Date	5/1/01	5/2/01	5/2/01
Sample Type	FS	FS	FS
Lab ID	MA00Q9	MA00R6	MA00R8
Method	ILM04.1	ILM04.1	ILM04.1
Arsenic	24.5	86.8	217
Cobalt		2.8	1.5
Iron	744	2750	2330
Manganese	44.5	40.5	41.2
Nickel		10	5.8
Zinc		97.2	74.3

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CONFUSIONS

- **Are As and Co associated mineralogically ?**
- **Are high As concentration data in FLUTes a Function of Sampling Methodology or a Function of depth and geochemical changes within the Aquifer (Redox, DO etc) ?**
- **Are sophisticated sampling techniques appropriate for assessing exposure point concentrations for As and related metals ?**