CNWRA

NOPAL I PETROGRAPHY

+10 LEVEL

EAST-WEST TRAVERSE

PENA BLANCA, CHIHUAHUA, MEXICO

308 --- Q200405270004
Supplemental Material, Technical Activity Supporting Documentation: Experimental Data for Nopal I Petrography +10 Level East-West Traverse Pena Blanca, Chihuahua, Mexico (01/19/1993 through 01/20/1993)

NOPAL I PETROGRAPHY

Sample No. 20.65/7.55 - TS 1

Description of matrix and alteration: very fine quartz/feldspar matrix with cryptocrystalline iron oxide throughout. Alunite is identified by XRD and is probably a fine crystalline constituent of the matrix.

Description of phenocrysts/lithoclasts and alteration: Kaolinite replaced feldspars and corroded quartz are the most abundant phenocrysts. A few iron oxide phenocrysts, were ilmenite, but have been replaced.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Kaolinite fills all the fractures and replaces most phenocrysts. Some fractures and voids are filled with coarse grained quartz.

Degree of kaolinization: none slight moderate extreme

Degree of hematitization

Description of mineralization:

no Uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides

Other minerals

NOPAL I PETROGRAPHY

Sample No. 20.1/7.7 – TS1

Volcanic texture destroyed

Description of matrix and alteration: fine grain to crypto crystalline quartz feldspar & iron oxide matrix. Most phenocrysts have been replaced by Kaolinite. Any volcanic structures have been destroyed. Alunite is probably fine constituent of the matrix.

Description of phenocrysts/lithoclasts and alteration: Kaolinite has replaced all feldspar phenocrysts. Coarse grained quartz is replacing the Kaolinite in some cases. Ilmenite phenocrysts embedded with zircons are being replaced by iron oxides.

Degree of fracturing or brecciation: none slight (moderate) extreme

Description of fracture-filling material: Fractures are filled with Kaolinite and Alunite or with iron oxides. Pyrites are numerous and have been oxidized to hematite in fractures with kaolinite.

Degree of kaolinization: none slight (moderate) extreme

Degree of hematization: (moderate)

Description of mineralization:

Kaolinite has replaced most of the phenocrysts and filled the fractures. Alunite is found in the matrix and in fractures. No Uranium minerals - may be traces in fractures.

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides Hematite, Ilmenite and iron oxides

Other minerals zircons found in assoc w/ ilmenite and occasionally alone

NOPAL I PETROGRAPHY

Sample No. 20.1/7.7 - TS 2

Description of matrix and alteration:

Same as TS 1

Description of phenocrysts/lithoclasts and alteration:

More quartz phenocrysts present.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Hematitization along fracture and very slightly radiating from fracture.

Degree of kaolinization: none slight moderate extreme

Degree of hematitization O

Description of mineralization:

No uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 19.65/7.55 - TS1

Description of matrix and alteration: fine grained quartz/kaolinite matrix. Amorphous iron oxide intergrown with clay matrix. Cryptocrystalline iron oxide throughout sample. XRD show alunite but is too fine grain to see in thin section. Volcanic ~~texture~~ preserved.

Description of phenocrysts/lithoclasts and alteration: feldspars have altered to kaolinite. A few corroded euhedral quartz phenocrysts. Alunite with zircon also found. Some kaolinized phenocrysts are being replaced by coarse grained quartz.

Degree of fracturing or brecciation: ~~none~~ slight moderate extreme

Description of fracture-filling material: N/A

Degree of kaolinization: none slight moderate extreme

Degree of hematization

Description of mineralization:

No Uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 19.0/7.8 - TS1

Description of matrix and alteration: Coarse grain quartz and clay have preserved volcanic texture. Most fractures & phenocrysts filled by Kaolinite, amorpheous iron oxide throughout matrix. Matrix contains less hematite than fractures.

Description of phenocrysts/lithoclasts and alteration: Kaolinite replaces most phenocrysts. There are some euhedral quartz grains that are corroded.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Most fractures are filled with kaolinite + iron oxides.

Degree of kaolinization: none slight moderate extreme

Degree of hematitization

Description of mineralization:

No Uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides Amorpheous iron oxide (hematite) throughout the sample.

Other minerals

NOPAL I PETROGRAPHY

Sample No. 18.6 | 7.7 – TS1

Description of matrix and alteration: Quartz / kaolinite intergrown. Volcanic texture & eutaxitic texture still evident in plane light. XRD shows alunite but not visible in the section. Strong hematization around a replaced phenocryst (?) with coarse grained quartz rimming the phenocryst.

Description of phenocrysts/lithoclasts and alteration: Most feldspar phenocrysts have been replaced by kaolinite. Some quartz phenocrysts and lithics with silicon, are also found.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material:

Degree of kaolinization: none slight moderate ~~extreme~~

Degree of hematization: localized

Description of mineralization:

No uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides Localized around replaced phenocryst or vug. Amorphous iron oxide

Other minerals

NOPAL I PETROGRAPHY

Sample No. 18.35/7.9 – 751

Description of matrix and alteration: Quartz & Kaolinite - fairly coarse grained In plane light volcanic & cataclastic texture is evident. Cryptocrystline iron oxide throughout matrix. Amorphous iron oxide also throughout sample Alunite present in XRD & is probably in matrix.

Description of phenocrysts/lithoclasts and alteration: Most phenocrysts have been replaced by kaolinite. Quartz & chlorite < 1%

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: ~~Kaolinite~~ No fractures

Degree of kaolinization: none slight moderate extreme

Degree of hematization localized near fractures + vugs.

Description of mineralization:

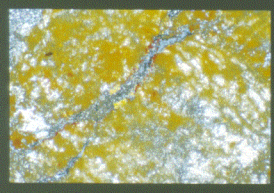
No Uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides Amorphous iron oxides & cryptocrystalline hematite.

Other minerals

20.1/7.7-T51



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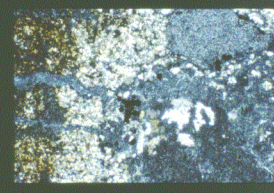

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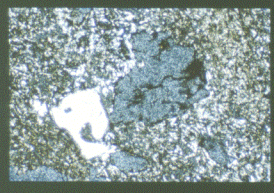

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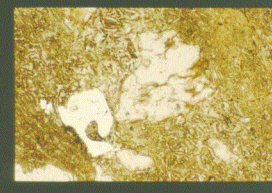

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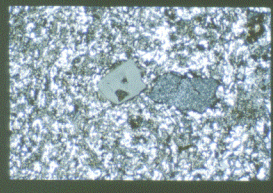

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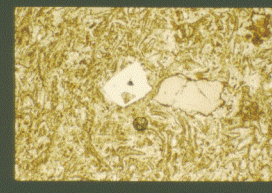

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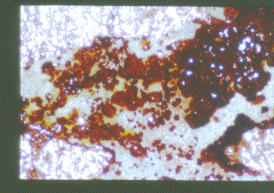

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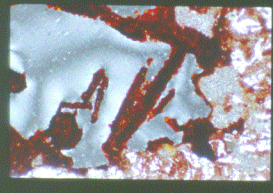

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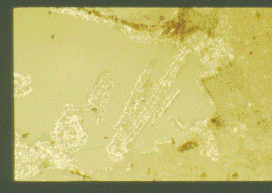

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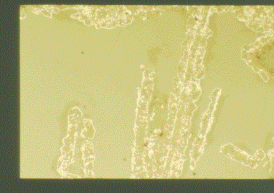

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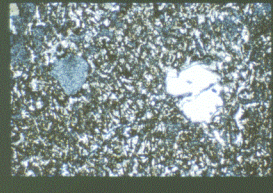

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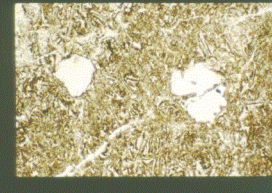

NOPAL I PETROGRAPHY

Sample No. 18.05/7.9 - 751

Description of matrix and alteration:

Same as previous sample but matrix is very hematized XRD shows olenite and feldspar - can't be seen in TS

Description of phenocrysts/lithoclasts and alteration:

all Kaolinite replaced.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material:

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Degree of kaolinization: none slight moderate extreme

Degree of hematization

Description of mineralization:

No uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides Amorpheous iron oxide throughout sample

Other minerals

NOPAL I PETROGRAPHY

Sample No. 17.4/7.85 – TS1

Description of matrix and alteration: quartz / hematite / limonite - orange brown / kaolinite & possibly alunite intergrown. Volcanic texture still evident in plane light. Cryptocrystalline iron oxides evident throughout matrix.

Description of phenocrysts/lithoclasts and alteration: Phenocrysts consist mostly of kaolinized feldspars, a few euhedral quartz grains and a few ilmenite. The ilmenite is being replaced by amorphous iron oxides

Degree of fracturing or brecciation: ~~none~~ slight moderate extreme

Description of fracture-filling material:

N/A

Degree of kaolinization: none slight moderate ~~extreme~~

Degree of hematization 0

Description of mineralization:

No uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 16.4/7.9 - TS1

Description of matrix and alteration: Amorphous iron oxide, frequently w/ cryptocrystalline iron oxide makes up the matrix, XRD shows NO alunite.

Description of phenocrysts/lithoclasts and alteration: Kaolinite has replaced all feldspars - XRD shows feldspar present, probably in matrix

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: N/A

Degree of kaolinization: none slight moderate extreme

Degree of hematitization

Description of mineralization:

NO uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides Amorphous iron oxide

Other minerals

NOPAL I PETROGRAPHY

Sample No. 15.6/7.7 - TS1

Description of matrix and alteration: Hematite/limonite in matrix. Matrix is quartz/feldspar intergrown with amorphous iron oxide. Cryptocrystalline iron oxide is found throughout the slide. Pyrite replaced by iron oxides

Description of phenocrysts/lithoclasts and alteration: Kaolinite replaced feldspars with a few replaced by coarse grained quartz.

Degree of fracturing or brecciation: none slight moderate extreme
Sample appears quite disturbed

Description of fracture-filling material: Kaolinite followed by iron oxides after pyrite.

Degree of kaolinization: none slight moderate extreme hard to see due to degree of hematization
Degree of hematization

Description of mineralization:

No Uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides < 80% iron oxides

Other minerals

NOPAL I PETROGRAPHY

Sample No. 15.0/7.6 - TS1

Description of matrix and alteration: Quartz/Feldspar matrix is intergrown by amorphous iron oxides. Cryptocrystalline iron oxide throughout matrix (pyrite?).

Description of phenocrysts/lithoclasts and alteration: Phenocrysts consist of kaolinite replaced feldspars, corroded quartz & iron oxide replaced ilmenite and zircons.

Degree of fracturing or brecciation: none slight (moderate) extreme

Description of fracture-filling material: Iron oxides and kaolinite fill in fracture. Colloform iron oxides rim open fracture.

Degree of kaolinization: none slight (moderate) extreme hard to see

Degree of hematization

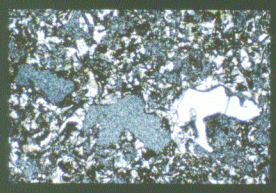
Description of mineralization:

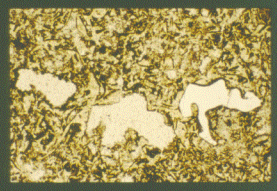
XRD shows uranophane (α) but not visible in thin section

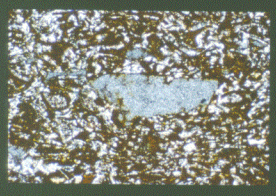
Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

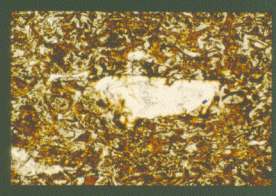
Iron oxides >90% iron oxide

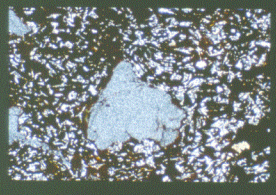
Other minerals

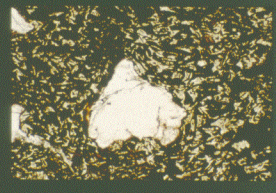


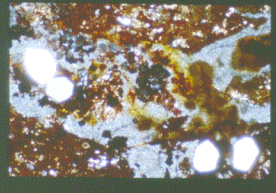


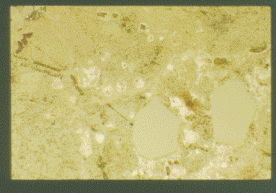


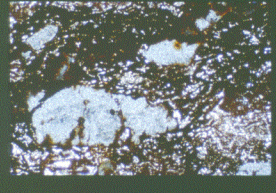


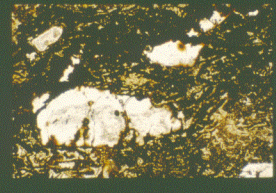


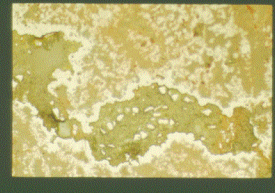


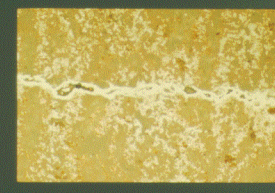












NOPAL I PETROGRAPHY

Sample No. 14.45 / 7.95 - TS1

Description of matrix and alteration: fine grained quartz & feldspar with cryptocrystalline iron oxide throughout sample. Euhedritic texture can be see in plane light. Amorphous iron oxid also found in matrix

Description of phenocrysts/lithoclasts and alteration: Kaolinite has replaced most of the phenocrysts. Some euhedral quartz grains. Coarse grained quartz has replaced some. Ilmenite almost completly replaced by iron oxides - zircons.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Kaolinite fills the fractures

Degree of kaolinization: none slight moderate extreme

Degree of hematization

Description of mineralization:

NO uranium minerals

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides >50% iron oxides

Other minerals

NOPAL I PETROGRAPHY

Sample No. 13.95/8.0 - TS1

Description of matrix and alteration: Very hematized/both amorphous + crystalline. Amorphouse iron oxide has replaced most of the quartz & feldspar matrix. Pyrite crystals have been replaced by iron oxides also. Found mostly in fracture. Coarse grained quartz has replaced and filled in vugs and phenocrysts.

Description of phenocrysts/lithoclasts and alteration:
Kaolinite phenocrysts have a rim of amorphouse iron oxide

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Kaolinite fills most fracture
Large iron oxide filled fracture has numerous pyrite crystals that have been replaced.

Degree of kaolinization: none slight moderate extreme

Degree of hematization

Description of mineralization:
Uranophane incepentitly fills voids and fractures.

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane	~2%	blade uranophane crystals	
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides

Other minerals

NOPAL I PETROGRAPHY

Sample No. 13.5/7.75-T51

Description of matrix and alteration: Very hematized. Fine crystalline quartz with some feldspar. Most feldspar replaced by kaolinite. Both amorphous + crystalline iron oxides. Volcanic tuffs preserved in PL.

Description of phenocrysts/lithoclasts and alteration:
Feldspar totally replaced by kaolinite, quartz, magnetite, ilmenite.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Kaolinite often with interspersed quartz. Pyrite oxidized. Uranophane in late fractures.

Degree of kaolinization: none slight moderate extreme
hemytate

Description of mineralization:
Minor uranophane in late fractures.

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane	~2%	euhedral	
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides Amorphous + crystalline 70%.

Other minerals

NOPAL I PETROGRAPHY

Sample No. 12.95 / 7.9-T51

Description of matrix and alteration: Very hematized. Fine quartz and some feldspar. Volcanic texture preserved.

Description of phenocrysts/lithoclasts and alteration: Feldspars replaced by kaolinite. Corroded quartz. Ilmenite/magnetite.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Kaolinite with oxidized pyrite. Open fractures contain uranyl silicate.

Degree of kaolinization: none slight moderate extreme

Hematite

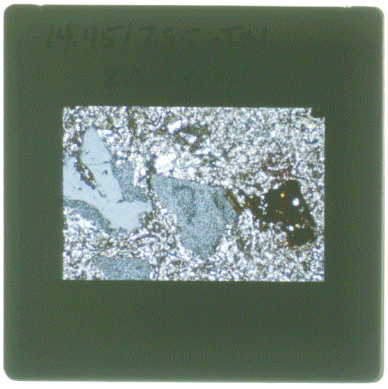
Description of mineralization:

Uranyl silicate in open fractures.

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane	~2%	Euhedral, acicular	
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides Amorphous + cryptocrystalline 65%.

Other minerals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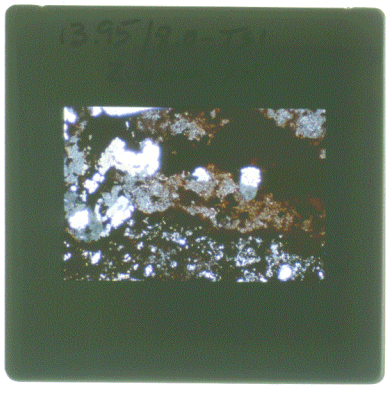
14.45/7.95-T31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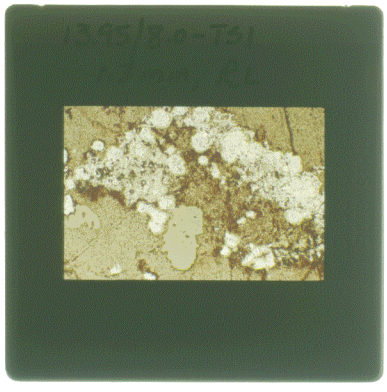
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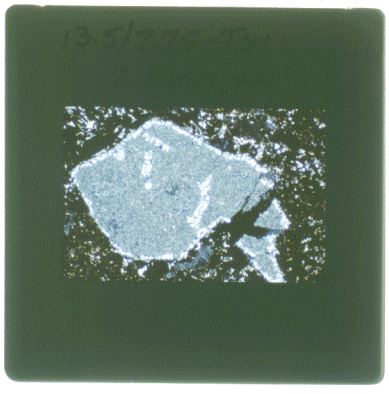
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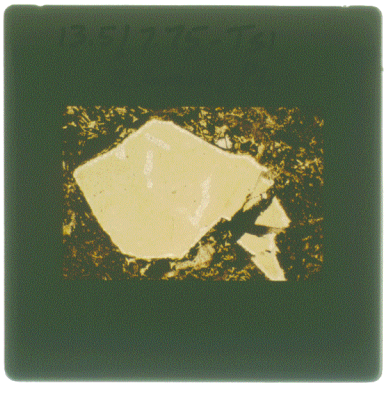
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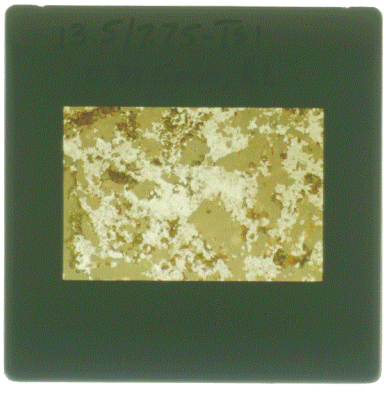
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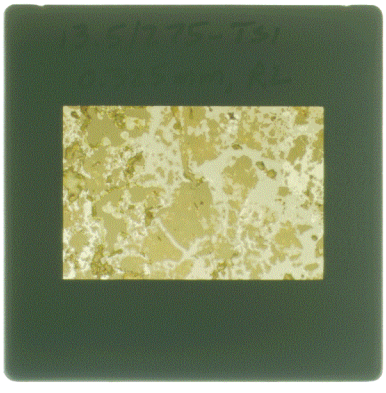
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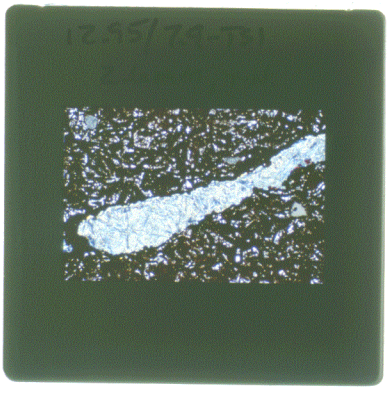
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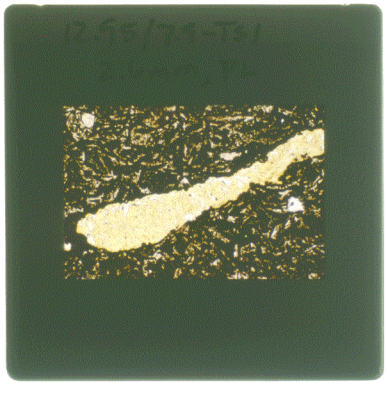
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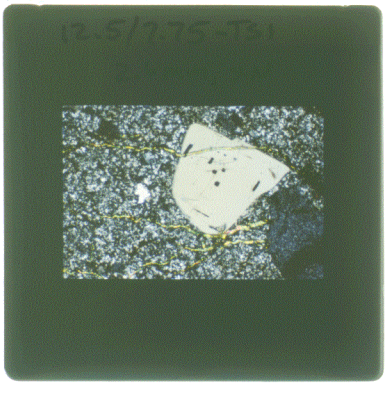

12.5/7.75-T31

12.5/7.75-T31

NOPAL I PETROGRAPHY

Sample No. 11.9/7.9-TS1

Description of matrix and alteration: Fine quartz with minor feldspar. Moderately hematized. Volcanic textures mostly destroyed.

Description of phenocrysts/lithoclasts and alteration: Kaolitized feldspars rimmed by hematite. Corroded qtz. Pyrites in kaolitized feldspars are oxidized.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Uranyl silicates, kaolinite, + hematite (intergrown)

Degree of kaolinization: none slight moderate extreme

Hematization

Description of mineralization:

Uranyl silicates in late fractures + intergrown with kaolinite replacing feldspars

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane	~2%	aquant (intergrown) acicular.	
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides

Other minerals

NOPAL I PETROGRAPHY

Sample No. 11.9/7.9-TS 2

Description of matrix and alteration: Same as previous sample.

Description of phenocrysts/lithoclasts and alteration:
Some feldspar not completely replaced by kaolinite.
Oxidized pyrites associated with replaced feldspar.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material:

Degree of kaolinization: none slight moderate extreme

Description of mineralization:

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides

Other minerals

NOPAL I PETROGRAPHY

Sample No. 11.55/7.8 - TS1

Description of matrix and alteration: Cryptocrystalline qtz/feld. Hematized throughout with some highly hematized areas locally and around replaced feldspars. Volcanic textures destroyed.

Description of phenocrysts/lithoclasts and alteration: Totally to partially replaced feldspars. Feldspars hematized along boundaries due to pyrite oxidation. Corroded qtz, ilmenite

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Kaolinite with some iron oxides.

Degree of kaolinization: none slight moderate extreme

Hematization

Description of mineralization:

No U minerals.

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 10.8/7.8-TS1

Description of matrix and alteration: Cryptocrystalline qtz/fld. Volcanic texture not completely destroyed. Locally hematized. Slightly hematized throughout

Description of phenocrysts/lithoclasts and alteration: Totally to partially replaced feldspars. Some feldspar hematite due to pyrite oxidation.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material:

Kaolinite with hematite

Degree of kaolinization: none slight moderate extreme
Hematization

Description of mineralization:

No U minerals.

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 10.3/7.7-TS1

Description of matrix and alteration: Same as previous sample

Description of phenocrysts/lithoclasts and alteration:

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material:

Degree of kaolinization: none slight moderate extreme

Description of mineralization:

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 9.7/7.35-TS1

Description of matrix and alteration: Cryptocrystalline qtz/feld. Volcanic textures are still visible. Slightly hematized.

Description of phenocrysts/lithoclasts and alteration: Feldspar phenocrysts not as kaolinized as in previous samples. Feldspar are locally hematized due to pyrite oxidation. Corroded qtz, magnetite, ilmenite

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Late fractures filled by qtz. Spherulitic qtz in some vugs.

Degree of kaolinization: none slight moderate extreme
Hematite

Description of mineralization:

No U minerals.

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides

Other minerals

NOPAL I PETROGRAPHY

Sample No. 9.0/7.5 -TS1

Description of matrix and alteration: Same as previous sample

Description of phenocrysts/lithoclasts and alteration:

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Late quartz in vugs + fractures
Spherulite / sutured.

Degree of kaolinization: none slight moderate extreme

Description of mineralization:

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 12.5/7.75-T31

Description of matrix and alteration: Much less hematized. Fine crystalline quartz with some feldspar. Volcanic texture obliterated. Hematite localized around phenocrysts.

Description of phenocrysts/lithoclasts and alteration: Feldspar replaced by kaolinite. Corroded qtz. Ilmenite.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Most fractures are small and filled by vuggy silicates, kaolinite/hematite.

Degree of kaolinization: none slight moderate extreme

Description of mineralization: Hematite

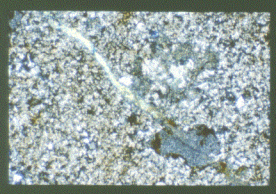
Vuggy silicates in late fractures

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane	~2%		
Soddyite			
Weeksite/ Boltwoodite			
Others			

Iron oxides

Other minerals

11.9/7.5-T31



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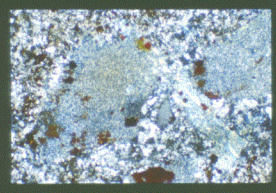

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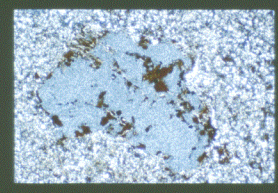

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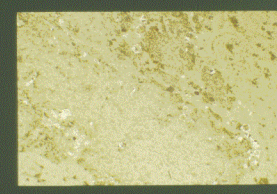
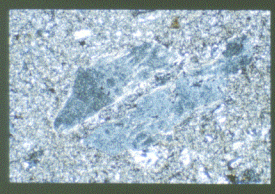


11.55/7.8-T31



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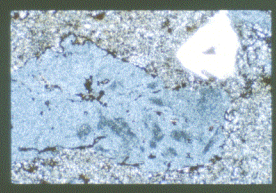
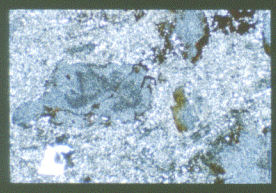
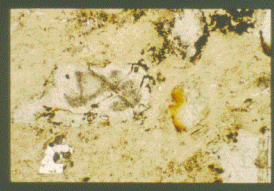


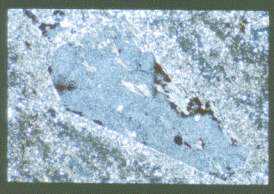
10.8/7.8-T31



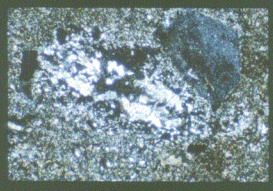
10.8/7.8-T31



9.7/7.35-T31



9.0/7.5-T31



NOPAL I PETROGRAPHY

Sample No. 8.15/8.0-TS 1

Description of matrix and alteration: Cryptocrystalline qtz/fld. Somewhat hematized + limonitized. Volcanic texture remain visible

Description of phenocrysts/lithoclasts and alteration: Partially replaced Fld. Corroded qtz. Magnetite/ilmenite. Feldspar less altered than previous samples.

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Quartz infills microfractures

Degree of kaolinization: none slight moderate extreme

Description of mineralization:

No U minerals.

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 7.45/7.9-TS1

Description of matrix and alteration: Same as previous sample

Description of phenocrysts/lithoclasts and alteration:

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Spherulite qtz in ~~vugs~~ replacing shards.

Degree of kaolinization: none slight moderate extreme

Description of mineralization:

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 6.2/8.1-TS1

Description of matrix and alteration: Same as previous sample.

→ Specular qtz/fld replaces matrix.

Description of phenocrysts/lithoclasts and alteration:

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material: Specular qtz prominent in some vugs + fractures.

Degree of kaolinization: none slight moderate extreme

Description of mineralization:

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 5.2/7.5-TS1

Description of matrix and alteration: Same as previous samples

Description of phenocrysts/lithoclasts and alteration:

Degree of fracturing or brecciation: none slight moderate extreme

Description of fracture-filling material:

Degree of kaolinization: none slight moderate extreme

Description of mineralization:

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			

NOPAL I PETROGRAPHY

Sample No. 40/7.75-TS1

Description of matrix and alteration: Same as previous sample. Lot of relatively coarse sutured qtz.

Description of phenocrysts/lithoclasts and alteration:

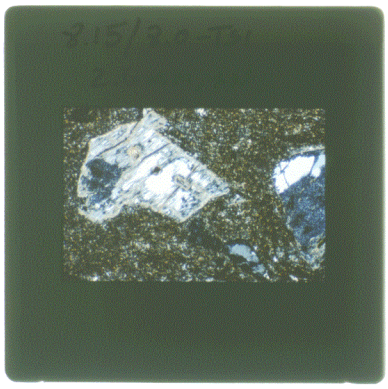
Degree of fracturing or brecciation: none slight moderate extreme

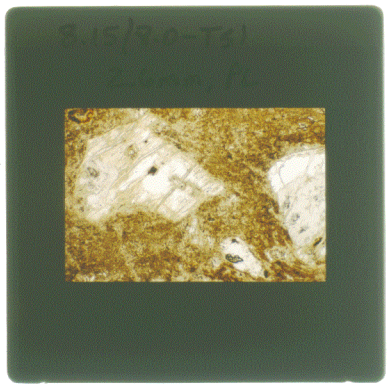
Description of fracture-filling material:

Degree of kaolinization: none slight moderate extreme

Description of mineralization:

Uranium minerals	%	crystal size/habit	remarks
Uraninite			
Schoepite			
Ianthinite			
Uranophane			
Soddyite			
Weeksite/ Boltwoodite			
Others			
Iron oxides			
Other minerals			


8.15/9.0-TS1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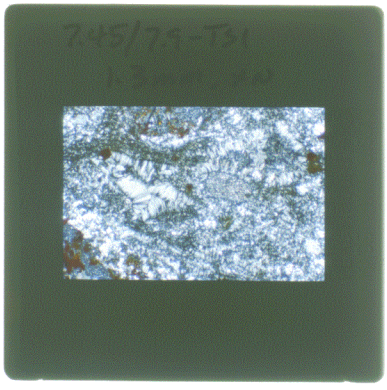
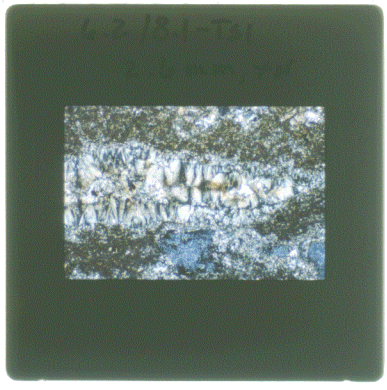
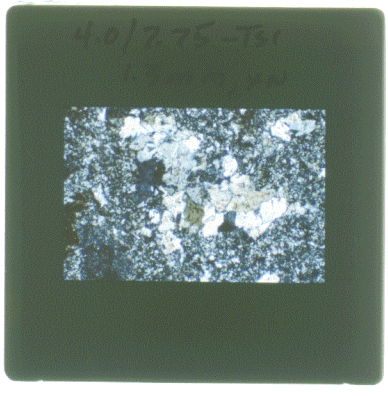

7.45/7.9-TS1

6.2/8.1-TS1


6.2/8.1-TS1


4.0/7.75-TS1

PHOTOGRAPHY

Photographer: PG

Microscope: Nikon

Type of photography: TS

Camera: Nikon

Date: 1/15/93

Film: Ektachrome 100

Photo No.	Sample No. and description	Obj.	FOV	Light
9	20.1/7.7 - TS1			
	Alunite ~~fr~~ lining fracture Actually may be fine marl silicate.	20x	0.65mm	XN
10	Carbon xtls	10x	1.5cm	
11	carbon xtls	10x	1.5cm	
	20.1/7.7 - TS1			
12	Kaolinite filled vug + fracture with quartz/alunite + oxidized pyrite. Could be replaced fld.	5x	2.6mm	XN
	19.65/7.55 - TS1			
13	Qtz and kaolinitized feldspar phenocryst in qtz/alunite matrix. Feldspar hematized along boundary of grain	5x	2.6mm	XN
14	Same as #13 showing remnant volcanic texture of matrix	5x	2.6mm	PL
	~~19.65/7.55~~ 19.0/7.8 - TS1			
15	Qtz + kaolinitized feldspar in remnant glassy matrix of qtz/alunite.	5x	2.6mm	XN
16	Same as #15 showing preserved volcanic texture of matrix	5x	2.6mm	PL

PHOTOGRAPHY

Photographer: JB

Type of photography: TS

Date: 1/19/93

Microscope: Nikon

Camera: Nikon

Film: Ektachrome 100

Photo No.	Sample No. and description	Obj.	FOV	Light
	19.0/7.8-TS1			
17	Fracture filled by kaolinite + oxidized pyrite.	5X	2.6mm	XN
18	Open fracture where hematite appears to replace some sort of tabular or prismatic mineral (B-uranophane?)	10X	1.3mm	XN
19	Same as #18 showing hematite replacement of prismatic mineral	10X	1.3mm	RL
20	Closeup of #19	20X	0.625mm	RL
	1835/7.9-TS1			
21	Qtz + kaolinized fld in fairly hematized matrix. Volcanic texture preserved.	5X	2.6mm	XN
22	Same as #21 showing remnant volcanic texture of matrix.	5X	2.6mm	PL
	18.05/7.9-TS1			
23	Qtz + kaolinized feldspar in very hematite matrix.	5X	2.6mm	XN
24	Same as #23 showing hematite + volcanic texture of matrix	5X	2.6mm	PL

PHOTOGRAPHY

Photographer: JP

Type of photography: TS

Date: 1/19/93

Microscope: Nikon

Camera: Nikon

Film: 100 Ektachrome

Photo No.	Sample No. and description	Obj.	FOV	Light
	17.4/7.85			
1	Kaolitized fld in hematite/limonite matrix of qtz/alunite/kaolinite	5x	2.6mm	XN
2	Same as #1 but shows volcanic texture & limonite/hematite in matrix.	5x	2.6mm	PL
	No.4/7.9-TS1			
3	Replaced fld in a very hematite matrix.	5x	2.6mm	XN
4	Same as #3 showing hematite matrix & volcanic texture.	5x	2.6mm	PL
	15.6/7.7-TS1			
5	Fracture cutting kaolinite + oxidized pyrite and euhedral qtz. Very hematite.	5x	2.6mm	XN
6	Closeup of #5 showing oxidized pyrite + qtz crystals.	10x	1.3mm	RL
	15.0/7.6-TS1			
7	Very iron oxide rich area near fracture with replaced feldspar.	5x	2.6mm	XN
8	Same as #7 shows volcanic texture of matrix	5x	2.6mm	PL

PHOTOGRAPHY

Photographer: JP

Type of photography: TS

Date: 1/19/93

Microscope: Nikon

Camera: Nikon

Film: Ektachrome 100

Photo No.	Sample No. and description	Obj.	FOV	Light
	15.0/7.6 -TS1			
9	Open fracture filled by colloform hematite.	~~20~~ 40X	0.325mm	RL
10	Colloform hematite in fracture & crystalline hematite in matrix.	40X	0.325	RL
	14.45/7.95-TS1			
11	Qtz, ilmenite with zircons & kaolinized feld in qtz/fld matrix	5X	2.6mm	XN
12	Same as #11 showing volcanic texture of matrix. Hematite in matrix	5X	2.6mm	PL
	13.95/8.0 -TS1			
13	Contact between hematized matrix & fracture with kaolinite & opaque pyrite & quartz.	5X	2.6mm	XN
14	Closeup of #13 showing replaced pyrite by iron oxides.	10X	1.3mm	RL
	13.5/7.75-TS1			
15	Feldspar replaced by kaolinite & quartz at rim. Very hematitic matrix.	5X	2.6mm	XN
16	Same as #15 showing remnant volcanic texture.	5X	2.6mm	PL

PHOTOGRAPHY

Photographer: gp

Type of photography: TS

Date: 1/19/93

Microscope: Nikon

Camera: Nikon

Film: Ektachrome 100

Photo No.	Sample No. and description	Obj.	FOV	Light
	13.5/7.75-TS1			
17	Iron oxides in matrix - hematite + ~~other~~ magnetite or goethite	40x	0.325	RL
18	Goethite/hematite in gravel matrix. Pores are rimmed by colloform iron oxide.	40x	0.325	RL
	12.95/7.9-TS1			
19	Open fracture (late) filled by vuggy silicate	5x	2.6mm	XN
20	Same as #19 showing hematized matrix	5x	2.6mm	PL
	12.5/7.75-TS1			
21	Late fracture of vuggy silicate cutting through a gray phenocryst	5x	2.6mm	XN
22	Closeup of vuggy silicate filled fracture. Notice FL in qtz	10x	1.3mm	PL
	11.9/7.9-TS1			
23	Vuggy silicate in fracture and also intergrown with kaolinite in matrix. Kaolitized fld.	5x	2.6mm	XN
24	Kaolitized fld with opaqued pyrite + vuggy silicate	10x	1.3mm	XN

PHOTOGRAPHY

Photographer: JP

Type of photography: TS

Date: 1/19/93

Microscope: Nikon

Camera: Nikon

Film: Ektachrome 100

Photo No.	Sample No. and description	Obj.	FOV	Light
	11.9/7.9-TS2			
1	Partially kaolitized feldspar with oxidized pyrite.	5x	2.6mm	XN
2	Closeup of #1 showing oxidized pyrite in replaced feldspar	10x	1.3mm	RL
	11.55/7.8-TS1			
3	Partially replaced feldspar by kaolinite Also include oxidized pyrites	5x	2.6mm	XN
4	Quartz & kaolinite fld. with oxidized pyrites.	5x	2.6mm	XN
	10.8/7.8-TS1			
5	Partially kaolitized feldspars; hematite due to pyrite oxidation	5x	2.6mm	XN
6	Same as #5 showing remnant volcanic texture of matrix	5x	2.6mm	RL
	9.7/7.35-TS1			
7	Partially kaolitized feldspar with pyrite oxidation.	5x	2.6mm	XN
	9.0/7.5-TS1			
8	Sutured quartz in vug	5x	2.6mm	XN

PHOTOGRAPHY

Photographer: JP

Type of photography: TS

Date: 1/20/93

Microscope: Nikon

Camera: Nikon

Film: Ektachrome 100

Photo No.	Sample No. and description	Obj.	FOV	Light
	8.15/8.0-TS1			
9	Partially replaced feldspar	5x	2.6mm	XN
10	Same as #9 showing volcanic texture of matrix.	5x	2.6mm	PL
	7.45/7.9-TS1			
11	Spherulic qtz/fld replacing shards in matrix.	10x	1.3mm	XN
	6.2/8.1-TS1			
12	Spherulic qtz/fld? appears to be replacing matrix.	5x	2.6mm	XN
13	Spherulic qtz/fld? in vug or possibly replacing a phenocryst (pumice)	5x	2.6mm	XN
	4.0/7.75-TS1			
14	Coarse sutured qtz in matrix	10x	1.3mm	XN
	NOPI-ECP-30-TS3			
15	Black granular UO_2 area where pyrite appears to be being replaced by lanthanite.	5x	2.6mm	XN
16	Closeup of #15 showing remnant pyrite and granular + collapsed UO_2	20x	0.625mm	RL