5060 0003

Humboldt Co. General

Item 38

URANIUM-OCCURRENCE REPORT

Quad Name A90< Vya >

Quad Scale A100< 1,2,5,0,0,0,0 >

Deposit No. B40< 13 >

Deposit Name A10 < Virgin Valley >

Synonym Name(s) A11 < >

District or Area A30 < Virgin Valley >

Country A40 < U,S > [U,S]

State Nevada

State Code A50 < 3,2 > [3,2]
(Enter code twice from List D)

County A60 < Humboldt >

Position from Prominent Locality A82 < About 7 mi (11 km) southwest of the Virgin Valley Campground. >

Field Checked G1 < 8,0 | 0,7 > By G2< Castor, Stephen B.
Yr Mo — Mitchell, Thomas P. >
Last name, First, Initial

Latitude A70 < 4,1 | 4,7 | 5,0 N >
Deg Min Sec

Longitude A80 < 1,1,9 | 0,6 | 0,0 W >
Deg Min Sec

Township A77 < 1,4,5 | N > Range A78 < 2,5 | E > Section A79 < 2,4 >
N/S E/W

FT/M

Meridian A81 < Mt Diablo > Altitude A107 < 5000 FT (1500M) >

Quad Scale A91 < 6,2,5,0,0 >
(7½' or 15' quad)

Quad Name A92 < Big Spring Butte >

Physiographic Province A63 < 1,2 | Basin and Range >
(List K)

Location Comments A83 < From Denio Junction, drive about 26 mi W on Hwy 8A. Turn left and drive 2.5 mi to the campground. Take the road marked "Virgin Valley * >

Location Sketch Map:

URANIUM-OCCURRENCE REPORT

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Commodities Present:
C10 <U>

Commodities Produced:
MAJOR < > COPROD < >

MINOR < > BYPROD < >

Potential Commodities:
POTEN <U> OCCUR < >

Commodity Comments C50 < >

Status of Exploration and Development A20 < 3 >
(1 = occurrence, 2 = raw prospect, 3 = developed prospect, 4 = producer)

Comments on Exploration and Development L110 < >

Property is (A21) (Active) A22 (Inactive) (Circle appropriate labels)

Workings are M120 (Surface) M130 (Underground) M140 (Both)

Description of Workings M220< Numerous bulldozed trenches and prospect holes. At least 3 drill holes. >

Cumulative Uranium Production PROD YES (NO) SML MED LGE (circle)

DH2
G7<U> G7A< > G7B<LB> G7C< > G7D< % U3O8>
(accuracy; thousands of lb.; years; grade)

Source of Information D9 < >

Production Comments D10 < >

Reserves and Potential Resources

EH
E1<U> E1A< > E1B<LB> E1C< > E1D< % U3O8>
(accuracy; thousands of lb.; year of est.; grade)

Source of Information E7 < >

Comments E8 < >

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Deposit Form/Shape M10 < Mostly stratiform. >

Length M40 < 2700 > M41 < M > (FT/M)

Width M50 < 500 > M51 < M >

Thickness M60 < 1 to 7 > M61 < M >

Strike M70 < NNE >

Dip M80 < 5° to 10° E >

Size M15 (circle letter): 1b U308

A 0 - 20,000
B 20,000 - 200,000
C 200,000 - 2 million
D 2 million - 20 million
E More than 20 million

Tectonic Setting N15 < Mobile belt. >

Major Regional Structures N5 < High-angle NW faults and NNE basin and range faults. Henry (1978) infers a 20-km-wide caldera from the arrangement of rhyolite flow domes around Virgin Valley. The uranium occurrences are in the SW part of this* >

Local Structures N70 < A rhyolite flow dome at least 9 km in diameter is just south and west of the occurrences. The pattern of lateral flow and pressure ridges in the dome indicates that the vent is about 6 km southwest of the occurrences. >

Host-FM. Name U1 < Virgin Valley Fm > Member U2 < >

Host Rock K1 < M I O (Age) | B Volcaniclastic sequence mostly comprised of (Rock type, texture, composition, color, alteration, attitude, geometry, structure, etc.) coarse rhyolitic pumiceous air fall tuff. Some tuffaceous sandstone and shale is also present, along with locally abundant diatomite. The underlying and adjacent rhyolitic flow rock is also locally enriched in uranium. >

Host-Rock Environment U3 < Pyroclastic-lacustrine and flow dome. >
(Sed. dep. environ., metamorphic facies, ign. environ.)

Comments on Associated Rocks U4 < Tuffaceous sedimentary rocks and air fall tuffs with relatively low radioactivity (less than 40 UR) overlie the relatively radioactive tuffs (45+ UR) which contain the uraniferous beds. >

Ore Minerals C30 Meta-autunite, carnotite, KUS: mineral (weeksite?), KUP mineral (Saleeite?), US: mineral (coffinite?), uraniferous opal, and uraniferous manganese oxide.

Gangue Minerals K4 < White to black opal, mostly brown, quartz; minor pyrite and manganese oxide; traces of barite, ilmenite, and galena. >

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Alteration N75 < In the uraniferous sequence, the airfalls are generally devitrified and contain abundant zeolites, clay minerals, and opal. >

Reductants U5 < Certain tuff beds and sedimentary horizons contain abundant carbonaceous trash, including petrified logs. Some, but not all, of these carbonaceous beds are uraniferous. >

Analytical Data (General) C43 < Grab samples of radioactive rock in the Virgin Valley Fm contain up to 0.14% U_3O_8 and have high As, Mo, Sb, and W. A few of the samples have high Be, F, Hg, La, Y, and Zn. Chip samples collected across* >

Radiometric Data (General) U6 < Bkg = 200 to 300 cps (45 to 65 UR). The uraniferous beds (see p. 13) range between 600 and 16,000 cps (130 to 3500 UR). An occurrence in rhyolite (sample 343, p. 6) ran 1000 to 20,000+ cps (220 to 4,400+ UR). >
(No. times background and dimensions)

Ore Controls K5 < Most of the uraniferous rock occurs on the west side of Virgin Valley in two groups of beds (see p. 13). The most extensive consists of two or more brown opal layers (corresponding to layers 8 through 11 of Staatz and Bauer, 1949) with interbeds of coarse air fall tuff and minor diatomite, tuffaceous ss and shale. The brown opal beds are underlain by coarse vitric air fall tuff beds making up a section 8 m or more thick. Uraniferous opal beds on the east side of the Valley are probably correlative with the brown opal beds, but include some * >

Deposit Class C40 < see below > Class No. U7 < | | | >

Comments on Geology N85 < Deposition of the uraniferous opal probably took place shortly after deposition of the host beds. The uranium is not thought to have been concentrated from ground water percolating downward from higher in the section for several reasons. Firstly, the Virgin Valley Fm above the radioactive section contains low amounts of U and Th. Secondly, deposition from cold groundwater does * >

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*See map page 5a.

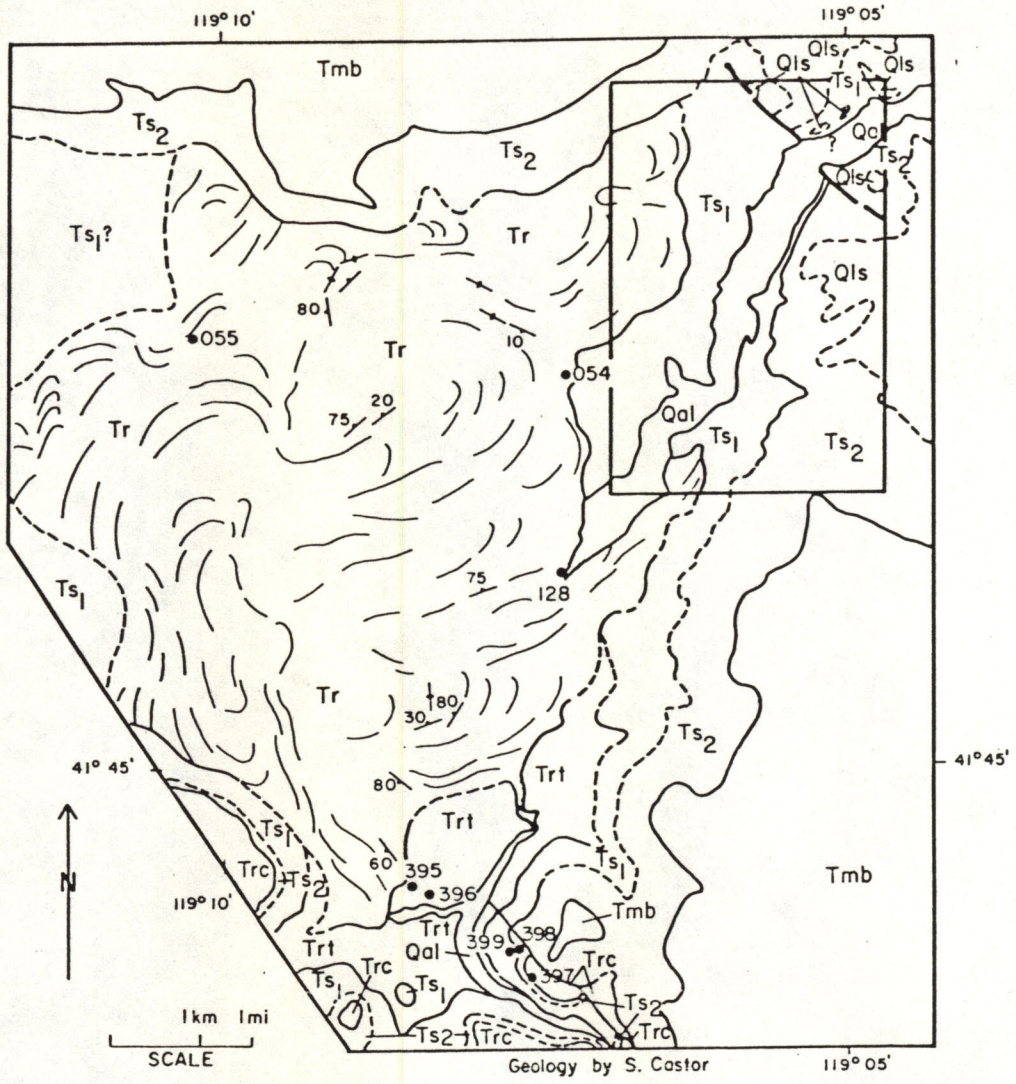
References:

F1 < Staatz, M.H., and Bauer, H.L., 1949, Virgin Valley opal district, Humboldt County, Nevada: US Geological Survey Circular 142, 7 pp. >

F2 < Wendell, W.G., 1970, The structure and stratigraphy of the Virgin Valley-McGee Mountain area, Humboldt County, Nevada: M.S. Thesis, Oreg. State Univ., 130 pp. >

F3 < Cupp, G.M., et al, 1977, Prelim. study of the favorability for uranium in selected areas in the Basin & Range Province, NV: US DOE Open-file Rpt. GJBX-74(77). >

F4 < Henry, C.D., 1978, Geology & uranium potential, Virgin Valley, NV, in Formation of uranium ores by diagenesis of volcanic sediments: US DOE Open-file GJBX-22(79). >



Quaternary	Qal	Alluvium
	Qls	Landslide deposits - consists mostly of Tmb and Ts_2.
Tertiary – Pliocene	Tmb	Mesa Basalt - finely crystalline grey olivine basalt of probable Pliocene age.
	Ts_2	Miocene and/or Pliocene sedimentary rocks and air fall tuff with low to moderate radioactivity (10-40 UR). Includes Thousand Creek Fm. and the upper part of the Virgin Valley Fm.
Tertiary – Miocene	Trc	Grey spherulitic rhyolite flow rock with abundant quartz and sanidine phenocrysts. Secondary opal very common.
	Ts_1	Lower part of the Virgin Valley Fm. Consists of rhyolitic air fall tuff and minor sedimentary rocks. High radioactivity (40 UR).
	Trt	Rhyolitic ash flow tuff with severely flattened pumice fragments. Crystals very sparse or absent. Basal grey perlitic vitrophere up to 20 m thick.
	Tr	Grey to brown or purple rhyolite flow rock. Phenocrysts very sparse or absent. Commonly spherulitic, with abundant secondary opal and chalcedony.

/65 Flow foliation in rhyolite. measured on ground.

Vertical flow foliation

Lateral flow ridges and pressure ridges determined by aerial photograph examinations.

Contact, dashed where covered or approximately located.

Fault, dashed where inferred.

•395 Sample location

Quad Name Vya

Deposit No. 13

Uranium Analyses:

Sample No.	Sample Description	U_3O_8	eU
MES 040	Tuffac. ss and silic. air fall tuff	44 ppm	
041	Coarse air fall and tuffac. sed. rock	13 "	
057	Air fall tuff and tuffac. sed. rock with minor opal	12 "	
065	5-m-thick chip spl across tuffac. seds. and opal beds	24 "	
066	1-m-thick channel spl across tuff, tuffac. ss and opal	29 "	
067	2-m-thick channel spl of two opal beds separated by air fall tuff	345 "	
068	vitric air fall tuff	12 "	
069	Air fall tuff and opal with secondary U mineral(s)	270 "	
070	Siliceous rhyolite flow rock	8 "	
071	1-m-thick channel across limonitic tuff and claystone	186 "	
072	Air fall tuff with secondary U mineral(s)	0.15%	
074	Silic. opal with petrified wood	458 ppm	
126	Partly silic. diatomite	9 "	
127	Completely opalized diatomite	435 "	
175	Select spl of lt. green opal replacing diatomite	0.11%	856 ppm
207	Rhyolite flow rock with limonite veinlets	0.24%	
300	Buff-colored opal cut by limonite veinlets	610 ppm	
337	Select spl of mottled green and buff air fall tuff	750 "	0.23%
338	2.5-m-thick chip spl across green beds - includes spl 337	344 "	
339	Opalized tree stump in brown opal layer - select spl with secondary U mineral(s).	0.14%	841 ppm
340	2.5-m-thick chip spl of brown opal and coarse air fall beds - contains spl 339	131 ppm	
341	2-m-thick chip spl across green beds	108 "	
342	2-m-thick chip spl across brown opal and grey air fall tuff beds	106 "	
343	Select spl of highly radioactive rhyolite flow rock with abund. limonite and secondary U mineral(s).	1.00%	
344	Chip spl taken across 20-m-wide radioactive area in rhyolite flow rock - includes spl 343	192 ppm	

Quad Name Vya

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Uranium Analyses:

Sample No.	Sample Description	U_3O_8	eU
MES 345	Grab spl of gray opalized ss from top of brown opal bed	0.12%	823 ppm
376	2-m-thick chip sample across buff air fall tuff - probably correlative with green beds	45 ppm	
377	1.5-m-thick chip spl across ss, air fall, and opal beds	107 "	
378	3.5-m-thick chip spl across green beds with minor opal	71 "	92 ppm
379	3-m-thick chip spl of brown opal and air fall tuff beds	80 "	77 ppm
380	0.5-m-thick channel spl across brown opal and air fall tuff beds - contains secondary U mineral(s)	60 "	
381	0.7-m-thick channel spl across green to brown opal beds and grey air fall tuff beds	83 "	79 ppm
383	3-m-thick chip spl across white to brown opal beds and grey air fall tuff beds	79 "	72 ppm
384	3-m-thick chip spl across brown opal beds and air fall tuff beds	148 "	101 ppm
385	2-m-thick chip spl across green beds	77 "	
386	4-m-thick chip spl across air fall tuff and brown opal beds	156 "	
387	Select spl of opalized breccia in tuffac. sed. rocks	211 "	170 ppm
388	3.5-m-thick chip spl across pink to brown opal beds, air fall tuff, and diatomite	43 "	
389	Chip spl across 0.3-m-thick reddish-brown to dark brown opal bed - included in spl 388	331 "	286 ppm
391	1-m-thick chip spl across white to green opal bed, grey air fall tuff, and a brown opal bed	201 "	
392	Rhyolite flow rock	10 "	12 ppm

The following samples were collected at more-or-less regular intervals in a single section including the "green beds" and "brown opal beds" radioactive intervals on the west side of Virgin Valley. This section also includes spls 337, 338, and 342 (see the fence diagram on p. 11).

MES 426	Olive-green devitrified coarse air fall tuff @ 0 ft	31 ppm	25 ppm
427	Same as spl 426 @ 3 ft	28 ppm	26 ppm
428	Same as spl 426, but coarser with more lithic fragments @ 6 ft	59 ppm	62 ppm
429	Olive-green sand-size air fall tuff or tuffac. sed. rock with abundant carbonaceous trash @ 9 ft	58 ppm	28 ppm
430	Same as spl 429, but lt. green color @ 12 ft	177 ppm	66 ppm
431	Highly radioactive lt. olive-green coarse air fall tuff with bright green patches - partly opalized @ 15 ft	383 ppm	577 ppm
432	Buff-colored coarse air fall tuff with pathes rich in limonite - no carbonaceous trash @ 18 ft	123 ppm	195 ppm

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Uranium Analyses:

Sample No.	Sample Description	U_3O_8	eU
MES 433	Very lt. gray partly devitrified sandy air fall tuff with glass granules and shards @ 21 ft	28 ppm	33 ppm
434	Lt. gray vitric sand-size air fall tuff with pumice granules @ 24 ft	23 ppm	47 ppm
435	Very lt. yellow-green fine air fall tuff or tuffac. ss with small opal fragments and carbonaceous trash @ 27 ft	20 ppm	16 ppm
436	Grey opal with abundant carbonaceous trash - petrified logs in lateral extension @ 30 ft	91 ppm	58 ppm
437	Lt. yellow-green very fine-grained air fall tuff with some pumice granules - glassy at base @ 33.5 ft	53 "	20 ppm
438	Brown opal - rather featureless - contains some green layers and possible secondary U mineral(s) @ 34.5 ft	54 "	24 ppm
439	Highly radioactive brown opal @ 38 ft	197 "	168 ppm
440	Lt. olive-green partly opalized air fall tuff with sparse carbonaceous debris @ 40 ft	40 "	19 ppm
441	Very lt. grey devitrified granule-size air fall tuff with relatively low radioactivity @ 43 ft	18 ppm	13 ppm
442	Lt. grey coarse vitric air fall tuff with relatively low radioactivity @ 50 ft	35 "	10 ppm

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Continuation from p. 1-5:

Label

A83 <Ranch" and drive 7 mi, keeping to the main road. The most extensive occurrences are in strata exposed in a disected terrace just west of the road.>

N5 <inferred structure.>

C43 <radioactive beds in an area about 1000 n long and 300 m wide contain an average of 130 ppm U_3O_8 over an average thickness of about 5 m (see fence diagram, p. 13). The most uraniferous rock from the area, which was collected from an occurrence in rhyolite flow rock near the radioactive beds, contains 1.0 percent U_3O_8.>

K5 <white to light green opal beds which replace diatomite. Opalized wood is locally abundant in the opal beds; particularly in the lowest radioactive brown opal bed on the west side of the valley, which contains pertrified logs up to 2 m long. Although opalized wood is the most radioactive material in the opal beds (spl 339, p. 6), petrified wood outside the area of uranium occurrences or that found higher in the section than the radioactive beds has low radioactivity. Individual radioactive opal beds are remarkably continuous - some have been traced for 400 m in a NNE direction (Staatz and Bauer, 1949). A group of uraniferous air fall tuff beds with an average thickness of 2.5 m lies 4 to 8 m stratigraphically beneath the brown opal beds on the west side of Virgin Valley. These uraniferous beds, which extend for at least 950 m in a NNE direction (see fence diagram, p. 13), are characterized by the presence of light green rock and have been informally named the "green beds." They contain minor amounts of partially opalized air fall tuff and tuffaceous sedimentary rock, but lack the dense, brown opal beds of the more extensive, stratigraphically higher group of radioactive beds (informally named the "brown opal beds"). Although the green beds locally contain abundant organic trash, high radioactivity is not restricted to horizons which are obviously rich in carbonaceous trash. A third group of anomalously

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Continuation from p. 1-5:

Label

K5cont< radioactive beds is comprised of white to brown dense to fissile opal beds and fine to coarse air fall tuff. These beds, named the "upper opal beds", are less extensive and of lower grade than the brown opal beds which lie 3 to 5 m lower in the section. The upper opal beds include opal layers 14 and 15 of Staatz and Bauer (1949).

In addition to uraniferous strata in the Virgin Valley Formation, the area contains several radioactive occurrences in rhyolite flow rock near its contact with the Virgin Valley Fm. The largest of these occurrences is about 20 m in diameter and contains up to 1.00 percent U_3O_8 and an average of 192 ppm U_3O_8 (spls 343 and 344, p. 6). The host rhyolite is commonly brecciated and is characteristically silicified, and the rock comprising the radioactive anomalies is not appreciably different from that in the flow dome as a whole. However, the most radioactive rock (spls 207 and 343, p. 6) is heavily limonitized, contains traces of iron sulfide, and exhibets more thorough brecciation. The occurrences in rhyolite do not appear to be along linear fractures or veins, but are mostly located near the approximately linear north-trending contact with the Virgin Valley Fm adjacent to the area containing the bedded uranium occurrences.

N85 not account for the anomalous Hg, La , Sb, W, and Y contents of some of the samples from the radioactive beds, or for the sulfide present in some of the opal. Thirdly, the radioactive opal beds are remarkably continuous and almost perfectly stratabound, suggesting nearly syngenetic deposition of the opal (and associated uranium). Fourthly, the radioactive opal is not restricted to porous beds, or to interfaces between porous beds and underlying non-porous beds; it appears to replace fine to coarse air fall tuff, diatomite, sandstone, and shale.

Deposition of uranium in Virgin Valley probably took place by a combination

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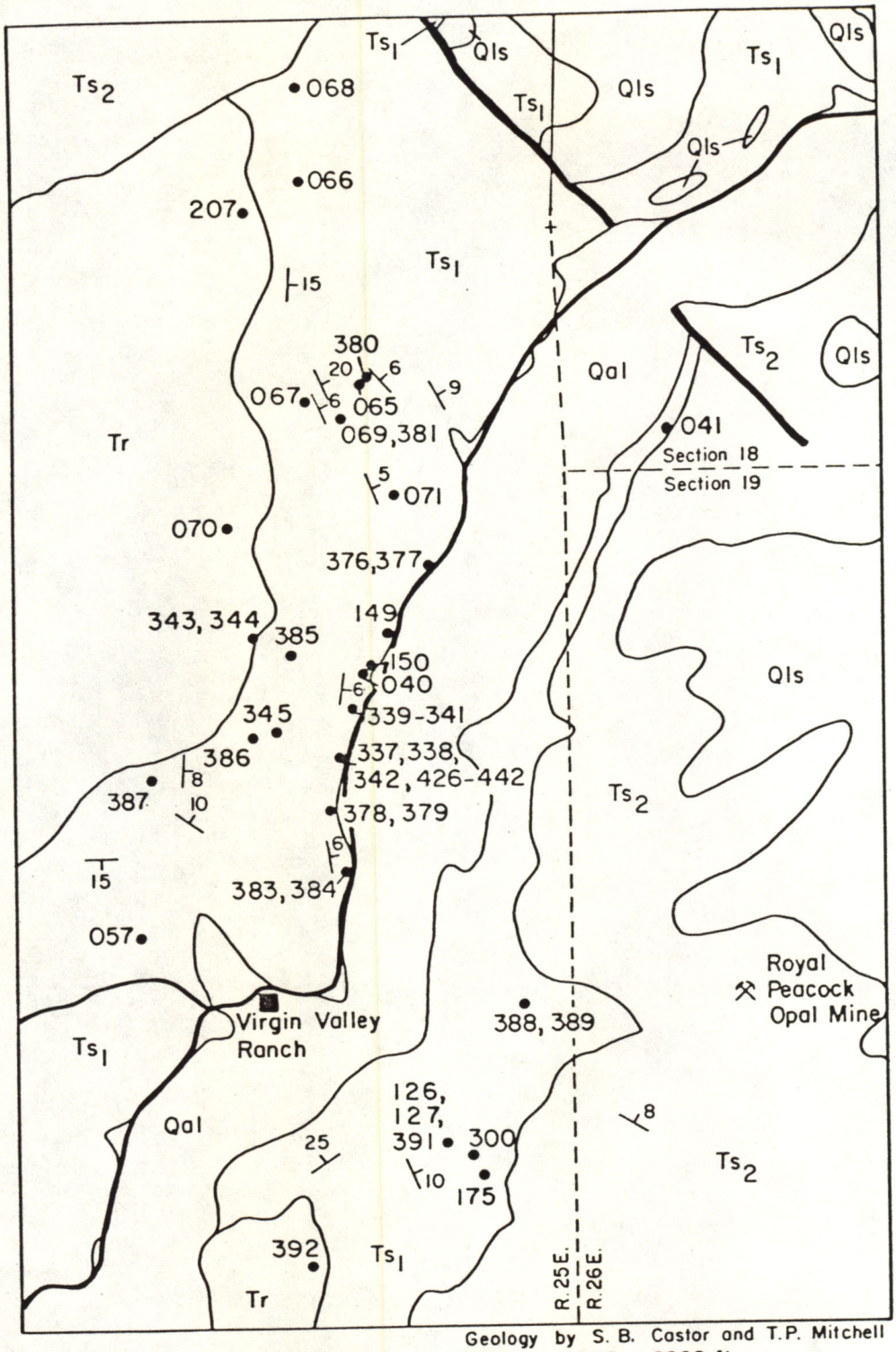
Continuation from p. 1-5:

Label

N85 cont< of hydrothermal and syngenetic sedimentary processes. Uraniferous beds were formed in the Virgin Valley Fm by the introduction of uranium-rich geothermal waters during sediment and pyroclastic deposition. Uranium concentrations in the rhyolite are related and were deposited by ascending fluids. The rhyolite flows could have acted as a heat source, driving a hydrothermal cell which extracted uranium and silica from relatively uranium-rich rhyolite and air fall tuffs underlying the uraniferous beds (extraction of some of the other trace elements, such as Hg and W, could also have taken place under these conditions). Hot spring activity could then have released the uranium and other elements to the surface to be deposited during or shortly after mixture with cool lake waters.>

F5 <Cathrall, J.B., and others, 1978, Mineral resources of the Charles Sheldon wilderness study area: U.S. Geological Survey open-file report 78-1002.>



Qal Alluvium

Qls Landslide deposits

Ts_2 Sedimentary rocks and airfall tuff with low to moderate radioactivity (13-44 UR). Includes Thousand Creek Fm. and the upper part of the Virgin Valley Fm.

Ts_1 Lower part of the Virgin Valley Fm. Mostly air fall with some sedimentary rocks. High radioactivity (44 UR +).

Tr Rhyolite flow rock

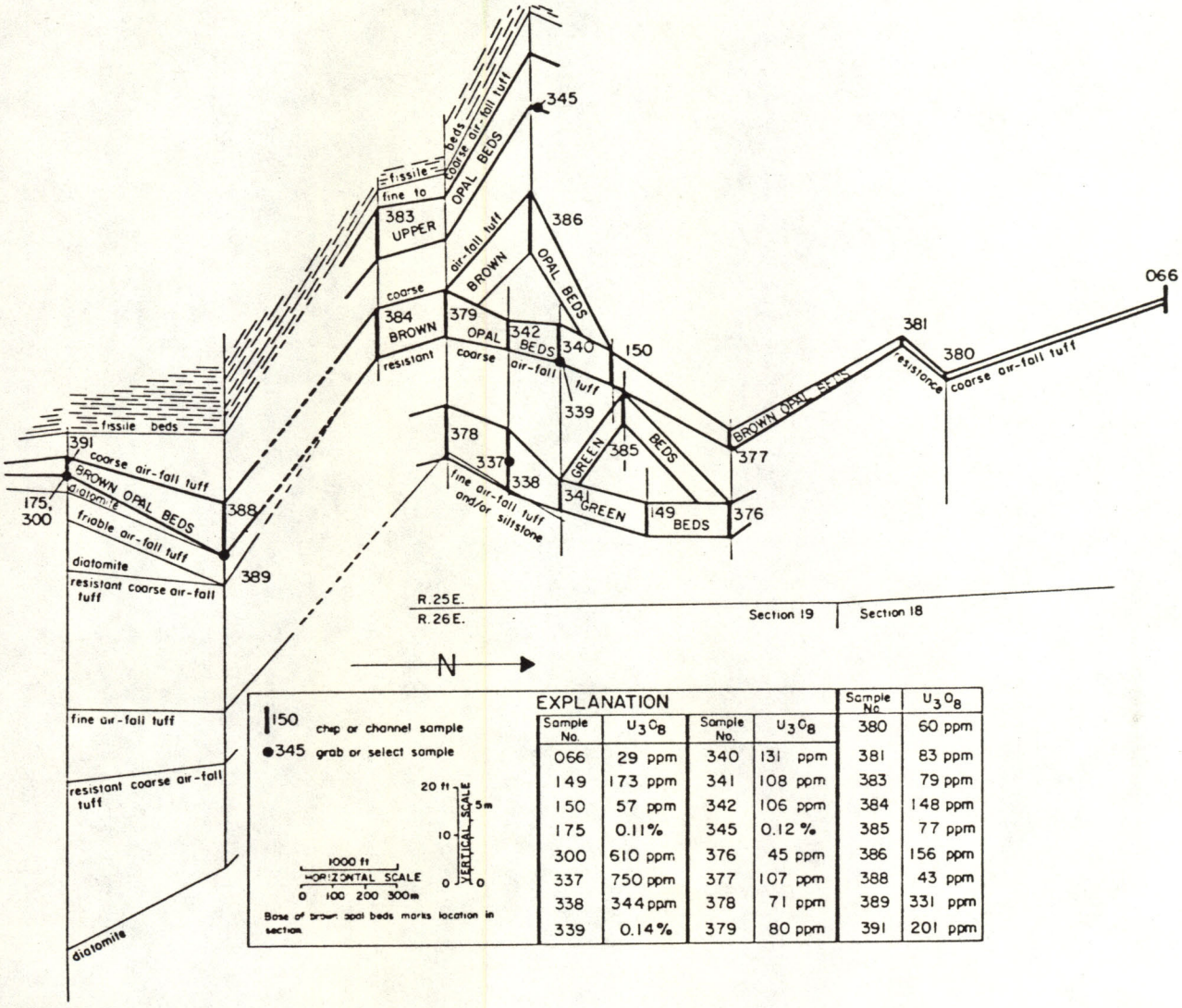
Contact

Fault

Bedding

Road

●380 Sample location



EXPLANATION

150 chip or channel sample

●345 grab or select sample

20 ft 10 0 — VERTICAL SCALE — 5m 0

1000 ft HORIZONTAL SCALE 0 100 200 300m

Base of brown opal beds marks location in section

Sample No.	U_3O_8	Sample No.	U_3O_8	Sample No.	U_3O_8
066	29 ppm	340	131 ppm	380	60 ppm
149	173 ppm	341	108 ppm	381	83 ppm
150	57 ppm	342	106 ppm	383	79 ppm
175	0.11%	345	0.12 %	384	148 ppm
300	610 ppm	376	45 ppm	385	77 ppm
337	750 ppm	377	107 ppm	386	156 ppm
338	344 ppm	378	71 ppm	388	43 ppm
339	0.14%	379	80 ppm	389	331 ppm
				391	201 ppm