COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

RECORDS 1955 No. 18

EXAMINATION OF MUSEUM SPECIMENS FOR RADIOACTIVITY

by

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CONTENTS

ILLUSTRATION

1. INTRODUCTION.

In connection with the search for radioactive minerals, a programme of radioactive investigation of mineral specimens held in various Australian museums was undertaken during 1949. This programme has been completed as regards official collections in Victoria, New South Wales and Queensland. This report gives details of all samples showing significant radioactivity in these collections. Information with regard to specimens held in museums in Tasmania, South Australia and Western Australia is not available in the Bureau, but it is understood that the Mines Departments concerned have carried out their own investigations.

2. TECHNICAL DETAILS

The examination covered specimens in the following collections :-

The Geological Survey Museum, Melbourne.
The National Museum, Melbourne.
The School of Mines, Ballarat.
The School of Mines, Bendigo.
The Technical School, Bairnsdale.
The Mining Museum, Sydney.
The Australian Museum, Sydney.
The Geological Survey Museum, Brisbane.
The Museum, Beechworth.

The samples were tested for radioactivity using a portable Geiger-Muller counter, comparing the numbers of pulses per minute heard when the counter was held on the sample with the "background" count obtained when the counter was at some distance from any radioactive material. The sensitivity of this method depends on the size of the sample, but would be sufficient to detect a concentration of 0.05% thoria or 0.02 % uranium oxides in a hand specimen of ordinary size. It may be taken as certain that any concentration of radioactive minerals of commercial value would have been readily detected.

For the purpose of this work, it was not necessary to devote attention to areas already under investigation as possible sources of radioactive minerals. For this reason, samples of the following types have not been recorded.

(a) Beach sands or concentrates therefrom
(b) Samples from the Mt. Painter and Radium Hill areas in South Australia, and from the Pilbara area in Western Australia.
(c) Overseas samples.

3. RESULTS.

Specimens showing significant radioactivity are listed below, in the order in which they were encountered in the various museums. No significant radioactivity was found in any of the specimens examined at Ballarat, Bendigo and Bairnsdale.

(a) Geological Survey Museum, Melbourne.

Sample No.	Description	Locality	Museum No.	Remarks
1	Monazite	Stanning Hills, Queensland.		
2	Scheelite and Cassiterite	Whelans No.2 Workings, Koetong, Victoria.		
3	Carnotite	50 miles north of Broken Hill, N.S.W.		
4	Titaniferous iron sand	Coliban River, Victoria.		
5	Titaniferous iron sand	Acheron River, Victoria.		
6	Titaniferous iron sand	Euroa, Victoria.		
7	Gem sand	Bethanga, Victoria,		
8	Gem sand	Daylesford, Victoria.		
9	Titaniferous iron sand	Howqua River, Victoria.		
10	Monazite sand (several samples)	Pinch Swamp Creek, Bonang, Victoria.		
11	Stream tin ore	Latrobe River, Victoria.		
12	Tin and Monazite sand	Buxton, Victoria.		
13	Concentrates (from gold wash) (two samples)	Chiltern, Victoria.		
14	Titaniferous iron ore	Bingo, Nr. Omeo Victoria.		
15	Stream tin	Mt. Leinster, Nr. Omeo, Victoria.		
16	Cassiterite	Beenak, Victoria.		
17	Fine black sand	Osborn's Claim Spring Creek, Beechworth, Vic.		
18	Fine black sand	Dryburgh's Claim, Spring Creek, Beechworth, Vic.		
19	Tin ore	Maddern's Claim, Woolshed, Beechworth, Vic.		
20	Coarse-grained titaniferous iron ore	Yackandandah, Victoria.		
21	Fine grained titaniferous iron ore	Yackandandah, Victoria.		

(b) National Museum, Melbourne.

Sample No.	Description	Locality	Museum No.	Remarks
22	Chalcocite	Wallaroo, S. Australia.	10402	Strongly radioactive.
23	Chalcocite	Moonta S. Australia.	10384 10385	" "
24	Bornite	Moonta S.Australia.	11291	
25	Bornite	Winninnie Copper Mine, S.Australia.	10400	
26	Bornite	From O.B.Rule collection S.Australia.	12994	
27	Ilmenite	Coliban River, Victoria.	10983, 10985	

(b) National Museum, Melbourne (Continued)

Sample No.	Description	Locality	Museum No.	Remarks
28	Cassiterite	Bunyip River, Victoria.	9224	
29	Cassiterite	Beenak, Victoria.	9225	
30	Creek sands	Beechworth Victoria.	Several samples	Slightly radioactive. Not recorded in detail, as other samples from the same locality were recorded in the Geological Survey Museum Victoria.
31	Kaolin, with molybdenite and molybdic ochre.	Grenfell N.S.W. (marked as doubtful)		The Dept. of Mines, N.S.W. advises that the locality given is almost certainly incorrect, as no such mineral occurrence has been recorded from this district.
32	Granite with a few crystals of torbernite	Anchor Mine, Blue Tier, Tasmania.		

(c) Mining Museum, Sydney.

Sample No.	Description	Locality	Museum No.	Remarks
33	Cobalt and molybdenite ores	Carcoar, N.S.W.	1612,1334, 2811,15303, 7626 and others un-numbered.	Uranium minerals have been identified in several of these samples.
34	Molybdenite and bismuth ores	Chipstick, N.S.W.	9007,17609, 16187,6763, 17173,17174, 9668.10967, 11638,17175, and others un-numbered.	
35	Wolfram, cassiterite, bismuth and monazite ores	Torrington area, N.S.W.	17225,1624, 15366,15349 17445,17647, 15347 and others un-numbered.	
36	Cobalt, bismuth and wolfram ore	Block 14, Torrington, N.S.W.	Un-numbered.	
37	Molybdenite and copper ore	Mt. Perry, Queensland	14128	A comprehensive set of samples of copper ore from this locality in the Geological Survey, Museum, Brisbane showed no activity.
38	Auriferous zircon sand	Rocky River, Uralla, N.S.W.	12446	

(c) Mining Museum Sydney. (Continued)

Sample No.	Description	Locality	Museum No.	Remarks.
39	Auriferous black sand concentrate	Murray River, near Corowa, N.S.W.	13956	
40	Malachite	West Bogan Mine, Tottenham, N.S.W.	14236 14708	
41	Lode tin ore	Trident Mine Euriowie, N.S.W.	15762	
42	Alluvial tinstone	Meadow Flat, N.S.W.	7977, 12369.	
43	Bismuth ore	Riddles Line, Ducmaloi, N.S.W.	18814	
44	Lead ore	Southern Cross Mine, Broken Hill, N.S.W.	19092	
45	Silver ore	War Dance Mine, Silverton, N.S.W.	1389	
46	Lead ore	Hen & Chicken Mine, Silverton, N.S.W.	1500	
47	Molybdenite ore	Attunga, N.S.W.	209	
48	Molybdenite and bismuth ore	Wunglebung, N.S.W.	17301	

(d) Australian Museum, Sydney.

Sample No.	Description	Locality	Museum No.	Remarks
49	Tantalite	Anningie, N.Territory	35507	Strongly active.
50	Tantalite	Finniss River, N. Territory	3552, 30223, 29926, 30224, 35448, 29925, and others not recorded.	Several samples strongly active.
51	Tantalite	West Arm, N.Territory	29556	
52	Molybdenite ore	Kingsgate, N.S.W.	30811, 14498, 35844, 35847, 30812.	
53	Cobalt and molybdenite ore	Carcoar, N.S.W.	15325, 30846, 10638.	
54	Molybdenite and bismuth ore	Whipstick N.S.W.	18469	
55	Tantalite	Bynoe Harbour N.Territory.	29352	
56	Tantalite	Greenbushes W.Australia.	29191	
57	Tantalite	King's Table-land, N.Territory.	35554, 35556 35557, 35558.	
58	Columbite	Londonderry, W.Australia.	36858, 36859.	

(d) Australian Museum, Sydney (Continued).

Sample No.	Description	Locality	Museum No.	Remarks
59	Cobalt ore	Charters Towers, Queensland.	24918	The Dept.of Mines, Q'land advises that this location is probably erroneous, since no occurrence of cobalt minerals is recorded from this locality.
60	Molybdenite and copper ore	Chowey Creek, Queensland.	24077	
61	Gem sands	Various localities in N.S.W.	Box T113	General slight activity.
62	Mica specimens	Torrington, N.S.W.	Box T114E	Slight activity in several tungsten-bearing samples from this area.
63	Wolfram and molybdenite ore.	Bismuth, Torrington, N.S.W.	24843	
64	Zircon gravels	Various localities in N.S.W.	Box T241	General slight activity.
65	Stream tin	Clifton Creek, Tasmania.	23711	

(e) Geological Survey Museum, Brisbane

Sample No.	Description	Locality	Museum No.	Remarks
66	Tin ore	Herberton, Queensland,	GSQ50, GSQ55, GSQ109, GSQ60 A.B.	Several specimens of copper ore from this locality showed no activity
67	Cobalt ore	Selwyn, Queensland.	GSQ441	
68	Bismuth, wolfram, molybdenite ore	Wolfram, Queensland.		
69	Copper ore	Old Rawbelle Mine, Gladstone, Queensland.	GSQ20	Radioactivity observed in some specimens only.
70	Tin ore	Vulcan Mine, Irvinebank, Queensland.	GSQ110	
71	Gold-Silver -Copper ore	Una Mine, Cloncurry, Queensland.	GSQ89	
72	Silver-Copper ore	Duchess Mine, Cloncurry, Queensland	GSQ87 D12/105 D12/107 D12/115 D12/118	
73	Tin ore	Irvinebank, Queensland.	GSQ111	
74	Copper ore	Mt. Elliott, Queensland.	GSQ83	

(e) Geological Survey Museum, Brisbane (Continued)

Sample No.	Description	Locality	Museum No.	Remarks
75	Molybdenite	Wolfram, Queensland.	GSQ114A.B.	
76	Molybdenite and wolfram ore	Irvinebank, Queensland	GSQ118	
77	Molybdenite and wolfram ore	Bamford, Queensland	Several samples unnumbered.	
78	Mangano-Columbite	Mica Creek, Mt. Isa, Queensland.	Several samples unnumbered.	Some samples highly active.
79	Monazite	Mica Creek, Mt. Isa, Queensland.		
80	Molybdenite	Stanthorpe, Queensland.		This sample showed a few scattered green crystals resembling torbernite.
81	Atacamite	Cloncurry, Queensland		
82	Bornite	Cloncurry, Queensland.		

(f) Beechworth Museum

Sample No.	Description	Locality	Museum No.	Remarks
83	Wolfram	Koetong, Victoria.		

4. CAUSES OF OBSERVED ACTIVITY.

Specific tests to determine the nature of the radioactive mineral present were not undertaken. Information concerning some of the localities is available from other sources. For example, the presence of uranium in copper ores from Moonta, S.A., and in cobalt ores from Carcoar, N.S.W. has been established by chemical tests. Laboratory tests indicate that the activity of molybdenite from Whipstick, N.S.W. is due to uranium. The occurrence of uranium minerals has been reported from a few localities in the Herberton district, Queensland. (See Queensland Mineral Index under " pitchblende" and "chalcolite").

5. CONCLUSIONS.

It is considered that the localities from which the above-mentioned samples were obtained provide a useful guide to prospecting for deposits of radioactive minerals. However, the following qualifications, based on the Bureau's experience, should be borne in mind :-

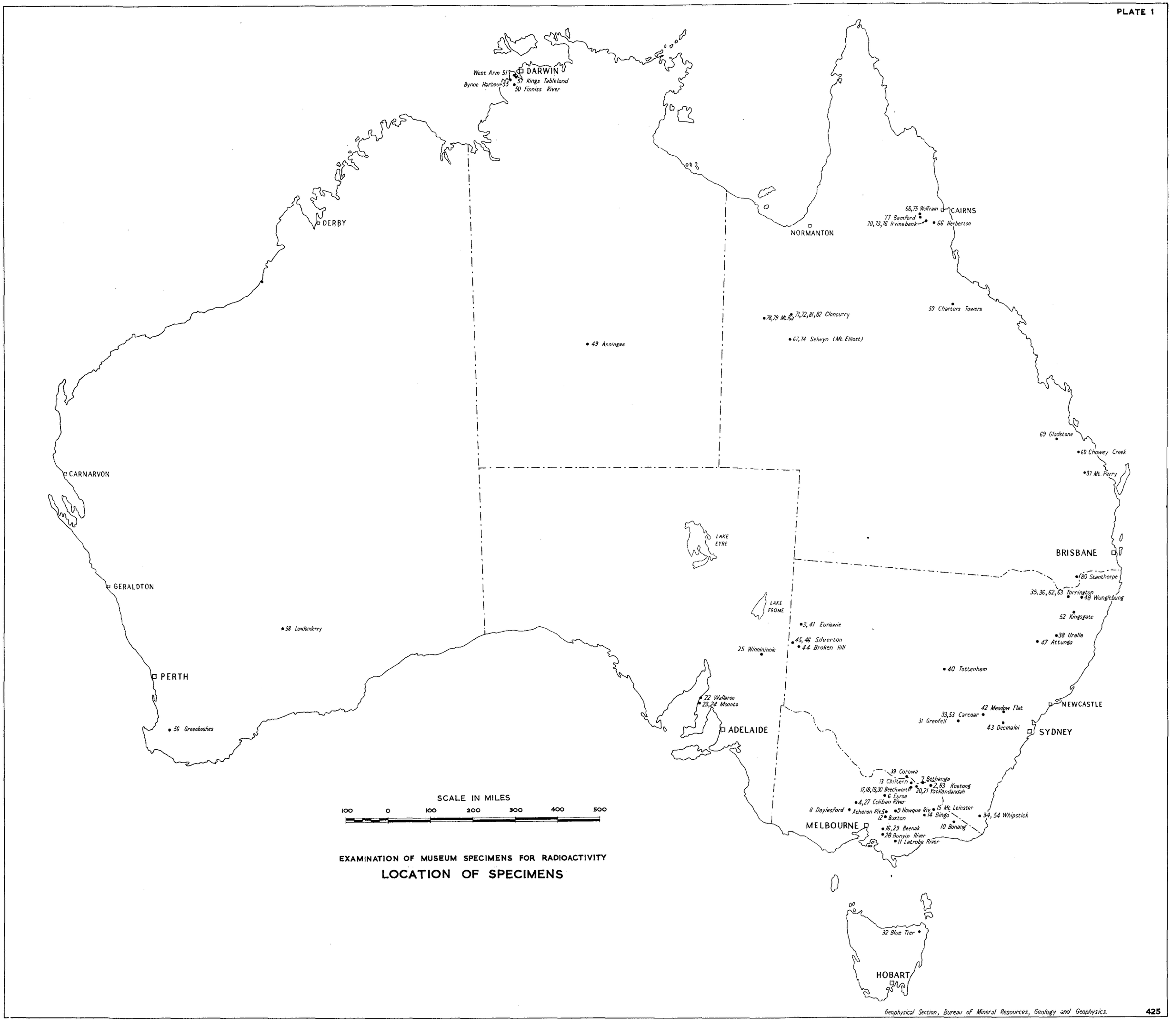
(a) The localities given by the museum authorities as the source of samples are not invariably correct.

(b) Uranium compounds are generally slightly soluble, and uranium minerals are rarely found in alluvial deposits. On the other hand, the thorium mineral monazite is a very common constituent of such deposits. It is likely therefore, that the radioactivity of gem sands and alluvial deposits generally, is due to monazite in the majority of cases.

(c) The association of radioactivity with tantalite and columbite appears to be almost invariable in Australia. The nature of the radioactive constituent is still under investigation. However, these minerals generally occur in alluvial or eluvial deposits in relatively small quanitites, and lode deposits of minable grade are extremely rare. Also, the minerals are refractory, and the extraction of any uranium they may contain would be a difficult and costly process. For these reasons, tantalite deposits are not considered likely to be of importance as sources of uranium.

(d) The association of radioactivity with molybdenite is common, but by no means invariable. In some instances it appears to have been proved that the radioactivity is due to uranium. The radioactive molybdenite samples have come mainly from the pipes which generally occur in or near contacts between granite and porphyry. The difficulties of mining such deposits, owing to the irregular course and dimensions of the pipes and the erratic occurrence of the molybdenite, are well known. Present knowledge indicates that such deposits are unlikely to be useful as sources of uranium, unless further deposits can be found in which the concentration of uranium is much higher than in any deposit so far examined.

(e) Any lode base metal deposit showing radioactivity is worthy of investigation. In some instances it has been found that uranium ore of good grade occurs in portions of the lode which were very poor in the minerals originally mined.



SCALE IN MILES

100 0 100 200 300 400 500

EXAMINATION OF MUSEUM SPECIMENS FOR RADIOACTIVITY

LOCATION OF SPECIMENS

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics.