Return to previous file: Part 9

Figure 64. Tin streamworks on Bodmin Moor in Cornwall. Note how the tailings piles have become covered with soil and grass after hundreds of years of exposure. This site was created by using basic ground-sluicing techniques, similar to those used several hundred years later in the Otago goldfields and Pegaus tin field. *Photo: P. Petchey.*

Figure 65. Herringbone gold tailings in Central Otago on the Earnscleugh Flats near Alexandra (site G42/162). They have been cut through by later dredge tailings, at the top of the picture. Comparison of this view with Fig. 64 shows distinct similarities in the mining methods used and the distribution of tailings. *Photo: P. Petchey.*

Figure 66. Tin workings on Stewart Island (Site D49/47). Note how the tailings are still loosely stacked, just as they were originally placed, but now becoming very overgrown. Comparison with Figs 64 and 65 shows similarities in mining techniques; notably, the orderly hand-stacking of tailings within worked-out ground, with tailraces running through the tailings piles. *Photo: P. Petchey.*

Alluvial gold mining began in earnest in Central Otago in the early 1860s. Attention was first paid to the rich river and stream deposits, but ground sluicing quickly became commonly used as water races were dug. A number of typical alluvial tailings types identified by Ritchie (1981) in Otago bear distinct similarities to those found in the Pegasus and Cornish tin fields (Figs. 64, 65, 66). The Pegasus tin field was found by prospectors looking for gold, and as tin ore can be extracted in a similar fashion to gold (both have a high specific gravity), the mining techniques employed for the tin mining were those already in use in the Otago and Southland goldfields. This technology had arrived in New Zealand via the Australian and, to a lesser extent, Californian goldfields, as part of the skills base of itinerant alluvial gold miners (May 1962: 104). One clear Californian influence was the introduction of hydraulic sluicing to New Zealand goldfields (Ritchie 1981: 53). The evidence for the use of this mining technique in the Pegasus tin field is archaeologically unequivocal for the 1912–17 period, and good for 1890 (based on information in Gordon (1890)).

It is likely that many of the workings in the Pegasus tin field did produce small amounts of gold (Williams & Mackie 1959). Therefore they could, in some cases (particularly in Pegasus Creek), be considered gold and tin workings.

Thus the mining technology employed at the Pegasus tin field was a direct transplant from the goldfields of southern New Zealand (and had been introduced to New Zealand from the Australian and Californian goldfields). There is no direct link to the Cornish tin fields, as although Cornish miners were present in the Otago goldfields (Paterson 1980), Cornish alluvial tin mining had effectively finished several hundred years earlier. The fact that archaeological sites in the Pegasus tin field bear striking similarities to much older Cornish sites suggests that the basic technology was developed to an effective form at an early date, and had subsequently changed little over time.

The men who arrived during the Pegasus tin rush in late 1888 carried with them a mining knowledge that had been developed in many places over many years, but was specifically acquired in the goldfields of Otago, New South Wales, Victoria and California. It was, in essence, a purely goldfields technology applied to a tin field.

15. Archaeological interpretation of events

A number of accounts of the Pegasus tin rush have been published (e.g. Howard 1940; Walrond 1999). However, none of these have been made with a full knowledge of the tin field itself. Several claim maps exist, showing the total area that was surveyed, and there are lists of the men who applied for the claims. But as was noted at the time of the rush, many of the claims were speculative; some were never prospected, let alone worked.

The archaeological survey will certainly have missed some sites. However, for the first time a reasonably full picture has emerged of the work actually carried out during the tin rush. Workings and prospect pits are to be found scattered about the area; some men quite obviously worked very hard for a period. But who were they?

It is interesting to start with who they were not. Two quite substantial areas of workings were found to be outside the surveyed claim areas. Site D49/93 (alluvial workings on Scollays Flat) was outside the surveyed areas, while sites D49/68 & 69 (alluvial workings and hut site on western flank of Tin Range) were in an area specifically labelled as 'Crown Lands' on the claim maps. What this signifies is that the available records are not necessarily correct or comprehensive. There is no evidence at present to identify the individuals responsible for these workings. More files may remain buried in Government Departments or Archives New Zealand as claims for the Pegasus tin field were made to the Commissioner for Crown Lands, rather than the Warden's Courts who were responsible for gold mining in proclaimed goldfields.

This means that caution is required when ascribing names to sites, even when the evidence appears clear. For example, sites D49/48 and 49 are both on Section 27 Block VII Pegasus District, held in 1890 by William Smith. However, the archaeological evidence clearly shows that the two sets of workings are of different ages, and are unlikely to be the work of one man (or group of men).

There is also good evidence that a number of men were employed on some claims, and the claim holder may not have physically worked it himself. H.A. Gordon made clear reference to employed workers on the claims after his inspection of the Pegasus tin field (Gordon 1890: 95).

What can be clearly stated is that there is good archaeological evidence for tin mining and prospecting throughout much of the surveyed area, but while some claims clearly had a great deal of work carried out in them, others languished. In this the published accounts are correct: there was a good deal of speculation. It is of note that a small group of names can be associated with areas where there is good archaeological evidence of mining activity. These names include G. Swain and A.E. Livingstone, who were members of the group that first found tin in Pegasus Creek: R. Scollay who took Black to the Pegasus tin field in his boat in 1888, and Alex Glennie, who held the Smiths Stream claim.

With regard to the operations of The Stewart Island Tin and Wolfram Lodes Limited, the archaeological evidence matches exactly the information presented in the company directors' reports. The accounts of the site-works can almost all be backed-up by material evidence in the field today. While the directors may have been ill-advised in attempting to open a tin mine, they were certainly scrupulous in their description of work undertaken with shareholders' money.

16. Summary and recommendations

This archaeological survey has recorded for the first time the physical evidence of the Pegasus tin rush of 1888–89, and the ill-fated attempt by a Dunedin company to re-open the field in 1912. Apart from the Kakapo Project workers of the 1980s, the area has remained largely deserted since mining ceased. This, and the lack of trampling by large animals, has meant that the tin workings have survived in a remarkable degree of preservation.

The Pegasus tin field contains examples of both ground sluicing and hydraulic sluicing operations, the latter complete with most of the original equipment. These archaeological sites are in excellent condition, and are certainly amongst the best examples of their type in New Zealand. The technology applied was typical of the southern New Zealand goldfields, particularly those of Central Otago, transplanted directly to the tin fields. The failure of the tin mining, with an estimated total production of less than 1 ton of tin ore (Williams 1965: 199), served to help preserve this tin field as it was not re-mined at a later date.

This area has enormous value, both historically and scientifically. As a perfectly preserved alluvial mining field, its potential for further study is considerable. And as New Zealand's only tin rush field, it is historically very significant. Foot access, while difficult, is possible via the tramway or the Surveyors Track, both of which require active management.

In terms of future management of the field, a delicate balance is required between maintaining the isolation that has preserved the archaeological sites, and keeping those sites open for visit and study. If left completely alone, the field would be lost to revegetation. This would almost be as great a loss as damage caused by over-visitation, as tree roots would, in time, break apart the tailings and many sites would disappear into the bush. But any control or clearance of vegetation would have to be well-managed and delicate. Such activities could easily cause more damage to a site in one day than has occurred in the past 100 years.

One site that could be actively managed is D49/49, the large area of tailings beside the Surveyors Track. This site is close to an existing track, is still partially open, and has visually impressive features such as tailings piles and deep tailraces. The nearby hydraulic sluicings (D49/41) could also be managed, as the site has similar ease of access, and illustrates very well the different mining technology used by the 1912–17 company.

The work that has been done to date on the tramway (D49/73) has been very valuable, particularly in re-establishing drainage which has reduced channel erosion, and in reducing tracking off the formation. Future management should continue this process. Similarly, work is required on the Surveyors Track (D49/71), particularly drainage to reduce boggy areas, and clearance to re-establish the original (often straight) alignment. Multi-tracking to avoid tree fall and bogs is a current problem with both historic tracks, and will require ongoing management.

In conclusion, this report does not claim to be comprehensive, as more evidence of tin mining activities certainly remains to be found. However, it does, for the first time, provide a detailed account of this quite remarkable archaeological landscape that can be used as a basis for further research, and for determining the future management of the sites.

17. Acknowledgements

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S.O. 2550 (1889) Block VII, mining areas
S.O. 2547 (1889) Blocks II and VIII Pegasus claims
S.O. 2548 Mining areas, Pegasus
S.O. 2574 Mining areas, Pegasus
S.O. 2575 Mining areas, Pegasus
S.O. 2609 (1890) Triangulation plan, Pegasus
S.O. 2610 (1890) Pegasus District (shows cut tracks and boundaries)
S.O. 2633 (nd) Tramway plan
S.O. 2634 (nd) Tramway plan
S.O. 2635 (nd) Tramway plan
S.O. 2636 (nd) Tramway cross-sections
S.O. 2637 (nd) Tramway cross-sections
S.O. 2638 (nd) Tramway cross-sections
S.O. 2639 (nd) Tramway cross-sections
S.O. 2640 (nd) Tramway cross-sections
S.O. 3053 (1897) Sections 29 and 30, Block III
S.O. 3984 (1911) Section 34, Block III (shows hut location)
S.O. 4454 (1918) Survey Plan of Stewart Island

Map: Tin mining areas, Pegasus District, Stewart Island (1889). Copy held by Rakiura Museum, Oban. (Published version of information contained in some of above S.O. plans.)

Internet web pages

www.mcxindia.com/tin_res.aspx

www.roskill.com/reports/tin

19. Glossary

Adit: A nearly horizontal passage from the surface by which a mine is entered and dewatered.

Alluvial: Pertaining to *alluvium*.

Alluvium: Deposits of eroded sediments that have been sorted by water action, particularly in streams and rivers. Usually unconsolidated or not lithified. Alluvial mining is the extraction of valuable minerals from these deposits, generally by washing with water.

Borrow pit: An excavation from which material (soil, clay, gravel) was extracted for some purpose (such as dam or embankment construction).

Cassiterite: (SnO_2) Tin ore. A heavy (SG = 7) mineral, also known as stream tin (when found in alluvial deposits) or tinstone. Usually reddish brown to black, but also sometimes grey or whitish. Commonly found in *pegmatites* associated with *granites*.

Eluvial: Pertaining to *eluvium*.

Eluvium: Deposits that have formed in situ by natural weathering of rock, or have only been shifted by wind, in contrast to *alluvial* deposits which have been sorted by water action.

Granite: A plutonic rock consisting essentially of alkali feldspar and quartz.

Greisen: A type of rock formed during the last stages of cooling and crystallisation of granitic *plutons*. Commonly formed at the contact between the intrusion and the surrounding country rock. Griesen rocks are the characteristic mother rocks of *cassiterite* (tin ore). See also *pegmatite*.

Ground sluicing: A mining technique that uses running water to wash away the ground. Water is supplied by a head race, and directed across a face which is eroded by the running water.

Hydraulic sluicing: A mining technique that uses high-pressure water cannons (*monitors*) to wash away ore-bearing ground.

Iron pan: A type of hardpan (a hard impervious layer cemented by relatively insoluble materials) in which a considerable amount of iron oxide is present.

Lode: A tabular mineral deposit or vein in consolidated rock. In the present context, a tin lode was a deposit of tin ore within its parent rock, as opposed to *alluvial* and *eluvial* deposits in which tin ore had eroded out of this rock, and been deposited downslope.

Mullock: Waste rock from a mine, containing no payable *ore*.

Monitor: A type of water cannon used in *hydraulic sluicing*.

Ore: A mineral or aggregate of minerals that contains a metal or other economically desirable substance.

Paddock: A mining pit, often square or regularly shaped. Can be fully or partially backfilled with waste rock/tailings.

Pegmatite: Coarse-grained igneous rock found usually as dikes associated with plutonic rock (usually *granite*). Forms from the molten residue left after most of the *pluton* has solidified. Often contains traces of valuable minerals such as *cassiterite* and *wolframite*.

Placer deposits: A surficial mineral deposit formed by mechanical concentration of mineral particles from weathered debris. The mechanical agent is usually *alluvial* but can also be marine, eolian, lacustrine, or glacial.

Pluton: A body of igneous rock that has formed deep beneath the surface of the earth by consolidation from magma. In the case of the Tin Range, the Knob Pluton formed beneath older *schist*, which has since largely eroded away. See also *greisen*.

Riffles: (Also 'ripples') Bars set across a tailrace channel in a sluicing operation, designed to catch heavy *ore*, such as *cassiterite* or gold.

Schist: A medium or coarse-grained metamorphic rock with subparallel orientation of the micaceous minerals which dominate its composition.

Tailings: Waste rock from an *alluvial* mining operation, often stacked back into worked areas. Also the waste material discharged from a hard-rock crushing battery.

Tin: An elemental metal, symbol Sn. An important metal in history, as it has a prodigious ability to form alloys, the first known to man being bronze (tin and copper alloy). For centuries the most important area of tin production was Cornwall, although now most tin comes from alluvial deposits in Southeast Asia. It is still an important metal with a wide range of applications.

True left/right: The true left bank of a river is the bank on one's left when facing downstream.

Wolfram/Wolframite: Principal tungsten (W) ore. Tungsten is used in the manufacture of hardened steel, and tended to increase markedly in value during times of war, when it was in demand for munitions manufacture. Prices increased significantly prior and during the 1914–18 and 1939–45 World Wars.

Appendix 1

LIST OF MINING CLAIM APPLICANTS

(Held by Rakiura Museum, Stewart Island/Rakiura)

6 G. Swain
7 Jas. Thomson
8 Livingston
9 R. Scollay
10 Jno. Murdoch
11 Chas. Robertson
12 Thos. Mullay
13 Thos. McFadgin
14 D. Hanning
15 J.G. Ward
16 Wm. Peterson
17 John Peterson
18 Robt. Yule
19 Ed. Gowring
23 Thos. Leask
24 R. McGee
25 Wm. Cundy
26 H. Simpson
27 Fraser
28 Thos. Cross
29 J. Williams
30 Jno. Murdoch
31 R. Sidley
32 G. Ellis
33 H. McGaw
34 Wm. Lewis
35 Wm. Hall
36 Wm. Smith
37 Wm. Fleming
38 G. Swain
39 Jno. Goodall
40 T. McChesney
41 R. Williams
42 Geo Waddel
43 W. Henderson
44 W.R. Thomson?
45 Alex. Glennie
46 Wm. Allen
47 Wm. Goodlet
48 Jas. Ashcroft
49 R. McLeod
50 Geo. E. Tucker
52 John Wilson
53 J. McLean
54 T. Young
55 A. Bradshaw
56 Jno. Robertson
61 Jas. Edwards
62 Thos. Martin
63 Wm. Kirkland
64 R. Rusha
65 Jno. Moffet
68 Geo. Baker
72 J. Hunter
73 Wm. Smith
75 Wm. Nieles
76 H. Daly
77 B. Smith
78 H.R. Fraser
79 F. Rogers
80 R. Kirkby
81 J. Marshall
83 R. Stevens
84 C. Stevens
85 E. Hogan
87 G. Bailly
88 A. Morrison
89 G. Wills
90 J. Jarman
91 J. Baxter
92 W. Batchelor
93 R. Scollay
94 Livingston
96 G. Young
107 A.L. Smith
108 R. Leary
109 M. Ashton
120 R. Scollay
121 W. Cutten
122 D. Black
135 R. Manisty
144 Broderick

Appendix 2

LIST OF RECORDED ARCHAEOLOGICAL SITES

NZAA No.	FIELD No.	EASTING	NORTHING	DESCRIPTION
D49/15	TW12	2108100	5326300	Hut sites
D49/23	TW4	2108700	5326100	Diprose Bay base (tin mining company)
D49/32	HC1	2110800	5327200	Debris barrier
D49/33	HC2	2111000	5327100	Sluicings
D49/34	HC3	2111000	5326900	Small sluice pit
D49/35	HC4	2111100	5326800	Small sluice gully
D49/36	HC5	2110700	5325900	Stream working
D49/37	TW1	2110600	5328300	Two hut sites
D49/38	TW2	2111200	5329600	Dam
D49/39	TW3	2110800	5329000	Building terrace
D49/40	TW5	2110800	5328300	Surveyors camp site
D49/41	TW6	2110600	5328200	Hydraulic sluicings
D49/42	TW7	2107400	5326900	Tin workings and hut site
D49/43	TW8	2107900	5327200	Hut site
D49/44	TW9	2111300	5328200	Prof. Black's tin mine adit
D49/45	TW10	2111300	5329200	Dam and water race
D49/46	TW11	2108100	5326300	Hotel site
D49/47	TW13	2110200	5328200	Reservoir
D49/48	TW14	2110100	5328100	Tin workings
D49/49	TW15	2110200	5328200	Tin workings
D49/50	TW16	2108100	5326200	Building site and boat landing
D49/51	TW17	2110500	5328300	Series of shallow tin workings
D49/52	TW18	2110500	5328600	Dam and water race
D49/53	TW19	2111300	5329600	Tin workings
D49/54	TW20	2111300	5329500	Hut site
D49/55	TW21	2111100	5329500	Water race
D49/56	TW22	2107500	5326600	Small sluice pit
D49/57	TW23	2107900	5327200	Tin workings
D49/58	TW24	2108200	5327700	Tin workings
D49/59	TW25	2108300	5327600	Small area of tin workings and tailrace
D49/60	TW26	2108800	5327800	Water race
D49/61	TW27	2108400	5327700	Water race
D49/62	TW28	2108500	5327800	Shallow tin workings
D49/63	TW29	2108400	5327900	Tin workings
D49/64	TW30	2108700	5327800	Tin workings
D49/65	TW31	2108300	5328000	Pit
D49/66	TW32	2110000	5328000	Tin workings
D49/67	TW33	2110100	5328000	Hut site
D49/68	TW34	2111300	5330200	Hut site
D49/69	TW35	2111300	5330200	Tin workings
D49/70	TW36	2112000	5330800	Two small terraces
D49/71	TW37	2108300	5326500	Surveyors track
D49/72	TW38	2110100	5328000	Tin workings
D49/73	TW39	2108700	5326100	Tramway
D49/74	TE1	2112200	5328700	Hut site
D49/75	TE2	2112300	5324700	Carrington's Maori Bay hut site

Continued on next page

Appendix 2 continued

NZAA No.	FIELD No.	EASTING	NORTHING	DESCRIPTION
D49/76	TE3	2113100	5328200	Worked creek bed
D49/77	TE4	2112900	5328600	Carrington's hut site
D49/78	TE5	2112900	5328600	Tin workings
D49/79	TE6	2112800	5328600	Shallow tin workings
D49/80	TE7	2112700	5328500	Dam
D49/81	TE8	2112500	5328700	Tin workings
D49/82	TE9	2112700	5328700	Tin workings, timber sluice box
D49/83	TE10	2112800	5328700	Tin workings
D49/84	TE11	2112900	5328800	Tin workings
D49/85	TE12	2113000	5328600	Diversion race around waterfall
D49/86	TE13	2113000	5328800	Small sluice pit
D49/87	TE14	2113000	5328800	Water race
D49/88	TE15	2113100	5328600	Tin workings
D49/89	TE16	2113100	5328500	Tin workings
D49/90	TE17	2112600	5327700	Hut site
D49/91	TE18	2112600	5327700	Tin workings
D49/92	TE19	2112500	5327800	Small sluice gully
D49/93	TE20	2112900	5327600	Tin workings
D49/94	TE21	2112500	5328100	Tin workings and deep tail race
D49/95		2123400	5330300	Tin workings, Kopeka River
D49/96		2110600	5327600	Packhorse Track

Appendix 3

ARTEFACT LIST FROM TED CARRINGTON'S INLAND HUT (D49/77)

All items are sitting in and around the hut site. Only visible items are listed, no excavation or other invasive investigation was undertaken. It is known that the hut site has been visited on a number of occasions, and numerous items removed. Much of the material left has also been moved about, and the positions of items now are unlikely to be original (especially items placed on the table and on the bank beside the hut).

A photograph of the hut in about 1984 was published in Best & Powlesland (1985: 12). This showed a number of the artefacts listed below, as well as more of the hut structure intact (but still largely collapsed).

On table:
Enamelled iron pot
Green whisky bottle
Marmite jar (milk glass) broken
2 × slasher blades
Brace and bit
Chisel
Wedge
Primus 631 blowlamp
On bank:
Cast iron camp oven
Length machine drive chain
Iron bars (2)
Tailings fork
Pick head
Galvanised pulley
Wooden box containing:
  Galvanised reel of electrical flex
  Brass face for 'Henry Boker Pocket Balance'
  Cold chisel
  Nuts, bolts etc.
In hut:
Bottles:
  'Rawleighs' pill bottle (full)
  'Waerenga Wines Tekauwhata'
  Long-neck beer, 'BC', 'Invercargill Bottle Co.'
  Ring seal beer
  Meat paste jar (broken)
  Clear bottles (2)
Geared rope winch (wooden pulley)
Hand-operated geared grindstone
Belt drive water pump
'Bull' dynamo ('Bull 62MS')

Pelton wheel (fabricated, plain (not split) buckets)
Large drive wheel, toothed for chain drive
Small drive wheel, toothed for chain drive
Drive chains (2 sets)
Wooden pulley block
Pipe end strainer (cast aluminium)
Sledge hammer heads (2)
Iron bars (3)
Steel layshaft with 2 bearings
Rubberised canvas loops (11)
Rubber gumboots (1 black sole, 1 red sole)
Leather boots (2)
Leather belt
Shovel head
Enamelled plates (3)
Enamelled mugs (2)
Enamelled pots (2)
Cast iron pipe fitting
Galvanised iron pipes (5)
Galvanised iron tapered pipe
Large auger
Hammer head
Wooden handle screw driver (handle rotten)
Iron wedges (2)
Galvanised iron ash shovel (home made)
Cord
Iron bar with hooks over fireplace
Various nuts, bolts, nails, light-weight corrugated iron sheets.