Chapter 6. Mineral Occurrences and Geochemical Anomalies, South Nahanni River Region

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The South Nahanni River region contains significant deposits and numerous occurrences of mineral and hydrocarbon resources. The recently re-opened CanTung mine is world-class and the Prairie Creek mine that is proposed for re-opening targets an exceptionally large silver-rich lead-zinc vein system that is associated with potentially extensive stratabound sedimentary sulphide or manto base metal deposits that are rich in precious metals. Numerous other large to small deposits of tungsten and base metals of skarn, vein, replacement, sedimentary exhalative and sedimentary-diagenetic type are listed in Appendix 1. Many of these were examined in the field; analyses of 100 lithogeochemical samples of such showings are listed in Appendix 2. Coal is also included here, whereas oil and gas potential are examined in Chapter 8. Mineral occurrences are located in Figure 6.1, organized according to deposit types as described in Eckstrand et al. (1996) and summarized below. The named deposits of Figure 6.1 (also shown in Fig. 3.1) are described in summaries included in Appendix 1.

Stream sediment (Chapter 4) and spring water (Chapter 5) geochemistry have identified a number of anomalous stream catchment basins and spring waters respectively that complement and amplify the mineral showings data. Highlights of these data are discussed in Section 6.3, by domain, with focus on the two study areas for proposed expansions to NNPR (Figures 6.2 and 6.3).

6.1. Mineral Showings of Proposed Expansions to NNPR

The northwestern study area is located just east of CanTung, NWT and is named after the rugged Ragged Range that typifies its topographic setting. Exploration in this area has located three major mineral deposit types and several others of interest, local examples of which are summarized in Appendix 1 in the sections indicated: (1) tungsten (+/- copper, silver, zinc, lead) - bearing skarns similar to the world-class deposits which are being mined at the recently re-opened (Ednie, 2002) CanTung Mine, NWT (A-1.2, A-1.4); (2) Gemstones associated with the Selwyn Plutonic Suite (A-1.7); (3) shale-hosted lead-zinc deposits similar to the Faro Mine and the partly developed resources located at MacMillan Pass and Howards Pass (A-1.3). Other deposit types of particular interest include: (4) silver (+/- gold, lead, zinc) in quartz-carbonate veins, (5) placer gold; (6) disseminated lode gold deposits inferred from the existence of the placer occurrences, (7) laterally extensive disseminated zinc in carbonate rocks such as the Mawer Showing (A-1.6) and (8) Nick type nickel-platinum deposits hosted by shale (Hulbert, 1995).

The southeastern study areas, Nahanni Karst and Tlogotsho Plateau, differ geologically from the CanTung region by lacking granites and straddling a major facies change between karsted platformal carbonate strata on the east and basinal shales to the west. Such rock types typically host resources such as oil, gas (Chapter 8 documents very significant gas potential in the Liard Fold Belt), coal, and strata-bound zinc-lead deposits similar to those found at Pine Point, NWT (Carbonate-hosted lead zinc, Sangster, 1995) and Faro, Yukon (Sedex; Lydon, 1995). In addition, the silver-rich Prairie Creek zinc-lead vein now being explored by Canadian Zinc Corp. just west of the Nahanni Karst study area, is spatially associated with such stratabound mineralization (Appendix 1, section A-1.8).

6.2. Gemstones- new to the Region

Particular attention is paid to gemstones here, because they are a new discovery that involves high value, very small workings compared to base metal and tungsten mines, and a high degree of uncertainty because of their small size and the specialized skill required to find and develop economic deposits. They are also likely to be found associated with skarn tungsten deposits like those under production at the CanTung mine. Other mineral deposit types are adequately described in appendices and in synoptic assessment tables in Chapter 7. The following account from the Yukon Geology Program web-site, viewed on January 6, 2002, provides context to the summary descriptions of gemstone deposits in Appendix 1.

Since 1997 there have been two discoveries of emeralds in or near the Yukon Territory! Significant emerald localities in North America are rare. A small but quality emerald could easily be worth in excess of $10,000.

The first discovery of emeralds in the north was made in 1997 by Whitehorse-based prospector, Ron Berdahl. He discovered vanadium-rich emeralds near the Lened tungsten showing in the westernmost N.W.T. adjacent to the Yukon border. The property is currently owned by Liberty Mineral Exploration Inc. The Lened Property is underlain by a rare-element enriched two-mica pluton and associated rare-element pegmatites. There are two other nearby two-mica plutons, locally known as the CAC and the RUDI. Emeralds on the Lened property are associated with phlogopite schist developed along the contact zone between a rare-element pegmatite and Devonian-Mississippian black shales. The emeralds are vanadium-rich, transparent to translucent, and are up to 2 cm long and 0.50 cm wide.

The second emerald discovery was in the autumn of 1998, by Expatriate Resources' field geologist, Bill Wengzynowski, in the Finlayson Lake area of southeastern Yukon. The geological setting is similar to 'schist-type' occurrences where quartz-tourmaline pegmatites cut phlogopite and chlorite-bearing schist.

The possibility of emerald occurrences in the Yukon was earlier suggested by Walton (1996). She provided extensive background information on ruby and sapphire, emerald, tsavorite garnet and tanzanite, chrysoberyl, gem-bearing pegmatites and topaz-bearing rhyolites, including their physical and chemical properties, field identification, geological settings, and exploration criteria.

In the following resource assessment chapter, Walton's exploration criteria for emeralds and gem-bearing pegmatites are used for resource assessment. One of the key associations in both the Finlayson Lake and Lened occurrences is proximity to a two-mica granite. Emeralds are located where quartz veins cut mica-rich layers in the adjacent contact-metamorphosed zone, in both stacked gently dipping schist zones and in vertical cross structures. The Finlayson Lake emeralds are an unusual genetic type enriched in W, Cr and Mo, and are being evaluated by True North Gems for their economic potential. Summaries of the Lened and O'Grady Batholith gemstone settings and rare-element-bearing Little Nahanni Pegmatites are provided in Appendix 1 (Sections A-1.4, A-1. 5 and A-1.7).

6.3. Geochemical Anomalies

Figures 6.2 and 6.3 summarize the geochemical anomalies developed in Chapter 4 (Stream Sediment Geochemistry) and Chapter 5 (Spring Water Geochemistry), together with summary information from geological relationships and mineral occurrences as they pertain to the two study areas for park expansion: Ragged Ranges, and Nahanni Karst – Tlogotsho Plateau respectively. Tables 6.1 and 6.1 list the summary data used in the two maps.

Appendix 2 provides descriptions and analytical data for 100 representative "Nahanni" rock samples collected by C.W. Jefferson, listed in chronologic order. These whole rock and trace element analyses were intended to test the showings described in assessment reports and to check for additional elements of potential economic value that might not have been assessed earlier. In particular, rare metals such as gallium and germanium were thought to have some potential (anonymous, 1987), as were gold or silver byproducts. Analyses confirmed all previous descriptions, and did not reveal any new strategic elements, however they are reported in Appendix 1 for archiving purposes and to provide data access to explorationists who might have other new ideas for mineral potential.

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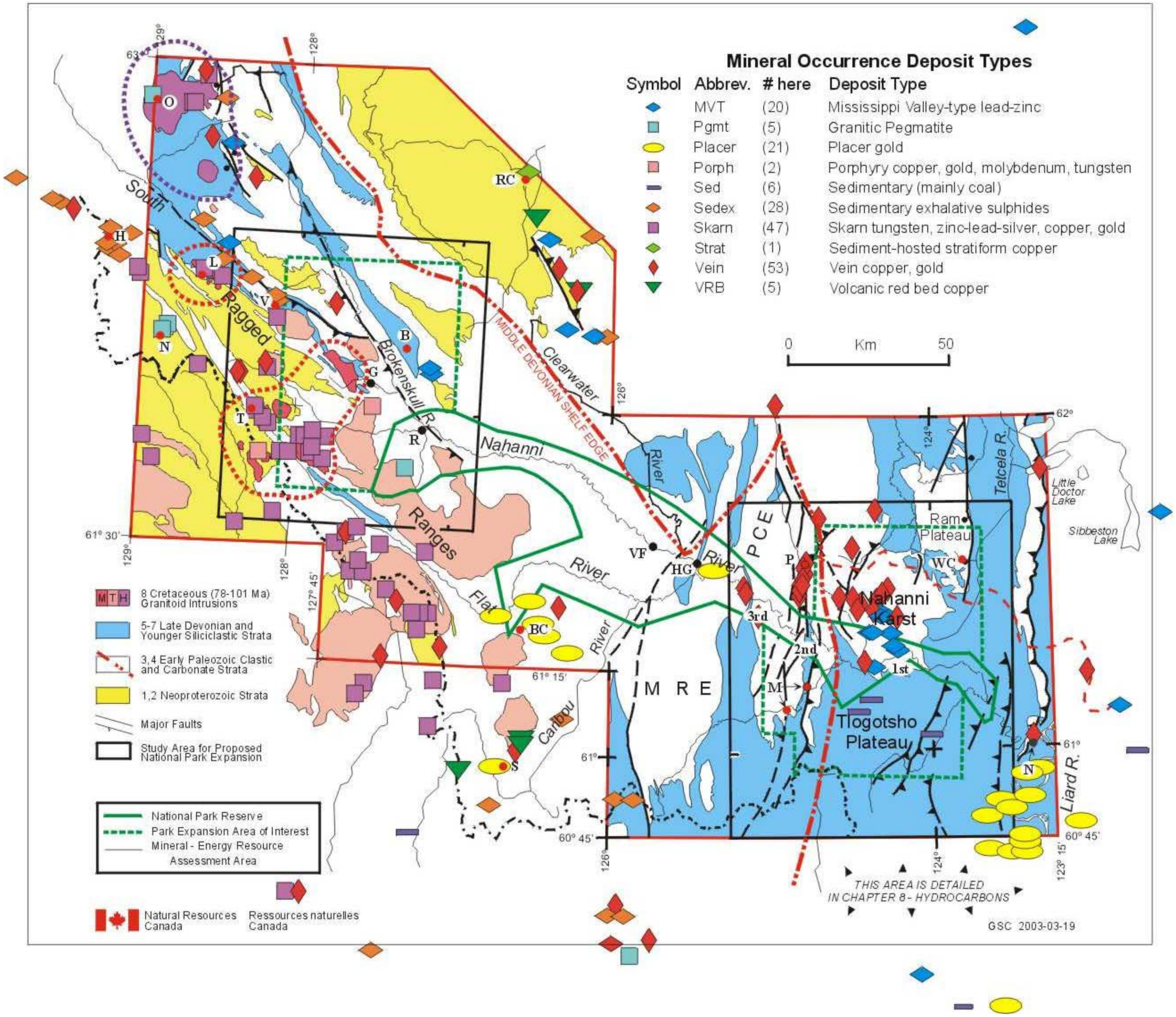

Figure 6.1a. Mineral occurrences of the South Nahanni River region on geology from Fig. 3.1. Occurrences are selectively labelled here, with full names and commodities identified in Appendix 1. Abbreviations: MRE = Meilleur River Embayment, PCE = Prairie Creek Embayment, SS = Sombre Salient. Localities (black dots) and mineral sites (red dots) are: 1st, 2nd, 3rd = Canyons of South Nahanni R.; B=Broken Skull; BC = Bennett Creek placer gold; G = Glacier L., H = Howards Pass zinc-lead; HG = Hells Gate; L = Lened tungsten; M = Meilleur River hot springs; N = Nahanni Butte community; O = O'Grady gemstones; P = Prairie Creek silver-lead-zinc; R = Rabbitkettle Hot Springs; RC = Redstone copper; S = Selena Creek placer gold; T = CanTung Mine and Hot Springs; V = Vulcan zinc-lead; VF = Virginia Falls; WC = "Wretched Creek" (informal) placer gold.

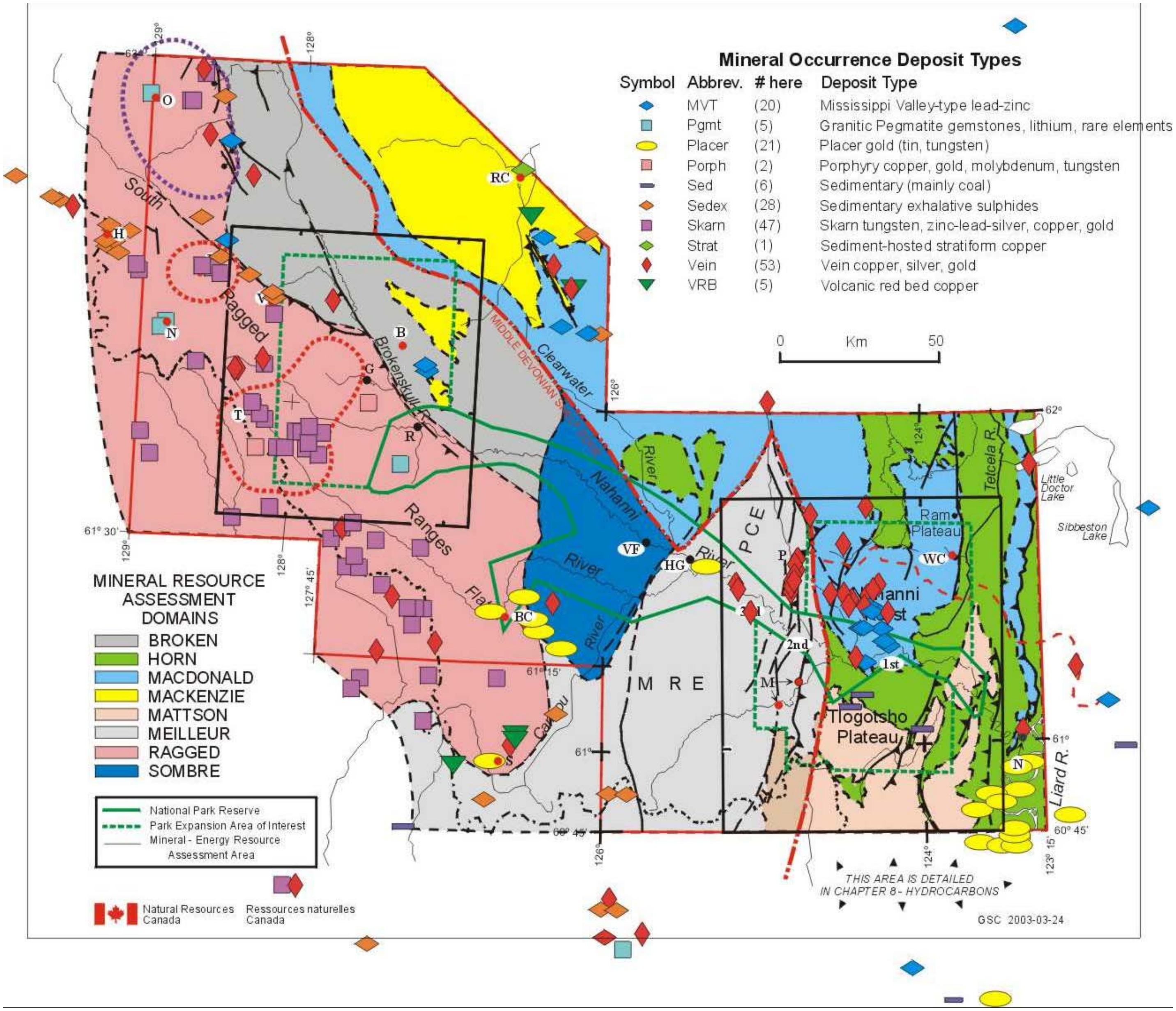

Figure 6.1b. Regional mineral occurrences on regional mineral resource assessment domains (explained in Chapter 3). See caption to 6.1A for abbreviations. This map provides a transition to the detailed maps of Figs 6.2 and 6.3 for Ragged Ranges and Nahanni Karst-Tlogotsho Plateau study areas respectively.

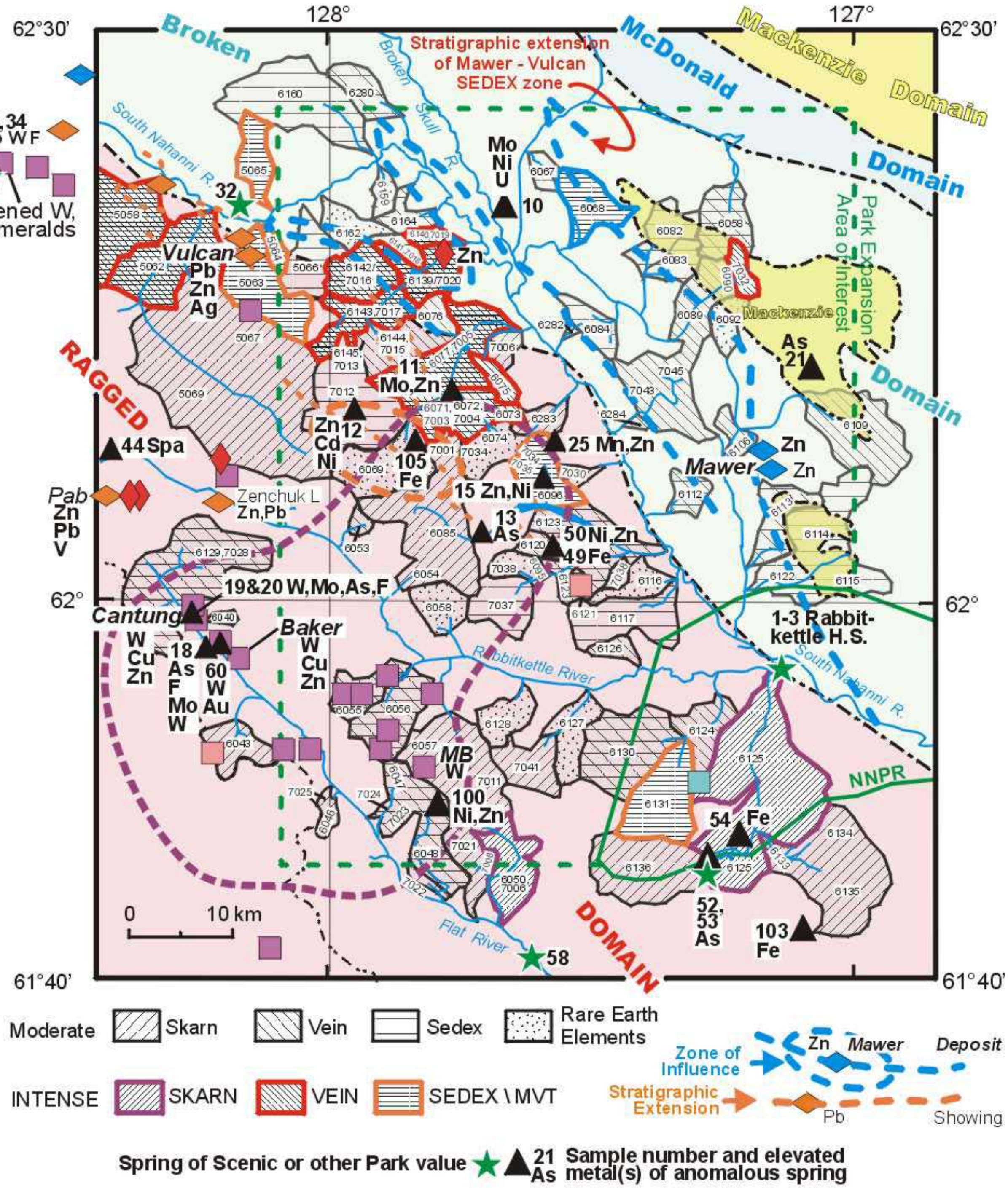

Figure 6.2. Regional mineral resource assessment domains (Fig. 6.1B) in Ragged Ranges study area with summary data on mineral occurrences (Fig. 6.1A,B), grouped anomalous stream sediment catchment basins (Chapter 4; Fig. 4.40a) and anomalous spring waters and scenic springs (Chapter 5, Fig. 5.1 and Table 5.12). Mineral showings deposit types are listed in Fig. 6.1; zones of influence are colour matched with related deposit types. Data are compiled in Table 6.1.

Table 6.1. Summary of anomalous data in Ragged Ranges Area with reference to catchment basins shown in Fig. 6.2 (derived from Chapter 4, summarized in Figure 4.40a, built on Table 4.10). Element symbols used in this table are described in footnotes. SPANS plots of individual elements in catchment basins are shown in Figures 4.5-4.10 and 4.16-4.27 of Chapter 4; chemical analyses of stream sediments are statistically interpreted in Chapter 4. Spring waters (e.g., **S100**) are from Table 5.12, Chapter 5.

Catchment basin #	Anomalous elements in decreasing percentiles[1]; Springs & Showings	Deposit(s) inferred[2] STRONG/weak	General location
5058	*Au Ni (Ba Cr W)	vein + Sedex	Mouth Lened Creek
5062	**Pb *Sb Cd Zn Cr (As Au Th)	SEDEX + vein	Mouth Bologna Creek
5063	**Pb ***Zn** *Sb *Ni Cd; **Vulcan PbZnAg**	SEDEX	Vulcan Creek
5064	*Ni Co (Ni Pb); **Vulcan PbZnAg**	SEDEX	E of Vulcan
5065	*Pb [Cd] HMC too small	SEDEX	N of Vulcan
5066	(As Ni)	Sedex	E of Vulcan
5067	W (As Ni Th Zn)	skarn + granite	S of Vulcan
5069	(As Au Ce Hf Th Zn)	granite/sandstone	Head Bologna Creek
6040	W	skarn	E of CanTung
6043	Mo (W); Tuna porphyry W Mo Cu	Skarn / porphyry?	Baker showing area
6046	Cu (Cr Pb Mo) [**As W** Au]	SKARN	Baker showing area
6047	*As Sb (Cu W) [Pb]	SKARN + vein	MB Showing
6048	*As Co Cu(Cd **W** Zn Mo) **Spring100 NiZn**	SKARN + vein	MB Showing
6050/7006	*Au *W Cu (Co As Cr) [Ni]	SKARN	E of MB Showing
6053	[Ce As Cr]	vein?	NE Rabbitkettle R.
6054	*Cr	skarn?	NE Rabbitkettle R.
6055	**As** Au Co Cr Sb W; **Pyramid, Pyramid Mtn., & Rabbitkettle skarn W occur.**	SKARN + vein	NW of MB Showing
6056	**W** Au; **House of Lords, Whistler, Dobson skarn W occurrences**	SKARN + vein	NW of MB Showing
6057	Au (W) [Ba]; **MB skarn W occurrence**	skarn?	N of MB Showing
6058	Ce	granite	NE Rabbitkettle R.
6059	Mo Zn (Co)	Sedex + vein	S. of Avalanche L.
6067	(Cd) [Mo]	Sedex	Black Wolf Mt.
6068	Zn (Ba Mo Ni) / **E of Spring10; along strike from Mawer**	SEDEX/MVT	Black Wolf Mt.
6069	(Hf) [Hf As] / **Spring 105 Fe**	granite	Mt. Sir James MacBrien
6071/7003	*Mo*W Cd Co Cu(**Ni** Zn) **Spring11MoZn**	SKARN +Sedex	Mt. Sir James MacBrien
6072/7004	*Ce*Hf*Zn Mo Ni Pb Th (Au Ba Cd Co) **Spring 11 MoZn**	SKARN + SEDEX	Mt. Sir James MacBrien
6073	***Mo *Ni** *Pb *Sb **Cu** Cd	SKARN + SEDEX	Mt. Sir James MacBrien
6074	***Th** *Hf **Ce**	granite	Mt. Sir James MacBrien
6075	***As** (Co Au)	VEIN	Mt. Sir James MacBrien
6076	Co Sb (Au)	vein	SE Mount Appler
6077/7705	***Hf** *Au **Th** (**Ce** Cr W) **Spring 11 MoZn**	VEIN + skarn	Mt. Sir James MacBrien
6082	Mo	Sedex/vein?	S. of Avalanche L.
6083	Mo	Sedex/vein?	S. of Avalanche L.
6084	*Cd [Ba Mo Zn]	Sedex	NW of Dolf Mt.
6085	Th W (Hf)	granite/skarn	Mt. Sir James MacBrien
6089	(As); along strike from Mawer	vein	S. of Avalanche L.
6090	As	vein	S. of Avalanche L.

6092	**Hf**	sandstone	S. of Avalanche L.
6095	Th	granite	Mt. Ida
6096	*Co (Cr Cu Ni Zn) **Spring 15 Zn Ni**	SEDEX	Mt. Sir James MacBrien
6106	Co; closely on strike with Mawer Zn	vein?/skarn?	Dolf Mt.
6109	(Co)	vein?	NE of MAWER Showing
6112	Ba (As Au)	vein + Sedex	Dolf Mt.
6113	***Zn** *Cr *Sb **Ba** Cd Cu Mo Ni (Au); closely on strike with Mawer Z	MVT/SEDEX/VEIN	MAWER Showing area
6114	(Ba)	Sedex	MAWER Showing area
6115	***Ba** (Sb)	Sedex	MAWER Showing area
6116	*Cd (Hf) [Sb Zn]	Sedex + granite	Mt. Sydney Dobson
6117	Cd (Ba Sb Zn)	Sedex	Mt. Sydney Dobson
6120	Co (Ce Sb) / **Springs 49, 50**	vein?	Mt. Ida
6121	[Ba Sb Zn]	Sedex	Mt. Sydney Dobson
6122	(Ba); closely on strike with Mawer Z	Sedex	MAWER Showing area
6123	***Th *W** *Hf *Au Ce Mo (Ba)	SKARN + Sedex	Mouth Brintnell Creek
6124	Au; Eudyalite pegmatite V,REE,P occurrence	vein	Hole-in-the-wall
6125	*Hf *W (Th Co) / **Springs 52,53 As, 54Fe; Eudyalite pegmatite V, REE, P occur.**	SKARN/granite	Hole-in-the-wall
6126	(Au)	vein	Mt. Sydney Dobson
6127	Ce Th (Hf) [**Th** W]	granite	S Rabbitkettle R.
6128	(Hf Th W) [Ce Th Hf]	granite/skarn	S Rabbitkettle R.
6129/7028	W Cr Ni [Ce]	SKARN + Sedex	Upstream CanTung
6130	**As** (**Au** Ba Th Hf)	vein + Sedex	Hole-in-the-wall
6131	*Sb Ni Zn (Ba)	SEDEX	Hole-in-the-wall
6133	*Co	skarn?	Hole-in-the-wall
6134	(Co)	skarn?	Hole-in-the-wall
6136	[W] / **Springs 52, 53**	skarn?	Hole-in-the-wall
6135	*Co	skarn?	Hole-in-the-wall
6139/7020	**Th Zn** Ba (Ce Au)	SEDEX/MVT+vein	Vampire Peaks
6140/7019	*Au Sb Zn (Pb)	VEIN + Sedex	Vampire Peaks
6141/7018	(Ba Ni)	Sedex	Vampire Peaks
6142/7016	***Au** *Ce *Pb Th (Cr)	VEIN + SEDEX	Mount Appler
6143/7017	***Ni Zn** Co As Sb (Pb)	SEDEX + vein	Mount Appler
6144/7015	Th (Au Ce)	vein	SE Mount Appler
6145/7013	Cr (Cu Au)	vein	SE Mount Appler
6159	Ce Cr (**Hf** Th)	sandstone	Vampire Peaks
6160	(Zn Ni)	Sedex	N of Vulcan
6162	*Mo *Zn **Ba** Sb (Cr Cu Hf Ni)	SEDEX+sandst.	Vampire Peaks
6163	Sb (Zn)	Sedex + vein	Vampire Peaks
6164	Sb (Zn)	Sedex + vein	Vampire Peaks
6280	Mo Sb (Ce Ni)	Sedex + vein	N of Vulcan
6282	Co (As)	vein	South Nahanni River
6283	[**W**]; **Spring 25 *Zn; Spring 104 As**	skarn?	Mt. Sir James MacBrien
6284	(Au)	vein?/placer?	Dolf Mt.
7001	***Mo** *Cu (Co)	skarn/porphyry	Mt. Sir James MacBrien
7008	(Pb)	skarn + Sedex?	E of MB Showing

7011	***Ni** Cu [Pb]	skarn	E of MB Showing
7012	Stream na but **Spring12 Zn Cd Ni**	SEDEX	W.Mt.SirJamesMacBrien
7021	[Co Ni]	skarn?	E of MB Showing
7022	*Ni Co Zn (As Hf) [Cu]	skarn + Sedex	MB Showing
7023	***W** Mo [Hf]	SKARN	MB Showing
7024	***Sb *W Th** (As Cu Pb Zn Hf)	SKARN + Sedex	W of MB Showing
7025	*As *Mo *W Sb (Au)	SKARN	Baker showing area
7026	Co	skarn?	Mt. Sir James MacBrien
7027	*Mo	porphyry/Sedex	Mt. Sir James MacBrien
7030	***Hf** *Th	granite	Mt. Sir James MacBrien
7032	*As (Au Co Ni) / 8 km NW of **Spring 21**	VEIN	S. of Avalanche L.
7033	*As *Cr (Ce Sb Th)	VEIN	S. of Avalanche L.
7034	Cu Cr Ni Zn	SEDEX	Mt. Sir James MacBrien
7035	Pb (As)	SEDEX + vein	Mt. Sir James MacBrien
7036	*Ba (Zn Mo)	Sedex	Mt. Sydney Dobson
7037	***Ce *Th** (Pb Cr Hf W)	granite + Sedex	Mt. Sydney Dobson
7038	Ce	granite	Mt. Ida
7041	Cr [Th Hf]	skarn?	S Rabbitkettle R.
7043	Ce (Cr)	vein?	Dolf Mt.
7045	(Hf Co)	vein?	Dolf Mt.

7003-7006, 7013, 7015-7020, 7028- duplicates of 6xxx samples (collected in 1986) listed above

[1]**Percentile symbols for anomalous elements in catchment basins**	
****Au**	extremely anomalous
***Au**	>98th percentile in silt + HMC (heavy mineral concentrate) (one may be only >90th percentile)
*Au	>98th percentile in silt only
*Au	>98th percentile in HMC only
Au	>95th percentile in silt + HMC (one may be only >90th percentile)
Au	>95th percentile in silt only
Au	>95th percentile in HMC only
(**Au**)	>90th percentile in silt + HM
(Au)	>90th percentile in silt only
(Au)	>90th percentile in HMC only
[Au]	selected >80th percentile: >95% in raw data and/or part of a geochemical association

[2]Anomalous element associations in Ragged Ranges area (listed alphabetically), and their inferred relevance to mineral deposit types. Not all of each association is anomalous at any one site.
As-Au-Ce-Co-Cr-Cu-Hf-Mo-Ni-Pb-Sb-Th-W-Zn: SKARN tungsten: granite-associated elements are Ce-Hf-Th; the remaining elements are related to the skarn process. Pb and Zn may also be derived from a Sedex deposit predating the skarn. Elements such as As-Au-Co-Sb are anomalous not only in known skarn areas but also around Vampire Peaks, Mount Appler, Mount Sir James MacBrien, SW of Hole-in-the-Wall, south of Avalanche Lake, around Dolf Mountain and near the Mawer Showing. Some of these associations, especially Mo-Cu-Co, suggest a porphyry deposit type.
Ba-Cd-Cr-Cu-Mo-Ni-Pb-Sb-Zn: SEDEX/MVT zinc-lead-silver or nickel-zinc: All of these elements are anomalous

in the creek draining the Mawer-Showing. This zinc-lead showing is situated in carbonate rocks of the Sunblood Formation, associated with dolomite and karst-like breccia, characteristic of the Mississippi Valley (MVT) deposit type. A number of other small showings and geochemical anomalies in the assessment area suggest that zinc concentrations are regional and stratabound in the upper Sunblood Formation, with local high-grade sites (e.g., 6068, 6072, 6073, 6162) marked by several of the associated hydrothermal elements and two by associated lead (Pb) and cadmium (Cd). Cadmium is useful to corroborate zinc as Sedex indicators, which can be concentrated hydromorphically (e.g., Jonasson et al., 1987), and barium (Ba) which constitutes extensive thin beds as well as parts of base-metal deposits. Lead (Pb) is dispersed in detrital form and is a more direct indication of outcropping base-metal sulphides. The Mo-Ni association with zinc suggests the presence of a newly recognized SEDEX deposit sub-type, represented by the Nick in Yukon Territory, which also contains platinum group elements (Hulbert et al., 1990).
As-Au-Cu-Sb: VEIN/SKARN/REPLACEMENT PRECIOUS METALS: No known precious metal veins were tested geochemically in orientation surveys in Ragged Ranges, but this element association is inferred to represent vein systems which are either independent of, or distal parts of, skarn/replacement or porphyry systems.
Ce-Hf-Th: MATURE HEAVY MINERAL CONCENTRATE: Sandstones and granitic rocks contribute high proportions of zircon and monazite which contain the rare earth elements listed. They are not considered to have economic mineral potential, except for possible rare-element pegmatites such as the CALI which may contain mineral species suitable for specimen collecting.

6.3. Geochemical Anomalies *(cont'd from p.6- 2)*

Geochemical anomalies in stream sediments and spring waters therefore constitute the main new information generated in this resource assessment. The stream sediment geochemistry is the most comprehensive data set. Spring waters augment the stream sediment data in very important ways by sampling bedrock at depth, thereby providing clues to hidden mineral potential. All indications are that trajectories in the spring systems are short, and the waters interacted with base metal sulphides in the immediate subsurface. This is particularly important in areas such as the Meilleur River valley where exposure is poor and much of the terrane is mantled by varved clay deposits of Glacial Lake Nahanni. The following two sections synthesize the various sources of mineral deposits-related data ("Metallotects") for the respective study areas.

6.4. Ragged Ranges Metallotects

The following correlations among elements, geological features and known mineral occurrences were made by visual spatial analysis of the geology and summary plots of stream sediment geochemistry. In our approach, a single threshold value for an element could not be determined because it varied based on the percentage of underlying rock type in the catchment basin. Chapter 4 provides details on the use of percentiles to determine anomalous basins. In the following discussion "anomalous" means data above the 95th percentile as determined by visual inspection (Hale, 1994) after predictive regressions (Chapter 4) to provide background corrections with respect to rock type.

Anomalous tungsten (W) +/-copper (Cu) +/- arsenic (As), antimony (Sb) +/- molybdenum (Mo) +/- cobalt (Co) hafnium (Hf) +/- thorium (Th) +/- nickel (Ni) +/- Chromium (Cr) are common element associations in both silts and HMCs although anomalies in these elements are not well correlated between the two media. In both media these elements are spatially associated (although in different catchment basins) with Cretaceous intrusions and suggest the presence of skarns with potential for tungsten (cf Dawson, 1995c).

Goodfellow and Aronoff (1988) explored similar metal associations together with stream acidity (pH) and landsat imagery to locate structures suggestive of buried plutons. They established threshold values for stream sediment analyses above which the elements W, pH, As, Cu, Ag, F-P_2O_5 and Sb were considered to be anomalous. They proposed a number of prospective sites for skarn tungsten, all outside of the Ragged Ranges study area.

The copper, silver and gold associated with these skarns are unlikely to be deposits in their own right, because gold skarns are typically associated with relatively mafic intrusions of subalkaline to alkaline composition (Dawson, 1995b) (not present in Ragged Ranges). However minor gold could be useful as a pathfinder based on analogy with well known tungsten skarns in the region (Dick and Hodgson, 1982; Aranoff et al., 1986). Silver (Ag) has not been detected sufficiently to discuss here (cf Skarn silver, Dawson, 1995a).

Minor placer gold grains are scattered throughout the drainages in CanTung Domain. The possibility of a significant disseminated lode gold deposit being present must not be discounted, by analogy with Carlin type deposits (e.g., Knutsen et al., 1991) and other granite-related disseminated gold deposits (e.g., Poulsen, 1995b; Poulsen et al., 2000). Rowan (1989) and Richards (1989) proposed the existence of a Carlin type deposit as a lode source for the Selena Creek placer deposit. Poulsen (1996) noted that a variety of types of intrusion related gold deposits are associated with, and generally located on the eastern side of, the metalliferous Cretaceous magmatic arc which in Ragged Ranges is represented by the Selwyn Plutonic Suite. Gold-rich skarns (Dawson, 1995b) are also prime candidates as sources of placer gold.

Components of the multi-element association (W-Cu-As-Sb-Mo-Co-Hf-Th-Ni-Cr) are represented in a number of places such as the catchments of samples 6055, 6056, 6057 and 7025 on both sides of the upper Flat River valley. These drainages cover tungsten showings such as the Baker, the Nahanni and the MB which have been only superficially investigated, despite some drilling, and have high mineral potential. Significantly, the major CanTung deposit which has been mined for many years, is expressed in silts of the Flat River only as the single anomalous element tungsten, and in heavy minerals as anomalous chromium (Cr) and nickel (Ni). This suggests that the mill and tailings dam systems are very effective at removing and containing pathfinder elements such as gold and copper which are abundant payable by-products of the tungsten deposit.

Furthermore, the CanTung deposit is blind (not exposed) having been discovered accidentally. First, as an after thought, copper-bearing drill core samples behind a storage shack were lamped for tungsten. Second, while drilling for tungsten, drillers went past the usual stopping place during their night shift and transected an overturned fold to intersect high grade ore on its lower limb (Bartlett, pers. comm., 1986). Other such blind occurrences are highly likely within the zone of two-mica granite that was mapped by Anderson (in Gordey and Anderson, 1993) and is outlined on Figs 6.1 and 6.2. Also, as noted above, the geochemical expression of this world class deposit is very limited.

A possibly critical stratigraphic criterion for the CanTung deposit may be the specific facies of the Sekwi Formation (map units 2 ("Swiss-cheese limestone") and 3 ("Ore-limestone") of Blusson (1968)) at the location where they are intersected by the Mine Stock pluton. Considerations include: 1) the chemical composition of these facies, 2) the hydrogeological characteristics of the interbedded carbonate and shale that may have effectively channelled mineralizing fluids as the skarn developed; 3) the location at the facies change from more platformal Sekwi Formation to more basinal Gull Lake shales and siltstones at that place, and 4) the particular assemblage of supracrustal rocks that the pluton intersected and assimilated during its ascent at that place. If these factors are important, then the area of very high potential for skarn tungsten is restricted to the Flat River Valley region, or other sites in the northern Cordillera region where two-mica granites intersect the Sekwi Formation at its shelf-to-basin transition. These thoughts were encouraged by discussions with R.G. Garrett who pointed out similar musings by Gabrielse (1969) regarding the location of the (then named) Eocambrian – Cambrian carbonate-shale facies change as trending parallel to Flat River valley through the CanTung area.

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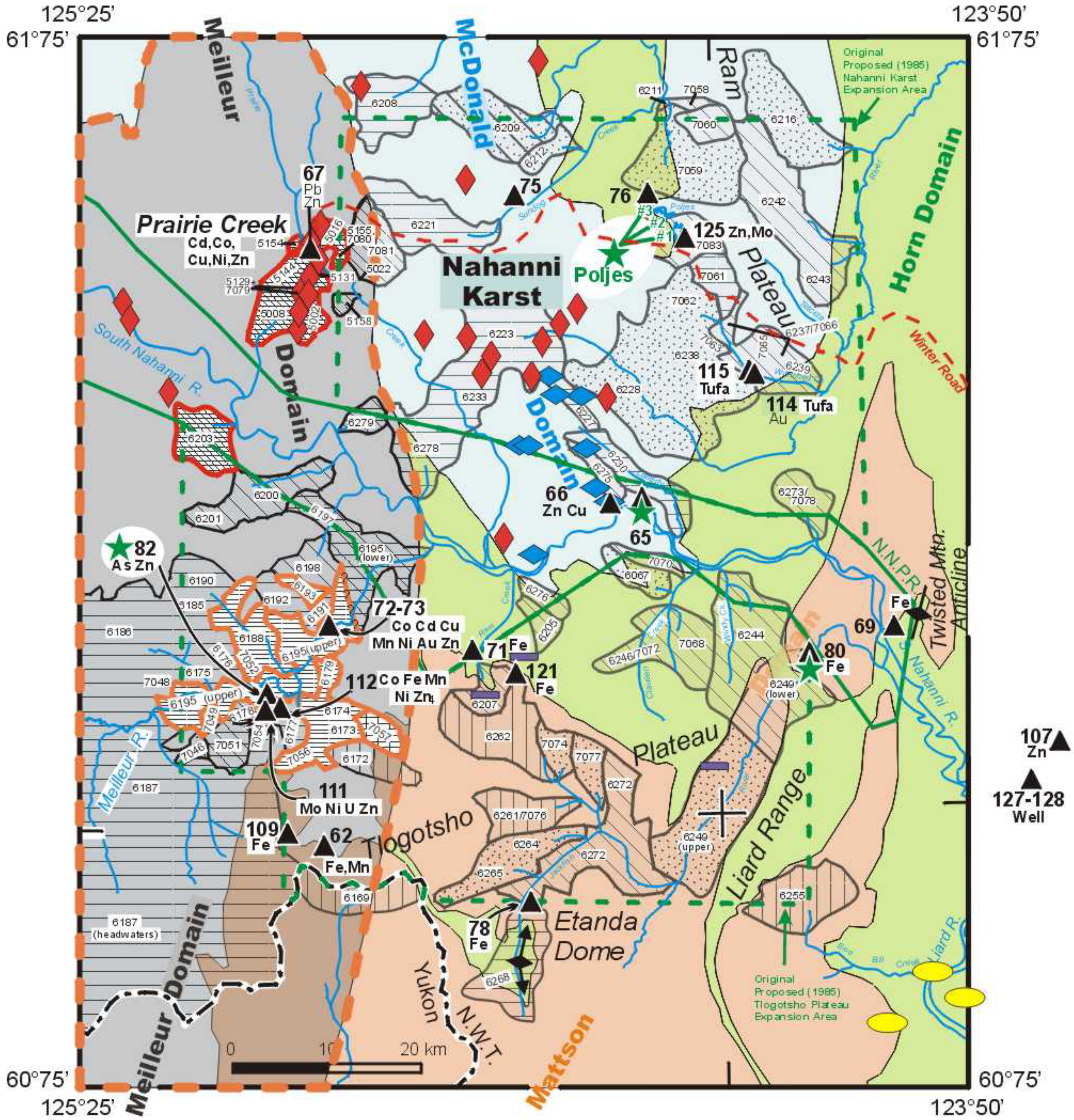

Figure 6.3. Regional mineral resource assessment domains (Fig. 6.1B) in Nahanni Karst – Tlogotsho Plateau study area with summary data on mineral occurrences (Fig. 6.1A,B), grouped anomalous stream sediment catchment basins (Chapter 4; Fig. 4.41a) and anomalous spring waters and scenic springs (Chapter 5, Fig. 5.1 and Table 5.12). Mineral showings deposit types are listed in Fig. 6.1; zones of influence are colour matched with related deposit types. Data are compiled in Table 6.2. The zone of influence of occurrences and anomalies in the Meilleur Domain is the entire domain in the study area.

Table 6.2. Summary of anomalous data in Nahanni Karst -Tlogotsho Plateau areas with reference to catchment basins amalgamated in Fig. 6.3 (from Chapter 4, summarized in Figure 4.41a, built on Table 4.11). Element symbols are described in footnotes. SPANS plots of individual elements in catchment basins are shown in Figures 4.11 and 4.28-4.39 of Chapter 4; chemical analyses of stream sediments are statistically interpreted in Chapter 4. Spring waters (e.g., S100) are from Table 5.12, Chapter 5.

Catchment basin	Anomalous elements in decreasing percentiles[1]; Springs & Showings	Deposit(s) inferred[2] STRONG / weak	General location
5002	*Zn Au Pb (Zn); **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5008	*Pb (Ni Zn); **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5016	*Pb *W **Sb** Cu (Zn); **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5022	(Zn); **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5129+7079	Pb; **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5131	*Pb; **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5144	*Pb; **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5154	(Zn); **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5155+7080	*As *Ba *Zn (Sb); **vein occurrences**	PB ZN AG VEIN	Prairie Creek
5158	Pb; **vein occurrences**	PB ZN AG VEIN	Prairie Creek
6067	(Cr)	mature HMC	trib. Claussen Creek
6169	Cu	sandstone Copper	S-central Tlogotsho
6172	(Cu)	sandstone Copper	W Tlogotsho Plateau
6173	Mo Ni Zn	SEDEX/MVT	S trib. Meilleur R.
6174	***Hf** *Cr *Zn (As Ni)	SEDEX/MVT	S trib. Meilleur R.
6175	Ba (Ce Co Zn)	Sedex	N trib. Meilleur R.
6176	(Mo)	Sedex?	N trib. Meilleur R.
6177	Sb (**Mo**)	Sedex/MVT?	S trib. Meilleur R.
6178	Co Cu Mo Sb	Sedex + vein?	S trib. Meilleur R.
6179	*As*Ba*Ce*Co*Cr*Cu Sb Zn (Mo Pb)	Sedex/MVT	S trib. Meilleur R.
6185	(Zn)	Sedex	N trib. Meilleur R.
6186	(Ba Sb)	Sedex	N trib. Meilleur R.
6187	**Sb Zn** Ba Mo Ni (**Co** Ce Cu)	SEDEX/MVT	upper Meilleur R.
6188	*As Cu Mo Ni Sb Th Zn (Ba Co Cr)	Sedex + vein	N trib. Meilleur R.
6190	Mo (Ce Sb)	Sedex?	N trib. Meilleur R.
6191	(Ba Ce Co Cr Mo Sb Th)	SEDEX/MVT	N trib. Meilleur R.
6192	Ni	Sedex?	N trib. Meilleur R.
6193	Mo Ni (Ba Ce Co Cr Th)	SEDEX/MVT	N trib. Meilleur R.
6195	(Ba)	Sedex/MVT	main Meilleur R.
6197	(Co Mo)	Sedex?	NW of Meilleur R.
6198	(Co Cr Cu)	vein?	NW of Meilleur R.
6200	As Co (Hf Sb)	vein	SW of Prairie Ck.
6201	Mo (As)	vein	SW of Prairie Ck.
6203	***Sb** Ba Mo (As Co)	VEIN	SW of Prairie Ck.
6205	Ce As Cu Th (Au Co)	VEIN	E of Ram Creek
6207	Zn (**Co**)	vein?	upper Ram Creek
6208	(Zn); vein occurrences	MVT Pb Zn	NE of Prairie Creek
6209	*Ce *Cr Cu (**Co**)	vein + sandstone	NE of Prairie Creek
6211	*Hf Cu (As)	vein + mature	S trib. Sundog Ck.

6212	(Cr Th)	sandstone	N trib. Sundog Ck.
6216	Th	mature HMC	W trib. Tetcela R.
6221	(Zn)	MVT Pb Zn	NE of Prairie Creek
6223	Ni; vein occurrences	MVT/vein?	E of Prairie Creek
6227	As; occ. of Pb-Zn in Manetoe Facies	vein?	Lafferty Creek
6228	(Ce Cr Hf Th)	mature HMC	SW of poljes
6230	Zn + Cu Zn Pb float #6230R	MVT	Lafferty Creek
6233	Zn (Ni Sb); vein occurrences	MVT/vein?	lower Prairie Creek
6237+7066	*Au *Au* Hf (Th) both samples	placer/vein	Wretched Creek
6238	(Cr Th)	mature HMC	southern poljes
6239	*Au;* **tufa spring 114 Au**	placer/vein	trib. Wretched Ck.
6242	**Au*	placer/vein	W trib. Tetcela R.
6243	**Au*	placer/vein	W trib. Tetcela R.
6244	**Au*	placer/vein	Windy Creek
6246/7072	Ce (Au 7072 only)	vein?	Claussen Creek
6249	**Au* upstream limit unknown; Kraus Fe-hot spring spa.	placer/vein	lower Jackfish R.
6255	*Cu (Co)	sandstone Copper	Blue Bill Creek
6261+7076	Cu (Mo)	sandstone Copper	S-central Tlogotsho
6262	(Co Mo)	sandstone Copper	trib. Jackfish R.
6264	Hf	mature HMC	trib. Jackfish R.
6265	(Hf)	mature HMC	trib. Jackfish R.
6268	*Ni Co Zn (As)	SEDEX	Etanda Lakes
6272	(Au Co)	placer/vein?	upper Jackfish R.
6273+7078	Au both samples	placer/vein?	W of Fishtrap Ck.
6275	*Sb (As Zn); **Spring 66 Cu Zn; occ. of Pb-Zn in Manetoe Facies**	VEIN/MVT	W of Lafferty Creek
6276	*Au*	placer/vein	E of Ram Creek
6278	(Co Cr Th Ni)	MVT/Sedex?	SE of Prairie Creek
6279	Co Mo Ni (Au)	MVT/vein?	S of Prairie Creek
7046	As Hf (Ce Cr)	vein + mature	S trib. Meilleur R.
7048	Zn Th	Sedex	N trib. Meilleur R.
7049	Ce Cr (Hf)	mature HMC	S trib. Meilleur R.
7051	*Ni W (Mo)	SEDEX + vein	S trib. Meilleur R.
7052	***Ce** *As*Ba*Sb*Th **Ni** Cu Mo Zn (Co); **north of Spring 111 Mo U Ni Zn**	SEDEX/MVT	N trib. Meilleur R.
7054	(Ni)	Sedex/MVT?	S trib. Meilleur R.
7056	*Zn *Mo Sb (As Hf Mo)	SEDEX/MVT	S trib. Meilleur R.
7057	Cu Mo Ni Zn	SEDEX + sandstone Cu	W Tlogotsho Plateau
7058	*Ce *Cr *Ni *Th Cu (As)	VEIN	S trib. Sundog Ck.
7059	(Cr Th)	mature HMC	S trib. Sundog Ck.
7060	***Cr *Hf** *Ni **Th** *Au*	vein + mature	S trib. Sundog Ck.
7061	(Ni)	MVT?	SE of poljes
7062	(Hf)	mature HMC	S of poljes
7063	*Hf *Th Cr Th (Co)	mature HMC	trib. Wretched Ck.

7065	Au	placer/vein	Wretched Creek
7068	(Cu Ni)	vein?	trib. Claussen Ck.
7070	Au	vein	trib. Claussen Ck.
7074	(Cr)	mature HMC?	trib. Jackfish R.
7077	Cr Ni	mature HMC?	trib. Jackfish R.
7081	*Cr Ni (Zn)	Pb Zn Ag vein	Prairie Creek
7083	*As *Cr *Mo *Ni Cu Sb Zn (Ba); no HMC; **Spring 125 Zn Mo**	VEIN + MVT	northern polje

[1]**Percentile symbols for anomalous elements in catchment basins**	
****Au**	extremely anomalous
***Au**	>98th percentile in silt + HMC (heavy mineral concentrate) (one may be only >90th percentile)
*Au	>98th percentile in silt only
*Au	>98th percentile in HMC from gravels
**Au*	>98th percentile in HMC from silts
Au	>95th percentile in silt * HMC (one may be only >90th percentile)
Au	>95th percentile in silt only
Au	>95th percentile in HMC only
Au	>95th percentile in HMC from silts
(**Au**)	>90th percentile in silt + HMC
(Au)	>90th percentile in silt only
(Au)	>90th percentile in HMC only
(*Au*)	>90th percentile in HMC from silts
[Au]	selected >80th percentile: >95% in raw data and/or part of a geochemical association

[2]Anomalous element associations in Nahanni Karst/Tlogotsho Plateau area (listed alphabetically), and their inferred relevance to mineral deposit types. Not all of each association is anomalous at any one site.
Ba-Cd-Cr-Cu-Mo-Ni-Pb-Sb-Zn: SEDEX/MVT zinc-lead-silver or nickel-zinc: All of these elements are anomalous one or more streamlets feeding the tributary to Prairie Creek that flanks the many showings there; the same suite is strongly represented in Meilleur River and its tributaries. The Prairie Creek silver-lead-zinc veins transect basinal carbonate rocks of the Whittaker Formation, associated with a high-angle reverse fault and extensive quartz-carbonate veining, as well as stratiform sulphides at depth (Jones, 1997, p. 95). The elements (Au-Cr-Cu-Sb) suggest that hydrothermal processes were active here. No showings are recorded for the Meilleur River valley which has subdued topography and extensive cover by till, varved lacustrine clays and forest, but the widespread extent of highly anomalous values suggest that zinc concentrations are regional. The highly metalliferous hot and cold springs also located in and around Prairie Creek and Meilleur River valley are interpreted to represent significant buried deposits, with local high-grade sites (e.g., 5002, 5176, 6179, 6187, 6188, 7052) marked by several of the associated hydrothermal elements. Cadmium is not anomalous in the eastern streams, in contrast to those of the Ragged Ranges area (Table 6.1), however Cd *is* anomalous in *springs* of both Prairie Creek and Meilleur River areas, again serving as a Sedex indicator (e.g., Jonasson et al., 1987), and to corroborate barium (Ba) which is anomalous in stream sediments and characteristically is associated with Sedex base-metal deposits. Lead (Pb) is dispersed in detrital form and is a more direct indication of outcropping base-metal sulphides. The molybdenum-nickel (Mo-Ni) association with zinc, here as in Ragged Ranges, suggests the presence of the newly recognized Nick deposit type, which also contains platinum group elements (Hulbert et al.,1990; Hulbert ,1995).
As-Au-Cu-Pb-Sb-Zn: VEIN PRECIOUS METALS: This element association is characteristic of the Prairie Creek vein system, and is inferred to represent vein systems which are spatially related to, intersecting fault zones and lineaments. In many cases gold (Au) is the only anomalous element, and it is present in placer form so that no direct geochemical inference can be made as to the type of vein system.
Ce-Hf-Th: MATURE HMC (Heavy Mineral Concentrate): Sandstones and carbonate rocks contribute high proportions of zircon and monazite which contain the rare earth elements listed. They are not considered to have economic mineral potential in Nahanni Karst –Tlogotsho Plateau area.
Co-Cu-Mo: SANDSTONE COPPER: Small deposits of copper are suggested by this element association in the Mattson sandstones. They are not likely to be large and high grade.

Continued from page 6-10

An important geochemical association is the association of metal-rich skarns, rare element pegmatites (Little Nahanni Pegmatites, Appendix 1.5) and gemstones (e.g., emeralds, Appendix 1.4, Lened) with two-mica granites that are rich in lithophile elements (Al, Be, F, Li, Mo, Sn, U and W) and intrude contrasting carbonate and shale host rocks which in turn contain abundant colouring trace elements, e.g., V, Cr and Mo (Walton, 1996). Barton (1987) recognized the importance of two-mica granites for skarn deposits of the Great Basin, USA. Anderson (in Gordey and Anderson, 1993) has mapped the distribution of such granites in Ragged Ranges. This distribution is here used as a prime criterion for outlining maximum potential for skarn tungsten and, more importantly, gemstones.

The distribution of vanadium and chrome-rich strata is, as noted above, also important for emerald potential, as colouring elements that create the green colour in beryl. Many catchment basins in Ragged Ranges have elevated chromium and a few have elevated vanadium levels. These anomalies are thought to be related to the distribution of Devonian Earn Group shales which likely host the widespread Nick horizon of nickel-platinum sulphides that are rich in chromium (Hulbert, 1995; Goodfellow, 2002). The Earn Group was mapped into the Ragged Ranges study area during this study.

Gemstones (gem quality tourmaline, known as Elbaite) are also associated with hornblende-bearing metaluminous plutons in the region (O'Grady; see Appendix 1.7). The third type of pluton in the region, transitional, shares characteristics of the first two (Anderson, in Gordey and Anderson, 1993) and therefore also has potential for rare-element deposits and a variety of gemstone types. Specific evolutions of the magmas associated with each pluton in the study area must be known before their gemstone potential can be assessed on an individual basis.

Zinc (Zn) +/- barium (Ba) anomalies are also accompanied in several catchment basins by two or more of arsenic (As) +/-antimony (Sb) +/- copper (Cu) +/-chromium (Cr) +/- lead (Pb) +/- molybdenum (Mo) +/- nickel (Ni). Of these, some of the Ni, Cr, V associations could be contributed by shales of rock package 5 that typically contain stratiform base metal deposits in this region and produce acid solutions that mobilize these elements. On the other hand, the Mawer 3% Zn showing, represented by catchment basins 6113-6115, is hosted by carbonates that should have neutralized such solutions, yet a wide suite of accessory elements is still present (Au, Ba, Cr, Cu, Mo, Ni, Sb).

Zinc in stream sediments is anomalous only in HMCs, after regressions have been performed (Chapter 4), but is elevated in certain spring waters along with pathfinders such as Cd, Ni and Co. Elements such as Mo, As, Sb, Co and Cu may have been added to existing lead-zinc deposits by later hydrothermal activity superimposed on primary sulphide deposits, or, the hydrothermal activity may have been the main factor in generating base metal skarn deposits. The Hf, As and Mo could also represent detrital components derived from clastic (or carbonate) rocks with mature sedimentation histories, hence relatively abundant zircon, allanite and monazite in stream sediments draining the heavily glaciated plutons and intervening areas of clastic Windermere Supergroup strata.

In summary, the Ragged Ranges study area is noted for its numerous small showings of zinc and other base metals which are hosted by both shale and carbonate rocks either as intrinsic stratabound deposits, or as polymetallic skarns at Cretaceous pluton contacts. The geochemical survey of this study has not located any previously unknown mineral showings, because the area has been intensely prospected and geochemically surveyed. This study has, nevertheless confirmed and amplified the intensity of some of these metallotects. For example, cold springs #12 and #25 contain 220-450 and 3900 ppb Zn respectively, despite carrying very little other dissolved species. Unpublished documents supplied by Welcome North Mines Ltd. (C/O W.J. Roberts) indicate that far more showings are present than those plotted in this report.

6.5. Nahanni Karst - Tlogotsho Plateau: Placer Gold

Gold anomalies in heavy mineral concentrates were an unexpected result in the gently deformed platformal carbonate and shale terrains of the Ram Plateau and northern Jackfish River areas. The gold was first discovered in the process of tabling heavy mineral concentrates from sample site 6237. Thirty three flakes were recovered from this sample, weighed on a preciion balance and calculated as equivalent to over 77,000 ppb gold in the concentrate, which is about .05 g per tonne of gravel. This discovery was duplicated in subsequent sampling of the same media (heavy mineral concentrates from gravel), and the investigation of the silt size fraction provided further confirmation of this site. More importantly, other tabled silt samples yielded anomalous amounts of gold at several other sites, both north and south of Wretched Creek. In all, eight sites have now been identified along a zone extending northerly from Yohin Ridge to the northern edge of the study area.

Jefferson et al. (1987) and Spirito et al. (1988) previously considered three hypotheses for the origin of this gold: (1) lode vein and/or disseminated gold in carbonaceous calcareous fine-grained sediments; (2) fortuitous placer concentrations of gold from Laurentide till derived from auriferous greenstones far to the east; (3) surficial geochemical leaching and re-precipitation of gold from shales into the stream-gravel environment. Based on a full discussion of these possibilities in Chapter 4, Section 4.5.5, the second hypothesis (transported) is strongly favoured here, and the placer gold is considered to be more of tourist interest than for mining.

6.6. Nahanni Karst - Tlogotsho Plateau: Sedex Zinc-Lead, Meilleur River Area

The same multi-element association as established for Sedex zinc-lead in CanTung and Broken domains is intensely present in Meilleur Domain. A significant number of stream silts and heavy mineral concentrates from small and large catchment basins; as well as groundwater and precipitate samples are anomalous in elements such as As, Ba, Co, Cr, Cu, Sb, Mo, Ni, Pb, rare-earths (e.g., Ce), Zn and W. Although lead (which is diagnostic of exposed Pb-Zn sulphides) is above the 90th percentile in only one basin (86JPW179 in silts), this is not considered to seriously downgrade the zinc anomalies as hydromorphic, for a number of reasons.

First, Pb could not be detected by the neutron activation analytical method used for HMCs. Second, so many other elements are also anomalous (e.g., Cd in groundwater samples) and match the accessory anomalies at known vein and stratabound Zn-Pb showings such as Prairie Creek (due north) and Mawer (basin 6113 on the other side of South Nahanni River from Rabbitkettle Hot Springs. Thirdly, the zinc and associated metal values are among the highest recorded anywhere in the study region except for Prairie Creek. These are particularly high in precipitates from spring waters. Fourthly, a buried massive sulphide deposit would not be expected to produce a lead anomaly because lead is so immobile in the surface environment that it is only transported physically. Only the observed anomalous elements would be transported and detected from a buried massive sulphide body. That said, a number of precipitate samples (86JPN-037, 061, 082 [61ppm] and 87JPN124) are actually elevated in lead, fortifying the inference of one or more buried deposits.

No showings or occurrences have been documented in the specific Meilleur River area, but it is geologically located in the Meilleur River Embayment of Selwyn shale basin, close to the facies change with platformal clastic rocks and south of the Prairie Creek Embayment of Morrow (1987) that hosts very significant vein and stratabound lead-zinc-silver deposits of the Prairie Creek property.

These shale-basin embayments are now defined by rapid facies changes between platformal carbonates and basinal carbonaceous shales. Fault zones that are now dip slip and thrust in character are spatially associated with the facies changes and geochemical anomalies, and can reasonably be interpreted as reactivated growth faults that influenced basin development as well as providing conduits for hydrothermal fluids to generate Sedex or MVT deposits. In this favourable geological context, the combined anomalies of heavy mineral concentrates, stream silts, and spring water and precipitate geochemistry make this an area of very high mineral potential for lead, zinc and silver.

The Meilleur River area contains at least one surface resource of definite park value - the “Meilleur Hot Spring” (#082; Figure 5.26), the largest of the thermal and hot springs discovered during the 1986 and 1987 field seasons (Hamilton et al., 1985). This spring, with the highest lead values (82 ppm) of all precipitate samples analyzed, and related springs in the Meilleur River, are simultaneously bearers of evidence from the depths that other non-renewable resources of potential economic value are also present. Such evidence is amplified by geochemical analyses of stream silts and heavy mineral concentrates from the same area.

The only known major mineral occurrence in Nahanni Karst area is the Prairie Creek silver-lead-zinc vein. It is characterized geochemically by highly anomalous lead (Pb) and zinc (Zn) in silts, and by anomalous zinc (Zn), antimony (Sb), arsenic (As), barium (Ba) and nickel (Ni) in HMCs. Single separate anomalies of gold and tungsten are also present in this locality. The vein is located in a fault of small offset to the west, and in the hanging wall of a high-angle easterly directed reverse fault. The vein is most dilatant and of highest grade where the host fault cuts the Whittaker dolostones. Base-metal veins such as this are actually favourable indicators for much larger stratiform Sedex deposits, and deeper drilling of the Prairie Creek property has intersected stratiform sulphides (Jones, 1997, p 80).

Numerous small lead-zinc showings are documented in the mineral index files for the Nahanni Karst area, and at Nahanni Butte (tetrahedrite with Cu-Ag-Pb). A large boulder of dolostone with tetrahedrite, galena and sphalerite was discovered in Lafferty Creek (6230), and these are associated with moderate anomalies of zinc and lead in stream sediments.

6.7. Nahanni Karst - Tlogotsho Plateau: other geochemical associations.

Sandstone copper (generally small deposits) is suggested by copper (Cu) in silts draining Mattson Formation sandstones (>98th %tile from basin 6255, >95th from basins 6169, 6261/7076, 7057; >90th from 6172 and 7068). Local accessory cobalt (Co), Molybdenum (Mo) and nickel (Ni) are compatible with the sandstone copper deposit type.

Raw silt and heavy mineral data from Tlogotsho Plateau area are highly elevated in rare earth elements (Hf, Ce), thorium (Th) and uranium (U) (Chapter 4). After the influence of rock type was removed by regression analysis using SPANS these concentrations were shown to be normal for the Mattson Formation sandstones. Mineralogical analysis of heavy mineral concentrates revealed high concentrations of zircon and monazite, which account for the above elements and are typical of supermature heavy mineral suites from quartzose sandstones.

The large poljes represented by catchment basin 7083 in Nahanni Karst were sampled only by silt, at one site; an associated cold spring (#125) is anomalous in zinc and molybdenum; again registering the relatively high abundance of MVT style zinc mineralization in these carbonate rocks. A number of the showings located south and east of the study area (Fig. A-1(i) are actually drill hole intersections of lead-zinc sulphides in oil ands exploration holes, fortifying the complementary relationship between the Manetoe Facies, hydrocarbons and base metals Morrow et al. (1990 and related publications).

The Mattson Formation hosts numerous thin coal seams (e.g., Potter et al., 1993), these being associated with iron-rich silty and shaly units. Spring waters draining these strata are typically metalliferous, particularly in iron. Such iron springs, like those of the Selwyn Basin, are discounted as mineral deposit indicators, even though the bright red and ochre gossans they produce are eye catching and serve as geochemical sponges for other elements such as zinc.

6.8. Summary of Metallotects, Proposed Expansions to NNPR

Figures 6.2 and 6.3 appear to be very complicated, however they display only a fraction of the data relevant to the generation and preservation of mineral deposits in the study areas. The number of showings is relatively large for a northern remote area – many more would be found in southern areas of similar geological endowment that are closer to infrastructure. This density of information allows higher certainty regarding mineral potential than in very remote regions such as Brock Inlier (Tuktut Nogait) and Wager Bay (Ukkusiksalik), which were initially assessed at the same time as this (e.g., Jefferson, 1994 and Jefferson et al., 1991). These data also indicate higher and more definite mineral potential in the Ragged and Meilleur domains, than in such previous assessments.