Number	Author(s)	Title of Report	Bulletin	Page	Year
I-148	Lim P.S.	Progress report: The geology of the Wullersdorf area, eastern Sabah	Annual Report of GSM, 1977	191~193 (193)	1977
III-21	Newton-Smith J.	Geology and mineralization at the Mamut copper prospect, Sabah	Geological Papers of GSM, Vol. 2, 1977	55~ 65 (59~ 65)	"
I-149	Lee D.T.C.	Mineral resources of Sabah	Annual Report of GSM, 1978	67~ 77	1978
IX-4	Kosaka H., Wakita K.	Some geological features of the Mamut porphyry copper deposit, Sabah, Malaysia	Economic Geology Vol. 73	618~627 (623~ 626)	"
I-154	Lee D.T.C.	Mineral resources of Sabah	Annual Report of GSM, 1979	68~ 79	1979
I-156	"	Mineral resources of Sabah	Annual Report of GSM, 1980	70~ 81	1980
I-158	Lee D.T.C., Kwan H.E.	Bauxite deposit at Sungai Mansan and Sungai Wasai, Telupid, Labuk Valley, Sabah	"	298~306	"
I-159	Lee D.T.C.	Segama Valley alluvial gold, Sabah	"	307~316	"
I-160	"	Mineral resources of Sabah	Annual Report of GSM, 1981	70~ 80	1981
II-10	Lim P.S.	Wullersdorf area, Sabah, Malaysia	Report of GSM (Report 15)	1~106 (81~98)	"
IX-8	Nishiwaki C.	Tectonic control of porphyry copper genesis in the southwestern Pacific island arc region	Mining Geology, 31 (in Japanese, abstract in English)	131~146	"
I-165	Lee D.T.C.	Mineral resources of Sabah	Annual Report of GSM, 1982	62~ 71	1982
I-167	Lim P.S.	Geology of the Mankadau area, Merungin, Sabah	"	251~254 (253)	"
I-170	Lee D.T.C.	Mineral resources of Sabah	Annual Report of GSM, 1983	65~ 75	1983
I-173	Muff R., Mylius H.G., Weber H.S.	Cupriferous massive sulfide occurrences in the Bidu-Bidu Hills, Sabah	"	334~346	"
I-175	Lee D.T.C.	Mineral resources of Sabah	Annual Report of GSM, 1984	69~ 79	1984

Number	Author(s)	Title of Report	Bulletin	Page	Year
I-179	Lee D.T.C.	Mineral resources of Sabah	Annual Report of GSM, 1985	73~ 83	1985
I-186	"	Mineral resources: Sabah	Annual Report of GSM, 1986	115~126	1986
I-187	"	Occurrences of Platinum group minerals in Sabah and their possible source rocks	Annual Report of GSM, 1986	569~577	"
I-190	Yan A.S.W.	Progress report: Geological mapping, Gunung Meliau area, Sheet 5/117/1, Sabah	"	580~590 (588~ 589)	"
I-193		Mineral resources: Sabah	Annual Report of GSM, 1987	93~104	1987
I-196	Lim P.S.	Porphyry copper mineralization in the upper Bambangan valley, Sabah	"	387~402 (387~ 390)	"
I-200		Mineral resources: Sabah	Annual Report of GSM, 1988	111~121	1988
II-11	Lee D.T.C.	Gunung Pock area, Semporana Peninsula, Sabah, Malaysia	Report of GSM (Report 9)	1~120 (66~ 74)	"

Note: Pages in brackets show pages being concerned with mineral resources, mineral occurrence and mineral deposit.

Table 14 C. Prospecting or Exploration

Number	Author(s)	Title of Report	Bulletin	Page	Year
II-1	Fitch F.H.	The geology and mineral resources of part of the Segama Valley and Darvel Bay area, Collony of North Borneo. (Memoir 4)	Memoir of GSM (Memoir 4)	1~142 (96~112)	1955
I-19	"	Geology of the Sandakan area and parts of the Kinabatangan and Labuk valleys	Annual Report of GSM, 1956	134~167 (159~164)	1956
II-2	"	The geology and mineral resources of the Sandakan area and parts of the Kinabatangan and Labuk valleys, North Borneo	Memoir of GSM (Memoir 9)	1~202 (125~151)	1958
I-37	Roe F.W.	Geochemical prospecting for copper and chromium	Annual Report of GSM, 1959	102~104	1959
I-58	Collenette P.	Chromite prospecting in Sabah: 1959~63	Annual Report of GSM, 1963	47~ 58	1963
I-64	"	Mineral resources of Sabah	Annual Report of GSM, 1964	44~ 56 (49~53)	1964
I-65	"	Prospecting in Sabah by Borneo Mining Limited; 1959~1963	"	56~ 61	"
I-70	Lewis D.E.	Case history of a geochemical anomalous copper zone at Pinanduan, Sabah	"	163~175	"
I-71	Cooper R.A., Woolf D.L., Tooms, J.S.	A geochemical reconnaissance survey of part of the Labuk Valley, Sabah	"	176~185	"
I-78	Kirk H.J.C.	Mineralogy of Pinanduan copper deposit, Sabah	Annual Report of GSM, 1965	196~204	1965
I-79	Winkler H.A.	Geophysical prospecting in the Kiabau and river Sualog areas, Labuk Valley, Sabah	"	205~211	"
I-80	Woolf D.L., Tooms J.S., Kirk H.J.C.	Geochemical surveys in the Labuk Valley, Sabah, 1965	"	212~226	"
I-85	Wong N.P.Y.	Progress report: Mount Silam area	Annual Report of GSM, 1966	62~ 68 (66~67)	1966

Number	Author(s)	Title of Report	Bulletin	Page	Year
I-86	Collenette P.	Labuk Valley mineral investigation and consequent development	Annual Report of GSW, 1966	68~ 71	1966
III-12	Lewis D.E.	The Karang copper prospect, Karamuak valley, Sabah	Geological Papers of GSM, 1966	62~ 67	"
III-13	Kirk H.J.C.	The Mamut copper prospect, Kinabalu, Sabah	"	68~ 80 (68~72) (78~79)	"
I-92	Wong N.P.Y.	Geochemical prospecting, Segama area	Annual Report of GSM, 1967	66	1967
I-93	Newton-Smith J.	Geochemical prospecting in the Semporna Peninsula	"	66~ 70	"
II-6	"	Bidu-Bidu Hills area, Sabah	Report of GSM (Report 4)	1~109 (68~102)	"
III-20	Wilford G.E.	Iron and nickel prospecting at Tavai Plateau, Sabah, 1962~64	Geological Papers of GSM, 1967	80~ 87	"
I-99	Wong N.P.Y.	Geochemical prospecting in Sabah	Annual Report of GSM, 1968	130~133	1968
VIII-1	United Nations	Natural resources survey of the Labuk Valley, Malaysia	Report of United Nations Development Programme	7~100 (7~70)	"
I-106	Wong N.P.Y.	Geochemical prospecting in Sabah	Annual Report of GSM, 1969	194~195	1969
I-110	Leong K.M.	Progress report: Upper Segama and Darvel Bay area, Sabah (revised Memoir 4)	Annual Report of GSM, 1970	170~180 (175~178)	1970
I-112	Lee D.T.C.	Geochemical prospecting in Sabah	"	200~202	"
VIII-2	Hunting Geology and Geophysics Ltd.	Aeromagnetic survey of the Kinabalu-Tambuyukon area, Sabah, Malaysia	Unpublished report	1~ 35	"
VIII-3	Overseas Mineral Resources Development Co., Ltd.	Report on prospecting survey in Mamut prospecting licence area	"	1~ 11	"
I-114	Lee D.T.C.	Mineral resources of Sabah	Annual Report of GSM, 1971	38~ 48 (44~45)	1971

Number	Author(s)	Title of Report	Bulletin	Page	Year
I-119	Nicholas P.Y.W.	Geochemical prospecting in the Semporna Peninsula, Sabah	Annual Report of GSM, 1971	154~159	1971
I-124	Lee D.T.C.	Progress report: Semporna, eastern Sabah	Annual Report of GSM, 1972	241~242	1972
I-128	Leong K.M.	Progress report: Ranau-Paranchangan area (Report 12)	Annual Report of GSM, 1973	220	1973
I-132	Lim P.S.	Progress report: The Gunung Wullersdorf area, Semporna	Annual Report of GSM, 1974	228~232 (230~231)	1974
II-9	Leong K.M.	The geology and mineral resources of the upper Segama Valley and Darvel Bay area, Sabah	Memoir of GSM (Memoir 4 revised)	1~348 (273~299) (317~330)	"
I-138	Walls P.J., Johnston J.C.	Progress report: Telupid area	Annual Report of GSM, 1975	236~238	1975
IX-3	Kosaka H., Wakita K.	Geology and mineralization of the Mamut Mine, Sabah, Malaysia	Mining Geology, Vol. 25 (in Japanese, abstract in English)	303~320 (310~316)	"
I-143	Lee D.T.C.	Progress report: Note on Semporna area	Annual Report of GSM, 1976	213	1976
V-15	Bull P.F.	The Gunung Nungkok copper prospect	Unpublished Report (Thesis for MSc.)	1~137 (25~34)	"
I-152	Lim P.S.	Geochemical prospecting in the Wullersdorf area, Sabah	Annual Report of GSM, 1978	295~297	1978
III-23	"	The evaluation, assessment and calculation of ore reserves of the Mamut mine-a case history	Geological Papers of GSM, 1980	114~125	1980
I-162	Weber H.S.	Joint Malaysian-German mineral resources investigation in Sabah-some results of the first project year	Annual Reports of GSM, 1981	356~368	1981
I-164	Yan A.S.W.	Geochemical exploration in the Gunung Pock area	"	386~400	"
II-10	Lim P.S.	Wullersdorf area, Sabah, Malaysia	Report of GSM (Report 15)	1~106 (81~87)	"

Number	Author(s)	Title of Report	Bulletin	Page	Year
VI-1	Hoppe P., Lee D.T.C., Stövesand G., Weber H.S.	Report on geochemical exploration in Gunung Pock area/Semporna Peninsula	Unpublished Report (Joint Malaysian-German mineral exploration project)	1~ 29	1981
VI-2	Lim P.S.	Report on geochemical prospecting in Tawau area/Semporna Peninsula	"	1~ 21	"
VI-3	Hoppe P., Yan A., Weber H.S.	Report on geochemical exploration in Kinabalu-Ranau-Paranchangan area/Sabah	"	1~ ?	"
I-168	Markwich H., Weber H.S.	Joint Malaysian-German mineral resources investigation in Sabah-Selected results of the second project year	Annual Report of GSM, 1982	254~259	1982
VI-4	Lee D.T.C., Weber H.S.	Report on geochemical exploration in the Bidu Bidu Hills/NE-Sabah	Unpublished Report (Joint Malaysian-German mineral exploration project)	1~ 34	"
I-169	"	Discovery of Cyprus-type massive sulfide mineralization in the Sualog area, Bidu-Bidu Hills, Sabah	"	260~267	"
I-172	Lee D.T.C.	Malaysian-German mineral exploration project in Sabah	Annual Report of GSM, 1983	331~334	1983
VI-8	Yan A.S.W., Grissemann C.	Geophysical survey in west Sualog, Kiabau and Ulu Pari areas, Bidu-Bidu Hills, Sabah	Unpublished Report (Joint Malaysian-German mineral exploration project)	1~ 8	"
VI-9	Weber H.S.	Report on geochemical prospecting in the Labuk Valley area/NE-Sabah	"	1~ 46	"
VI-10	Lim P.S., Markwich H., Weber H.S.	Report on base metals prospecting in Gunung Wullersdorf area/ Semporna Peninsula, Sabah; 1981~1983	"	1~ 35	"

Number	Author(s)	Title of Report	Bulletin	Page	Year
VI-11	Weber H.S., Yan A.	Report on geochemical prospecting in the Segama-Darvel Bay area/SE Sabah	Unpublished Report (Joint Malaysian-German mineral exploration project)	1~ 31	1983
I-178	Lee D.T.C.	Exploratory drilling at West Sualog copper prospect, Bidu-Bidu, Sabah	Annual Report of GSM, 1984	333~353	1984
I-181	Tungah S.	Iron prospecting at Tavai plateau south, Sabah	Annual Report of GSM, 1985	444~451	1985
I-182	Lee D.T.C.	The occurrence of massive sulfides at Kiabau, Labuk Valley, Sabah	"	451~465	"
VI-12	Grisseman C., Muff R., Mylius H.G., Weber H.S., Yan A.S.W.	Report on base metals prospecting in the Bidu-Bidu Hills/NE Sabah; 1982~1984	Unpublished Report (Joint Malaysian-German mineral exploration project)	1~262	"
VI-13	Weber H.S.	Final report on investigation of mineral resources in Sabah; 1980~1984	"	1~128	"
I-184		General review 1986: Sabah	Annual Report of GSM, 1986	19~ 21	1986
I-188	Tungah S.	Controlled source audio-frequency magneto telluric survey of the Bambangan-Kundsang area, Sabah	"	577~578	"
I-189	Mohd Y.R., Lim P.S.	Detailed geochemical survey of the Lingangaa area, Sabah	"	579~580	"
IV-10	Lee D.T.C., Weber H.S.	Base metal exploration in Sabah	Bulletin of Geological Society of Malaysia	405~409	"
VII-1	JICA, MMAJ (*1) (*2)	Report on the collaborative mineral exploration of Sabah area; Phase I	Unpublished Report (Joint Malaysia-Japan mineral exploration program)	1~302	"

Number	Author(s)	Title of Report	Bulletin	Page	Year
I-191		General review 1987: Sabah	Annual Report of GSM, 1987	13~ 14	1987
I-194	Muda J.	Alluvial gold investigation, middle Segama valley, Lahad Datu, Sabah	"	364~375	"
I-195	Yan A.S.W.	Follow-up geochemical exploration for base metals in the Bukit Luminitong area, Labuk Valley, Sabah	Annual Report of GSM, 1987	375~386	"
I-196	Lim P.S.	Porphyry copper mineralization in the upper Bambangan valley, Sabah	"	387~402 (390~ 402)	"
VII-2	JICA MMAJ	Report on the mineral exploration in Sabah, Malaysia; Phase II	Unpublished Report (Joint Malaysia-Japan mineral exploration program)	1~136	"
I-198		Mineral exploration: Sabah	Annual Report of GSM, 1988	16	1988
II-11	Lee D.T.C.	Gunung Pock area, Semporna Peninsula, Sabah, Malaysia	Report of GSM (Report 9)	1~120 (75~109)	"
VII-3	JICA, MMAJ	Report on the mineral exploration in Sabah, Phase III	Unpublished Report (Joint Malaysia-Japan mineral exploration program)	1~ 80	"
VII-4	"	Report on the mineral exploration in Sabah, Malaysia; consolidated report	"	1~168	"
III-25	Muda J., Yan A.	Base metals exploration in the Ulu Marasimsim area, Marudu Bay, Sabah	Proceedings of the 20th geological conference, 1989-Technical Papers Vol. 1	83~ 92	1989

Note; Pages in brackets show pages being concerned prospecting or exploration.

(*1): Japan International Cooperation Agency
(*2): Metal Mining Agency of Japan

1-3 List of Known Mineral Deposits and Mineral Occurrences

List of known mineral deposits and mineral occurrence (Table 15) was made after inquiry of the contents of the existing data on the lists of the category (B) (Table 13) and category (C) (Table 14) mentioned above and subsequent picking of the prospect, namely mineral occurrences and mineral deposit, which are reported in the existing data belonging to the aforementioned categories (B) and (C). In case of the picking of the prospect, the mineral occurrence which consisted of float or boulder and geochemical anomaly only and was not followed after discovery was excepted from the prospect in principle.

Table 15 List of Known Mineral Occurrences and Mineral Deposits

Number	Prospect Name	Location	Ore Mineral	Type of Ore Deposit	Host Rock	Exploration History
A-1	Bambangan	Bambangan Valley, near Mount Kinabalu	Chalcopyrite, pyrrhotite, sphalerite, molybdenite	Porphyry copper	Adamellite porphery, hornfels	1963~65: Geochemical prospecting by UNDP (*1) 1970: Geochemical prospecting, drilling by OMRD (*2) (no ore interesected) 1981: Geochemical prospecting by MGM (*3) 1985: Geophysical prospecting (CSAMT, IP, SIP) by MJP (*4) 1985~87: Drilling by MJP (18 holes, 6,063.3m)
A-2	Kenango	Kenango, Mankadau V., near Ranau	Cu			1962: Geochemical prospecting by Soriano y Cia (Cu anomaly detected)
A-3	Kenipir	Kenipir V., near Ranau	Cinnabar		Eocene Trusmadi Formation	1962: Discovered in stream sediment
A-4	Latu	Latu, Lenisidan V., Kinabalu area	Stibnite	Irregular vein in joint	Lower~Middle Eocene sandstone, siltstone	Further investigation is not justified (deposit is too small)
A-5	Lingangaa	Lingangaa, Mankadau V., near Ranau	Pyrite, chalcopyrite (Cu 34~38%, Au 1.18 ~1.71 g/t, Ag 157~ 158 g/t)	Boulder (ø1.2m) of massive sulfide		1962: Geochemical prospecting by Soriano y Cia (Cu anomaly detected) 1981: Geological survey by GSM (*5) 1986: Detailed geochemical prospecting by MJP (included in Mankadau)
A-6	Liwagu	Liwagu V., near Ranau	Cinnabar in Alluvial			1962: Discovered
A-7	Mamut	Upper Mamut V., north of Ranau	Chalcopyrite, molybdenite, (galena, sphalerite)	Porphyry copper	Adamellite porphyry, serpentinite, siltstone of Trusmadi Formation	1965: Geochemical prospecting by UNDP 1966: Follow-up geochemical survey and shallow drilling (29 holes, 2,217 feet), 200 pits by GSM 1967: Prospecting license to OMRD 1968: DDH 10 holes (2,500m) 1969: DDH 53 holes (11,000m), tunnelling (755m) mining lease to OMRD 1975: Production started
A-8	Mankadau	Lingangaa Creek, Mankadau Valley, Ranau area	Copper sulfide	Boulder of massive copper sulfide	Peridotite	1963: Discovered by Soriano y Cia 1985: Geological survey, geochemical prospecting, geophysical prospecting (CSAMT) by MJP
A-9	Nungkok	Gunung Nungkok, Kinabalu area	Pyrrhotite, chalcopyrite, pyrite, (arsenopyrite, molybdenite, magnetite, sphalerite, scheelite)	Porphyry copper	Silicified sedimentary rocks, quartz diorite	1965: Discovered, geochemical prospecting, geophysical prospecting (SP, EM) by Soriamont Investment Co. 1966~68: Drilling (21 holes, 3,354m) 1973: Drilling (6 holes, 762m) by Srikundasan Development and BHP 1974: Magnetic survey and geochemical prospecting
A-10	Paliu	S. Paliu, Ranau area	Pyrite	Stringer and/or disseminated with quartz veinlets (<several cm)	Sedimentary rocks	1985: Geological survey, geochemical prospecting by MJP 1986: Geochemical prospecting, 10 trenches
A-11	Paranchangan	Paranchangan, Sugut V., Ranau area	Chromite (aluminium magnesiochromite) Cr_2O_3 31.0~53.6%	Small, irregular lense	Serpentinite	1910: Discovered by R.R. Pilz 1957: Rediscovered 2 trenches, 40 pits by GSM

Number	Prospect Name	Location	Ore Mineral	Type of Ore Deposit	Host Rock	Exploration History
A-12	Rendagong	Rendagong, Ranau area	Stibnite			
A-13	Samalang	Samalang V., Ranau area	Cinnabar in stream sediment			
A-14	Sansogan	Sansogan V., Mankadau V., near Ranau	Cu	Gossan, boulder of Cu ore		1962: Geochemical prospecting by Soriano y Cia (Cu anomaly detected)
A-15	Timbalong	Timbalong, Mankadau V., near Ranau	Cu			1962: Geochemical prospecting by Soriano y Cia (Cu anomaly detected)
B-1	Bangau Bangau A	Bangau Bangau V., Bidu Bidu Hills, Labuk Valley	Pyrite, chalcopyrite, chalcocite	Vein or lense W = 1~3 ft. L = 5~20 ft.	Serpentinised peridotite	1959~60: Geochemical survey by Borneo Mining Limited 1962~64: Geophysical survey, drilling by Asian Mining Corporation
B-2	Bangau Bangau B	Bangau Bangau V., Bidu Bidu Hills, Labuk Valley	Pyrite, chalcopyrite, chalcocite	Vein or lense W ≦ 9 in. L = 4 ft.	Serpentinised peridotite	1959~60: Geochemical survey by Borneo Mining Limited 1962~64: Geophysical survey, drilling by Asian Mining Corp.
B-3	Bangau Bangau B1	Bangau Bangau V., Bidu Bidu Hills, Labuk Valley	Pyrite, chalcopyrite, chalcocite	Vein or lense W = 18 in. L = 15 ft.	Serpentinised peridotite	1959~60: Geochemical survey by Borneo Mining Limited 1962~64: Geophysical survey, drilling by Asian Mining Corp.
B-4	Bangau Bangau C	Bangau Bangau V., Bidu Bidu Hills, Labuk Valley	Pyrite, chalcopyrite, chalcocite	Vein or lense W = 1~6 in. L = 1~4 ft.	Serpentinised peridotite	1959~60: Geochemical survey by Borneo Mining Limited 1962~64: Geophysical survey, drilling by Asian Mining Corp.
B-5	Bangau Bangau D	Bangau Bangau V., Bidu Bidu Hills, Labuk Valley	Chalcopyrite	Dissemination	Serpentinised peridotite	1959~60: Geochemical survey by Borneo Mining Limited 1962~64: Geophysical survey, drilling by Asian Mining Corp.
B-6	Bangau Bangau E	Bangau Bangau V., Bidu Bidu Hills, Labuk Valley	Pyrite, chalcopyrite, chalcocite	Dissemination	Spilite & dolerite of Chert-Spilite Formation	1962~64: Geophysical survey, drilling by Asian Mining Corp.
B-7	Bidu Bidu	Bidu Bidu V., Bidu Bidu Hills, Labuk Valley	Pyrite, (sphalerite, chalcopyrite, malachite)	Disseminations, stringers, clusters of sulfides in sicicified zone	Basalt, gabbro, Chert-Spilite Formation	1959~60: Investigated by Borneo Mining Limited
B-8	Bidu Bidu Hills	Bidu Bidu Hills, Labuk Valley	Limonitic iron, lateritic iron	Residual deposit by weathering of peridotite	Peridotite	1904: Discovered, investigated by British Borneo Exploration Co. 1908, 1910: Reinvestigated 1962: Investigated by Malayan Miners Limited
B-9	Northern Bidu Bidu Hills	Bidu Bidu Hills, Labuk Valley	Iron rich laterite		Ultrabasic rock	1959: Discovered 1963: 3 augers by Southern Mining & Development Ltd. 1965: Pitting by Borneo Industrial Enterprised Co., Ltd.
B-10	Ensuan	Ensuan V., Lower Labuk Valley	Nickeliferous laterite garnierite (Ni silicate)	Residual deposit in weathering zone of ultrabasic rock	Ultrabasic rock	1960: Discovered 1961: 85 pits and auger holes by Malayan Miners Co., Ltd.

Number	Prospect Name	Location	Ore Mineral	Type of Ore Deposit	Host Rock	Exploration History
B-11	Karang	Karang V., Karamuak V., Kinabatangan V., south of Telupid	Pyrite, (chalcopyrite)	Chalcopyrite bearing pyritic quartz vein in shear zone (striking N~NE, dipping 90°)	Spilitic basalt	1904: discovered; 1908~12: 500 ft. adit, 3 shaft by British Borneo Exploration Co.; 1955~56: geochemical prospecting; 1964: geochemical prospecting, geophysical prospecting (SP, EM), drilling (3 holes, 1,113 ft.) by Soriamont Investment Co.
B-12	Katai	Bukit Lumisir, 6 miles northeast of Telupid	Chromite	Thin lense, bands, pods W=6 ft., L=15 ft.	Dunite	1961: Investigated by Borneo Mining Limited by pitting
B-13	Kiabau	Kiabau, Bidu Bidu Hills, Labuk Valley	Pyrite, (chalcopyrite, magnetite)	Cyprus type massive sulfide similar to West Sualog deposit	Basic volcanic rock in ophiolite sequence (dipping 50°W)	1959~60: Geophysical prospecting by Borneo Mining Ltd. 1964: Geochemical prospecting, geophysical prospecting (SP, ABEM) by UNDP 1933: Geological survey, geochemical prospecting, geophysical prospecting (PEM, IP) by MGM 1984: Detailed geochemical survey, PEM, 4 test drilling by MGM 1985: Drilling (2 holes) by MGM
B-14	West Kiabau	1 mile west of Kiabau, Bidu Bidu Hills, Labuk Valley	Bauxite		Gabbro	1959: Discovered (by A.W. Allen), pitting (depth≦5 ft.) 1963: Reinvestigated
B-15	Luminitong	Bukit Luminitong, Labuk Valley	Pyrite, (chalcopyrite)	Fracture filling with network veinlets & stringers of quartz	Brecciated spilite & spilitic basalt	1963~65: Geochemical prospecting by UNDP 1986: Follow-up geochemical survey by GSM
B-16	Lumisir	Mt. Lumisir, Labuk Valley	Chromite			1961: Discovered
B-17	Mansan	Mansan R., near Terupid	Chalcopyrite, sphalerite	Cu·Zn bearing quartz vein in silicified shear zone	Brecciated pillow basalt	1974: Discovered by GSM
B-18	Mansan & Wasai	Mansan R. & Wasai R., south of Telupid	Bauxite	Residual deposit by weathering of gabbro	Gabbro	1978~79: Pitting (66 pits), augering (7 holes) by GSM
B-19	Meliau	Meliau R., Labuk Valley	Pyrite, chalcopyrite	Pyrite·chalcopyrite bearing irregular, lenticular quartz vein (W=1.5 ft., H=8 ft.)	Diorite, basalt	1909: Discovered 1910~11: Trenching by Borneo Exploration Co. 1962: Geochemical prospecting by Soriano y Cia (Cu anomaly detected)
B-20	Paliu	Paliu V., Lower Labuk Valley	Manganiferous limonite similar to Taritipan ore			Uneconomical due to low content of Mn (poor quality, too small quantity)
B-21	Pinanduan	Pinanduan V., Karamuak V., Kinabatangan Valley	Pyrrhotite, (chalcopyrite)	Chalcopyrite bearing pyrrhotite-vein	Serpentinised peridotite	1962~63: Geochemical prospecting 1963: Geophysical prospecting (SP, EM) by Soriano y Cia 1964: Pitting, augering, drilling (4 holes) by Soriamont Investment Co.
B-22	Porog (Cr)	Porog V., Labuk Valley	Chromite (Cr_2O_3 45.93~50.42%)	Bands and dissemination (T=15 ft.)	Serpentinised dunite in peridotite	1959: Discovered 1962: Drilling (9 holes, 1,952 ft.) by Borneo Mining Ltd.

Number	Prospect Name	Location	Ore Mineral	Type of Ore Deposit	Host Rock	Exploration History
B-23	Porog (Fe)	Porog V., Labuk Valley	Lateritic iron ore	Residual deposit by weathering of peridotite	Peridotite	1957: Investigated
B-24	Sualog (Fe)	Sualog V., Bidu Bidu Hills, Labuk Valley	Manganiferous limonite			1958: Pitting (10 pits), trenching (1) by GSM
B-25	Northeast Sualog	Sualog V., Bidu Bidu Hills, Labuk Valley	Gossan	Vein type along fault zone	Red shale of Chert-Spilite Formation	1961: Geochemical prospecting by Borneo Mining Ltd. 1963~64: Geochemical prospecting by UNDP 1983~84: Reinvestigation by MGM
B-26	Southwest Sualog	Sualog V., Bidu Bidu Hills, Labuk Valley	Pyrite, (chalcopyrite, sphalerite)	Sulfide dissemination (W=1~3 in., L=15 ft.)	Chert-Spilite Formation	1961: Investigation by Borneo Mining Ltd. 1963~64: Geochemical prospecting by UNDP 1983~84: Reinvestigation by MGM
B-27	West Sualog	Sualog V., Bidu Bidu Hills, Labuk Valley	Pyrite, chalcopyrite, (covelline, bornite)	Cyprus type cupriferous massive sulfide, 2 sulfide bodies (eastern sulfide body, western sulfide body)	Underlying basaltic rock and overlying shale of ophiolite	1961: Investigated by Borneo Mining Ltd. 1962~63: Geophysical prospecting, shallow drilling by Asian Mining Ltd. 1964: Geophysical prospecting (SP, EM) by UNDP 1965: Geochemical prospecting by UNDP 1980: Reevaluated by MGM 1982~84: Geophysical prospecting (PEM, IP), drilling (13 holes) by MGM until 1988: 90 drill holes by Leadstar Co.
B-28	Taguuk	Taguuk R., Ensuan R., Labuk Valley	Chromite	Pods and bands (T≦6 in.)	Dunite in peridotite	1961: Investigated by Borneo Mining Ltd.
B-29	Tavai Plateau	Tavai Plateau, Labuk Valley	Nickeliferous limonite	Residual deposit by weathering of ultrabasic rock	Ultrabasic rocks	1962: Drilling (20 holes, 800 ft.) & pitting by Borneo Mining Ltd. 1964: Augering by Soriamont Investment Co.
B-30	Tavai Plateau South	South of Tavai Plateau, Labuk Valley	Iron laterite		Peridotite	1984~85: Pitting (11 pits) & augering by GSM
B-31	Tonsuan	Mount Tonsuan, Labuk Valley	Chromite			1961: Discovered by Borneo Mining Ltd.
B-32	Ul Pari	Sualog R., Bidu Bidu Hills, Labuk Valley	Gossan	Cyprus type cupriferous massive sulfide	Basic volcanic lava with shale	1961: Investigation & geochemical prospecting by Borneo Mining Ltd. 1963~64: Geochemical prospecting by UNDP 1980: Reevaluated by MGM 1983: Geological survey, geochemical prospecting, geophysical prospecting (PEM, IP) by MGM 1984: Drilling (3 holes), 3 holes were abandoned due to mechanical trouble
C-1	Beeston	Mt. Beeston, Darvel Bay	Chromite		Ultrabasic rocks	1962: Investigated by Borneo Mining Ltd.
C-2	Edam (Au)	Edam R., Kuala Sungai Bole, Segama Valley	Alluvial gold (1.5 g/t Au)			1986: Detailed panning by GSM
C-3	Edam (Pt)	Edam R., Kuala Sungai Bole, Segama Valley	Alluvial PGM (platinum group minerals) ø0.3~1.0 mm, 85% Pt			1986: Detailed panning by GSM
C-4	Diwata	Diwata V., Darvel Bay	Pyrite, (chalcopyrite) (Ag 10~14 oz/t, Au nil)	Dissemination, minute vein, thin film	Diorite, ultrabasic rock, Chert-Spilite Formation	1961: Discovered & investigated by Borneo Mining Ltd.

Number	Prospect Name	Location	Ore Mineral	Type of Ore Deposit	Host Rock	Exploration History
C-5	Kalung	Kalung Island, Darvel Bay	Chromite	Discontinuous bands (4 zones, 1/8 in.~2 ft. thick, 150 ft. long)	Dunite	1961~63: Investigated by Borneo Mining Limited
C-6	Laila	Laila Island, Darvel Bay	Chromite	Discontinuous bands (1/8~1/2 in. thick)	Dunite	1961~63: Investigated by Borneo Mining Ltd.
C-7	Sadde	Saddle Island, Darvel Bay	Chromite	Fractured band (1 ft.~3 ft. 3 in. thick, 10 ft. long)	Dunite	1961~63: Investigated by Borneo Mining Ltd.
C-8	Silam (Hitam)	Mt. Silam, Darvel Bay	Chromite (Cr_2O_3 32.55~48.48%) (drill core)	Lenticular (43 ft.×23 ft.×2 ft.)	Serpentinised dunite	1962: Investigated by Borneo Mining Ltd. 1963: Drilling by Borneo Mining Ltd.
C-9	Subahan	Subahan R., Darvel Bay	Cu, Ni			1962~63: Geochemical prospecting by Soriamont Investment Co.
C-10	Telewas	Telewas R., Segama Valley	Alluvial gold	In river gravel		1963: Discovered
C-11	Tingkayu	Tingkayu R., southwest of Orchid Plateau, Darvel Bay	Pyrite, chalcopyrite	Along foliation planes	Epidote-amphibole schist or meta tuffaceous rock	1962~63: Geochemical prospecting by Soriano y Cia
C-12	Tribulation	Mt. Tribulation, upper Segama Valley	Pyrite (Ag 2.3~3.3 dwt/t)	Dissemination	Schist	
C-13	Ulu Segama	Ulu Segama, Upper Segama Valley	Pyrite, (chalcopyrite)	Pyrite, chalcopyrite bearing quartz vein	Amphibole schist	1962~63: Geochemical prospecting by Soriano y Cia
C-14		Unnamed small island, Silam Harbour, Darvel Bay	Chalcopyrite, chalcocite, malachite	Quartz vein (W=few in.~2 ft.)	Silicified schistose dioritic rock	1966: Discovered
C-15	Upper Danum	Upper Danum V., Segama Valley	Pyrite, (chalcopyrite)	Quartz vein, dissemination	Sheared dolerite	1962~63: Geochemical prospecting by Soriano y Cia; 1980~81: Reassessment by MGM
C-16	Upper Umas Umas	Upper Umas Umas V., Umas Umas Valley	Millerite (Ni sulfide)		Serpentinite	1962: Investigated
D-1	Baturong	South of Mt. Baturong, Semporna Peninsula	Bauxite (Al_2O_3 53.0%, SiO_2 4.0%)			1962: Discovered by British Aluminium Co., Ltd. GSM failed to relocate
D-2	G. Pock	Gunung Pock, Semporna Peninsula	Pyrite, chalcopyrite, sphalerite, galena	Sulfides bearing quartz vein	Silicified dacite, dacite (Alteration minerals: quartz, chlorite, epidote, calcite, sericite, pyrite, magnetite, kaoline)	1967~68: Reconnaissance geochemical survey (stream sediment) by GSM 1972: Follow-up geochemical survey (stream sediment & soil) by GSM 1977~79: Detailed grid geochemical survey (soil) by GSM 1980: Reevaluated by MGM 1981: Follow-up geochemical survey, drilling (3 holes) by MGM

Number	Prospect Name	Location	Ore Mineral	Type of Ore Deposit	Host Rock	Exploration History
D-3	G. Wullersdorf	G. Wullersdorf, Semporna Peninsula	Pyrite, chalcopyrite, sphalerite, galena, (covelline, chalcocite, malachite)	Sulfides bearing quartz vein (T=15 cm), sulfides in joints, or quartz veins, dissemination of sulfides and quartz, stockwork of sulfides and quartz	Silicified, chloritised, epidotised dacite breccia, silicified dacite (W=6.0 m)	1967~69: Reconnaissance geochemical survey (stream sediment) 1971, 73: Follow-up geochemical survey (soil) 1974~78: Detailed geochemical survey by GSM 1980: Reevaluated by MGM 1981~83: Follow-up geological survey, geochemical survey, shallow drilling (15 holes, 29.5 m) by MGM
D-4	Kalumpang	Kalumpang V., Semporna Peninsula	Sulfide, (Au, Ag) in quartz			1962: Discovered
D-5	Mantri	Mantri R., Upper Kalumpang R., Semporna Peninsula	Alluvial gold		May be derived from silicified volcanic rocks of Mt. Wullurs-dorf	1960: Discovered
D-6	Mentarip	Mentarip R., south of Mt. Pock, Semporna Peninsula	Alluvial gold		May be derived from volcanic rocks and minor intrusive rocks forming Mt. Pock range	1960: Discovered
D-7	Umas Umas	Umas Umas R., Semporna Peninsula	Alluvial gold	Quartz vein along faults (origin)	Kalunpang Formation	1960: Discovered
E-1	Manjupanju	Manjupanju R., Taritipan, Marudu Bay	Malachite (Cu 2.96%)	Film on the boulder of basalt	Basalt	1904: Discovered 1909~10: Pitting (2 pits) by Pilz
E-2	Marasimsim	Ul Marasimsim area, Marudu Bay	Sulfide	Sulfide bearing quartz-calcite veinlets with pyritic dissemination	Spilitic pillow lava	1968: Reconnaissance geochemical survey (stream sediment) by GSM 1988: Follow-up geochemical survey by GSM
E-3	Pingan Pingan	Pingan Pingan, Taritipan, Marudu Bay	Pyrite, chalcopyrite, sphalerite	Sulfide bearing quartz vein (T=several inches)	Basalt	1909~10: Trenching, drilling (800 ft.), 2 adits (50 ft., 16 ft. long), 1 shaft (5 ft. deep) by British Borneo Exploration Co. 1980~81: Reassessment by MGM
E-4	Tagaho	Tagaho Hill, near Mumus, Marudu Bay	Lateritic limonite	Residual deposit formed by weathering of peridotite	Peridotite	1905: Discovered by British Borneo Exploration Co. 1959: Reinvestigation, pitting (4 pits) by GSM
E-5	Taritipan	Taritipan, Marudu Bay	Psilomelane, (pyrolusite)	Mn oxide in lateritic soil (D=3~4 ft.)	Chert of Paleocene-Eocene	1902: Discovered 1903 May~July: Exploration by British Borneo Exploration Co. 1903 August~1908: Mining

Note: ( ): Mineral in brackets is minor mineral.

(*1) UNDP : United Nations Development Program
(*2) OMRD: Overseas Mineral Resources Development Co., Ltd.
(*3) MGM : Joint Malaysian-German Mineral Exploration Project in Sabah
(*4) MJP : Joint Malaysia-Japan Mineral Exploration Program in the Kinabalu area
(*5) GSM : Geological Survey of Malaysia

A : Kinabalu - Upper Sugut Valley area
B : Labuk Valley - Upper Kinabatangan Valley area
C : Upper Segama Valley - Darvel Bay area
D : Semporna Peninsula area
E : Marudu Bay area

1-4 List of Prospecting Results of Mineral Deposits and Mineral Occurrences

List of prospecting results of mineral deposits and mineral occurrences (Table 16) was made after the prospects were selected from the existing data, in which the results of the prospecting of the prospects and conclusions or recommendations were reported, belonging to the categories (B) and (C) mentioned above, among the prospects on the list of known mineral deposits and mineral occurrences mentioned above.

The prospect, which was not placed on the list of known mineral deposits and mineral occurrences mentioned above but was reported as the geochemical anomaly in the existing data on the aforementioned category (C), and for which further work was recommended, was also placed on the list of prospecting results of mineral deposits and mineral occurrences.

Result of study obtained from the result of inquiry of the existing data is placed on the list of prospecting results of mineral deposits and mineral occurrences as the one item of the list.

Table 16 List of Prospecting Results of Mineral Deposits and Mineral Occurrences

Number	Prospect Name	Prospector	Year	Prospecting Method	Result of Prospecting	Conclusion from Prospecting Result	Result of Study
A-1	Bambangan	UNDP(*1) OMRD(*2) " MGM(*3) MJP(*4) "	1963~65 1970 1970 1981 1985 1985~87	Geochemical prospecting Geochemical prospecting Drilling Geochemical prospecting Geophysical prospecting Drilling (18 holes, 6,063.3 m)	Mineralized zone L=400m, W=200m~250m, T=90m Average grade Cu 0.14%, Au 0.07 g/t Size of ore deposit will be small.	No further exploration for the mineralized zone is necessary, low possibility of new mine to be developed.	
A-7	Mamut	UNDP GSM(*5) OMRD " " "	1965 1966 1968 1969 " 1975	Geochemical prospecting Follow-up geochemical prospecting, shallow drilling (29 holes, 2,217 feet), 200 pits Drilling (10 holes, 2,500m) Drilling (53 holes, 11,000m) Tunneling (755m) Production started	Mineralized zone L=1,200m, W=1,000m Ore reserves 179 million tons Cu 0.476%, Au 0.5 g/t Minable ore reserves 77 million tons, Cu 0.608% Au & Ag contents in copper concentrates: Au 20 g/t, Ag 120 g/t		
A-8	Mankadau	Soriano y Cia MJP	1963 1985	Discovered Geological survey, geochemical prospecting, geophysical prospecting (CSAMT)	Failed to locate ore outcrop; Geochemical anomaly and low resistivity zone were not detected.	No further survey work is advisable.	
A-9	Nungkok	Soriamont Investment Co. " Srikundasan Development & BHP "	1965 1966~68 1973 1974	Geochemical prospecting, geophysical prospecting (SP, EM) Drilling (21 holes, 3,354m) Drilling (6 holes, 762m) Magnetic survey & geochemical prospecting	Mineralized zone L=915m, W=366m Grade of mineralised zone Cu 0.18~0.56%, Mo 0.003~0.051%, Au<0.02 oz/t, Ag 0.03~0.31 oz/t	Discouraging and inconclusive	Mineralised zone is small and grade is low.
A-10	Paliu	MJP "	1985 1986	Geological survey, geochemical prospecting Geochemical prospecting, trenching (10 trenches)	Mineralization is weak.	No further survey is advisable.	
A-11	Paranchangan	R. R. Pilz GSM	1910 1957	Discovered 2 trenches, 40 pits	Ore zone (L=45 feet, W=20 feet, D=7 feet, 150 yd^3)	Deposit is small.	
B-1	Bangau Bangau A	Borneo Mining Ltd. Asian Mining Corporation	1959~60 1962~64	Geochemical prospecting Geophysical prospecting, drilling	Drilling failed to locate any horizontal or vertical extension of primary ore.	Further exploration was not warranted.	
B-2	Bangau Bangau B	Borneo Mining Ltd. Asian Mining Corporation	1959~60 1962~64	Geochemical prospecting Geophysical prospecting, drilling	Drilling failed to locate any horizontal or vertical extension of primary ore.	Further exploration was not warranted.	
B-3	Bangau Bangau B1	Borneo Mining Ltd. Asian Mining Corporation	1959~60 1962~64	Geochemical prospecting Geophysical prospecting, drilling	Drilling failed to locate any horizontal or vertical extension of primary ore.	Further exploration was not warranted.	

Number	Prospect Name	Prospector	Year	Prospecting Method	Result of Prospecting	Conclusion from Prospecting Result	Result of Study
B-4	Bangau Bangau C	Borneo Mining Ltd. Asian Mining Corporation	1959~60 1962~64	Geochemical prospecting Geophysical prospecting, drilling	Drilling failed to locate any horizontal or vertical extension of primary ore.	Further exploration was not warranted.	
B-5	Bangau Bangau D	Borneo Mining Ltd. Asian Mining Corporation	1959~60 1962~64	Geochemical prospecting Geophysical prospecting	Drilling failed to locate any horizontal or vertical extension of primary ore.	Further exploration was not warranted.	
B-6	Bangau Bangau E	Asian Mining Corporation	1962~64	Geophysical prospecting, drilling	Drilling failed to locate any horizontal or vertical extension of primary ore.	Further exploration was not warranted.	Reinvestigation (detailed geological survey, geochemical prospecting & geophysical prospecting) is recommended to search for massive sulfide which might be present in the area.
B-7	Bidu Bidu	Borneo Mining Ltd.	1959~60	Investigation			Reinvestigation (detailed geological survey, geochemical prospecting and geophysical prospecting) is recommended to search for massive sulfide which might be present in the area.
B-8	Bidu Bidu Hills	British Borneo Exploration Co. Malayan Miners Ltd.	1904 1908, 1910 1962	Investigation Reinvestigation Investigation	Ore reserves 1,500,000 t (area=1,100 yd. × 400 yd.)		
B-9	Northern Bidu Bidu Hills	Southern Mining & Development Ltd. Borneo Industrial Enterprised Co. Ltd.	1963 1965	Augering (3 augers) Pitting	Volume: 10 million cubic yard (depth=12 ft.) Fe 40~45%, Ni 0.37%		
B-10	Ensuan	Malayan Miners Co., Ltd.	1961	Pitting (85 pits) & augering	Area=160 acres (depth=20 ft.) Ni 0.5%	Prospecting work proved discouraging. Nickel content of limonite is too low.	
B-11	Karang	British Borneo Exploration Co. GSM Soriamont Investment Co.	1908~12 1955~56 1964	Adit (500 ft.), 3 shafts Geochemical prospecting Geochemical prospecting, geophysical prospecting (SP, EM), drilling (3 holes, 1,113 ft.)	Drilling showed uncommercial mineralization in shear zone in spilitic basalt (by Soriamont)	Further prospecting was not justified (by Soriamont). Reinvestigation (detailed geological survey & PEM) should be considered, because geological setting & mineralization are similar to those of W-Sualog. (by MGM)	Same opinion as indicated by MGM
B-12	Katai	Borneo Mining Ltd.	1961	Investigation, pitting		Inconclusive	

Number	Prospect Name	Prospector	Year	Prospecting Method	Result of Prospecting	Conclusion from Prospecting Result	Result of Study
B-13	Kiabau	Borneo Mining Ltd. UNDP MGM " "	1959~60 1964 1983 1984 1985	Geophysical prospecting Geochemical prospecting, geophysical prospecting (SP, ABEP) Geological survey, geochemical prospecting, geophysical prospecting (PEM, IP) Detailed geochemical survey, geophysical survey (PEM), test drilling (4 holes) Drilling (2 holes)	No conductor detected. (by Borneo Mining Ltd.) Conductor is too weak, (by UNDP) Strong EM conductor was detected. (by MGM) 2 holes intersected cupriferous massive sulfide (20m thick, Cu 0.5~2.5%, Au 0.1~1.0 g/t, Ag 2~5 g/t) in 1984. (other 2 holes were abandoned due to mechanical trouble.)	Too small for economic consideration. No recommendation for further work (by UNDP) Further substantial drilling is needed to outline geometry of sulfide bodies, their mineral composition and metal contents. (by MGM)	Ore body seems to be not so big.
B-14	West Kiabau	A.W. Allen GSM	1959 1963	Pitting (depth≦5 ft.) Reinvestigation		Economically unattractive, no further work is warranted (by GSM)	
B-15	Luminitong	UNDP GSW	1963~65 1986	Geochemical prospecting Follow-up geochemical prospecting		Massive sulphide similar to West Sualog might not be present.	Geophysical survey (PEM) is recommended to search for massive sulfide which might be, still, present in the area.
B-17	Mansan	GSM	1974	Discovered			Reinvestigation (detailed geological survey, geochemical prospecting, geophysical prospecting) is recommended to search for massive sulfide which might be present in the area.
B-18	Mansan & Wasai	GSM	1978~79	Pitting (66 pits), augering (7 holes)	Ore reserves: 2.5 million T Grade: Al_2O_3 45~54% Area: 2.4 Km × 1.6 Km Thickness: several cm ~ 3.7 m	Ore reserve is insufficient to mine, due to long distance from the port.	
B-19	Meliau	Borneo Exploration Co. Soriano y Cia	1910~11 1962	Trenching Geochemical prospecting			Reinvestigation (detailed geological and geochemical surveys) is recommended to search for massive sulfide which might be present in this area.
B-21	Pinanduan	Soriano y Cia " Soriamont Investment Co.	1962~63 1963 1964	Geochemical prospecting Geophysical prospecting (SP, EM) Pitting, augering, drilling (4 holes)	Drilling showed uncommercial sulfide mineralization.	No further work was warranted.	
B-22	Porog (Cr)	Borneo Mining Ltd.	1962	Drilling (9 holes, 1,952 ft.)	No continuation in depth was found by drilling.	Failed to locate chromite in minable quantity in commercial quality	
B-23	Porog (Fe)	GSM	1957	Investigation	Ore reserves: 50,000 t (Fe 60%, Cu 0.2~0.3%)	Too small orebody; no immediate commercial interest	

Number	Prospect Name	Prospector	Year	Prospecting Method	Result of Prospecting	Conclusion from Prospecting Result	Result of Study
B-24	Sualog (Fe)	GSM	1958	Pitting (10 pits), trenching	No economic value	No further work is recommended.	
B-25	Northeast Sualog	Borneo Mining Ltd. UNDP MGM	1961 1963~64 1983~84	Geochemical prospecting Geochemical prospecting Reinvestigation	Result of reinvestigation was disappointing.	No further prospecting work is recommended. (by MGM)	
B-26	Southwest Sualog	Borneo Mining Ltd. UNDP MGM	1961 1963~64 1983~84	Investigation Geochemical prospecting Reinvestigation	Result of reinvestigation was disappointing.	No further prospecting work is recommended. (by MGM)	
B-27	West-Sualog	Borneo Mining Ltd. Asian Mining Ltd. UNDP " MGM	1961 1962~63 1964 1965 1982~84	Investigation Geophysical prospecting, shallow drilling Geophysical prospecting (SP, EM) Geochemical prospecting Geophysical prospecting (PEM, IP), drilling (13 holes)	9 holes out of 13 holes intersected massive sulfide. Ore reserves: 1,542,240 t Eastern body- 1,224,000 t (300m × 15m × 80m × 3.4) Western body- 318,240 t (130m × 12m × 60m × 3.4) Cu 6.2~10.1%, Au 1.6~7.3 g/t, Ag 14.6~30.3 g/t	Further substantial drilling is needed to outline geometry of sulfide bodies, their mineral composition and metal contents. (by MGM)	Ore body appears to be not so big.
B-28	Taguuk	Borneo Mining Ltd.	1961	Investigation		Finding chromite concentration of economic importance is poor.	
B-29	Tavai Plateau	Borneo Mining Ltd. Soriamont Investment Co.	1962 1964	Drilling (20 holes, 800 ft.), pitting Augering	Drilling indicated substantial tonnage. Ore reserves: 200 million tons (area=15 Km^2, Ni 0.40~0.55%, Fe 40~49%)	Further drilling to test Fe & Ni contents is necessary. (by Borneo Mining Ltd.) Uneconomical, due to low content of Fe. (67% Fe is necessary.) (by GSM)	Same opinion as indicated by GSM
B-30	Tavai Plateau South	GSM	1984~85	Pitting (11 pits) & augering	Area=3.5 Km^2, 2~10m thick (Fe 35~50%, Cr 0.32~1.5%, Ni 0.12~1.18%) Ore reserves=4.9 million tons (cut off: Fe 45%)	Uneconomical, due to low content of Fe. (67% Fe is necessary.)	
B-31	Ul Pari	Borneo Mining Ltd. UNDP MGM "	1961 1963~64 1983 1984	Geochemical prospecting Geochemical prospecting Geological survey, geochemical prospecting, geophysical prospecting (PEM, IP) 3 drill holes (abandoned)	Strong EM conductor was detected.	Further drilling for EM conductor is recommended.	
B-33	Bangau Bangau (Bidu Bidu Hills)	MGM	1982~84	Geochemical follow-up prospecting	Geological environment in the southern part of the area is believed to offer some prospect for massive sulfide mineralization.	Detailed geological mapping, soil sampling, and possibly geophysical work is considered in selected parts of Bangau Bangau area.	

Number	Prospect Name	Prospector	Year	Prospecting Method	Result of Prospecting	Conclusion from Prospecting Result	Result of Study
B-34	East-Sualog (Bidu Bidu Hills)	MGM	1982~84	Geochemical follow-up prospecting	Geological conditions are quite similar to those of W-Sualog. Significant Cu/Zn geochemical anomalies were detected.	Additional follow-up work (grid soil sampling, geophysical survey) is warranted to examine as to whether massive sulfide mineralization at W-Sualog extends to the east.	
B-35	Sualog/Pari (Bidu Bidu Hills)	MGM	1982~84	Geochemical follow-up prospecting	Geological conditions are quite similar to those of W-Sualog. Significant Cu/Zn geochemical anomalies were detected.	Additional follow-up work (grid soil sampling, geophysical survey) is warranted to examine as to whether massive sulfide at W-Sualog extends to the south.	
B-36	Ulu West-Sualog (Bidu Bidu Hills)	MGM	1982~84	Detailed geochemical and geophysical surveys	Additional massive sulfide prospects are indicated by the results of geophysical work.	Drilling should be carried out for massive sulfide prospects indicated by geophysical work to outline additional ore potential.	
B-37	Binalik (Labuk Valley)	UNDP MGM	1963~64 1980~81	Geochemical prospecting reassessment of UNDP work	Significant geochemical Cu anomalies which have close spatial relationship to outcrops of Chert-Spilite Formation representing pillow lava stage of ophiolite sequence were detected.	Systematic PEM surveys are recommended.	
B-38	Ulu Unsandan-Tungud/ Pinapakang (Labuk Valley)	UNDP MGM	1963~64 1980~81	Geochemical prospecting reassessment of UNDP work	Outstanding geochemical anomalies which have close spatial relationship to outcrops of the Chert-Spilite Formation representing pillow-lava stage of ophiolite sequence in the area were detected.	Narrow-spaced stream and base-of-slope samplings followed by soil survey as first step are recommended.	
C-4	Diwata	Borneo Mining Ltd.	1961	Investigation	Mineralization is too poor.		Detailed geological survey & geochemical survey are recommended to investigate whether opiolite sequence of Chert-Spilite Formation with possible massive sulfide is present.
C-5	Kalung	Borneo Mining Ltd.	1961~63	Investigation	No evidence to suggest that chromite occurs in minable quantity at shallow depth	The search was unsuccessful.	
C-6	Laila	Borneo Mining Ltd.	1961~63	Investigation	No evidence to suggest that chromite occurs in minable quantity at shallow depth.	The search was unsuccessful.	
C-7	Saddle	Borneo Mining Ltd.	1961~63	Investigation	No evidence to suggest that chromite occurs in minable quantity at shallow depth.	The search was unsuccessful.	

Number	Prospect Name	Prospector	Year	Prospecting Method	Result of Prospecting	Conclusion from Prospecting Result	Result of Study
C-8	Silam (Hitam)	Borneo Mining Ltd. " GSM	1962 1963 1970	Investigation Drilling Investigation	Prospecting failed to prove minable ore reserves. (BML) Drill records are incomplete and it is not known whether other ore bodies were found. (GSW)	The search was unsuccessful. (Borneo Mining Ltd.) More pits and trenches could be dug to be supplemented by drilling if warranted. (GSW)	Same conclusion as indicated by Borneo Mining Ltd.
C-9	Sabahan	Soriamont Investment Co.	1962~63	Geochemical prospecting	Unsuccessful		
C-11	Tingkayu	Soriano y Cia	1962~63	Geochemical prospecting	Geochemical Cu anomaly was detected.	Further detailed work especially soil sampling in the area is recommended.	
C-13	Ulu Segama	Soriano y Cia	1962~63	Geochemical prospecting		Further detailed work especially soil sampling in the area recommended.	
C-15	Upper Danum	Soriano y Cia MGM	1962~63 1980~81	Geochemical prospecting Reassessment of previous prospecting	Geochemical anomalies of Cu were found. (by Soriano) These anomalies can be considered as potential indicators for the massive sulfide mineralization. (by MGM)	Detailed follow-up work (narrow spaced stream & base-of-slope sampling combined with geological mapping perhaps followed by soil sampling) is recommended. (by Soriano and MGM)	
D-2	G. Pock	GSM " " MGM	1967~68 1972 1977~79 1981	Reconnaissance geochemical survey (stream sediment) Follow-up geochemical survey (stream sediment & soil) Detailed grid geochemical survey (soil) Follow-up geochemical survey, drilling (3 holes)	The geochemical anomalies were found to reflect widespread base metals sulfides. Drilling penetrated altered andesite disseminated by pyrite, but did not intersected economic mineral.	Further investigation are not considered. (MGM)	Hydrothermal alteration around G. Pock should be investigated to delineate hydrothermal alteration halo which might be a indicator of porphyry copper type mineralization emplaced underground.
D-3	G. Wullersdorf	GSM " " MGM	1967~69 1971, 73 1974~78 1981~83	Reconnaissance geochemical survey (stream sediment) Follow-up geochemical survey (soil) Detailed geochemical survey Follow-up geological survey, geochemical survey, shallow drilling (15 holes, 29.5m)	Geochemical anomalies originate from widespread but discontineous, generally low-grade sulfide mineralization. Sulfide mineralizations outcroping in stream beds were found in 23 localities in the northern part of the Wullersdorf area.	Further investigations comprising more extensive narrow spaced grid soil sampling, trenching, and perhaps geophysical survey should be carried out in a step-by-step approach in the Bukit Mantri area. (MGM)	The hydrothermal alteration in the Bukit Mantri - G. Wullersdorf area should be investigated to delineate hydrothermal alteration halo which might be a indicator of porphyry copper type mineralization emplaced underground.
E-1	Manjupanju	R. R. Pilz	1909~10	Pitting (2 pits)	No copper ores were found by pitting.	No economic value	
E-2	Marasimsim	GSM GSM	1968 1988	Reconnaissance geochemical survey (stream sediment) Follow-up geochemical survey	3 Cu-Zn-Ag anomalies in stream sediment were detected. (1988) These anomalies are related to vein type mineralization in spilitic pillow lava and may resemble the stockwork zone of Cyprus-type cupriferous massive sulfide deposit.	Follow-up work, including ridge and spur soil sampling and rock-chip sampling within the anomalies, to delineate the extent of the stockwork zone which may possibly lead to the detection of the underlying massive sulfide deposit.	

Number	Prospect Name	Prospector	Year	Prospecting Method	Result of Prospecting	Conclusion from Prospecting Result	Result of Study
E-3	Pingan Pingan	British Borneo Exploration Co. MGM	1909~10 1980~81	Trenching, drilling (800 ft.), 2 adits (50 ft., 16 ft. long), 1 shaft (5 ft. deep) Reassessment	No copper was found by drilling. Occurrences of copper mineralization in basaltic rocks of Chert-Spilite Formation suggest prospects for West-Sualog type massive sulfides. (MGM)	Copper occurs in negligible quantities and deposit appears to be of no economic value. Reinvestigation work should initially start with narrow-spaced drainage and base-of-slope sampling perhaps followed by soil surveys with the aim to indentify target zones for ground geophysical surveys. (MGM)	Same opinion as indicated by MGM
E-4	Tagaho	British Borneo Exploration Co. GSM	1905 1959	Investigation Reinvestigation, pitting (4 pits)	Ore reserves: 25 million T (British Borneo Syndicate)	Ore reserves are greatly overestimated. Ore is of no economic value. (GSM)	
E-5	Taritipan	British Borneo Exploration Co. "	1903 1903~08	Exploration Mining	Ore body is small in quantity. (Ore reserves at the various mining localities are estimated at most as a few hundred tons.)	Mining was unsuccessfull. (Quality of ore is not marketable due to high silica content derived from chert.)	

Note: (*1) UNDP : United Nations Development Program
(*2) OMRD : Overseas Mineral Resources Development Co., Ltd.
(*3) MGM : Joint Malaysian-German Mineral Exploration Project in Sabah
(*4) MJP : Joint Malaysia-Japan Mineral Exploration Program in the Kinabalu area
(*5) GSM : Geological Survey of Malaysia
(*6) BML : Borneo Mining Limited

1-5 Supplemented Mineral Distribution Map of Sabah

The positions, together with metal components and prospect names, of the mineral occurrences and mineral deposits which were discovered after 1976 were plotted on the mineral distribution map of Sabah in the scale of one to 500,000 made by Geological Survey of Malaysia as of 1976.

The details of the prospect plotted additionaly are as follows.

(A) Kinabalu area
- (1) Cu occurrence of Bambangan was changed to Cu large deposit.
- (2) Prospect name "Lingangaa" was filled up.

(B) Labuk Valley area
- (1) Ulu Pari (Cu occurrence) was plotted newly.
- (2) Wasai Mansan (Al Fe occurrence) was plotted newly.
- (3) Tavai South (Fe large deposit) was plotted newly.
- (4) Cu occurrence of West-Sualog was changed to Cu large deposit.
- (5) Cu occurrence of Kuala Kiabau was changed to Cu large deposit.

(C) Upper Segama Valley-Darvel Bay area
- (1) Two Cr occurrences near G. Silam were plotted newly.
- (2) Two Mg occurrences near G. Silam and G. Tingkayu were plotted newly.
- (3) Cu occurrence near G. Tingkayu was plotted newly.
- (4) Two Ag occurrences near G. Ambun and G. Tribalation were plotted newly.
- (5) Six alluvial Au between G. Beeston and G. Heather were plotted newly.
- (6) Thirteen alluvial Cr in the Upper Segama Valley were plotted newly.

(D) Semporna Peninsula area
- (1) Twelve Cu-Zn-Pb occurrences near G. Wullersdorf were plotted newly.
- (2) Cu-Zn-Pb occurrence near G. Pock was plotted newly.
- (3) Cu occurrence near G. Pock was plotted newly.
- (4) Six Cu-Zn-Pb-Au-Ag floats near G. Wullersdorf were plotted newly.
- (5) Three alluvial Au near G. Pock were plotted newly.

1-6 Summary of Geochemical Prospecting Carried Out in Sabah

Geochemical prospectings carried out by Unite Nations, Geological Survey of Malaysia and Joint-Malaysia Mineral Exploration Project in Sabah in the past are summarized below and the prospecting areas are shown in the Figure 10.

1-6-1 United Nations Labuk Valley Project

Geochemical prospecting was carried out in 1963 to 1965.

(1) Kinabalu area

area of prospecting	:	980 km^2
sampling method	:	reconnaissance stream sediment (drainage) and base-of-slope (bank) sampling, detailed follow-up drainage and grid soil sampling
number of samples	:	7,560
sampling interval	:	half mile
average sample density	:	2.6/km^2
element analyzed	:	Cu, Ni

(2) Labuk Valley area

area of prospecting	:	2,600 km^2
sampling method	:	reconnaissance drainage and bank sampling, detailed follow-up drainage and grid soil sampling
number of samples	:	15,600
sampling interval	:	half mile
average sample density	:	2/km^2
element analyzed	:	Cu, Ni

1-6-2 Geochemical Prospecting done by Geological Survey of Malaysia

(1) Upper Segama Valley-Darvel Bay area

period of prospecting	:	1966-1970
area of prospecting	:	about 4,500 km^2
sampling method	:	reconnaissance drainage and bank sampling
number of samples	:	5,529
sampling interval	:	3/4 ~ 1 mile
element analyzed	:	total Cu

(2) G. Pock area

period of prospecting	:	1967-1972
area of prospecting	:	about 500 km^2
sampling method	:	reconnaissance drainage and bank sampling, follow-up closer spaced drainage and soil sampling
number of samples	:	1,830
sampling interval	:	750 m
average sample density	:	3.6/km^2
element analyzed	:	total Cu

(3) G. Wullersdorf area

period of prospecting	:	1967-1973
area of prospecting	:	about 500 km^2
sampling method	:	reconnaissance drainage and bank sampling, reconnaissance grid soil sampling
average sample density	:	drainage and bank-1.75/km^2 soil-300 m × 300 m grid (16 km^2)
element analyzed	:	reconnaissance drainage-Cu soil-Cu, Zn

(4) Tawau area

year of prospecting	:	1969
area of prospecting	:	about 1,050 km^2
sampling method	:	reconnaissance drainage and bank sampling
average sample density	:	1.5/km^2
(number of samples	:	1.5 × 1,050 = 1,575)

1-6-3 Joint Malaysian-German Mineral Exploration Project

After reevaluation of the results of the geochemical prospectings carried out previously by United Nations and Geological Survey of Malaysia, re-analysis of the samples which were collected in the areas shown in the Table 17 and had been preserved since then and follow-up drainage sampling were carried out from September, 1980 to August 1981.

Subsequently, ridge-and-spur soil sampling (total length 30,000 m, 50 m interval) and grid soil sampling (25 m × 100 m grid) in the G. Wullersdorf area and detailed grid soil sampling in the Bidu Bidu Hills area, Labuk Valley in 1982. (Simplified from "Final

Report on investigation of mineral resources in Sabah 1980-1984" of Joint Malaysian-German Mineral Exploration Project)

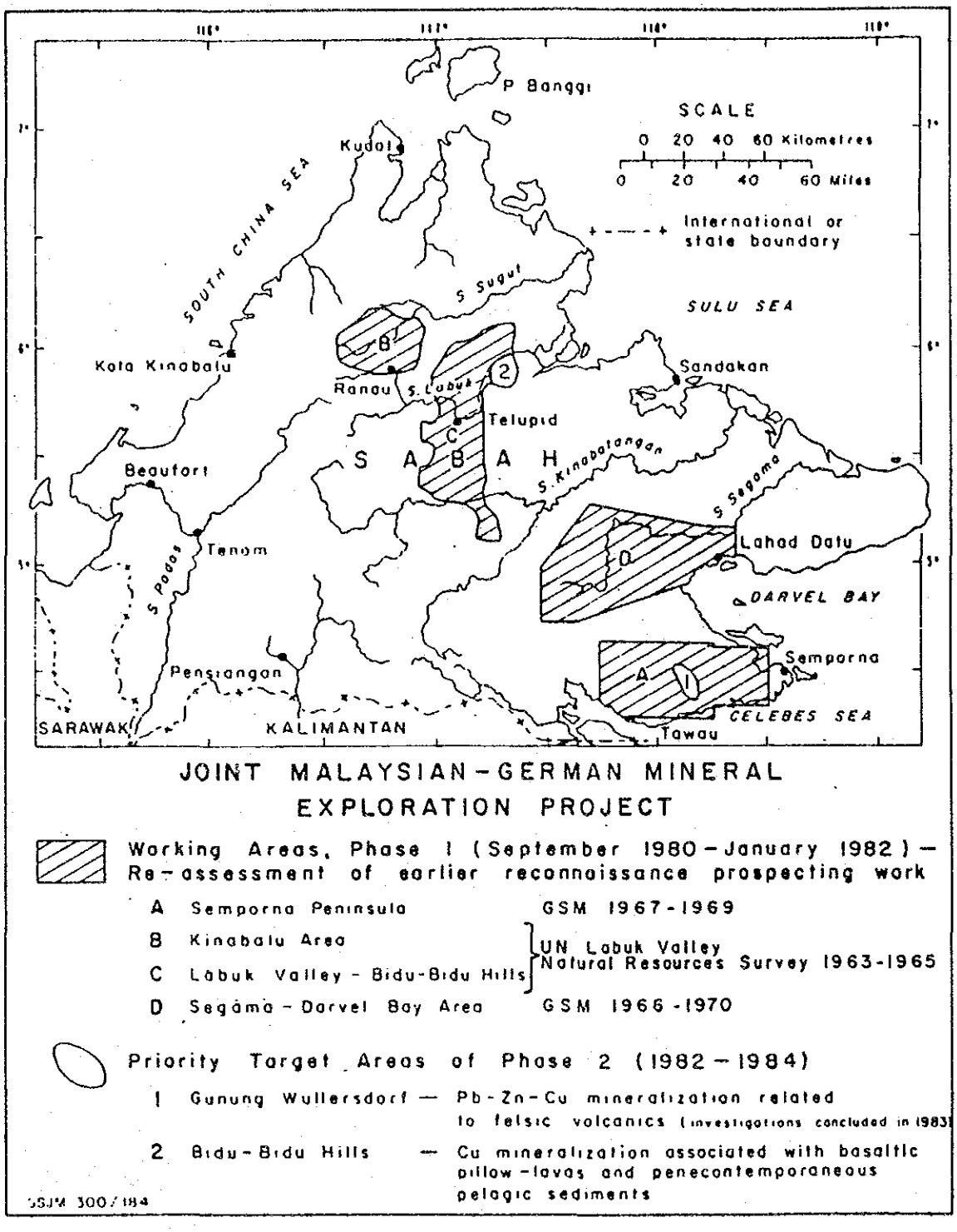


Figure 10 Location Map of Geochemical Prospecting Area in Sabah (Taken from "Final Report on investigation of mineral resources in Sabah 1980-1984")

Table 17 Joint Malaysian-German Mineral Exploration Project
Analytical work performed during Phase 1 (September 1980-August 1981)

Area	Surface covered by reconnaissance survey (sq km)	Reconnaissance Survey		Earlier follow-up prospecting work	MGM follow-up prospecting work	Number of determinations
		Number of drainage samples analyzed *)	Number of base-of-slope samples analyzed *)	Number of soil samples (ridge & spur and grid samples) analyzed *)	Number of drainage samples analyzed *)	
Gunung Pock (Semporna)	500	2048 (7)	1153 (3)	208 (4)	237 (3)	19338
Gunung Wullersdorf (Semporna)	500	2610 (7) 204 (5)	1235 (3)	224 (5)	717 (4)	26983
Tawau (Semporna)	1050	1565 (6) 1565 (3)	–	–	–	14085
Kinabalu	980	2521 (6)	183 (3)	–	–	15675
Kota Belud	150	515 (6)	–	–	–	3090
Labuk Valley	2600	6648 (6)	585 (3)	2675 (4)	–	52343
Segama-Darvel-Bay	4000 (sample location maps of about 1000 sqkm missing)	1286 (6)	–	–	–	7716
	Total :	18962	3156	3107	954	139230 **)

*) In brackets respective number of elements determined

**) 25,470 determinations carried out in the laboratory of the Geological Survey of Malaysia in Ipoh

(Taken from "Final Report on investigation of mineral resources in Sabah 1980-1984")

CHAPTER 2 DIGITIZING OF THE TOPOGRAPHICAL AND GEOLOGICAL DATA

The items in the digitizing work of the topographical and geological data are as follows.

2-1 Input of the Topographical Map of the Survey Area in the Scale of One to 500,000

Contour lines at every 500 feet in the topographical map of the survey area in the scale of one to 500,000 were read by means of the digitizer. In addition, the input of names and altitudes of mountains as well as roads, rivers, towns and cities, and their names was done.

The input area is about 26,500 square kilometers.

The original point of the reading by the digitizer was set in latitude 4°00' North and in longitude 116°00' East in the bottom left in the topographical map.

The input data were confirmed by examining visually the contour lines drawn on the paper by means of the computer.

2-2 Input of the Geological Map of the Survey Area in the Scale of One to 500,000

The polygon input of the geological information in the geological map of the survey area of about 26,500 square kilometers in the scale of one to 500,000 was done.

The items of the input include lineament, fault and so on in addition to the geological information.

The original point of the reading by the digitizer is the same point as mentioned in the section 2-1.

The input data were confirmed by examining visually the line drawing drawn on the paper by means of the computer.

2-3 Input of the Main Topographical Data (1:50,000 in scale) of the Detailed Survey Area

The main topographical data (1:50,000 in scale) of the detailed survey area (about 8,000 square kilometers) in the survey area were digitized by reading the co-ordinates at the intersection of the 500 meters-mesh, namely mesh of the every one centimeter long on the map, by means of the digitizer.

2-4 Input of the Main Topographical Data (1:50,000 in scale) of the Specified Area in the Detailed Survey Area

The main topographical data (1:50,000 in scale) of the specified area (2,250 square kilometers) in the detailed survey area were digitized by reading the co-ordinates at the intersection of the 50 meters-mesh, namely mesh of the every one millimeters long on the map, by means of the digitizer.

2-5 Drawing of the Superimposed Bird's-eye View Synthesized by the Topographical Map and Geological Map

The superimposed bird's-eye view was made by superimposing the picture drawn from the geological data digitized in the section 2-2 upon the bird's-eye view made from the topographical data digitized in the section 2-1.

Superimposed bird's-eye views consist of two kinds of bird's-eye view, namely, bird's-eye view of geology (Annex 2), on which geology is depicted, and bird's-eye view of geological structure (Annex 3), on which geological structure such as fault, fold axis and so on is expressed.

2-6 Drawing of the Superimposed Bird's-eye View Synthesized by the Topographical Data and the Landsat Image Data

The superimposed bird's-eye view was made by superimposing the digitized Landsat image data upon the bird's-eye view made from the topographical data digitized in the section 2-4. The Landsat image is expressed by the infrared color. The superimposed bird's-eye view was made from the four kinds of pictures consisting of each two pictures from the two directions of the digitized topographical data and the digitized Landsat image data respectively.

Part III Conclusion and Recommendation

PART III CONCLUSION AND RECOMMENDATION

CHAPTER 1 CONCLUSION BASED ON THE RESULTS OF THE ANALYSIS OF THE EXISTING DATA

As the result of the analysis of the existing data collected, it seems that the base metal deposit with high possibility of its existence in Sabah is, firstly, Cyprus type cupriferous massive sulfide deposit similar to the West-Sualog deposit, which was prospected by drilling after discovery by drilling in 1982 and is under feasibility study, in the Bidu Bidu Hills area in central Sabah. The West-Sualog deposit is associated with ophiolitic rocks belonging to the Chert-Spilite Formation of the Cretaceous to Eocene age. The foot wall rock of the West-Sualog deposit is basalt and the hanging wall rock is shale. As the Chert-Spilite Formation has an comparatively extensive distribution in Sabah, it is possible that the West-Sualog type massive sulfide deposit is found associated with ophiolitic rocks belonging to the Chert-Spilite Formation.

Secondarily, it is possible that the porphyry copper type deposit might be found. Exploration for the porphyry copper deposit has been carried out considerably in the Kinabalu area around the Mamut Mine compared with other areas. It seems that the areas, where the porphyry copper type deposit occurs with high possibility, after the Kinabalu area, are the Gunung Pock area and the Bukit Mantri-Gunung Wullersdorf area in the Semporna Peninsula. Although the outcrop of the porphyry copper deposit has not been found in both areas, the small to very small veinlets consisting of sphalerite, galena, chalcopyrite and quartz are found in the silicified dacite and andesite of the Pliocene age. In the Gunung Pock area, microdiorite intrudes into dacite. Dacite and andesite have undergone hydrothermal alteration such as chloritization, epidotization, carbonatization, sericitization, pyritization, kaolinization as well as widespread silicification.

The mineral assemblage consisting of chlorite, epidote and carbonate possibly suggest "propylitic zone" which consists of chlorite, epidote, carbonate, adularia and albite and is distributed in the outermost zone of hydrothermal alteration zone associated with some porphyry copper deposits. The mineral assemblage of quartz, kaolin and chlorite possibly suggest "argillic zone" which is distributed in the inner part than propylitic zone. The mineral assemblage of quartz, sericite and pyrite maybe suggest "phyllic zone" which is found in the inner part than propylitic zone and argillic zone.

Small veins to veinlets consisting chalcopyrite, spalerite, galena and quartz possibly correspond to veins or veinlets which are distributed in the inner part than veins zone in "peripheral zone", in which chalcopyrite, sphalerite, galena, gold and silver are found, of some porphyry copper deposits.

Consequently, it is possible that the porphyry copper type deposit is emplaced underground together with the related acidic to intermediate intrusive rock, and it seems that zinc-lead-copper mineralization and hydrothermal alteration possibly suggest the indication over or around the porphyry copper type deposit emplaced underground.

CHAPTER 2 RECOMMENDATION FOR THE FUTURE SURVEYS

Although many prospectings have been conducted in the survey area up to date and have resulted in discovery of many encouraging prospects, it is difficult to evaluate all the survey area synthetically because method and precision of prospecting are various.

Consequently it is recommended, firstly, that geochemical prospecting based on the same standard should be conducted in the survey area in order to evaluate all the area synthetically. It is desirable to carry out simultaneously geological mapping in the same area as covered by geochemical prospecting to analyze the result of geochemical prospecting effectively.

As the next step, detailed prospecting in the encouraging prospect found by geochemical prospecting is desirable. We would guess that the area, in which Chert-Spilite Formation accompanied by ophiolite is distributed, and Gunung Pock and Bukit Mantri-Gunung Wullersdorf areas are promising at present.

MINERAL GROUPS

Based on the properties, uses, and significance of the minerals

- Major Metals
- Other Metals (used mainly in alloys)
- Precious Metals and Gemstones
- Industrial (non-metallic) Minerals and Rocks
- Fuels
- Clays and Constructional Stone
- Other Minerals

Note: Construction materials such as coral, gravel and sand collected near shore, beaches and from rivers are not shown. Several of the clay deposits produce bricks. Many of the constructional stone deposits are producing crush rock, only some deposits estimated to contain more than 100,000 cu.yds. of stone are shown on the map

SIZE OF DEPOSITS

Two symbol sizes are used, e.g.

- ◯ Large deposit, or significant prospect
- ○ Occurrence

LETTER STYLE

- Cr *in situ* occurrence
- *Cr* alluvial, float or block

FRAME SYMBOL

Where two or more different minerals occur at a locality, the symbols denoting the minerals are enclosed by a block frame

- Minerals occur in the same deposit or in closely related deposits or same rock sample
- Minerals occur in unrelated deposit but at the same locality

ALPHABETICAL LIST OF MINERALS TO

MINERAL NAME AND LETTER		SIZE OF DEPOSITS		MINERAL NAME AND LETTER		SIZE OF DEPOSITS	
Aluminium Aluminous laterite	Al AlFe		▲	Magnesite	Mg		●
				Magnetite see *black sand minerals*			
Antimony	Sb		✚				
Asbestos; chrysotile	As		●	Manganese Manganiferous limonite (or laterite)	Mn MnFe	✖	✖
Bauxite - see *aluminium*				Mercury	Hg		●
Bentonite, bentontic clay, fuller's earth	Bn		●	Mica	M		▮
Black sand minerals: ilmenite and magnetite; for chromite sand, see *chromium*	Bim		◆	Molybdenum	Mo		●
				Monazite	Mon		▼
Chromium	Cr	●	●				
Clay: brick and pottery	Cl		●	Natural gas - see *oil, gas and other symbols*			
Coal (p: peat)	C	⬢	⬢	Nickel Nickeliferous laterite	Ni NiFe	●	●
Copper	Cu	■	■	Petroleum - see *oil, gas and other symbols*			
Dolomite, magnesium limestone	Do		▮	Phosphate rock, guano, cave earth	P	▬	▬
Gemstones: agate	Ge		□	Pyrite Pyrrhotite (significant occurrence only)	Pyr Pyrr		★
Gold	Au	⬭	○	Salt - see *oil, gas and other symbols*			
Guano and cave earth - see *phosphate rock*				Silica - quartz pebble, silica sand, quartz	Si	■	■
Gypsum	Gy		▲	Silver	Ag	▽	▽
Ilmenite - see *black sand minerals*				Stone, constructional	St		●
Iron, iron-rich laterite	Fe	◆	◆	Talc	Tl		●
Lead	Pb		●	Tungsten	Ts		▼
Limestone, coral limestone	Ls	L	L	Zinc	Zn		●

OIL, GAS AND OTHER SYMBOLS

- Well with no hydrocarbon shows or data lacking
- Well with gas shows
- Well with oil shows
- Well with oil and gas shows
- Well with significant gas shows
- Well with significant oil shows
- Well with significant oil and gas shows
- Oil production platform
- Isolated oil-producing well
- Hydrocarbon smell
- Oil seepage, impregnation
- Gas seepage
- Oil and gas seepages
- Mud volcano, mostly with gas seepage
- Mud volcano with saline water

SUMMARY OF MINERAL PRODUCTION IN SABAH

Manganese ore was mined at Taritipan from 1903 to 1908 with total production at less than 6,000 tons.

Gold has been prospected for the last 90 years in the Upper Segama River and Darvel Bay region. No large payable alluvial deposits were found; only small amounts were obtained from Sungai Segama, Bole and Sabahan.

Coal has been mined at Silimpopon and on Labuan Island. At Silimpopon, a colliery operated from 1905 to 1932 and produced about 1½ million tons of coal. A survey from 1950 to 1952 showed that 14 million tons of high rank sub-bituminous coal may remain. At Labuan, coal was produced for more than 60 years from 1847 until 1912, but total production was only half a million ton. An investigation in 1948 showed that 9 million tons of sub-bituminous non-coking coal may still exist.

From the closure of the coal mines until late

FIGURE 9

PETA TABURAN GALIAN SABAH
(MINERAL DISTRIBUTION MAP OF SABAH)
MALAYSIA

1st. EDITION

SCALE 1:500,000

10 5 0 10 20 30 Miles

10 5 0 10 20 30 40 Kilometres

SEDIMENTARY AND SEDIMENTARY-VOLCANIC ROCKS

- Alluvium, peat, coral, sand, silt, mud, clay and gravel (Pleistocene - Recent)
- Sandstone, limestone, shale, marl, mudstone, conglomerate, coal beds (Miocene - Pleistocene)
- Tuffaceous sandstone and mudstone, conglomerate, volcanic breccia, agglomerate, tuff (Miocene - Pliocene)
- Sandstone, shale, mudstone, slump breccia, chert, tuff, some limestone and coal beds (Oligocene - Miocene)
- Sandstone, shale, phyllite, argillite, some limestone and volcanic rocks (Palaeocene - Oligocene)
- Sandstone, shale, limestone, chert, tuff, spilite, basalt, volcanic breccia, agglomerate (Cretaceous - Early Tertiary)

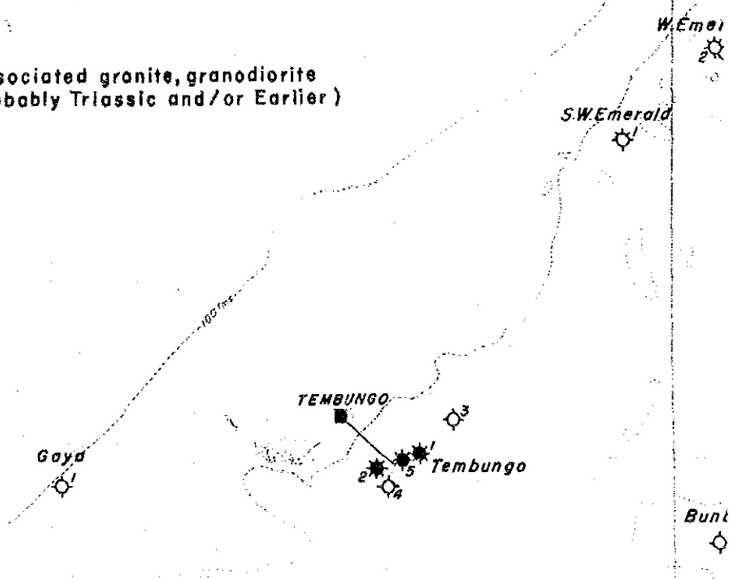
IGNEOUS AND METAMORPHIC ROCKS

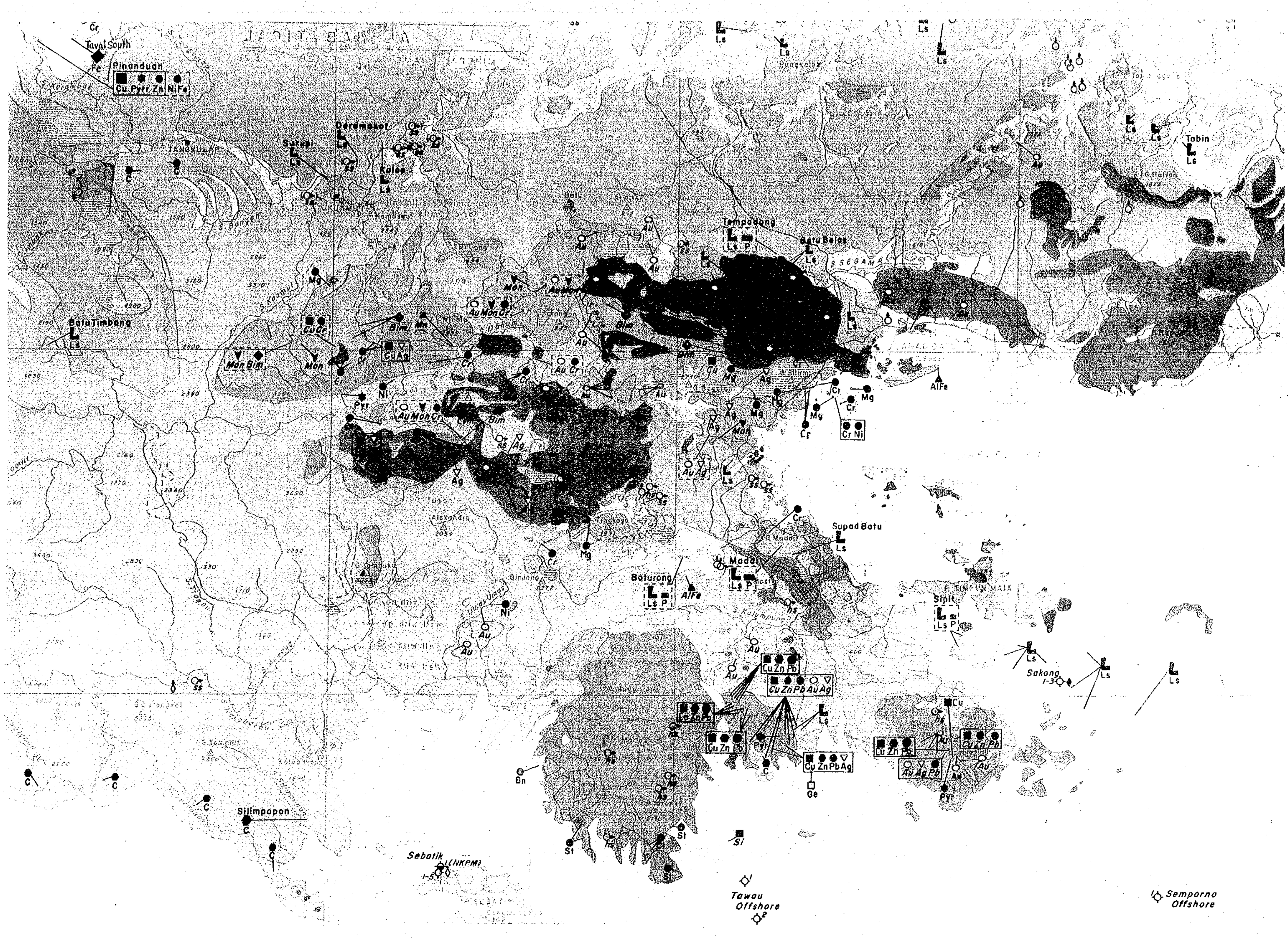
- Olivine basalt and dacite lava, pyroclastic rocks, andesite, tuff and silicified volcanic rocks (Pliocene - Quaternary)
- Adamellite, granodiorite, tonalite, tonalite porphyry and other hypabyssal rocks (Upper Miocene - Pliocene)
- Gabbro, dolerite (Cretaceous - Early Tertiary)
- Serpentinite, peridotite, dunite, pyroxenite (Cretaceous - Early Tertiary)
- Gneiss, schist, amphibolite and associated granite, granodiorite and tonalite (Pre - Cretaceous, probably Triassic and/or Earlier)

TOPOGRAPHICAL SYMBOLS

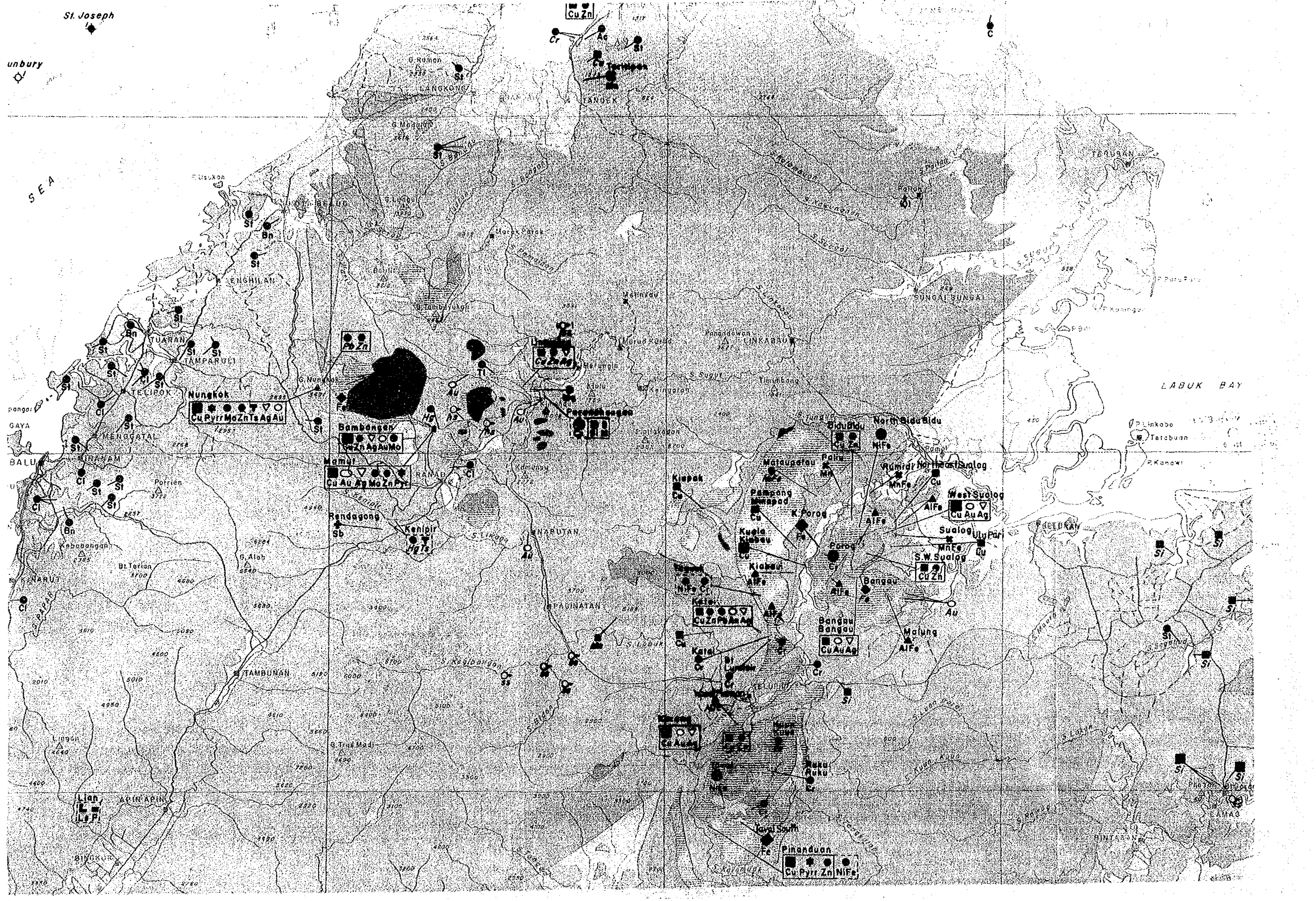
- Road (major)
- Other roads
- Railway
- Main town
- Other settlement
- Major airfield
- Airstrip
- Summit of mountain or hill with height in feet
- Marine contour with depth in fathoms
- International boundary
- State boundary

Bukit	Bt	hill
Gunung	G	mountain
Kampung	Kpg	village
Kuala	K	river mouth
Pulau	P	island
Sungai	S	river
Tanjung	Tg	cape, headland





Tavai South
Fe
Pinanduan
Cu Pyrr Zn
NiFe
Deramakot
Surupi
Kalap
Ls
Tempadong
Batu Belas
Tabin
Batu Timbang
Mon Bim
Cu Cr
Cu Ag
Au Mon Cr
Au Cr
Bim
Mon
Pyr
Ni
Mg
Cr
Ag
Au
Cu
AlFe
Cr Ni
Supad Batu
Madai
Ls P
Baturong
Stpit
Sakong
1-3
Cu Zn Pb
Au Ag
Cu Zn Pb Ag
Au Ag Pb
Ge
Bn
St
Si
C
Silimpopon
Sebatik
1-5
(NKPM)
Tawau
Offshore
Semporna
Offshore



St. Joseph
SEA
LABUK BAY
TUARAN
TAMPARULI
TELIPOK
MENGGATAL
INANAM
GAYA
BALU
K. NARUT
LANGKONG
Tarnipon
Nungkok
Cu Pyrr Mo Zn Ts Ag Au
Pb Zn
Bambangan
Cu Zn Ag Au Mo
Mamut
Cu Au Ag Mo Zn Py
RANAU
Rendagong
Sb
Kehipir
Hg Ts
Potrien
Kebabangan
Cu Zn Ag
Cu Zn
Penanbangan
G. Nungkok
G. Trus Madi
TAMBUNAN
PAGINATAN
NARUTAN
Linkabau
SUNGAI SUNGAI
TERUSAN
North Bidu Bidu
Bidu Bidu
Ni Fe
Northeast Sualog
West Sualog
Cu Au Ag
Sualog
Ulu Pari
Mn Fe
S.W. Sualog
Kiabau
Kuala Kiabau
Kiepak
Pampang Minapad
K. Porog
Porog
Bangau
Bangau Bangau
Cu Au Ag
Malung
Al Fe
Ketai
Cu Zn Pb Au Ag
Cu Au Ag
Pinanduan
Cu Pyrr Zn Ni Fe
Taval South
Fe
Lian
Ls Pl
APIN APIN
BINGKUR
TELUPID
RINTASAN
LAMAG
St
Bn
Cl
Cr
Au
Si
Cu