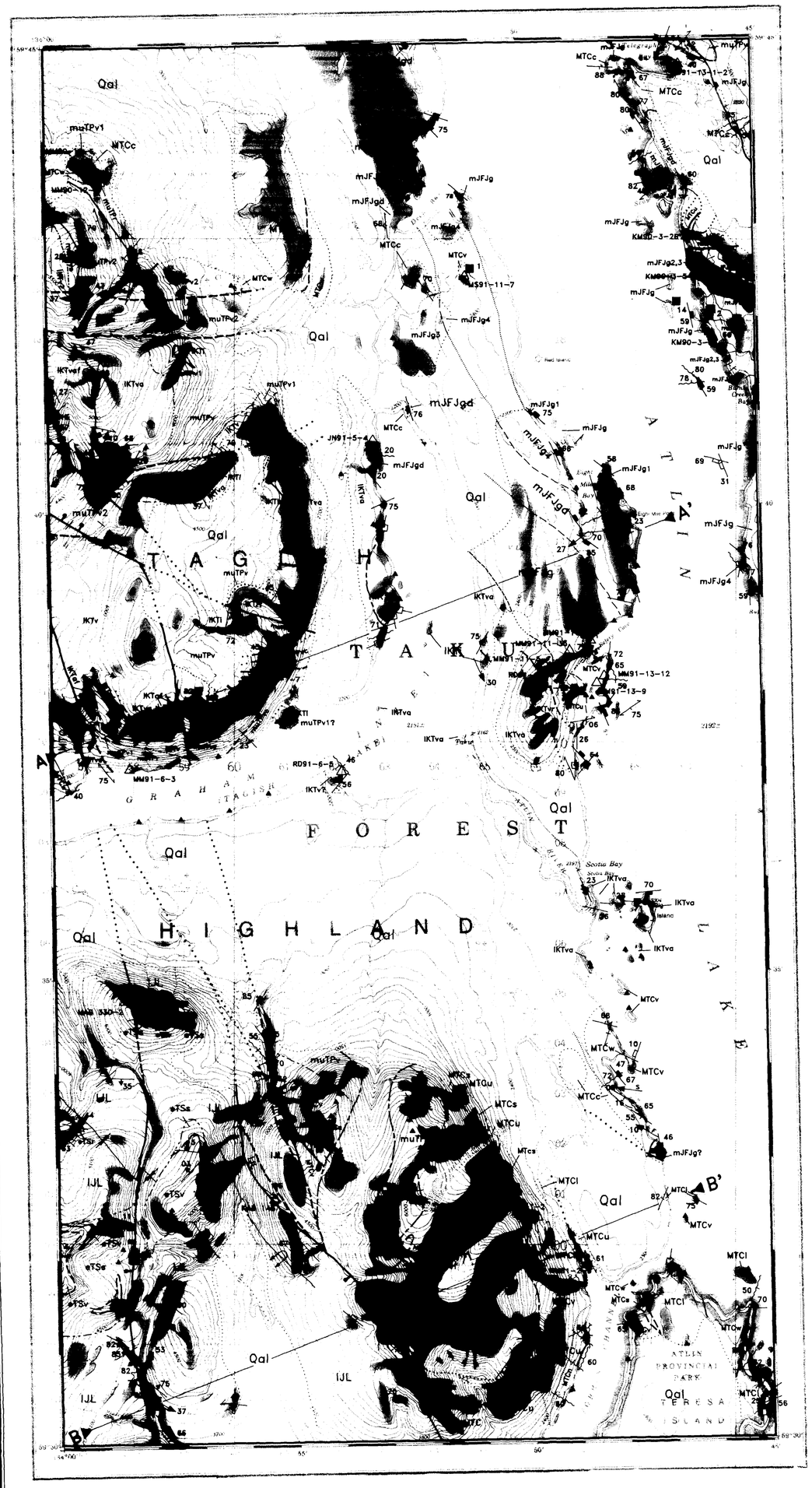


Ministry of
Energy, Mines and
Petroleum Resources

BRITISH COLUMBIA GEOLOGICAL SURVEY

OPEN FILE MAP 1992-8

GEOLOGY and GEOCHEMISTRY of the ATLIN (WEST) MAP AREA

NTS (104N12/W)

geology by: M.G. MIHALYNUK, M.T. SMITH, K.J. MOUNTJOY, J.H. NAZARCHUK, W.J. McMILLAN, C.H. ASH, J.L. HAMMACK, and R. DUTCHAK

compiled by: M.G. MIHALYNUK and M.T. SMITH

SCALE 1: 50 000

LEGEND

LAYERED ROCKS

QUATERNARY

Qal — *unconsolidated glacial till and poorly sorted alluvium; locally contains minor gold flakes and nuggets.*

EARLY TERTIARY

SLOKO GROUP

(Undivided as eTe. Primarily volcanogenic rocks of intermediate to felsic composition. Essentially flat lying, overlying a deeply incised paleosurface on deformed Laberge Group strata.)

eTsv — ***Rhyolitic to andesitic flows, breccia, tuff and ignimbrite:*** *Brown to mauve, white or green weathering, locally rusty; rocks typically aphanitic to feldspar porphyritic with minor quartz, biotite, and acicular hornblende.*

eTse — ***Conglomerate:*** *present at the base of the succession. Well-rounded pebbles, cobbles and boulders of Laberge Group sandstone and shale, unfoliated granitic rocks, and Cache Creek volcanic rocks and chert in a coarse sand matrix, grading upsection into angular volcanic conglomerate.*

LATE CRETACEOUS

TABLE MOUNTAIN VOLCANIC COMPLEX

(Unit was originally correlated with the Late Cretaceous Hutshi and Carmacks Group volcanics (Grond et al. 1984), then subsequently assigned the name Peninsula Mountain suite and a Triassic age by Mihalynuk et al. (1991). Isotopic ages of 81.4 Ma (U-Pb) and 73.4 Ma (Rb-Sr) (Mihalynuk et al. in review) confirm that at least some of the rocks assigned to the Peninsula Mountain suite are in fact Late Cretaceous; these are assigned the name Table Mountain Complex, which includes both volcanic rocks (IKTv where undivided) and an associated intrusive suite (IKTi).

IKTvc — ***Conglomerate and tuffaceous conglomerate*** *Directly overlies and contains clasts of Fourth of July batholith and Cache Creek lithologies. Commonly well indurated and may grade into IKTr.*

IKTvr — ***Rhyolite:*** *white-weathering, aphanitic flows and ashflows, locally with well-developed flow foliation and parallel platy parting. Commonly brecciated or tuffaceous*

IKTb — ***Basaltic andesite flows:*** *Dark brown to black, with vitreous, acicular to tabular plagioclase up to 5mm. Flow units may be greater than 5m to less than 0.5m thick and either planar or with highly irregular bounding surfaces. Flow-top breccias are common. Interflow tuffs are generally blue-green, feldspar porphyritic, block to well-bedded ash tuffs. At one locality these flows rest on a probable paleosol.*

IKTva — ***Coarse andesitic to dacitic breccia and flows:*** *Volumetrically the most significant unit in the Table Mountain volcanic complex. Blocks are rounded and range from 0.05 to 3m diameter, with 5-20cm most common. Blocks and flows vary in colour: orange, tan, maroon, grey or light green and generally display some flow layering and display weak but pervasive argillic alteration. Feldspar ± hornblende comprise 5-20%. Also includes sparsely feldspar-phyric mauve dacite with irregular flow banding and subconchoidal fracture. Coarse block accumulations are in part laharic. May contain rhyolitic blocks. Locally intercalated with IKTaf.*

IKTaf — ***Feldspar-biotite ash flows:*** *Volumetrically minor but distinct; with or without quartz, biotite may be totally altered. May display good welded textures.*

LOWER JURASSIC

LABERGE GROUP (undivided)

lJL — ***Wacke, argillite and conglomerate.*** *Primarily brown to olive green weathering, medium-grained, thick-bedded, quartz-rich lithic wacke with thin shale, argillite, or siltstone interlayers. A distinctive green weathering unit adjacent to the Atlin Mountain fault may reflect the presence of appreciable volcanic detritus. Uncommon facing indicators include grading, scour marks, flute casts, and rare cross laminations. Locally contains units of: (1) Argillite: forms successions 10-100m or more thick; 2-5cm beds, may have normal grading; bioturbated tops and feeding trails. Also as recessive sets between wacke beds; dark brown to black; 1-30mm, may be silty; (2) Conglomerate: typically clast-supported with a coarse wacke matrix, or 1-30% clasts floating in an argillite matrix. Clasts include volcanic rocks (pyroxene and hornblende feldspar porphyry, feldspar porphyry, aphanitic mafic to felsic rocks); sedimentary rocks (light and dark grey, rarely fossiliferous, carbonate with lesser wackes and argillite); and intrusive rocks (syenite through leucogranite); (3) Quartz subarenite: sandstone and granule conglomerate composed largely of quartz with lesser feldspar.*

MIDDLE TO UPPER TRIASSIC(?)

PENINSULA MOUNTAIN VOLCANIC SUITE

(The age of this package is based upon a radiolarian collection (Fabrice Cordey, pers. comm., 1990) and is in agreement with the age previously proposed by Bultman (1979) from whom the name originated. Undivided as muTPv).

muTPc — ***Volcanic conglomerate:*** *White-weathering and indurated with a dark green matrix, and cobbles and pebbles of andesite, basalt, and rare rhyolite, and pyroxene-phyric varieties. Clasts may be altered to massive epidote or partially digested by reaction with matrix. Includes heterolithic tuffite of massive to thin bedded character. May occur at two or more locations within the stratigraphy.*

muTPr — ***Pyritic, banded and spherulitic rhyolite flows, breccia and ?domes:*** *Generally rusty or yellow, but also white to grey on weathered or fresh surface. Forms resistant blocky to rounded outcrops. Generally aphyric, although locally with sparse, fine to medium-grained feldspar.*

muTPv$_1$ — ***Pyroxene-phyric andesite and basalt:*** *Distinguished from Table Mountain volcanic complex by high degree of induration, green colour, and epidote/ chlorite/albite alteration. Unit includes: dark green, fine grained, massive greenstone with sparse clasts and phenocrysts; green, tabular feldspar porphyry; and pillowed to massive basalt flows. Included in this unit is black tuff with maroon, green, grey and black lapilli and coarse ash matrix with conspicuous pyroxene-crystals.*

muTPv$_2$ — ***Heterolithic feldspar-phyric pyroclastic rocks:*** *Difficult to distinguish from undivided IKTv and may in part belong to this latter unit. One distinctive lithology includes moderately indurated medium-grained, tabular feldspar (20%) porphyry. These units are generally green, grey or maroon, massive to poorly bedded tuffs with minor hornblende (2%, rarely 10%) and rare pyroxene.*

MISSISSIPPIAN TO TRIASSIC

CACHE CREEK COMPLEX

(MTC where undivided. The Cache Creek complex is a deep water, oceanic assemblage that may represent closure and obduction of an ocean basin. Sparse microfossil evidence from nearby areas suggests an age of Mississippian through Upper Triassic for the unit in the Atlin area. Rocks are typically highly sheared and individual units may be lensoid in shape and fault bounded, thus the stratigraphic order is unknown.)

MTCl — ***Limestone:*** *grey to tan or white weathering, grey to black on fresh surface. Massive, rarely bedded, locally traversed by dissolution pockets or irregular bands of hackley, tan to grey chert. Brecciated zones or sets of tension gashes may be infilled with coarse, white calcite. Present as large blocks or lenses; contacts with other units generally faulted.*

MTCc — ***Chert:*** *light grey to tan or black, generally massive, forms highly fractured, angular outcrops. Abundant fractures enveloped by black discolouration. Locally well bedded on scale of 2 to 10 cm with 0.5 to 4 cm argillite or rarely medium-grained wacke interbeds. Ribbons may be boudined, or have significant argillaceous component. Radiolarian ghosts occur at several locations. Massive sections typically have zones of vague contorted bedding or light chevron folds.*

MTCs — ***Sedimentary rocks, primarily argillite and broken formation:*** *rusty weathering, black on fresh surface, highly fractured, fissile, and incompetent. Finely laminated, to thin bedded, with beds commonly discontinuous. Chert-rich varieties common, as well as gradations into wacke. May be more widespread than presently recognized through outcrop mapping due to recessive nature.*

MTCw — ***Wacke:*** *unit as mapped includes: (1) volcanic wacke: fine, medium, and locally coarse grained, medium to dark grey-green or olive green weathering; clast types include basalt, plagioclase, minor quartz; generally massive but locally with disrupted bedding; and (2) lithic wacke: grey to green weathering, dark grey on fresh surface, medium to coarse grained, locally conglomeratic. Clast types include chert, granitic rocks, argillite, and lesser quartz.*

MTCv — ***Volcanic rocks:*** *massive, green to grey or brown weathering, fine-grained basalt flows and breccia. Characteristic dark green ("mint green") on fresh surface. Rare protolith textures include pillows, amygdules and breccia clasts. Pervasive randomly oriented shears and sheared layers containing cataclasite 1 mm to 1 cm in size are diagnostic, and may represent primary slump or autoclastic processes. Unit as mapped also includes a unit of massive, light green, aphanitic siliceous volcanic rocks near the northwest tip of Teresa Island.*

MTCu — ***Ultramafic rocks:*** *unit as mapped includes: (1) Harzburgite: light to dark brown or red weathering, dark purple brown to black on fresh surface; typically forms unlayered, medium to coarse-grained domains within a fine-grained, foliated matrix of sheared, recrystallized harzburgite or serpentinite; and (2) Serpentinite: green to rusty brown weathering, greenish black to purple on fresh surface; slickensided surfaces are light to medium green, polished, and contain fibrous aggregates.*

MTCn — ***Nahlin structural unit:*** *highly sheared, medium to fine-grained, medium to dark grey-green volcanic wacke and mudstone. Contains small, rootless isoclinal folds and dismembered compositional layers on a mm to cm scale; superimposed penetrative brittle shear fabric on outcrop scale defines angular to ellipsoidal domains generally <2 cm in diameter. Shear surfaces are slickensided, chloritized, or calcified. Contains localized zones of black cataclasic rock, lenses of dioritic and ultramafic rock, and sheared basalt.*

INTRUSIVE ROCKS

EARLY TERTIARY

RHYOLITE DIKES AND SILLS

eTsr — ***White weathering, grey on fresh surface; aphanitic to sparsely feldspar, quartz and rarely pyroxene-phyric. Often with very pronounced flow banding. Forms dikes and sills in the Laberge Group; probably represent feeders to overlying Sloko Group volcanics.***

LATE CRETACEOUS

ATLIN MOUNTAIN INTRUSION

(The Atlin Mountain intrusion is dated by a two-point whole-rock Rb-Sr isochron as 50.4 Ma (Mihalynuk et al., in review). Sample locations are noted on the map.)

IKqm — ***Quartz monzonite:*** *homogeneous, light grey to pink or orange weathering, fine to medium-crystalline, and locally K-feldspar porphyritic; 10 to 25 % mafic minerals, including biotite, hornblende, and magnetite; <15% quartz. Fine crystalline phase present along margins and as dikes and sills intruding adjacent country rocks.*

TABLE MOUNTAIN INTRUSIVE SUITE

IKTi — ***Coarse quartz-feldspar-porphyry.*** *Includes a small, high-level stock and a swarm of north to northwest-trending dykes which are feeders to overlying Table Mountain suite. All are orange weathering, extensively clay-altered, grey green on fresh surface. Phenocryst assemblage: K-feldspar (20-25%) plagioclase (50-60%; albite to oligoclase, glomeroporphyritic with K-feldspar), quartz (5-25%), accessory biotite, hornblende, apatite, and zircon. Coeval with the upper quartz-biotite-feldspar phyric ash flows in the upper Table Mountain volcanic section. Orange, coarsely quartz-phyric dykes may be mantled by an orange alteration halo extending two or more dyke widths into weakly indurated volcanic strata.*

MIDDLE JURASSIC

FOURTH OF JULY INTRUSIVE SUITE

(mJFJg where undivided. Polyphase, heterogeneous intrusive suite of Middle Jurassic (165 to 171 Ma U-Pb; Mihalynuk et al., in review) age. West of Atlin Lake, the different phases form linear, north-northwest-trending belts, cut by a stock of leucogranite and alaskite south of Deep Bay.)

mJFJg1 — ***Biotite-hornblende granite:*** *pink weathering, medium to light grey on fresh surface, equigranular, medium-grained with 5 to 15% brown biotite and dark green to brown hornblende in subequal amounts. Locally quartz monzonite.*

mJFJg2 — ***Hornblende granite and quartz monzonite:*** *medium-grained and holocrystalline with hornblende (5 to 25%) dark green to black and typically subhedral in habit.*

mJFJg3 — ***Biotite granite to alkali feldspar granite and alaskite:*** *medium to coarse crystalline, light grey to pink fresh, pink weathering; range from 1 to >20% biotite; a accessory hornblende. K-feldspar from 50 to ~100% of total feldspar. As mapped, probably represents at least two distinct phases: an early phase coeval with mJFJg1, 2, 4, and g, and a younger alaskite phase present as pegmatitic and aplitic dikes and sills in other units and as a small stock south of Deep Bay.*

mJFJg4 — ***K-feldspar megacrystic granite:*** *characterized by the presence of large (1 to 4 cm) K-feldspar megacrysts, in a medium-grained, biotite to hornblende-rich matrix. Megacrysts are commonly zoned, from light grey cores to pink rims, and may form "cumulate" layers with >50% megacrysts.*

mJFJgd — ***Border phases, granite to diorite:*** *This unit is a diverse assemblage ranging from lamprophyre and diorite to alaskite in composition, including the following: (1) fine-to medium-crystalline, dark grey, biotite hornblende granodiorite; (2) medium-grained hornblende biotite granodiorite; (3) dark grey, medium-grained, pyroxene glomeroporphyritic hornblende granodiorite or diorite; (4) medium-grained biotite-hornblende granite (coarse-grained equivalent is described above); (5) leucogranite or alaskite (described above); and (6) dark green, coarse to fine grained, knubbly weathering lamprophyre. The latter is a relatively late phase, but is cut by younger alaskite dikes. Several phases may be present in a single outcrop; xenolith-rich horizons are common.*

MISSISSIPPIAN TO TRIASSIC?

GRAHAM CREEK IGNEOUS SUITE (undivided)

(This suite is of uncertain age and affiliation. However, based upon an association with ultramafic rocks, proximity to the Cache Creek terrane, and proximity to a major structure that in part bounds the Cache Creek Terrane, the rocks are tentatively interpreted as Mississippian fragments of the oceanic Cache Creek complex).

MTg — ***Altered hornblende gabbro and pillow basalt:*** *generally medium grained but may be variable on an outcrop scale. Appears brecciated or sheared, extensively crosscut by minor faults with cm to dm offset, chloritized. Basalt occurs as well developed pillows or as pillow breccia. Black, dark green or brown weathering.*

Limit of Quaternary alluvium

Conformable contact (defined, approximate, assumed)

Unconformable contact (defined, approximate, assumed)

Disconformable contact (defined, approximate, assumed)

Intrusive contact (defined, approximate, assumed)

Unspecified contact (defined, approximate, assumed)

Bedding (inclined, vertical, overturned, tops known) 40 40 75

Volcanic flow layering (inclined, vertical) 23

Intrusive flow layering (inclined, vertical) 23

Foliation (inclined, vertical) 75

Joint (inclined, vertical) 67

Dike (inclined, vertical) 10

Small shear (inclined, vertical) 65

Anticline (upright, overturned; defined, assumed)

Syncline (upright, overturned; defined, assumed)

Axis of small fold 27 F

Lineation (unspecified, M=mineral, S=Slickenside, I=intersection) 08 S

High angle fault (defined, approximate, assumed; solid circles on downthrown side)

Thrust fault (defined)

Dike

Cross section line A A'

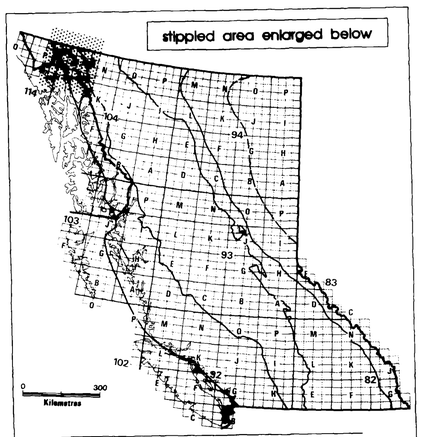
Geochemical sample locality MM91-2-5

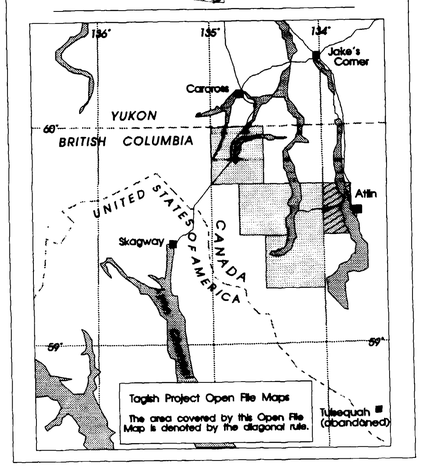
Rb-Sr isotopic sample locality

MINFILE occurrence 102

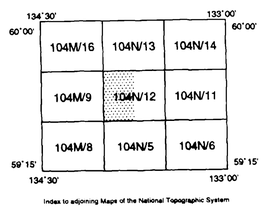
Station location with no structural data

approximate extent of outcrop indicated by shaded areas





INTERPRETIVE CROSS SECTIONS



Index to adjoining Maps of the National Topographic System

CONTOUR INTERVAL ..... 100 feet

North American Datum 1927
Transverse Mercator Projection

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 8

Metres 1000 0 1000 2000 3000 4000 Metres
Miles 1 0 1 2 3 Miles

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ASSAY RESULTS FOR 104N/12W

Field Number	UTM Easting	ZONE 8 Northing	Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
JN91-5-4	562740	6615900	<5	0.4	18	50	7	5	11
KAB148	560800	6600850	<2	<0.8	2	17	14	122	5
KM90-3-2B	569000	6620100	7	<0.5	22	4	37	11	8
KM90-3-5	569150	6619400	6	<0.5	80	41	110	3	1
KM90-3-8	569550	6618050	6	<0.5	43	11	72	4	2
MAB330-2	557810	6604750	3	1.0	5	20	29	27	5
MAB333	558350	6604470	<2	<0.5	5	18	18	9	4
MM90-12-6	556780	6621430	1510	<0.5	11	13	27	10	6
MM90-12-7	557250	6621150	<5	<0.5	9	19	26	13	1
MM91-2-5	567075	6599500	<5	0.4	5	4	23	1	<0.5
MM91-6-3	557920	6609350	<5	<0.4	8	38	95	265	15
MM91-9-1-2	565025	6600525	<5	<0.4	47	10	141	20	3
MM91-11-1	567125	6611925	30	<0.4	37	16	74	11	3
MM91-11-3	566650	6611775	20	<0.4	49	20	91	10	3
MM91-11-5	566175	6611500	<5	<0.4	47	14	95	7	1
MM91-13-12	567300	6611050	40	1.2	560	6	33	336	6
MM91-13-2	566975	6610900	<5	<0.4	2	6	8	3	4
MM91-13-9	567200	6611100	250	3.2	14	112	72	410	7
MS91-11-7-3	564550	6619150	<5	<0.4	7	38	548	3	2
MS91-7-7-1	560300	6611190	<5	0.4	5	136	34	1900	8
RD91-11-4-1	566270	6611460	<5	<0.4	19	26	83	8	3
RD91-13-1-2	568780	6623500	<5	<0.4	33	8	39	3	0.8
RD91-6-5-1	562130	6609360	<5	1.0	25	28	48	6	29