Pedley Pass
840773

MEMORANDUM

TO E.D. Dodson / J. Simpson September 20 1976

FROM L. Dekker Project C429

SUBJECT Carbonates which are hosting Pedley Pass Barite/Sphalerite showing

YOUR FILE

Attached are Doug Pounder's findings of his thin section study from field section DK 760. This section was examined and sampled to obtain an understanding of the paleo environment in which these carbonate rocks were deposited. I think his comments speak for themselves and confirm our macroscopic findings discussed in a previous memo.

Of interest is his observation that the section can be divided into four major shallowing cycles each grading from a shallow subtidal depositional environment to an extremely shallow water or supratidal environment. The lower dolomite portion of the section is microscopically identical to the upper limestone portion indicating similar depositional conditions and epigenetic dolomitization.

I particularly draw attention to the last paragraph of his memo in which again the lack of effective porosity is cited as a major exploratory drawback.

Larry Dekker

Memorandum

Calgary, Alberta
September 15, 1976

Mr. R. L. DEKKER
Minerals Staff
Vancouver, B.C.

At long last! You will think we had completely forgotten about the samples from your field section. It took the lab much longer to complete the thin sections than they had estimated. Ross Stewart went to hospital for an operation and was away from work for 3 weeks. I just received the thin sections last Friday. You will note they didn't section samples 25 and 26 but did section a couple of rocks from your conodont collection. (16 and 20) Nonetheless, I think the thin sections give a good picture of the section.

General Comments

The attached log of the thin sections gives you the description of each of the thin sections. These should be combined with your recording of the macro features of the rocks on your field section log. The lower dolomite portion of the section has fair to good ghost or relict textures and reveals that the rocks are similar to the rocks in the upper limestones. Of course, more detail is seen in the undolomitized carbonates. All of the calcite in the dolomites is secondary cement filling fractures or as late pore filler in small vugs, etc., as in samples 8, 9 and 10. Samples 14 and 15 have a strange secondary lath-like crystal texture in the matrix. The polaroid picture (sample 14) illustrates this. The lath-like crystals are now dolomite but must be pseudomorph~~i~~s after some previous mineral. I suggest these may have been gypsum replacement laths which later dissolved and were recemented with dolomite. This is not very important but may give some clue to diagenetic history. You will note that quartz silt or very fine sand and lese commonly muscovite flakes are present in many of the rocks.

Environment of Deposition

The carbonate rocks were all deposited in very shallow water to supratidal environments. I believe the whole section can be divided into four major shallowing upward cycles as follows:

1. Samples 4 to 13
2. Samples 14 to 19
3. Samples 20 to 27
4. Samples 28 to 31 - this latter cycle is the least well-defined.

Each of these cycles is composed of a lower portion with a normal marine fauna including crinoids, brachiopods, corals, echinoids, ostracods, trilobites, gastropods and other unidentified microfossils or very small fossil fragments. The matrix is primarily lime mud, some of which has been pelleted. Most primary textures are skeletal wackestones or biomicrites. These sediments were deposited in shallow water (in modern terminology they are shallow subtidal).

The upper portion of each cycle (except cycle #4) indicates shallowing conditions with a restricted fauna (ostracods) or none at all. These upper portions are composed primarily of lime mud, commonly pelleted, some birdseye textures, and culminate in extremely shallow water to supratidal stromatolites. The environment of these rocks probably had above normal salinities. This may account for dolomitization (penecontemporaneously?) of at least these primarily algal lime muds.

The beginning of each cycle marks a slight transgression. The last cycle which is capped by what you describe as a black shale may indicate an episode of continuing transgression or water daepening. The one sample (#31) which was thin-sectioned has more carbonate in it than noncarbonate. It is very bituminous (much organic material) and more pyritic but contains a poorly preserved (due primarily to pressure solution) fauna which is similar to that of the fossiliferous lower portions of previous cycles. The clay content (if any) is not identifiable in the thin section.

The above analysis does not add much to the good analysis contained in your preliminary report. I am quite unfamiliar with the regional stratigraphy of the early paleozoics of the mountains and it is not possible to expand on the significance of the environments postulated for this one section. It must be realized that supratidal environment does not necessarily indicate proximity to a regional coastline. Extensive carbonate shoaling areas in the epeiric seas of the Paleozoic can be periodically exposed subaerially. The quartz silt (and muscovite flakes) were probably carried into the carbonate environment by winds. and may be far removed from any coastal provenance area.

The absence of significant effective porosity in these primarily lime mud rocks is not encouraging. Fracturing and brecciation could create access to mineralizing fluids. The lack of effective porosity is the major reason why the early Paleozoic carbonates have not been extensively explored for hydrocarbons in Western Canada.

Let me know if you wish the thin sections to be sent to Vancouver. I will be away on vacation during most of October. Please let me know if I can be of any further help.

Doug

D. A. POUNDER

DAP/kw

N. Pedley Pass

DK 760. 14

X100.

DK. 760

CARBONATE THIN SECTION LOG

REMARKS Outcrop Samples

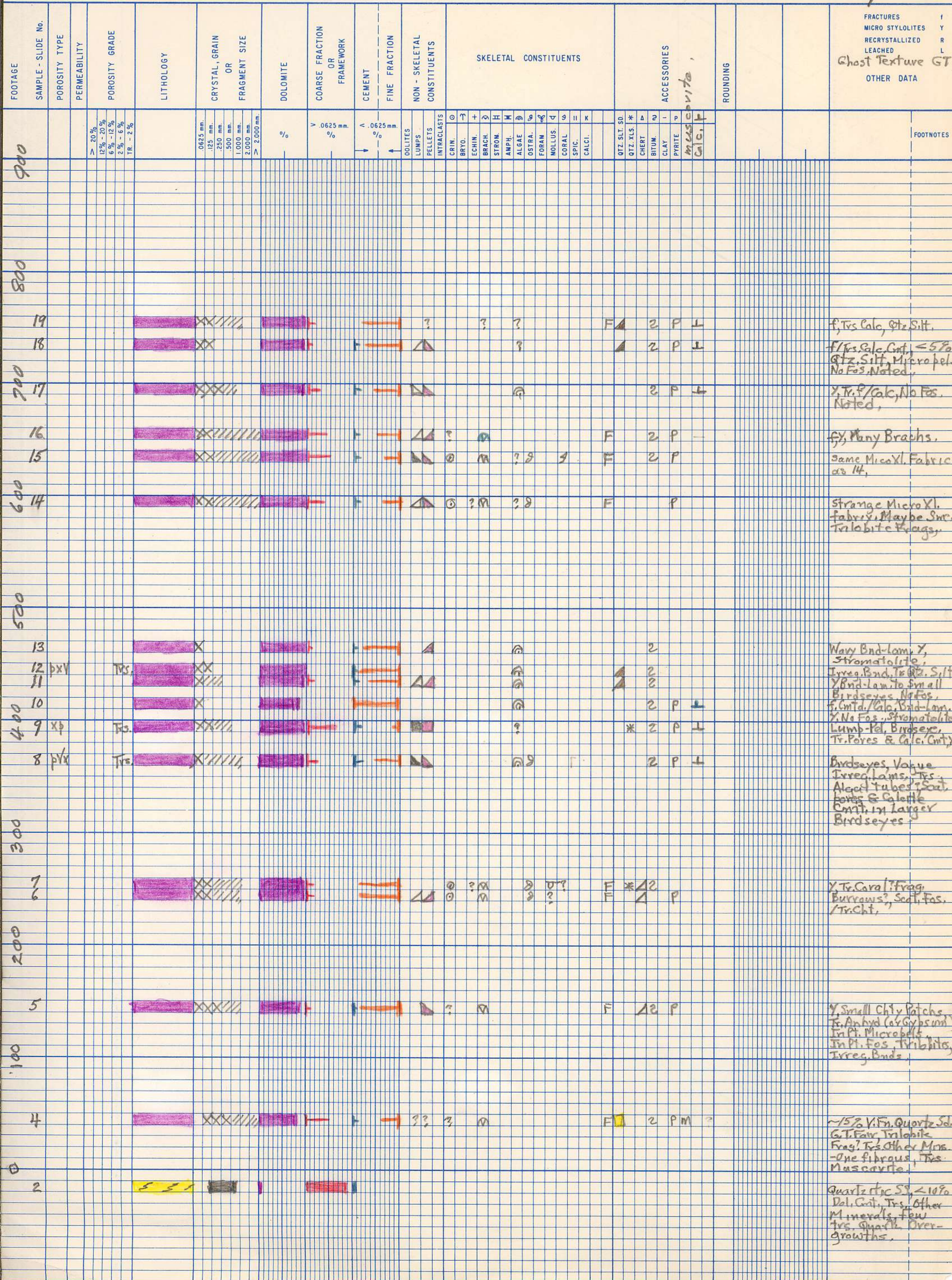
NAME Fairmont Hot Springs Immed. N. of Pedley Pass

OTHER LOGS Field Sect. Log by L. Dekker

LOCATION LAT. ≈ 50°27′ LONG ≈ 115°47′

STAINED ✓ IMPREGNATED ✓

LOGGED BY AND DATE DAPounder Sept. /76



Sample	Porosity Type	Porosity Grade	Other Data
19			f, Trs Calc, Qtz Silt.
18			f/Trs. Calc. Cmt., <5% Qtz. Silt, Micropel. No Fos. Noted.
17			Y, Tr. f/Calc, No Fos. Noted,
16			f, Y, Many Brachs.
15			Same MicoXl. Fabric as 14,
14			Strange MicroXl. fabric, Maybe Sme. Trilobite Frags,
13			Wavy Bnd-Lam, Y, Stromatolite,
12	pxY	Trs.	Irreg. Bnd, Tr Qtz. Silt
11			Y Bnd-Lam. to Small Birdseyes, No Fos.
10			f, Cmtd./Calc, Bnd-Lam. Y, No Fos., Stromatolite
9	xp	Trs.	Lump-Pel, Birdseye, Tr. Pores & Calc. Cmt)
8	pYx	Trs.	Birdseyes, Vague Irreg. Lams, Trs. Algal tubes? Scat. Pores & Calcite Cmt. in Larger Birdseyes.
7 6			Y, Tr. Coral? Frag. Burrows?, Scat. Fos. / Tr. Cht,
5			Y, Small Chty Patchs, Tr. Anhyd (or Gypsum) In Pt. Micropels, In Pt. Fos, Trilobites, Irreg. Bnds,
4			~15% V. Fn. Quartz Sd. G.T. Fair, Trilobite Frag? Trs. Other Mns. - One fibrous, Trs. Muscovite.
2			Quartzitic SS, <10% Dol. Cmt, Trs. Other Minerals, few trs. Quartz Overgrowths.

GEO-9-CS (3/64)

SHEET 1 OF 2

DK 760

CARBONATE THIN SECTION LOG

REMARKS OUTCROP SAMPLES

NAME FAIRMONT HOT SPRINGS Immed. N. of PEDLEY PASS

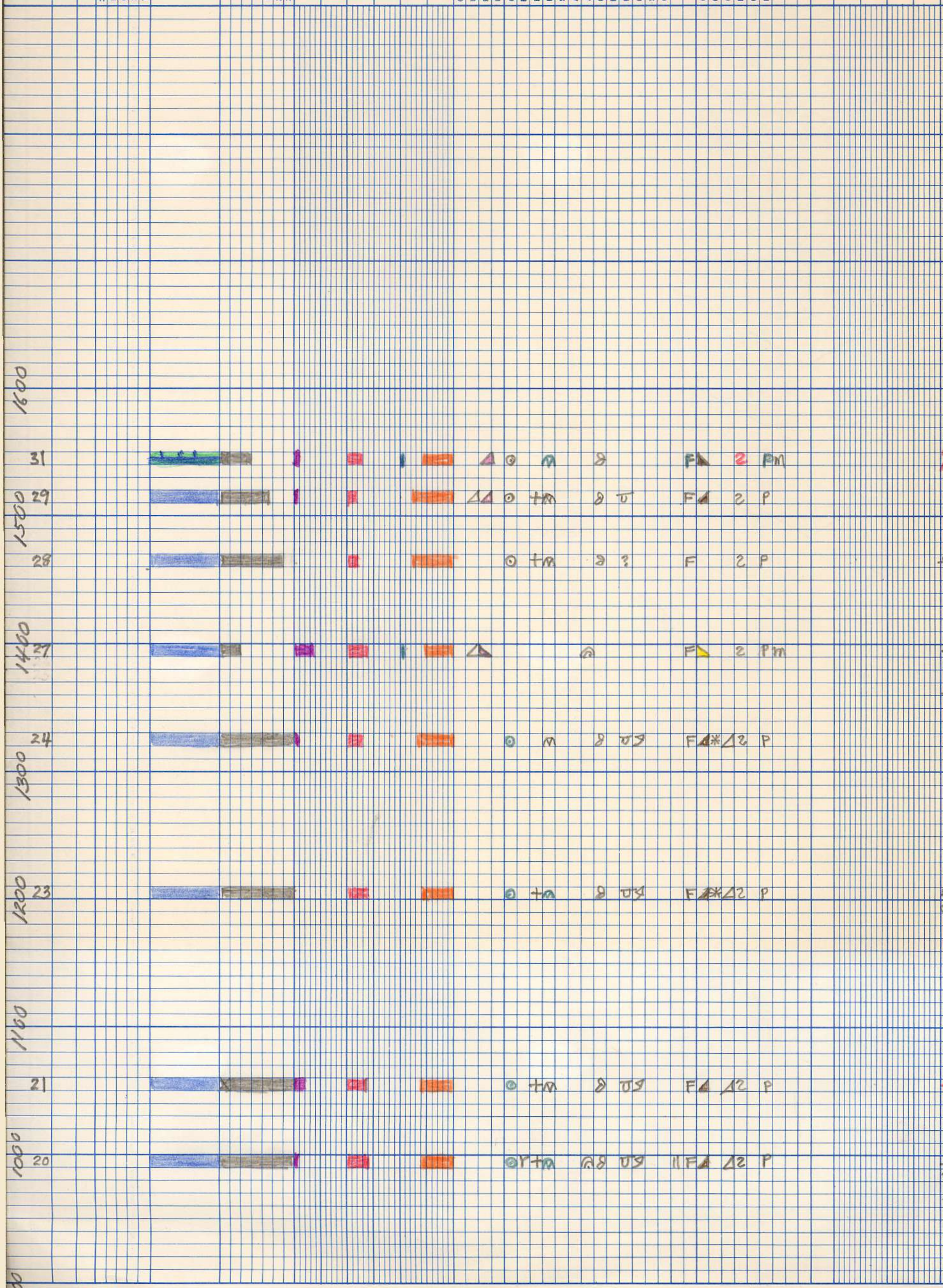
OTHER LOGS FIELD SECT. LOG by L. DEKKER

LOCATION LAT. ≈ 50°27' LONG. ≈ 115°47'

STAINED ✓ IMPREGNATED

LOGGED BY AND DATE DPP. Sept. /76

FOOTAGE	SAMPLE - SLIDE No.	POROSITY TYPE	PERMEABILITY	POROSITY GRADE	LITHOLOGY	CRYSTAL, GRAIN OR FRAGMENT SIZE	DOLOMITE	COARSE FRACTION OR FRAMEWORK	CEMENT	FINE FRACTION	NON - SKELETAL CONSTITUENTS	SKELETAL CONSTITUENTS	ACCESSORIES	ROUNDING	OTHER DATA	FOOTNOTES
				> 20 % 12 % - 20 % 6 % - 12 % 2 % - 6 % TR. - 2 %		.0625 mm. .125 mm. .250 mm. .500 mm. 1.000 mm. 2.000 mm. > 2.000 mm.	%	> .0625 mm. %		< .0625 mm. %	OOLITES LUMPS PELLETS INTRACLASTS	⊙ CRIN. BRYO. + ECHIN. BRACH. H STROM. AMPH. ALGAE OSTRA. FORAM MOLLUS. CORAL ∥ SPIC. K CALCI. sponge spics.	QTZ. SLT. SD. ∗ QTZ. XLS. Δ CHERT BITUM. CLAY P PYRITE M(ica)		FRACTURES f MICRO STYLOLITES Y RECRYSTALLIZED R LEACHED L	



SAMPLE - SLIDE No.	OTHER DATA
31	Y, f, V. Bit, Pyritic, Silty Limy Sh' to Argill LS.
29	Scat. Qtz. Silt, Dol. Rhombs, Trs. Trilobite frags.
28	f, Trs. Trilobite frags, Few Fos., Ostracods most impt.
27	f, Y, >10% Qtz. Sd. Silt, Trs. Fos. Noted, faint Bnd-lam. Stromatolite.
24	Y, Gastro, Trilobite Frag., f.,
23	f, scat. Qtz. silt, Qtz. Xls. and Cht.
21	f, Sheared, Y, Similar to 20.
20	f, <10% Dol Rhombs, Trs. Qtz. Silt, Sl. Chty, V. Fos., Gastros, Trilobite Frags.,

GEQ - 9 - CS (3/64)

SHEET 2 OF 2