FIELD TRIP GUIDE

A VISIT TO THE DIGITY MUD VOLCANO, AND EXAMINATION OF THE SEDIMENTOLOGY OF THE FOREST FORMATION IN DEBE AND UPPER MORNE L’ENFER FORMATION IN PENAL

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STRUCTURE
This area forms part of the fold and thrust system, known as the Naparima fold belt, lying south of the Central Range. The thrusts and folds trend WSW – ENE. The core of the anticline is made up then Upper-Lower Cruse Formation and plunges in a SW direction. The anticline is asymmetric, with a moderately dipping north flank (45°) and a steeply dipping (80-90°) south flank. Within the core of the anticline is a zone of highly disturbed rock marked by a line of oil and gas seeps and occasional mudflow. There are also a number of NW-SE trending normal faults and are probably tension faults related to folding.

STRATIGRAPHY

Forest Formation
Within this area the Upper Forest Clay is poorly developed and seldom recognized paleontologically. The Lower Forest Clay is however identifiable. The sands fall into what are called the Wilson sands, after the Wilson area where the sands are major producers. 
The interval consists of an alternating series of sands, silts, and shales, with the sands development greatest in the lower half of the interval. The sands are fine to very fine grained, frequently laminated, and often poorly sorted with silty and clayey matrix. The sands attain individual thicknesses in excess of 100ft., but are extremely lenticular. A maximum thickness of 3,500 ft. has been identified in the Wilson area. The sand deposition shows a westerly shift and successively younger sand zones appear further westward. It was suggested by Bower that the sandy facies was laid down in a long and narrow (4 x 1 mile) belt. This trough paralleled the crest of the uplift and thus influenced by it. To the north of this uplift the whole Forest interval is dominantly argillaceous.

Morne L’Enfer
It is present only on the south flank of the uplift. It is dominantly sand, well bedded, fine to very fine grained, with subordinate silts
Kugler (1959) surface geology (1:10000)
DIGITY MUD VOLCANO
Location UTM (Naparima Datum) : E 06723357  N 1126241,  63’ msl.
Digity Mud volcano 28th Feb. 2003 The Digity Mud Volcano is located in a slight saddle separating the Penal and Barrackpore areas. The mudflow covers an area of 5 acres.

The cone is 63’ above sea level and is 20’ high with mud and gas being ejected very infrequently (22/2/2003) It appears also that the amount of mud being ejected is directly related to the amount of rainfall, since in the dry season little or activity is present. Meteoric water is thus important here.
DIGITY TRACE

Location UTM (Naparima Datum): E 0672352  N 1126446, 32’ msl.

Dip is 72°, strike 33°, direction of dip 303°. Dip amount and azimuth changes from left to right. Dips are to the NW on the left become vertical and then dip to the SW on the right. The dip change appears to be a fault zone.
Panoo Trace, Bp427 wellsite
Location UTM (Naparima Datum): E 0672013 N 1125725, 49’ msl.

Sand outcrop showing lignite, sand and reverse faults.
Sequence of parallel bedded sands and claystones, section gets sandier to the top.
THE UPPER MORNE L’ENFER OF PENAL

Location: Penal 1
UTM co-ordinates Naparima datum E- 0668412 : N - 1124446

Kugler (1959) geological map
Location: Penal 2 UTM. Naparima datum E – 0668666 : N – 1124066

Closest Well P 181

Kugler (1959) geological map
This outcrop is located on the hill which overlooks the Penal market, the well Penal 181 is found nearby. The section is dominated by sand with claystones underlying it, measured dips are around 15° and strikes NW – SE.

Cross-bedded sands, the surfaces between trough sets are lined in places, at their base by grey claystone pebbles.
This outcrop represents a sequence of deposits that represents an offshore to foreshore transition. The base of the sequence is dominated by thin medium grey claystones and siltstones. Platy limonite particles are abundant and no biogenic structures are noticed, probably due to the weathering of the outcrop. The Offshore to lower shoreface transition is marked by the appearance of thin sands that thicken upwards. The uppermost of these is heavily bioturbated by *Ophiomorpha* burrows. Overlying undisturbed beds are parallel laminated. The upper shoreface seems to be missing. The shoreface to foreshore transition is marked by the appearance of trough cross bedded sands, that are fine to very fine grained and well sorted. Biogenic structures are absent. The upper sands represent a foreshore beach deposit.
Location: Penal 3 UTM. Naparima datum
E – 0668367 : N – 1124194

Kugler (1959) geological map

Schematic stratigraphic column for exposure

Vertical section showing cut and fill by small channels. Sands are thin and are separated by grey laminated claystones.
Overview of the outcrop, Dips appear to be to the SE, but could not be measured. The sequence is sand rich, beds are 1 – 1.5’ thick, parallel bedded, though in places erosional bases are observed. Beds are separated by thin (1”) claystones that are iron stained at the top and base.

Reference: