Pg 1 is wide
Pg 4 is wide

SEISMIC RESEARCH UNIT

UNIVERSITY OF THE WEST INDIES

ST. AUGUSTINE, TRINIDAD

GEOLOGICAL REPORT ON THE ST. JOHN LANDSLIP, GRENADA

BY

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INTRODUCTION

At Christmas time 1980 land disturbance was noted by residents in St. John in the north-east of Grenada. On 14 January 1981 the Seismic Research Unit was notified of this abnormal activity by the Permanent Secretary, Ministry of Planning, Development and Training, Peoples Revolutionary Government of Grenada. This Ministry requested a geologic investigation of this phenomenon.

Prof. H. Sigurdsson carried out investigations in the St. John area on the 18 and 19 January, together with Mr. Bill Crossman and Mr. Charles Francis of the Ministry of Agriculture. On 19 January a meeting was held with Mr. Paul Koulen of the Ministry of Planning, where this geological disturbance and other geological issues regarding Grenada were discussed.

This report presents the results of a survey and geologic investigations of the St. John area and makes recommendations regarding further monitoring and disaster prevention.

THE LANDSLIP

Investigations show that the St. John disturbance is a landslip of the steep southern bank of the Antoine River. The landslip affects a semi-circular area (Fig. 1) defined by an arcuate scar or fracture zone. The area affected is 2300 square meters or little more than half acre of land and extends about 60 m inland from the south bank of the Antoine River. On 18 January the headscarp generated by the landslip was a 4 m high cliff at the south end. The amount of vertical displacement is less on west and east portions of the arcuate fracture, or about 1 to 1.5 m. There are three gaping fissures present in the fracture zone at the southern point of the landslip. These are due to northward motion of the slipping block of rock.

In the Antoine River the landslip has pushed up river gravel and boulders from the southern river bank and thrust this material towards the northern bank. This motion has partially dammed the river, resulting in formation of a pool or small pond behind this dam.

Motion of the landslip was continuing during my visit to Grenada and the entire block moved 8 cm laterally during a 20 hour period on the 18 and 19 January.

The St. John landslip is a common geologic phenomenon, related to slumping of steep banks or cliffs along curved shear planes. Such slips commonly have arcuate or horse-shoe shaped scars on the surface and the slipping block of rock is rotated along a horizontal axis as it moves down-slope. The process is schematically illustrated in Fig. 2. The bedrock of

this region is a friable, old and highly altered volcanic tuff (pyroclastic flow deposit) over 20 m in thickness. This rock has a very low yield strength and consequently is now unable to sustain its own weight in the 20 m high south bank of the Antoine River. The amount of rock affected or involved in this landslip is 23,000 m^3 or 575,000 tons. At the time of writing, this mass has not yet reached a state of equilibrium and will therefore continue to slip.

NATURAL HAZARD

The St. John landslip presents a significant potential hazard to the people of St. John and those residing on banks of the Antoine River, down-stream from the landslip. A sudden movement of the slip may endange lives of people in and around the slip. Pedestrian traffic should be discouraged around and over the landslip area, by posting danger signs and informing the local population.

Continued movement of the slip will result in further damming of the Antoine River. This natural dam may develop to such an extent that a large body of water may accumulate behind the slip. Should this occur, there is danger of flooding as the river breaks through the dam. Such flooding might affect the bridge north of St. John and the flood waters could also affect housing in the Belmont region, downstream from St. John.

MONITORING

Movement of the landslip should be monitored frequently by Government officials in order to assess the potential hazard. It is recommended that the distance from a fix point on the slipping block (Oven, point 5 on Fig. 1) to the headstone on a grave outside and south of the slip (point 14 on Fig. 1) be measured twice a week. On 19 January 1981 this distance was 28.33 meters. Location of data points on Fig. 1 is known to Mr. Charles Francis of the Ministry of Agriculture and it is recommended that he supervise further monitoring of the landslip, including damming of the Antoine River.

CONCLUSIONS

The St. John geological disturbance is a common form of landslip, involving 2300 m^2 of land, which has slipped towards the Antoine River along an arcuate scar. Slumping of the steep river bank has taken place on a curved shear plane, causing a rotational slip (Fig. 2). This feature is a normal process of erosion and does not relate to any deep Earth processes, and is thus not due to volcanic activity or faulting. A total of 575,000 m^3 of rock is involved. The slip is likely to continue, but at a decelerating rate.

The landslip presents a potential hazard to pedestrians in the immediate vicinity and warning signs should be posted. Further movement may cause damming of the Antoine River and thus pose a flooding threat. Continued monitoring of the slide is recommended.

A P P E N D I X

Distance between fix points on map, Fig. 1 (bearings in degrees magnetic, distances in centimeters).

18 Jan. 1981		cm	degrees
1 (tree) to	15 (pillar)	1358	140
2 (cocoa) to	15 (pillar)	1709	240
3 (soursop) to	15 (pillar)	2326	205
4 (mango) to	15 (pillar)	877	155
5 (oven) to	15 (pillar)	1235	110
6 (mango) to	5 (oven)	1760	085
7 (tree) to	5 (oven)	2125	120
8 (fissure) to	9 (rock)	3060	060
10 (golden apple) to	11 (tree)	2000	130
11 (tree) to	12 (cocoa)	1375	195
12(cocoa) to	13 (sappodilla)	1250	212
13 (sappodilla) to	1 (tree)	1190	043

19 Jan. 1981			
1 (tree) to	15 (pillar)	1366	140
5 (oven) to	14 (headstone)	2833	182

FIG. I. LANDSLIP IN ST. JOHN, GRENADA.

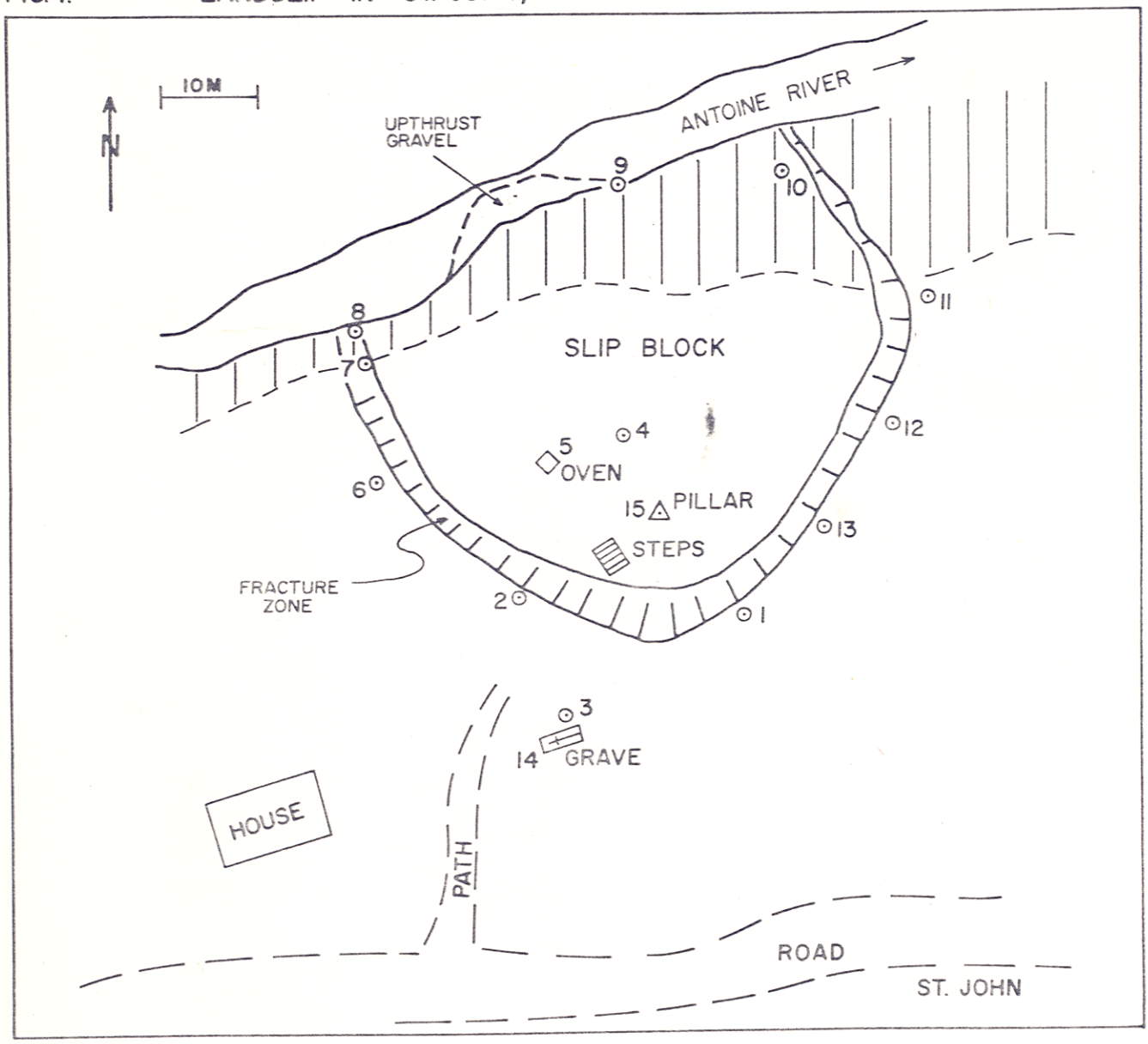

FIG. 2. ST. JOHN LANDSLIP