CHAPTER VI

SUMMARY AND CONCLUSIONS

The geological and hydrogeological data collected in the field, together with the results from the laboratory investigation and the slope stability analyses, are summarized as follows. They then lead to a conclusion on the slope stability to be expected in a further excavation of Mae Moh lignite mine.

1. The slope materials consist mainly of the soft rocks of Overburden Claystone. These rocks are slightly to moderately weathered and heavily jointed. The subordinate rocks are highly weathered Red Beds claystones and residual soils, the latter only cover the top of the northwest flank slope. The interlayered materials composing of shales, ligneous claystones and thin-bedded lignites were also found among the overburden claystones on the northwest flank slope.

2. The geological structures affecting the stability of overall northwestern slope are the commonly found closely-spaced joints and a few faults. These structures together with the highly weathered and porous nature of the slope materials causes the wedge failure which later gives way to a larger-scale mass movement.

3. The wedge failure starts as a small-scale mass movement on the slope of an individual bench where the discontinuities intersected

one another and the intersection line exposed on the slope face.

4. Three principal types of down-slope mass movement were found in the mine area on the northwestern pit wall. They are rock slides, topple rotational slumps and debris flows.

5. Planar sliding occurs on the bedding plane in the place where the excavation approaches the bedding up-dip. This is a case of the southeastern pit wall.

6. The main factors that determine the slope stability are the residual shear strength parameters, not the peak shear strength ones.

7. The shear strength of claystones which make up the slope is not homogeneous, depending on the degree of roughness of shear surface. The cohesion varies from 5.7 to 10.3 metric ton/m^2 and the angle of internal friction varies from 16 to 22 degrees.

8. The water action plays a very important role in the stability of slope in all subareas of study, by reducing the strength of rock mass in a weathering process and erosion, and increasing the weight of slope mass, i.e. the driving force, and at the same time, acting as the lubricant to reduce the friction. The slope instability is critical when the slope is soaked by the water or when the pore pressure ratio increases from 0.24 to 0.49 (saturation from 50 to 70 percent).

9. Decomposition of claystones and their interbedded materials owing to the self-combustion of lignite may contribute to the decrease

of the strength of the slope materials.

10. For the stability analysis, the stereographical method and circular failure charts were used for a primary evaluation. The further detailed analysis was done using simplified Bishop method of slices for an assumed circular failure.

Back analysis was also performed in the planar sliding area where the pre-failure profile was known.

The conclusions are drawn from the above summary as follows.

1. Only the southwestern slopes, and probably northeastern slopes also, are stable.

2. Elsewhere, where the slopes are unstable, the overall slope plays an important role on the larger-scale instability. In the individual bench slope,the slope angle is too high for the value of friction angle and discontinuity orientation according to Markland's (1972) diagram technique. Thus the structural-controlled smaller-scale slope failures easily start in the limit of the bench slope especially during the wet season.

3. The overall slopes of Subareas 2 to 4 are generally stable in the dry season. It will instead become unstable in the wet season when the slopes are partially- to fully saturated.

4. Where the bedding plane dips into the pit, planar bedding-plane sliding can easily occur.