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Panel Meeting  
Report #57

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Mr. David D. Wozniak  
Project Engineer  
Alaska Power Authority  
334 West 5th Avenue  
Anchorage, Alaska 99501

ALASKA POWER AUTHORITY

Dear Mr. Wozniak:

The undersigned met with staff members of Acres International, Harza-Ebasco and APA on November 18 and 19, 1982, to review (1) the 1982 summer geotechnical exploration program and its impact on the feasibility and design of the Susitna Hydroelectric project, and (2) the geotechnical exploration program proposed for the winter of 1982-83.

Our comments on these programs are presented below:

1. 1982 Geotechnical Program

During the summer of 1982 geotechnical studies were made of:

1. The geology and rock conditions at the Watana damsite
2. The soil conditions in Borrow Area D
3. The stratigraphy, geometry and characteristics of the soils in the Watana Relict Channel, and
4. The configuration of the Fog Lakes Relict Channel.

The scope of this program included 83,000 ft of seismic refraction lines, 16 borings, geologic mapping at the damsite and a substantial laboratory program of grain-size distribution tests and Atterberg limit tests in the samples obtained.

Preliminary information on the program was presented during the meeting. The program has provided a significantly improved basis for assessing the geologic and soil conditions in the area of the Watana site.

Of special interest in this regard were the studies completed in the Watana Relict Channel. Concerns to be addressed by this program of investigation were (1) potential reservoir leakage and piping along the channel; (2) potential for soil liquefaction during earthquake shaking; (3) potential settlements due to the saturation and permafrost thawing.

This summer's program did not provide information on the more permeable unit of the soil deposits filling the relict channel (unit K) but it provided useful data on the density of the soils in the upper 200 feet, through the acquisition of penetration test data, and therefore, on the liquefaction and settlement potential of these soils.

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A preliminary interpretation of this data was presented showing that penetration resistance was generally high except in the surficial deposits and in unit G at a depth of about 70 to 90 feet. However unit G was also found to be generally cohesive (indicated by grain-size tests and Atterberg limit tests). Overall these results are generally encouraging with regard to the settlement and liquefaction problems, since dense cohesionless soils or stiff cohesive soils are not likely to be vulnerable to either significant settlement or liquefaction due to saturation or earthquake shaking. While more work remains to be done, the preliminary results would seem to indicate that some of the present concerns may ultimately prove to be unfounded.

## 2. Damsite

The principal objectives of the winter program are to improve knowledge of the thickness and engineering properties of the alluvium and the corresponding configuration of the underlying bedrock. We agree with these objectives. These factors will have a considerable effect on the design and layout, inasmuch as they control (1) the extent to which the alluvial material must be removed from the area to be occupied by the shells of the dam, (2) whether the upstream cofferdam could possibly be incorporated in the main dam and, therefore, (3) whether the diversion-tunnel portals might be located in more favorable rock downstream from the present tentative position. The significance of these effects leads us to suggest that consideration should be given to concentrating the hammer-drill holes along a line near the upstream toe of the dam. This will provide the maximum probability of learning the depth of the lowest bedrock surface in this area, the most critical factor in establishing the position of the cofferdam.

We concur in the intention to gather as much quantitative data as possible by in-situ testing in the drill holes and accompanying refraction surveys and believe that the correlation between the seismic and drillhole data near the upstream toe will be useful in interpreting the results of refraction surveys at the other proposed locations at the damsite. We believe, however, that the design should take account of the likelihood that conclusive information regarding the possibility of allowing part of the alluvium to remain in place may not be obtained before the core trench is excavated during construction. Consideration should, therefore, be given to preparing the contract documents in such a way that deferring the decision until that time will not adversely affect the cost and schedule.

Diamond drillholes on the abutments and along the axis in the river bottom will, of course, be necessary for detailed final design, but the rock on which the dam will be supported leaves no doubt regarding the feasibility of constructing an embankment dam at the site.

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### 3. Relict Channel

Acres presented a stratigraphic profile of the various deposits believed to exist in the Watana Relict Channel which is a composite section based upon the results of the Corps of Engineers and recent exploration programs. Of the 14 different units shown on the profile, the lowermost alluvial deposits (K) are believed to be the most pervious and therefore the most likely to allow higher seepage through the right abutment.

The seismic refraction surveys completed during the past summer have basically confirmed the geometry of the buried channel as had been revealed in previous programs.

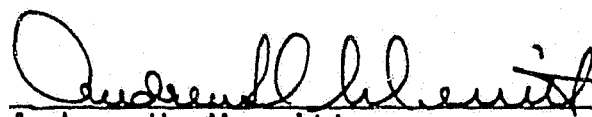
The abutment drilling program for the coming winter will consist of Becker drilling in the deepest part of the buried channel where unit K is believed to be thickest. Pumping tests are planned as well as some in-hole geophysical logging.

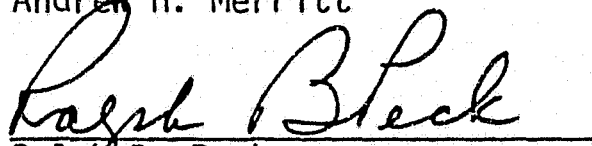
We are basically in agreement with the proposed program and recognize that some modifications may be proposed by the engineer as the work proceeds. We suggest that consideration be given to exposing the channel deposits in Deadman's and Tsusena Creeks by side-hill bulldozer cuts to obtain a better idea of the channel deposits.

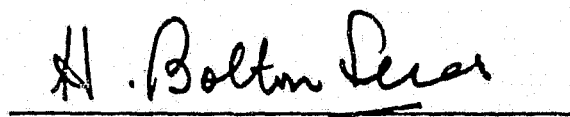
The next phase of exploration following the winter program has not yet been defined. Such work would include, among other items, the exploration adits and borings for portals, underground chambers, and shafts. We foresee that delays in this work could affect the ongoing design process and we would endorse an early start in this phase of the explorations.

Please do not hesitate to call if you have any questions.

Sincerely yours,

  
Andrew H. Merritt

  
Ralph B. Peck

  
H. Bolton Seed