# DISPOSITION FORM

(AR 340-15)

REFERENCE OR OFFICE SYMBOL: NPSEN-FM

SUBJECT: Skagit River Upstream Storage, Geologic Reconnaissance

TO: C, Proj Plng Br

FROM: C, F&M Br

DATE: 12 Aug 65

CMT 1

Cary/sh/393

1. This report covers certain geologic phases of upstream storage sites as viewed on a 5-day reconnaissance by Messrs. A. S. Cary, F&M Branch and W. R. McKinley, Project Planning Branch, into the Skagit drainage area.

2. The Skagit and its tributaries drain the west slope of the Northern Cascade Range in Washington. The area has a total relief up to about 8,000 feet, with Mt. Baker rising to 10,778 feet, Glacier Peak to 10,528 feet, and a number of others to above 8,500 feet elevation. It is generally heavily timbered below 6,500 feet except where logged, burned, or farmed. Dense undergrowth occurs on most north facing slopes and on many valley bottoms. Dense second growth covers much of the area that was logged 20 or more years ago.

3. An examination of any map of the area shows a very striking northwest-southeast alinement of drainage, with some streams such as the Skagit below Newhalem cutting at right angles to this trend. The northwest-southeast trend of the stream is a direct reflection of the regional rock structure inherited from an Oligocene Mountain Range that was almost completely worn away by Miocene time. Numerous short reaches of the divide along the Cascade crest also follow this same trend, although the overall trend of the range is north-south.

4. Much of the rocks in the area other than volcanics, are ancient sediments that have been metamorphosed through various stages to granodiorite gneiss and schist. Despite the extremes of metamorphism, the original sedimentary structures are still evident in many areas. All of the rock is adequate for either earth and/or rock fill or concrete gravity dam foundation. Each site will, of course, present its peculiar rock foundation problems but none should be of great significance in the overall cost of the proposed structures with the exception of Copper Creek site on the main stem where Talc occurs adjacent to the left abutment. This occurrence will be discussed more thoroughly under the section devoted to that site.

5. All of the sites have been affected very markedly by the Pleistocene glaciation, Faber, Copper Creek and Lower Sauk by the Puget Lobe and the more upstream sites by big alpine glaciers that pushed down each valley at about the same period as each Puget advance.

6. Each channel now occupied by the streams, whether cut in bedrock, lake clay, sand and gravel, or morainal dumps and till, may have been duplicated during each interglacial and may now be buried in some position parallel to and in rather close proximity to the existing channel. The possibilities for leakage around either abutment of any site are infinitely varied. This is not to say that there is a buried channel at each site, but that the geologic history allows for one.

7. Most of the available information on each site is discussed in Memo for Record dated 9 July 1965 by W. R. McKinley which this memo should accompany. Each individual site will be mentioned here only briefly in order to avoid duplication.

8. Cascade River Site. No mention is made in the McKinley report of a side channel or a deeper channel in the existing valley. There is rock exposed on the

left valley side to well above elevation 1300' (estimated). No evidence of a buried channel on either valley side was seen but the possibility of the existence of one cannot be dismissed without more detailed reconnaissance and possibly drilling. Depth of rock in the river bottom is also an unknown, but the possibility is there, in fact it might be considered a good probability that considerable depth of canyon has been refilled with sand, gravel and boulders.

9. Suiattle River Site (Lower). The greatest unknown at this site is depth of overburden under the broad valley floor. It is expected that there may well be 300' of overburden.

10. Suiattle River Site (Upper). The possibility for deep valley fill on this site is the same as lower site.

11. Sauk River Site (Upper). Rock is exposed on both valley sides but the valley floor may contain as much as 300-400 feet of overburden materials and there may be more than one inner rock canyon.

12. Sauk River Site (Lower). The lower Sauk River site is a relatively flat broad valley floor with valley sides of rock. Depth of fill under the valley floor may be great - 300 to 500 feet. The Skagit Valley far upstream has a depth of fill near 500 feet and if the rock floors of the Sauk and Skagit are concordant, the depth is well below sea level.

13. Copper Creek Site, Skagit River. Since the McKinley memo was written, contact with other geologists who have spent some time at the site, indicate that the moraine mentioned is, in fact, a slide within the talc zone of rock on the left bank and further that bedrock floor in the section is almost certainly below sea level, possibly with a total of 500 feet of overburden. The site has little to recommend it. If the Corps is seriously interested in a dam site in this vicinity, it is recommended that some axis other than this be considered.

14. Thunder Creek Site. The depth of overburden in the river channel should be nominal, there being a 15'-20' falls just upstream from the apparent axis. Parallel rock channels could be concealed beneath overburden on benches on either valley side. Geologic reconnaissance and mapping might prove their existence, but drilling will ultimately be necessary.

15. Faber Dam Site, Skagit River. This site has two serious problem areas; first, the depth to bedrock in the valley floor may be at least 500 feet and seepage under the proposed dam might be heavy although that will depend upon the kind of materials in the fill. The second serious problem is the seepage through the silt and sand in the left abutment and the resulting danger to the stability of the entire abutment.

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