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APPENDIX E  
LETTERS ON GEOLOGY AND HYDROLOGY

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Fax Copy to: Bill Walker, Shasta County 245-6468

July 7, 1999

John H. Humphrey, Ph.D., P.E.  
Hydmet, Inc.  
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P.O. Box 678  
Palo Cedro, CA 96073  
530-547-3403 (Fax also)  
Email: [hydmetjack@aol.com](mailto:hydmetjack@aol.com)

Duane K. Miller  
2846 East Street  
Anderson, CA 96007  
530-365 5610

**Subject: Hydrologic Analysis of Burney Creek Overflows to Hat Creek Construction, Inc. Property**

**Introduction:** Burney Creek flood overflows have entered the site via an abandoned irrigation ditch during recent flood events in 1995 and 1997. There is concern that larger flood events could cause flood damage to property at the site. An investigation was made of the cause and risk of the flood events and recommendations given for prevention.

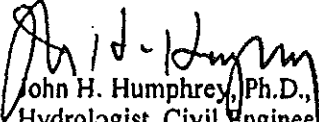
**Site Description:** Hat Creek Construction, Inc. is located at 24339 Highway 89 North and Hat Creek Way in Burney, California. This is the site of the former Fiberboard wood processing facility which occupied the site since the 1950s. All of the former buildings have been removed, but the dikes surrounding the pond are still present. In the Burney Creek flood of January 1997, overflow from Burney Creek entered the property north of the entrance driveway coming from an abandoned diversion ditch passing through culverts under Highway 89. Water accumulated a few feet deep along the north side of the pond dike and between the pond dike and the slope to the east before exiting to the northeast via a channel going back to Burney Creek under Highway 89. Water accumulating during this flood event did not threaten any buildings or other property.

**Site Hydrology:** Flow records were available for Burney Creek (USGS Station No. 11360500) at Burney for 1959-1980. The largest flood events during that period were in December 1964 and January 1970. Flow records from other stream gaging stations in the region indicate that similar flood events occurred in January 1995 and January 1997 with the previous largest flood before 1959 in December 1937. Based on this data, overflow from Burney Creek reaches the property in flood events of 10-year recurrence interval or greater and the maximum event on Burney Creek since 1959 (probably in 1970) had an recurrence interval of at least 50 years.

**Site Reconnaissance:** A field visit was made to determine the source of the flood overflows from Burney Creek. An diversion ditch was found from just north of the Hat Creek Construction, Inc. entrance (passing through culverts under Highway 89) extending approximately 4000 feet west to Burney Creek near the center of the southeast corner of Section 9. This ditch was obviously manmade since it is not located in a natural ravine, has regular cross sections and has areas of elevated banks. This ditch is known (from conversation with Bob Thompson and others familiar with the site) to have been originally constructed to irrigate property at the site. The Fiberboard company used it to fill their holding pond and it was abandoned by them when groundwater pumping became more reliable. The ditch has not been used for at least 30 years. However the original diversion dam in Burney Creek is still mostly intact. The actual diversion structure, a narrow opening in the east bank of the diversion dam covered with flashboards, is damaged and allows overflows to reach the diversion ditch. The diversion ditch was partially blocked by

fill (probably when it was abandoned based on the age of vegetation growth) and would only receive overflow in major flood events.

**Recommendations:** If no changes are made to the diversion ditch, flood overflows would continue to reach the property in major flood events on Burney Creek (greater than 10-year recurrence). The magnitudes of flood flows reaching the property are hydraulically limited by the limited area of flow over the fill blockage at the beginning of the diversion ditch. Larger events on Burney Creek would increase flow reaching the diversion ditch somewhat but still below its capacity. Since overflow water accumulating on the Hat Creek Construction property is limited since the property drains to the north, even 100-year events would exhibit similar flooding limits (accumulations north and east of the pond dikes), to those already observed. Constructing a small area of dike or fill on the property would prevent any flood water from flowing south to the area between the east pond dike and the slope, limiting flooding to the north of the pond. However, it would be better to restore the Burney Creek bank to its original elevation at the diversion ditch, filling the diversion ditch for 20-30 feet. It would not be necessary to remove the diversion dam or modify the diversion structure. If this was done, no overflow from Burney Creek would reach the property via the diversion ditch. Note that blocking of the diversion ditch overflow would have no influence on water levels in Burney Creek since the maximum overflow is much less than 1% of the flow in the creek. The overflow returns anyway downstream approximately one mile.

  
John H. Humphrey, Ph.D., P.E.  
Hydrologist, Civil Engineer

# COOKSLEY GEOPHYSICS, INC.

Geology • Geophysics • Engineering

January 9, 1996

Stuart Busby  
 Hat Creek Construction  
 24339 Hwy. 89 N. and Hat Creek Way  
 Burney, CA 96013

RE: Mining Reclamation Plan for Rimrock  
 Corporation, Aggregate Products.

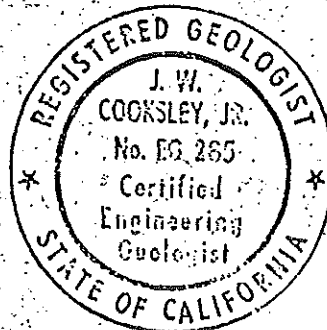
Dear Mr. Busby,

The mafic volcanic rock which is mined and crushed to provide aggregate and base course rock products forms a northerly-striking escarpment rising about 60 (sixty) feet above a northerly-trending valley. In the general area of eastern Shasta and Siskiyou counties and western Lassen and Modoc counties, many similar escarpments coincide with northerly-striking normal faults. Generally, these faults are less than five million years old, and at least some have probably experienced movement during the past million years. During historic times, however, seismic activity in the area is infrequent. During a site inspection conducted on November 15, 1995, no evidence of geologically recent movement was observed along the escarpment of the quarry site. The rock is generally massive and should remain stable at a slope of 3/4 to 1.

If there are further questions concerning seismic hazards or slope stability at the Rim Rock quarry site, we would be pleased to discuss further these matters.

Respectfully,

*James W. Cooksley*  
 James W. Cooksley  
 Engineering Geologist # 285



JWC:lt



January 26, 1996

Stuart Busby  
Hat Creek Construction  
24339 Hwy. 89 N. and Hat Creek Way  
Burney, CA 96013

RE: Mining Reclamation Plan for Filmrock  
Corporation, Aggregate Products.

Dear Mr. Busby,

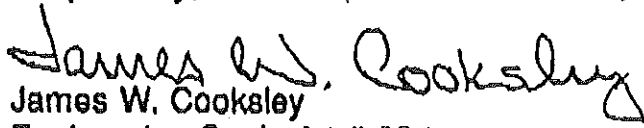
The mafic volcanic rock which is mined and crushed to provide aggregate and base course rock products forms a northerly-striking escarpment rising about sixty (60) feet above a northerly-trending valley. In the general area of eastern Shasta and Siskiyou counties and western Lassen and Modoc counties, many similar escarpments coincide with northerly-striking normal faults. Generally, these faults are less than five million years old, and at least some have probably experienced movement during the past million years.

In the past ten (10) years, some geologists have noted features associated with some of these escarpments which suggest fault movement has taken place along these scarps within the past 11,000 years (Wills, C.J., 1990, and Woodward-Clyde Consultants, 1987). Based on these reportings, these faults have been designated as Earthquake Fault Zones, and as such, building along these zones is regulated in conformance with the Alquist-Priolo Earthquake Fault Zoning Act. It is therefore recommended that any permanent buildings be situated as depicted on the State of California Special Studies Zones, Cassel Quadrangle, Preliminary Review Map of May 1, 1991.

During a site inspection conducted on November 15, 1995, no evidence of geologically recent movement was observed by this writer along the escarpment of the quarry site. The rock is generally massive and should remain stable at a slope of 3/4 to 1.

If there are further questions concerning seismic hazards or slope stability at the Rim Rock quarry site, we would be pleased to discuss further these matters.

Respectfully,

  
James W. Cooksley  
Engineering Geologist # 285

JWC:lt

Enclosures:

References

Map

## REFERENCES

Wills, C.J., 1990, Hat Creek, McArthur and related faults, Shasta, Lassen and Siskiyou Counties, California: Division of Mines and Geology Fault Evaluation Report FER-209 (unpubl.).

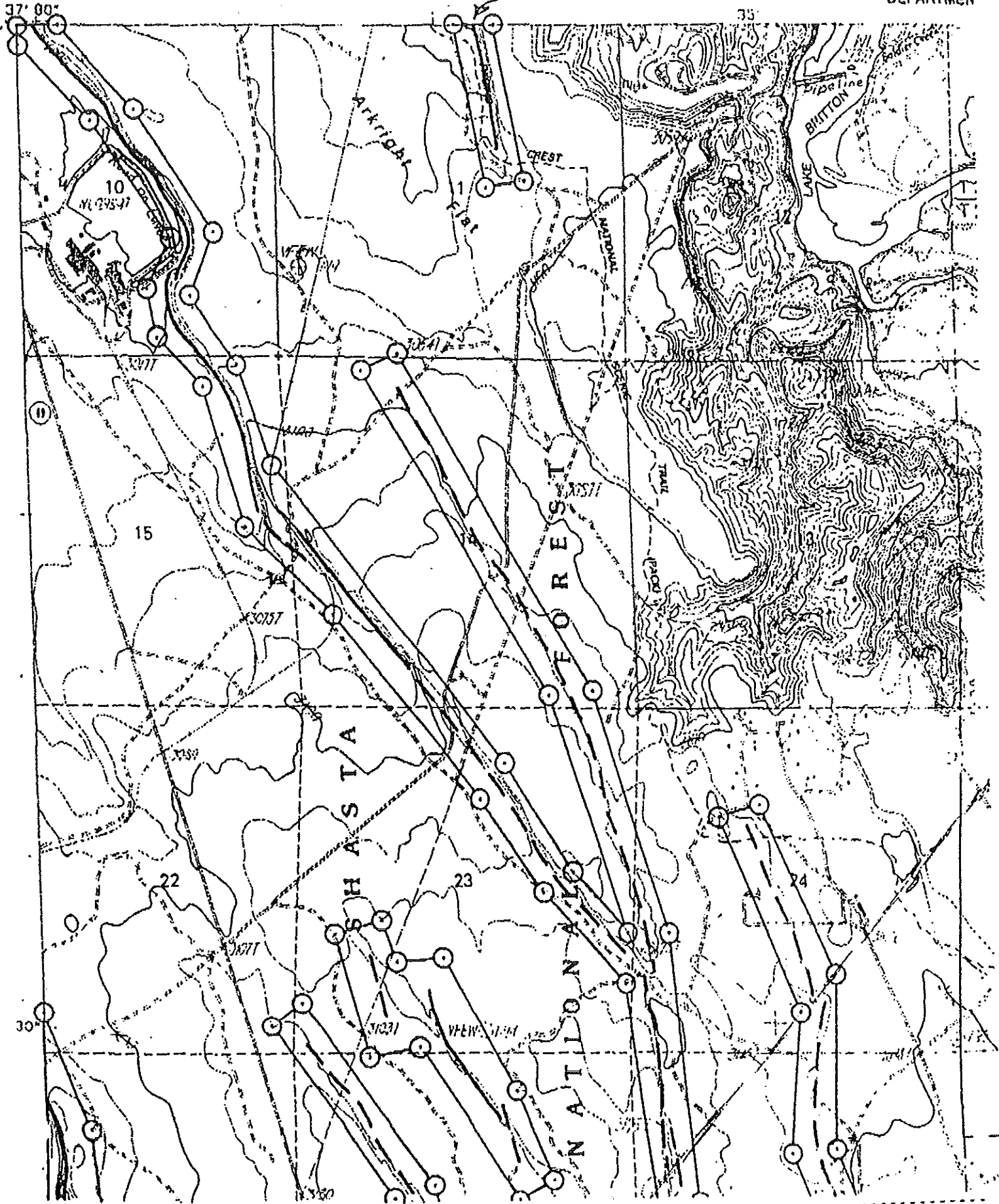
Woodward-Clyde Consultants, 1987, Pit Forebay Dam (97-110), Evaluation of seismic geology, seismicity and earthquake ground motions: Unpubl. consult report prepared for Pacific Gas and Elec. Co. project #8743025A, 48p., 2 app.

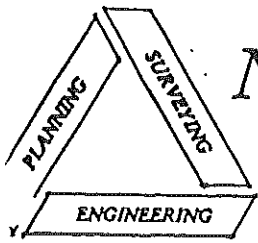


ALQUIST/PRIOLO  
ZONE?

DIVISION OF MINES AND GEOLOGY  
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF  
THE RESOL  
DEPARTMENT





# NST ENGINEERING, INC.

PG.46

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Vernon H. Templeton, R.L.S.  
Stephen H. Schmidt, R.L.S.  
Fredric R. Nagel, R.C.E., R.L.S.  
Jeffery A. Morrish, R.C.E.

January 4, 1996

Hat Creek Construction, Inc.  
24339 Highway 99N  
Burney, CA 96013  
ATTN: Stuart Busby

RE: Rim Rock Corporation Quarry  
in SW 1/4 of SE 1/4 Section 10, T36N R3E, MDM  
(Shasta County APN 23-250-14)

Dear Stuart:

On January 3, 1996 I inspected your proposed Phase I pit site. The site is located in a talus slope at the edge of an ancient lava flow (Qpvb: Pleistocene Volcanic, Basalt), comprised of fragmented rocks and boulders lying at various slopes; natural slopes, depending on materials, range between 3/4:1 and 1 1/2:1, although some rock cliffs are near vertical and other very loose rock slopes lie near 2:1. The total slope is approximately 60-80 feet high from the relatively level valley base to the top of the relatively level "mesa".

Older random excavations into the slope reveal a lateral profile of initially loose boulders, then a soil-rock-boulder mixture, and finally fissured bedrock. The bedrock is jointed horizontally and vertically resulting in large "block" shaped units, typical of lava flow geology.

Zones of loose boulders and slightly deeper soil-rock-boulder mixtures would have safe natural repose slopes of 1:1. The deeper undisturbed bedrock, although heavily jointed, is very stable and can stand essentially vertical, but I do not recommend cutting at slopes steeper than 3/4:1 to allow for degradation by random rock fallouts from weathering and/or seismic actions.

Any topsoil horizons present at the tops of cuts should be rounded back at 2:1; if any portions of the cuts terminate in zones of unstable loose rock or soil-rock mixtures, slopes must be maintained at 1 1/2:1 unless further studies conclude otherwise.

Please note these recommendations are based upon observations of the unopened pit at this time. As the pit is developed, and if differing soil-rock conditions are encountered than are anticipated, these recommendations may not remain valid and additional study may be necessary.

Very truly yours,

*Fred R. Nagel*  
Fred R. Nagel  
RCE 26319

