

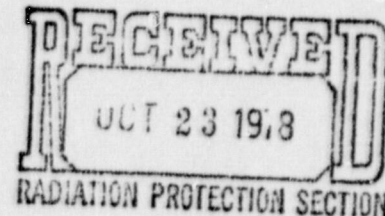
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# BOKUM RESOURCES CORPORATION

P. O. Box 1833  
142 W. PALACE AVENUE  
SANTA FE, NEW MEXICO 87501  
(505) 982-1824

October 23, 1978

Mr. Alfonso Topp  
Environmental Improvement Division  
P. O. Box 968  
Santa Fe, New Mexico 87501



Subject: Modifications to Bokum Resources Corporation's Diversion  
Channel

Dear Mr. Topp:

Pursuant to your request that Bokum Resources Corporation submit a proposal to the EID outlining design modifications to the diversion channel agreed to in the Tailings Management meeting held in Denver, Colorado on October 3, 1978, and discussing certain points relative to the diversion channel as outlined in the minutes of the referred to meeting drawn up by Mr. Ross Scarano of the Nuclear Regulatory Commission and Mr. John Stryker of Stearns-Roger, please find the enclosed:

- (1) Letter dated October 6, 1978, from J. Stryker to Wm. P. Biava outlining the incorporated design modifications agreed to that eliminate the need for an ongoing maintenance program and responding to the specific questions posed in the above referred to meeting.
- (2) 4 copies of Stearns-Roger drawings #08-2-26 and #08-2-38 which incorporate and reflect the design modifications as agreed.
- (3) Minutes of the Tailings Management meeting held October 3, 1978, prepared by Mr. Ross Scarano of the NRC and Mr. John Stryker of Stearns-Roger.
- (4) Letter dated October 5, 1978, from Mr. Frank J. Holliday of Woodward-Clyde Consultants to Mr. John Stryker of Stearns-Roger, responding to the following points referred to in the above mentioned minutes:
  - (a) Determination of appropriate embankment height compared to a wall of water from PMF condition.
  - (b) Potential for and effect of accumulation of silt, debris or any type of similar channel blockage.

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To: Mr. Alfonso Topp

-2-

October 23, 1978

These documents confirm the design modifications which resulted from the meeting and discuss points of information requested by Ross Scarano of the NRC and Thomas Shepherd and John Nelson of Colorado State University as well as yourself on behalf of the State of New Mexico.

For further clarification of item 3 of Mr. Stryker's letter to me dated October 6, 1978, regarding the extension of riprap above the 100 year flood level to 3 feet above the PMF condition, Bokum Resources Corporation will provide the additional riprap within the first five year period of applicant's license period prior to renewal. Riprap covering the full channel up to the 100 year flood level will be provided prior to mill operation. The tailing stabilization and reclamation performance bond required by the State of New Mexico will include this additional riprapping until such is completed, therefore, assuring performance in the event that mill operations cease for unforeseen reasons.

It further should be noted that during the expected operational life of the mill, (20-30 years) much experience and data will be gathered with respect to the diversion channel. This experience will be utilized in the final reclamation design to further assure that the diversion channel is not dependant upon ongoing maintenance once operations are terminated.

If you have any questions regarding our proposal, please do not hesitate to contact me.

Sincerely,

*William P. Biava*

WILLIAM P. BIAVA  
Executive Administrator

WPB:bg

encl. *Sheet 6 of 9 Dwg No 08-2-26*  
*Dwg No SK 08-2-38*





ENGINEERING • CONSTRUCTION

REC'D OCT 10 1978

October 6, 1978

Mr. William P. Biava  
Bokum Resources Corporation  
P.O. Box 1833  
Santa Fe, New Mexico 87501

Reference: Marquez Uranium Mill  
Our C-19620

Subject: Diversion Channel Modification

Dear Mr. Biava:

We are presently modifying details of the proposed diversion channel as agreed to during the tailings management meeting held in Denver on October 3, 1978. These modifications will eliminate the need for an ongoing maintenance program, and are as follows:

- (1) Widening the invert from 20' to 40'.
  - This is shown on Diversion Ditch Typical Section - Dwg. 08-2-26 (attached).
- (2) Reducing the channel slope to 0.2% from 0.3% and thereby reducing flow velocity to 12 FPS for a PMF condition.
  - This is shown on Diversion Ditch Profile and Diversion Ditch Typical Section - Dwg. 08-2-26.
- (3) Extend Riprap rock to 3' above PMF condition for full length of channel.
  - This is shown on Diversion Ditch Typical Section - Dwg. 08-2-26. Note that the extension of riprap above the 100-year flood level is indicated as "future", as was discussed with Mr. Ross A. Scarano of the NRC following our meeting.
- (4) The diversion dam will be an engineered structure.
  - See Woodward-Clyde Consultants letter to Stearns-Roger Inc., dated October 5, 1978 (attached).

Mr. William P. Biava  
Bokum Resources Corporation  
Santa Fe, New Mexico 87501

October 6, 1978

In addition, the State of New Mexico requested a proposal incorporating the above modifications and including a discussion of the following points:

- (1) Determination of appropriate embankment height compared to a wall of water from PMF condition.
  - This is discussed by Woodward-Clyde Consultants in their letter to Stearns-Roger Inc., dated October 5, 1978. Further, we are extending the riprap along the upstream face of the diversion dam to the crest of the dam as indicated on SK 08-2-38 (attached).
- (2) Assure stability at point where arroyos enter channel.
  - This is accomplished with 100 ft. long riprapped transition sections from Canon de Marquez and Arroyo Hondo into the diversion channel as indicated on SK 08-2-38.
- (3) Potential for and effect of accumulation of silt, debris or any type of similar channel blockage.
  - See Woodward-Clyde Consultants letter to Stearns-Roger Inc., dated October 5, 1978.

Drawing 08-2-26 is being revised and a new Drawing 08-2-38 is being prepared to reflect these modifications. We intend to issue these drawings no later than Friday, October 13. We will also transmit mylar reproducibles of the two drawings to you, which must be submitted to the State Engineer for his file.

Very truly yours,

  
John R. Stryker

JRS/jm

Att.

cc: Mine Tailings International  
Geocon  
Woodward-Clyde  
D. L. Bradfield  
G. M. Knight  
P. E. Lantis  
R. B. Olson

NOTES OF MEETING

TAILINGS MANAGEMENT FOR BOKUM RESOURCES CORPORATION

REC'D OCT 16 1978

URANIUM MILL AT MARQUEZ MESA, NEW MEXICO

OCTOBER 3, 1978

Attending:

William P. Biava  
Gene Andrews  
Gerald Knight  
Frank J. Holliday  
Wesley G. Holtz  
Al Topp  
Ross A. Scarano  
John Stryker  
Ralph Olson  
Tom Shepherd  
John D. Nelson  
Gary D. Rose  
Bert Hoare  
M.A.J. (Fred) Matich

Bokum Resources  
Stearns-Roger  
Stearns-Roger  
Woodward-Clyde Consultants  
Woodward-Clyde Consultants  
NM Env. Impr. Division  
NRC - Uranium Mill Licensing  
Stearns-Roger  
Stearns-Roger  
Colorado State University  
Colorado State University (NRC)  
Geocon/Femco  
Mine Tailings International  
Geocon Ltd.

General discussion of tailings management program for Bokum Resources Corporation at Marquez Mesa, New Mexico resulted in a proposed modified diversion channel to eliminate the need for an ongoing maintenance program. This channel modification includes the following features:

- 1) Widening the invert from 20' to 40'.
- 2) Reducing the channel slope to 0.2% from 0.3% and thereby reducing flow velocity to 12 FPS for a PMF condition.
- 3) Extend riprap rock to 3' above PMF condition for full length of channel.
- 4) The diversion dam will be an engineered structure.

State of New Mexico requested a proposal incorporating above modifications for review. Submittal shall include a discussion of the following points.

- 1) Determination of appropriate embankment height compared to wall of water from PMF condition.
- 2) Assure stability at point where arroyos enter the channel.
- 3) Potential and affect of accumulation of silt, debris or any type of similar channel blockage.



October 5, 1978

Stearns-Roger, Inc.  
P.O. Box 5888  
Denver, Colorado 80217

Attention: Mr. John R. Stryker

Re: Geotechnical Services, Bokum Resources Corporation,  
Flood Diversion Channel to Protect Tailing Dam and  
Pond near Marques, New Mexico.  
Stearns-Roger Contract No. C-19620  
Job No. 19460-18971

Gentlemen:

The undersigned and Wesley G. Holtz, Jr. of Woodward-Clyde Consultants met in your offices on October 3, 1978 with representatives of the Nuclear Regulatory Commission, State of New Mexico Environmental Improvement Division, Colorado State University, Bokum Resources, Stearns-Roger Inc., Mine Tailing International, Geocon, Ltd. and Geocon/Femco (see Stearns-Roger meeting notes dated October 3, 1978) and discussed diversion channel modifications.

As a result of these discussions, you asked us to (a) review our report pertaining to the diversion dam in the light of the meeting discussions, (b) estimate the depth of water in the arroyos which would be turned by the diversion dam, assuming the probable maximum flood, and (c) estimate minimum velocity of water in the channel that would be needed to remove "silt" that might be deposited in the channel by lesser flows and the recurrence frequency at that flow.

Our report titled "Tailing Dam, Bokum Resources Corporation near Marquez, New Mexico," dated April, 1978 discussed design of the diversion facilities. We evaluated our recommended



Stearns-Roger, Inc.  
October 5, 1978  
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diversion dam design in the light of our studies of the engineering characteristics of the foundation soils and rock at the site, soils and rock available for dam construction and the purposes of the dam. We understand you incorporated our report recommendations in your diversion dam design.

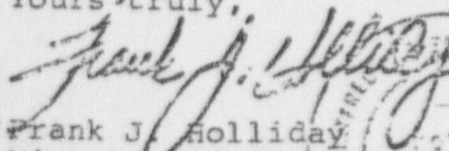
Our report titled "Flood Estimates, Bokum Resources Relocated Dam and Diversion Ditch near Marquez, New Mexico," dated April 1978 includes our studies of the diversion channel hydrology. Extending the work in this report we calculated the theoretical superelevation height of water as it is turned by the diversion dam into the diversion channel assuming the probable maximum flood. In our opinion, the average depth of the turning flood waters in the channel will be 22 feet and the depth at the diversion dam slope will be less than 27 feet. This depth water would be within the riprapped perimeter of the diversion as shown on the Stearns-Roger drawings.

Review of this data in our report pertaining to the tailing area shows the soils available for erosion by runoff in the arroyos will be silty low to medium plasticity clays and low plasticity silts with some silty sands. Water velocities necessary to move silt and clay sizes ( $\sim$ #200 sieve sizes) are of the order of 0.2 foot per second and sand sizes ( $\sim$ #200 sieve size to #4 sieve size) are of the order of 1 foot per second.

The theoretical recurrence frequency for a 1 foot per second flow through the diversion channel is between 1 and 3 years, suggesting that the clays, silts and sands deposited in the ditch by lesser flows will frequently be washed from the channel.

If you have questions concerning our opinions in this letter, please call.

Yours truly,

  
Frank J. Holliday  
Vice President

FJH:et

(6 copies sent)

