

APR 1 1988

NOTE GUPTA 3/30

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NOTE FOR: David Brooks  
Don Chery  
Philip Justus  
Rick Weller  
Seth Coplan

FROM: Mysore Nataraja  
Technical Review Branch, HLWM

SUBJECT: ADDITIONAL GUIDANCE TO DOE ON REPOSITORY SEALING

In the CDSCP, the DOE has proposed seal design concepts that emphasize free drainage of water through unsaturated rock for a long time period. Our GTP on borehole and shaft seals (February 1986) as originally developed focussed mainly on issues related to saturated medium and thus may not have adequately covered seal issues in unsaturated medium. Based on the results of the CDSCP review, we feel that additional guidance to the DOE is necessary to clarify NRC staff position on borehole and shaft sealing and drainage in unsaturated medium.

Dinesh Gupta of my staff has prepared the attached draft outline for additional guidance to the DOE on repository seals and drainage in unsaturated medium. Since there are many issues in the outline that are inter-disciplinary, I am requesting through this note that you review this outline and provide your comments to me as soon as possible so that we can proceed with the development of the proposed guidance. Depending on the direction the final version of this position paper takes, we may be able to extract portions of it to constitute a review plan for the statutory SCP and the license application.

Your comments by COB April 15, 1988 will be greatly appreciated.



Mysore Nataraja, Section Leader  
Technical Review Branch, HLWM

Attachment:  
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PROPOSED OUTLINE FOR  
TECHNICAL POSITION/REVIEW PLAN ON POST-CLOSURE SEALS AND  
DRAINAGE FOR UNSATURATED MEDIUM

The GTP on Borehole and Shaft Sealing (February 1986) was originally developed for repositories in saturated media. Although it is stated in the GTP that the GTP guidance is applicable for repositories in unsaturated medium as well, it is evident from current DOE's sealing plans (emphasizing free drainage) that additional guidance is needed to clarify NRC staff position on sealing and drainage for repository in unsaturated medium. The purpose of the proposed Technical Position document is to provide this guidance.

The following outline is proposed to develop NRC Technical Position on Seals and Drainage for Yucca Mountain Site. The position is intended to be used as a review plan for repository sealing and drainage issues in the license application. However, if it is released as a Technical Position, it can also be used to review sealing issues in the statutory SCP.

1. INTRODUCTION  
Explain need for additional guidance; purpose, scope.
2. REGULATORY BACKGROUND  
Update the regulatory framework included in the existing GTP on Borehole and Shaft Seals to incorporate changes in the Rule since the GTP was issued in February 1986.
3. TECHNICAL POSITION
  - I. DESIGN CONSIDERATIONS
    - A. Underground Facility: Sealing and/or drainage of faults
      - (i) Whether sealing is needed or reliance on drainage alone is sufficient. Combination of sealing and drainage concept.
      - (ii) Performance requirements if sealing is relied upon.
      - (iii) Reliability question, if drainage is relied upon. Effect of time, thermal environment and geochemical changes and dissolutioning.
      - (iv) Installation procedures for sealing and drainage system.
      - (v) Compatibility of seals or man-made drains material to host rock; material selection.

B. Seals for Shafts and Ramps

- (i) Infiltration through surface openings
- (ii) Damage around shafts and ramps
- (iii) Perched water zones
- (iv) Drainage through bottom of shafts; repository drifts slopes; thermal effects
- (v) Compatibility of liner to host rock; removal of liner, effect of time and thermal environment
- (vi) Effect of seal material on natural drainage
- (vii) Effect of backfill settlement, time effects

C. Borehole Seals

- (i) Number of borehole openings
- (ii) Sealing of up gradient boreholes, other boreholes
- (iii) Compatibility of seal material with host rock, thermal and time effects.

II. SITE CHARACTERIZATION CONSIDERATIONS

- (i) Confirm adequacy of seal and drainage design concepts, emplacement methods and material compatibility
- (ii) Starting time for tests, duration, performance confirmation testing
- (iii) Thermal effects, long-term reliability concerns

III. PERFORMANCE ANALYSIS CONSIDERATIONS

- (i) Effect of seal and drainage performance on overall system performance analysis: Requirement 10 CFR 60.112
- (ii) Effect on individual component performance: Requirement 10 CFR 60.113

4. DISCUSSION

5. REFERENCES

6. APPENDIX A: GLOSSARY

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OFFICIAL CONCURRENCE AND DISTRIBUTION RECORD

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