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U.S. Nuclear Regulatory Commission
ATTN: Dr. Hans Arlt
Division of High-Level Waste Repository Safety
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Mail Stop TD–13
Washington, DC 20555

Subject: Responses to NRC comments on "Infiltration in the Upper Split Wash Watershed, Yucca Mountain Nevada—Journal Paper" (IM 20.06002.01.131.440)

Dear Dr. Arlt:

Your comments to "Infiltration in the Upper Split Wash Watershed, Yucca Mountain Nevada—Journal Paper" have been addressed and a copy of the responses are attached. Enclosed is a revised copy of the report.

If you have any questions, please contact me at 210.522.5082 or Randall Fedors at 210.522.6818.

Sincerely yours,

Gordon Wittmeyer

Gordon Wittmeyer, PhD
Manager, Hydrology

/ph
Enclosure
cc: D. DeMarco
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Responses to Hans Arlt's comments are inserted below. –Randy Fedors

-----Original Message-----
From: Hans Arlt [mailto:HDA@nrc.gov]
Sent: Friday, September 24, 2004 12:55 PM
To: RFEDORS@cnwra.swri.edu; Emarsha Whitt
Cc: GWITT@cnwra.swri.edu; JWINTERLE@cnwra.swri.edu; Crystal Johnson; Deborah DeMarco; Jack Guttmann
Subject: Ticket number CNWRA 2004 0137 is closed

Ticket number CNWRA 2004 0137 is closed. ADAMS Acc. No.: ML042680104. The CNWRA journal paper titled ""Infiltration in the Upper Split Wash Watershed, Yucca Mountain, Nevada" to be submitted to Journal of Hydrologic Engineering for publication has been reviewed and approved with the following comments or qualifications:

1.) page 2
"This redistribution may cause zones of focused infiltration leading to localized deep percolation to the repository horizon."
Is it known that the spatial distribution caused by focused infiltration at the surface is propagated all the way down to the repository horizon? The PTn does not change this distribution? It may be better to drop the "...to the repository horizon" part.
>> Text revised per suggestion. However, the authors believe the spatial distribution of net infiltration is propagated to repository horizon. However, the topic of this point is not considered integral to the manuscript, so the reference to the repository horizon was deleted. The PTn may modify the percolation distribution slightly (small shift and some dampening). However, the spatial distribution should still closely match the percolation at the repository horizon. Temporal dampening more likely is prominent because of the PTn, but we are only referring to spatial distribution here.
>>

2.) page 2
What is "effective precipitation"?
>>
A definition for "effective precipitation" was added to text. It is the amount of water available for infiltration and includes local precipitation plus runon and minus runoff.
>>

3.) page 4
"Shallow infiltration" is used in the section before "Climate". Would net infiltration be more consistent?
>>
Global revision of text to use net infiltration instead of shallow infiltration. Also, changed usage of "shallow soils" to "thin soils"; though, "shallow soil depths" was retained.
>>

4.) page 6
"Surface runoff can be generated by the Hortonian mechanism when rainfall rates exceed the infiltrability of the soil or can be induced when top layer becomes saturated." Should be rewritten to make clear that there are two methods. The first time I read this I understood Hortonian to be both: infiltrability of the soil and saturated induced. (Is "infiltrability" really a word?)
>>
Text on page 6 revised to clarify the distinction between the two mechanisms for runoff. Some

watershed modelers make this distinction, others do not. It can be a gray area in some practical applications. "Infiltrability" appears in peer-reviewed journals and books. Granted, though, it does seem to be an awkward word.
>>

5.) page 25
Conclusions: Discussion about Hortonian mechanism vs. saturation mechanism. These two mechanisms were identified, but not discussed that much, in the main text.
>>
A clearer delineation was added to the text on about page 12 (per your comment 4). The mechanisms were mentioned throughout the text (e.g., old pages 6, 11, 12, 13, 14, 16, 19, 21, 22, and the conclusion section). Therefore, no new text was added.
>>

6.) page 27
Acknowledgments: Change form "Division of Waste Management" to
"Division of High-Level Waste Repository Safety"
>>
Revised text to correct error.
>>

7.) Figure 2
Are the channel elements the ones with the blue lines?
>>
Yes, the plane elements are outlined by black lines and channel elements are the blue lines. This clarification was added to the text at the first mention of Figure 2.
>>

8.) Figure 8
- The text refers to "excess infiltration"; the figures to "infiltration excess"?
- Isn't infiltration excess part of bedrock infiltration, or, in other words, can infiltration excess be greater than bedrock infiltration?
>>
For consistency, all text and figures (Figures 3, 5, 8) now use the "excess infiltration" terminology. Excess infiltration was defined in the text as being relative to the precipitation amount. Positive values of excess infiltration denote areas where infiltration exceeds the precipitation that is falling on that area. Whereas some portion of infiltration becomes bedrock infiltration, excess infiltration should not be thought of as an amount of infiltration that might become bedrock infiltration because it is a relative number derived by comparison to the precipitation amount.
>>

Please send any new revision, including those required by technical reviewers of the Journal of Hydrologic Engineering, to the HLWRS.

Thanks for your efforts, Hans.

Hans Arlt
Program Element Manager and
USFIC KTI Lead
U.S. Nuclear Regulatory Commission

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