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Geosciences and Engineering Division
6220 Culebra Road • San Antonio, Texas, U.S.A. 78238-5166
(210) 522-5160 • Fax (210) 522-5155

September 18, 2008
Contract No. NRC-02-07-006
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NMSS06n: PROJ0734; PROJ0735

U.S. Nuclear Regulatory Commission
ATTN: Mr. Michael L. Fuller
Division of Waste Management and Environmental Protection
Two White Flint North
11545 Rockville Pike
Mail Stop T7-J8
Washington, DC 20555

Subject: Software Validation Test Plans and Reports for SIBERIA Version 8.33
and EAMS Version 2.09 and Channel-Hillslope Integrated Landscape
Development (CHILD) Version 2.3.0 (Deliverable 14003.01.007.240)

Dear Mr. Fuller:

This letter transmits Deliverable 14003.01.007.240 CHILD/SIBERIA Validation Reports.

Center for Nuclear Waste Regulatory Analyses (CNWRA®) Technical Operating Procedure (TOP)-18 was used to conduct limited validations of the SIBERIA and CHILD landscape evolution codes. These acquired codes simulate long-term wind and water erosion processes responsible for the evolution of natural landscapes. They have, however, been used to evaluate erosion processes on artificial landforms, such as reclaimed mined land. Preliminary CNWRA evaluations of these codes indicated they may also be useful for evaluating the long-term stability of engineered soil covers, particularly the effect of gully formation and mass wasting. These are localized processes that are not considered by simpler erosion models designed for agricultural fields. Because of the complex nature of the landscape forming processes simulated by SIBERIA and CHILD, quantitative comparisons between the test cases simulating landforms and independent calculations were not possible. Instead, the test simulations were qualitatively evaluated to see whether the codes yielded reasonable results when factors such as slope and surface roughness were changed. Although both codes met this "reasonableness" test for the range of conditions evaluated, documentation of input parameters for CHILD was found to be incomplete and, in some cases, ambiguous regarding the effect of certain input parameters on simulation performance. These shortcomings resulted in a limited TOP-018 validation of both codes.



Washington Office
1801 Rockville Pike, Suite 105 • Rockville, Maryland 20852-1633

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Although the CHILD code has capabilities that go beyond those of SIBERIA and could be used for evaluating long-term soil cover performance, a detailed investigation of the source code would be required before we can recommend CHILD for regulatory analyses. Because both CHILD and SIBERIA simulate complex, coupled, and nonlinear processes, we recommend more detailed investigation for both codes if needed for regulatory analysis.

Please do not hesitate to contact me at 210.522.6260 with any questions regarding this deliverable.

Sincerely,



Ali Simpkins
Assistant Director
Environmental Science and
Environmental Engineering

GW/AS/lis
enclosures

cc:

D. DeMarco
S. Kim
R. Jackson
B. Meehan
P. Bubar

A. Kock
C. Barr
D. Esh
H. Arit

G. Walter
C. Dinwiddie
M. Necsoiu
Record Copy B—IQS

Letter only:
W. Patrick
B. Sagar
GED Directors
GED Managers
L. Gutierrez