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QUARTERLY REPORT
APRIL-JUNE 1980

SEDIMENT AND RADIONUCLIDE TRANSPORT IN RIVERS
TRANSPORT MODELING

FIN Number B2294

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Pacific Northwest Laboratory
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SEDIMENT AND RADIONUCLIDE TRANSPORT IN RIVERS

TRANSPORT MODELING

CATTARAUGUS AND BUTTERMILK CREEKS, NEW YORK

QUARTERLY PROGRESS REPORT

APRIL-JUNE 1980

WORK PERFORMED

The hydraulic simulation of Cattaraugus Creek from Buttermilk Creek to Springville Dam was completed using newly acquired field data from the May 1980 field trip. Work continued on the hydraulic modeling of Buttermilk Creek and the remainder of Cattaraugus Creek below Springville Dam.

HYDRAULIC MODELING

The application of the full dynamic unsteady flow model DWOPER is proving to be very difficult for the low flow conditions encountered during the Phase 3 sampling trip. Hydraulic simulation of these low flow conditions attempted during the preceeding quarter indicated that the available channel geometry data was not sufficient to allow the model to converge to a solution. More detailed data was surveyed on Buttermilk and Cattaraugus Creeks during early May 1980 as discussed in April-June 1980 Quarterly P rt for the field sampling program. Subsequent runs with DWOPER have sho at the data was necessary if a solution is going to be obtained at all. I al runs using the new data were made from the upstream inflow point on Butte Creek down to the Springville Dam spillway or Cattaraugus Creek. Buttermilk Creek still proved difficult to simulate but the reach of Cattaraugus Creek from its confluence with Buttermilk Creek downstream to Springville Dam did converge to an acceptable solution. A discharge rating curve for the spillway at Springville Dam is being developed which will allow simulation to be accomplished for the remainder of Cattaraugus Creek down to Lake Erie.

Buttermilk Creek still does not adequately converge to a solution and the problem appears to be the extreme changes in width as the computations proceed from one cross-section to another coupled with the low flows. The lower discharges on Buttermilk Creek are on the order of 40 cfs while for Cattaraugus Creek the lower discharges are about 200 cfs or more at the various gaging stations. Since most of the low flow tends to concentrate at a particular portion of the cross-sectional area an effective width can be specified which reduces the difference between water surface widths. The remainder of the cross-section is assigned to storage. Efforts are underway at this time to complete the simulation of low flow conditions in Buttermilk Creek.

This low flow simulation problem has been discussed with other persons involved in river hydraulic modeling, including Danny Fread, the developer of the model DWOPER. All have experienced the same problems and either ignored the low flows as they were not important or else reworked the cross-sectional data. It is evident that this problem is not unique but since low flows are usually not considered to be as significant in most hydraulic problems as peak flows there are no published guidelines on the subject that we have been able to find. We anticipate completing the Buttermilk Creek simulations in time for the sediment and radionulcide transport modeling of Phase 3 data.

SEDIMENT AND RADIONUCLIDE TRANSPORT MODELING

This modeling effort will commence as soon as all the Phase 3 data has been received from the University of Washington and the hydraulic modeling is completed. The model SERATRA has been modified in anticipation of this effort and is ready to receive data.