



Incorporation of Inelastic Movement Level Demands in ORNIM

Start Date: Jan 2006

POC:

**Projected
End Date:** Sep 2007

[POC](#)

Problem Addressed:

Models currently employed by the Corps are partial equilibrium annual models, with the waterway annual demand forecasts and implicit shipping plan modal splits (origin-destination-route) determined external to the modeling process. In the current Corps planning models, transportation price changes are explicitly modeled for the waterway routing, but are not modeled for alternate non-waterway routing; waterway shippers respond only when waterway prices rise above the least-cost all-overland transportation price which serves as the willingness-to-pay for water (barge) transportation. The shipper response is basically to either ship the annual demand tonnage by water or not, depending upon its least-costly all-overland route rate. It is understood, however, that: 1) the next best transportation option for a water-routed movement is not necessarily the least-costly all-overland routing option (e.g. pool hop, shift of origin and/or destination); 2) the water ship or not ship decision can be made at less than the annual volume size; 3) the water ship or not ship decision can be sensitive to not only water transportation costs, but also water transportation time changes; 4) the willingness-to-pay for barge transportation may exceed the least-cost all-overland rate; and 5) the waterway transportation demand can also be sensitive to land transportation cost and time changes. The desire is to more dynamically link equilibrium waterway traffic demand forecasts with shipper specific transportation cost and time sensitivities.

Objective:

The model used to estimate system benefits (transportation rate-savings) for the Ohio River System is the Ohio River Navigation Investment Model (ORNIM). ORNIM is used to estimate the annual quantity and cost of accommodated waterborne traffic given a user specified waterway infrastructure. The waterway infrastructure scenarios can then be compared to analyze and optimize investments in maintenance and new construction activities across time and multiple sites by comparison of incremental waterway transportation rate-savings to the investment costs. Under NETS, there has been considerable research on developing shipper response functions, regional routing models and in defining their proper place within a three tier modeling framework. The intention is to build upon and extend this work of movement origin-destination-route choice and apply the research by integrating equilibrium forecasting and shipper rate and time response into the USACE planning process. The first step of this work effort is to develop a design document for integrating the origin-destination-route choice shipper response functions into the USACE planning process. There are two methods of expanding the shipper response in the USACE modeling process: 1) input total origin-destination-commodity demands (instead of unconstrained waterway traffic demands) into ORNIM and expand ORNIM (a Tier 3 model) with the Train-Wilson origin-destination-route choice logic; or 2) apply the Train-Wilson origin-destination-route choice logic into a regional routing model (a Tier 2 model), input the regional routing model equilibrium waterway traffic into ORNIM and remove ORNIM's economic equilibrium / diversion logic (versus an unscheduled closure diversion). The second step of this work effort is to provide

proof of concept tests for the uncovered methods. The third step of this work effort is to modify the USACE planning modeling process with the selected incorporation method.

Benefits:

This will make for more defensible investment decisions, although it is yet to be determined whether the recommendations from the planning process will be significantly different or improved.

Status:

In Progress

FY06 and FY07 desgn document scope of work negotiated and executed. Code work on ORNIM conversion has begun and preliminary results expected mid-December 2006.

Contract Data:

130465, W1040

Progress:

Products (Bookshelf/Toolbox):

Related Links:

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