Appendix D: Introduction to IMPLAN

As discussed within Section 4 of the report, the use of the IMPLAN software and data packages appears to be a consistent trend when conducting socioeconomic impact analysis. The IMPLAN software package is based on the mathematical input-output analysis as developed by the Noble Prize winning economist Wassily Leontief. The software examines the flow of dollars through the economy both between businesses and between businesses and final consumers. IMPLAN is considered a secondary input-output model in that the analysis utilizes economic and industry transaction data collected from a variety of other sources including national, state, and local government entities.[1,2]

There are two steps in conducting the input-output analysis. This includes (1) descriptive modeling and (2) predictive modeling.

- **Descriptive Modeling**

    In descriptive modeling, local economic interactions are examined in terms of the flow of dollars between purchasers and producers. Further, by using social accounting data, the descriptive model also examines non-industrial transactions, such as tax collection and government payments to business and individuals.

- **Predictive Modeling**

    In predictive modeling, the local economic interactions as examined in the descriptive modeling effort are used to develop multipliers, that is, the response of the economy to a change in demand or production. Three types of multiplicative effects are considered during the predictive modeling effort:

    o **Direct Effects** – Changes in the industries to which a final demand change was made

    o **Indirect Effects** – Changes in inter-industry purchases in response to the changes to the directly affected industries

    o **Induced Effects** – Changes in household spending based on income changes as a result of the industry changes

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[1] Minnesota IMPLAN Group, Inc. "IMPLAN Professional User Guide, Analysis Guide, and Data Guide." 2nd Edition, June 2000.
[2] Aase, Sara. "The Number Factory," Twin Cities Business Magazine, February 2008.

The IMPLAN Program is used by a variety of public and private entities including, but not limited to, the following[3]:

Federal Government
- Army Corp of Engineers
- Bureau of Economic Analysis
- Bureau of Land Management
- Economic Research Services
- Environmental Protection Agency
- Federal Reserve Bank
- Fish & Wildlife Service
- Forest Service
- National Park Service
- Natural Resources Conservation Service
- USDA Rural Development

Texas State Government
- Texas Department of Economic Development
- Texas Forest Service
- Texas Water Development Board

Universities
- Texas A&M University
- University of Texas
- University of North Texas

KEY ASSUMPTIONS OF IMPLAN

IMPLAN was originally developed by the University of Minnesota in conjunction with the United States Department of Agriculture's Forest Service. Since that time, it has been further developed by MIG, Inc. and has become a widely accepted tool for conducting economic analysis as evidenced by its use by federal and state governments and academic institutions. Despite its place as the seminal economic analysis tool, the software package does rely on assumptions which may or may not result in the most accurate analysis. The input-output modeling system is based on the following five assumptions as outlined by MIG, Inc.[4]

- **Constant Returns to Scale** – Production functions are considered linear with no recognition of economies of scale;

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[3] MIG, Inc. Client Listing, http://implan.com/index.php?option=com_content&task=view&id=64&Itemid=28, accessed March 24, 2009

[4] Minnesota IMPLAN Group, Inc. "IMPLAN Professional User Guide, Analysis Guide, and Data Guide." 2nd Edition, June 2000.

- **No Supply Constraints** – Industries are assumed to have unlimited access to raw materials and output is limited only by demand;

- **Fixed Commodity Input Structure** – Price changes are assumed to not impact a firm's buying decisions, that is, industry demand is assumed to be inelastic;

- **Homogenous Sector Output** – The proportion of commodities produced by an industry is assumed to be the same, that is, all products of an industry will be produced at the same rate;

- **Industry Technology Assumption** – It is assumed that an industry uses the same technology to produce all of its products.

While it is recognized that these assumptions do potentially produce some inherent weaknesses in the IMPLAN results, it is the Project Team's opinion that these weaknesses do not materially affect the outcome of the analysis. This opinion is further substantiated by third-party review of the Weinstein and Clower study in which it is stated:

> "The IMPLAN model does not fully capture local effects (particularly for induced impacts). In testing the results against a more appropriate model; however, the results were not materially different."[5]

Given the above finding and the general acceptance of the IMPLAN model in the industry, along with its use by the Texas Water Development Board, the Project Team believes the IMPLAN model is appropriate and produces sufficiently accurate results for the purposes of conducting socioeconomic impact analysis related to water supply alternatives.

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[5] Perryman, Ray., Technical memorandum reviewing and critiquing the draft economic impact analysis of the proposed Marvin Nichols Reservoir conducted by Weinstein, L.B., and Clower T.L, (March 2003) and a review of the economic impact analysis conducted by Weihaun, Xu of the Texas Forest Service (August 2002). Prepared for Mr. John Rutledge of Freese and Nichols, Inc. December 2002.