Design and Development of Geographical Information System (GIS) Map for DOE Waste Streams

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INTRODUCTION

The Waste Information Management System (WIMS) is an n-tier web-based system created to visualize, understand, and manage the vast volumes, categories, and problems of forecasted waste streams.

Limitations of GIS map module of WIMS:
- Static image display through custom programming
- Modifications of waste generating sites and waste disposition sites result in redesigning flow lines
- Multiple polylines affect the visualization of the map as shown in Fig. 1

Fig 1. WIMS GIS map showing intersecting polylines
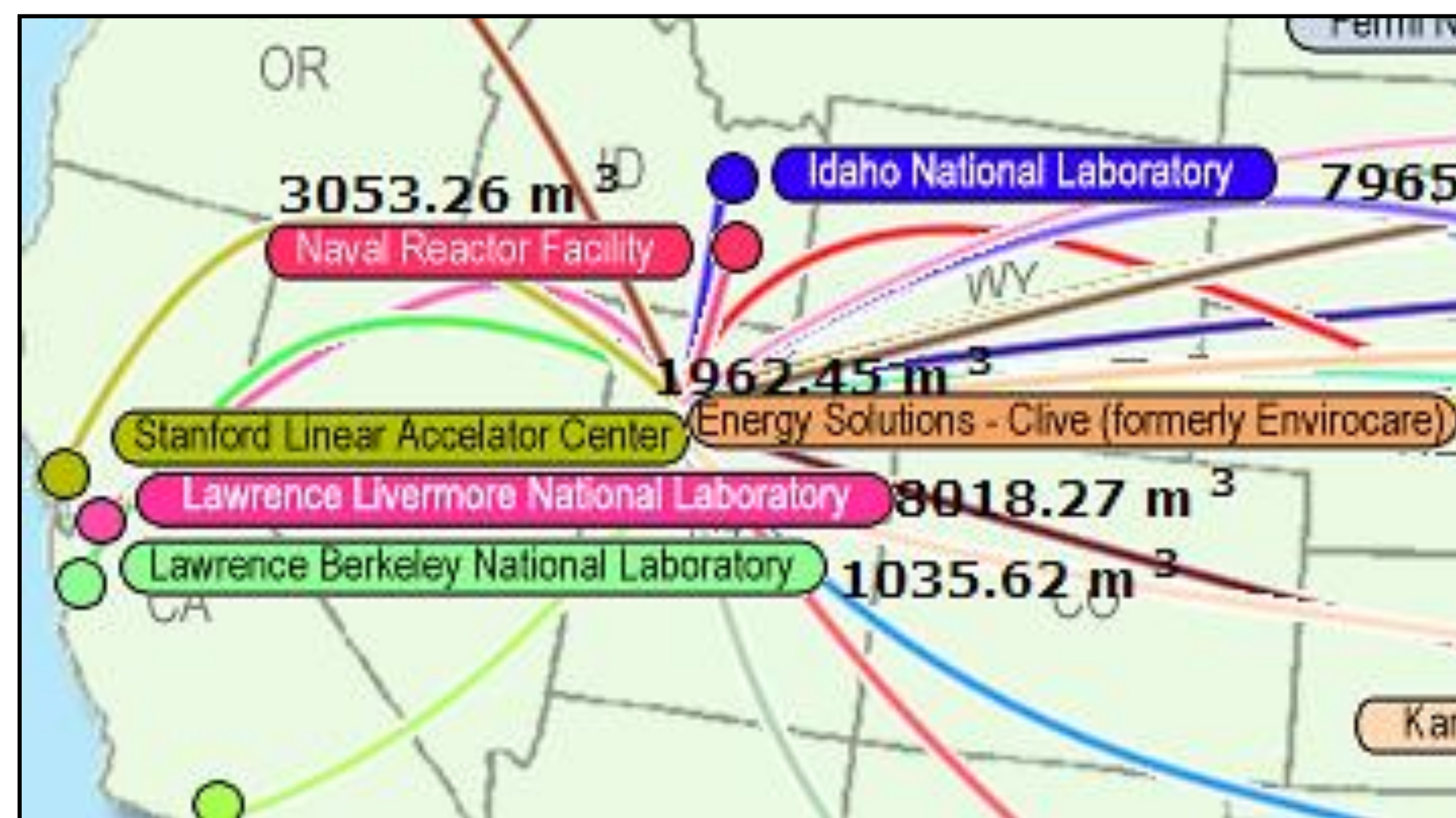
OBJECTIVES

- Design and development of waste streams services using WCF
- Development of GIS module using Google Application Programming Interface (API) and waste stream services
- Research and development of an algorithm to prevent overlapping of polylines for enhanced visualization of the map

METHODS

- Development of waste stream database using SQL Server
- Development of waste stream services using Windows Communication Foundation (WCF) framework
  - *Asynchronous JavaScript and XML (AJAX)*
  - *JavaScript Object Notation (JSON)*
- Development of Google map using Google map API
- Development of algorithm using trigonometric graphic formulas for drawing Bezier curve

Fig 2. Functionality diagram of the application
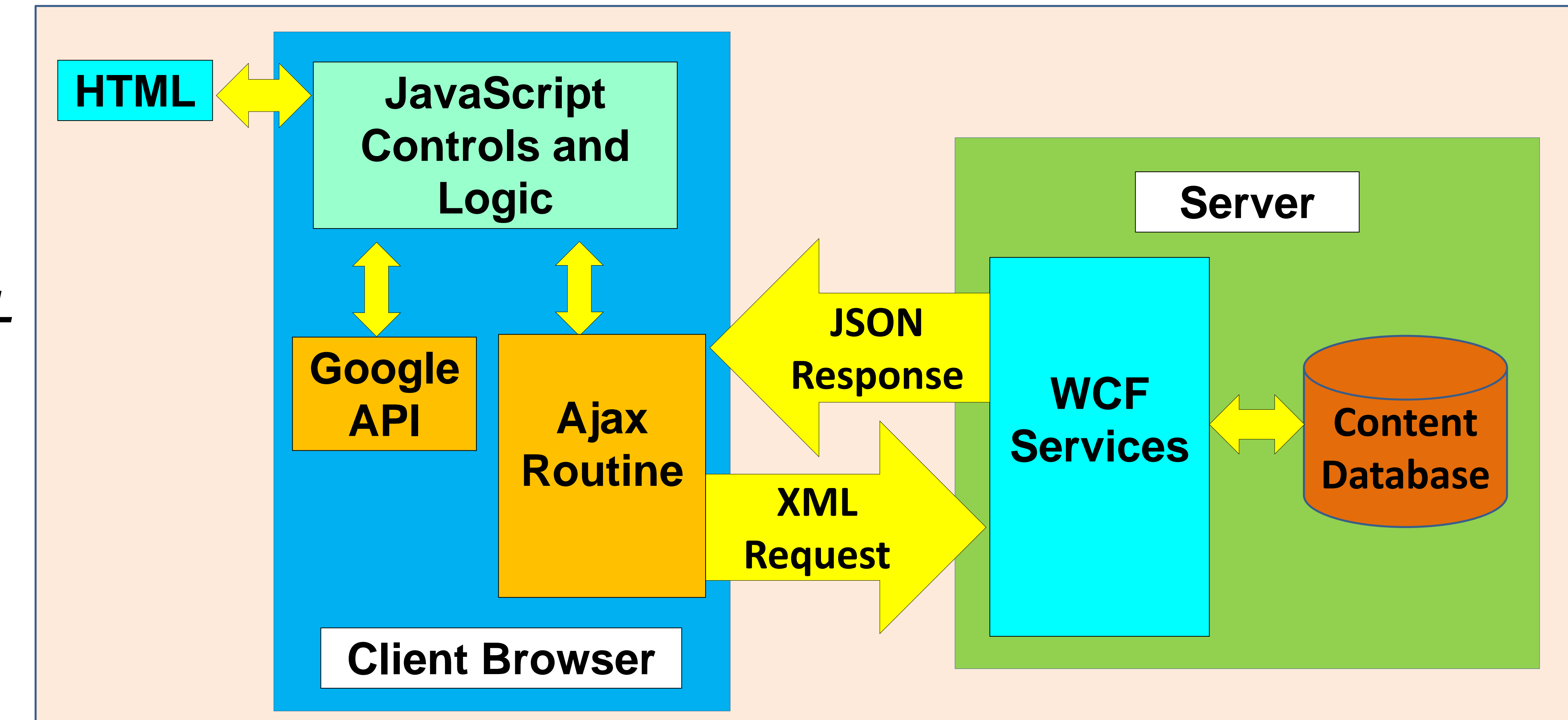
RESULTS

Fig 3. Google map showing reporting site and its disposition facility
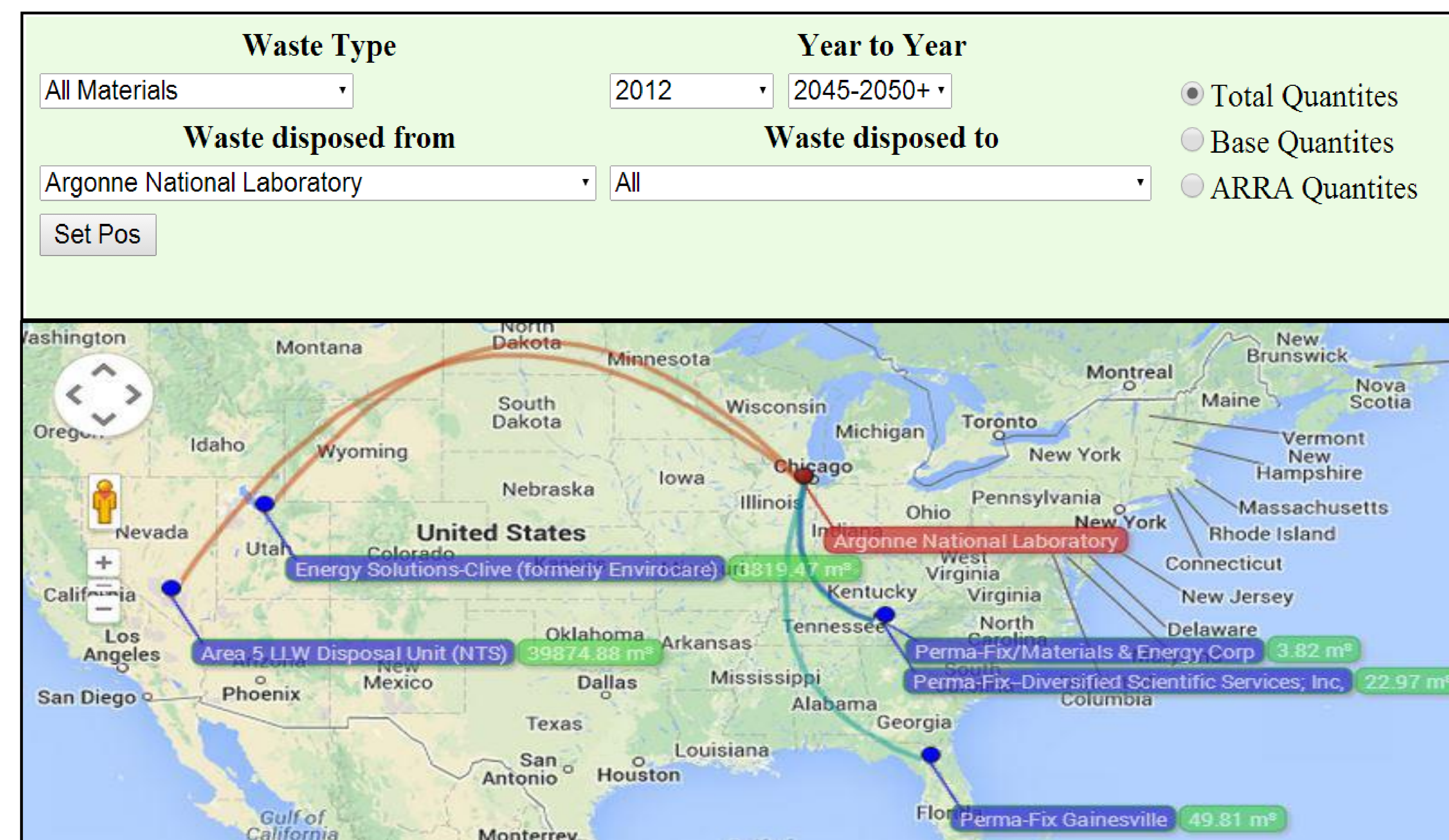
CONCLUSION

Designed and developed a Google map for displaying the waste reporting site and its disposition facility with the volume of waste transported.

PATH FORWARD

Development of an algorithm for the clear presentation of polyline on Google map which will make use of mathematics (Cubic Bezier) to determine which lines will be closer to each other and to formulate relationships between the lines and space them accordingly.