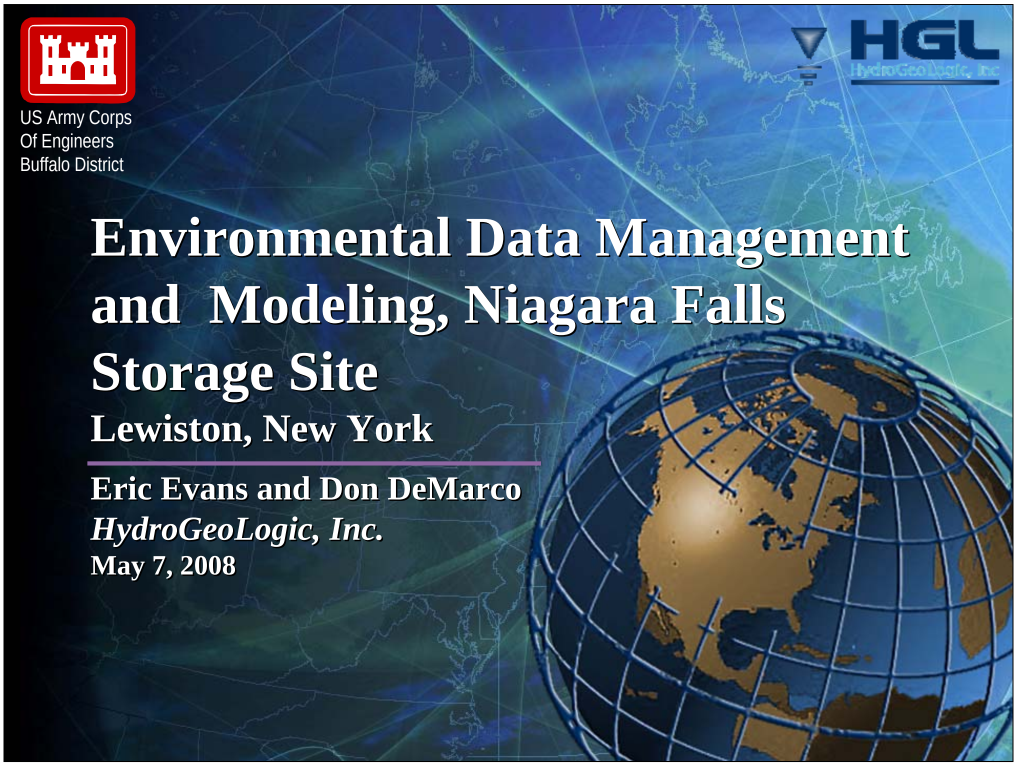


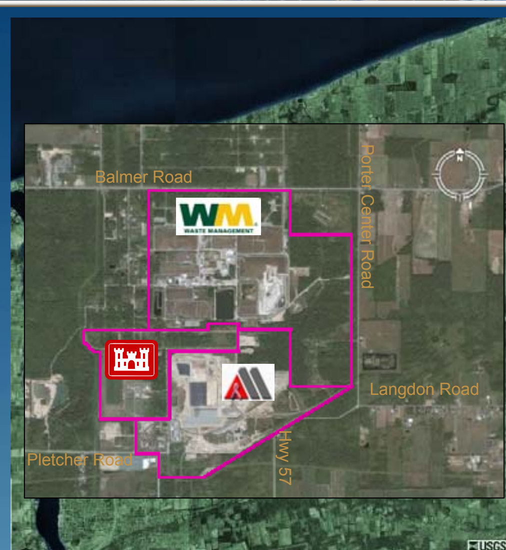
Mr. Eric Evans, M.Sc., P.G. is a Senior Hydrogeologist with 20 years experience. His role on the project has been as Program Manager, Project Manager and expert modeling technical oversight.

Mr. Don DeMarco, M.Sc. P.Geo. is a Senior Hydrogeologist with 12 years experience. His role has been as Project Manager and Lead Modeler.

US Army Corps
Of Engineers
Buffalo District

Overview

- Model Overview;
- Data Compilation / Conceptual Model Development;
- Flow Model Development;
- Solute Transport Model Development;
- Predictive Simulations;
- Summary & Conclusions.



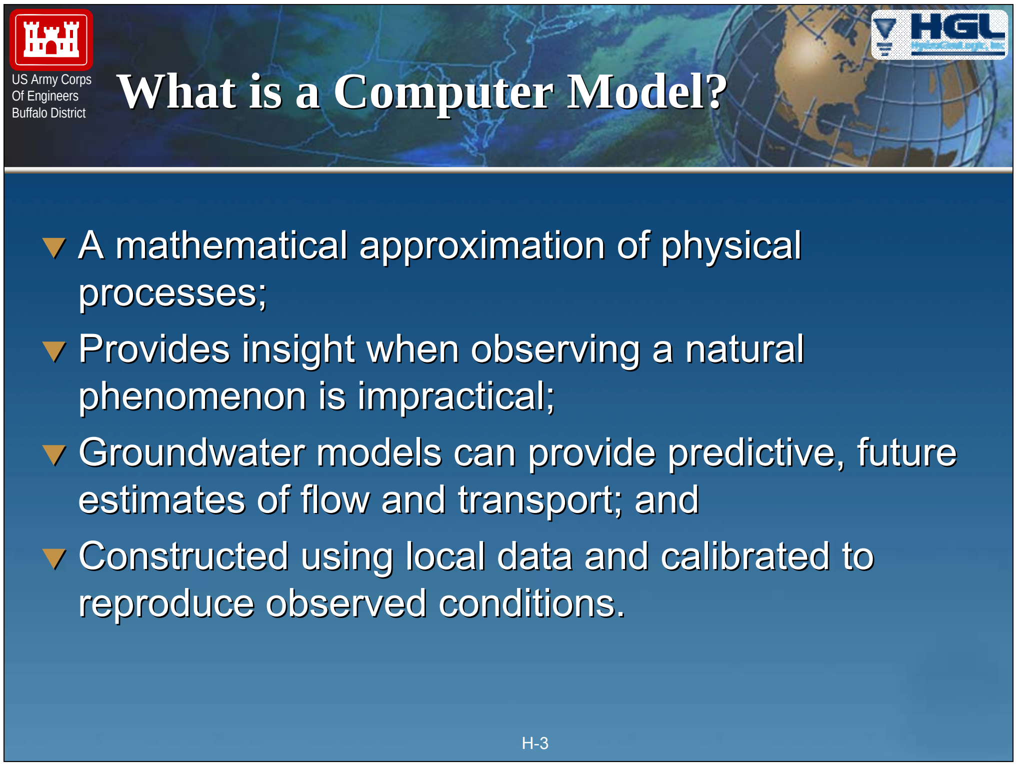
H-2

The modeling presentation will provide an overview of the modeling analysis conducted for the Niagara Falls Storage Site (NFSS).

The main purpose of the modeling analysis is to predict the long-term migration of contaminants originating from the NFSS.

The work was conducted in four primary phases: 1) data compilation / conceptual model development; 2) flow model development; 3) solute transport model development; and 4) prediction simulations.

Details regarding the modeling analysis can be found in the report, Groundwater Flow and Contaminant Transport Modeling, Niagara Falls Storage Site, Lewiston, New York, dated December 2007.



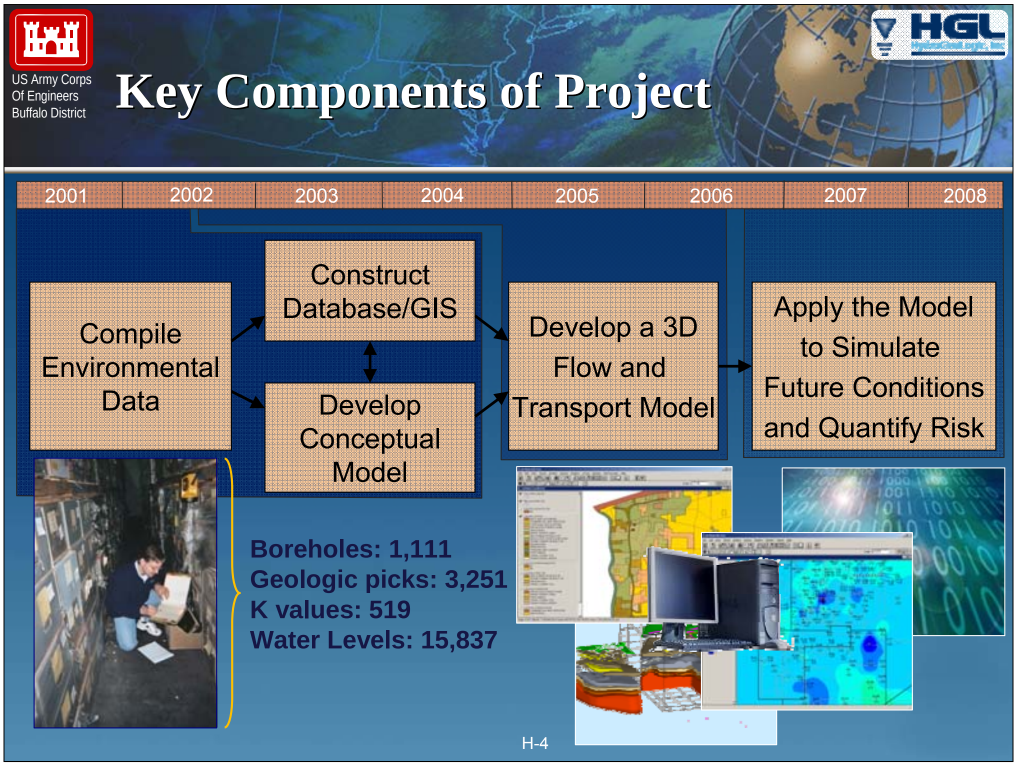
Groundwater modeling involves the use of a computer to solve a series of mathematical equations that describe groundwater flow and contaminant transport.

Groundwater models are calibrated using field observations and measurements.

Groundwater models are used to estimate groundwater flow directions, groundwater velocities, and the concentration of chemicals dissolved in groundwater.

Groundwater models are commonly used to understand conditions that occurred in the past or will occur in the future.

Groundwater models are calibrated using field observations and measurements.



The modeling analysis conducted for the NFSS was comprehensive and spanned several years.

At the beginning of the project, an extensive effort was undertaken to compile data from the NFSS and surrounding properties. These data were organized in a database and a Geographic Information System (GIS) was developed to view the data on maps.

The GIS and database management system were used to develop a conceptual model for the site. The conceptual model summarizes all of the key components that govern the flow of groundwater and migration of contaminants including hydraulic conductivity, water table elevations, and physical properties of the porous media and constituents.

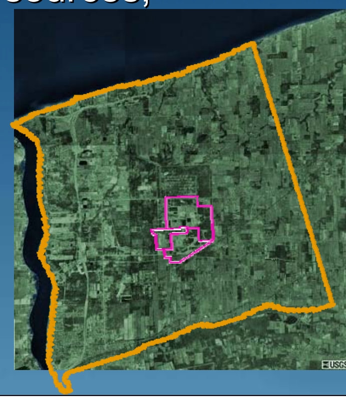
The NFSS conceptual model formed the foundation for the development and calibration of a groundwater model.

Once the NFSS model was calibrated, it was used to conduct predictive simulations.

US Army Corps
Of Engineers
Buffalo District

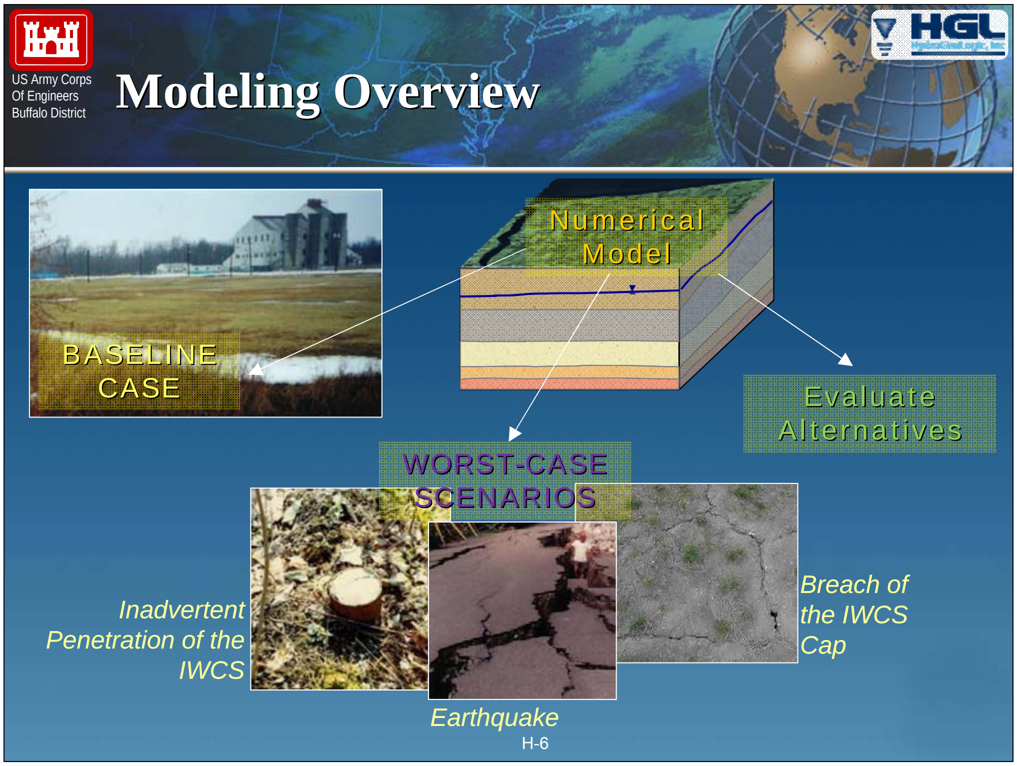
Features of NFSS Model

- Developed using MODHMS which is based on the widely accepted USGS MODFLOW model;
- A 60 square mile regional model incorporating data from CWM, ML and USGS data sources;
- Developed from NFSS database of more than 100,000 site-specific or local data values;
- HGL model developers for USEPA and US Nuclear Regulatory Commission.



H-5

A few of the notable features of the NFSS model and relevant experience of the modeling team are presented in this slide.

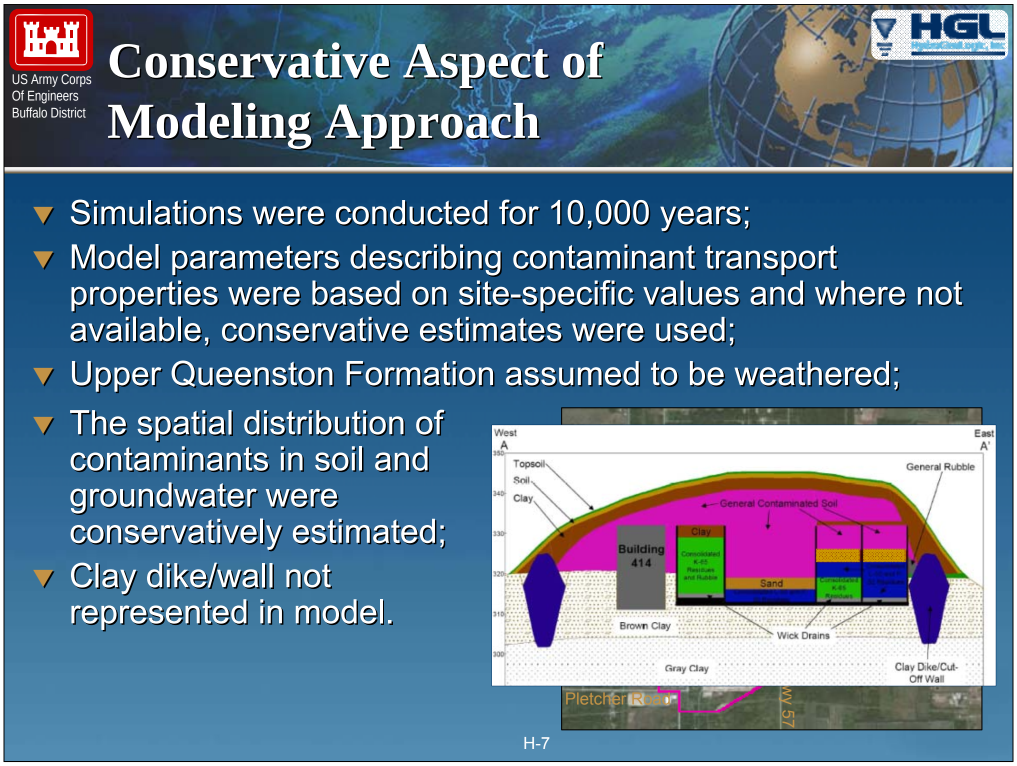


After the NFSS model was constructed and calibrated, it was used to predict the future migration of contaminants originating from the site.

Computer simulations were conducted to predict the long-term migration of contaminants assuming current site conditions (i.e. baseline simulations).

Simulations were conducted to evaluate the impact of three worst-case scenarios; inadvertent penetration into the interim waste containment structure (IWCS); a large-scale breach of the cap; and the impact of a large scale earthquake.

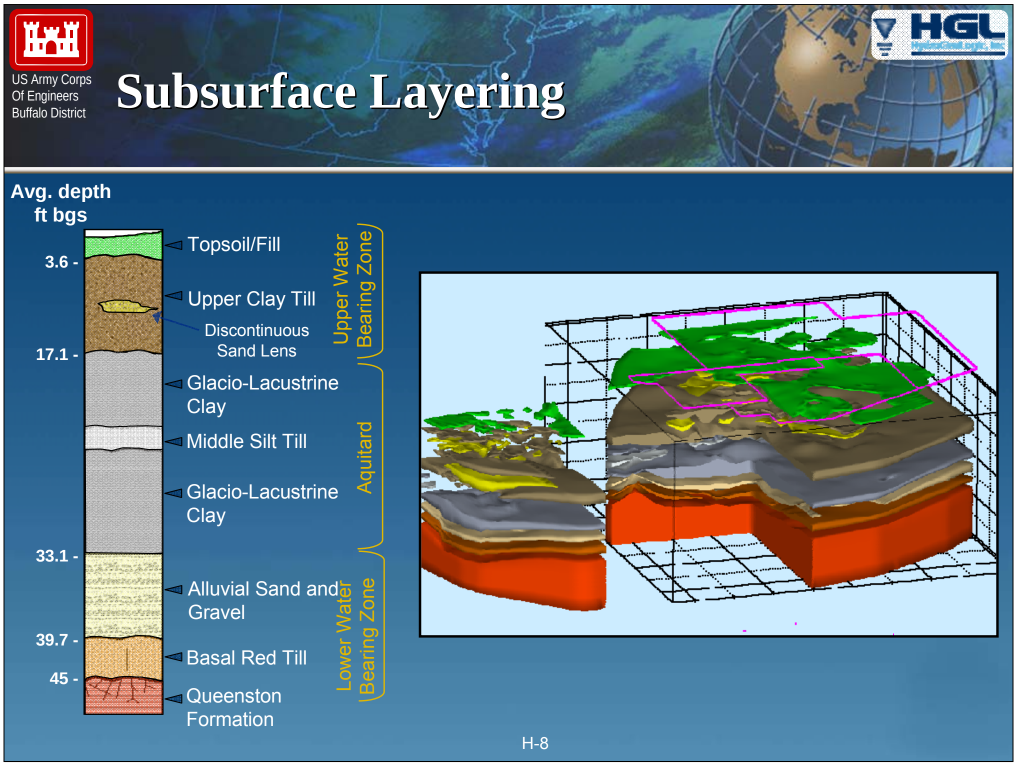
The model will also be used to help evaluate the effectiveness of remedial alternatives that will be evaluated in the feasibility study.



There is uncertainty associated with all models, because there is uncertainty in the data that are input into the model. Uncertainty can be reduced by developing a model using comprehensive and site-specific data. The NFSS model was developed based on a large volume of local field observations.

To ensure that the model provides predictions that are protective of human health and the environment, conservative assumptions and estimates of input parameters were used in cases where field estimates were not available.

The slide illustrates a few of the assumptions that were used in the modeling analysis.



Prior to constructing the NFSS model, considerable effort was undertaken to understand the geology underlying the NFSS and surrounding region. Three dimensional data visualization tools were used to define the extent and thickness of geologic layers and to understand the permeability of these geologic units.

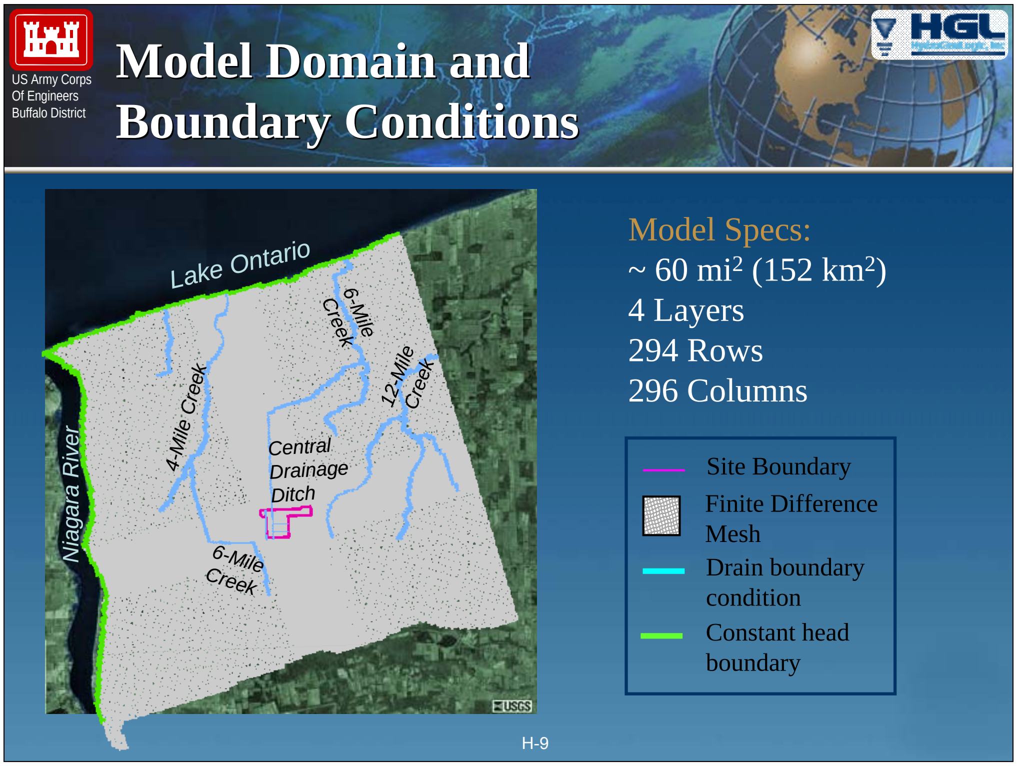
Permeability is the ease at which a fluid will move through soils or rocks. Sand and gravel are typically characterized by high permeability and clays are characterized by low permeability. Groundwater flow and contaminant migration is typically slow in low permeability materials.

The glacial sediments and bedrock underlying the NFSS are characterized by low permeabilities; however, there are units that are more permeable than other units.

The Upper Water Bearing Zone (UWBZ) consists primarily of the Upper Clay Till (UCT), which primarily consists of clay. Thin discontinuous sand lenses can be found within the Upper Clay Till; however, the results of a detailed geostatistical analysis concluded that these sand lenses are not continuous over distances greater than 15 to 20 feet in length and 4 to 5 feet in height.

The Lower Water Bearing Zone consists of the Alluvial Sand and Gravel and the upper, fractured portion of the Queenston Shale.

The Upper and Lower Water Bearing Zones are separated by a thick sequence of low permeability clays that impede groundwater flow.



The first step in the groundwater flow model construction process is to superimpose a grid onto the modeled area.

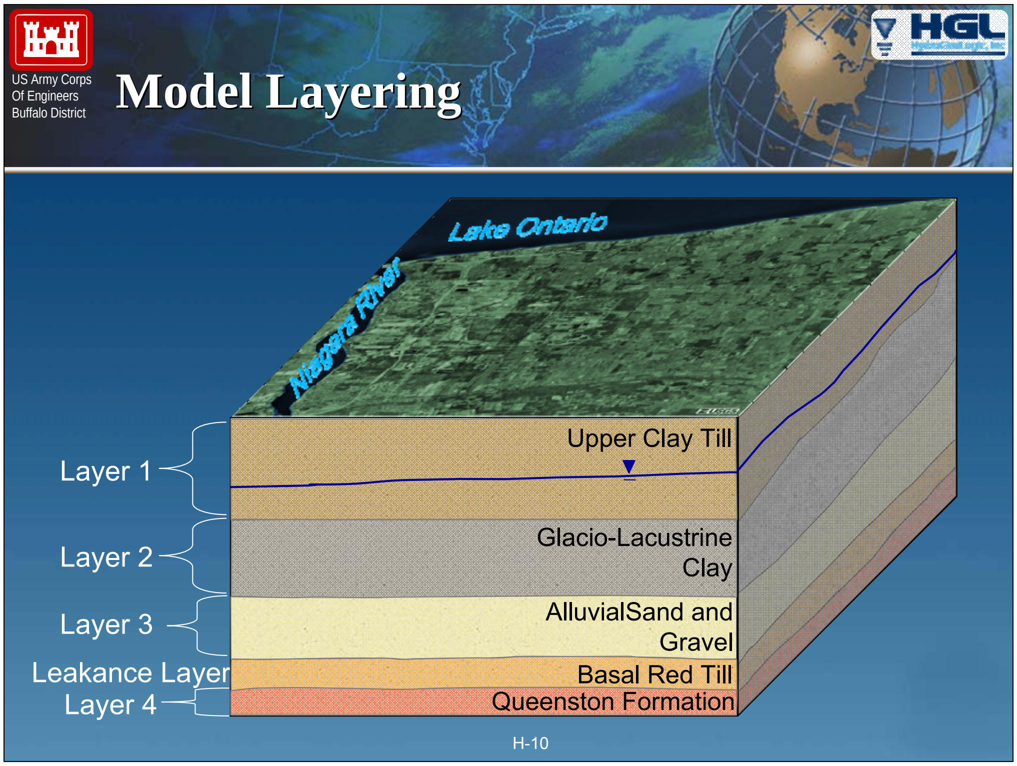
Water-level elevations, groundwater velocities, and contaminant concentrations are calculated by the model at the center of each grid cell.

The spacing of the grid is finer in the area of interest and is coarser outside this area where less accuracy is required.

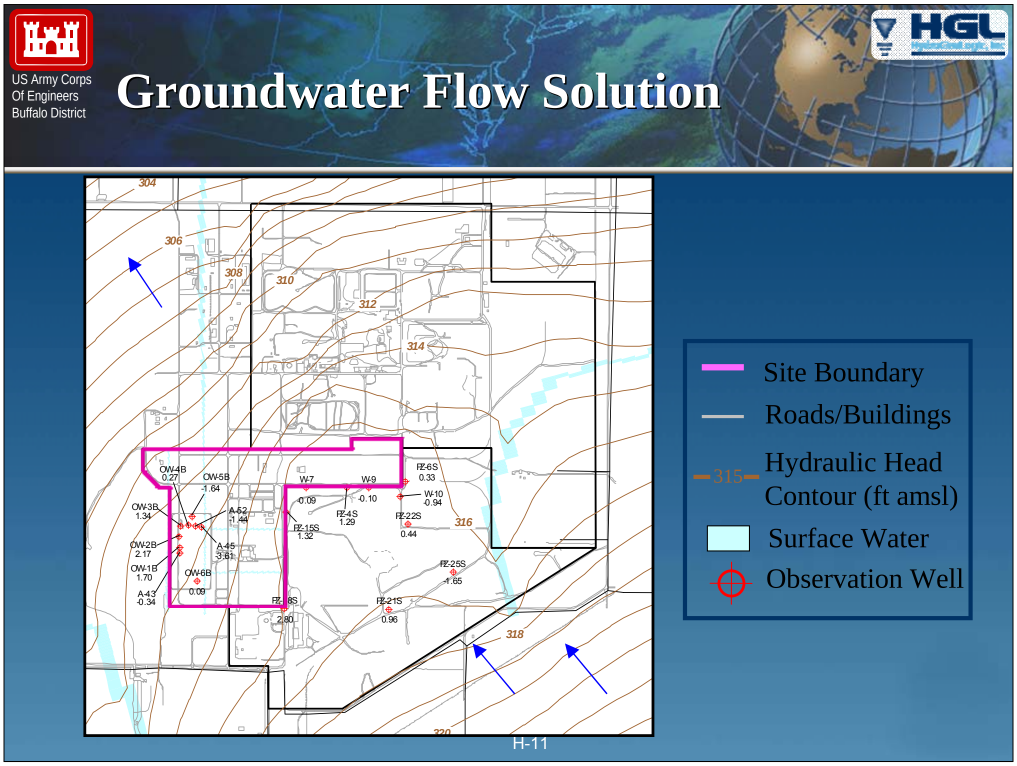
At the beginning of the project, we did not know the predicted extent of contamination; consequently, we extended the edges of the model far beyond the NFSS property boundary.

The model extends to the Niagara River and Lake Ontario, which are natural hydrologic features which control regional groundwater flow.

The regional groundwater flow direction is to the west and to the north towards these surface water bodies.



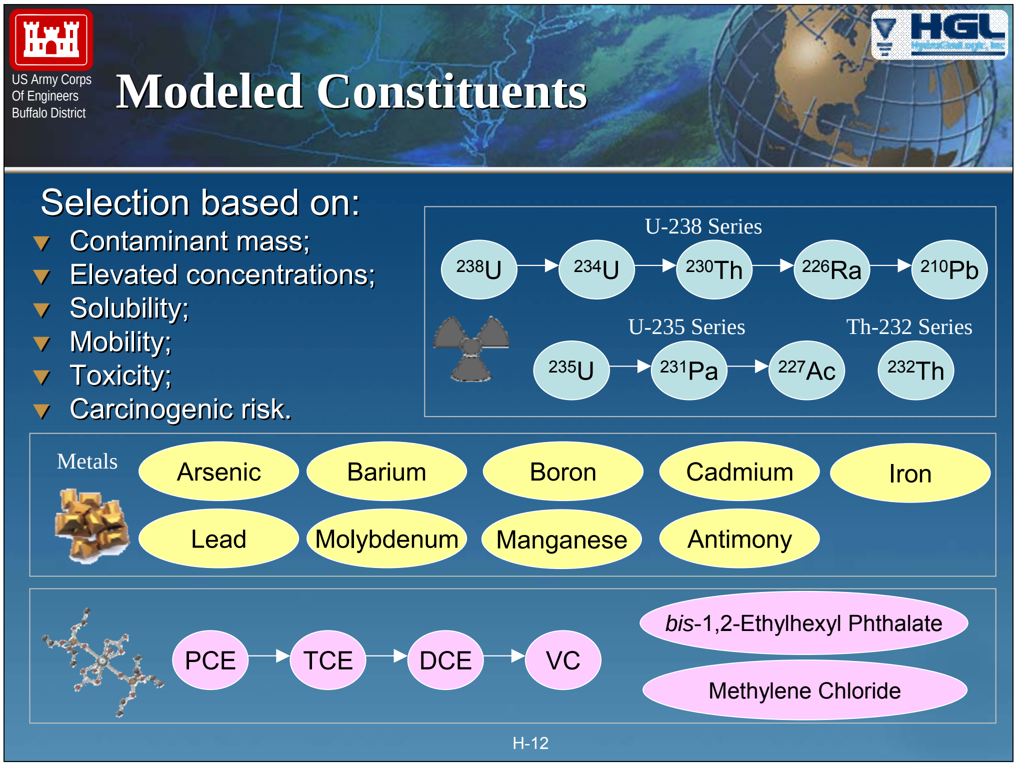
The model was constructed using four layers of model cells. These layers represent the primary geologic units underlying the NFSS and surrounding region. The topography of each layer surface was obtained by interpolating the depth to the layer an extensive catalogue of local borehole data.



The groundwater flow model was calibrated using water-level data measured in wells located at the NFSS, Chemical Waste Management (CWM), and Modern Landfill facilities. Regional data were also obtained from the U.S. Geologic Survey.

We achieved a very good calibration. This is illustrated on the map which shows the difference between water levels calculated by the model and observed in the field.

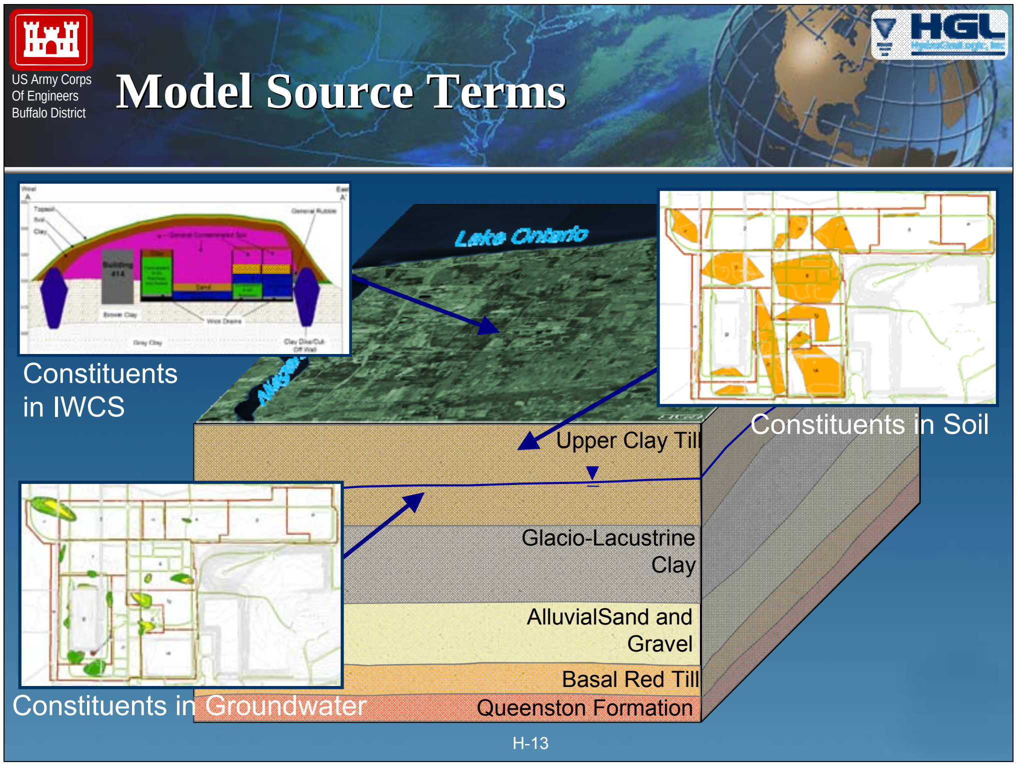
In accordance, groundwater flow patterns predicted by the model closely match those observed at the site.



After the model was successfully calibrated, the model was adapted to simulate the transport of contaminants.

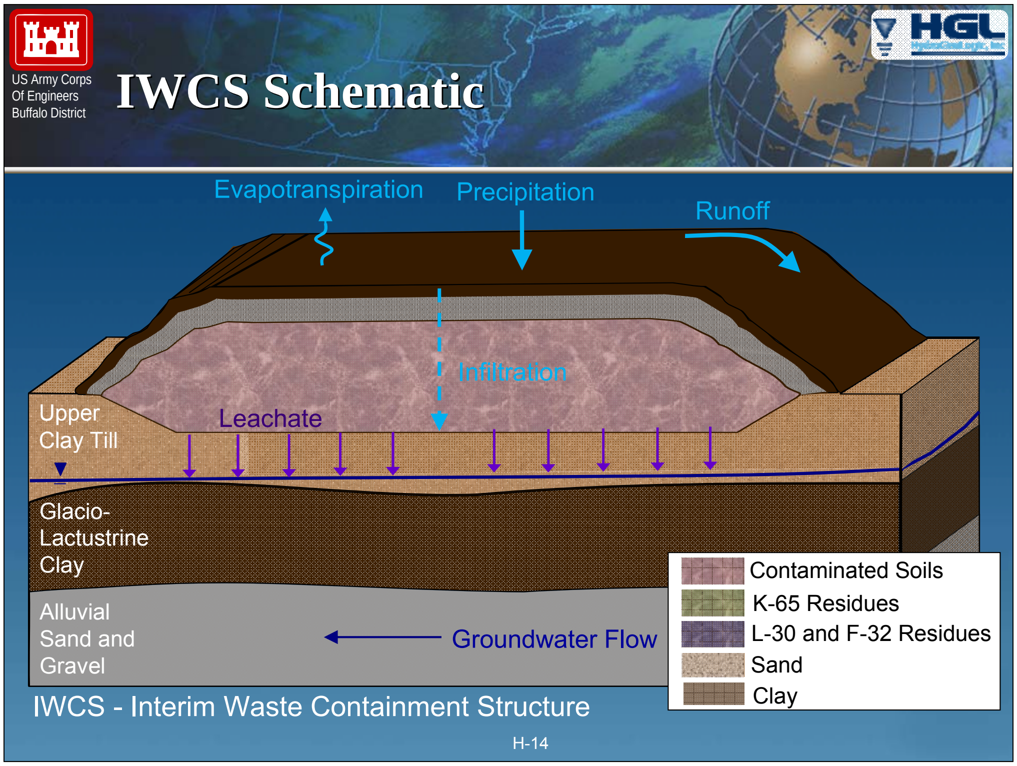
It is a lengthy process to simulate each constituent; consequently, key constituents were selected for simulation. The key constituents were selected based on the criteria described in the slide.

The model was constructed to accurately simulate the decay and ingrowth of radionuclides. As a parent radionuclude decays, it is converted to its daughter product.



There are three sources of contaminant mass that are represented in the three dimensional groundwater flow model. These include: 1) contamination in the IWCS; 2) contamination in soil; and 3) contamination that currently exists in groundwater.

Additional modeling tools were used to simulate the downward movement of contaminants in the IWCS and soil, and provide an estimate of the concentrations reaching the water table.



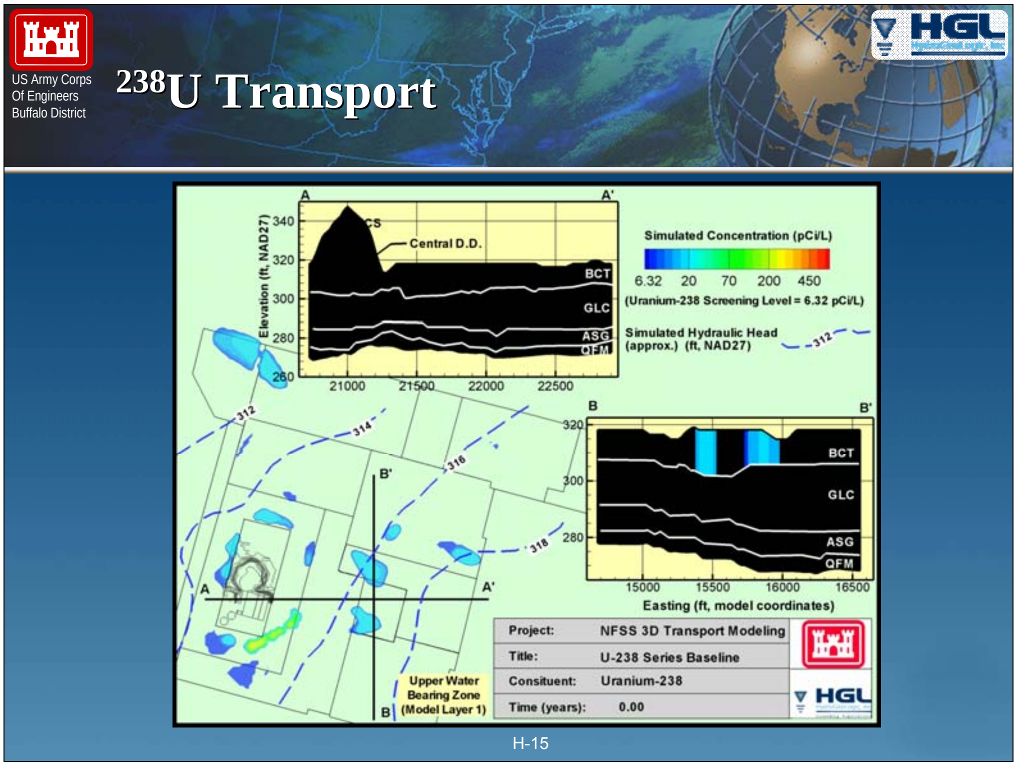
Because the IWCS contains the majority of the contaminant mass at the NFSS, a considerable effort was made to accurately predict the leaching of contaminants originating from the IWCS and the transport of these contaminants to the water table.

Two one-dimensional models were used to perform these simulations.

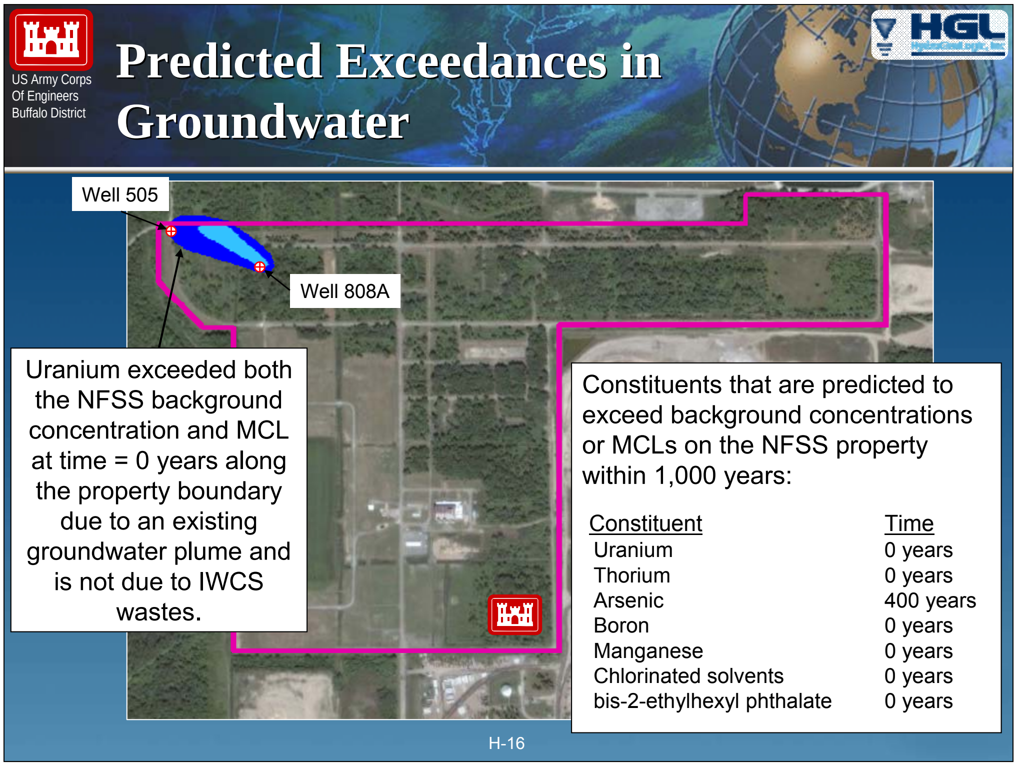
The Hydrologic Evaluation of Landfill Performance (HELP) model was used to predict the rate in which water would flow through the cap and into the IWCS waste. The HELP model is commonly used to simulate landfill performance. It is known to provide conservative infiltration rates.

A one-dimensional MODHMS model was constructed to simulate leaching and migration of contaminants. The results of the HELP model were used as input into the MODHMS model.

The amount of mass in each of the waste materials was assigned in the model along with the physical properties of the waste materials.

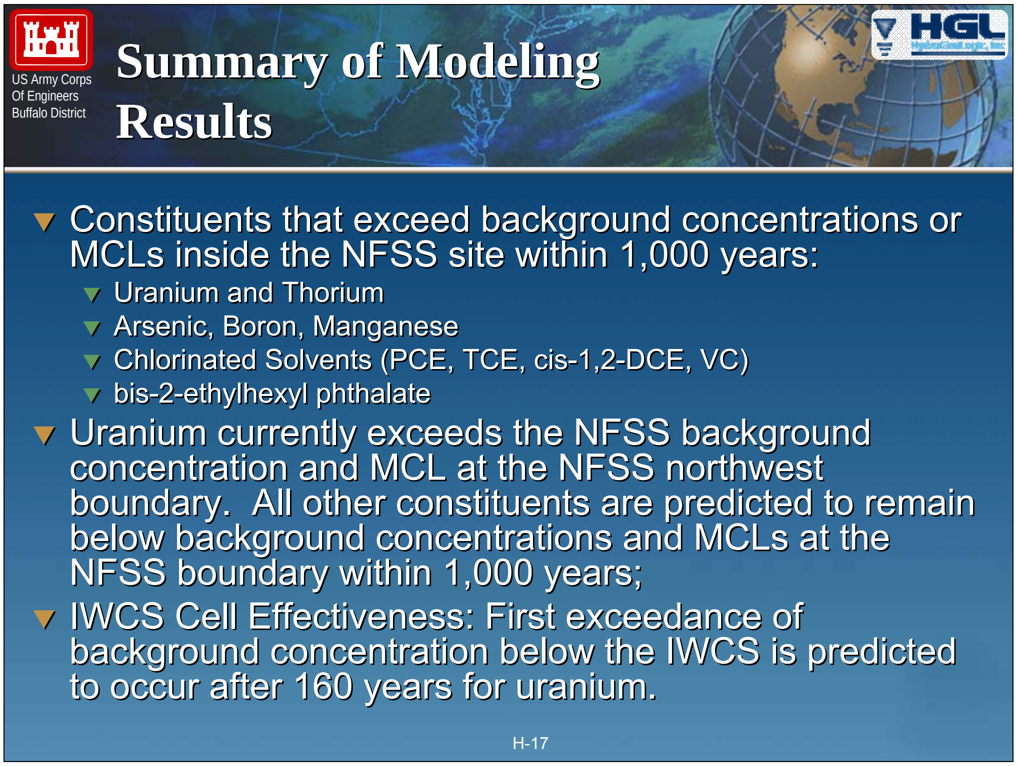


The following animation illustrates the predicted migration of uranium-238. For Uranium shown here, localized areas of elevated concentration are denoted using color contours corresponding to values shown in the legend.



Uranium in groundwater currently exceeds background levels at the northwestern portion of the site. Uranium is the only constituent to migrate off-site within 1,000 years. The source of these Uranium concentrations is not the IWCS, but the result of past radioactive storage activities that caused contaminants to leach to groundwater.

The extents of the Uranium plume were determined based on data from wells 505 and 808A. The dissolved total uranium result for well 505 was 30.2 µg/L and marginally exceeded the USEPA drinking water standard of 30 µg/L for Total Uranium. The drinking water standard is only presented for comparison purposes although groundwater is not being used as a source of drinking water at this location. Well 505 was incorporated into the USACE Environmental Surveillance Program to monitor the Uranium concentrations at this location.



The following slide summarizes the general conclusions of the modeling analysis that was conducted for the NFSS.

This concludes our formal presentation.