TECHNICAL GUIDANCE

GROUND WATER REMEDIAL INVESTIGATIONS UNCONSOLIDATED DEPOSITS OF NEW JERSEY

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THE OLD DAYS...GONE BYE...




TECHNICAL REGULATIONS REQUIRE A REMEDIAL INVESTIGATION OF GROUND WATER (7:26E-4.4)

WHEN ?

1. Previous Ground Water Sample Exceeds **Any** GW Quality Standards
2. Soil Sample Within 2.0' of Saturation Zone/Bedrock Exceeds Soil Standards
3. Soil Contamination Exceeds Standards & To Be Left In-Place
4. Any Contaminant Water Solubility Greater Than 100 mg/liter

REMEDIAL INVESTIGATION
Ground Water (Section 3.0)

PURPOSE :

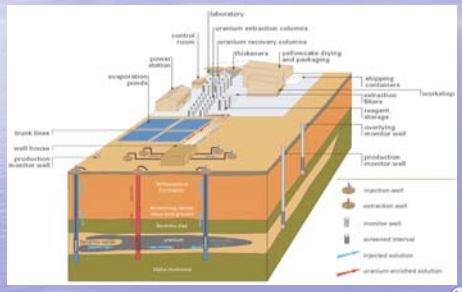
- Characterize Site Hydrostratigraphic Units
- Delineate Ground Water Contamination
- Identify Sources of Ground Water Contamination

KEY TO ANY REMEDIAL INVESTIGATION

"Hydrogeological Model"

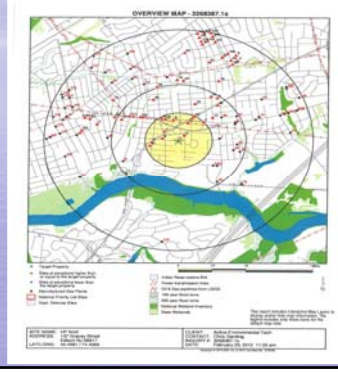
(NOTE : New Guidance Appendix - Details Methodologies)

3D HYDROGEOLOGICAL MODEL
DEVELOPED FROM OTHERS' INFORMATION



START A CONCEPTUAL MODEL

IDENTIFY DRAINAGE



RECEPTORS

DEFINE SITE CONDITIONS & SITE INVESTIGATION (MUST)

LOCATION AND TYPES OF UNCONSOLIDATED AQUIFERS NEW JERSEY

FOUR MAJOR TYPES OF UNCONSOLIDATED AQUIFERS

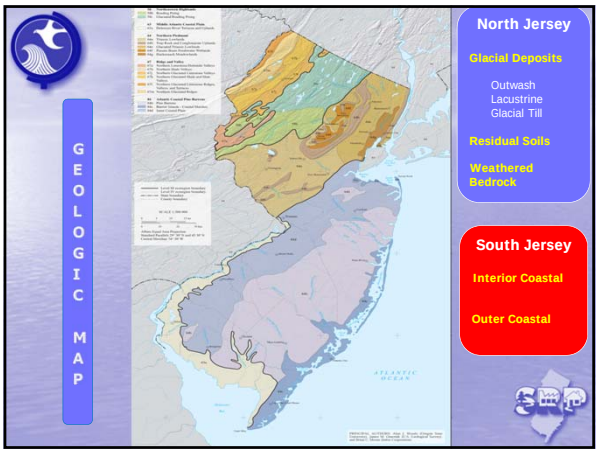
Coastal & Beach Deposits (South Jersey)

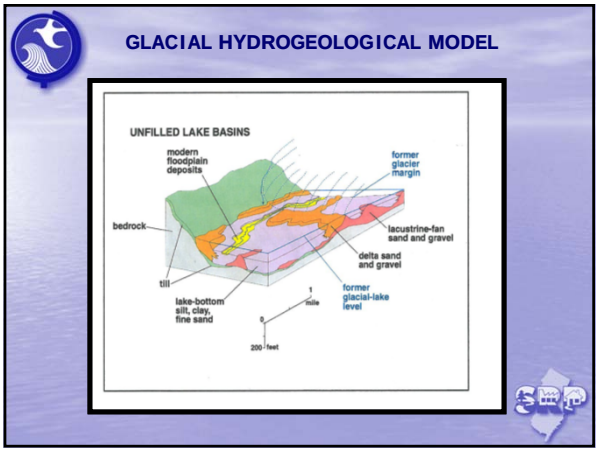
Glacial Deposits (North Jersey)

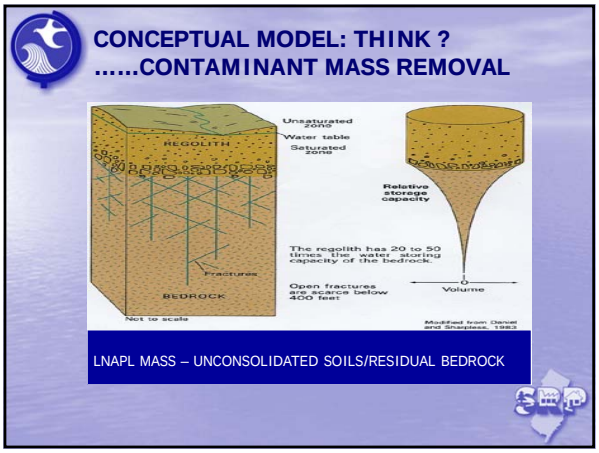
Residual Soils (Central & North Jersey)

Upper Weathered Bedrock (Acting As An Unconsolidated Aquifer)

NOTE: New Reference Source(s) In Guidance As Appendix


GEOLOGIC MAP
North Jersey
Glacial Deposits
Outwash
Lacustrine
Glacial Till
Residual Soils
Weathered Bedrock
South Jersey
Interior Coastal
Outer Coastal


GLACIAL HYDROGEOLOGICAL MODEL
UNFILLED LAKE BASINS
modern floodplain deposits
former glacier margin
bedrock
lacustrine-fan sand and gravel
delta sand and gravel
till
former glacial-lake level
lake-bottom silt, clay, fine sand
1 mile
0
200 feet


CONCEPTUAL MODEL: THINK ?
.....CONTAMINANT MASS REMOVAL
REGOLITH
Unsaturated zone
Water table
Saturated zone
Fractures
BEDROCK
Not to scale
Relative storage capacity
The regolith has 20 to 50 times the water storing capacity of the bedrock.
Open fractures are scarce below 400 feet
Volume
LNAPL MASS – UNCONSOLIDATED SOILS/RESIDUAL BEDROCK

IMMEDIATE ACTION SOMETIMES NECESSARY

- Potable Well (10 feet Away)
- Vapor Hazard In Home
- Sump in Basement (Free Product Exists)
- Residual Soil Contaminated
- Bedrock Grossly Contaminated
- Remove Free Product
- Excavate Residual Soil & Weathered Bedrock While Dewatering Free Product

The Triad Approach

"Triad approach is a process that integrates systematic planning, dynamic work plans, and real-time measurements to achieve more timely and cost effective site characterization and cleanup."

ACTIVE ENVIRONMENTAL TECHNOLOGIES, Inc.

TRIAD APPROACH
REMEDIAL INVESTIGATIONS

TECHNICAL TASK	BUDGET	COST	SCHEDUEL (Years)
TRIAD - REMEDIAL INVESTIGATION & REMEDIATION	$854,401.80		
RI-1 , CONCEPTUAL MODEL BASED ON OTHERS	$7,114.00		
RI-2, MOBILIZATION	$2,420.00		
RI-14 , R/W Report			
RI-18 , Remedial Investigation Ground Water	$14,710.00		
RI-19, PILOT TESTING	$20,700.00		
RI -21 , FULL SCALE TREATMENT TEST	$630,000.00		

REMEDIAL INVESTIGATION APPROACH FOR UNCONSOLIDATED AQUIFERS

Initial Hydrostratigraphic Model Complete

- Initial Concepts Developed
- Data Gaps & Limitations Identified

Site Specific Data Needed To Update The Site Model:

- Determine Ground Water Flow Direction
- Delineate the Contaminant Plume
- Determine Hydrostratigraphic Properties of Each Unit
- Design and Install Monitoring Network

Determine Ground Water Flow Direction

KEEP IN MIND THE FOLLOWING :

Are Wells Screened In Same Units ?

Do We Have Sufficient Background Data ?

Are The Plume Limits Understood (Horizontal & Vertical) ?

Do We Have Any Side Gradient Issues ? Pumping Wells

Are the Down Gradient Conditions Know ?

Where Will Additional Wells Be Needed ?

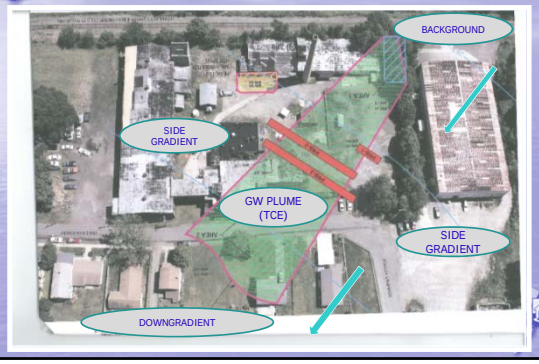
Installation of Monitoring Well Network

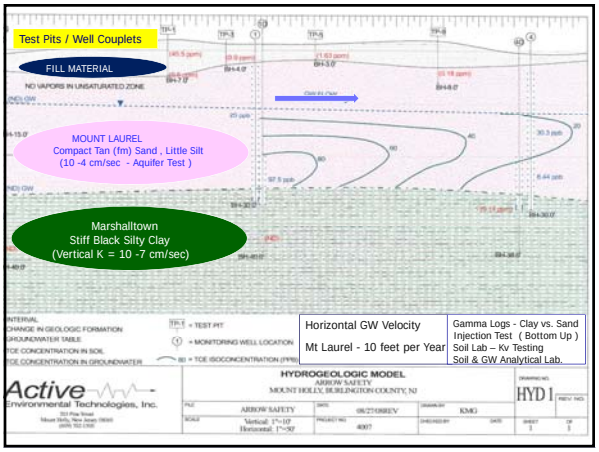
USE UPDATED HYDROSTRATIGRAPHIC MODEL

- Monitor Contaminant Plume
- Document Ground Water Flow Direction(s) in each water-bearing unit
- Document Vertical Gradients
- Evaluate Effectiveness of the Remedial Action

NOTE : ALWAYS WORK TOWARDS REMEDIATION SOLUTION

GENERALIZED SITE CONDITIONS





DRILLING SENTINEL MONITORING WELL

PRESENTATION & ANALYSIS CONTAMINANT PLUM INFORMATION

Make Sure Ground Water Contour Map Is Representative

Tabulate All Data

Do a Plan View of Contaminant Distribution in GW/Soil

Prepare Transects Perpendicular to GW Flow Direction (Flow Net)

Prepare Transect On GW Contour (Seepage Face)

Evaluate Data (Unknown Contamination, Background, etc.)

Evaluate Limitations (Hydraulic Conductivity Sensitive Variable)

FINALIZE HYRDROGEOLOGICAL MODEL & SELECTION OF REMEDIAL ACTION