

# Validating the Conceptual Site Model

NEWMOA

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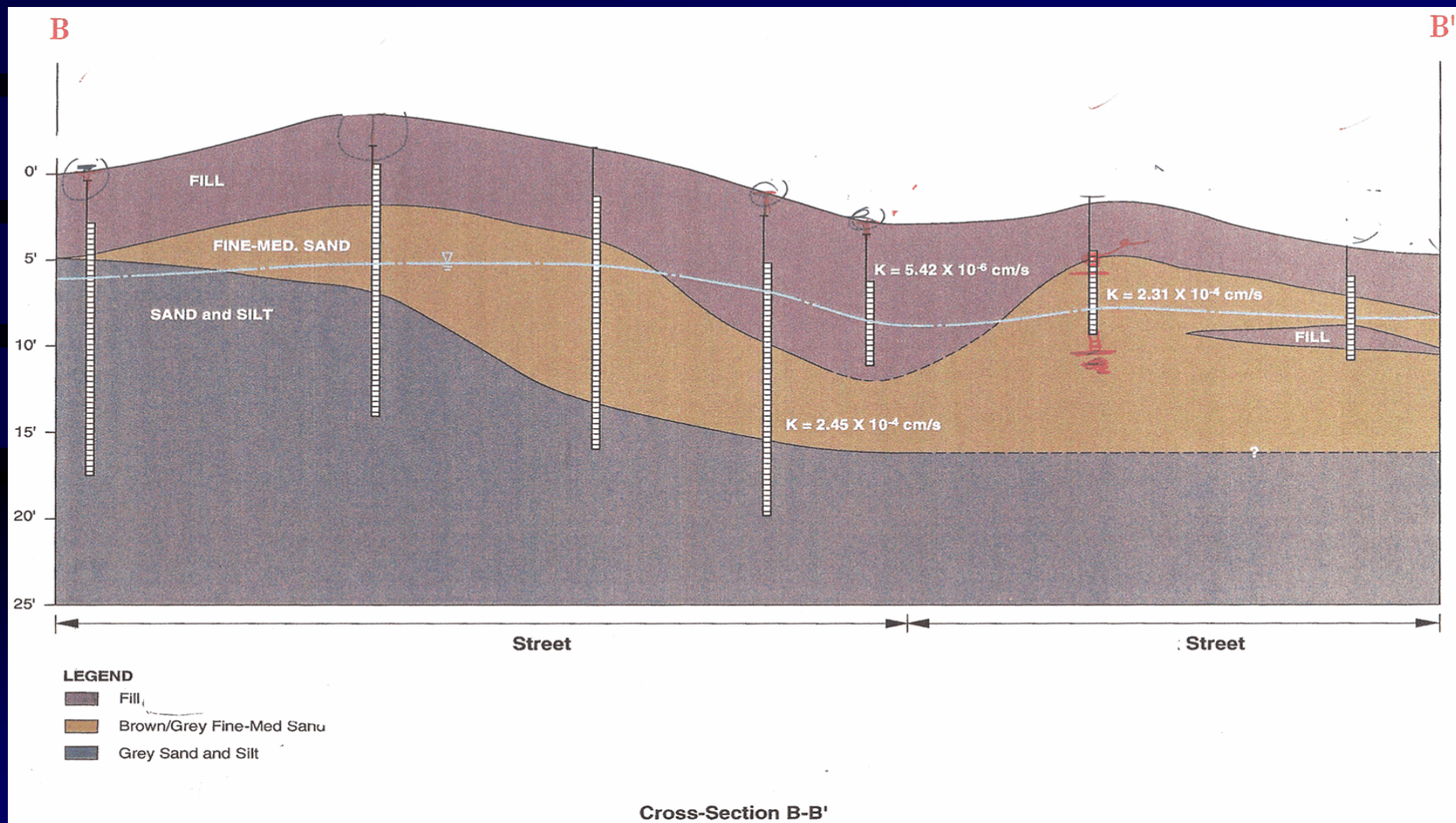
# Validating the Conceptual Site Model

- Why - You've created hypothesis; prove OR disprove
- How - by obtaining and evaluating data
- When - constantly (before, during, and after field work)
- Where - documentation (regulators are NOT mind-readers)

# Why validate?

- CSM tells the “story” of the site in a format that is easy to read, see, and understand
- Preliminary CSM is sketchy, lots of data gaps identified, field work supplies answers
- Evaluation of additional data either:
  - completes the picture/story OR
  - causes re-evaluation/restructuring of CSM

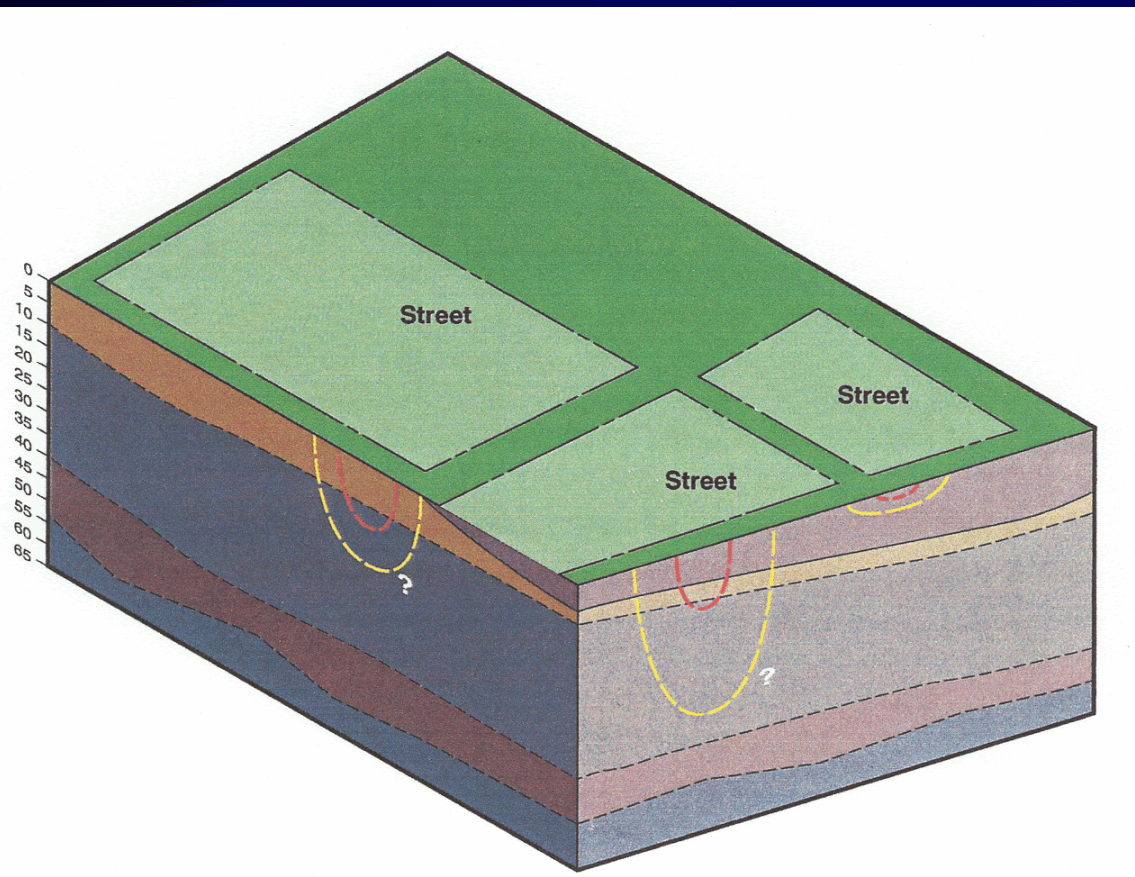
# Cross-Section for CSM



# CSM Validation is....

- An integral part of the Site Characterization Process; is documented in an updated CSM
- An iterative approach aimed at supporting the working hypothesis
- A process which occurs at simple or complex sites
- A dynamic process that may have to be done partly in the field, e.g., during response actions





**LEGEND**

- Fill
- Brown/Grey Fine-Med Sand
- Grey Sand and Silt
- Till
- Bedrock
- Estimated Contaminated Area

NOTE: Dashed lines indicate approximations of actual conditions

Figure 3.7

**Conceptual Illustration of Geology and Subsurface Contamination**

# Common Pitfalls

- Not validating a CSM, or not documenting validation of the CSM
- “My data WILL fit the model” (or, “I don’t really need to explain that anomaly”)
- Senior personnel not connected to field decisions
- Not allocating enough budget/time for peer review
- In absence of peer review - loss of perspective/objectivity (not being able to stand back far enough to see the big picture)

# CSM Validation is not.....

- Force fitting of data to match a preferred model
  - ⇒ Modify CSM to fit the data
- A process which always results in the filling of all data gaps
  - ⇒ All major data gaps must be evaluated
- Simply completing a canned checklist
  - ⇒ CSM Validation is site-specific

⇒ From LSPA/DEP course 2000



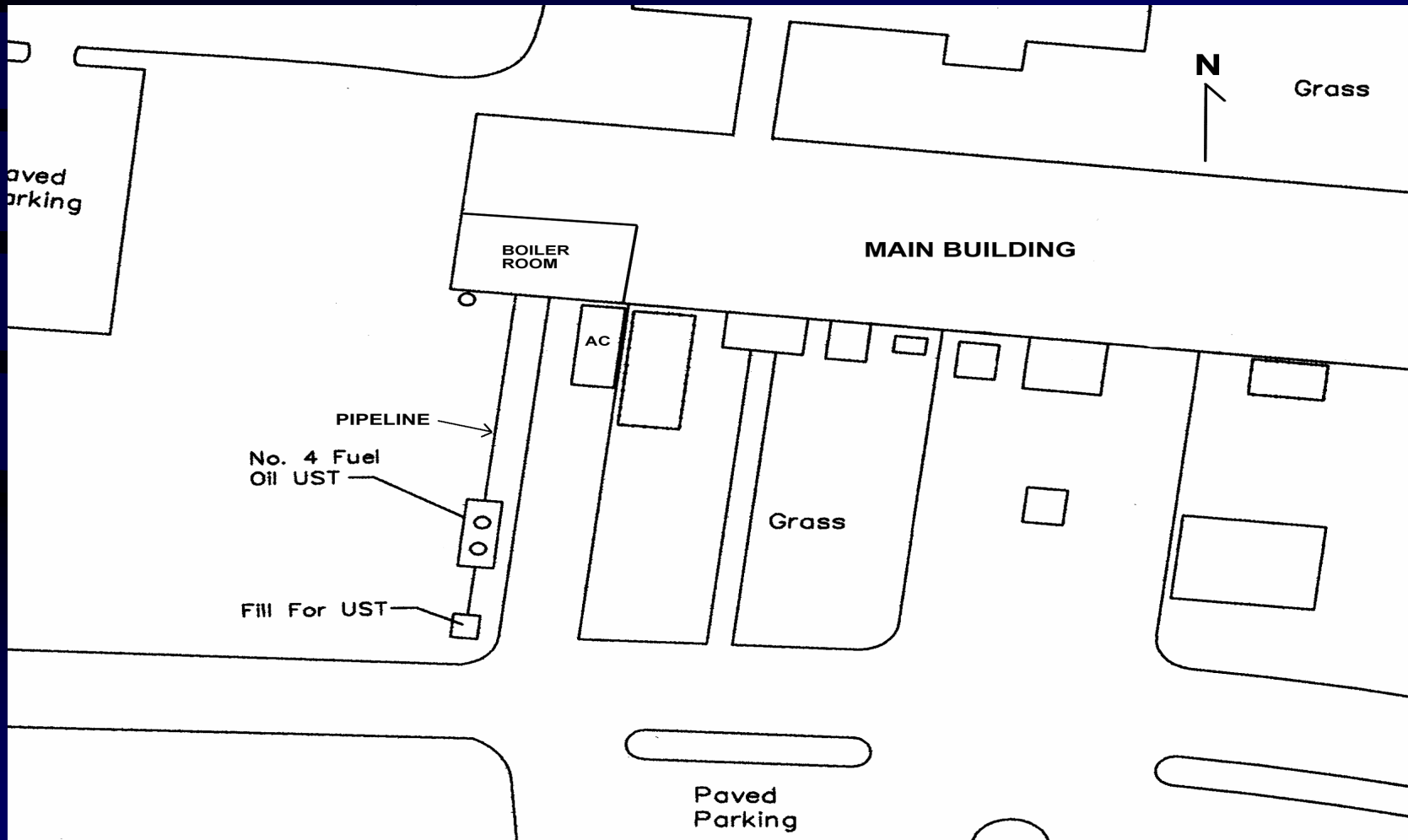
# Result

- Result of validation can be:
  - Model is similar to original; additional information answers questions
  - Model changes and produces more data gaps
  - Model is significantly changed (it happens!) - start over

# Hypothetical Case Study - Petroleum

- Initial Knowledge:
  - Former Warehouse (non-hazardous materials)
  - No known releases
  - No. 4 Fuel Oil Heating (15,000 gallon UST)
  - On top of steep hill adjacent to major river valley
  - Future use expected to be the same

# Site Layout



# Preliminary CSM

- Possible fuel oil release around tank, piping
- Contaminants - petroleum-related
- Pathways - soil, groundwater, indoor air
- Receptors - adjacent river; indoor air
- Lower concerns about risks in part due to likely future use, lack of human/environmental receptors

# Initial Results

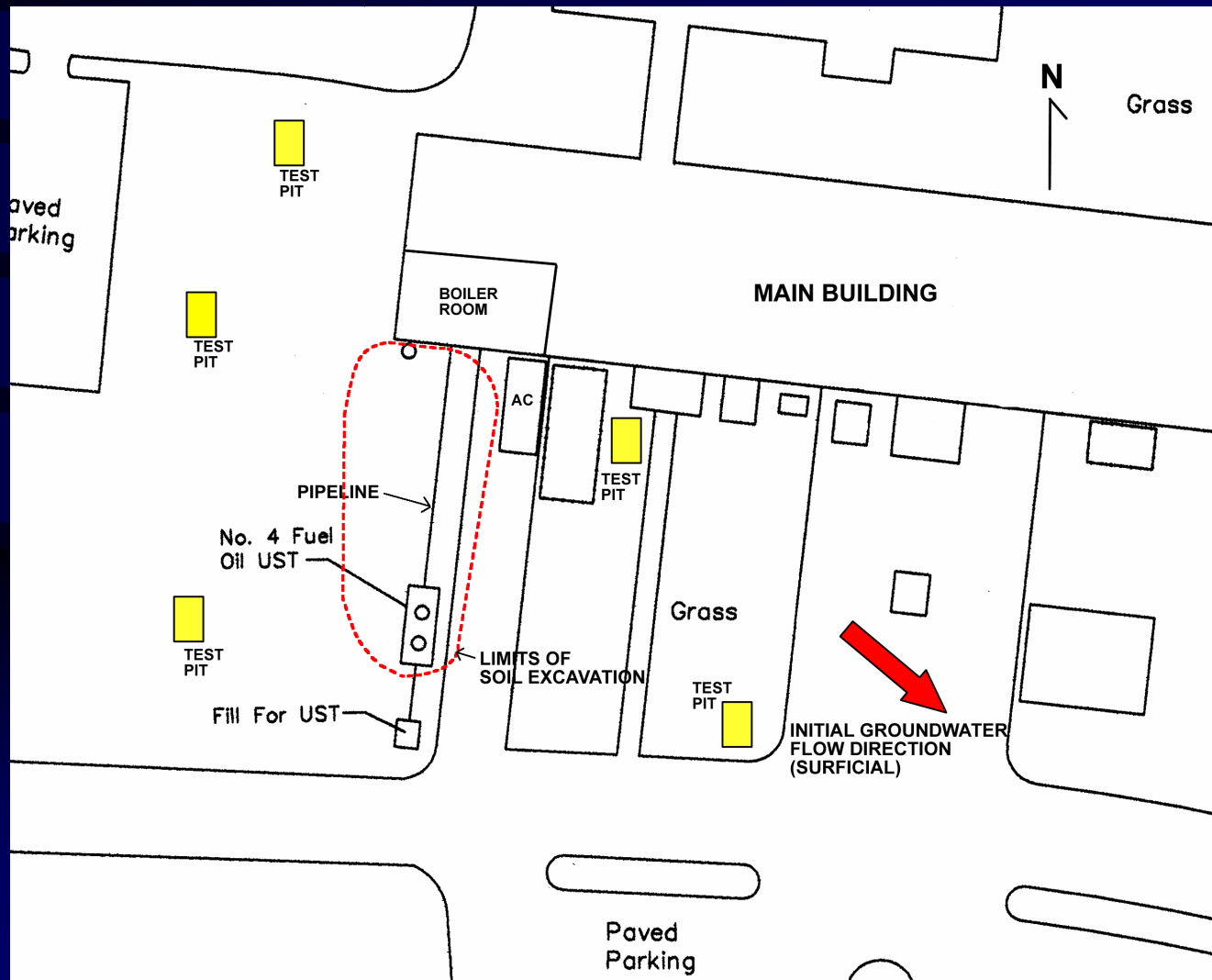
- PURPOSE - To provide coverage in due diligence
- Geoprobe soil borings to refusal (8-10 ft bg) show no evidence of release except in one boring adjacent to tank
- No nearby receptors - municipal water and sewer
- Groundwater flow direction established

# Additional Information

- Client wants to remove UST as potential concern (over 40 years old)
- Additional borings note contamination around piping, not UST
- Fuel oil UST removed, found to be in good shape
- Petroleum contamination found directly beneath piping run to building



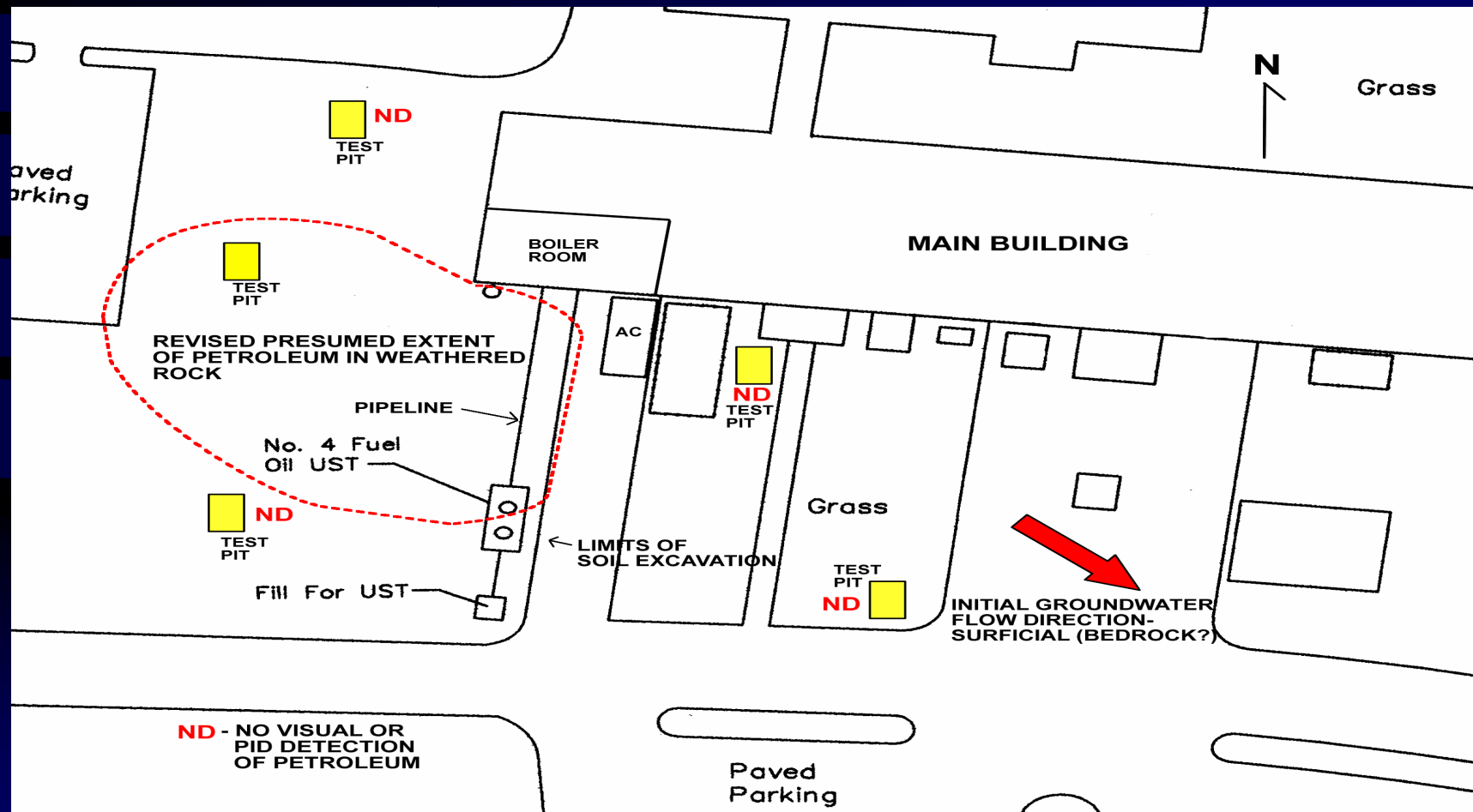
# Excavation Changes CSM



# MORE Information

- Potential Buyer may locate private school on property
- Private well on the north, “upgradient side” in bedrock within 500 feet
- Contamination is in the weathered bedrock
- Geoprobe wells were not deep enough to detect majority of contamination

# Validating “on the fly”



# CSM Validation includes...

- Identification of data gaps
- Evaluation and prioritization of data gaps
- Further investigation to eliminate significant data gaps
- Discussion/defense of decision to evaluate
- Evaluation of other hypotheses which are supported by the data

# Simplify

- Simplification is tough for data hounds like scientists!
- Caveat is important (“The information is based on.....”) but can also be simplified
- Think like an English major - tell the story very simply
- Use basic format - one paragraph to one page; use pictures/sections if possible

# Executive Summary for Reports

- Source area, release mechanism
- Site setting - current and historical uses
- Contaminants of concern/fate & transport
- Site hydrogeology/geology (regional and local)
- Migration Pathways (soil, gw, sw, air)
- Exposure Pathways/Receptors



# Summary - CSM Validation

- Identify and investigate data gaps, OR explain why you did not
- Adjust the CSM based on data
- Validate CSM with an objective mind
- Use peer review where possible
- Clearly describe your results - Executive Summary