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NYSERDA's Views on the Preliminary Draft Decommissioning EIS

for the
West Valley Citizen Task Force

Presented by: Paul Bembia

August 23, 2006

New York State Energy Research and Development Authority

Purpose of this Discussion

- In Sept 2005, SAIC completed a Preliminary draft DEIS for agency review.
- Multi-agency review of the Preliminary draft was completed in March 2006.
- Independent Peer Review of the Preliminary draft was completed in April 2006.
- Significant technical issues were identified through these and earlier reviews.
- The schedule for release of the DEIS for public review has not been updated and remains at January 2007.
- Important for the CTF to understand some of the challenges that must be addressed before a Joint Decommissioning DEIS can be completed and issued for public review.

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Decommissioning Environmental Impact Statement

- Important technical issues
- Results of the EIS Peer Review
- Final thoughts and discussion

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Important Technical Issues

- Long-Term Erosion Modeling
- Groundwater Modeling
- Receptors and Exposure Scenarios
- Engineered Barriers

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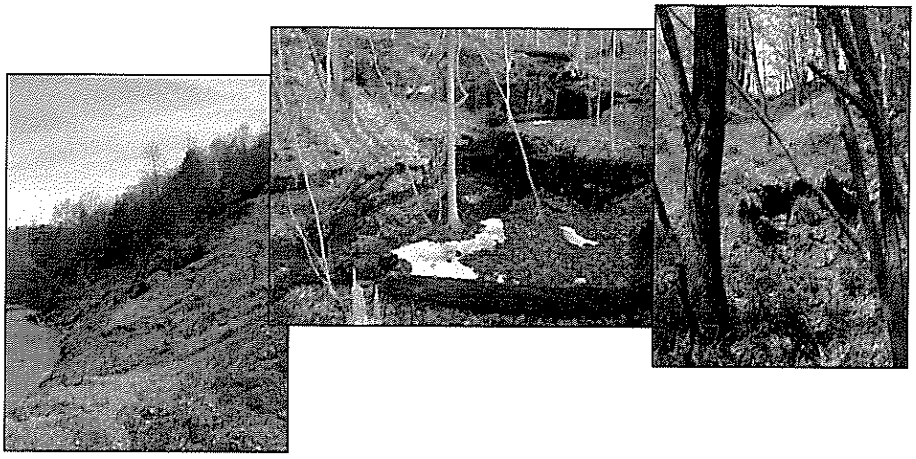
Erosion

Erosion is an important consideration in assessing decommissioning options at West Valley.



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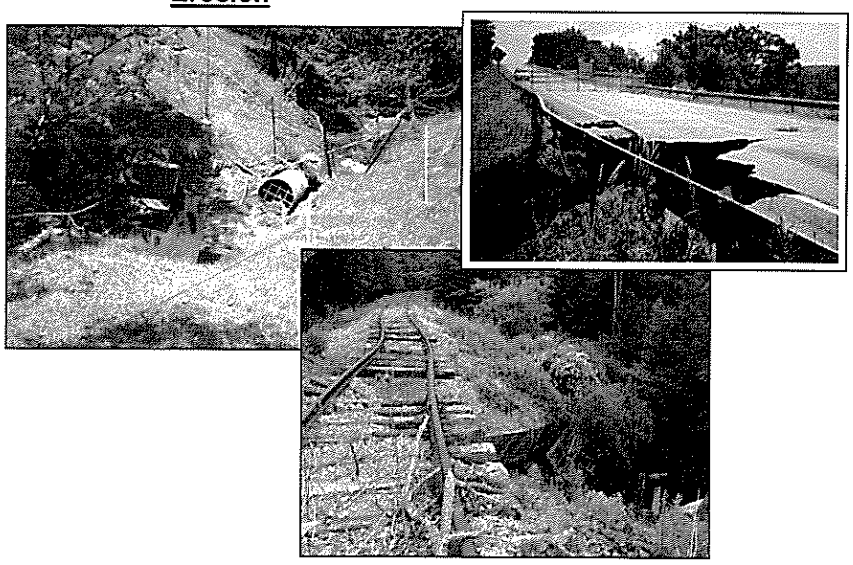
Erosion



If left unabated, erosion may also degrade or destroy engineered structures.

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Erosion in long-term dose modeling

If a facility gets impacted by erosion, erosion processes will control the volume and rate of contaminant release into creeks...

The volume and rate of contaminant release into creeks controls the concentration at downstream receptor locations...

Concentrations at the receptor locations are critical in determining ***the dose to a receptor...***

...and the NRC decommissioning criteria in the West Valley Policy Statement are based on the dose to a receptor.

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Long-Term Erosion Modeling

Some practical considerations ...

- Erosion processes in the real world are sensitive to many natural and man-made influences.
- Predicting erosion impacts over tens of thousands of years is a significant technical challenge.
- There is no "standard" method for conducting erosion predictions, particularly for long periods of time.

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Long-Term Erosion Modeling

A computer program (SIBERIA), was selected for preparing the erosion predictions.

SIBERIA uses mathematical equations to represent erosion processes.

Certain site and environmental data are input to the program, including a digitized map of the site topography.

SIBERIA calculates the change in elevation at each point by simulating the movement of soil from one point to another.

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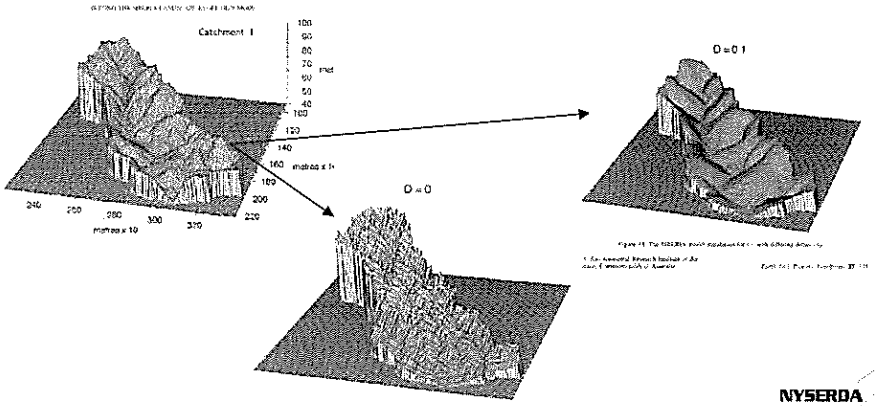
Long-Term Erosion Modeling

The calculations change the points on the grid from their initial elevations to new elevations.

The new elevations represent the changes in the landscape.



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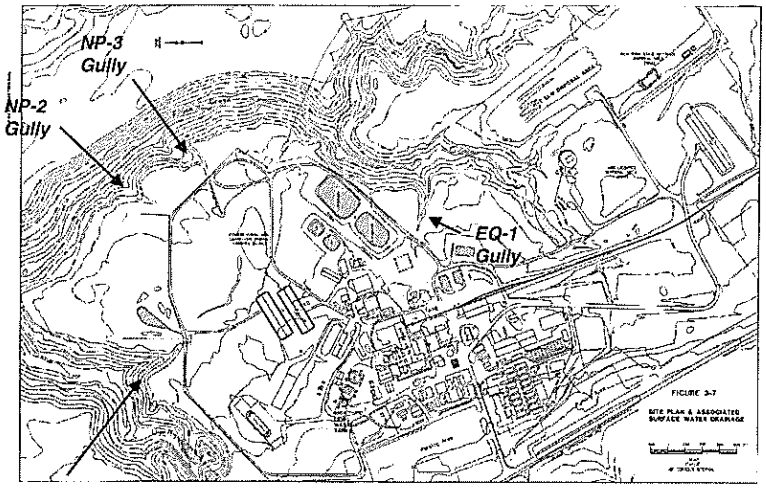
Present Day Site Topography



WVDP-RFI-017, *RCRA Facility Investigation Rpt., Volume 1 Introduction and General Site Overview*

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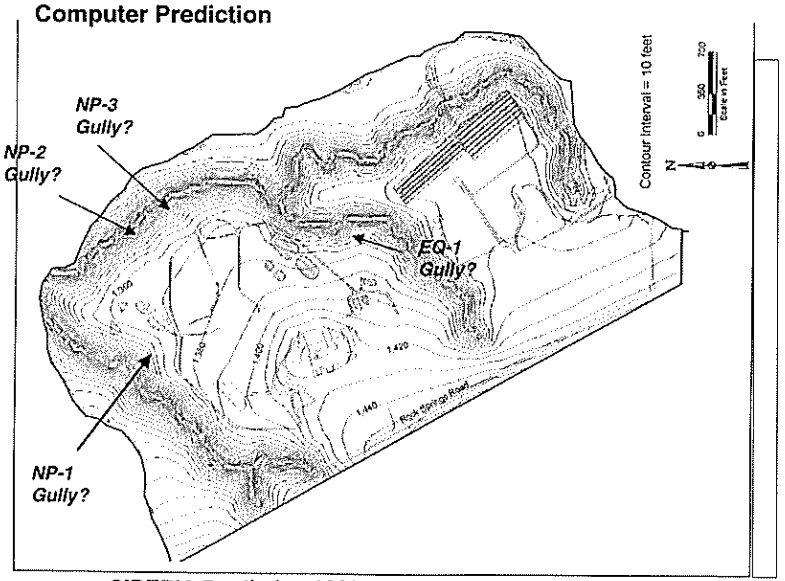
Computer Prediction



SIBERIA Prediction 1000 years from now - Stream channels are deepening and are gullies disappearing.

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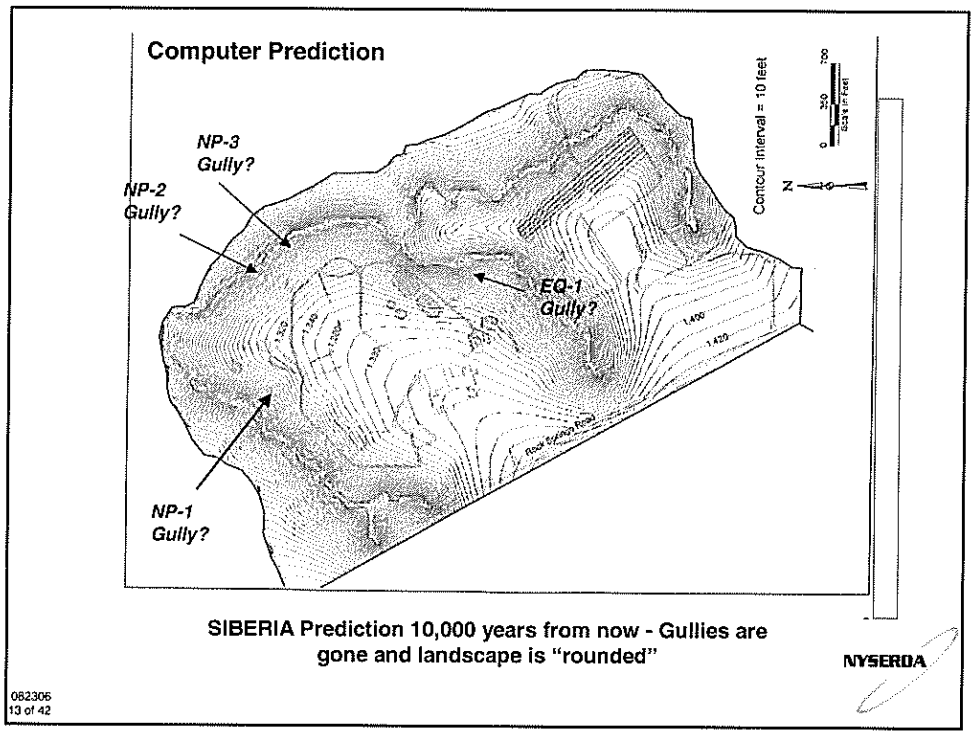

SIBERIA Prediction 10,000 years from now - Gullies are gone and landscape is "rounded"

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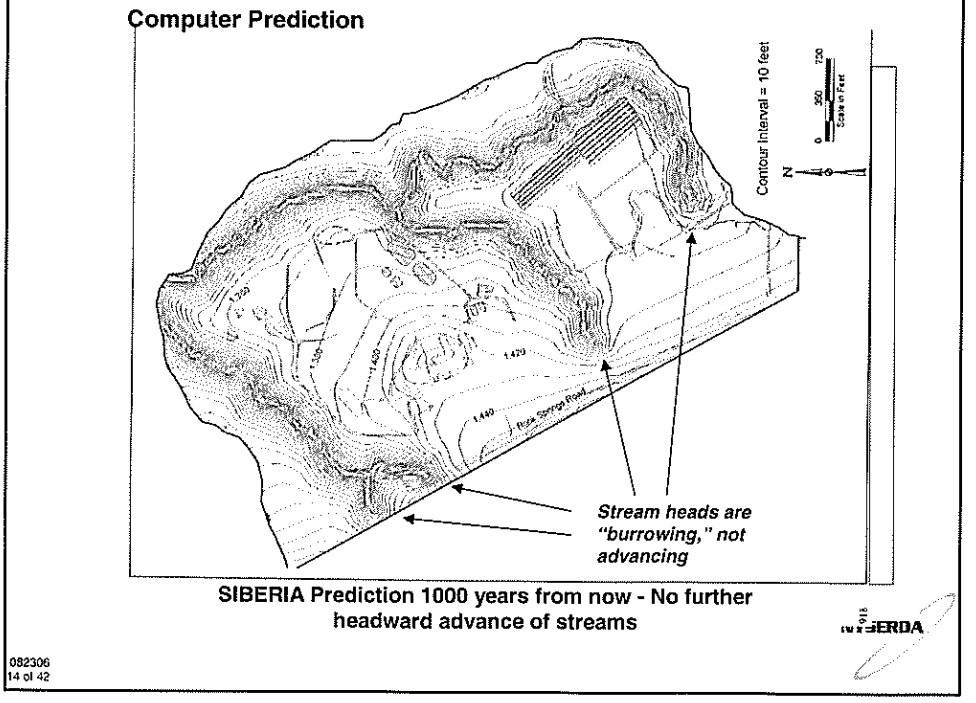

SIBERIA Prediction 1000 years from now - No further headward advance of streams

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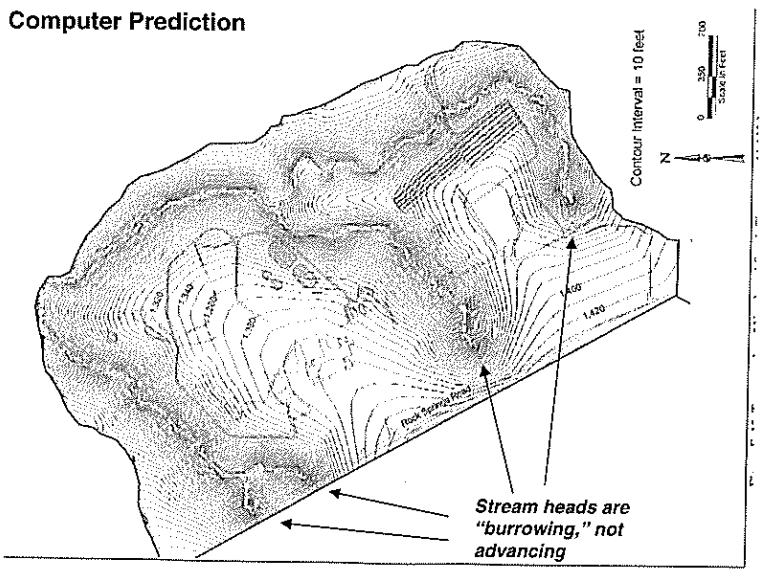
Computer Prediction



SIBERIA Prediction 10,000 years from now - Stream heads are deeper, but have not advanced

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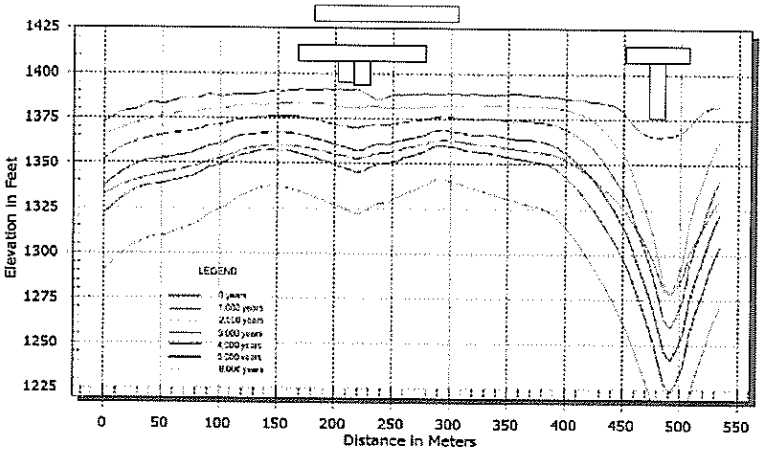
Computer Prediction



The SIBERIA prediction shows erosion impacting all parts of the land surface equally, like the layer of an onion being peeled off. This eventually results in the land surface becoming rounded.

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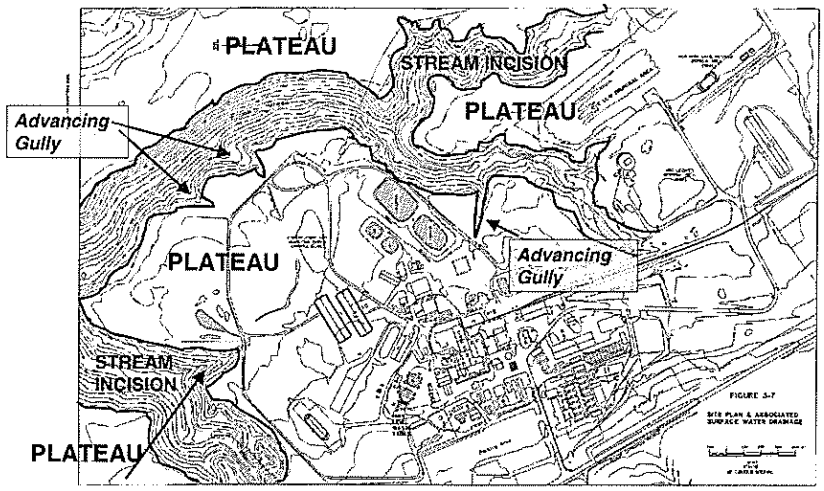
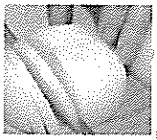
What do we observe in the real world?



- Erosion is bisecting and "notching" the landscape
- Gullies are growing and lengthening, not disappearing
- Streams are advancing by headward erosion
- Flat-lying plateaus remain between the streams



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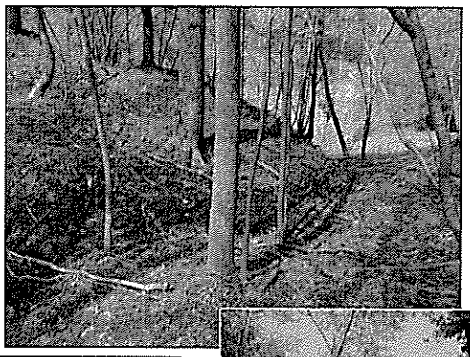
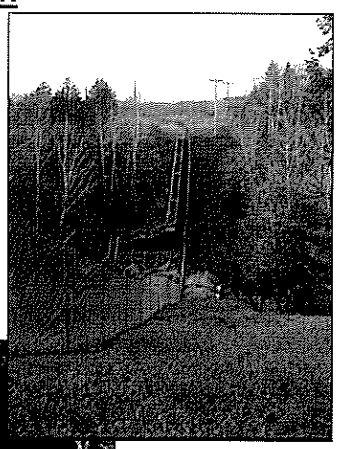
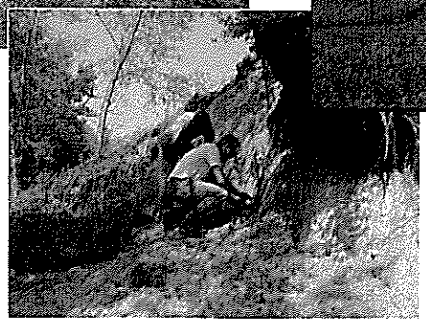
Stream Incision



Buttermilk Creek



Frank's Creek



EQ-1 Gully

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Recent paper by the developer of SIBERIA states:

- While landscape evolution models work for a range of useful problems, we are still "some way" from having a complete and comprehensive model for landform evolution;
- Much work remains to be done to validate and test landscape evolution computer models; and
- Where testing (by comparison with data) shows the computer model does not work, deficiencies in the models must be addressed.

(Gary Willgoose, 2005, "Mathematical Modeling of Whole Landscape Evolution," Annual Review of Earth and Planetary Sciences, Vol 33.)

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Long-Term Erosion Predictions

Model Results

Did not produce credible landscapes.

Recent Publication

Recent recognition in the scientific literature that more work is needed to test and validate these models.

Peer Review Group

"The science behind landscape evolution models such as SIBERIA is not mature enough to rely on these models to provide long-term prediction of erosion in glaciated terrains of the northeast U.S."

Lack of confidence in the SIBERIA erosion model as a predictive tool for the West Valley site.

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Long-Term Erosion Predictions

NYSERDA's conclusions on long-term erosion predictions:

There is a large degree of uncertainty in long-term erosion predictions. It's not clear whether this uncertainty can be quantified;

Based on the work to date, NYSERDA has no confidence in the long-term predictive ability of SIBERIA for the West Valley site; and

NYSERDA cannot support the use of these long-term erosion predictions in identifying a proposed action, or in a determination of compliance with the LTR and West Valley Policy Statement.

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Important Technical Issues

- Long-Term Erosion Modeling
- Groundwater Modeling
- Receptors and Exposure Scenarios
- Engineered Barriers

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Groundwater Modeling

1996 DEIS

SAIC used a 3-dimensional groundwater model to simulate groundwater flow.

The three-dimensional model simulated flow within a geologic unit, flow between units, water flow in, seepage flow to surface water - This provided an assessment of the groundwater system as a whole.

2005 Preliminary Draft

SAIC used sets of one-dimensional flow models to simulate flow within each of the modeled geologic units.

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Groundwater Modeling

NYSERDA's conclusions on Groundwater Modeling:

The simplified approach used does not include important components of groundwater analysis needed for a complex site like West Valley.

A three-dimensional groundwater flow model should be developed for the EIS that includes flow within units, flow between units, water balance considerations, comparison of predicted results with site water level data.

The contaminant transport model should be developed based on the three-dimensional groundwater flow model.

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Important Technical Issues

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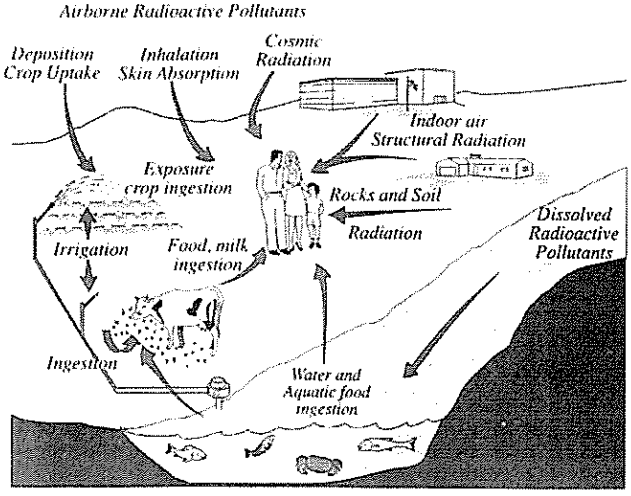
Radiation Exposure Pathways



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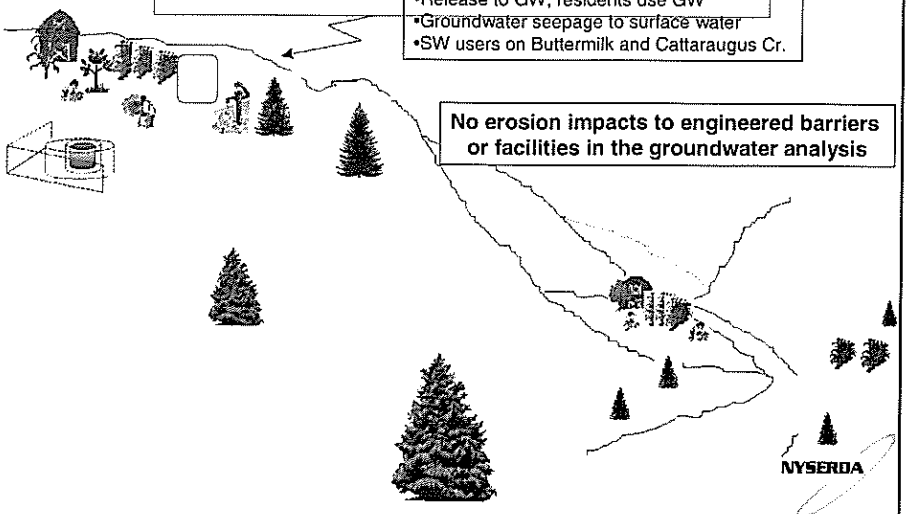
Groundwater Exposure Scenarios

- In-ground facilities
- No institutional controls
- Residents on the North and South Plateau
- Release to GW, residents use GW
- Groundwater seepage to surface water
- SW users on Buttermilk and Cattaraugus Cr.



No erosion impacts to engineered barriers or facilities in the groundwater analysis

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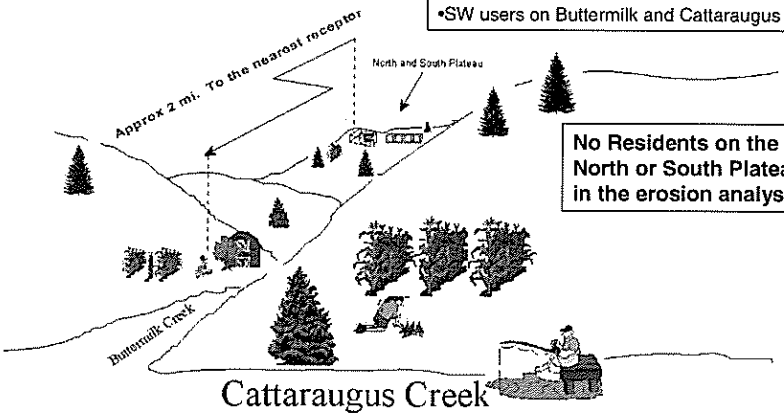
Erosion Exposure Scenarios

- In-ground facilities
- No institutional controls
- Erosion impacting engineered barriers and facilities
- Release to surface water
- SW users on Buttermilk and Cattaraugus Cr.



No Residents on the North or South Plateau in the erosion analysis.

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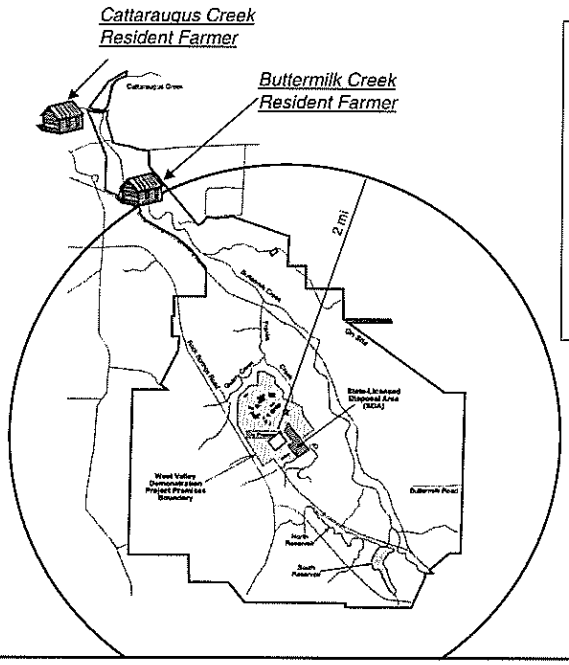
Exposure Scenarios - Erosion



The nearest resident farmer for the erosion exposure scenario is placed on Buttermilk Creek, 2 miles away from the major contamination sources.

EIS assumes that erosion will generate slopes too steep for a residence or for farming...

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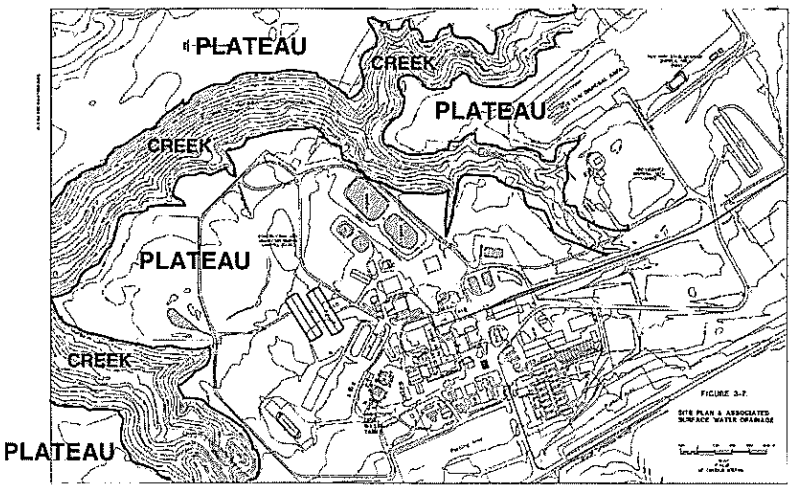
Current Site Topography



In the real-world, we see flat-lying plateaus next to eroding creeks and gullies

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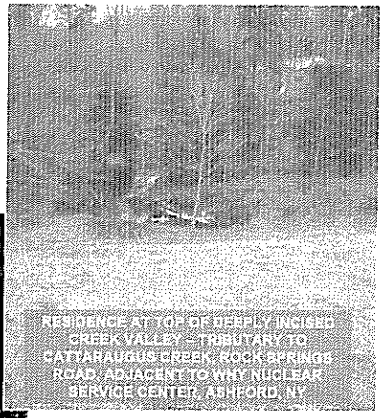
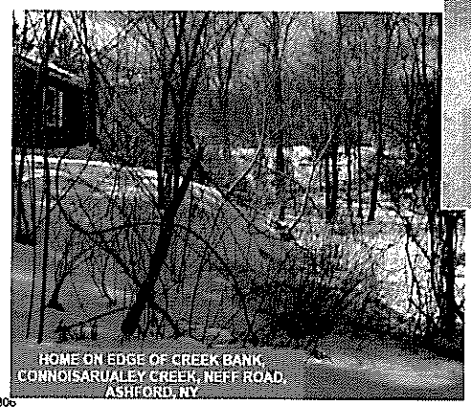
Receptors and Exposure Scenarios

There are homes on flat areas next to erosion features...



RESIDENCE AT TOP OF DEEPLY INCISED CREEK VALLEY - TRIBUTARY TO CATTARAUGUS CREEK, ROCK SPRINGS ROAD, ADJACENT TO WNY NUCLEAR SERVICE CENTER, ASHFORD, NY



HOME ON EDGE OF CREEK BANK, CONNOISARUALEY CREEK, NEFF ROAD, ASHFORD, NY

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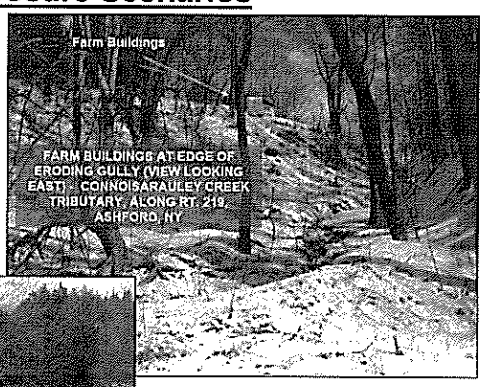
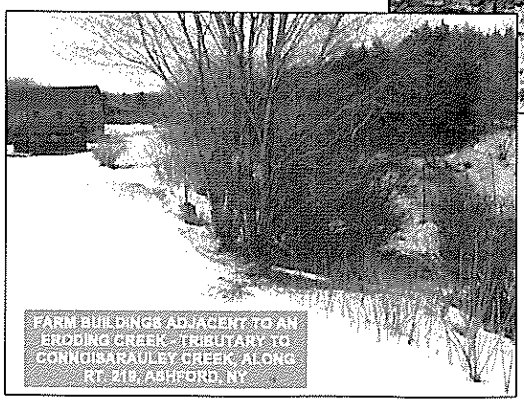
Receptors and Exposure Scenarios

There are farms on flat areas next to erosion features...



FARM BUILDINGS AT EDGE OF ERODING GULLY (VIEW LOOKING EAST) - CONNOISARAULEY CREEK TRIBUTARY, ALONG RT. 219, ASHFORD, NY



FARM BUILDINGS ADJACENT TO AN ERODING CREEK, TRIBUTARY TO CONNOISARAULEY CREEK ALONG RT. 219, ASHFORD, NY

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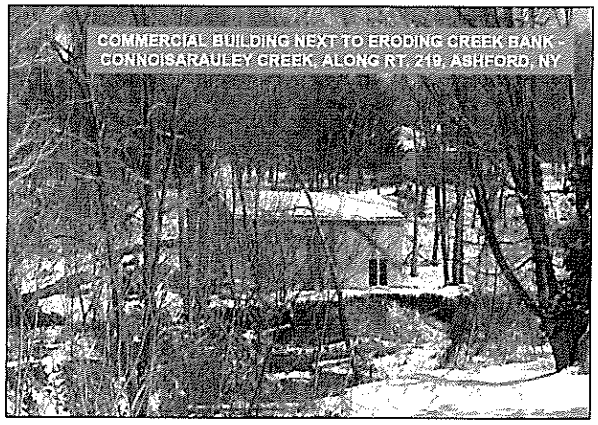
Receptors and Exposure Scenarios

There are other types of structures on flat areas next to erosion features.



People live, farm and work next to erosion areas today, so the EIS should assume people will do the same in the future.

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Receptors and Exposure Scenarios

NYSERDA's conclusions on Receptors and Exposure Scenarios:

There is no reasonable justification for locating the nearest resident 2 miles away from the site facilities. The analysis must include resident farmers living near erosion-impacted facilities.

There should be one impact analysis for on-site residents that includes both groundwater transport and erosion.

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Important Technical Issues

- Long-Term Erosion Modeling
- Receptors and Exposure Scenarios
- Groundwater Modeling
- Engineered Barriers

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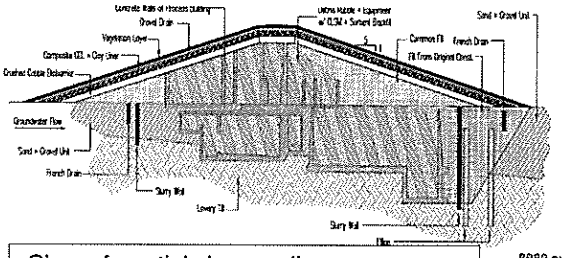
Engineered Barriers

"Generally, engineered barriers are passive man-made structures or devices intended to improve a facility's ability to meet a site's performance objectives" - from NRC's West Valley Policy Statement



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- Circumferential slurry walls
- Upgradient slurry walls
- French drains
- Multi-layered caps
- Various types of grout barriers

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Engineered Barriers

Engineered Barriers in the EIS:

- **Barriers are assumed to degrade a pre-defined amount, then are assumed to perform at that level in perpetuity;**
- **Partial failure of barrier systems is not considered.**

NYSERDA's conclusions on Engineered Barriers:

All assumptions for the long-term performance of the engineered barriers must be clearly supported.

The impact of partial failure of engineered barrier systems should be assessed.

Erosion impacts to engineered barriers must be considered.

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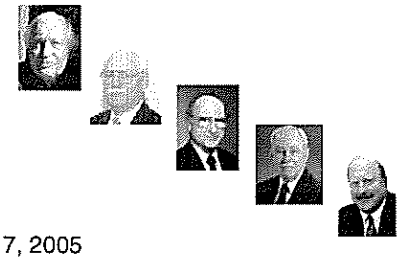
Peer Review of the EIS Long-Term Performance Assessment

Scope- Assess the adequacy of the approach used and the technical basis for the long term performance assessment in the Decommissioning EIS.

Members – Distinguished group of five highly experienced and recognized scientists in earth sciences, engineering, risk assessment, and health physics:



Dr. John Bredehoeft
Dr. Robert Fakundiny
Dr. Shlomo Neuman
Dr. John Poston
Dr. Chris Whipple

Schedule
Kick-off Meeting - November 7, 2005
Final Report – April 25, 2006

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EIS Peer Review - Findings:

Exposure Scenarios and Receptors

•Scenarios that consider groundwater flow and transport ignore erosion and scenarios that consider erosion ignore groundwater flow and transport.

•Assumption that there are no near-by resident farmers ignores the possibility that residents could be present under less severe erosion scenarios.

Erosion Predictions

•SIBERIA produced landscapes that are unrealistic and not credible. Certain aspects of the analysis could be improved, but the reliability of SIBERIA as a predictor would remain highly uncertain.

•The science behind landscape evolution models such as SIBERIA is not mature enough to rely on these models to provide long-term prediction of erosion in glaciated terrains of the northeast US.

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EIS Peer Review – Findings, continued:

Groundwater Flow Modeling

•The analysis of existing groundwater flow is unreliable, ignoring basic principles of groundwater balance and hydraulics.

•One dimensional flow tubes are arbitrary and fail to capture adequately the full three-dimensional nature of subsurface flow conditions at the site.

•Groundwater flow analyses in the EIS should be conducted using state-of-the-art numerical models that conserve water balance and allow the representation of key spatial and temporal aspects of flow conditions.

Contaminant Transport Modeling

•Contaminant releases and groundwater transport of contaminants depend critically on underlying flow assumptions. Since flow is not represented accurately, there is no basis for confidence in the long-term predictions of contaminant concentrations and doses.

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EIS Peer Review – Findings, continued:

Approach to Addressing Uncertainty

•The authors of the EIS are urged to account for the significant uncertainties in a comprehensive manner.

Final Statement

•The PRG questions the suitability of the DEIS to serve as a basis for an informed selection of a preferred site closure or decommissioning alternative.

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Some final thoughts:

Long-term erosion predictions are a significant technical problem. NYSERDA believes that defensible long-term erosion predictions for this site are beyond the state of the science at this time.

Other approaches are needed to address the erosion problem, for example -

- Focus on identifying and agreeing on a proposed action that is less dependent on long-term erosion predictions – e.g. EPA proposal.

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