Presentation for
NYSDEC/telecon
& Legislative Brief
8/8/00

Status of FUSRAP
Seaway Site

August 2000

[redacted]

Commander
Buffalo District
U.S. Army Corps of Engineers

FUSRAP

2

200.1e

Seaway_04.11_0009_a

Agenda

- Briefing purpose
- Presentation of draft Seaway Proposed Plan briefing for the public
- Discuss policy and program issues with Proposed Plan
- *Presentation on recent activities and stakeholder issues*
- Discuss recent activities and stakeholder issues

FUSRAP

Briefing Purpose

- Discuss the Proposed Plan
  - Review briefing to the public
  - Address technical issues
- Discuss the results of our Feasibility Study Addendum and provide an update on significant findings
- Receive your feedback

FUSRAP

Presentation of Proposed Plan for the Seaway FUSRAP Site

[redacted]
Project Engineer
Buffalo District
U.S. Army Corps of Engineers

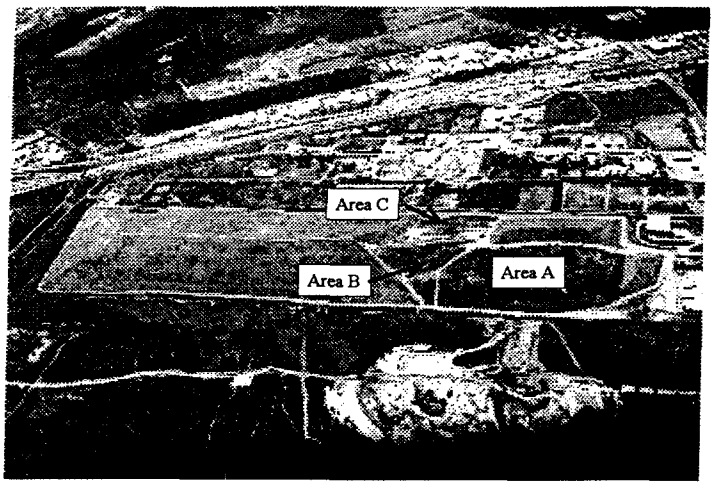
FUSRAP

Outline

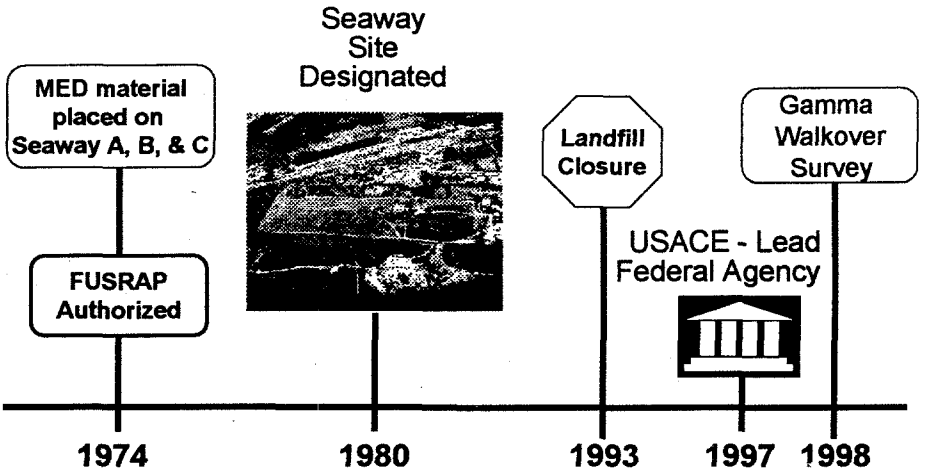
- Site history
- Documentation completed
- Alternatives considered
- Recommended alternative
- Benefits of recommended alternative

FUSRAP

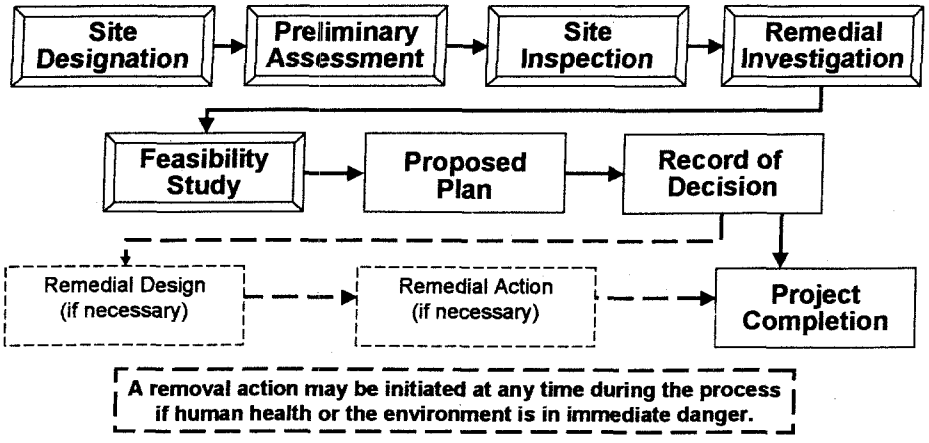
Seaway



FUSRAP and Seaway History



Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Process for FUSRAP



Complete To be completed

CERCLA Documentation

- **Principal CERCLA documents completed by the Department of Energy**
  - Remedial Investigation Report for Tonawanda Sites (1993)
  - Baseline Risk Assessment for Tonawanda Sites (1993)
  - Feasibility Study for Tonawanda Sites (1993)
  - Proposed Plan for the Tonawanda Sites (1993)

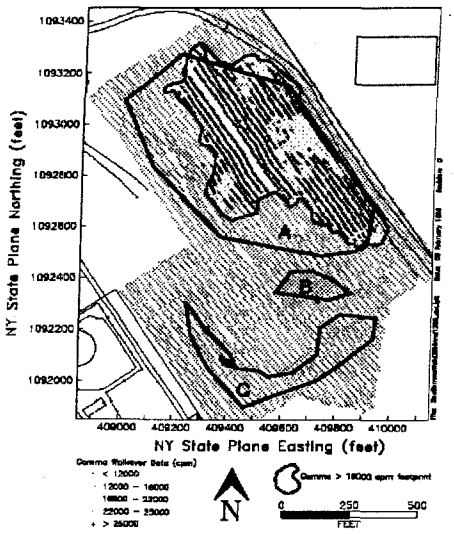
CERCLA Documentation

- **Principal CERCLA documents completed by the U.S. Army Corps of Engineers**
  - Feasibility Study Addendum for the Seaway Site (2000)
    - Additional assessments
      - Groundwater
      - Institutional controls
      - Radon
    - Incorporated additional sampling results
    - Improved volume estimates
    - Updated radiological risk
  - Proposed Plan for the Seaway Site (2000)

CERCLA Documentation

- **Supporting documents**
  - Seaway Areas B and C Additional Surface Characterization Technical Memorandum (1999)
  - Synopsis of Volume Calculations for Seaway Site Areas A, B, and C Technical Memorandum (1999)
  - Seaway Modeling of Radiological Risk Technical Memorandum Rev. 2 (2000)
  - Estimates of Air Quality Impacts of Radon in Landfill Gas Technical Memorandum (2000)
  - Application of 10 CFR 40, Appendix A, Criterion 6(6) Benchmark Doses Technical Memorandum (2000)

Gamma Walkover Survey Results

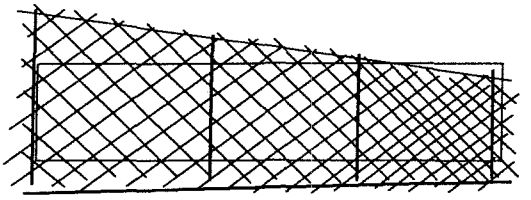


Seaway Alternatives

- Alt. 1: No Action
- Alt. 2: Complete Excavation, Off-Site Disposal
- Alt. 3: Complete Excavation, On-Site Disposal (N/A)
- Alt. 4: Partial Excavation, Off-Site Disposal
- Alt. 5: Partial Excavation, On-Site Disposal (N/A)
- Alt. 6: Containment (Preferred)

Alternative 1: No Action

- Leave material in place
- Periodic monitoring
- Conduct 5-year reviews

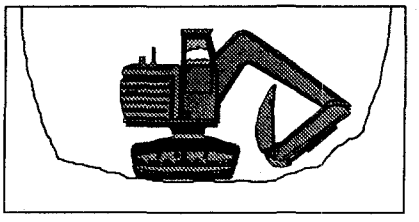


Cost

$5.1M

Alternative 2: Complete Excavation, Off-Site Disposal

- Remove all soils exceeding the removal criteria
- Ship excavated soils exceeding criteria offsite for disposal
- Cover excavated area with 1 foot of soil
- Conduct 5-year reviews

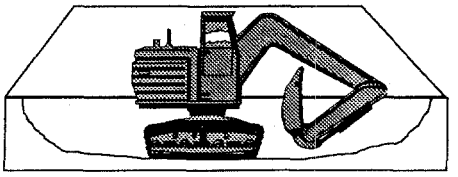


Cost

$110.9M

Alternative 4: Partial Excavation, Off-Site Disposal

- Remove accessible soils in Areas A, B, and C exceeding the criteria until trash/refuse is encountered (approximately the top 4 feet)
- Ship excavated materials offsite for disposal
- Cover Areas A, B, and C with minimum 5-foot cover
- Apply institutional controls
- Conduct 5-year reviews

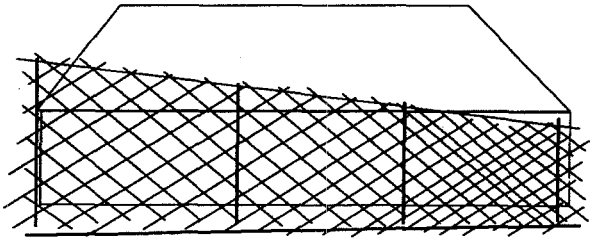


Cost

$66.4M

Alternative 6: Containment

- MED material on the Seaway property will be contained within Seaway Areas A, B, and C
- Cover the areas with a minimum of 5 feet of cover
- Apply institutional controls
- Conduct 5-year reviews



Cost

$16.8M

Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Evaluation Criteria

Threshold

No

Yes

Balancing

Modifying

Alternative(s)

- Protective of human health and environment
- Complies with regulations

- Long-term effectiveness and permanence
- Short-term effectiveness and environmental impacts
- Reduction in toxicity, mobility, or volume through treatment
- Implementable
- Cost

- State Acceptance
- Community Acceptance

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Principal ARARs

(Relevant and Appropriate Requirements)

- **40 CFR 192, Subpart A**
  - Designs for control must be effective for at least 200 years and, to the extent reasonably achievable, for 1,000 years
  - Releases of radon-222 (Rn-222) from residual radioactive materials to the atmosphere will not exceed an average release rate of 20 pCi/m^2/sec
  - Average Rn-222 concentration associated with residual radioactive material cannot exceed 0.5 pCi/L at the property boundary
  - Maximum groundwater concentrations as follows:
    - Combined Ra-226 and Ra-228 - 5 pCi/L
    - Combined U-234 and U-238 - 30 pCi/L
    - Gross Alpha (excluding radon and uranium) - 15 pCi/L

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Principal ARARs

(Relevant and Appropriate Requirements)

- **40 CFR 192, Subpart B**
  - 5 pCi/g of Ra-226 in the top 15cm
  - 15 pCi/g of Ra-226 in subsequent 15cm
- **10 CFR 40, Appendix A, Criterion 6(6)**
  - Compute benchmark doses
  - Establish concentration limits for radionuclides other than radium, such as thorium and uranium
  - Sum of the ratios of actual concentration averaged over 100 m^2 to the concentration limit for each radionuclide must be less than or equal to one

Evaluation of Threshold Criteria

	Alternative			
	No Action	Complete Removal	Partial Removal	Contain-ment
Compliance with ARARs				
5/15 pCi/g radium	✗	✓	✓	✓
Radon standards in 40 CFR 192	✗	✓	✓	✓
Effective for at least 200 years	✗	✓	✓	✓
Groundwater protection	✓	✓	✓	✓
10 CFR 40 Benchmark Dose Stds	✗	✓	✓	✓
Protectiveness				
CERCLA Risk Range ($10^{-4} - 10^{-6}$)	✗	✓	✓	✓

Risk Information for Alternatives

Alternative	Range of Risks	Cost
No Action	10^{-3} to 10^{-7}	$5.1M
Complete Removal [a]	$<10^{-7}$	$110.9M
Partial Excavation	10^{-6} to $<10^{-7}$	$66.4M
Containment	10^{-6} to $<10^{-7}$	$16.8M

[a] Risk before landfill closure will be 10^{-5} to $<10^{-7}$

Summary Information on Alternatives Seaway Area A

	Recreational		Industrial/Comm.	
Alternative	Dose (mrem/y)	Risk ($x10^{-6}$)	Dose (mrem/y)	Risk ($x10^{-6}$)
No Action [a]	12	60	110	2,000
Complete Removal	<1	<0.1[b]	<1	<0.1[c]
Partial Removal	<1	<0.1	<1	<0.1
Containment	<1	<0.1	<1	<0.1

[a] After Landfill closure, the dose will be <1 and the risk will be <0.1
[b] Before Landfill closure, the risk will be $3x10^{-6}$
[c] Before Landfill closure, the risk will be $8x10^{-5}$

Summary Information on Alternatives Seaway Areas B and C

Alternative	Recreational Dose (mrem/y)	Recreational Risk ($x10^{-6}$)	Industrial/Comm. Dose (mrem/y)	Industrial/Comm. Risk ($x10^{-6}$)
No Action	<1	<0.1	5	60
Complete Removal	<1	<0.1	<1	<0.1
Partial Removal	<1	<0.1	<1	<0.1
Containment	<1	<0.1	<1	<0.1

Alternative 2: Complete Excavation - Assessment to CERCLA Criteria

Balancing Criteria	Advantages	Disadvantages
Long-term effectiveness and permanence	• Materials of concern removed • No institutional controls	• None
Short-term effectiveness and environmental impacts	• Materials of concern removed	• Environmental impacts associated with excavation • Transportation risks

Alternative 2: Complete Excavation - Assessment to CERCLA Criteria

Balancing Criteria	Advantages	Disadvantages
Reduction in toxicity, mobility or volume through treatment	• None	• None
Implementability	• Technology available	• Most difficult to implement • Added concerns due to excavation of trash/refuse • May not be a disposal facility for mixed waste
Cost	• Minimal future liabilities	• Cost will greatly extend duration of project

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Alternative 4: Partial Excavation - Assessment to CERCLA Criteria

Balancing Criteria	Advantages	Disadvantages
Long-term effectiveness and permanence	• Accessible soils removed	• Relies on institutional controls • Relies on periodic reviews • Long-term O&M required
Short-term effectiveness and environmental impacts	• Precludes environmental impacts associated with excavation of trash/refuse	• Transportation risks

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Alternative 4: Partial Excavation - Assessment to CERCLA Criteria

Balancing Criteria	Advantages	Disadvantages
Reduction in toxicity, mobility or volume through treatment	• None	• None
Implementability	• Technology available	• May generate mixed waste for which no disposal facilities are available
Cost	• Least costly of removal alternatives ($66.4M)	• Potential future liability

Alternative 6: Containment - Assessment to CERCLA Criteria

Balancing Criteria	Advantages	Disadvantages
Long-term effectiveness and permanence	• Isolates material from public and environment	• Relies on institutional controls • Relies on periodic reviews • Long-term O&M required
Short-term effectiveness and environmental impacts	• Minimal environmental impacts • Reduced construction transportation risk	• None

Alternative 6: Containment - Assessment to CERCLA Criteria

Balancing Criteria	Advantages	Disadvantages
Reduction in toxicity, mobility or volume through treatment	• None	• None
Implementability	• Easiest to implement of action alternatives	• None
Cost	• Least costly ($16.8M) of protective alternatives	• Potential future liability

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Disposal Volumes

Based upon studies and computer modeling, the volumes of soils estimated are:

	TOTAL	PARTIAL
A	94,700	61,400
B	7,900	0
C	35,600	11,200
TOTAL	138,300	72,600

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Recommended Alternative

Alternative 6: Containment

- MED material on the Seaway property will be contained within Seaway Areas A, B, and C
- Cover the Areas with a minimum of 5 feet of cover
- Apply institutional controls
- Conduct 5-year reviews

Rationale for Selection of Proposed Alternative

- Fully protective of human health and the environment
- Complies with ARARs
- Consistent with Town of Tonawanda Waterfront Development Plan
- Presents the lowest risk to workers and the community during the remediation
- Cost effective
- Higher probability of early implementation
- Will expedite closure of the Seaway Landfill

Schedule

- Proposed Plan is ready for release
- Receive your input prior to release
- Formal comments on the Proposed Plan will be accepted for 30 days after release
- If requested, a minimum 30-day extension will be given
- Signed Record of Decision and Responsiveness Summary will be issued after the Corps considers all comments

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Discuss policy and program issues with Proposed Plan

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Detailed Briefing Outline

- **Recent activities**
- **Implementation of 10 CFR 40 Criteria**
- **Stakeholder issues**
  - Institutional controls
  - Groundwater
  - Radon
- **Comments and discussion**

Summary of Recent Activities

- **Revised the "Seaway Modeling of Radiological Risk Technical Memorandum"**
  - Changed building construction scenario from "basement" to "slab"
  - Added results for both Rn-222 and Rn-220 versus total radon
- **Prepared technical memorandum on "Estimates of Air Quality Impacts of Radon in Landfill Gas, Seaway Site, Areas A, B and C, Tonawanda, New York" (June 2000)**
- **Prepared technical memorandum regarding implementation of 10 CFR 40, Appendix A, Criterion 6(6) Benchmark doses and associated SOR Concentration Limits (July 21, 2000)**

Summary of Recent Activities

- Draft Proposed Plan and Feasibility Study Addendum and final Technical Memorandums provided to CANiT, NYSDEC and USEPA on June 27, 2000
- Draft technical memorandum regarding implementation of 10 CFR 40, Appendix A, Criterion 6(6) Benchmark doses and associated SOR Concentration Limits provided to CANiT, NYSDEC and USEPA on July 24, 2000

Implementation of 10 CFR 40

- 10 CFR 40, Appendix A, Criterion 6(6) is an ARAR
- Benchmark doses computed for industrial and recreational scenarios
- Radionuclides considered in benchmark dose calculation
  - Actinium-227
  - Protactinium-231
  - Thorium-230
  - Thorium-232
  - Uranium-234
  - Uranium-235
  - Uranium-238

Benchmark Dose for Seaway Site (Industrial Scenario)

Based on 40 CFR Part 192 (Ra-226 at 5/15 pCi/g), the "Benchmark Dose" for surface and subsurface contamination was computed (commercial/industrial scenario):

	Ra-226 Concentration (pCi/g)	Benchmark Dose (mrem/yr)
Surface	5	8.8
Subsurface	15	4.1

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Concentration Limits for Sum of the Ratio Calculations

	Benchmark Dose (Commercial/Industrial Scenario)	
Radionuclide	8.8 mrem/yr (Surface)	4.1 mrem/yr (Subsurface)
Ra-226	5.0 pCi/g	15 pCi/g
Th-230	15 pCi/g	44 pCi/g
U_{Total}	605 pCi/g	3,039 pCi/g

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Risk Associated with Sum of the Ratio Concentration Limits

	Benchmark Dose (Commercial/Industrial Scenario)	
Radionuclide	8.8 mrem/yr (Surface)	4.1 mrem/yr (Subsurface)
Ra-226	1.3×10^{-4}	6.1×10^{-5}
Th-230	1.3×10^{-4}	6.1×10^{-5}
U_{Total}	7.5×10^{-5}	4.1×10^{-5}

FUSRAP

Benchmark Dose for Seaway Site (Recreational Scenario)

Based on 40 CFR Part 192 (Ra-226 at 5/15 pCi/g), the "Benchmark Dose" for surface and subsurface contamination was computed (commercial/industrial scenario):

	Ra-226 Concentration (pCi/g)	Benchmark Dose (mrem/yr)
Surface	5	0.9
Subsurface	15	0.4

FUSRAP

Concentration Limits for Sum of the Ratio Calculations

	Benchmark Dose (Recreational Scenario)	
Radionuclide	0.9 mrem/yr (Surface)	0.4 mrem/yr (Subsurface)
Ra-226	5.0 pCi/g	15 pCi/g
Th-230	15 pCi/g	44 pCi/g
U_{Total}	560 pCi/g	3,021 pCi/g

FUSRAP

Risk Associated with Sum of the Ratio Concentration Limits

	Benchmark Dose (Recreational Scenario)	
Radionuclide	0.9 mrem/yr (Surface)	0.4 mrem/yr (Subsurface)
Ra-226	1.3×10^{-4}	6.1×10^{-5}
Th-230	1.3×10^{-4}	6.1×10^{-5}
U_{Total}	7.5×10^{-5}	4.1×10^{-5}

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Stakeholder Issues

- Institutional Controls
- Groundwater
- Radon

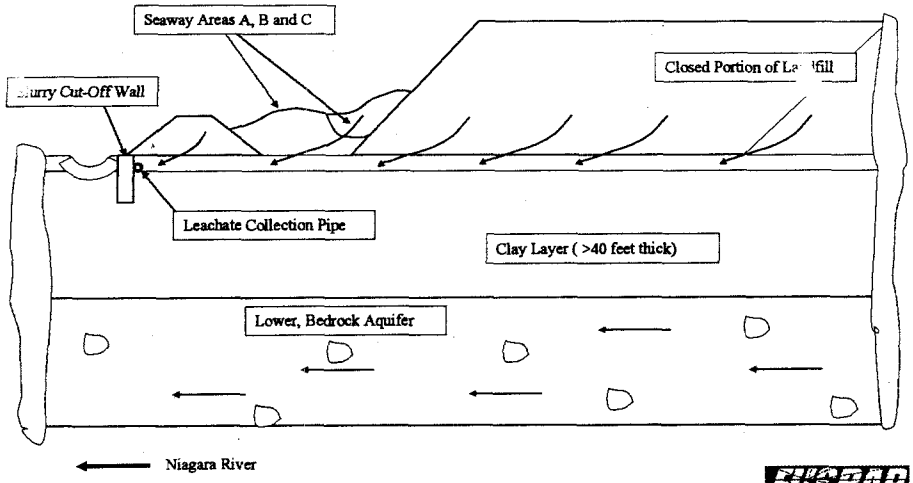
Institutional Controls

- **Existing institutional controls**
  - Zoning is consistent with future uses
  - Listed on State Registry of Inactive Hazardous Waste Sites
  - State Solid Waste Regulations Apply
    - Deed notice
    - Deed restrictions
    - Monitoring - Disturbance of cap/containment system subject to State approval
- **Long-term Federal monitoring**
- **Institutional controls ensure the long-term effectiveness of the remedy**

Groundwater

- **Groundwater is not and will not be impacted by MED material**
- **MED residuals are not leachable**
  - Residuals are the residues resulting from aggressive acid leaching to remove leachable materials
  - Do not expect MED material to impact the landfill leachate
- **The landfill has a leachate collection system**
- **There is a low-permeability clay layer, approximately 40 – 60 feet thick between the bottom of the landfill and the lower groundwater system**

Seaway Leachate Collection System



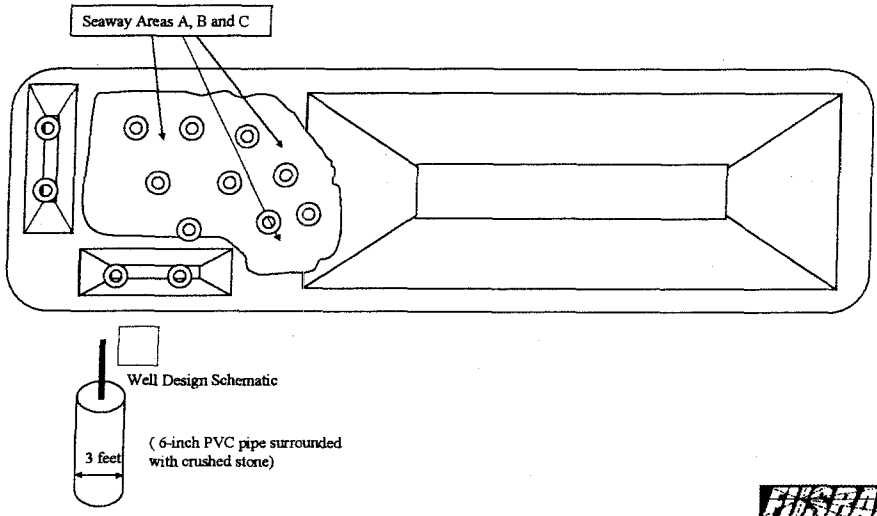
Current Leachate Results

- **Average daily generation rates**
  - 1995: 44,500 gallons
  - 1996: 26,900 gallons
  - 1997: 30,600 gallons
  - 1998: 34,000 gallons
  - 1999: 24,200 gallons
- **Gross alpha results**
  - Range from <2 pCi/L (5/95) to 30.86 pCi/L (11/98)
- **NRC limit for discharge to sewer system**
  - Ra-226 = 600 pCi/l
  - U Total = 3,000 pCi/l
  - Th-230 = 1,000 pCi/l

Radon

- **Evaluated both passive and active venting due to typical landfill gas generation**
- **Used RESRAD to generate the radon flux source terms**
- **Used Landfill Gas Emission Model (LandGEM) developed by EPA for landfill gas generation rates**
  - Methane, carbon dioxide, and non-methane organic compounds
- **Used EPA SCREEN3 model to assess air quality impacts**

Seaway: Landfill Passive Gas Venting System



Results of Seaway Radon Modeling-Passive Venting*

- **Range of results assuming 9 vents in Area A and 3 vents in Areas B and C**
  - 0.45 pCi/L (year 2000) to 0.024 pCi/L (year 2100)
- **Rn-222 limitation per 40 CFR 192, Subpart A**
  - 0.50 pCi/L

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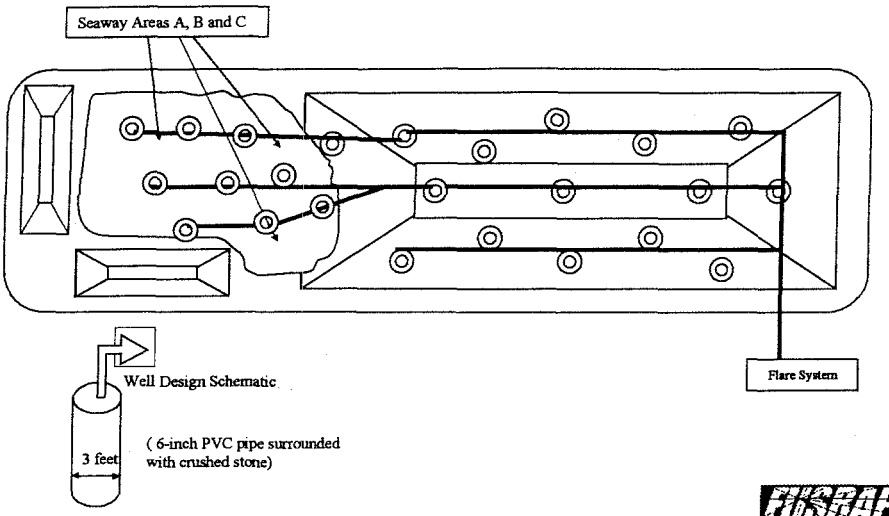
* **Conservatively assumes that the impacts from all 12 vents occur at one location**

Seaway: Landfill Active Gas Venting System



Results of Seaway Radon Modeling-Active Venting

- **Range of results for maximum annual concentration at the property line using SCREEN3 and different defaults values (e.g., AP-42 and CAA)**
  - 0.255 to 0.335 pCi/L
- **Rn-222 limitation per 40 CFR 192, Subpart A**
  - 0.50 pCi/L

Discuss recent activities and stakeholder issues

GENERAL RESPONSES TO EPA COMMENTS

General response to EPA issues relating to the lack of consideration of reduction of toxicity, mobility and volume through treatment, in the selection of alternatives for the Seaway site.

The 1993 Tonawanda Sites FS evaluated the application of various treatment technologies that might be applied to contaminated soils from the Tonawanda sites (chemical, physical, biological and thermal) to possibly reduce the toxicity, mobility or volume of contaminants, as part of the general response action selection process (Section 3.3.1). Due to the nature of the FUSRAP waste (radiological contaminants), there is no process to reduce the toxicity of the waste (i.e. make the radioactive material non-radioactive). Various methods of volume reduction are discussed and evaluated in the FS, however, separation techniques (to isolate radioactive residues from the soils with which they are now mixed) are all very labor/time intensive and were considered to not be viable in part due to the fact that the resultant treatment residues would still contain some radioactive contaminants.

In order to verify the assumptions that were made relative to soil treatment to reduce volume, in 1994 the DOE conducted tests on FUSRAP waste from several FUSRAP sites. In 1994 soil samples were obtained from Tonawanda sites, including the Ashland sites, and tests conducted to assess the cost effectiveness of reducing the volume of soils requiring disposal as radioactive waste through treatment. Soil washing was the primary process evaluated. However, much of the contamination was found locked within a slag type matrix, making it difficult to chemically extract. The chemical extraction treatment process was not cost effective as it could not produce a clean soil fraction to offset the cost of purchasing and recycling the extractant solution.

Reduction in mobility through treatment was also evaluated in the FS. The RI concluded that the radiological constituents of the contaminated soil were non-soluble and therefore not mobile in the sense that they were not likely to leach. Mobility issues, therefore, relate only to the mobility of the solid particles. Various solidification technologies were considered and were all found to add significantly to the cost of remediation, would all add volume to the remediation waste and, over the long term, would not add considerably to the immobilization of the waste considering that the ultimate disposal would include containment within a disposal cell of some form. The FS concluded that containment in a disposal facility would result in sufficient mobility reduction.

Additionally, it should be noted that the assessment of the reduction of toxicity, mobility and volume criterion is performed during the "balancing phase" of the alternative selection process. The criterion itself is not a "threshold" criterion but rather a "balancing" criterion and therefore does not have to be "met".

General response to EPA issues relating to the lack of characterization of non-MED chemical waste that might be present in the Seaway site

During the detailed assessment of the alternatives considered for the remediation of the Seaway site, concern was raised over the possible impacts that non-MED chemical waste, which might be found to be commingled with the FUSRAP waste, might have on site workers and waste disposal options. Investigations during the RI, involving records reviews of records filed with NYSDEC as part of the solid waste facility's permit files, indicate that wastes considered to be hazardous under today's regulatory programs, were accepted at the facility in years past.

The U. S. Army Corps of Engineers (USACE) has determined that there is no need to conduct additional characterization of possible chemical contaminants at the site once a presumption is made that site probably contains residues of the contaminants indicated to be present in documentation available about the historical use of the site. As is pointed out in EPA's Landfill Presumptive Remedy Directive (Directive No. 9355.0-661), there is no need to further characterize landfill contents considering that the presumed remedy at these sites (if they include landfill caps, source area groundwater control, leachate collection and treatment, landfill gas collection and treatment, and institutional controls as is the case at the Seaway site) will be containment. This allows for a streamlined approach to risk assessments under the RI and FS "...because the containment remedy addresses all migration pathways presented by the landfill source."

As far as the assumption that chemical waste that might be commingled with the FUSRAP waste might impact ultimate disposal options should one of the removal alternatives be implemented at the site, USACE has only raised the concern under the assessment of implementability of the alternatives and has not found these alternatives to be "nearly non-implementable".

General response to EPA issue that two alternatives, Alternatives 3 and 5, were prematurely dropped and should be included in this Proposed Plan and stated that only the Threshold Criteria can be used to eliminate alternatives.

The two alternatives identified, Alternatives 3 and 5, involved the building of an engineered disposal cell at either the Ashland 1 Site, the Ashland 2 Site, or the Seaway Site and placement of all of the waste from cleanup of the Tonawanda Sites, as well as possibly waste from other New York FUSRAP Sites, into the disposal cell. Although the public strongly objected in 1993 to any disposal cell being built and all of the FUSRAP waste being placed in it, this was not the primary factor that resulted in the two alternatives presented in the 1993 Proposed Plan (for which a public meeting was held and public comments received) from being considered in the current Proposed Plan for the Seaway Site. The primary reason was that these two alternatives, as presented in the 1993 Proposed Plan, were not applicable to the scope of the remediation of the Seaway Site by itself. In fact, the remediation of the Linde and the Ashland Sites would have generated most of the waste for placement in the disposal cell. The remediation of the Linde and Ashland Sites are proceeding with off-site disposal.

Also, the federal government (i.e., DOE) and Congressman LaFalce agreed with the other stakeholders in 1996 that an on-site disposal cell handling the waste from all of the Tonawanda FUSRAP sites, and possibly other FUSRAP Sites in New York, would no longer be proposed

General response to EPA issues regarding the FUSRAP addressing non-MED related materials as well MED-related materials and addressing the site in totality.

Public law transferred FUSRAP from the Department of Energy to the U.S. Army Corps of Engineers in October 1997. Another public law made it clear that the Corps only had authority to address contamination associated with past MED operations included within the FUSRAP, and that USACE's authority for cleanup was CERCLA, acting as the lead agency, except for FUSRAP NPL sites. None of the Tonawanda Sites are NPL sites. USACE only has authority to remediate areas impacted by MED-related activities. If the MED-related materials are commingled with other non-MED materials, USACE must address only the MED-related material and handle and dispose of any excavated material based on the waste characteristics

considering both the MED and non-MED materials. USACE does not have the authority to address the entire Seaway Landfill, only those areas of the landfill where MED-related materials were placed.

General response to EPA issues regarding institutional controls.

USACE has evaluated all existing institutional controls required for the landfill, such as those imposed by NYSDEC for the landfill closure. USACE has found that those institutional controls, will be sufficient to accomplish the proposed remedy. As for ensuring that those controls remain for the 1,000 year period, the federal government has the responsibility to ensure the protectiveness of the selected remedies and conduct necessary reviews, five years at a minimum as required by CERCLA , to ensure the remedy is still protective. The Corps has a Memorandum of Understanding with the DOE requiring the DOE to assume responsibility for any long-term surveillance and maintenance of remediated FUSRAP sites. , plus l ensuring that the necessary institutional controls are in place and maintained.

Seaway Proposed Plan Tough Questions

1. **How can you be sure how much contamination is in the Seaway Landfill when you totally missed the amount of contaminated material in Ashland 2?**

There were surveys done in 1976 (ORNL) 1981 (FBDU), and 1986 ( ). Those investigations pinpointed the geographical locations of the contaminated areas. We did further char in 1998 of Areas A, B, and C, and we altered the volumes, and we are confident that these numbers are correct. A gamma walkover survey was conducted in September 1998 and confirmed the findings of the historical information and previous studies. Generally speaking, throughout our sites, we have found material in areas where we expected to find it. The state regulators have agreed that this is where the rad material is located.

2. **If the material is left in place, how can you guarantee that it will not be disturbed at a later date?**

There are existing controls that are now in place at the Seaway Landfill. The zoning is consistent with the future use that was considered when we developed the proposed plan. The site is also listed on the state registry of inactive hazardous waste disposal sites and state solid waste regulations apply. Accordingly deed notices, deed restrictions and monitoring is required to ensure that the cap and containment system remain effective. Additionally an integral part if our containment remedy is long term monitoring and inspection that will be conducted by the federal government including 5 year reviews under CERCLA.

3. **If you select the leave in place option, you are leaving 10 times the material there than what we had originally heard before was in there. Why would you think that it would be acceptable to leave so much more contamination in place?**

The amount of contamination that entered into the sites has remained the same. Based on improved procedures developed during the Ashland 2 project, we have developed more accurate volume estimating procedures. We have used these updated volume estimates in our calculation of the risks associated with the site, and based on our analysis even considering the more accurate volume we have determine that the containment alternative is protective now and in the future.

4. **Has the international joint commission on water ever been provided with any information on this site?**

We have not identified any impact to groundwater. We made contact with the IJC for the Ashland Sites, and we are in the process of making contact with the IJC regarding Seaway.

5. **Your material is adding radon to the methane that is being pumped from the landfill. Since the methane gas from the landfill is being pumped instead of being able to vent naturally, the time frame does not allow the radon to decay. Our children go to school down wind from there, what about the radon emissions from the landfill?**

Our material is not adding radon to the methane in the landfill. The current system does not pump gas from the area of the MED waste. (Get DEC's latest response to this). The levels are within the range in soils (USGS). We are also concerned about radon and we wanted to make sure that what we are doing is safe, consequently we conducted extensive evaluation of the radon situation under the containment scenario. We modeled the addition of radon from areas where MED waste is to the passive and active venting systems and found that we will meet the ARARs associated with radon gas. Most likely only passive vents would be needed in the areas where MED waste is located, because there is very little methane in Area A where most of the MED waste is located. The Corps has prepared a tech memo addressing this issue that is available in the admin record.

6. **Who will be responsible for final closure of the landfill?**

The owner and operator of the facility is responsible for final closure, not the Fed gov't.

7. **This landfill was not constructed to meet the strict standards that are set for landfills that hold radioactive materials. How can you guarantee that leaving this material where it is will be safe?**

Our remedy will be implemented in such a way that it is protective in the long term. Engineering and Institutional Controls will be utilized, and the site will be monitored to ensure that the controls are in place.

8. **Does capping meet the commercial/industrial development requirements for risk? What about 50 years from now, if the intended land use changes, are we going to have another Love Canal scenario?**

Yes this remedy does meet the requirements for an industrial/commercial land use and will continue to meet the requirements in 50 years. Regulatory programs have been put in place to prevent a Love Canal scenario. The deed restrictions that will be placed on the landfill require state approval in order to change to containment system.

9. [redacted] **Has your company concluded that there is no FUSRAP or MED waste, located in the upper portion of the landfill, behind sections A, B & C and farthest from the river? What reports were used to reach this conclusion?**
The Seaway Site was investigated by the DOE and the results summarized and documented in the 1993 Remedial Investigation report for the Tonawanda Site. Based on their review of the historical information and field surveys, the DOE concluded that only the areas now known as Areas A, B, C, and D are contaminated with MED-related materials. Based on these results, the FUSRAP was to address only Seaway Areas A, B, C, and D. Area D is being addressed with the remediation of Ashland 1 and was included in the Record of Decision for the Ashland Sites. USACE did additional investigations in 1998 (Gamma Walkover), and the results confirmed the earlier information relating to Areas A, B, and C, and that is that there is contamination in Areas A, and C, that was detectable, and no evidence of contamination outside of those areas was found.

10. **I am having a really hard time believing that only Areas A, B, and C contain radioactive material. Do you honestly expect us to accept DOE's conclusion that the only contaminated areas are A, B, and C. If I'm not mistaken, the DOE grossly underestimated the amount of contamination at Ashland 2. Has the Corps even looked at the historical information or field surveys that the DOE used to come to this conclusion? When you started working on the Ashland 1 site, you changed the estimated amount of contamination based on the lesson you learned from DOE's contamination estimate at Ashland 2. Why wouldn't you use the same lesson learned and apply it to Seaway. I think that you should at least look into the possibility that other areas of the landfill may contain radioactive material. I really don't want to be going through all of these arguments years down the road, when some document turns up that says radioactive material was dumped all over the landfill.**
Answers 1 and 3. Even if there was MED material in other areas of the landfill, those areas are already capped, so it is still protective.

11. [redacted] **Given that the Niagara River is close to the landfill, hydraulics and leaching will be a fact as well as earthquakes. A fence does not contain hydraulics, how will it impact the river, and what will the environmental impact be on the population?**
There is a leachate collection system in place, so hydraulics and leachate are contained. There is also 40 feet of clay protecting the groundwater. The MED waste is not leachable. The remedy we are proposing is a cap to further eliminate concerns of leaching. The MED waste does not pose an instantaneous risk to people, it presents a chronic, long term exposure risk. Should and earthquake occur, there would be ample opportunity to re contain the waste.

12. [redacted] **The process used was a chemical process, is there a possibility of a chemical reaction with the garbage?**
No, the existence of garbage with the residues could not produce the aggressive chemical leaching process that was originally used to remove the uranium.

13. [redacted] I find it humorous that you are saying that the radon that is coming out of the landfill is all natural. Where is the radon from your material?

What has been measured to date of the methane gas, is gas that has been collected from areas that do not include MED waste. And those levels based on DEC responses are consistent with other landfills, and are also consistent with concentrations in soil gas (per USGS). The radon from the MED waste is also being emitted, but the modeling shows that it is not in any concentrations that exceed any standards.

14. [redacted] I find it hard to believe that if there is a permeable cap on the landfill, and there is garbage under the cap, gases and fluids will not find a way to come out.

That is correct, gasses and fluids are being produced in this landfill. The gases are being dealt with as part of the collection system, and the fluids are being addressed as part of the leachate system.

15. [redacted] The Dept of Health has done a study on gas storage wells, the radon from the landfill is high compared to the threat that you explain, why the anomaly?

We don't feel that the radon levels are high, they seem to be indicative of natural soil gas levels.

16. Look at DEC sample data of individual wells, wells with the highest level are highest in elevation along the spine. This seems to indicate that methane is a carrier.

Yes, methane is acting as a carrier, the levels measured however, are within the range typically found in soil gas (USGS).

17. Is Area A under the cap?

No, not under the current cap.

18. I watched a bulldozer push stuff all over the landfill for 20 years. I don't see how contamination could stay only in areas A, B, + C.

All of the evidence that we have shows the material is only in Areas A, B, and C.

19. [redacted] Institutional Controls – who does what, and who is left with the 200 year responsibility?

The State puts in the deed restrictions, and the federal government monitors to make sure the remedy remains in place. The various government bodies are left with the responsibility.

20. [redacted] How long do you have to figure out what the institutional controls could be?

We anticipate having institutional controls in place at the time the remedy is complete, and they will be reviewed every 5 years. Institutional controls will become more defined as the process continues.

21. [redacted] If you are talking about 1,600 years, can you reasonably expect the government to be responsible for the institutional controls?

It is reasonable to expect that the government will continue to exist and exert whatever controls are appropriate.

22. [redacted] This will be called a nuclear garbage dump. Do you know what the impact will be on the people in this community? What the environmental impact will be? What perception it will bring to businesses, and what the quality of life will be like in this area?

Implementing the remedy on the MED waste is a positive step to ensuring protectiveness to the community. This is already a solid waste landfill, the presence of rad materials does not present any more of a stigma for the community. This site was identified 20 years ago, now it's being brought to closure.

23. [redacted] The wording of the partial excavation alternative needs to be more clearly defined or it will haunt you and me.

24. [redacted] If the rad waste is in areas A, B + C only, what accounts for the hot radon readings that NY State found on the back section?

The levels that were measured by DEC in the back section, have been determined by DEC to be consistent with other landfills. The levels are also consistent with levels of Radon in natural soil gas.

25. [redacted] Has anyone taken air samples to measure radon gas concentrations above background level, in areas A, B, and C? If so how do these measurements compare to those taken in the large portion of the landfill, behind sections A, B, and C, and farthest from the river? Also, how do these measurements compare to others, taken at landfills around the U.S., that are known, not to contain radioactive wastes, either FUSRAP or MED, or man-made from the production of commercial or consumer products?

No we haven't, and we are not aware of any radon sampling done in the Seaway Areas A, B, and C as part of FUSRAP activities.

We have addressed these issues in two tech memos, that are available in the admin record.

As far as comparing any results to landfills that contain no radioactive materials that are MED-related or man-made as in consumer products, USACE is not aware of any typical landfills that would not have consumer products in them that contain radioactive materials.

26. Describe what will be necessary for closure of the site.

If you mean closure of the landfill, the owner/operator is responsible for closure of the landfill pursuant to the state solid waste landfill regulations. For closure of the FUSRAP site, we need to implement the remedy that is described in the ROD, and that closure does not mean closing the site under the state's solid waste landfill regulations.

27. Referring to the picture that you showed us that illustrates Seaway A in red and Seaway Area C in yellow, can you give us a more quantitative statement regarding the levels of radioactive contamination? For example, this area is 10 times less safe. All they have to do is take these "safe" limits and look forward into the future about seven generations and see how much damage has been done.

Yes, see slide.

28. Could you discuss what you mean by background levels of radiation?

Background refers to typical naturally occurring levels in the Tonawanda area where man-made radioactive material has not been placed. These are the levels you would normally expect to find in your background.

29. Will any attempts be made to estimate the additional radon that is coming out of the flare from your material?

Yes, and those results can be found in the technical memorandum.

30. Where is all that radon going to go? That radium is producing radon.

The radon decays into its breakdown products and diffuses in the soils, it does not make its way up to the surface.

31. Despite the fact that the NRC guideline in not a law, it would be more protective. Is there any reason why you couldn't clean up to a stricter guideline at other sites? If you use NRC guidelines would it then be unsafe to leave material in Seaway?

It is not a law, the NRC has promulgated its position and we are following NRC regulations.

32. Is the cap that might be going on Seaway, the same quality cap that is already on other areas of the landfill?

Yes.

33. If you cap in place, will you monitor the site? How long will you monitor the site? What will you test for?

Yes. We will monitor the site as long as necessary. Our testing process will include inspecting the cap for disturbances, and document review to ensure that institutional controls are in place and still functioning. We will also review any test data from the ongoing post closure monitoring at the site.

34. What is the cost difference for partial excavation vs. capping? If it is only a couple of million dollars, how can you justify leaving it there, when you could remove it? You keep telling us that it would be more dangerous and you do not want to disturb the garbage. What about all this precise excavation we keep hearing about at Ashland 1 and 2? Couldn't you employ the same technique to safely remove the material from the landfill?

The site is safe as it is being used currently. To be conservative we assumed more active use of the site, and our remedy is protective under those very conservative scenarios. Partial removal wouldn't make the site any safer. Capping is fully protective of human health and the environment.

In developing our partial and complete removal scenarios we included precise excavation and other lessons learned from the Ashland projects to maximize efficiency.

35. The Niagara Landfill is the only site where capping will not contain the emission of deadly radon gas. Radon gas, from the FUSRAP materials, is blown by the prevailing south-westerly winds over the city of Tonawanda. Since FUSRAP material was mixed with methane producing garbage in the landfill (in violation of federal guidelines) and since methane from the garbage in the landfill must be vented, the City of Tonawanda General Environmental Control Board has determined that the only way to prevent radon emission is to remove the radium that is producing the radon gas.

We share your concerns regarding radon, and its impact to the community. To ensure that we are being protective we completed the tech memo that is available in the admin record.

36. [redacted] If cleanup solutions #2 were implemented, does your company conclude that sections A, B, and C could be designated "unrestricted use"? Would this designation be suitable for growing crops? Would fencing and hazardous waste danger signs need to be posted around the entire landfill?

Cleanup using Alternative 2, Complete Excavation with Off-site Disposal, would provide for a site with no further radiological restrictions. From a radiological perspective, this designation would not prohibit a future user from growing crops on the site. Neither fencing or signage would be necessary for the residual MED-related radiological materials, however, they may be needed for the other Non-MED wastes remaining in the landfill.

37. [redacted] If cleanup solution #6 were implemented, would the 5' cap to cover sections A, B, and C be vented or not vented?

These areas may or may not need to be vented. This is dependent on what other materials were disposed in those areas and whether methane gas production is likely. BFI and NYSDEC will make the determination as to what needs to be vented. If venting is required, it could be passive venting (i.e., not connected to an active venting system where air is pulled out through a stack using an exhaust fan) or active.

38. **Here it is the year 2000, and we are back to fighting the battle we fought with the DOE in 1993. We were opposed to 1993 Proposed Plan which included the disposal of wastes from Tonawanda Site properties in an on-site cell to be located at Ashland 1, 2 or Seaway. Now you are proposing to leave radioactive material in the Seaway Landfill. We do not want the material to stay here. You've cleaned up Ashland 2 and are in the process of cleaning up Ashland 1 and Linde. I just don't understand why you would think that we would go for leaving the material in the landfill. We did not put it there, you did, and we want it taken out. You aren't going to be here 200 years from now, but our children's children will be. And they shouldn't have to worry about your problem. You have the ability to take at least some of the material out. I know that you will not be able to get it all out, but removing some of the material is better than removing none.**

39. **The City of Tonawanda Board of Education is concerned that the following statements in the NYSDEC fact sheet can not be proven according to generally accepted scientific standards of confidence...**

"the NYSDEC found that gas does not contain concentrations (175 to 194 picocuries) of radon higher that should be expected from any landfill" is not true. The concentration of the radon in the landfill is higher than any other landfill the NYSDEC has measured in NYS and even higher than radon concentration in natural gas underground storage.

"...the flare also has the effect of reducing concentration of the radon. This is because the air and the gas expand when they are heated." Since the heated radon soon cools to ambient temperature, which is well below the original temperature of the radon as it enters the flare, the net temperature change is one of cooling. The effect of this net cooling causes the gas to contract and causes the concentration of radon to increase, and does not have the effect of reducing the concentration of radon as stated by the NYSDEC when expansion or contraction due only temperature change is considered. The threat of the radon to humans will be at the ambient temperature not at the flare temperature (1,680F), because no one resides in the flare.

The DEC has determined that the radon levels at the site are typical of other landfills. Our modeling shows that there won't be any release in the future.

What about the greater than 1,000 years theme.

The purpose of 5 year review is to determine if the remedy is adequate. If we find that it's not we will reopen the ROD and do a different remedy.