

Integration of Performance Assessment and Monitoring

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Scope of the presentation

- **Definitions**
- **Issues in using monitoring information from a performance assessment perspective**
- **Conclusions**



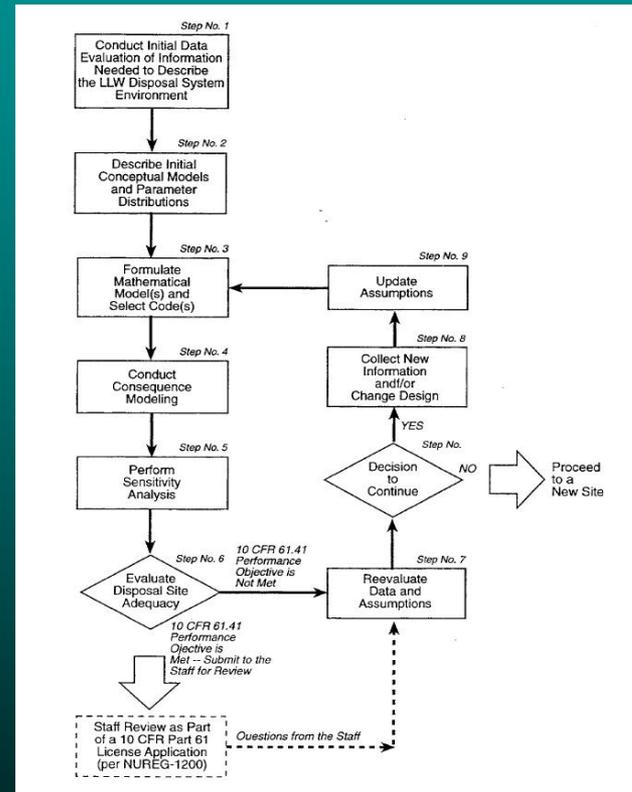
Definitions

- **Monitoring**
 - Observations directed at dependent variables of performance assessment models
 - This context is well understood and commonly used in the context of RCRA and CERCLA
- **Data Collection**
 - Observations directed at independent variables (input parameters) of performance assessment models
 - Clearly provides the necessary input for the performance assessment, but it is necessary to set priorities
- **Some “monitoring” programs are really directed toward data collection**



Data Collection

- **Performance assessment is an unusual activity**
 - Projection of doses over long time periods
 - Need for modeling as the basis for decisions
 - Decisions in the absence of observations of the model output
- **NRC guidance on the need for integration of performance assessment and data collection**



NUREG-1573



Monitoring

- **Two distinct situations**
 - A proposed facility
 - An existing facility, potentially with an existing plume
- **The utility of monitoring differs for these two situations**
- **For a proposed, modern, engineered repository, a monitoring system will never be expected to have a positive hit for many lifetimes into the future**
 - View monitoring as an approach to public confidence
 - Technically largely irrelevant
 - Except for ancillary data collection
- **What can we do with monitoring data from existing facilities?**



Monitoring Results: Negatives, False or Otherwise

- No observed migration from the repository
- Surface inspection suggests some degradation of the engineered system
- What can be concluded?



Novi Han, Bulgaria, circa 1994

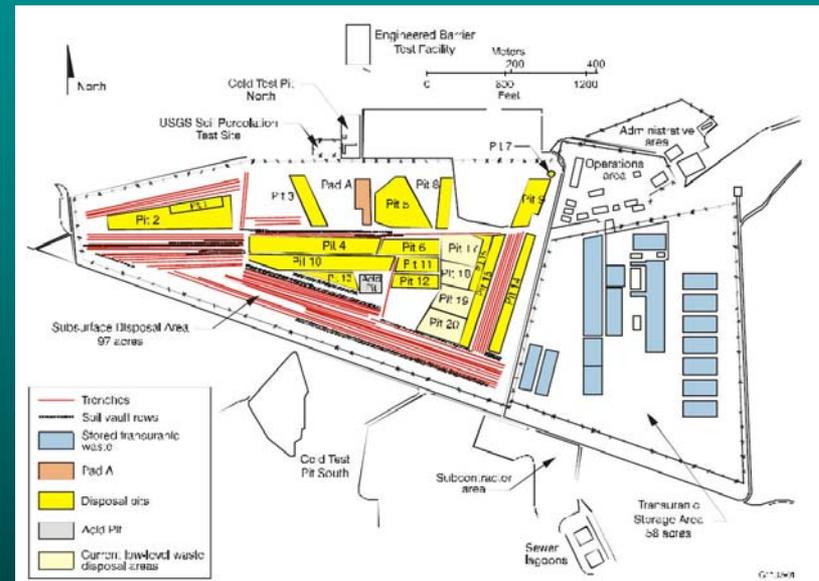


Novi Han, Bulgaria, circa 2004



Monitoring Results: False Positives

- **Plutonium observed in deep clay interbeds**
- **Not confirmed by subsequent monitoring**
- **Led to substantial effort**
 - “Calibrate” performance assessment
 - Additional monitoring
 - Public furor
- **Now there is substantial evidence that the original observations were false positives**

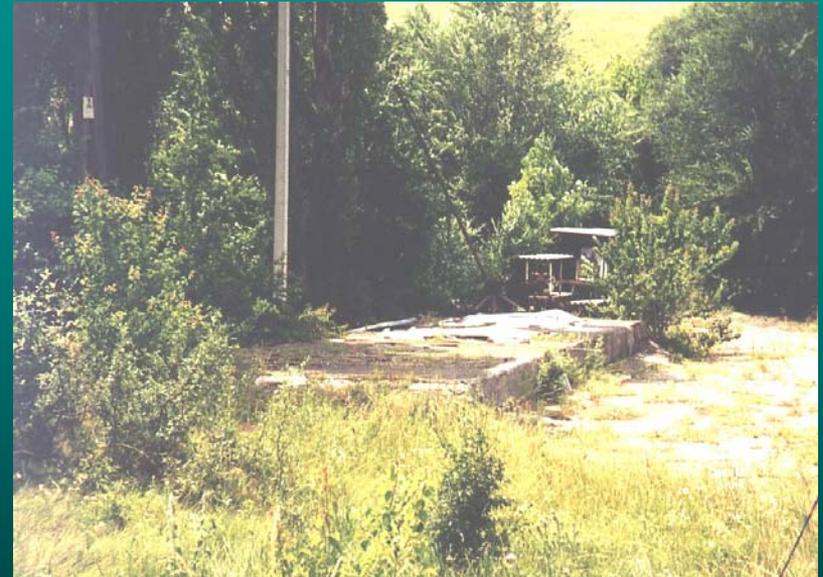


INL Radioactive Waste
Management Complex



Monitoring Results: True Positives

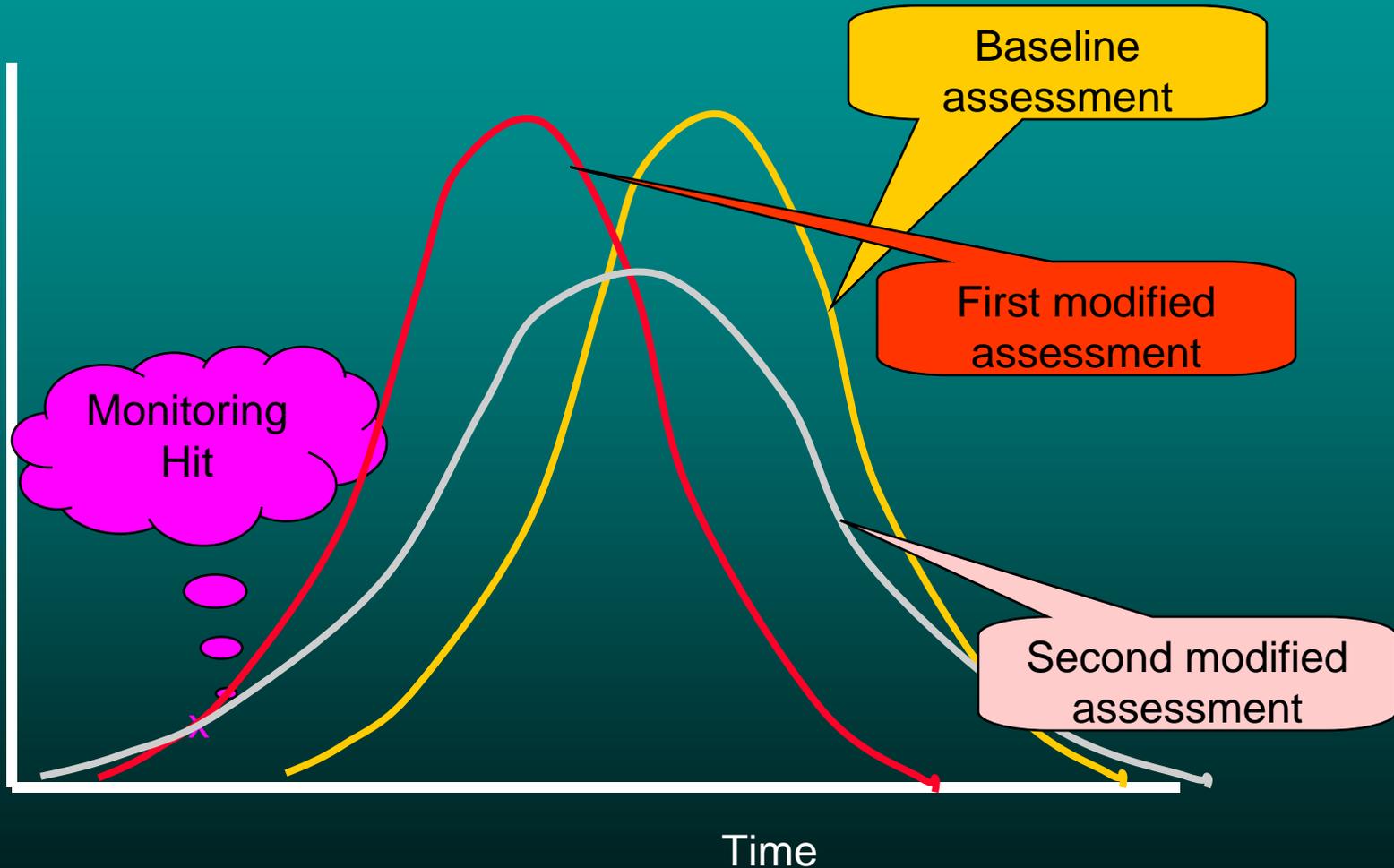
- **Observations of Ra-226 migration outside the vault**
- **Initial performance assessment showed negligible consequences of those observations**
- **Other issues were more important**
- **The decision was not made based on good technical grounds**



Disposal Vault at Chisenau,
Republic of Moldova



What does a monitoring observation mean?



What does a monitoring hit mean for performance assessment?

- **Early arrival times are not necessarily worse than later, but are perceived to be**
- **Early monitoring hit may be indicative of greater dispersion or a fast path not critical to risk**
- **Calibration of the performance assessment to the observation may actually make it less conservative**
 - **It may be possible to improve operational limits**
 - **But should not fundamentally change regulatory decisions**



Summary

- **Data collection is an integral part of performance assessment**
- **From a purely technical view, monitoring is largely irrelevant for new facilities**
 - However, “monitoring” networks may provide useful information for data collection
 - Monitoring may reduce risk associated with societal perceptions
- **Monitoring is of limited utility for operational facilities**
 - Negatives do not provide confidence because of the high potential for false negatives
 - Significant issues with false positives
 - Limited use for true positives
- **Positive hits should be used with caution, but political and social pressures may overwhelm such caution**



Conclusions

- **All knowledge about a facility is useful**
- **Monitoring programs should be designed for both monitoring and data collection**
- **Results (either positive or negative) need to be treated carefully**

