Natural Resource Damage Assessment

Emphasis on Groundwater

May 4, 2004

MPCA Mission —

To help Minnesotans protect their environment.

Objectives

- Introduction to NRDA
- Introduction to NRDA Process
- Introduction to groundwater and NRDA
- Introduction to Minnesota's NRDA program

Typical Scenario Today

- Typical scenario Today-
  - Discharge
  - Emergency clean up*
  - Remedial Investigation
    - Risk assessment
      - Eco-risk *
      - Human health risk*
  - Remedial Options
    - Active Cleanup
    - Passive Cleanup
    - Remediation Complete
    - Natural Resources may not be what they were before the discharge

NRDA Process

- Preassessment
  - Determines further assessment work
- Injury
  - Determining injury
  - Quantification of injury
- Restoration
  - Identify potential projects
  - Scale projects to injury

Baseline and Interim Damage

- Baseline – Level of natural resources before the release.
- Return to Baseline – RP liable to return natural resources to baseline.
- Primary Restoration –Restoration to achieve baseline.
- Interim natural resource damage – Lost natural resources from discharge to time of “Return to Baseline.”
- Compensatory Restoration –Restoration to compensate the public for interim lost resources

Typical Scenario and NRDA

- Typical Scenario and NRDA
  - Discharge
  - Emergency clean up* and baseline and injury investigations.
  - Remedial Investigation and baseline conditions and injury
    - Risk assessment
      - Eco-risk and Injury to Natural Resources.
      - Human health risk and Injury to Human use of Natural Resources.
  - Remediation - Options
    - Active Cleanup - Integrate with natural resource restoration.
    - Passive Cleanup – Integrate with natural resource restoration.
  - Remediation complete - Natural Resources may not be what they were before the discharge

Primary and Compensatory Restoration

- Primary Restoration – Natural resource restoration that brings the natural resource back to baseline.
- Compensatory Restoration – Natural resource restoration that compensates the public for lost resources from the time of discharge to when baseline is achieved.

Emergency NRDA Work

- Ephemeral Data
  - Habitats
    - Forest type
    - Wetland type
    - Habitats
    - Water Sampling – All
    - Biological Sampling
    - Air
  - Baseline
    - All of the above
    - NRDA Emergency Remedial Integration

Preassessment Screen

- Discharge
- Pathway to Natural Resources
- Injury
- Reasonable Cost for Assessment
- Response Actions will not Remedy the Injury

Investigate Natural Resource Injury

- Observable or adverse change
  - From baseline
  - Contaminates exceeding standards
- Impairment of service
  - Natural Resource Service
  - Human Service

Injury Examples

- Observable and/or Adverse Change
  - Exceedence of drinking water standards, surface water standards
  - Exceedence of action levels of edible organisms (for example, fish advisories)
- Impairment of Services
  - Loss of ecosystem functions (for example, impairment of food chain) (Natural Resource Service)
  - Loss of Human Use (Unable to drink the water)


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Injury Quantification

- Quantify injury relative to baseline
  - Degree, spatial and temporal extent of injury
  - Reduction or Loss of services
- Unit of Measurement for Scaling Restoration
  - Acre Years of Habitat Loss
  - Acre Feet of Contaminated Groundwater
  - Valuing Lost Resources or Services

Restoration

- Restoration options/projects
- Scale the restoration to the injury
- Determine type and scale of restoration appropriate for the injury

Groundwater and NRDA

- Assess injury
  - Change from baseline
  - Standard
  - Service Loss
- Groundwater Services
  - Ecological Services - water for vegetation, water for wildlife via surface water, maintenance of hydrologic flows.
  - Human Services – agriculture, drinking water, industrial, recreational, future use, assimilative capacity (buffers and cleans)
- Quantify injury
  - Physical and Chemical Attributes of the Aquifer
  - Volume
  - Flux
  - TIMEFRAME - Return to Baseline
  - Unit of measurement – appropriate scale
  - Valuing Groundwater

Groundwater and NRDA
Continued

- Valuation of Groundwater
  - Market Price Methodology – Where there is market prices for groundwater
  - Appraisal Methodology – Similar to Market Price Methodology
  - Factor Income Methodology – If groundwater is used in a process
  - Travel Cost Methodology – Travel costs to obtain clean water
  - Hedonic Pricing Methodology – Relates price of a market-traded commodity to its attributes. Example: land prices may be related to contaminated groundwater

Groundwater and NRDA Continued

- Valuation of Groundwater Continued
  - Unit Value Methodology – Preassigned dollar values
  - Contingent Valuation Methodology – Human valuation of groundwater with and without contamination
  - Simplified Methods
    - New Jersey, Washington, Florida have formulas

Groundwater and NRDA cont.

- Groundwater Valuation cont.
  - Cost - Cost of treating contamination – Minnesota Closed Landfill Program
  - Service to Service – Providing Equivalent Services as those Lost

Groundwater Restoration

- Groundwater Protection Strategies
- Providing Drinking Water to Affected Residents
- Providing Treatment for Municipalities Water – To Treat Contamination
- Conservation Easements – To Protect Aquifers in Danger of Contamination Due to Future Development

Alternative NRDA Process

- Traditional Process
- Cooperative Process
- Negotiate
- Settlement
- Justification

Cooperative Assessments

- Alternative to Traditional Process
- Promotes Participation from RP's and Trustee's
- Optimize Integration of Response and Restoration
- Integrate expertise
- Cost Effective