Region 8 QA Tribal Training

Using a Conceptual Site Model to Tell the Environmental Story of your Tribal Lands

Annual WQ Meeting 4/4/2012

Mary Goldade, EPA Region 8
Tim Spade, Flandreau Santee Sioux Tribe
Training Goals

Incorporate Conceptual Site Models into your Project Planning and QAPPs:

- Define a Conceptual Site Model (CSM)
- Use of CSMs in Project Planning and QAPPs
- CSM Case Study—Flandreau CWA 106 Program
  - CSM Worksheet
  - CSM for the Flandreau CWA 106 Program
  - CSMs in establishing Initial Target Levels for QAPPs
What’s a Conceptual Site Model?

• Conceptual Site Model (CSM) is a tool used to help describe or visualize environmental conditions at your site

• Describes known or potential:
  - Sources of contamination
  - Media that are contaminated or may become contaminated
  - Contaminants of concern
  - Movement of contamination through the environment
  - Exposure scenarios/Receptors (human or ecological)
  - Potential Benchmarks or Action Levels (Target Levels)
Why Develop a Conceptual Site Model?

• Tells the **pictorial story** of environmental conditions on your Tribal Lands and nearby property

• Identifies data needs and gaps that are customized to your regional, geographical and tribal needs

• Supports the rationale for selection of sampling locations

• Establishes requirements for background (off-site) and on-site characterization

• Serves as a Communication Tool to tell the **story**
Agricultural Run-off (from Soil) → Fertilizer (Nutrients) & Others? → Run-off from precipitation events or irrigation activities → Surface Water → Recreational Activities: Adults & Children

Surface Water to Fish & Fish to Human Consumption

Sediment to Fish & Fish to Human Consumption

For demonstration purposes only
All Projects Begin with a Plan

- Problem or Concern
- Decision(s) to be Made
- Surface water contains Contaminants
- Decide what, if any, action is required
Case Study:
Development of a CSM for Big Sioux River
Developing a CSM

- Start with a map of the site
- Use CSM Worksheet to describe site conditions
- Draft/Create a CSM
- Discuss/Review with EPA Tribal Technical and QA Leads
- Use CSM to develop Initial Target Levels
- Include CSM and Initial Target Levels in QAPP
Conceptual Site Model Worksheet*
<table>
<thead>
<tr>
<th>Known or Potential Sources and/or Activities</th>
<th>Known or Potential Contamination</th>
<th>Movement of Contaminant</th>
<th>Known or Potentially Impacted Media</th>
<th>Potential Exposure Pathways</th>
<th>Potential Receptors</th>
<th>Action Level(s) (Technology, Regulatory, Screening, Human Health, Water Quality, Ecological, etc.)</th>
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Conceptual Site Model Worksheet
CSM Worksheet: Big Sioux River

Known or Potential Sources and/or Activities
- Natural Sources
  - Metals
  - Sulfides
  - Nitrate
  - Radon
- Agricultural Sources
  - Pesticides
  - Herbicides
  - E. coli
- Highway Runoff
  - Chloride
  - Sodium
  - Calcium
  - Metals
  - Suspended Solids

Known or Potential Contamination
- Metals
- Sulfides
- Nitrate
- Radon
- Pesticides
- Herbicides
- E. coli
- Chloride
- Sodium
- Calcium
- Metals
- Suspended Solids

Movement of Contaminant
- Irrigation Runoff
- Rainwater Runoff
- Rainwater Leach
- Downstream Movement
- Groundwater Movement

Known or Potentially Impacted Media
- Groundwater
- Surface Water

Potential Exposure/Receptors
- Recreational Activities/Adults and Children
- Surface Water to Fish/Human Consumption
- Sediment to Fish/Human Consumption
- Habitat Degradation

Action Level(s)
- Technology
- Regulatory
- Screening
- Human Health
- Water Quality
- Ecological

Base Monitoring for National Database
Information will be used for Adoption of Tribal Water Quality Standards
Build a Conceptual Site Model
Big Sioux A Conceptual Site Model
For demonstration purposes only

Known or Potential Sources and/or Activities

Known or Potential Contamination

Movement of Contaminant

Known or Potentially Impacted Media

Potential Exposure/Receptors

Action Level(s) (Technology, Regulatory, Screening, Human Health, Water Quality, Ecological, etc.)

Natural Sources
- Metals
- Sulfides
- Nitrates
- Radon

Agricultural Sources
- Pesticides
- Herbicides
- E. coli
- Nitrates

Highway Runoff
- Chloride
- Sodium
- Calcium
- Metals
- Suspended Solids

Rainwater Leach

Groundwater Movement

Surface Water

Sediment to Fish/Human Consumption

Rainwater Runoff

Irrigation

Surface Water to Fish/Human Consumption

Downstream Movement

Surface Water

Recreational Activities/Adults and Children

Base Monitoring for National Database

Cleanup to be Determined by Necessity/Availability

Information will be used for Adoption of Tribal Water Quality Standards

Habitat Degradation

Information will be used for Adoption of Tribal Water Quality Standards

R8 QA Tribal Training: Using CSM to Tell the Environmental Story of your Tribal Lands—April 4, 2012
Known or Potential Sources and/or Activities:
- Natural Sources (Geologic formations)
- Nearby Highways

Known or Potential Contamination:
- Metals
- Sulfides
- Nitrates
- Mercury
- Magnesium Chloride
- Suspended Solids

Movement of Contaminant:
- Leaching
- Erosion or Precip/Irrigation Run-off

Known or Potentially Impacted Media:
- Groundwater
- Sediment/Soil
- Surface Water

Potential Exposure Pathways:
- Ingestion
- Dermal/Direct Contact

Potential Human Receptors:
- Fish Consumption (Adults & Children)
- Recreational Activities (Adults & Children)

Potential Ecological Receptors (Habitat Degredation):
- Aquatic Freshwater Fish
- Benthic Invertebrates

Potential Human Receptors:
- (Mercury)

Potential Ecological Receptors:
- (Mercury)

LEGEND:
- X: Pathway is not complete, no evaluation required
- : Pathway is or may be complete, but is judged to be minor or unlikely. Quantitative data collection not required.
- *: Pathway is or may be complete, collect quantitative data.

*Initial target levels and justification listed on next tab and in Appendix C of the QAPP.
Initial Target Level(s)

• Numerical values included in the QAPP to define the laboratory detection limits needed to make decisions at your site

• Initial Target Level(s) may be:
  — Technology limits (e.g., analytical detection limits)
  — Risk-based concentrations or screening levels
  — Regulatory standards (Tribal, Federal or State)
  — Regulatory criteria (MCLs, tribal, etc.)
  — Other?
  — or a combination of all of the above

• Based upon CSM information (receptors, media and contaminants of concern)
Conclusions

• CSMs are a tool to aid in defining your
  – General site conditions or status
  – Overall Project Goals (e.g., Monitoring Strategy)
  – Annual Sampling Goals (e.g., QAPP)
  – Initial Target Level(s) for laboratory analysis of your samples

• Update your CSM annually to reflect new information or data you’ve gained from the last sampling season

• CSMs communicate the **pictorial story** of environmental conditions on your Tribal Lands (your “go to” document)

• Use CSMs at any stage in your work to refine your understanding of the site conditions (initial site characterization, and selection of remedial alternatives, post-remediation monitoring, etc.)
Questions?
Handouts

1. EPA Conceptual Site Model Worksheet*
2. Case Study Handouts
   • Flandreau Tribe Site Map
   • Flandreau Tribe CSM

*This document and other QA references may be found at the QA website (http://www.epa.gov/region8/qa/)