Tribal Perspective
HAZMAT Spills
Clearwater River Basin

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Presentation Topics

- NPT Environmental Response
- Historic Spills Clearwater Basin
  - Impacts from both large and small spills
- Higher water quality standards needed to support greater fish consumption
- Protection of in-stream spawning and rearing habitat
Historic Spills 1991–2012
Clearwater River Basin, Idaho
Hazardous Environmental Response Team – HERT

- Support training for Groundwater Program priorities
  - Pollution prevention for UST and hazardous waste
  - Brownfields: Soil and groundwater assessment and cleanup
- Hazmat Environmental Response – no medical capability
- 3 funding sources:
  - Tribe
  - HMEP Training Grant
  - Brownfield Tribal Response Grant capacity development
Oil Spill Response Training

Fastwater Booming – Clearwater River, ID

TSWAN Oil Spill Response – Ocean Shores, WA
Hazardous Environmental Response Team (HERT)

Knife Edge Diesel Spill
6,300 gal, Nov 2003

Winter Spill Sampling
3 Categories of Spills

- Large-river, large-volume spills
- Small-creek, small-volume spills
- Spills contaminating groundwater

The Dose Makes the Poison
Sensitive Receptors

- Drinking water intakes
- Fish hatcheries and seasonal acclimation sites
- Mature free-swimming fish
- Juvenile fish
- Spawning beds with eggs (redds)
- Pacific lamprey rearing habitat
Middle Fork Clearwater, MP 84, 10,000 gallons dyed diesel

- Natural Resource Damage Assessment
- Collected fish tissue – analyzed for petroleum
- Collected 100s of samples
- Analyzed 7 steelhead filets and whole carcass
- Concentrations were similar upstream to downstream of spill
- NRDA abandoned
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Average filet ((n) size = (7)) ng/g</th>
<th>Consumption Rate 175g Per Day (ng/g)</th>
<th>Convert ng/g to ug/L</th>
<th>Fish Concentration OR Standard ug/L</th>
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<tbody>
<tr>
<td>Acenaphthene</td>
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<td>Benz(a)anthracene</td>
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<td>Pyrene</td>
<td>0.79</td>
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Clear Ck Diesel Spill
2–10 gal, July 2008

Loader rolls into Ck

Diesel sheen on hatchery
Orofino Gasoline Seep
12/31/2011
Orofino Gasoline Seep
Contaminated beach 3/14/2012
Underground gas line fails 3rd pressure test

2nd dispenser also gas wet, but passed P-test

Source of leak finally identified
July 30, 2012
Sheen at Clearwater River’s edge

Coon tracks and sheen

Transformer present but not a source of oil
Gasoline Concentrations
Shallow Groundwater

Orofino Gasoline Seep
7/23/2012

PID (ppm)
Benzene
Ethylbenzene
Toluene
Total Xylene
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Elmer Crow, NPT Elder
Bonneville Dam
Lamprey Ammocoetes
Dissolved Plume Area 10% Mass
75% Plume Size

Bioremediation, Natural Attenuation, ISCO (speed only)

Core Plume Area 10% Mass
20% Plume Size

ISCO, BioRemediation, Pump & Treat

Source Area 80% Mass
5% Plume Size

Dig and Haul, Thermal, ISCO
Conclusions

- Location, location, location
- The sensitive receptor is the aquatic nursery at the interface between surface and groundwater
- Water quality needs to improve to support the changing fish consumption standards
- Cumulative effects of multiple spills
- Effective remediation requires good site assessment and aggressive source removal
Shoring Post and Panel
Questions ?
In-situ Chemical Oxidation

Clean Sands Showing Radius of Injection
Figure 1. Pacific lamprey adult upstream passage day counts at Bonneville Dam, OR (USACE 2006). Trend line fitted through regression. From Cochnauer and Claire 2009.
Larval Pacific lamprey
Pacific lamprey life cycle

Figure 2. General life cycle of Pacific lamprey (Streif 2009).

- Adults live in ocean 1-3 years and feed on host fish.
- Adults develop teeth on sucking disk for parasitic feeding.
- Adults migrate to freshwater and reside there about a year.
- Larvae transform to juveniles (macrophthalmia) and migrate to the ocean.
- Adults spawn in gravel nest then die.
- Ammocoetes live in silt/sand substrates and filter feed for 3-7 years.
- Eggs hatch into larvae (ammocoetes) and drift downstream to slow velocity area.