

US EPA ARCHIVE DOCUMENT

In-Situ Burning Case Histories: Uplands and Wetlands

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OBJECTIVES

- As a followup to the 1999 API-funded literature study of inland and upland sites where ISB was used as a response strategy, conduct field visits to document medium-term recovery rates at selected sites.
- Synthesize the results into guidelines for using ISB in the future

SITE SELECTION

- Started with 31 case histories in API report, plus new sites since then
- Criteria were:
 - Permission to access site
 - Habitat other than fields or ditches
 - Had sufficient data on spill and burn conditions
 - Ability to document conditions/use of site since burn

SITES SELECTED

- Lakehead Pipeline Milepost 914: crude oil spill, Ruffy Brook, MN
- Chevron Pipeline MP 68: diesel spill, Corinne, UT
- Williams Energy: condensate spill, Louisiana Point, LA
- Williams Energy: condensate spill, Mosquito Bay, Louisiana

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LAKEHEAD PIPELINE: MP 914

- **Date of Spill:** 22 July 2000
- **ISB Conditions:** >500 bbls crude oil. 3 acres burned in 3 hr same day of spill. Tarry residue was picked in sheets
- **Environmental Setting:** Freshwater ponded marsh (willows, cattails, rushes, lots of open water). Water depth 1-3 feet



Lakehead MP 914
Source
Burn



Pre-burn July 2000
Post-burn July 2000
Post-burn July 2001



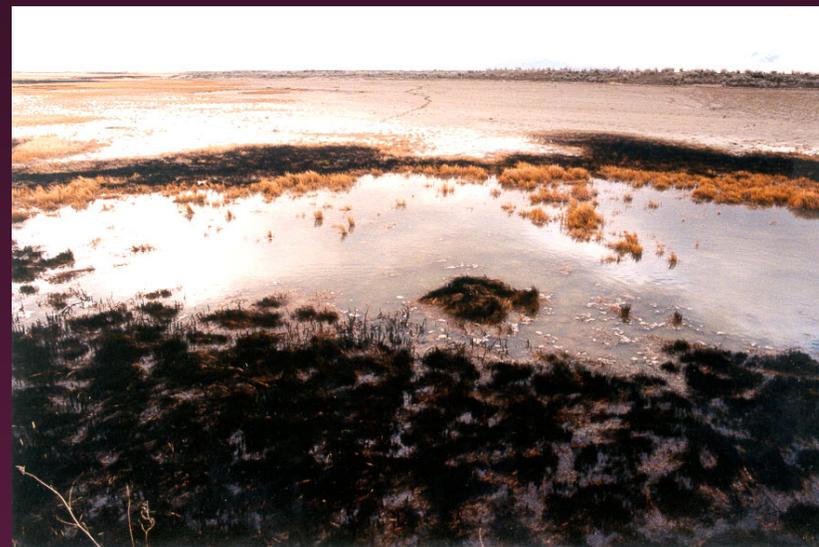
Pre-burn July 2000
Post-burn July 2001
Close up July 2001

Results: Lakehead MP 914

- Burn area = oiled area
- Burned willows died
- Herbaceous vegetation recovered within 1 yr
- Heavy sheens released when pond sediments near break site were disturbed
- Only slight sheens released in other areas
- No evidence that any significant oil sank

CHEVRON P/L: MP 68, UT

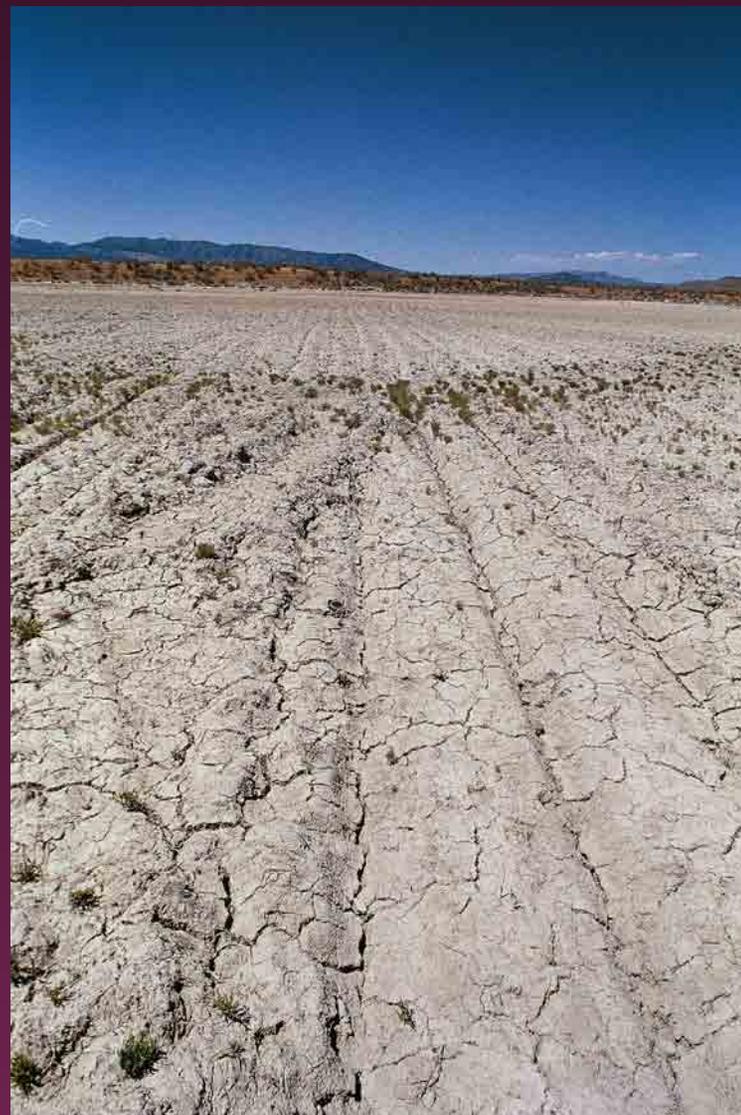
- **Date of Spill:** 21 January 2000
- **ISB Conditions:** ~100 bbls diesel, 9.4 acres burned 10 March; 12.6 acres burned 27 April (7 and 14 wk post-spill). Unvegetated areas tilled 9/00 and 8/01
- **Environmental Setting:** wetlands along drainage bordered by alkali or mud flats, snow/ice with multiple freeze/thaws before 1st burn



Salt Flat Area
Pre-burn Feb 2000
Post-burn March 2000
Post-burn July 2001



Sorbent use Feb 2000



July 2001



Ponded Area
Post-burn March 2000
Post-burn July 2001
Stubble July 2001



Second Burn May
2000



July 2001

Results: Chevron MP 68

- Burned area was 1.3 x oiled area
- Vegetation recovery best in ponded water
- Vegetation recovery was variable in other areas, depending on degree of oiled sediments
- Burning was effective in removing surface oil but not oil penetrated into sediments
- Oiled sediments in heaviest oiled areas persisted 2 summer seasons (>20 ppm PAH)

WILLIAMS: Louisiana Point

- **Date of Spill:** 23 February 2000
- **ISB Conditions:** Unknown quantity condensate spilled/burned 26 February (3 d post-spill). Oiled area = 13.9 acres; burned area = ~100 acres
- **Environmental Setting:** Brackish high marsh (Distichlis, Borrichia, Batis, S. patens)



Louisiana Point Post-burn Aerial Photo





July 2001 oiled/burned



Burned, open areas with stubble, July 2001



Results: Louisiana Pt.

- Burned area was 7 x oiled area
- 1-2 inches water and water-saturated soils kept oil from penetrating sediments
- Burning was very effective; 2 mo later TPH = 20-240 ppm; no oil visible 1 yr later
- Vegetation recovery was variable areas of heaviest oil

WILLIAMS: Mosquito Bay, LA

- **Date of Spill:** 5 April 2001
- **ISB Conditions:** >1,000 bbl condensate spilled/
burned on 12 and 13 April (7-8 d post-spill). Oiled
area 37 acres; burned area ~100 acres
- **Environmental Setting:** Brackish intertidal
marsh (*Distichlis*, *S. alterniflora*, *S. patens*)



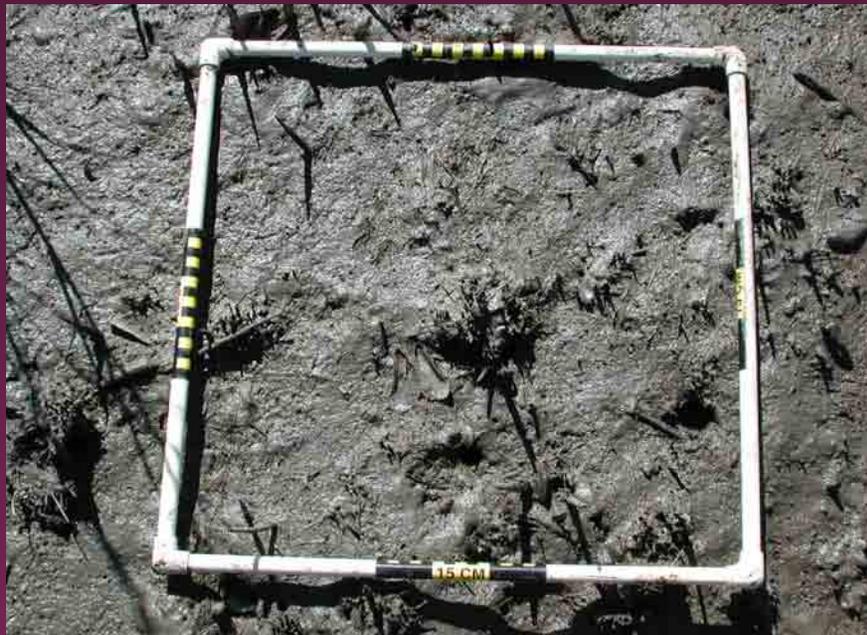
Mosquito Bay Pre-burn 10 April 2001











Area 1
Pre-burn Apr
Post-burn Apr
Post-burn Oct



Area 1
Post burn 12 Apr
Post burn 17 Oct
Planted Spartina



Area 3 burn





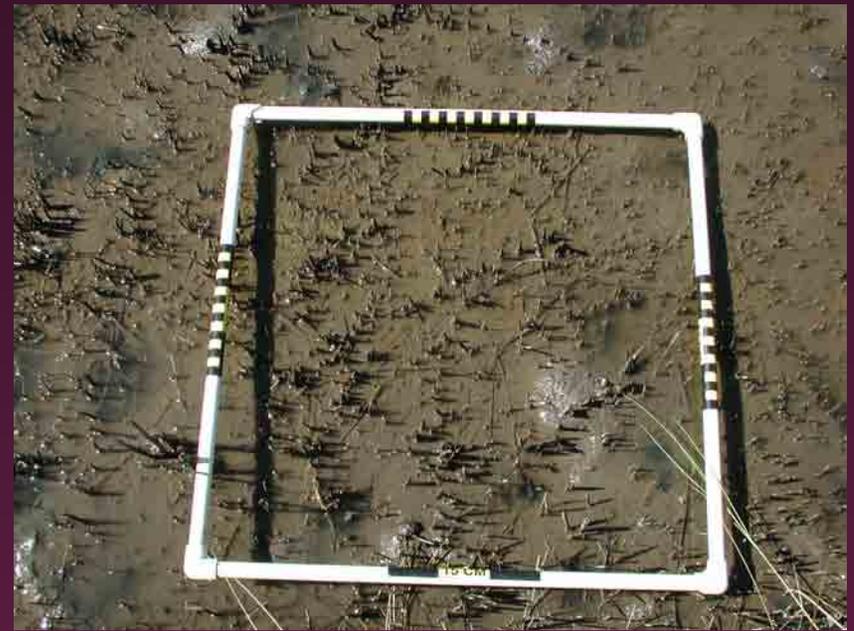




Area 3; 13 days post-burn



Area 3; 6 mo post-burn



Area 3
Post burn 26 Apr
Post burn 17 Oct
Post burn 17 Oct



Unoiled, burned - 13 days post-burn



Mosquito Bay ISB



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Results: Mosquito Bay

- Burned area was ~3 x oiled area
- Oil penetrated burrows and root cavities during low water over 7-8 d period post-spill
- Burning was effective in removing surface oil but not subsurface oil
- Vegetation died in areas of heavy oiling; good vegetative recovery in light oiling and unoiled

LESSONS LEARNED

- ISB can be used weeks to months post-spill to remove oil; but it will not prevent vegetation mortality from oil exposure
- Light oils that penetrate permeable substrates will persist after burning
- A water layer is preferred but not required under all conditions

LESSONS LEARNED, cont.

- In 3 of 4 sites, the burned area >> oiled area, so the potential for a larger burn area should be explicitly considered for sites:
 - That have not been burned recently (thus have abundant natural fuel present)
 - Where fire breaks cannot be completely cleared
 - Without a lot of free-standing water
 - With dry or dead vegetation