

# 2002 Application for Research Funding

**PROJECT TITLE:** Field-Scale Assessments of the Phytoremediation of Weathered Hydrocarbons in Soil

**CATEGORY:** Soil & Groundwater

## APPLICANT'S CONTACT INFORMATION

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## SCHEDULE

**Projects should, where possible, be broken into 12 to 18 month segments with results being available before the next phase commences.**

Phase 1	Start: May 2001	Finish: Aug. 2001
Phase 2	Start: Sept. 2001	Finish: Aug. 2002
Phase 3	Start: Sept. 2002	Finish: Aug. 2003
Phase 4	Start: Sept. 2003	Finish: Dec. 2004

## RESEARCHER(S) INFORMATION

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## PROJECT GOALS AND DELIVERABLES

### Phase 1

1. Establish research sites to assess/demonstrate the potential of phytoremediation to reduce hydrocarbon levels in oil contaminated soils. (Note: these sites are being established as part of the *RTDF Phytoremediation Action Team-TPH Subgroup Cooperative Field Trials.*)
2. Conduct initial site characterizations and treatability studies. (Note: site characterization and monitoring will be conducted in accordance with RTDF protocols.)

### Phase 2

1. Establish unplanted (fertilized and unfertilized) and planted experimental plots at each of three sites.
2. Monitor changes in hydrocarbon (TPH, PAH, Biomarker, TPH fractions) and microbial (MPN, CLPP, FAME, DGGE) parameters in rhizosphere and bulk soils.
3. Assess plant species composition and plant growth; replant as necessary
4. On-site tours
5. Progress report to stakeholders.

### Phase 3

1. Monitor changes in hydrocarbon (TPH, PAH, Biomarker, TPH fractions) and microbial (MPN, CLPP, FAME, DGGE) parameters in rhizosphere and bulk soils.

2. Assess plant species composition, plant growth, and hydrocarbon uptake by plants.
3. Progress report to stakeholders.
4. On-site tours

#### Phase 4

1. Monitor changes in hydrocarbon (TPH, PAH, Biomarker, TPH fractions) and microbial (MPN, CLPP, FAME, DGGE) parameters in rhizosphere and bulk soils.
2. Assess plant species composition, plant growth, and hydrocarbon uptake by plants.
3. Prepare cost estimates for both research & development and full-scale implementation of phytoremediation.
4. On-site tours
4. Final report to stakeholders.

### **PROJECT BENEFITS FOR INDUSTRY/OTHER**

1. Rigorous scientific determination of the applicability and efficiency of phytoremediation of weathered hydrocarbons under conditions representative of the oil and gas producing regions of the western Canadian prairies.
2. Standardization of site set-up and monitoring (using the RTDF protocols) will facilitate comparisons of the data obtained on these sites with those obtained on RTDF sites established in the United States. Together, this information should allow for a comprehensive assessment of the potential of phytoremediation to address a range of contaminated sites.
3. Generally less expensive than traditional (engineered) remediation technologies.

### **PROJECT BENEFITS FOR REGULATORS/PUBLIC**

1. Collection of data that will help regulatory officials evaluate the potential of phytoremediation under western Canadian conditions.
2. Enjoys a favorable public perception.
3. Passive and solar driven.
4. Good esthetics.

### **POLICY CHANGE REQUIREMENTS**

1. Requires a step change in approach from “dig and haul” that is still in place within some regulatory jurisdictions.

### **SUCCESS MEASURES**

1. Establishment of field (demonstration) sites; on-site tours to be arranged in 2002, 2003, and 2004.
2. Database documenting the performance of phytoremediation under field conditions.
3. Demonstrate the feasibility of using native plant species for the phytoremediation of petroleum hydrocarbons under western Canadian conditions.
4. Identify and demonstrate management practices that promote the phytoremediation of petroleum hydrocarbons.

### **COMMUNICATION OUTPUT**

1. Annual report to funding agencies and RTDF Phytoremediation Action Team; updates published on the RTDF and Univ. of Saskatchewan phytoremediation web sites.
2. Presentation of research results at appropriate technical seminars and industry workshops.
3. Publication of research results in peer-reviewed journals.

### **SUGGESTED PEER REVIEWERS (should be two or three)**

1. Sandra Blenkinsopp, Ph.D.

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**Description of area of expertise of suggested peer reviewer**

Sandra is an environmental scientist in the Emergencies Science Division of Environment Canada, with expertise in the areas of oil spill remediation and remediation technologies (including phytoremediation).

2. Todd Han  
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**Description of area of expertise of suggested peer reviewer**

Todd is an environmental specialist in the Petroleum Development Branch of Sask Energy & Mines, with expertise in the areas of remediation technologies and regulatory issues.

3. Julie L. Roy, Ph.D.  
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**Description of area of expertise of suggested peer reviewer**

Julie is a research scientist at Imperial Oil Resources, with expertise in the area of bioremediation.