

# F1 to F4

[2018 Re-Evaluation of F2 and F3 Petroleum Hydrocarbon Management Limits](#)

[2015 Field Validations of the F2:F3b Ratio and BOC-adjusted PHC F3 Calculation for Resolving False Detections of Crude Oil and Diesel Petroleum Hydrocarbons in Clean Soils](#)

- [2009 UoW\\_DRAFT Part 1 Biogenic Petrogenic F3a F3b DRAFT Report](#)
- [2009 UoW\\_DRAFT BiogenicPetrogenicF3aF3bDRAFTReport](#)
- [2012 University of Waterloo\\_Petroleum Index Presentation](#)
- [2016 CH2M\\_ Field Validations of PHC Fractions F2 and F3](#)

[2013 Proposed Management Limits for F2 and F3 Hydrocarbons at Remote Alberta Green Zone Sites](#)

- [2013 MEMS and AITF\\_Green Zone Presentation](#)
- [2013 MEMS and AITF\\_Proposed Management Limits for F2 and F3 Petroleum Hydrocarbons at Remote Alberta Green Zone Sites](#)

[2013 Subsoil Guidelines for Green Zone Sites, Proposed Exclusion Depths for the Ecological Direct Contact Exposure Pathway at Remote Alberta Green Zone Sites](#)

- [2013 MEMS and AITF\\_ReportAlberta Green Zone](#)

## Rooting Depth Study

### 2013 Residual Saturation, Fire/Explosion Hazard and Hydrophobicity

- 2013 AITF\_Residual Saturation Fire Explosion Report

### 2012 Validation of Petroleum Hydrocarbon Stratified Remediation Subsoil Criteria

- 2012 AITF\_Validation of Petroleum Hydrocarbon Stratified Remediation Subsoil Criteria Report
- 2013 AITF\_Validation of PHC Stratified Remediation Subsoil Criteria Presentation

### 2011 Validation of Petroleum Hydrocarbon Stratified Remediation Subsoil Criteria

- 2010 AITF\_Validation of Subsoil Hydrocarbon Criteria for Stratified Remediation Report
- 2011 AITF\_Validation of Petroleum Hydrocarbon Stratified Remediation Subsoil Criteria Report

### 2011 Standardization of an Analytical Method to Differentiate Petrogenic and Biogenic Inputs in Contaminated and Background Soils

- 2009 UoW and Env Canada\_Biogenic Presentation
- 2012 Env Canada\_\_Standardization of an Analytical Method to Differentiate Petrogenic and Biogenic Inputs in Contaminated and Background Soils\_Report

- [2012 ENV Canada Analytical Method to Differentiate Petrogenic and Biogenic Inputs Report](#)

[2011 Utilizing Carbon Ranges, Unresolved Complex Mixtures and Carbon Preference Index Signatures as a New Tool for Quantifying Biogenic vs. Petrogenic Hydrocarbons in Soils Contaminated with Heavy Petroleum Products](#)

- [2010 UofWaterloo Oil Contaminated Soil from Background Presentation](#)
- [2013 UoWaterloo Publication IS IT CLEAN OR CONTAMINATED SOIL Report](#)
- [2013 UoWaterloo Publication IS IT CLEAN OR CONTAMINATED SOIL Tables](#)
- [2013 UoWaterloo IS IT CLEAN OR CONTAMINATED SOIL Figures](#)

[2010 Evaluating the Ecotoxicity of PHC F3 in Peat Soils versus Mineral Soils](#)

[2010 Weathered PHC F2 and the Eco-Contact Pathway, Phase 2, Effects of Soil Texture](#)

- [2012 Axiom Weathered F2 Eco-Contact Guideline Report](#)
- [2010 Axiom Weathered PHC F2 and the Eco-Contact Pathway Phase I Report](#)

[2009 Paragon Soil Comprehensive Literature Review on effect of Petroleum Hydrocarbons \(PHC\) on soil invertebrates with a focus on sub-soils below 1.5 m in both agricultural and natural areas in Alberta](#)

- [2010 AITF and Paragon\\_Stratified Approach Soil Remediation Presentation](#)

[2009 Distinguishing Natural vs Petroleum F3 Hydrocarbons in Diesel Invert Biopiles](#)

- [2009 UoW\\_Distinguishing Natural vs F3 Presentation](#)

[2009 Application of Different Measures of Bioavailability to Support the Derivation of Risk-Based \(Tiers 2 or 3\) Remedial Benchmarks for PHC-Contaminated Sites](#)

- [2009\\_910651 PTAC Progress Report](#)
- [2009 Stantec\\_Bioavailability Presentation](#)
- [2010 Stantec\\_RiskBased Remedial Benchmarks for PHC Presentation](#)

[2008 Weathered PHC F2 and the Eco-Contact Pathway – Phase 1 – Quantifying the Effects of Weathering](#)

- [2008 AENV\\_Draft Tier 2 Soil Ecocontact Guidelines PHC Presentation](#)
- [2009 BodyCote and Axiom\\_Weathered PHC F2\\_Phase 1 Presentation](#)
- [2009 Stantec\\_Weathered F2\\_Phase 1 Report](#)
- [2010 Axiom\\_Weathered PHC F2 and EcoContact Pathway\\_Phase 2 Presentation](#)
- [2012 Stantec\\_Weathered F2\\_Phase 2 Report](#)

[2008 Validation of Subsoil Hydrocarbon Criteria for Stratified Remediation at Upstream Oil and Gas](#)

## Facilities in Alberta: Field Study

- 2010 AITF and Paragon\_Stratified Approach Soil Remediation Presentation

## 2007 Validation of Subsoil Hydrocarbon Criteria for Stratified Remediation at Upstream Oil and Gas Facilities in Alberta

- 2008 AITF and Paragon\_Stratified Approach Soil Remediation Presentation

## 2007 Environmentally Acceptable Endpoints for Weathered/Aged (Residual) Petroleum Hydrocarbons CCME CWS Fraction F3 in Soil, Phase 3

- 2007 Axiom\_ENVIRONMENTALLY ACCEPTABLE ENDPOINTS FOR WEATHERED:AGED PETROLEUM HYDROCARBON FRACTION F3 Report
- 2007 Worley\_Bioremediation of Weathered Petroleum Hydrocarbons Literature Review

## 2007 Distinguishing Natural vs Petroleum F3 Hydrocarbons in Oil Spill Impacted Muskeg Material

- 2007 UofWaterloo\_Natural vs F3 in Oil Spill Impacted Muskeg Project Scope
- 2007 UofWaterloo\_Natural vs F3 in Oil Spill Impacted Muskeg Presentation

## 2006 Field-Scale Assessments of the Phytoremediation of Weathered Hydrocarbons in Soil

- 2006 UoS\_Phytoremediation in SK Report Yr 4

- [2006 UoS\\_Phytoremediation in SK Presentation Yr 4](#)
- [2007 UoS\\_Phytoremediation in SK Project Update](#)

[2006 Ecotoxicity Evaluation of Composted Site and Reference Soils Contaminated Predominantly with PHCs and Arsenic](#)

- [2006 Stantec\\_ECOTOXICITY EVALUATION OF SOILS CONTAMINATED WITH PHCS AND ARSENIC](#)
- [2006 WorleyParsons\\_Bioremediation of F3 Presentation](#)

[2006 Assessment and Refinement of Ecotoxicity Methods for Development of Tier 2 Soil Eco-contact Standards and Application to Site-specific Risk Assessments \(Tier 3\)](#)

- [2007 Stantec\\_Tier 2 Soil EcoContact Site Specific Risk Assessments Presentation](#)

[2005 Environmentally Acceptable Endpoints for Weathered/Aged \(Residual\) Petroleum Hydrocarbons CCME CWS Fraction F3 in Soil, Phase 2](#)

- [2005 Matrix and Axiom\\_Acceptable Endpoints for PHC Fraction F3 Presentation](#)
- [2005 Axiom\\_ENVIRONMENTALLY ACCEPTABLE ENDPOINTS FOR F3 Presentation](#)

[2005 Investigations into the Fraction-specific Toxicity of PHC in Soil: Evaluation of the Toxicity of Fraction F3 on the Exposure, Uptake and Toxicity of](#)

## Individual and Binary Mixtures of CCME PHC Fractions

- Stantec and UoWaterloo\_PHC Fraction 3 Phase 3 Presentation
- 2005 Stantec\_CCME F3 Binary Yr 2 Presentation
- 2006 Stantec and UoWaterloo\_F3 Report

## 2005 Summary of Chronic Screening Toxicity Test Results with Reference Soils and Soils Contaminated with Petroleum Hydrocarbon Residuals

- 2005 Stantec\_Toxicity Tests with Soils Contaminated with Petroleum Hydrocarbon Residuals Report

## 2005 PHC CWS Ecotoxicity Data Compliation and Analysis

- 2001 UMA and Komex\_Petroleum Hydrocarbon CanadaWide Standards
- 2005 Axiom\_PHC CWS ECOTOXICITY DATA\_Report
- Norwest\_Validation of the Alternate CCME method\_Project Proposal

## 2005 Ecotoxicity Risk Assessment of Hydrocarbon Residuals in Bioremediated Oil-Contaminated Clay Soils

- 2003 ERAC\_Ecotoxicity Risk Assessment of PHC in Clay
- Matrix\_PHC Bioremediated Oil Contaminated Clay Soil
- 2003 Matrix\_Petroleum Hydrocarbons to Soil Organisms\_Phase 3 Final Report

- [2005 Matrix\\_F3 Presentation](#)

### [2005 Case Study Analysis on Phytoremediation across Canada](#)

- [2005 Imperial\\_Phytoremediation of Salt Sites](#)
- [2005 UoWaterloo\\_Phytoremediation\\_Part 1](#)
- [2005 UoWaterloo\\_Phytoremediation\\_Part 2](#)
- [2005 UoWaterloo\\_Phytoremediation\\_Part 3](#)
- [2005 UoWaterloo\\_Phytoremediation\\_Part 4](#)

### [2004 Environmentally Acceptable Endpoints \(EAE\) of CCME Canada-Wide Standards \(CWS\) Petroleum Hydrocarbons Fraction F3 for Weathered Petroleum Hydrocarbons in Soil, Phase 1](#)

- [2004 EAE CWS PHC F3 in Soil\\_Project Scope](#)
- [2004 EAE CWS PHC F3 in Soil\\_Letter](#)
- [2004 Axiom\\_ Environmentally Acceptable Endpoints for Fraction 3 Report](#)

### [2004 Compost amendment of oil field waste to remediate high concentrations of petroleum hydrocarbons F3 and F4 fractions](#)

### [2003 Framework Foundation and Guidance for Tier 2 Site-Specific Development of Soil Contact Cleanup Standards for PHC-contaminated sites](#)

- [2001\\_ERAC Framework Foundation for Tier 2 Soil Contact Cleanup Standards for PHC Contaminated Sites](#)
- [2002 Gladys\\_Tier 2 Site Specific Development of](#)



Soil Contact Cleanup Standards for PHC Contaminated Sites Presentation

- 2003 Stantec\_Framework for Tier 2 Presentation
- 2003 Stantec\_Tier 2 Site Specific Development of Soil Contact Cleanup Standards for PHC Presentation
- 2003 Stantec\_FRAMEWORK AND GUIDANCE FOR TOXICITY ASSESSMENT OF CONTAMINATED LANDS Report
- 2005 Stantec\_Toxicity Tests with Soils Contaminated with Petroleum Hydrocarbon Residuals Report

2003 Toxicity of Petroleum Hydrocarbons to Soil Organisms and the Effect on Soil Quality, Field Studies, Phase 2

- 2003 Matrix and Stantec\_Petroleum Hydrocarbons to Soil Organisms\_Phase 2 Field Studies
- 2003 Matrix and Stantec\_Toxicity and Guideline Development for Crude Oil\_Phase 2 and 3\_Presentation
- 2003 Matrix\_Petroleum Hydrocarbons to Soil Organisms\_Phase 3 Final Report
- 2003 EBA\_Environmentally Acceptable Endpoints for F3 Presentation

2003 Toxicity of Petroleum Hydrocarbons to Soil Organisms and the Effect on Soil Quality, Fraction-Specific Toxicity of Crude Oil, Phase 1

- Matrix and Stantec\_Toxicity and Guideline Development for Crude Oil\_Phase 1\_Field Studies

Presentation

- 2003 Stantec and Matrix\_TOXICITY OF PHCs TO SOIL ORGANISMS AND THE EFFECTS ON SOIL QUALITY, PHASE 1\_Report

2003 Comparison of the Soil Ecotoxicity of the Light and Heavy Ends of Fraction 3

- 2003 ERAC\_Soil EcoToxicity of PHC F3 Fraction
- Stantec\_Soil Test Methods for Assessing Toxicity in Contaminated Soil Presentation
- Stantec\_Soil Ecotoxicity of Fraction 3 Presentation

2002 Field-Scale Assessments of the Phytoremediation of Weathered Hydrocarbons in Soil

- 2001 Germida & Farrell\_Phyto Proposal
- 2002 UoS\_Phytoremediation\_Field Studies Report
- 2002 ARC\_Phytoremediation to Enhance Hydrocarbon Remediation in Landfarms
- 2004 UoS\_Phytoremediation\_Presentation

2001 Modification of plant roots to accelerate microbial degradation of hydrocarbons

2001 Treatment Of Hydrocarbon Contaminated Water Using Constructed Wetlands Phase 3

- 2004 Komex\_CONSTRUCTED WETLAND PILOT PROJECT AT THE STRACHAN GAS PLANT
- 2000 Komex\_Constructed Wetlands for Treatment of Condensate Presentation

- [2000 Komex\\_Constructed Wetlands](#)
- [2001 Komex\\_Constructed Wetlands for Treatment of PHC Presentation](#)

#### [2001 Plant Uptake And Degradation Of Process Chemicals And Hydrocarbons in Wetlands](#)

- [2002\\_Constructed Wetlands for Hydrocarbon Removal ERAC Update](#)
- [2002 Komex\\_Wetlands\\_Field Update Presentation](#)

#### [2001 Monitored Natural Attenuation for Upstream Oil and Gas](#)

- [2000 Komex\\_Uptake of Sulfolane by Cattails Report](#)
- [2001 Komex\\_MNA Presentation](#)
- [2001 UoA\\_Natural Attenuation](#)
- [2002\\_Remediation by MNA\\_ERAC](#)
- [2002 Komex\\_MNA Letter Update](#)
- [2002 Komex\\_Diffusion Samplers in MNA Letter Update](#)
- [2002 Armstrong\\_Assessment MNA Report](#)
- [2003 ERAC\\_Remediation of PHC Site by MNA](#)
- [2004 Komex\\_Sulfate Reduction\\_MNA](#)
- [2004 Komex\\_MNA Presentation](#)
- [2005 Komex\\_MNA Presentation](#)

#### [2001 Assessment of Phytoremediation In Situ Technique for Cleaning Oil Contaminated Sites Phase 2](#)

- [2000 UoS\\_Phytoremediation as an InSitu Technique for Cleaning OilContaminated Sites\\_Final Report](#)

- [2001\\_ERAC\\_Phytoremediation](#)
- [2001\\_UoS\\_Phytoremediation](#)

### [2000 Assessment of Fraction Specific Toxicity and Derivation of Recommended Soil Quality Guidelines for Crude Oil in Agricultural/Grassland Soils](#)

- [1998 Assessment of fraction specific toxicity and derivation of recommended soil quality guidelines](#)
- [2001 Matrix and Stantec\\_Soil Quality Guideline for Crude Oil in Agricultural Soils\\_Presentation](#)
- [Matrix and Stantec\\_Toxicity and Guideline Development for Crude Oil\\_Phase 1\\_Field Studies Presentation](#)
- [2003 Matrix and Stantec\\_Toxicity and Guideline Development for Crude Oil\\_Phase 2 and 3\\_Presentation](#)
- [Matrix and Stantec\\_Toxicity and Guideline Development for Crude Oil in Agricultural Soils\\_V2 Presentation](#)

### [1999 Assessment of Phytoremediation In Situ Technique for Cleaning Oil Contaminated Sites Phase 1](#)

- [1999 UoS\\_Phytoremediation Presentation](#)
- [UoS\\_Database of Plants that Play a Role in the Phytoremediation of Petroleum Hydrocarbons](#)
- [1999 UoS\\_Phytoremediation as an InSitu Technique for Cleaning Oil Contaminated Sites\\_Report](#)