

# F1 to F4

## [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 Compilation 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