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Brian W. Zelt, Ph.D.

Brian is president of an independent company with over 30 years of consulting experience in air dispersion modelling. Brian currently applies his knowledge and experience in the fields of air dispersion modelling, risk assessment, surface water dispersion modelling and application programming. A brief summary of his qualifications is listed below:

- Professional member of the Association of Professional Engineers and Geologists of Alberta (APEGA) and British Columbia (APEGBC)
- Has extensive background in the applied fields of turbulence and dispersion modelling with experience authoring air quality and surface water quality dispersion models, and using other regulatory dispersion models. He is active in the development of new modelling techniques and tools for dispersion modelling of hazardous pollutants, sour gas, pipelines, risk assessment and non-routine flaring for the Alberta government.
- He is co-author of the regulatory models: AERflare (flaring and incinerator air dispersion modelling for AERMOD), ABflare (flaring and incineration air dispersion modelling for CALPUFF) and AERH2S (Emergency planning zones for sour gas). He has also developed and coauthored the development of ZZArisk for the calculation of quantitative risk calculations for public safety risk from toxic gas, pipelines and other hazards.
- Has knowledge of oil and gas operations and equipment, thermodynamics and combustion for the estimation of emissions
- Has experience as an expert witness for the AER, AUC and Queen's Bench
- Has experience in environmental and human health risk assessment techniques including probabilistic and discrete methodologies
- Graphic arts, graphing, mapping and GIS - communicating complex and technical information in layman-accessible formats
- Has extensive background in computer application and database programming. Languages include C/C++, fortran, awk, visual-basic, VB for Microsoft applications, PHP, MYSQL, jscript, TeX/LaTeX and assembler languages.

Brian W. Zelt

Education

PhD, Mechanical Engineering, University of Alberta, 1992
BSc, Mechanical Engineering, University of Alberta, 1984

Affiliations

Professional Engineer, Association of Professional Engineers and Geologists of Alberta (APEGA), British Columbia (APEGBC)
Air and Waste Management Association (AWMA)
Canadian Prairie and Northern Section of AWMA (CPANS)
American Chemical Society
Canadian Chemical Society

Awards

Gilpin Award for Research Excellence
Alberta Oil Sands Technology and Research Authority Scholarship
Gulf Canada Ltd. Graduate Scholarship
NSERC Undergraduate Summer Research Award
Dean's Research Award

Experience

2002- **Zelt Professional Services Inc.** **Calgary, Alberta**
President
Air quality modelling and assessment; public safety risk assessment; regulatory review and expert testimony; computer programming; probabilistic model formulation; surface water quality dispersion modelling; human health and environmental exposure risk assessment; communication of technical information, business graphics and presentation

1998-2001 **E2 Environmental Alliance Inc.** **Calgary, Alberta**
Zelt Professional Services Inc. (Partnership)
Director, Air Quality Services
Air quality modelling and assessment; human and ecological risk assessment; surface water quality modelling; probabilistic model formulation; statistical analysis, time series analysis; Windows C^{++} computer programming.

1993-1998 **Environmental Management Associates (EMA), Golder Associates Ltd.** **Calgary, Alberta**
Ecological and Human Health Risk Assessment, Exposure Modelling Specialist
Water quality modelling; atmospheric dispersion modelling; risk assessment; environmental noise modelling; probabilistic model formulation; statistical analysis; time series analysis; computer programming; industrial graphics art;

1992 **Spicer Corp.** (contract) **Kitchener, Ontario**
Design/Program user interface for retail version of graphics software

1992 **Toxcon Consulting Ltd** (contract) **Edmonton, Alberta**
Health risk assessment modelling for Water Treatment plant

1992 **University of Alberta** (contract) **Edmonton, Alberta**
Developed a three-dimensional flexible linkage robot simulation program

1990 **Toxcon Consulting Ltd** (contract) **Edmonton, Alberta**
Toxic gas dispersion modelling for new landfill

Brian W. Zelt

PROJECT RELATED EXPERIENCE - RISK ASSESSMENT

2019

AllHazards-SkyStone, Assorted operators — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

2018

AllHazards-SkyStone, Assorted operators — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

Hazard Review, EPCOR — **AB, Canada**

Hearing: hazards and setbacks potentially impacting EPCOR proposed operations from nearby sour gas battery.

2017

Sour Gas, SEM CAMS — **AB, Canada**

Sour gas plume dispersion and hazard assessment for on-site high pressure acid gas piping

LNG refueling station, Gaz Metro — **QC, Canada**

Quantitative risk assessment of risk associated with the operation of an LNG refueling station in Quebec. Modelling using PHAST/SAFETI.

Quantitative Risk Assessment, EPCOR — **AB, Canada**

Calculation of individual risk from pipeline and EPZ calculations of sour gas battery.

Hazard Review, EPCOR — **AB, Canada**

Review of hazards and setbacks potentially impacting EPCOR proposed operations from nearby sour gas battery.

AllHazards-SkyStone, ConocoPhillips — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

AllHazards-SkyStone, Predator — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

2016

GazMétro Solutions Transport — **Quebec, Canada**

Quantitative risk assessment of four natural gas transmission pipelines in Quebec with investigation of uncertainties of primary influences: pipeline incident rate (including review of PHMSA and NEB databases); thermal hazards; flash fires; building infiltration and explosions. Using SAFETI/PHAST modelling tools.

AllHazards-SkyStone, PennWest — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

AllHazards-SkyStone, Chinook — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

2015

Ackroyd LLP, ATCO pipeline — **Alberta, Canada**

Critical review assessment of ATCO's proposed natural gas pipeline adjacent to proposed senior's house development. Hazard and risk assessment using ZZArisk.

Alberta Energy Regulator, Pembina Pipeline — **Alberta, Canada**

Expert reviewer on behalf of AER of Pembina Pipeline Fox Creek to Edmonton, during hearing and preparation of materials supporting decision report.

AllHazards-FirstResponse, ConocoPhillips — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

AllHazards-FirstResponse, PennWest — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

AllHazards-FirstResponse, Chinook — **B.C., Canada**

Several different fields: calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

Ackroyd LLP, TAMA Power — **Alberta, Canada**

Critical review assessment of TAMA power assessment of proposed power plant and use of anhydrous ammonia. Risk calculations and modelling using ZZArisk.

2014

AllHazards-FirstResponse, ConocoPhillips — **B.C., Canada**

Calculation of hazard distances for jet flames, fire balls, distance to LFL/2 for pipelines, wells.

AllHazards-Spectra Energy — **Alberta, Canada**

Determine heat radiation and flammability limits for the proposed pipeline to support consultation and involvement processes. Modelling using PHAST and ZZArisk.

AllHazards-ConocoPhillips, Risk Tools Development — **Alberta, Canada**

Development of risk analysis tools (programming) for calculating hazard distances for jet flames, fire balls, distance to LFL/2. Modelling using PHAST and ZZArisk.

GazMétro Solutions Transport — **Quebec, Canada**

Quantitative risk assessment of a proposed LNG transport comparison to alternative fuels transport including CNG, propane, hydrogen and diesel. Risk of flammability, over pressure explosion, toxicity and fireball. Modelling using PHAST and ZZArisk. In association with Alp & Associates Inc.

2013

Natural Gas Pipeline, ENMAX — **Alberta, Canada**

Quantitative risk assessment of natural gas fuel pipeline to Calgary Energy Centre. Flammability, jet fire and fireball risk calculations using ZZArisk model. In association with Alp & Associates Inc

Sour Gas Well/Pipeline — **Alberta, Canada**

Sour oil and gas operations associated with Grizzly Resources Ltd Well and Sinopec Daylight Energy Ltd pipeline risk assessment using ZZArisk model Expert testimony at hearing. Concentrations and EPZ distances were calculated using CALPUFF and ERCBH$_2$S.

GazMétro Solutions Transport — **Cornwall, Canada**

Quantitative risk assessment of a proposed LNG distribution station for Robert Transport in an industrial location. Risk of flammability, over pressure explosion, toxicity and fireball. In association with Alp & Associates Inc.

Suncor, Equipment Failure EPZ — **Alberta, Canada**

Emergency response planning zone and dispersion calculations for the Suncor Energy at the base plant near Fort McMurray. Due to equipment failure, sour gas could potentially be emitted during repair. Concentrations and EPZ distances were calculated using CALPUFF and ERCBH$_2$S.

2012

Shepard Energy Centre, ENMAX — **Calgary, Canada**

Qualitative risk screening assessment and quantitative risk assessment of Shepard Energy Centre (in construction) using natural gas fueled turbine generators, steam turbine generator, aqueous ammonia storage, and hydrogen storage. Dispersion modelling for calculation of ERPG distance, probability of lethality mapping and risk calculations. In association with Alp & Associates Inc.

2011

Robert Transport, GazMétro Solutions Transport — **Mississauga, Canada**

Quantitative risk assessment of a proposed LNG distribution station for Robert Transport in an industrial location. Risk of flammability, over pressure explosion, toxicity and fireball. In association with Alp & Associates Inc.

Calgary Energy Centre, ENMAX — **Calgary, Canada**

Comparative quantitative risk assessment of changing operations from anhydrous ammonia to aqueous ammonia. Dispersion modelling for calculation of ERPG distance, probability of lethality mapping and risk calculations. In association with Alp & Associates Inc.

2010

ERCBrisk Model — **Alberta, Canada**

Co-authoring software for the Alberta Energy Resources Conservation Board for the calculation of sour gas toxicity risk from wells (point sources) and pipeline leaks (linear sources). Building upon the toxicity assessment software ERCBH2S. In association with PSAQM Inc.

2003-2009

ERCBH2S Model — **Alberta, Canada**

Co-authoring software for the Alberta Energy Resources Conservation Board for the calculation of sour gas public safety, a model to calculate H2S emergency response planning zone distances for public safety. In association with PSAQM Inc.

Parsons Lake, ConocoPhillips/Salmo — **NWT, Canada**

Surface water quality modelling and risk assessment of a historical slumping of drilling fluids contamination and potential release to nearby Parsons Lake.

2002 and before

Peer Review
Nanasivik-Human Health Risk Assessment, — **Alberta, Canada**

The Human Health and Ecological Risk Assessment Nanisivik Mine, (for CanZinco Ltd., by Jacques Whitford Environmental Limited, January, 2003) was reviewed with respect to data quality and methodology. The underground zinc-lead mine was located on the Borden Peninsula on northern Baffin Island. The risk assessment review included recalculation and assessment of the determination of risk based soil remediation concentrations.

Human Health Risk Assessment, BlackRock — **Alberta, Canada**

A human health risk assessment was developed to assess the impacts of the SAGD heavy oil project in northeastern Alberta. A multi-media exposure assessment of PAHs and arsenic were developed based on USEPA methods. Potential impacts of phenols and arsenic in the domestic groundwater wells was investigated.

Human and Ecological Health Risk Assessment, Agrium — **Alberta, Canada**

A human and ecological health risk assessment was developed to assess the impacts of the proposed gypsum stack (settling pond) expansion. A multi-media exposure assessment of fluorides was developed based on USEPA methods. Impacts due to fluoride and particulate ($PM_{2.5}$ and PM_{10}) emissions were assessed by incremental risk analysis.

Human Health Risk Assessment, Burnco — **Alberta, Canada**

Assessment of human health impacts from a proposed gravel pit operation near Wabamun Lake. Noxious chemicals included fugitive dust, $PM_{2.5}$, metals, silica, PAH from the proposed development, nearby developments

and background air quality. Impacts due to particulate ($PM_{2.5}$ and PM_{10}) emissions were assessed by incremental risk analysis.

Human Health Risk Assessment, Lafarge — **Alberta, Canada**

Assessment of human health impacts from a proposed gravel pit operation near Calgary. Noxious chemicals included fugitive dust, $PM_{2.5}$, metals, silica, PAH from the proposed development, nearby developments and background air quality in the Calgary region. Project included expert testimony at an EUB Appeal Board hearing.

Toxicity Review, Salmo — **Alberta, Canada**

Literature review of fish toxicity to selected metals.

Human Health Risk Assessment, BlackRock — **Alberta, Canada**

Screening level human health risk assessment for BlackRock Ventures Inc. for a SAGD heavy oil project in northeastern Alberta. The assessment examined reasonable maximum exposures to industrial emissions in the Cold Lake area. Literature review and qualitative multipathway exposure for effects of PAHs and acid deposition.

Risk Assessment Training — **Alberta, Canada**

A delegation of professors from Chinese universities were trained on the Canadian perspective of environmental issues related to the oil and gas development. An overview of ecological and human health risk assessment issues, practices and modelling methods were presented. (1-d course)

City of Calgary Landfill — **Alberta, Canada**

Peer review of a risk assessment prepared for a food industry adjacent to a landfill in Calgary. The risk assessment was reviewed and explained to City officials for their decision to allow the development

Goodfish Lake, ToxCon — **Alberta, Canada**

Review and reassessment of gas migration through basement slab and grade slab concrete into above structures. Gas migration resulting from PERC and landfill contamination.

Lead Paint Exposure, ToxCon — **Alberta, Canada**

Estimate of human health and wildlife exposure and risk assessment from soils contaminated with lead paint below a historic bridge. The contamination resulted from years of exposure to lead gasoline emissions and chips of paint from sand blasting (cleaning) of the structure.

Cyanide Spill, EuroGold — **Turkey**

Hazardous gas assessment involving the estimation of cyanide spill emission rates to the atmosphere and heavy gas dispersion assessment for a human health risk and consequence analysis for a proposed gold mine.

Performance Assessment — **Alberta, Canada**

Project management of the performance assessment of the closure plan for Syncrude. Wildlife, vegetation, forestry, soils and water resources impacts were modelled and predicted through a GIS based framework. A flexible closure planning protocol was developed to co-ordinate and direct closure planning based on company goals and policies and environmental risk.

Ecological / Human Health Risk Assessment — **Alberta, Canada**

An on-site, off-site and regional analysis of exposure for an ecological and human health risk assessment. The ecological analysis was performed probabilistically and examined the risks based on observed and predicted concentrations in waterbodies, soils and vegetation. The exposure assessment model included contaminant flows from the on-site landforms, through wetlands, rivers and seepage discharges to the Athabasca River. A river dispersion model was created to predict dilution zones and exposure concentrations for various release configurations. Risks to ecological subpopulation receptors were determined through a probabilistic risk assessment. Risks to humans were assessed based on on-site and off-site impact exposure scenarios.

Dust Dispersion Exposure Modelling — **Vancouver, B.C.**

Exposure problem formulation, dust dispersion modelling and expert consulting on the dispersion of dust from a landfill site in the greater Vancouver regional district for a human health risk assessment. U.S. EPA dispersion model techniques were applied and emissions were calculated based on field sampling and emission factor estimates.

Dust Dispersion Exposure Modelling — **Eastern Ontario, Canada**

Dust dispersion modelling using fundamentals and the U.S. EPA dispersion models (ISC, SCREEN and FDM) for a human health risk assessment of fugitive dust emissions from the hazardous waste pile of an electro-arc furnace flue dust pile at a steel recycling plant.

Decision Analysis — **Voisey Bay, Newfoundland**

Technical direction for the development of a probabilistic decision analysis model to assess the mine development options based on environmental impacts, costs and consequences. Preparation of presentation materials.

Preliminary Risk Assessment of Water Discharges — **Northern Ontario, Canada**

Preliminary ecological risk assessment of water discharges of heavy metals for Placer Dome and Environment Canada. The screening level assessment was performed deterministically to determine worst-case risks to ecological receptors.

Preliminary Risk Assessment of Seepage Water Discharges — **Alberta, Canada**

Preliminary risk assessment of the seepage water discharges from fine tailings sites was analyzed probabilistically. The exposure model was developed probabilistically using C++ code and examined aquatic biota, fish tissue and osprey as receptor endpoints.

End-Cap Lake Water Quality — **Alberta, Canada**

The potential effects on aquatic biota and plant and fish tissue concentrations were determined in a risk assessment framework for Syncrude Canada Ltd. Assisted in the assessment by performing probabilistic fate and exposure model calculations to determine water quality concentrations and plant and fish tissue concentrations.

Crab Orchard — **Chicago, USA**

Screening level and later detailed ecological risk assessment on this superfund site following the EPA guidelines. This project involved screening multiple chemical contaminants, multiple sites and multiple

receptors. The initial assessment was performed deterministically because of limited data and the large scope of the calculations. A probabilistic assessment of risk was conducted to put problem sites and deterministic risks into perspective.

Performance Assessment **Alberta, Canada**

Performance assessment investigating three land reclamation scenarios using generic landscapes for Syncrude and Suncor. Surface water quality and seepage water was modelled for each of the three landscapes and exposure calculations were performed to assess potential off-site impacts. The assessment was performed probabilistically using steady state seasonal modelling and Monte Carlo time series transient modelling. Code was developed in C++ to do the calculations with greater efficiency and speed than typical spreadsheet assessments.

Rossdale Water Intake
Health Risk Assessment, ToxCon **Alberta, Canada**

Probabilistic formulation of a health risk assessment model for contaminant exposure through consumption and use of Edmonton drinking water produced at the Rossdale Water Treatment plant in Edmonton, Alberta. The analysis included a probabilistic pathway analysis of compounds from drinking water to a lifetime averaged human receptor. This analysis was combined with an Alberta Research Council dispersion study to calibrate spill masses, into the stormwater sewer system, that would generate LOAEL/NOAEL level doses and Canadian drinking water chronic guideline concentrations.

Brian W. Zelt

PROJECT RELATED EXPERIENCE - AIR QUALITY MODELLING

2020

Well Test Flaring, Shell Upstream — **Shpirag, Albania**

Investigation of SO_2 concentrations downwind of well test flaring at several locations. Air dispersion modelling using ABflare, AERflare and CALPUFF.

Natural Gas Venting, Gas Liquid — **AB, Canada**

Investigation of the issues related to natural gas venting. Hazard modelling using HGsystems.

Flaring, Flare Tech — **AB, Canada**

Modelling for flare design using AERflare and AERMOD.

2019

Industrial Metals, LAM — **MA, Canada**

Review of air quality monitoring in reference to emissions from metals recycling facility emissions and monitoring study.

Natural Gas Venting, Gas Liquid — **AB, Canada**

Investigation of the issues related to natural gas venting. Hazard modelling using HGsystems.

Swan Hills Treatment Centre, Renewal — **Alberta, Canada**

SIR and air quality dispersion modelling using CALMET/CALPUFF for PCB, dioxins, furans and criteria pollutants.

Compressor Pack Vent, Compass Engg — **AB, Canada**

Investigation of the air toxics related to compressor packing leakage and venting of raw process gas (Egypt). Hazard modelling using HGsystems.

Chlorine, Alberta Environment Parks — **AB, Canada**

Investigation of concentrations related to accidental release of chlorine. Modelling was conducted using HGsystems (near field) and CALPUFF (far-field) using site-specific meteorological data.

PSV Venting, Pembina — **B.C., Canada**

Investigation of air toxics from individual PSV venting at plant site. Modelling was performed using HGsystems (near field) and AERMOD (far field).

CO2 Venting, Gas Liquid — **AB, Canada**

Investigation of hazard zones surrounding the venting of CO2. Modelling was conducted using HGsystems.

CO2 Venting, Gas Liquid — **AB, Canada**

Investigation of hazard zones surrounding the venting of CO2 and ammonia. Modelling was conducted using HGsystems.

Hydrogen Venting, Gas Liquid — **AB, Canada**

Investigation of hazard zones surrounding the venting of H2. Modelling was conducted using HGsystems.

NOx Compressor Station, Vesta Energy — **AB, Canada**

Investigation of NOx from a compressor station. Modelling using AERflare and AERMOD.

2018

Brine pond, AtlasBA — **AB, Canada**

SCREEN3 and AERMOD dispersion modelling of area source emissions from brine pond of propylene.

Facility Upgrade 1, Everdell — **AB, Canada**

Facility upgrade with addition of NOx sources. Dispersion modelling for AER approvals using AERMOD.

Facility Upgrade 2, Everdell — **AB, Canada**

Facility upgrade with addition of NOx sources. Dispersion modelling for AER approvals using AERMOD.

Facility Upgrade, Gold Creek — **AB, Canada**

Facility upgrade with addition of NOx sources. Dispersion modelling for AER approvals using AERMOD.

Sour Gas Well Flaring, Shell — **Shpirag, Albania**

Air quality dispersion modelling in complex terrain using the CALMET/CALPUFF dispersion models for well test flaring. CTSG processing of terrain.

Sour Gas Flaring, Matrix — **AB, Canada**

Air quality dispersion modelling in complex terrain with CTSG processing using the CALMET/CALPUFF dispersion models for regular flaring.

Flaring Heat Intensity, Matrix — **AB, Canada**

Review of ground level heat intensity calculation methods and calculations for several flares.

Flaring Screening Level — **AB, Canada**

Screening level sour gas flaring calculations

Husky Hastings Coulee, Update — **Alberta, Canada**

Facility update air dispersion modelling for NOx and SO2 continuous, upset and emergency flaring. Using AERflare, ABflare, CALPUFF/CALMET.

2017

Mervin Compressor Station, Husky — **Saskatchewan, Canada**

Facility update air dispersion modelling for NOx continuous. Using AERMOD.

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Propane & Mercaptan Bullet PSV, AtlasBA — **Carolina, USA**

Heavy gas air dispersion modelling for emergency PSV venting from propane and ethyl-mercaptan bullets. SLAB model.

Mercaptan Bullet PSV, AtlasBA — **Arizona, USA**

Heavy gas air dispersion modelling for emergency PSV venting from ethyl-mercaptan bullets. SLAB model.

Sour Gas, SEM CAMS — **AB, Canada**

Sour gas plume dispersion and hazard assessment for on-site high pressure acid gas piping

MD Greenview, AER — **AB, Canada**

Air dispersion modelling of all industrial and commercial SO2 and NOx sources for the MD Greenview, AB using CALPUFF. Comparison of predicted concentrations to monitoring data.

Venting, Tuxla — **AB, Canada**

Air dispersion modelling of venting to determine ground level concentrations greater than LFL.

Venting-Flare, Tuxla — **AB, Canada**

Air dispersion modelling of venting at flare stack A to determine if ignition could result by nearby flare stack B.

Carmon Creek, CNRL — **AB, Canada**

Air dispersion modelling in support of APEA application of the heavy oil Carmon Creek project at Peace River. Dispersion modelling of facility and regional emissions using CALPUFF.

Industrial Metals, LAM — **MA, Canada**

Air dispersion modelling and emissions review of metals recycling facility emissions and monitoring study.

2016

Husky Hastings Coulee — **Alberta, Canada**

Facility update air dispersion modelling for NOx and SO2 continuous, upset and emergency flaring. Using AERflare, ABflare, CALPUFF/CALMET.

Sour Gas Well Testing, Shell — **Shpirag, Albania**

Air quality dispersion modelling in complex terrain using the CALMET/CALPUFF dispersion models for well test flaring.

Kineticor 1-15, Compressor Station — **Saskatchewan, Canada**

Air dispersion modelling for NOx and SO2 using AERMOD, AERflare.

Husky Ram River Gas Plant — **Alberta, Canada**

Approval renewal air dispersion modelling for NOx and SO2 continuous, upset and emergency flaring. Using AERflare, ABflare, CALPUFF/CALMET.

Wisconsin Rapids — **Wisconsin, USA**

Review of meteorology and creation of AERMOD ready met dataset for hazard/risk screening. In association with Alp & Associates.

Generic Incinerator Model — **Sulphur Experts, Alberta**

Development of a reverse engineered dispersion model from first principles to provide estimates of stack height to meet ground level maximum concentrations for given incinerator conditions. Development of revised model with reverse calculations and AERMOD.

2015

Major Hazards Study — **Canada**

Review of meteorology and creation of AERMOD ready met datasets for 6-locations across Canada for hazard/risk screening: Quebec, Ontario, Manitoba, Saskatchewan, Alberta, BC.. In association with Alp & Associates.

Flare Assessment, RockEast — **Saskatchewan, Canada**

Flaring assessment using AERflare.

Alder Flats Phase II Gas Plant, Bellatrix — **Alberta. Canada**

NOx air dispersion for expansion project at Alder Flats. In association with Keywest Projects.

Provost Flare Assessment, RockEast — **Saskatchewan, Canada**

Flaring assessment using AERflare.

Boundary Lake, Flare Assessment, Venturion — **Alberta, Canada**

Flaring assessment using AERflare.

Gas Plant 5-16 Flare Assessment, Venturion — **Alberta, Canada**

Flaring assessment using AERflare.

2014

Husky, Moose Mountain — **Alberta, Canada**

Non-routine air quality dispersion modelling for advanced blowdown scenarios for planned and unplanned blowdowns. Dispersion modelling using ABflare and CALMET/CALPUFF.

Suncor, Flare Upgrade — **Alberta, Canada**

Air quality dispersion modelling using SLAB, CALPUFF and AERmode to determine potential hazards for workers operating at stack height on a operational flare and also being impacted from emissions from a nearby operational twin flare.

Tuxla — **Alberta, Canada**

Air quality dispersion modelling using SLAB, ZZArisk and AERflare to determine potential of ignition of a vented release being ignited from a nearby flare.

Connorsville — **Alberta, Canada**

Air quality dispersion modelling using AERflare.

Swan Hills Treatment Centre, Renewal — **Alberta, Canada**

Air quality dispersion modelling using CALMET/CALPUFF for PCB, dioxins, furans and criteria pollutants.

Update Stack Top Temperature
SO_2 Modelling, Kaybob South Plant 3 — **Alberta, Canada**

Air quality dispersion modelling in complex terrain using the CALMET/CALPUFF dispersion models for stack top temperature reduction of the facility incineration. In Association with Sulphur Experts.

Sour Gas Well Testing, Shell — **Shpirag & Molisht,Albania**

Air quality dispersion modelling in complex terrain using the CALMET/CALPUFF dispersion models for well test flaring and incineration.

Update, Sour Gas Well Testing, Petromanas — **Molisht,Albania**

Air quality dispersion modelling in complex terrain using the CALMET/CALPUFF dispersion models for well test flaring and incineration. Calculation of emergency planning distances using ERCBH2S.

Rheaume Engg. — **Alberta, Canada**

Air quality modelling using AERflare

Ceno, Sturgeon Lake, Behr Engg. — **Alberta, Canada**

Air quality modelling using AERflare

Encana, AERflare modelling — **Alberta, Canada**

Air quality modelling using AERflare

Manitok, AERflare modelling — **Alberta, Canada**

Air quality modelling using AERflare

Ferguson SO_2, DeeThree Exploration — **Alberta, Canada**

Air quality modelling for the Ferguson 01-21 Sour Oil Battery, DeeThree Exploration Ltd. Air dispersion modelling AERMOD and CALPUFF in complex terrain for three incinerators. In association with Keywest Project Ltd.

Alder Flats, NOx, Bellatrix Exploration — **Alberta, Canada**

Air quality modelling for the Alder Flats 10-09 gas plant, Bellatrix Exploration Ltd. Air dispersion modelling AERMOD in complex terrain compressor station. In association with Keywest Project Ltd..

2013

Sour Gas Flaring, — **Omers, Alberta**

Air quality dispersion modelling in complex terrain using the CALMET/CALPUFF dispersion models for well test flaring and AERMOD. Also using AERflare in development.

Stack Top Temperature
SO_2 Modelling, Kaybob South Plant 3 — **Alberta, Canada**

Air quality dispersion modelling in complex terrain using the CALMET/CALPUFF dispersion models for stack top temperature reduction of the facility incineration. In Association with Sulphur Experts.

Sour Gas Well Testing, Petromanas — **Molisht,Albania**

Air quality dispersion modelling in complex terrain using the CALMET/CALPUFF dispersion models for well test flaring and incineration. Calculation of emergency planning distances using ERCBH2S.

Odours, AER — **Alberta, Canada**

Air quality modelling for odours associated with oil and gas operations in the Peace River region of Alberta. Dispersion modelling using CALMET/CALPUFF and investigation of possible sources of odours from regular emissions from tanks, flaring and heaters associated with well pad battery and tanks. Expert testimony at a hearing.

Shell-Carmon Creek — **Alberta, Canada**

Air quality modelling for the Shell Carmon Creek. EIA is a re-evaluation of the 2009 Shell Carmon Creek project using CALPUFF/CALMET. In association with Worley Parsons.

2012

ERCBflare Update — **Alberta, Canada**

Furthering the development of ERCBflare and as an update to the screening capability (as opposed to ABflare) flare source and dispersion model. Co-authored a flare source model for short-term steady and transient flares, taking into account energy balance, flare efficiency, flare assist. User interface, spreadsheet modules, interface for AERMOD using AERSCREEN methodology. Terrain processing following AERmap and land use processing following AERSURFACE, allowing for screening and site-specific refined meteorology processing using AERMET. User guide. In association with ERCB.

Incinerators, Petromanas — **Albania**

Air dispersion modelling at two locations in the foothills like terrain of Albania. SO_2 modelling for well test incineration of waste gases at unknown rates and concentrations.

Update to Incinerators, Petromanas — **Albania**

Air dispersion modelling at two locations in the foothills like terrain of Albania. SO_2 modelling for well test incineration of waste gases at unknown rates and concentrations.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 03-05, Dispersion modelling and report for Barrick Energy. Modelling using ERCBflare, CALPUFF and AERMOD.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 03-05b, Dispersion modelling and report for Barrick Energy. Screening of 30 well test flares for scoping. Modelling using ERCBflare and AERMOD.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 6-21, Dispersion modelling and report for Barrick Energy. Modelling using ERCBflare and AERMOD.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 15-6, Dispersion modelling and report for Barrick Energy. Modelling using ERCBflare and AERMOD.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 2-31, Dispersion modelling and report for Barrick Energy. Modelling using ERCBflare and AERMOD.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 9-31, Dispersion modelling and report for Barrick Energy. Modelling using ERCBflare and AERMOD.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 13-3, Dispersion modelling and report for Barrick Energy. Modelling using ERCBflare and AERMOD.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 7-6, Dispersion modelling and report for Barrick Energy. Modelling using ERCBflare and AERMOD.

Well Test Flaring, Barrick Energy — **Alberta, Canada**

Well 12-5, Dispersion modelling and report for Barrick Energy. Modelling using ERCBflare and AERMOD.

Aitken Creek, Rheame Engineering — **NE, BC, Canada**

Facility flaring and incinerator dispersion modelling. Modelling using AERMOD. In association with Sirius Consulting Inc.

Baseline Update, Shell Canada — **Alberta, Canada**

Peace River Complex baseline SO_2 dispersion modelling update. Modelling using CALPUFF.

Moose Pad1, Husky — **Alberta, Canada**

Update of NOx modelling for Husky Moose Mtn. Pad1 facility in complex terrain. Modelling using CALMET/CALPUFF.

2011

ABflare — **Alberta, Canada**

Development of ABflare flare source and dispersion model. Co-authored a flare source model for short-term steady and transient flares, taking into account energy balance, flare efficiency, flare assist. User interface, stand-alone fortran modules, extension to CALPUFF, and user guide. In association with ERCB, PSAQM Inc. and Exponent Inc.

RAKgas, Sulphur Experts — **United Arab Emirates**

Air dispersion modelling for incineration of SO_2 and stack top temperature reduction options on the coast of the UAE in complex terrain. Modelling using CALMET/CALPUFF. In association with Sulphur Experts.

Oldman Gas Plant, Peyto — **Alberta, Canada**

Air dispersion modelling for NOx in complex terrain. Modelling using CALMET/CALPUFF.

Ammonia Destructor, Syncrude — **Alberta, Canada**

Syncrude is adding of new process equipment for the destruction of ammonia and emissions of SO_2. Various iterations of stack heights, locations and 3D modelling for on-site worker safety at cat-walk elevations. Accounting for local and regional emissions. Modelling using CALMET/CALPUFF.

Tank Odours, Suncor — **Alberta, Canada**

Suncor is investigating possible upset emission scenarios of vapours from tanks from the south tank farm and accounting for the new vapour recovery unit. Odour modelling using CALMET/CALPUFF.

Moose Pad1, Husky — **Alberta, Canada**

Husky is preparing emergency flare management plans for Moose Pad1 facility. Blowdown modelling of high SO_2 emissions in complex terrain. Modelling using CALMET/CALPUFF.

Flare Model, CNRL — **Alberta, Canada**

SO_2 modelling using CALMET/CALPUFF.

Harmattan, Taylor Engineering — **Alberta, Canada**

Update on NOx emissions modelling for the Harmattan gas plant for the addition of new equipment. Modelling using AERMOD.

Edson Oil & Gas Battery, Crocotta Energy — **Alberta, Canada**

Crocotta is adding equipment at the Edson Oil & Gas battery, requiring modelling for NOx in complex terrain. Modelling using CALMET/CALPUFF.

BurntTimber, Shell — **Alberta, Canada**

Stack top temperature reduction assessment and air dispersion modelling of SO_2 from acid gas incineration. Modelling using CALMET/CALPUFF. In association with Sulphur Experts.

GoldCreek, Progress Energy — **Alberta, Canada**

Emergency Planning Zone calculations using ERCBH2S.

2010

Rainbow Lake, Husky — **Alberta, Canada**

Air dispersion modelling for updated facility design for NO_x and SO_2. In association with PSAQM Inc.

South Monias Gas Plant, Shell — **Alberta, Canada**

Air dispersion modelling for dense gas CO_2 venting. In association with Sirius Consulting Inc.

NuVista 2 — **Alberta, Canada**

Revised facility design air dispersion modelling for revised facility design including NOx and flaring of SO_2. In association with PSAQM inc.

Brian W. Zelt

BDR Innes — **Saskatchewn, Canada**

Air dispersion modelling for revised facility design including NOx and flaring of SO_2. In association with PSAQM inc.

Excelsior — **Alberta, Canada**

SIR responses from application. In association with PSAQM inc.

Crocotta — **Alberta, Canada**

Air dispersion modelling for revised facility design including NOx and flaring of SO_2. In association with PSAQM inc.

Sinclair — **Alberta, Canada**

Air dispersion modelling for revised facility design including NOx and flaring of SO_2. In association with PSAQM inc.

Obed — **Alberta, Canada**

Air dispersion modelling for revised facility design including NOx and flaring of SO_2. In association with PSAQM inc.

Ranata — **Alberta, Canada**

Air dispersion modelling for revised facility design including NOx and flaring of SO_2. In association with PSAQM inc.

NuVista — **Alberta, Canada**

Air dispersion modelling for revised facility design including NOx and flaring of SO_2. In association with PSAQM inc.

McMullen — **Alberta, Canada**

Air dispersion modelling for revised facility design.

Eaglesham — **Alberta, Canada**

Air dispersion modelling of SO_2 from acid gas incineration. In association with PSAQM inc.

Donnelly — **Alberta, Canada**

Air dispersion modelling of SO_2 from acid gas incineration. In association with PSAQM inc.

Kakut — **Alberta, Canada**

Air dispersion modelling of SO_2 from an incinerator. In association with PSAQM inc.

CanSup — **Alberta, Canada**

Air dispersion modelling of SO_2 from an incinerator. In association with PSAQM inc.

2009

South Saskatchewan River Basin-Land Use Planning — **Alberta, Canada**

Air dispersion modelling and expert advice support for land use planning. In association with Alces Group.

Suncor VRU — **Alberta, Canada**

Air dispersion for Suncor VRU capacity increase. Dispersion modelling of emergency vent containing H_2S emissions. In association with Worley Parsons.

Suncor Ponds — **Alberta, Canada**

Updated air dispersion modelling of odour emissions from ponds. Flaring emission using hourly emissions and hourly source characteristics using CALPUFF. In association with Clearstone Engineering.

Husky McMullen Thermal Conduction — **Alberta, Canada**

Air quality modelling for a proposed pilot facility. In association with Matrix Environmental Solutions.

Chemical Fire/Risk — **Kansas, USA**

Air dispersion modelling for support of risk calculations. In association with PSAQM Inc.

Suncor Energy, Bighorn — **Alberta, Canada**

Well completion air dispersion modelling in complex terrain. In association with PSAQM Inc.

Atco Gas, Harmattan Gas Plant — **Alberta, Canada**

Update to NO_x and SO_2 modelling with the addition of and removal of: COGEN, engines and heaters. In association with PSAQM Inc.

Apache Energy — **Alberta, Canada**

Well test flaring modelling in complex terrain with well test flaring monitoring plan. In association with PSAQM Inc.

Laurus Energy — **Alberta, Canada**

Air quality modelling for a proposed pilot facility. In association with Matrix Environmental Solutions.

Shell-Carmon Creek — **Alberta, Canada**

Air quality modelling for the Shell Carmon Creek. EIA is a re-evaluation of the 2008 Shell Carmon Creek project using CALPUFF. In association with Matrix Environmental Solutions.

Husky, Hastings Coulee — **Alberta, Canada**

Air quality modelling for a facility renewal application including NO_x and SO_2 concentrations. . In association with PSAQM Inc.

Husky, Thompson Lake — **Alberta, Canada**

Air quality modelling for a facility renewal application including NO_x and SO_2 concentrations. . In association with PSAQM Inc.

Talisman, Narraway — **Alberta, Canada**

Air quality modelling in complex terrain for SO_2 concentrations related to a flare test for a new well. . In association with PSAQM Inc.

Excelsior — **Alberta, Canada**

Air quality modelling the Fort McMurray oil sands using new extraction technologies. In association with Matrix Environmental Solutions.

Swan Hills, Synergia — **Alberta, Canada**

Air quality modelling for update of facility emissions of SO_2 and vented H_2S. In association with PSAQM Inc.

Suncor — **Alberta, Canada**

Air quality modelling for incomplete combustion of waste gases to flare systems. Modelling H_2S and SO_2 concentrations using hourly variable inefficiency in response to meteorology. In association with Clearstone Engineering.

Minnow — **Alberta, Canada**

Air dispersion modelling and monitoring plans for well test flaring at two independent locations. In association with PSAQM Inc.

Kakut, BDR Engineering — **Alberta, Canada**

Air Quality modelling for updated facility of NO_x and SO_2. In association with PSAQM Inc.

Swan Hills, Synergia — **Alberta, Canada**

Air quality modelling for update of facility emissions of SO_2 and vented H_2S. In association with PSAQM Inc.

Syncrude — **Alberta, Canada**

Air quality modelling in relation to additional boiler emissions and modelling near-field NOx and CO. In association with Clearstone Engineering.

Syncrude — **Alberta, Canada**

Air quality modelling in relation to stack diversion resulting from equipment failure. In association with Clearstone Engineering.

2008

Shell-Carmon Creek — **Alberta, Canada**

A re-evaluation of the 2006 Shell Carmon Creek project using a completely re-designed facility. The air quality modelling used the CALPUFF modelling system. In association with DMLeahey and Matrix Environmental Solutions.

JACOS-Update — **Alberta, Canada**

Update on the proposed expansion of the JACOS SAGD operations. Air quality modelling was performed using the AERMOD model.

McMullen,Husky — **Alberta, Canada**

Air quality modelling for a proposed SAGD pilot facility. This air quality modelling report was prepared for the proposed Husky Energy Inc. McMullen Thermal Pilot Plant. The McMullen facility is located in northern Alberta, approximately 50 km northeast of Grande Prairie. The heavy oil battery is being proposed to test the potential of the reservoir and production methods. The oil plant has a licenced capacity of 160 m3/d of bitumen and will have sulphur emissions of 0.218 t/d. Modelling was performed using the CALPUFF modelling system for three proposed site locations. In association with Matrix Environmental Solutions.

Kakut, Galleon Energy Inc. — **Alberta, Canada**

This air quality modelling report was prepared for the proposed Galleon Energy Inc. Kakut Gas Plant with information supplied by BDR Engineering Ltd. The Kakut facility is located in northern Alberta, approximately 50 km northeast of Grande Prairie, along the eastern edge of the Saddle Hills. The oil battery is being expanded to process sour gas. The gas plant has a licenced inlet gas capacity of 480 103m3/d with a sulphur inlet of 0.65 t/d. Nitrogen dioxide (NO2) and sulphur dioxide (SO2) emissions from facility were modelled in the study area surrounding the facility using the USEPA-CALPUFF model.

Big Horn, Talisman — **Alberta, Canada**

Air quality modelling in complex terrain for a flare emissions during a well clean up. Modelling was performed using CALPUFF model. In association with PSAQM.

Ram River, Husky — **Alberta, Canada**

Air quality modelling for a facility change of emissions including NO_x and benzene emissions. Air quality modelling was performed using the AERMOD model in complex terrain. In association with PSAQM.

Ram River, Husky — **Alberta, Canada**

Meteorological review and assessment of on-site monitoring tower and sodar data. In association with PSAQM Inc.

PetroCanada, Wilson Ck — **Alberta, Canada**

Air quality modelling for continuous, upset and emergency flaring at PetroCanada Wilson Ck. Facility. In association with PSAQM Inc.

Innes, Saskatchewan — **Alberta, Canada**

Air quality modelling for battery at Innes, Saskatchewan. In association with PSAQM Inc.

PetroCanada, Peppers — **Alberta, Canada**

Air quality modelling using the ISCST model at the PetroCanada, Peppers facility. SO_2 flaring. In association with PSAQM Inc.

2007

Sawn Lake, Andora — **Alberta, Canada**

Andora Energy Corporation is proposing to construct the Sawn Lake SAGD Demonstration Project approximately 115 km northeast of Peace River. The demonstration Project will be located at 15-21-091-12 W5M or 7-30-091-12 W5M. The Project has a low pressure (LP) flare to dispose of sour produced gas and burns sweet fuel gas to produce steam in two once-through steam generators. In association with PSAQM.

ConocoPhillips — **Alberta, Canada**

Air quality modelling in support of legal claims regarding emissions from a sour oil pipeline leak near a farm house and cattle. In association with PSAQM.

JACOS, Renewal — **Alberta, Canada**

Air quality modelling in support of the JACOS renewal application and expansion. Air quality modelling was performed using the pre-approved ISCST model. In association with PSAQM.

Moose Mountain, Husky — **Alberta, Canada**

Air quality modelling in the complex terrain of the Rocky Mountain eastern slopes at three mountain top oil/gas pads. 3D wind fields were modelled using CALMET with 2003,2004 and 2005 RUCii data. Modelling included short-term upset flaring in connection with various duration pipeline blowdown scenarios. Modelling also considered flaring for various well cleanup emission scenarios. In association with PSAQM.

Prince George, PBEC — **Alberta, Canada**

Air quality modelling for the relocation of the Pacific BioEnergy Corporation (PBEC) wood pellet manufacturing facility in Prince George, British Columbia. Modelling focused on stack particulate emissions. Modelling used the UNBC CALMET configuration and the CALPUFF model. In association with SEACOR.

RAM Update, Husky — **Alberta, Canada**

Air quality modelling updates for the RAM renewal application to AENV. Modelling of SO2 and NOx using the AERMOD model included equipment changes. In association with PSAQM.

Vero-Sakwatamau, Talisman Energy — **Alberta, Canada**

Air quality modelling for compressor engine and heater NO_x emissions using the ISCST model. In association with PSAQM.

Orion Update, Shell — **Alberta, Canada**

Air modelling update to Orion EOR EIA for as built equipment and emissions. Modelling included both SO_2 and NO_x emissions using the CALPUFF model.

Harmattan Gas Plant, Taylor — **Alberta, Canada**

Air quality modelling for the renewal application of the Harmattan gas plant and compressors. Modelling included comparisons of CALPUFF (using MM5 meteorology), AERMOD (using MM5 meteorology and AENV screening data) and ISCST (using MM5 meteorology and AENV screening data). In association with PSAQM.

N-SOLV, Hatch Energy — **Alberta, Canada**

Air quality modelling for the N-Solv approval application to AENV included modelling using the ISCST model using AENV screening meteorology. In association with PSAQM.

PC Nordegg, PetroCanada — **Alberta, Canada**

Air quality modelling using CALMET/CALPUFF using 2002 MM5 data for a temporary flaring permit to EUB. In association with PSAQM.

Synergia Polygen — **Alberta, Canada**

Air Quality modelling for a pilot approval application to AENV for an in-situ coal gasification facility. Air quality modelling included CALPUFF/CALMET modelling using 2002 MM5 meteorological data in relatively flat terrain for upset and emergency flaring scenarios. In association with PSAQM.

Eaglesham, Galleon Energy — **Alberta, Canada**

Air quality modelling for a facility expansion. Modelling included CALPUFF/CALMET modelling using 2002 MM5 meteorological data for emissions of SO_2 and NO_x. In association with PSAQM.

Fugitive Odour, Suncor — **Alberta, Canada**

Air quality modelling of fugitive/odour emissions using CALMET/CALPUFF. Wind fields were created using surface stations in the Fort McMurray oil sands area and available upper air data. Local detailed terrain and landuse were digitized into the model. Modelling calculations included back-calculation for source emissions. In association with PSAQM and Clearstone Engineering.

Fugitive Odour, Syncrude — **Alberta, Canada**

Air quality modelling of fugitive/odour emissions using CALMET/CALPUFF. Wind fields were created using surface stations in the Fort McMurray oil sands area and available upper air data. Local detailed terrain and landuse were digitized into the model. Modelling calculations included back-calculation for source emissions. In association with PSAQM and Clearstone Engineering.

PC5-20, PetroCanada
PC9-05, PetroCanada
PC9-17, PetroCanada
PC5-11, PetroCanada — **Alberta, Canada**

Complex terrain modelling using CALPUFFF and 3D windfields for several well locations located in the Eastern Slopes. 3D windfields created using RUCII (2003, 2004) interpolation. In association with PSAQM.

Golden, Focus Energy Trust Resources — **Alberta, Canada**

The air quality modelling supported the review of the flaring at the battery to ensure compliance with Alberta Energy and Utilities Board (EUB) Directive 60. Modelling was conducted using CALPUFF/CALMET using 2002 MM5 meteorology. In association with PSAQM.

Benjamin, Husky — **Alberta, Canada**

Air quality modelling the Rocky Mountain eastern slopes complex terrain. Modelling supported the review of the flaring that the Benjamin well site and battery flaring scenario blowdowns. Modelling included various comparisons of multiyear results in complex terrain and sub-hourly emission duration estimates compared to hourly and continuous emissions. In association with PSAQM.

NuVista — **Alberta, Canada**

Air quality modelling for expansion and renewal application for NO_x modelling. Modelling included both AERMOD and CALPUFF modelling using MM5 2002 meteorology. In association with PSAQM.

Primewest — **Alberta, Canada**

Air quality modelling using AERMOD of the Primewest compressor station expansion and renewal. Modelling included NO_x emissions. In association with PSAQM.

2006

Olds, BDR — **Alberta, Canada**

In association with PSAQM.

Brian W. Zelt

AMD Update, Shell — **Alberta, Canada**

Preparation of an air quality monitoring station description report following the AENV-AMD.

Sylvan Lake — **Alberta, Canada**

Update.In association with PSAQM.

Pouce Coup — **Alberta, Canada**

Update 2. In association with PSAQM.

Twining, BDR — **Alberta, Canada**

In association with PSAQM.

Pouce Coup — **Alberta, Canada**

Update 1. In association with PSAQM.

ConocoPhillips — **Alberta, Canada**

Air quality strategic planning. Support for ConocoPhillips strategic planning for developments in the Fort McMurray oil sands area.

Twining Gas Plant, EOG Resources — **Alberta, Canada**

Air quality modelling in complex terrain using the AERMOD model for NO_x emissions using the PVRM and OLM models for NO_2 conversion. In association with PSAQM.

Donnely, Gas Plant — **Alberta, Canada**

Update. Air Quality modelling of SO2 and NOx for Licence renewal. Modelling included Aermod, CalPUFF and ISCST3. In association with PSAQM.

Savanna Creek, Petro-Canada
PC5-20, PetroCanada
PC5-10, Petro-Canada
PC10-25, Petro-Canada
PC5-33, Petro-Canada
Getty, Petro-Canada
Sullivan, Petro-Canada
West Limestone, Petro-Canada
Trap Creek, Petro-Canada — **Alberta, Canada**

Complex terrain modelling using CALPUFFF and 3D windfields for several well locations located in the Eastern Slopes. 3D windfields created using RUCII (2003, 2004) interpolation. In association with PSAQM.

2005

Donnely, Gas Plant — **Alberta, Canada**

Update. Air Quality modelling of SO_2 and NO_x for Licence renewal. Modelling included Aermod, CALPUFF and ISCST3. In association with PSAQM.

Pigeon Lake Acidification, Fairborne Community — **Alberta, Canada**

'Back of the envelope' scoping and modelling demonstrating magnitude of potential acidification of potential sour well test flaring and impacts on nearby Pigeon Lake.

Marten Hills, Gas Compressor, AltaGas — **Alberta, Canada**

Air quality modelling for a facility licence renewal of NO_x emissions near elevated terrain. In associate with PSAQM.

Rainbow Lake, Husky — **Alberta, Canada**

Air quality modelling and assessment of facility emissions and upset flaring near elevated terrain. Development of alternative strategies for upset flaring. In association with PSAQM.

Swalwell, Gas Compressor, EOG Resources — **Alberta, Canada**

Air quality modelling and assessment of facility NO_x emissions. In association with PSAQM.

Pouce Coupe, Acclaim Energy — **Alberta, Canada**

Air quality and stack height assessment for NO_x and SO_2 emissions. In association with PSAQM.

Hussar, Gas Compressor, Husky — **Alberta, Canada**

Air quality modelling for NO_x for license renewal. In association with PSAQM.

Peace River, Carmon Creek EIA, Shell — **Alberta, Canada**

Air quality modelling, emission estimation and assessment for the Peace River Complex (Cyclic Steam) facility expansion for the Carmon Creek EIA. In association with DML.

Ram River, Application, Husky — **Alberta, Canada**

NO_x and SO_2 modelling in complex terrain for license renewal of the Husky Ram River Facility. CALPUFF complex terrain modelling was completed using 3D windfield modelling. In association with PSAQM.

Incinerator/Flaring, EUB — **Alberta, Canada**

Programming and user-interface development of spreadsheet tools for EUB for assessment of incinerators and flares. Application development for public submissions of applications for incinerators and flaring. In association with PSAQM.

Upset Flaring, CAPP — **Alberta, Canada**

3D windfield modelling and CALPUFF complex terrain modelling of upset flaring. Several locations across Alberta. Providing scenario modelling and technical advice for development of upset flaring guidelines for Alberta. In association with PSAQM.

2004 and Before

Panther River II, Suncor — **Alberta, Canada**

Complex terrain dispersion modelling of a well completion flare scenario. CALPUFF was configured and applied in a screening model. Air monitoring design was completed. 3D windfield modelling was also complted. In association with PSAQM.

Legal, Hydrogen Chloride — **Alberta, Canada**

Screening level emissions and air quality modelling predictions of a hydrogen chloride spill.

Brian W. Zelt

Expert Witness, Ammonia Release — **Alberta, Canada**

Screening level emissions and air quality modelling predictions of an ammonia release. Provided expert witness evidence in criminal court regarding short-term exposure modelling for an ammonia release.

Incinerator, Questor — **Albania**

Albanian meteorology was processed for a screening level assessment of various incinerator designs in complex terrain using the ISCST3 model.

Stuart Lake, Husky — **Alberta, Canada**

Air quality modelling using the Aermod model for a gas plant registration in simple terrain.

Panther River, Suncor — **Alberta, Canada**

Complex terrain dispersion modelling of a well completion flare scenario. Aermod was configured and applied in a screening mode. Air monitoring design was completed.

Incinerator Optimization, Husky — **Alberta, Canada**

Complex terrain modelling of SO_2 using Aermod, Calpuf, ISCST3, RTDM, Screen3, and Screen2. Meteorological data sets for Aermod were summarized into screening data sets for comparison to the other listed models and for optimization of the incinerator stack temperature in complex terrain.

Toxic Gas Modelling, Legal — **Alberta, Canada**

Toxic gas modelling of an ammonia release. Near source modelling using the dense gas SLAB model.

SLAB (Dense Gas) Model Modification, EUB — **Alberta, Canada**

Thermodynamic and physical modifications developed by Michael Zelensky were programmed within the USEPA SLAB program. These program modifications will be released as the hazard and evacuation zone planning tool for the Alberta Energy and Utilities Board (EUB) for planning hydrogen sulphide pipelines and wells in Alberta.

Tucker Project EIA, Air Quality, Husky — **Alberta, Canada**

Air Quality modelling in simple and intermediate terrain using the CalPUFF model. Acid deposition modelling. Meteorological data review and emissions inventory preparation and estimation. Model verification and preparation of report.

Monitoring Review, Tolko — **Alberta, Canada**

Review of air quality monitoring and preparation of annual air quality and meteorological summary reports.

NOx/Ozone Environmental Review
TransCanada/Environment Canada — **Alberta, Canada**

Literature review of environmental effects of NOx and ozone in relation to strategies for NOx controls for gas turbines. Review of impacts from Selective Catalytic Reduction (SRC). Review of: ozone monitoring in Alberta; ozone regulations in USEPA/Canada; ozone and NOx photochemistry. Technical writing/editing.

Orion EOR Project EIA, Air Quality, BlackRock — **Alberta, Canada**

Air Quality modelling in simple and intermediate terrain using the CalPUFF model. Acid deposition modelling. Meteorological data review and emissions inventory preparation and estimation. Model verification and preparation of report.

Aerosol Assessment, Toxcon — **Alberta, Canada**

An integral component of the investigation on potential health effects from a new house carpet powder, the distribution of fine particles were analyzed. Distribution statistics and graphics were developed and a report was prepared.

Air Quality Modelling Training — **Alberta, Canada**

A delegation of professors from Chinese universities were trained on the Canadian perspective of environmental issues related to the oil and gas development. An overview of meteorology, air quality modelling issues, emissions estimation and practical examples were presented. (1-d course)

Lochend Sour Gas Well Modelling,
City of Calgary — **Alberta., Canada**

Modelling of combusted and uncombusted H_2S and SO_2 from the proposed Lochend sour gas well near Calgary. A detailed investigation of dense gas effects using the SLAB model was prepared. A far field model using neutrally buoyant gas was prepared using the ISC model.

Hub Oil Fire Review, Komex — **Alberta, Canada**

A review and report on the meteorology and probable plume path for the first few hours of the Hub Oil Refinery fire in 1998.

Maxhamish Air Quality Permit, Salmo — **Ft. Liard, B.C., Canada**

Air quality modelling in simple and complex terrain for the Maxhamish Gas plant in northern B.C. Emissions, modelling and report were prepared for the B.C. Permit to Operate. (ISC)

Lubicon Lake, Sorrel Environmental — **Alberta, Canada**

As a part of the Lubicon Lake lands claim process, the settlement (village) at Lubicon Lake will be moved. The air quality impacted by sources within 20km was modelled using the ISC model in complex terrain. Emission estimates included plant, battery and fugitives from well-heads.

Air Quality Modelling, Amoco — **Alberta, Canada**

An update to Wolf Lake SAGD operations resulted in a need to update the air quality modelling for Amoco's permit. SO_2 and NO_x modelling of steam generators, co-generation and field flares. (ISC).

EIA, Suncor Energy — **Alberta, Canada**

Management of the air quality task of the EIA for the Project Millennium oil sands mine and facilities expansion. Meteorological data set preparation and quality assurance based on site data from two meteorological towers. Emissions inventory preparation for the Millennium project and greater oil sands area. Air quality model development (ISCBE configuration and CALPUFF), calibration and use.

Brian W. Zelt

Noise Assessment,
Diavik Diamond Mines — **Northwest Territories, Canada**

A preliminary noise assessment was completed for Diavik Diamond Mines which included three separate noise assessments: aircraft noise assessment based on the aircraft types and frequency of traffic; general mine operation noise levels were estimated based on literature noise spectrum and were modelled using a modified version of NoiseCalc sound program.

Cyanide Spill, EuroGold — **Turkey**

Hazardous gas assessment involving the estimation of cyanide spill emission rates to the atmosphere and heavy gas dispersion assessment for a human health risk and consequence analysis for a proposed gold mine. Estimation of toxic gas concentrations in the direction of a nearby village.

Gazoduc, TransQuebec and Maritime Pipeline — **Quebec, Canada**

Two complex terrain air quality dispersion modelling assessments of compressor stations along the proposed TransQuebec and Maritime pipeline. The USEPA ISC model was applied using five-year meteorological data sets.

Air Quality Monitoring,
Newport Petroleum — **Saskatchewan, Canada**

Responsible for the design, implementation and environmental management of an air quality monitoring program for a new sour gas plant. Monitoring results from two trailers were analyzed to assess the likely hood of air quality problems reported at residential locations were resulting from the sour gas plant or from oil field operations.

Leak Detection/Emission Estimation
Union Carbide Canada — **Alberta, Canada**

Estimation of VOC and speciation emissions from the proposed Union Carbide Prentiss polyethylene plant expansion. Greenhouse gas emission inventory was also prepared.

Air Quality Modelling ,
Weldwood Canada — **Alberta, Canada**

Dispersion modelling using the ISC model in complex terrain for Weldwood Canada, Hinton mill for their license renewal. A review and detailed comparison of monitoring air quality data and meteorological data was completed in preparation for modelling.

Landfill Gas Dispersion
City of Windsor — **Ontario, Canada**

Technical direction and model configuration of the air quality modelling of landfill gases for the City of Windsor proposed elevated landfill.

Registration, Canadian 88 — **Alberta, Canada**

Nitrogen dioxide (NO_x) emissions summary was prepared from plant operations information and a screening level air quality model for NO_x was developed. A registration was prepared for a renewal for a Permit to Operate.

Air Quality Modelling,
Saskatchewan Wheat Pool — **British Columbia, Canada**

Technical direction of the ISC modelling for particulates, NO_x and SO_2 at the proposed SWP-Cargill grain terminal at Robert's Bank. Preparation of report graphics of the modelling results.

Clean Air Act Permit,
CS Resources Ltd — **Western Saskatchewan, Canada**

Air quality dispersion modelling for the Senlac Thermal Project and preparation of the Clean Air Act operating permit. The Alberta Environment air quality dispersion models were used in the assessment of heavy oil plant emissions from steam generators, flares and other sources of SO_2 and NO_x.

Wolf Lake Heavy Oil EIA — **Northeastern Alberta, Canada**

Air quality dispersion modelling using Alberta Environment and U.S. EPA dispersion models was used in this EIA amendment to determine air quality impacts as a result of the increased emissions for the Wolf Lake and Primrose operations. Plant site steam generators, processing equipment and field flares were included in the assessment of SO_2, NO_x and VOC concentrations. Greenhouse gas calculations and ozone precursor concentrations for ozone generation potential were included in the assessment for the EIA and AEUB approval.

Air Quality
Scoping Assessment, EIA — **Buenos Aires, Argentina, SA**

A scoping and issues assessment of the emissions and air quality resulting from port and ship traffic for the Hidrovia project in Buenos Aires. The EIA was a part of international project for approval of dredging of 3400 km of rivers in South America. Potential industrial related emission increases were scoped including dust and diesel emissions.

Dust Dispersion
Exposure Modelling — **Vancouver, British Columbia**

Exposure problem formulation, dust dispersion modelling and expert consulting on the dispersion of dust from a landfill site in the greater Vancouver regional district for a human health risk assessment. U.S. EPA dispersion model techniques were applied and emissions were calculated based on field sampling and emission factor estimates.

Air Quality Assessment, Ford — **Buenos Aires, Argentina, SA**

Air quality modelling around the Ford assembly and painting buildings to assess the ground level concentrations of hazardous fumes from rooftop vents.

Odour and Noise Assessment — **Alberta, Canada**

As a result of public complaints about odours adjacent to a gas compressor station and well battery, continuous H_2S and meteorological sampling was conducted. A noise survey was performed on the plant operations. The monitoring results were assessed and recommendations for remediation were supplied.

Dust Dispersion Exposure Modelling — **Eastern Ontario, Canada**

Dust dispersion modelling using fundamentals and the U.S. EPA dispersion models (ISC, SCREEN and FDM) for a human health risk

assessment of fugitive dust emissions from the hazardous waste pile of an electro-arc furnace flue dust at a steel recycling plant.

Complex Terrain Dispersion Modelling — **Western British Columbia, Canada**

Complex terrain dispersion modelling in a screening assessment for the design of a regional air quality monitoring plan in the Kitimat valley for Alcan, Methanex and Eurocan. The US EPA- ISC model was used in a screening level assessment of the emissions from three industrial source groups and included air quality estimates of TRS, NO_x, SO_x, TSP and fluorides. Recommendations were made as to the siting of the ambient air quality monitoring stations.

Long-Term Monitoring — **Western Saskatchewan, Canada**

Long-term air quality management including the assessment of air quality monitoring results, and preparation of regular reports of static and continuous monitoring results to the provincial government.

Primrose Commercial Development — **Northeastern Alberta, Canada**

The Primrose Commercial Development is the first expansion phase from the pilot study of the steam injection oil sands recovery project by Amoco. Air dispersion of slightly sour gas from 33 flared annulus gas oil production well stacks was performed using the Alberta Environment *SEEC* model for SO_2. NO_2 dispersion calculations were performed for the commercial development steam generators and existing plant operation equipment using the Alberta Environment *SEEC* model.

Air Quality Modelling for Monkman Area Gas Development — **Northeastern British Columbia, Canada**

Complex terrain air modelling using Alberta Environment and U.S. EPA air quality models for an environmental impact assessment of the gas development and expansion in the Sukunka and Bullmoose valleys, and Monkman gas field.

Progress Gas Expansion — **Northwestern Alberta, Canada**

Air quality modelling and permit preparations for a number of existing and expansion stacks and flares. The Alberta Environment air quality models were used in the analysis.

Landfill Gas Dispersion — **Edmonton, Alberta**

Gas contaminant dispersion estimates for the proposed Aurum Landfill site, using a modified ERCB computer model (PLUMES2) and the Wilson/Zelt computer model (SHELTER/EXPOSURE).

Indoor Air Quality Investigation in Drayton Valley — **Edmonton, Alberta**

Time series analysis of data from indoor monitoring equipment recording concentrations of contaminants in residential houses downwind of several pulp mills near Drayton Valley, Alberta. Programming of several analysis packages and graphical generation of analysis results provided insight for meaningful interpretation of the data.

Occupational Health and Safety & Alberta Public Safety Service Grants — **Edmonton, Alberta**

Development and programming of two state of the art dispersion models (SHELTER and EXPOSURE) which run on an IBM PC computer. The models predict concentrations and concentration fluctuation levels downwind of sources and predict indoor/outdoor toxicity and mortality estimates based on the gas lethality. Supervision of an experimental plume dispersion study in a water channel simulation of an atmospheric boundary layer. Co-ordination and preparation of reports and presentations.

Brian W. Zelt

Publications

Zelensky,M.J, B.W.Zelt. 2019. Consequences of using Pseudo-Science to Determine Pseudo-Parameters for Flares, A&WMA's 112th Annual Conference & Exhibition, Quebec, June 25-28, 2019. (AERflare)

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ABflare: A Refined Air Quality Dispersion Model for Evaluating Non-Routine Flaring for Sour Gas Facilities, User Guide, for AER and PTAC. 2014.

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Presentations/Seminars

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