



**GORDON J. ESPLIN, M.Sc., P.Eng.**  
**AIR POLLUTION ENGINEER**

Mr. Esplin has over 30 years of experience in air pollution consulting for industry and government, as well as conducting leading-edge research into new methods for monitoring, modeling and reducing air pollution.

### **Skills**

- Computer modeling of complex systems; atmospheric dispersion modeling.
- Bulk terminal (coal, potash, sulphur, grain, etc. ) dust monitoring and abatement.
- Aerosol physics - applications to aerospace and to dust mitigation
- UV reactor modeling and design of UV disinfection systems
- Air pollution monitoring with a strong emphasis on sampling and sample analysis. Development of new sampling methodologies. Air pollution forensic analysis.
- Assesment of the air pollution impacts of new developments.
- Air pollution meteorology - measurement and logging of meteorology.
- Atmospheric chemistry.
- Energy studies and life-cycle cost analysis
- Team leadership and project management.
- Research and new product development.
- Intellectual property protection

## Education

B.Sc. (Chemical Engineering), University of Alberta, Edmonton, 1965.

M.A.Sc. (Chemical Engineering), University of British Columbia, Vancouver, 1988.

## Experience

### *1995 – Present*

**Genesis Engineering** specializes in air pollution consulting and new product development. Recent projects that Mr. Esplin has worked on include:

- Forensic analysis of atmospheric dust particles to determine their origin, using SEM, LA-ICP/MS and other advanced techniques.
- Recommending cost-effective technologies for reducing exhaust contaminants from heavy-duty diesel engines such as trucks, locomotives, construction equipment, ferries, workboats and cruise-ships.
- Design and modeling of UV water disinfection systems.
- Design and modeling of ozone-disinfection systems for cruise-ships, hotels and health-care facilities.
- Using computer modeling to assess environmental impacts of atmospheric emissions from a variety of sources, such as fugitive dust from a ready-mix concrete plant in Vancouver, paint overspray from shipyards, odours from sewage sludge and wastewater treatment facilities, odours from a waste food recycling facility and wood-pellet plant particulate emissions.
- Measurement of exhaust emissions from ocean-going ships. Evaluation (cost/benefit) of technology and economic and regulatory instruments for reducing emissions from ocean-going ships.
- Evaluating (thermodynamic & cost) different hydrogen manufacturing processes and identifying the “bridges” that need to be built to get to the hydrogen future.
- Developing new methods to measure fugitive dust emissions from cargo ships during loading operations.
- Analysis (measurements and computer thermodynamic and kinetic modeling) of the explosion hazard associated with the unloading of sulphur trains.
- Experimentation and computer modeling of the aerosol physics associated with thermal fog generators. Development of new applications for these machines in the aerospace industry and the military.

- Evaluation of technology for reducing leachate emissions from wood residue storage facilities.
- Development and testing of a novel silencer for ship-yard sandblasting.
- Design of an advanced scrubber for reducing power boiler emissions.
- Training Chinese scientists and engineers in air pollution monitoring system design, installation and operation, and in computer modeling for chemical spill simulations and for air pollution dispersion modeling.

In addition to these consulting projects Genesis Engineering is actively involved in new product design. Products include a dust-free ship-loader, ergonomic seating, waste heat recovery system, air pollution software, forest silviculture systems, advanced slurry pump and an automatic water shutoff valve.

### **1980 – 1995**

#### ***Group Leader, British Columbia Research Inc***

Mr. Esplin led a group of scientists and technologists in applied research and consulting activities. He was responsible for promoting and successfully completing related contract work, developing and promoting novel air pollution measurement and control technologies, as well as the evaluation of biomass gasification and of hazardous waste destruction systems. Example projects for which Mr. Esplin was personally responsible for include:

- Development of advanced air pollution control systems for removing fine particles and toxic gases.
- Development and use of a new sampling technology (Boundary Layer Emission Monitoring) for measuring odour and hazardous chemical emissions from very large area sources such as hazardous-waste disposal sites, effluent treatment lagoons, municipal landfills, Superfund sites, etc.
- Determine and document the effects of kraft pulp mill emissions (particulate, sulfur gases, chlorine gases, etc.) on the environment.
- Assess the environmental impacts of the proposed Hat Creek Coal Liquefaction Plant and associated coal fueled Power Plant.
- Develop the use of sulfur hexafluoride gas as a surrogate hazardous compound in waste incineration studies and as a tracer in industrial ventilation studies.
- Develop the use of rare-earth elements as tracers in industrial paint overspray studies.

- Develop an analytical method for determining the concentration of coal in dustfall samples (Pyrolysis-GC).
- Measurement and reduction of fugitive dust emissions from bulk handling facilities – coal, sulfur, wood-chip, and grain terminals. Computer modeling of dust transport mechanisms. Development of a zero-emission ship-loading system.
- Development of a novel photochemical reactor for removing VOC and odours from gas streams (patents applied for).
- Claus Sulfur Plant efficiency studies and measurements.
- Research relating acid rain deposition to environmental damage.
- Research into the heterogeneous chemistry of acid rain precursors and atmospheric particulate. (This research led to world patents on a novel method for acid rain control – *Limestone-Enhanced Acid Rain Neutralization*).
- Computer modeling of gas-appliance "back-drafting".
- Evaluation of continuous PM<sub>10</sub> monitors. Design and construction of ambient PAH samplers.
- Measurement and computer dispersion modeling of chlorine and chlorine dioxide emissions from bleach plants and chemical plants.
- Development of standard protocols for the sampling and evaluation of biomass gasification systems. Testing of different gasifiers using these protocols.
- Development of a coastal log storage system (patent received).
- Process engineering design of a system for electrochemically producing THAQ, an additive for increasing the yield of pulp from wood chips.
- Design and testing of a modular mussel farming system (patent applied for).
- Development and testing of a novel hydrometallurgical process for recovering titanium, as synthetic rutile, from waste paint sludge (patent applied for).
- Research into enhanced liquid fuel combustion based upon the Rayleigh instability principle.

### **1978 – 1980**

#### ***Senior Air Pollution Engineer, Environment Canada***

Mr. Esplin acted as a consultant on policies and guidelines relating to the control of air pollution in B.C. and the Yukon. His activities included:

- Development of Emission Guidelines and computer modeling of the environmental impacts from coal-fired power plants and other proposed facilities.
- Technical review of all environmental impact statements and pollution permit applications within the British Columbia and Yukon region.

### **1969 – 1975**

#### ***Research Engineer, British Columbia Research***

Mr. Esplin was responsible for air pollution research, stack and ambient air sampling, and air pollution control technology (mainly for the pulp mill industry). Example projects included:

- Design of new stack-sampling instruments (insitu cascade impactor, high volume particulate sampler, continuous H<sub>2</sub>S monitor). Design and deployment of a novel ambient particulate flux monitor.
- Sulfur-gas odour emission inventories at all major pulp mills in B.C.
- Development of computer models to predict the environmental impact of an expanded Vancouver International Airport.
- Environmental impact assessment of coal mines and of a copper smelter.
- Design of odour control technology at a fish packing plant.

### **1967 – 1969**

#### ***Process Engineer, Celanese, Edmonton, Alberta***

While with Celanese Mr. Esplin worked on chemical plant improvements, new process designs, and on solving air and water pollution problems. Typical projects were:

- Design and installation of a plant odour control system.
- Design of process for recovering valuable fatty acids from a waste chemical stream.
- Distillation tower and heat exchanger designing.
- Improving the steam efficiency of the Power Plant.

**1965 – 1967**

***Design Engineer, Atomic Power Dept., CGE, Peterborough, Ontario***

While with CGE Mr. Esplin was involved in the design of nuclear power plant subsystems. Typical activities included:

- Design of the moderator cooling and ion-exchange systems, design of the gas recombination process for the helium cover-gas system, and design of the boron-doping system for the Karachi, Pakistan nuclear power plant. Selection and specifications of all plant testing and analytical instrumentation.
- Computer simulations of loss-of-coolant accidents. Two-phase flow analysis.
- Chief commissioning engineer for the heavy water facility at the Ontario Hydro nuclear power plant, Douglas Point, Ontario.

## **Associations**

- Association of Professional Engineers and Geoscientists of B.C.
- Executive of the Air and Waste Management Association, BC & Yukon Branch

## **Publications**

(Not included are approximately five hundred confidential client reports.)

Esplin, G.J: "Boundary layer emission monitoring." *Air Pollution Control Association Journal*. 38(9): 1158-1161, (Sept. 1988). (Also presented at the AIChE Spring Meeting and Petrochemical Expo '89, Houston, TX, [Apr. 2-6, 1989]).

Esplin, G.J. D.P.C. Fung and C.C. Hsu: "Comparison of the energy and product distribution from biomass gasifiers." *Canadian Journal of Chemical Engineering*. 64:651-662. (August, 1986).

Esplin, G.J. and E. McDonald: *Development of analytical methodology for biomass gasification products*. Presented at Fourth Bioenergy R & D Seminar, Winnipeg, Manitoba. (March 29–31, 1982).

Esplin, G.J., D.P.C. Fung and C.C. Hsu: "Development of sampling and analytical procedures for biomass gasifiers." *Canadian Journal of Chemical Engineering*, 63(6):946-953. (1985).

Esplin, G.J., R.S. Serenius and A.D. McIntyre: "Measurement and characterization of recovery furnace particulate. A status report." *Pulp and Paper Magazine of Canada*, 74(10):T404. (October, 1973).

Tomlins, G.F., M.J. Manore and G.J. Esplin: *The potential of remote sensing for monitoring pulp mill effluents*. Presented at Seminar on Pulp Mill Effluents, Environmental Protection Service, Vancouver, B.C. (March 17-18, 1983).

Esplin, G.J., and M.W. Aiken: "A study of laboratory fume hood performance." *American Industrial Hygiene Association Journal*, 48(6):A389-A391. (June, 1987).

Esplin, G.J: *TRS emissions from effluent lagoons*. Presented at 1988 Environment Conference, Canadian Pulp and Paper Association, Technical Section, Vancouver, B.C. (October 25-27, 1988).

Esplin, G.J: "Total reduced sulphur (TRS) emissions from effluent lagoons." *Pulp and Paper Canada*, 90(10):T398-T400. (1989).

Esplin, G.J.: "An approximate solution to the general line source problem." *Atmospheric Environment*, (In print,1995)

## **Patents**

Esplin, G.J: Balloon Forest Fertilization, USA Patent 5322219 (June 21, 1994).

Esplin, G.J: Acid Rain Neutralization. European Patent 207,616 B1. (Aug. 8, 1990).

Esplin, G.J: Method of storing logs. U.S. Patent Application 675,353 ( Dec. 1985).

Esplin, G.J: Method of storing logs. Canadian Patent 1,239,837. (Aug. 02 1988).

## **Contact**

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