

**PLANT SIZE:** Approximately 10 major buildings which house R&D facilities; engineering offices; machine, construction and maintenance work shops; administrative offices; protective services; fire department; and stores and warehousing. Very rough area of all facilities is 150,000 m<sup>2</sup>.

WNRE has a variety of facilities and expertise available for undertaking commercial work, e.g.:

- Other irradiation devices – a gamma-irradiator, Van de Graaf and fast neutron generator.
- "Hot Cell" facilities capable of handling up to 106 Curies of radioactive material.
- Various test "loops" for materials, component and corrosion testing.
- Comprehensive metallurgical and mechanical testing facilities with expertise in testing ferrous and non-ferrous metals, ceramics, glasses, rocks and composites.
- Expertise in electron microscopy, acoustic emission, fracture mechanics, etc., that can be applied to solving problems involving deformation, hydrogen embrittlement, stress corrosion cracking, creep cracking and fracture.
- Extensive analytical chemistry facilities including micro-analytical, radiochemical, neutron activation, mass spectrometry, atomic absorption spectroscopy, plus a strong capability for the characterization of surfaces by such means as scanning electron microscopy, scanning auger microscopy, secondary ion mass spectrometry and photoelectron spectroscopy.
- A research chemistry group adept in the measurement of the thermo-dynamic properties of solutions at high temperature and pressure, in the application of electrochemical techniques to the study of corrosion and film formation, in the study of gas phase reactions, and in several areas of colloid and surface chemistry.
- Combustion test facilities to study the detailed deflagration and detonation behavior of mixtures of combustible gases from the fundamental chemistry of combustion to engineering scale verification or demonstration experiments.
- Environmental research laboratories and field test facilities with experienced staff to study the impact of chemical and radioactive effluents of the environment.
- Biophysical research laboratories with expertise in virology, cell biology, radiobiology, biochemistry and biophysics.
- A geotechnical research capability which includes an underground research laboratory for excavation damage experiments for different excavation techniques, development of in-situ stress measurement techniques, evaluation of rock thermal/mechanical properties, hydraulic conductivity and rock porosity measurements and various geochemistry experiments.
- Expertise in modelling fluid heat transport systems and high pressure steam/water behavior.
- Consulting service groups encompassing nuclear engineering, risk analysis, development of computer models, mathematical analyses and meteorological assessments.

**EXPERIENCE:** AECL has been in existence for approximately 36 years. During this time, it has developed the CANDU-pressurized heavy water reactor system. It has helped to commercialize the radioisotope industry in the medical, pharmaceutical and industrial fields; developed and commercialized the Canadian heavy water industry. Canada is currently the world's largest producer of this commodity. In addition, AECL has been instrumental in developing the Canadian nuclear fuel industry and has played a large part in developing the US nuclear fuel designs, for both military and civilian reactors. It has also played a major role in developing and commercializing zirconium alloys.

More recently, AECL has been charged with the responsibility of managing the Canadian Waste Management program. It includes conceptual planning, fundamental research, development, testing, piloting, verification, acceptance, optimization, and providing specifications for the commercial system. Spent fuel storage (wet and dry), transportation, fission products removal and waste disposal are subsets of the total program. All of this work is being coordinated from WNRE. AECL's major assets are experienced staff and state-of-the-art facilities and equipment. Its reputation as a respected leader in the nuclear and non-nuclear industries is acknowledged both domestically and internationally.

**KEYWORDS:** ASME Codes; Biological Environment; Chemical Analysis; Chemical Processing; Chemistry; Colloid Chemistry; Combustion Research; Computer Code Development; Corrosion Science; Derived Release Limits; Detonation; Disposal (Nuclear Waste); Electrochemistry; Electronics Nuclear; Environment; Explosions; Fluid Dynamics; Fracture Mechanics; Health Physics; Hydraulics; Instruments (Nuclear); Irradiations; Isotopes; Materials Characterization; Materials Testing & Development; Mechanical Testing; Medical Biophysics; Metallography; Metallurgy; Neutron Activation; Non-Destructive Testing; Nuclear Engineering; Nuclear Waste Management; Physics; Quality Assurance; Radiation; Radiation Shielding; Radioactive Wastes; Rail Transport; Reactors; Risk Analysis; Separation Processes; Surface Chemistry; Tailings; Thermal Analysis; Toxic Chemicals; Trace Analysis; Vitrification; Waste Management.

**REVISED:** January 88

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**HISTORY:** W R Davis Engineering Ltd was founded in 1975 as Davis & Associates. In 1980, the corporate name was changed to W R Davis Engineering Ltd. In 1984, an affiliate, DEMAC Software Ltd, was created to provide software support. Today the company continues to grow in all areas of electro-mechanical engineering and production with significant expansion into international markets.

**CAPABILITY:** W R Davis Engineering Ltd was initially formed as a consulting engineering company to provide mechanical and electrical consulting engineering. This continues and the mechanical field can be further subdivided into: stress, shock, vibration, heat transfer and fluid analysis, and vehicle and human engineering and mechanical component/systems design. The electrical field has branched into: electronic system design, and control system design and analysis. Software development has been added to supplement other activities. A military engineering group which addresses land, air and naval applications, using the core mechanical and electrical groups has emerged. The military group has been enhanced with illustrators and technical writers to enable the production of technical documentation.

Hardware production and modification capabilities have emerged as a result of engineering projects. Specifically, the company can provide structural fabrication in steel, stainless steel and aluminum, vehicle modification and kitting, hydraulic systems fabrication and mechanical component/system fabrication. Electronic fabrication is available in a fully equipped laboratory.

Specific products are infrared signature suppression devices, wave generation systems for all sizes of test basins, active shaft grounding systems for naval vessels, a variety of vehicle test devices, low quantity production electronic systems, outfitted military special equipment vehicles, and vehicle data acquisition systems. Much work involves one-of prototypes. Examples include vehicle test systems, light emitting diode lighting systems, a road roughness and rolling resistance test rig, a 7m long submarine model for wind tunnel testing and 10m high interactive displays for Expo '86.