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Consumer and
Corporate Affairs Canada

Consommation
et Corporations Canada

The Honourable Pierre Blais
Minister

**ELECTRICITY AND GAS
INSPECTION ACT
REPORT TO PARLIAMENT**

Canada

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1. Purpose of this Report

The *Electricity and Gas Inspection Act* (1982, promulgated 1986) prescribes units of measurement for the sale of electricity and gas and generally regulates measurement in all forms of trade in electricity and gas covering residential, commercial, inter-utility and international transactions.

The 1986 Act combined separate pieces of legislation dating from the early 1950s. It contains a number of provisions designed to streamline operations and improve administrative efficiency. The most significant change is a new clause (section 10) which empowers the Director to accredit any person, upon approval of that person's application, to verify, reverify and seal meters. This fundamental change in the scope of the Act is known as accreditation.

This Report has been prepared as required by section 29 of the *Electricity and Gas Inspection Act*, which states:

"As soon as is practicable after the expiry of a period of five years beginning on the earliest day on which this Act or a provision thereof is in force, whether as regards electricity or gas or both, the Minister shall prepare a report with respect to the administration of this Act during that period and shall lay a copy of the report before Parliament on any of the first fifteen days that either House of Parliament is sitting after he completes it."

2. Background

History of the *Gas Inspection Act* and *Electricity Inspection Act*

The Federal Government was granted exclusive constitutional authority for weights and measures in Part VI, Section 91 of the *Constitution Act (British North America Act)* of 1867. Parliament introduced the first *Gas Inspection Act* in 1873 followed 21 years later by the *Electric Light Inspection Act* (1894). Interestingly, the *Gas Inspection Act* applied primarily to gas manufactured from coal and used for street lighting. These two acts established national standards for the measurement and sale of gas and electricity, providing assurance of accuracy to buyers and sellers alike.

More than a century has transpired since the passage of the *Gas Inspection Act*. Since that time, continuous technological advancement has occurred in the design and use of measuring instruments for the two energy forms, as well as in the sources and uses of energy itself. For example, natural gas has replaced coal gas as a significant energy source. The pace of these advancements required occasional amendments to the acts and regulations. In addition, staff training has been required on a continual basis to keep pace with technological advances. By far the most significant of the changes, however, has been the proliferation of measuring devices and massive increases in both volume and value of the energy being measured.

Extent of Application in Canada

The administration and enforcement of the Act is achieved through a metrological control program, which comprises seven major elements:

1) *Definition of units*

The legislation defines the units of measure for electricity and gas sales. Electricity may be sold in energy units (e.g., kilowatt hour) or a combination of energy and time units. Gas may be sold by volume, energy or mass.

2) *Maintenance and calibration of measurement standards*

The legislation requires that a system of reference standards for the units of measurement be maintained by the Department of Consumer and Corporate Affairs and be calibrated and certified periodically by the Director. All standards must be traceable to the primary measurement units maintained by the National Research Council.

3) *Pattern approval of new meters*

Before any meter may be verified for accuracy its type or pattern must have received approval from the Director. This prevents meters of inferior quality from entering the market. The approval process involves the evaluation of prototype meters against the specifications. They are tested in departmental laboratories throughout their measuring ranges under conditions which simulate the environment in which they are intended to operate. Pattern approval is granted only if a meter type complies with requirements.

4) *Verification of meters*

Once approved, meters must be verified before being placed in service. This ensures that meters conform to an approved pattern, function properly and have acceptable metrological characteristics. Verification prevents inaccurate meters from being installed at customers' premises. Meters are inspected individually or, for common meter types (residential meters), by statistical sampling techniques.

5) *Reverification of meters*

Under a compliance sampling program for residential meters, a sample from a lot of in-service meters is withdrawn and tested. The sample results are analyzed statistically and, where performance warrants, the meters in that lot may remain in service for a further specified time. This has the effect of extending the

original reverification period. For other meter types where sampling is not used or when sample results are unacceptable, utilities remove the meters from service and rework and recalibrate them prior to presenting them for reverification.

6) *Inspection of metering installations*

Complex configurations involving an assembly of two or more meters and auxiliary equipment are a primary source of measurement inequities. These are called metering installations and are found at commercial and industrial locations where high energy consumption can result in large inequities if there are measurement errors. Inspectors detect several million dollars of measurement inequities annually. The legislation contains provisions which allow the injured party to recover the amount owing.

7) *Resolution of measurement disputes*

Any buyer or seller who is dissatisfied with the condition or registration of a meter may request an inspector to investigate and resolve the matter. A dispute investigation normally involves a complete metrological evaluation to determine the amount of measurement error, and a detailed analysis of the billing calculation procedure and past records to detect administrative errors. Where an error is found the customer or utility is entitled to compensation.

Economic Dimensions of Regulated Industry

The Electricity and Gas sub-activity (E&G) exercises metrological control and authority over about 16 million in-service electricity and gas meters with a total metered value of \$33 billion annually, including domestic and international transactions.

Resources Allocated to the Sub-activity

The sub-activity was allocated 193 person-years in 1990-91. The staff is organized into five regions comprising 16 districts and a headquarters function including testing laboratories. In 1990-91 the total budget was \$10.6 million. In that year, \$8.3 million was recovered for the Consolidated Revenue Fund by way of fees for approvals, calibrations, inspections and audits. The program's net direct costs amounted to less than 10 cents per Canadian that year.

In anticipation of the efficiencies to be gained through accreditation, staff was reduced by 42 in the early 1980s, and has remained basically constant in spite of significant growth in the number of meters requiring inspection.

3. **Reasons for Amendments to the Legislation**

As the complexity of metering and size of trade in gas and electricity grew, E&G staff faced increasing difficulty in complying with the legal requirements to inspect all meters used in measuring gas and electricity. Various techniques were used to improve workforce efficiency and effectiveness. One such approach involves statistical sampling, where homogeneous lots of meters are inspected through statistical analysis of the test results of a representative sample drawn from the lot.

General reductions in federal government resources in 1979 and 1980 intensified the search for new means of accomplishing the sub-activity's objectives with fewer resources and without compromising quality. It was in this context that the concept of accreditation took form.

Several successive ministers of Consumer and Corporate Affairs tabled bills designed to modernize and combine gas and electricity meter regulation, improve administrative efficiency and program effectiveness, clarify the powers of the Director and authorize the accreditation of private persons to verify and seal meters, a function previously performed by government inspectors exclusively. Finally, Bill C-11 (1981) was passed by the House of Commons on December 18, 1981.

4. **Accreditation**

The new Act proclaimed in 1986 effected several minor changes to the former legislation and provided for the Accreditation Program. The program is voluntary, and participation by utilities and meter manufacturers has been encouraged through increased fees for the meter inspection services of E&G inspectors. Before accreditation is granted an applicant must demonstrate the existence of a fully documented and operational quality assurance program. Once accreditation has been granted, the holder is obliged to maintain his quality assurance program. The Minister may revoke an accreditation for failure to comply with any conditions to which the accreditation has been made.

Quality Assurance Defined

Quality assurance (QA) is a commitment to excellence and error prevention at all levels of an organization. It differs from quality control, which is a process of detecting and correcting errors. QA attempts to prevent errors by specifying detailed operations, documenting thoroughly all steps and duties in a process, and obtaining a commitment to quality from every member within the organization, from the most senior levels of management to the workers in the factory. The Accreditation Program quality assurance specifications are set out in a document entitled *Criteria and Procedures For the Accreditation of Electricity and Gas Meter Verifiers*. This standard is modelled on that of

the Canadian Standards Association. Teams of inspectors conduct on-site audits prior to accreditation being granted and conduct surveillance audits to ensure that the quality assurance program remains fully operational and effective.

Reasons for Accreditation

This fundamental change in the application of the Act came about in response to several factors. Primarily, the department had an interest in improving operational efficiency and effectiveness, heightened by general government restraint. As well, compliance rates for residential meters were historically high. Given the fact that large errors in measurement are known to occur in commercial applications, there was a desire to redeploy inspectors freed up by the Accreditation Program to such areas. Also very important was the growing recognition in industry that quality assurance could lead to higher compliance than quality control. The evidence indicated that some organizations were competent to undertake the sealing, verifying and reverifying of meters with strict adherence to QA standards. Additional impetus to privatize meter verification work came via the Task Force on Program Review which recommended that devolution of meter inspection to the private sector occur "within six years" (i.e., by 1992).

Achievements of the Accreditation Program

As of June, 1991 eight major organizations had been accredited, some for more than one type of meter. The group includes the three major Canadian manufacturers of electricity meters and five of the largest utilities. A number of applications from other utilities are in process. Accreditation is being introduced in phases, with phase one applying to simple residential meters. Successive phases will encompass more complex meters and inspection techniques.

Recently, the Director commissioned a study which reported that industry respondents believe the benefits of accreditation far exceed the original objective of cost savings and include improved customer service, greater quality awareness resulting in higher product quality, faster delivery, and expected longer meter life associated with the improvements.

The same study reported government officials to be of the opinion that accreditation, by involving an entire organization and not just the meter shop, extends the breadth of metrological control throughout the life of a meter. That is, end-of-the-line inspection has been replaced by quality systems throughout the process.

Based on these and other findings, the study concluded that public confidence in the accuracy of meters should in no way be eroded as a result of the Accreditation Program. In fact, the findings indicate that metering accuracy has been enhanced by the expanded breadth of control and strict adherence to quality assurance principles.

In concert with accreditation, the sub-activity has developed another new program which is designed to permit reduction of departmental inspection resources used in meter shops. Utilities either unable or unwilling to meet the rigorous accreditation criteria will have the option of adopting a Quality Monitoring Program, which would progressively reduce the number of government inspections and associated costs to utilities that consistently demonstrate high levels of product quality. The expectation is that such a system would eventually lead the organization to seek accreditation.

"Full Devolution" Revisited

Given the experience of the first five years, it appears that a maximum level of accreditation will be reached when 25 to 30 major organizations are accredited. This will account for about 80 percent of meter verification activity in Canada. Many smaller utilities will not request accreditation for various reasons. Some do not have meter verification facilities and rely on outside services for meter verifications. Others will be unwilling to pursue accreditation, either because of small scale operations or because, for customer relations reasons, they prefer that government inspectors verify their meters. Those who perceive criteria for accreditation as too demanding will have the options of subscribing to the less stringent Quality Monitoring Program, purchasing verification services from accredited third parties, or paying inspection fees for government inspection. In any event, it will not be possible for E&G to vacate the meter verification activity entirely.

Given this forecast of what may be possible it appears that the planned "full devolution" of meter inspection by 1992 was directed without a full appreciation of the complexities involved in its attainment. The fact that this goal was perhaps overly optimistic in no way diminishes the importance of the program's achievements to date. Progress has been substantial and effective and there is evidence that the pace of accreditation will quicken over the next few years.

5. Compliance Status

Meter Verification/Reverification

Subsection 9(1) of the Act requires that electricity and gas meters be verified prior to being placed in service, and section 12 stipulates that these meters must be reverified at set intervals. To avoid the enormous and unnecessary cost that would be incurred in testing every meter in Canada, new and in-service meters are inspected using statistical sampling where relevant. An analysis of meter compliance rates shows no significant change since 1986.

Installation Inspections

Whereas meter verification and reverification are normally carried out in meter shops, the installation inspection program requires inspectors to assess correct usage and performance of meters on site at commercial and industrial establishments. One of the motivations for implementing the Accreditation Program was to free inspection resources from high-compliance areas and redeploy them in these commercial/industrial applications where inequities are known to exist and where measurement error has greater consequences.

The current minimal installation inspection program finds and corrects marketplace inequity exceeding the entire annual cost of E&G program delivery. Since 1986, the priority on developing the Accreditation Program has required a shift of resources from installation inspections. As the Accreditation Program advances, however, the sub-activity will be able to return resources to this important area.

Investigation and Arbitration of Disputes

Under the provisions of the Act any buyer or seller of either form of energy who is dissatisfied with the condition or registration of a meter has the right to request an inspector to investigate and resolve the matter. A dispute investigation normally involves a complete metrological evaluation to determine the measurement error, and a detailed analysis of billing calculation procedures and past records to detect administrative errors. The customer (or the utility) is entitled to compensation when any billing or administrative error is found or when the overall measurement error exceeds three percent. Where a dispute cannot be resolved by an inspector, the Director is the final arbitrator. Overall, about 30 percent of dispute investigations detect errors. Interestingly, there is more underbilling by utilities detected than overbilling. All such errors must be corrected as equity demands that all customers pay their fair share for energy consumed. As energy costs and population rise the number of disputes referred to inspectors for resolution increases. Recently, disputes have numbered 10,000 to 12,000 per year with annual inequities in the order of \$10 million.

6. **Current Issues and Plans**

Technological Challenges

The constant challenge to the Electricity and Gas sub-activity is keeping pace with new technology. The recent availability of low-cost microprocessors has revolutionized metering technology. New technology has the effect of causing delays in the meter pattern approval process. At present, an applicant can expect to wait from eight months to one year before a submitted metering device can be tested by the laboratory. As technology changes, new skills are required by inspectors, and new testing equipment and standards must be acquired and developed. The situation should improve as the necessary skills and procedures are developed to deal with the recent changes.

Laboratory Facilities

The department is planning to expand laboratory facilities for the testing of high-capacity, high-pressure gas meters. Existing facilities do not have the capacity to test many gas meters submitted for approval, verification or reverification. As an interim measure, use is made of facilities in the United States. This is only a short-run solution, and does not permit full testing to Canadian standards. This is the only area where the sub-activity has experienced significant difficulties in fulfilling its mandate.

Outside Perceptions

In preparing this report, officials representing metering committees of industry associations were asked for written comments on the administration of the Act during its first five years. Basically, these officials applauded ongoing cooperative efforts in drafting standards and technical specifications and generally expressed appreciation for the Accreditation Program, noting that it had increased quality consciousness and efficiency. Their main criticisms were directed at the delays in pattern approval of meter types, intervals for reverification for different meter types, and the fact that documentation was not yet finalized for all aspects of the new Act.

In 1989-90 the Auditor General conducted an audit of the sub-activity and recommended the following actions:

1. The legal requirements regarding the verification of metering installations be clarified;
2. Inspection procedures be updated; and
3. A progress report be prepared on accreditation noting that full devolution of meter inspection to the private sector would not be achieved by 1992 (Part III of the 1991-92 Estimates responds to this recommendation).

The department accepted these recommendations and has initiated plans to address them. No other recommendations were made by the Auditor General.

More recently, a survey of industry officials on the achievements and expectations for accreditation led to several important conclusions:

- ◆ The strengths inherent in the program stem from the toughness of the requirements which are based on the highest level of national quality assurance standards, coupled with a high degree of dedication on the part of E&G staff members. Accreditation forces an organization to formalize and document its quality system using a total quality approach.

- ◆ Although the majority of applicants initially applied for accreditation on cost/benefit grounds (in response to the incentive created by successive increases in meter inspection fees) almost all conceded that the quality spin-offs in their organizations were equally important as the cost savings and reduced dependence on government inspectors.
- ◆ Communication channels with the department are excellent with respect to the overall E&G sub-activity. Many industry officials view themselves as partners with E&G staff in solving metering problems and are in contact on a regular basis. Regarding the Accreditation Program, some industry officials look for improvement in both the timeliness of feedback and the consistency of interpretive responses across regions. Concerns about timing appear to be more a function of the "newness" of accreditation and the fact that E&G inspectors have gone through the same learning curve as industry officials. On the consistency issue, E&G has responded by creating a National Accreditation Committee, which is in the process of developing rigorous and standardized procedures and manuals.
- ◆ The major impact of the Accreditation Program has been the inculcation of quality assurance rather than quality control as the operational philosophy for meter inspection. Accreditation is seen as beneficial by those organizations presently accredited. Even among those who were initially skeptical, it was conceded that the entire organization benefits through adoption of a quality assurance program, with greater commitment at all levels up to and including senior management.

7. **Summary and Conclusions**

During final debate on Bill C-11 on December 18, 1981 all parties in the House of Commons endorsed the principles and welcomed the Minister's proposal to report back to Parliament after five years of administration of the Act. Following finalization of regulations, the Act was proclaimed into force in 1986.

The main new feature of the legislation, the Accreditation Program, had a slow start but has gained momentum and is working well. The evidence demonstrates that accreditation works without compromising quality of measurement or public confidence in metering accuracy. Accredited organizations are experiencing operational improvements, greater efficiency and enjoying cost savings on inspection fees. The sub-activity, still implementing the initial phase of accreditation, has not yet benefited fully from the initial resource savings but expects to redeploy resources to installation inspections as the efficiencies of accreditation are realized.

Complaints regarding metering accuracy are minimal, and represent an exceptionally small proportion of both total transactions and the total value of natural gas and electricity consumed. Provisions in the Act to deal with dispute resolution are working effectively.

Concerns that have arisen relate to the difficulties in coping with constantly evolving

technology. Essentially, this review has found no major problems in the administration and enforcement of the *Electricity and Gas Inspection Act*. In conclusion, the legislation remains relevant and effective.