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COMMUNICATIONS CANADA

- ONTARIO REGION -

A PROPOSAL
FOR REGULATORY ENFORCEMENT MANAGEMENT
IN THE FIELD

9 January, 1972

Reprinted May, 1978

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PART I - BACKGROUND

INTRODUCTION

In the present trend toward an information-oriented society the role played by radio communications is a major one and, therefore, the effective and efficient use of the radio frequency spectrum is indispensable to the development of our society.

Characteristics of the Radio Spectrum are:

- It is used, not consumed, and is being wasted when not used.
- It has dimension of space, time and frequency, and all three are interrelated.
- It is an international resource and can only be utilized effectively by all nations within an international framework.
- As a national resource, its utilization must be carefully planned and properly managed.
- It is wasted when its parameters are not correctly applied.
- It is wasted when assigned to do tasks that can be done as easily in other ways.
- It is subject to pollution, and radio interference is in fact decreasing its utilization.

Use of Radio Spectrum

The problem of rational use of the radio spectrum is becoming more complex as time goes on. The radio frequency spectrum available is becoming less and less able to accommodate the progressive increase in requirements, despite the tremendous rate of scientific progress and the new possibilities opened up to mankind almost daily by developments in new techniques. Rational and Optimum occupancy of the spectrum is thus a problem of increasing urgency.

In using radio waves, which are transmitted through common space, the power of emission as well as its time, frequency and location have to be taken into consideration. Without such consideration not only would communications be

rendered impossible by mutual interference, but it would cause serious problems to navigation and emergency services. For these reasons efficient and careful management of the spectrum is necessary.

Regulatory Bodies Involved in Spectrum Management

. International/National

Each nation has its own regulatory body that exercises authority and controls telecommunications in its own country. Acting within the scope of international treaties and agreements, these regulatory bodies assign frequencies, provide plicing, establish technical rules and standards, and safeguard the public interest within their purview.

. Canadian Regulating Body

In Canada the management of the radio spectrum and the regulation of its users is assigned by Parliament to the Department of Communications.

Regulatory Instruments

The following lists international and domestic instruments applicable to Spectrum Management:

. International Instruments

- International Conference on Safety of Life at Sea (SOLAS)
- International Telecommunication Convention
- Radio Regulations, International Telecommunication Union
- Telegraph Regulations International Telecommunication Union
- Promotion of Safety on the Great Lakes by means of Radio (Great Lakes Treaty)
- Convention between Canada and the United States (Reciprocal Agreement) — NARBA

. National Instruments/

. National Instrument

- Radio Act
- General Radio Regulations
- Broadcasting Act
- Broadcasting Regulations
- Telegraph Act
- Telegraph Regulations
- Canada Shipping Act
- Ship Station Radio Regulations
- Life Saving Equipment Regulations
- Aeronautics Act
- Air Regulations

Objective of DOC Radio Spectrum Management Program

To develop and implement radio frequency plans and frequency assignment criteria; to administer and enforce the provisions of the Radio Act and Regulation and the Telepraph Act which includes development and application of technical standards for radio equipment and systems, the development and application of licensing and certification procedures and regulations. This activity includes technical certification for the granting of licences for broadcasting undertakings by the Canadian Radio and Television Commission as defined in the Broadcasting Act.

Regional Implementation of DOC Objective

The implementation of this departmental objective in the field necessitates the Regions having the technical ability and trained personnel capable of performing the following operational activities:

. Authorization - Processing of applications for licences

. Monitoring - Constant surveillance of the radio spectrum for the purpose of locating the origin of radio interference and other forms of interference that can be received and are interfering or could interfere with legitimate communications.

. Enforcement - Conducting periodic inspections and interference investigations to ensure implementation of the Radio Act and applicable regulations that form part of other acts, agreements, etc., as applicable to the proper operation of licensed stations.

Departmental policies, procedures and standards applicable to these activities are included in the Radio Inspectors' Manual (RIMs).

Enforcement - For purposes of this paper only the enforcement activity is considered. Monitoring Stations ?? — big gaps !

- Inspections - are conducted in the field and are carried out by technically qualified personnel. All types of licensed and unlicensed stations are subject to inspection as laid down in the appropriate sections of the Radio Operators' manuals.

- Interference - In providing this service to the public each complaint is investigated by a qualified inspector according to procedures included in the Radio Inspectors' manuals.

Summary

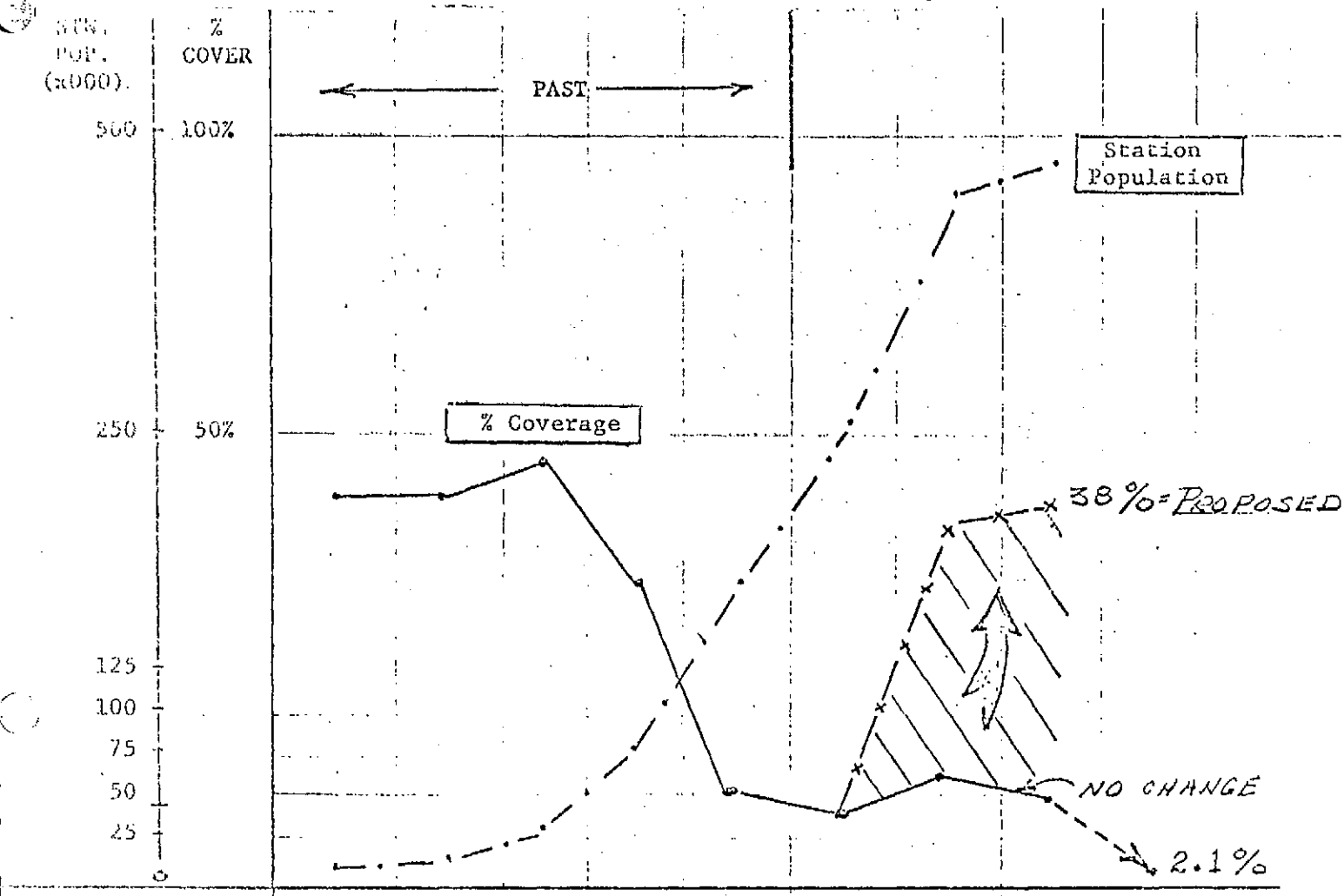
The Department of Communications Act established the department's responsibility for Spectrum Management. Various international/national instruments state the regulatory measures required to fulfill these responsibilities and departmental policies, procedures and standards indicate the degree of activity necessary for the implementation of regulatory enforcement programs in the field.

PART II

- REGULATORY ENFORCEMENT ACTIVITY - PAST, PRESENT AND FUTURE TRENDS

EXHIBIT NO. 1

INSPECTION COVERAGE VS. STATION POPULATION 1947-72



YR	47	50	55	60	65	70	75	78	98	
STN POP	12.7	16.6	27.4	76.7	163.8	256.3	439.6	488.2		(x000)
% INCREASE	-	32	65	150	140	55	70	11		
NO. INSP. VISITS	5.1	6.7	13.0	23.0	17.1	20.0	49.0	49.1		
% COVRGE	40	41	48	34	10.5	8	11	10	2.1	
PROPSD NO. VISITS							128	161		
% COVRGE							35	38		

NOTE -

(1) Interference not included.

(2) 38% Coverage = 20% "STATUS QUO" Non-Compulsory plus Compulsory

SOURCE - MOT and DOC Reports.

PAST SITUATION - Regulatory Enforcement

To develop the concept for regulatory enforcement management put forth in this proposal extensive research was conducted to obtain historical data which could be interpreted into the operational performance and effectiveness of the enforcement activity.

The period under examination is from 1945-1972 - a total of 27 years.

In 1945 there were 7,000 Licensed Stations in Canada. By 1973 there will be some 344,000 stations. This growth is indicated at 5 yearly intervals in Exhibit No. 1. The effectiveness of the enforcement program during this period is determined by the number of inspection visits conducted as a percentage of the total population. It will be seen from Exhibit No. 1 that from 1947 to 1960, a period of 13 years, coverage was in the order of 40%. However, between 1964 and 1970 when the Licensed Station population experienced its greatest growth rate the percentage dropped to 9%. Also, it is evident that if the inspection resources remain as they are today that by 1998 coverage will drop to 2.1% of the station population.

To further indicate the increased requirement for regulatory enforcement management it will be noted in Exhibit No. 2 that in 1950 there were 27 inspectors and that the number of stations per inspector was 590, whereas in 1972, there were 109 inspectors and the station population per inspector had risen to 3600.

A similar situation exists in regard to District Office to station population where in 1950 there was 25 offices - each having 640 stations; in 1972, 39 offices have a station population of over 10,000 per office.

Exhibits Nos. 1 and 2 clearly indicate that station population has been increasing far in excess of personnel resources. However, in regard to individual workloads for inspectors reference to Exhibit No. 3 indicates that in 1947 the inspector workload was 520 visits per year. Twenty-five years later the workload for an inspector had decreased to 450 visits per year.

EXHIBIT NO. 2

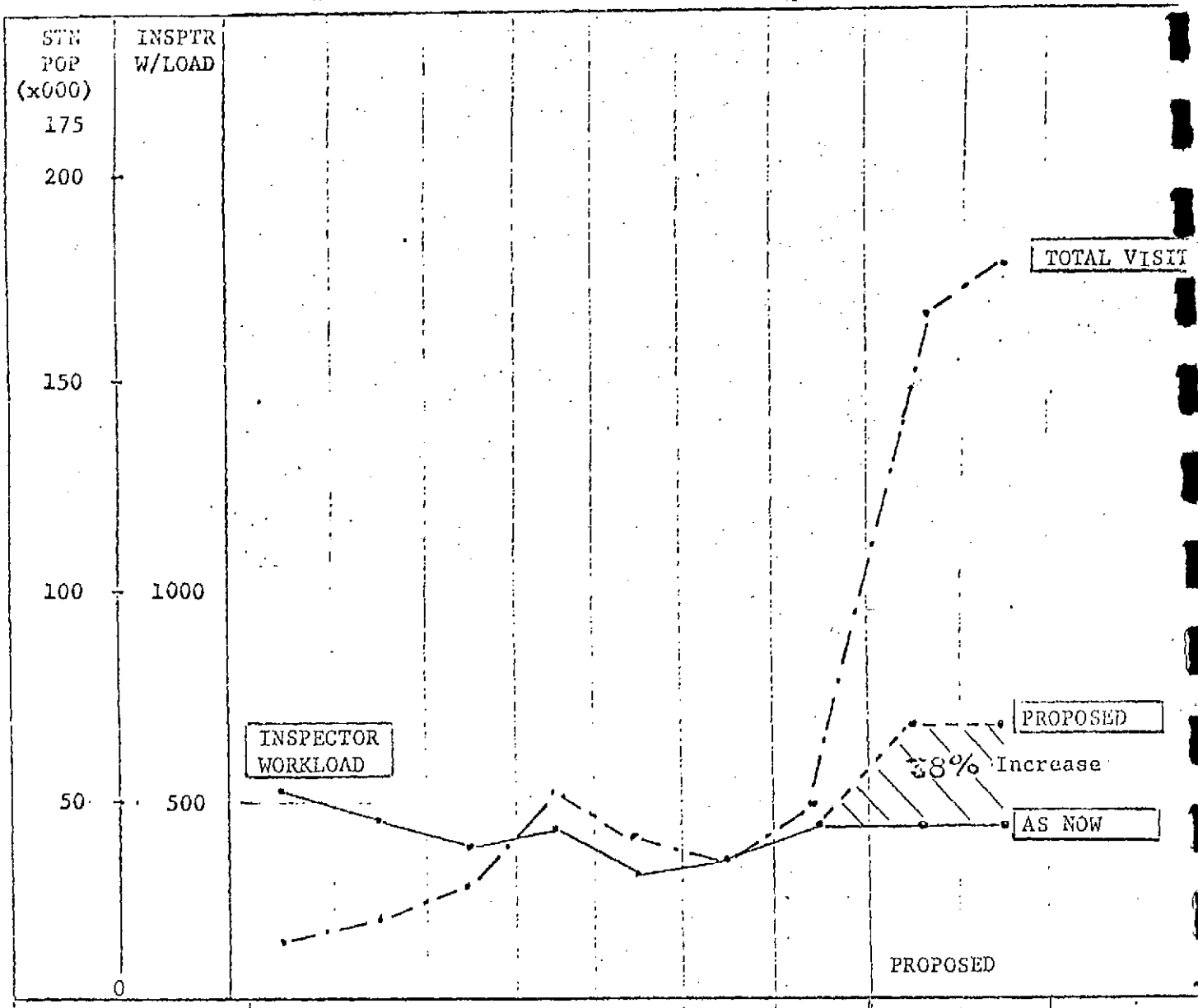
NUMBER OF LICENSED STATIONS

TO DISTRICT OFFICES AND INSPECTORS - (25 YEARS)

Year	47	50	55	60	65	70	72	75	78
No.Field Insptrs	16	27	54	84	93	100	109	(109) 273	(109) 301
No.Stns. per Insptr	800	590	500	800	1650	2560	3600	(4000) 1500	(4500) 1590
No. Dist Offices	-	25	25	28	30	35	39	39	39
No.Stns. Per Office	-	640	1100	2400	5500	7500	10000	11000	12500

EXHIBIT NO. 3

INSPECTOR WORKLOAD VS. TOTAL VISITS (25 YEARS)



YRS	47	50	55	60	65	70	72	75	80	
NO. INSP VISITS	5.1	6.7	13.0	27.2	25.8	20.6	23.4	145	162	
NO. INTRF. VISITS	9.4	11.1	9.4	25.1	15.8	17.1	26.0	25	25	
TOTAL VISITS	14.5	17.8	22.4	52.3	41.6	37.7	49.4	170	187	
NO. INSPTRS	28	37	66	133	130	103	109	273	301	
NO. INSPTR. W/LOAD	520	480	340	390	320	370	450	623	623	38% Increa Productivity

(1) Using ratio 40% in field with 25% of field personnel doing applications - Licences - Exams and Admin. - of Total Inspectors.

(2) 109 includes Inspectors still in training status.

This is primarily due to the many more types of services available, increased sophistication of equipment and systems and higher technical standards. Nevertheless, the average workload per inspector over a twenty-five year period has been relatively constant at 400 visits per year.

In summary then, it will be observed that the one constant in this situation is the inspector workload and that therefore any improvement in coverage will be a function of providing more personnel. Furthermore, if personnel resources reamain at the present level the station population increases of 8% per annum will cause further deterioration of the present 9% coverage to a point where regulatory enforcement management will be virtually non-existent.

Ontario Region - Effectiveness Inspection Coverage vs Population 1971-72

Location Type	Population		Inspection Calls	% Coverage	% Not Covered
A) COMPULSORY(Inspections)					
Brdcst. A.M.	148				
F.M.	37	243	171	69	31
T.V.	58				
C.A.T.V.	132		16	12	88
Ships (Comp)	268		194	73	27
Aero Grnd	241		41	17	83
Aircraft	3226		740	23	77
	4110		1192	29%	71%
B) COMPULSORY(Interference)	Complaints		*Interference Calls Made		
Complaints Rcvd.	7901				
Complaints Investigated	6373		12258		
Complaints Not Actioned	1528			87%	13%
C) Total Compuls. Calls	19912		13450	68%	32%
D) NON-COMPULS.(Inspections)	Population		Inspection Calls	%	% Not Covered
Ships (Non-C)	1345				
Marine Coast	29				
Prvt Com-Fxd	10787				
Prvt Com-Mob	54539		For All Types		
RCCMRS	93				
Paging	56				
Amateur	5884				
GRS	21827				
Exp	259				
Total Other	95290		6154	6.4%	93.6%
New & Amended	15690		-		
TOTAL ALL	130892		19604	5.0%	95.0%

*Average 2 calls per complaint

PRESENT SITUATION - Regulatory Enforcement

The Department has five regions which, through their district offices, inspection staff and facilities, are responsible for regulatory enforcement in the field.

Regulatory Enforcement in the field includes three activities, however, as previously mentioned for this proposal only the ENFORCEMENT activity which includes the inspection of licensed stations and the investigation of interference complaints is considered.

In 1973-74, the total licensed station population subject to enforcement, excluding MOT and DND stations, is expected to be 376,000. The number of interference investigations forecasted for the same period is 25,000.

Enforcement Effectiveness 1972

An example of the degree of effectiveness of the present enforcement program in the Ontario Region is given:

Infractions versus Station Population 1972, (Refer Exhibit 1.)

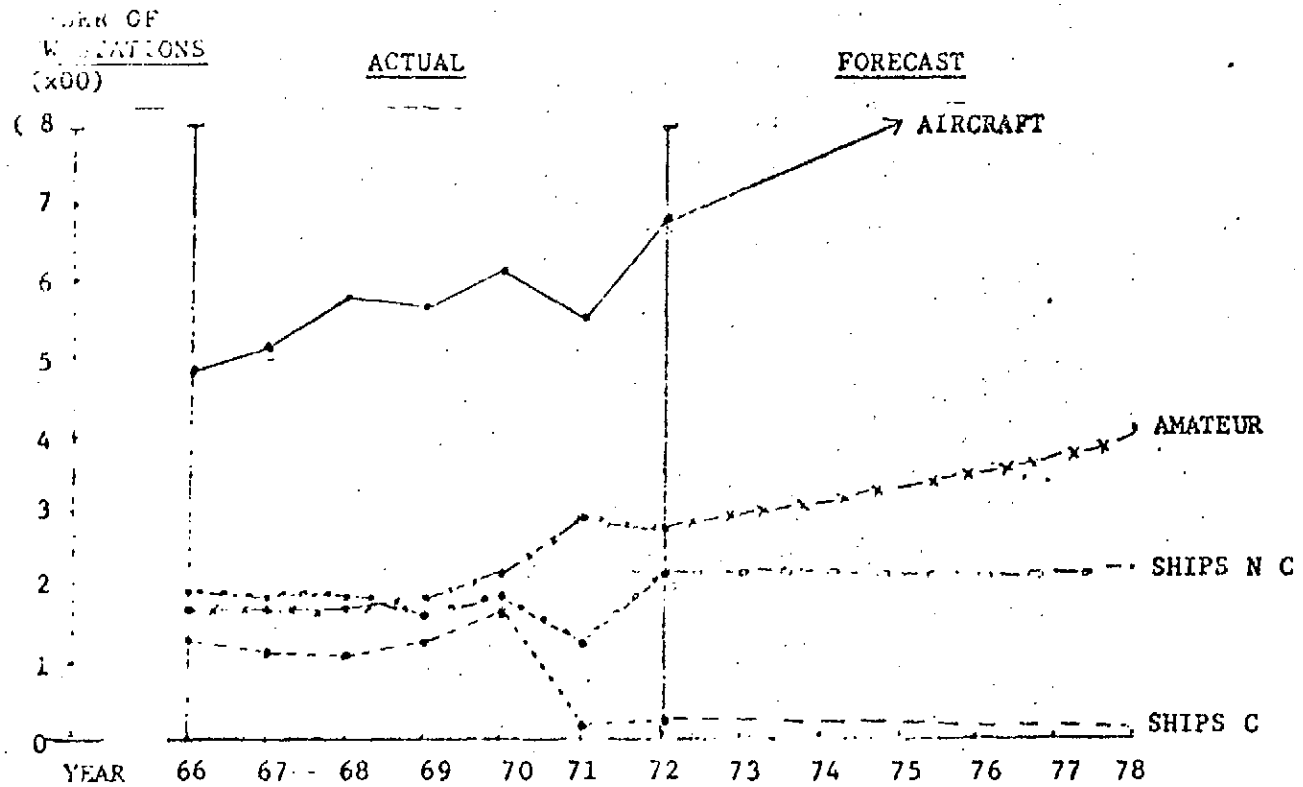
In 1972 of a total Non-Compulsory licensed station population of 95,290, it was determined that 24% of the population or 22,869 licensed stations could be expected to have infractions, as shown in Exhibit 3.

In analyzing the infractions included in the 24% it was determined that 20% would be stations off-frequency; 31% would be unlicensed stations and 14% would be stations using unauthorized equipment. It should be noted that these three types of infractions are the major contributors in restricting the efficient use of the Spectrum.

Furthermore, it was ascertained that the regulatory enforcement coverage of Non-Compulsory licensed stations was only 6.4%. Thus it can be stated that, of the 22,869 licensed stations having infractions at least 14,565 were not inspected.

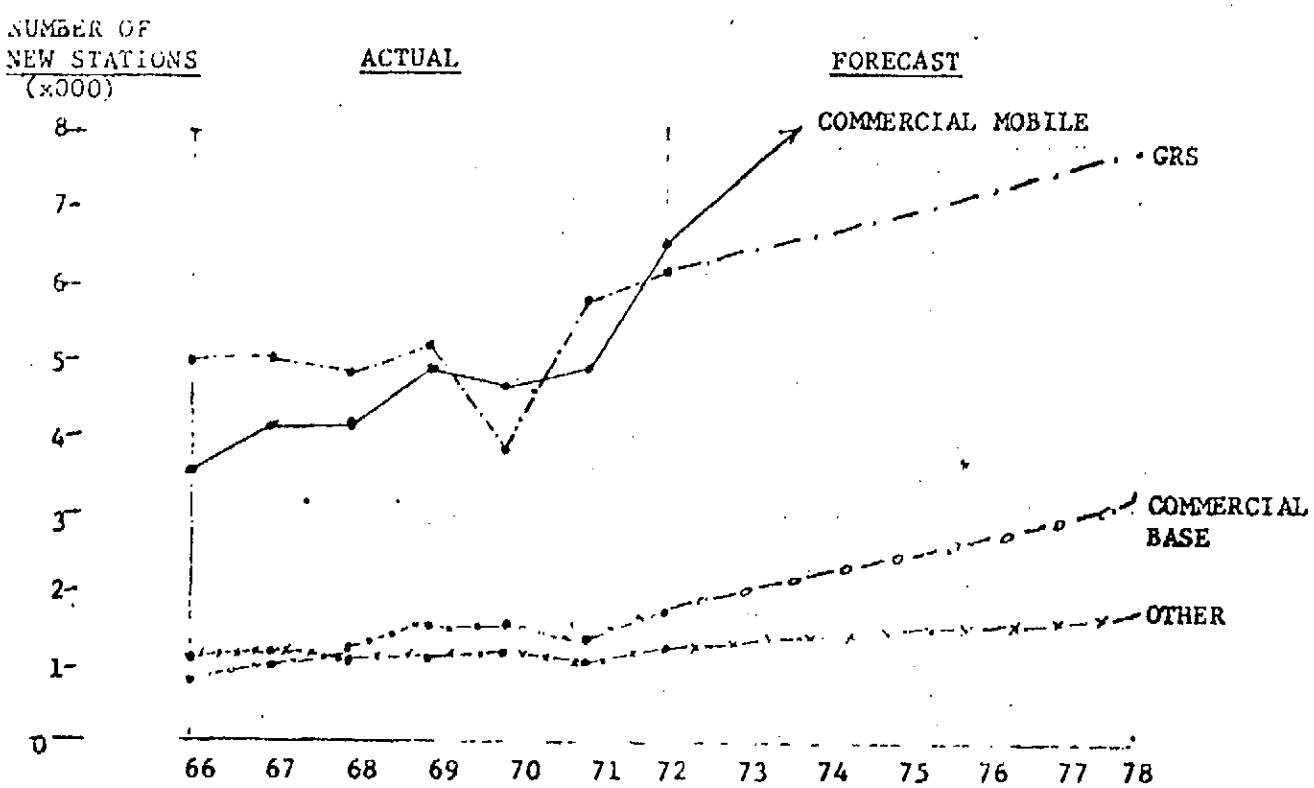
CHART NO.1 - STATION GROWTH -

EXHIBIT 9.



Average Yearly Increase 7.75
Average 7 Year Increase 7.21 %

CHART NO.2 - STATION GROWTH -



SOURCE - REGIONAL STATISTICS - (Refer Appendices "D" and "E")

Inspection/Interference Coverage as a Percentage of Total Population (Refer Exhibit 1)

- only 29% of the required Compulsory inspections were completed.
- Of the total number of interference investigations required, 87% were completed.
- Inspections completed as a percentage of the total Non-Compulsory population was 6.4%.
- Coverage of the total station population and interference investigations was 5%.

In view of the legislative requirements for the regulation of licensed stations and the prevention of interference and taking a most liberal approach to regulatory enforcement, it is evident that the Department's objective in this area is not being achieved in the Ontario Region.

Furthermore, as these enforcement activities are common to all regions, and as manpower and facilities ratios to station population are approximately the same as those in Ontario, it is reasonable to assume that similar results are being obtained in the other regions and, therefore, that on a national basis, enforecement activity in the field is not adequate.

Future Trends (Refer Exhibit 2.)

- Inspection

  An analysis of historical data and a detailed forecast indicate that the overall growth rate of 8% per annum in new stations can be expected. Any increase in licensed station population increases the inspection workload.

. New Service

In this area, the introduction of regulatory procedures and standards for new service, such as, CATV, MATV, computer periphery equipments and foreign attachments will generate an additional workload in the future.

. Spectrum Utilization

Present requirements for frequencies, particularly in the Private/Commercial sector of the VHF band are extremely difficult to meet. With the anticipated growth rate which far exceeds 8% in this particular sector, an increased demand for better utilization of UHF band will exist. Both of these problems are critical and present the need for a more effective enforcement program.

Conclusion

From the foregoing it is reasonably evident that the present regulatory/enforcement activity in the field is not sufficient to meet departmental objectives and that the future increase in the number of licensed stations and interference investigations will create a greater need for regulatory enforcement.

Proposal

In view of the conclusion, a concept for regulatory/enforcement management which it is believed will provide a more effective utilization of the Spectrum and a greater degree of regulatory control and enforcement, is proposed.

Furthermore, through the application of this concept it will be possible to establish realistic workload objectives and assess the efficiency of Regulatory management in the field.

PART III - A Proposal for Regulatory Enforcement Management in the Field

PART III(A) - Compulsory Licensed Stations

PART III(B) - Non-Compulsory Licensed Stations

PART III

A PROPOSAL FOR REGULATORY ENFORCEMENT MANAGEMENT IN THE FIELD

Requirement - DOC regulatory requirements for the operation of Licensed Stations and the prevention of Interference have been stated in Part I of this proposal. The degree of effectiveness of present programs and future trends were outlined in Part II.

Scope - This proposal deals only with the ENFORCEMENT activity of regulatory management, i.e. inspection of licensed stations and interference investigations.

Objective -

- To increase the effectiveness and efficiency of the ENFORCEMENT activity in the field.
- To introduce a method of OBJECTIVE setting and PERFORMANCE evaluation as applicable to regulatory enforcement management.

Regulatory - Enforcement Management

Regulatory Enforcement in the field is concerned with ensuring that Licensed Stations are operating in accordance with departmental requirements.

This is achieved through conducting field inspections and interference investigations.

Inspection and interference investigation procedures for all types of stations and categories of interference are laid down in the Radio Inspectors' Manuals (RIMs).

In conducting inspection a standard list of descrepancies is used to measure performance and establish any operating or technical infractions. (Refer page 10 .)

Similarly, interference investigations are analyzed and evaluated against a set of departmental standards.

Licensed Stations are identified by type of service of which there are twenty-four (refer Appendix "C".), and are further categorized as Compulsory and Non-Compulsory.

The total Licensed Stations population of Canada for 1973-74 is forecasted as 396,000.

PART III (A)

COMPULSORY LICENSED STATIONS

Background

For the purposes of this proposal the following groups of Licensed Stations as well as Interference Investigations have been considered, for the reasons given below, to have Inspection requirements similar to those laid down for the stations included within the Compulsory Licensed Station category. The total inspection requirement for these categories is as follows:

. Compulsory Stations	- 14,595
. New Stations	- 39,717
. Amendments	- 11,660
. Interference Investigations	- 26,049
Total Compulsory	92,021

Compulsory Licensed Stations

By legislation and international agreements, a certain percentage of the licensed stations must be inspected at agreed-to intervals. These inspections are referred to as COMPULSORY and include such stations as TV, AM, FM, CATV, Aeronautical Ground Aircraft and certain ship stations. Regulatory enforcement management is considered adequate when all stations have been inspected.

Interference Investigation

As interference complaints must be investigated as soon as they are received, this is a demand workload which, using historical data can be accurately determined. As it is a demand workload this activity can be considered similar to COMPULSORY inspections.

New stations

Probably the most productive area in which to exercise the required degree of regulatory enforcement is NEW licensees where, if proper control is exercised at the outset, it can be assured that these stations, initially, will be operated satisfactorily; therefore, they are included in the COMPULSORY category.

Additional benefits in the inspection of new stations are:

- As the location of a new station is known - inspection workload can be programmed.
- As licences are issued, inspections can be carried out on a predetermined schedule - efficient use of manpower.
- These inspections are "before the fact" and therefore this activity is a preventive measure - saves time in searching at a later date.
- A psychological benefit arises in the fact that as new licensees will know that they will be inspected they are less likely to operate a station that does not meet DOC standards.

PART III (B)

NON COMPULSORY LICENSED STATIONS

Background

Non Compulsory Licensed Stations comprise about 96% of the total licensed station population in the five regions of Canada, and will number in excess of 304,000 by the end of the 1973/74 fiscal year. This number is growing by approximately 8% per year.

To ensure ideal regulatory control, one could argue that an annual inspection of each of these stations is necessary. At an annual inspector workload of 623 inspections per man, to inspect these stations each year would require approximately 490 inspectors (400 additional to the present staff). At an approximate cost of $15,000 per additional inspector (salary $11,000; travelling expenses $1,200; clerical support $1,200; car + equipment $1,600) this inspection plan would require an additional $6,000,000 annually in inspector related costs. This plan, although ideal in principle, was rejected as it was felt that an adequate job of regulatory control could be done at a substantially lower cost using the method described below.

Definitions

An Unsatisfactory Station is one that is found to have one or more of the discrepancies listed below when inspected by D.O.C.

1) Off frequency
2) Overmodulation/Excessive FM deviation
3) Power in excess of authorization (including increase in ERP caused from transmission line or antenna changes)
4) Unauthorized installation
5) Unauthorized change of location
6) Spurious radiation
7) Inadequate type approval or model number identification plates
8) Unsafe installation of transmitting equipment, including antennae
9) Antenna structures not in accordance with authorization, e.g. height, markings
10) Station not equipped as required under the Radio Regulations

A Satisfactory Station is one that is found to have none of the discrepancies listed above when inspected by D.O.C.

Non Compulsory Stations are those in the following list:

Private Commercial Mobile
" " Fixed
Public Commercial Mobile
" " Fixed
Ships Non Compulsorily Fitted
General Radio Service
Amateur

NON COMPULSORY STATIONS continued...

Experimental
Restricted Common Carrier Mobile Radio Service
Paging

New Stations are those licensed within the year.

Amended Stations are those stations already licensed at the beginning of the year that are authorised to change their license specifications during that year.

General Description of Model

The method to be used views the problem of the occurrence of discrepancies in a station population as a dynamic problem. The dynamic process occurs as a fraction of the satisfactory stations drift into the unsatisfactory category each year, and, at the same time a fraction of the unsatisfactory stations have their discrepancies corrected and thus move into the satisfactory category. This process is displayed in Figure I.

The deterioration ratio is the fraction of the station population which will develop discrepancies during the year and thus move from the satisfactory to the unsatisfactory category.

The correction ratio is the fraction of the station population which will amend their operations during the year so that they will be "discrepancy-free" by year end, and thus will move from the unsatisfactory to the satisfactory category. The number of stations corrected is assumed equal to the number of unsatisfactory stations found during the D.O.C. inspection program. This assumption can be made since unsatisfactory stations found on inspection must correct their discrepancies (or lose their license).

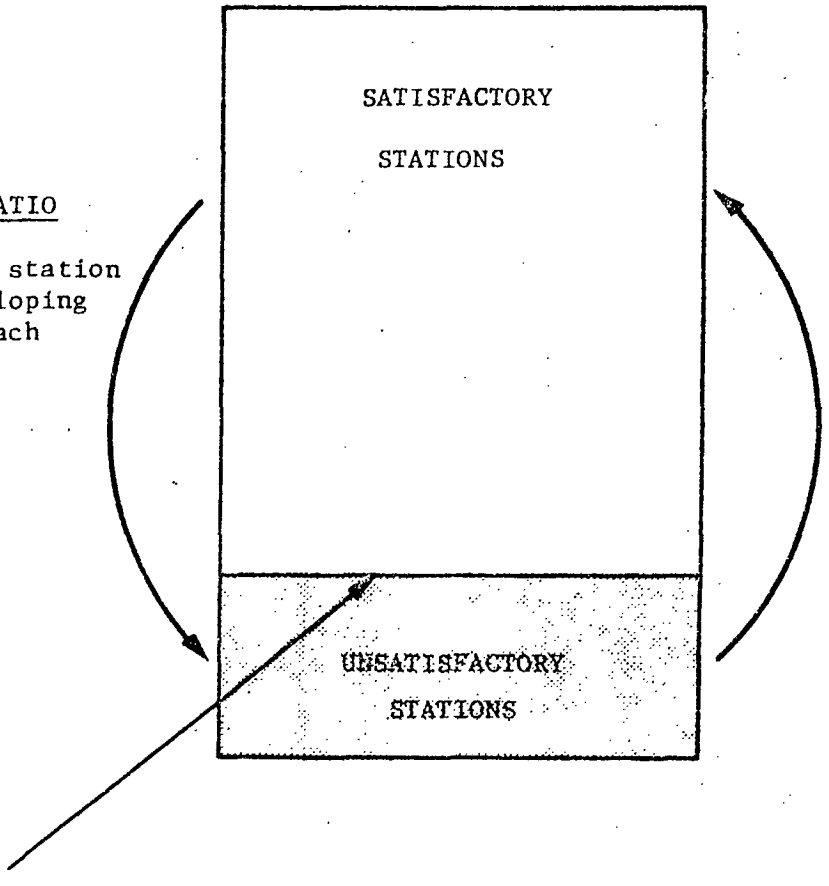
This assumption also implies, however, that correction of discrepancies will only occur if forced by D.O.C. Corrective action will never be initiated by the licensee. This is an assumption which appears valid from past experience; however, it should be verified at a later date.

Using this model of the real world system to look at the problem over time, a number of statements can be made if we neglect station population growth at this time.

If the correction ratio exceeds the deterioration ratio, then each year the fraction of unsatisfactory stations in the population is reduced. If the deterioration and correction ratios are equal, then the fraction of unsatisfactory stations in the population will remain constant over time and a state of dynamic equilibrium will exist, i.e., the number of stations drifting into the unsatisfactory category each year will be exactly balanced by those that are corrected and added to the satisfactory category.

If the deterioration ratio is greater than the correction ratio and this seems to be the case at present, then the fraction of unsatisfactory stations will grow each year.

Since the deterioration ratio is a constant over our five year time frame for any particular radio license category and is independent of any D.O.C. inspection program, we must accept it as a given input to our model. Any inspection program must be aimed at altering the correction ratio vis a vis the deterioration ratio to ensure that the fraction of unsatisfactory stations in the population does not increase beyond a predetermined level defined as full or adequate regulatory control.



DETERIORATION RATIO

- fraction of the station population developing discrepancies each year.

CORRECTION RATIO

- fraction of the station population whose discrepancies are corrected each year.

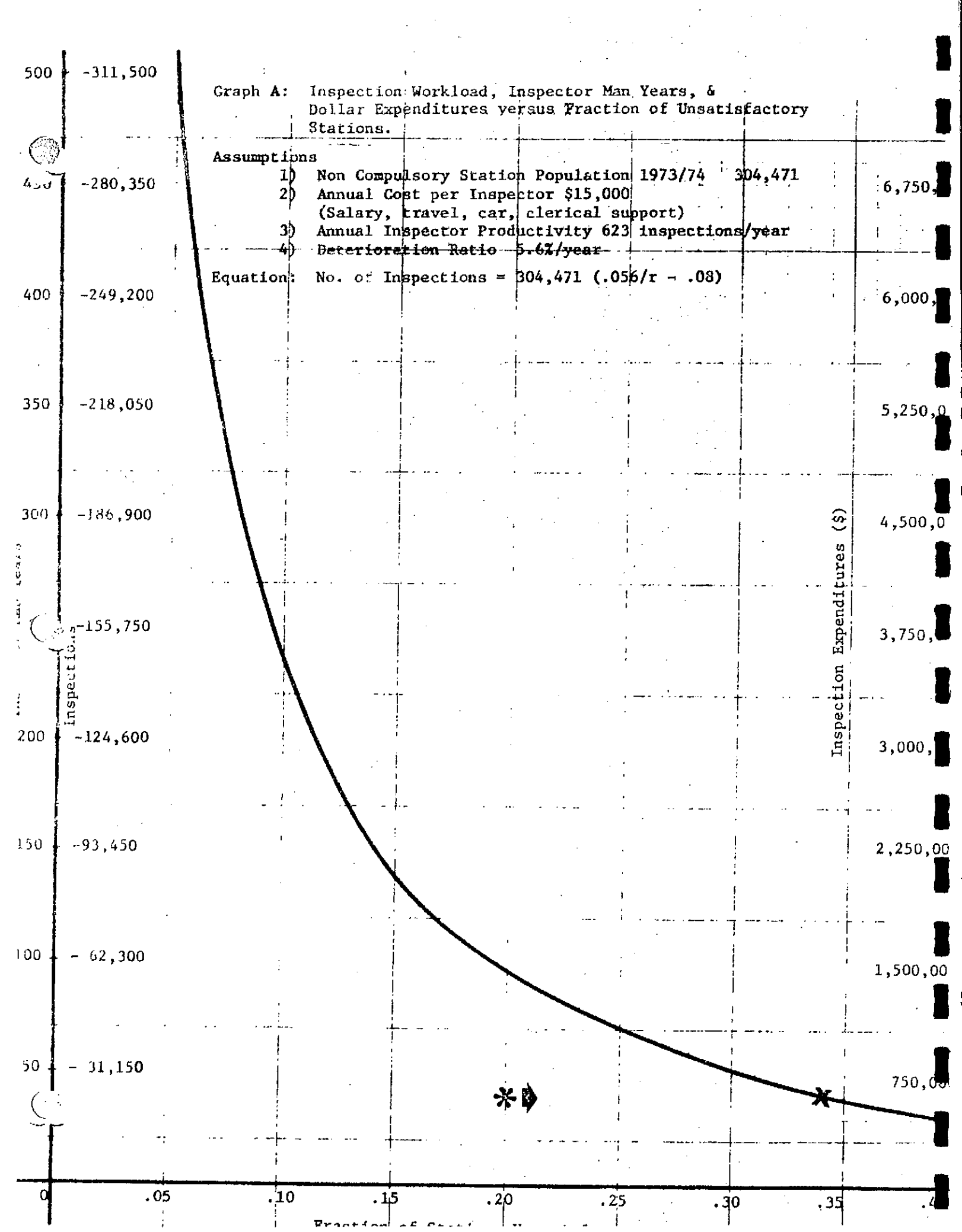
This line divides the total area representing the total station population into two sections - one for satisfactory stations and one for unsatisfactory stations.

FIGURE I: Dynamic Process of Station Deterioration and Correction

Given a particular value for the deterioration ratio we can plot Graph A dependent upon the model assumptions and derived using the formulae developed in the appendix "Derivation of Formulae". This graph is drawn for the inspection workload, dollar expenditures and inspector man-years requirements corresponding to the non-compulsory station population for all regions for the fiscal year 1973/74. The annual station growth is assumed to be 8%. The other parameters are marked on the graph and the equation used to find the number of inspection, etc. The development of the equation is given in the appendix "Derivation of Formulae".

Using the curve plotted, a number of conclusions can be drawn as to the results of any level of inspection activity.

At present (1971/72) we have approximately 90 inspectors on staff in all regions although probably less than 40 of these are working on non-compulsory inspections. At the same time the fraction of unsatisfactory stations for all regions is approximately 20%. This point as shown on the graph, * , is not on the curve and is thus unstable. If the same level of inspection activity continues (in terms of inspector man years, inspection workload, and dollars expended making the necessary allowance for station growth) we can expect our point * to move to the right until it intersects with the curve a number of years from now. At that level of inspection activity, approximately 34% of the non-compulsory station population in Canada will be unsatisfactory (marked X on the graph). For any expenditure approved for the 1973/74 fiscal year for inspection of non-compulsory stations using the graph we can determine what the expenditure will "buy" in terms of inspector man years and the number of inspections done. As well if this level of expenditure is continued (consistent with station growth) we can readily determine the trend in the unsatisfactory fraction and at what level this fraction will reach a constant value. At the present level of expenditure and hence inspection, the unsatisfactory fraction becomes constant at 34% after a number of years. This is considered an unacceptably high level. The next section discusses "Possible Courses of Action" in formulating an inspection program.


Graph A: Inspection Workload, Inspector Man Years, & Dollar Expenditures versus Fraction of Unsatisfactory Stations.
Assumptions
1) Non Compulsory Station Population 1973/74 304,471
2) Annual Cost per Inspector $15,000 (Salary, travel, car, clerical support)
3) Annual Inspector Productivity 623 inspections/year
4) ~~Deterioration Ratio 5.6%/year~~
Equation: No. of Inspections = 304,471 (.056/r - .08)
500 -311,500
450 -280,350
400 -249,200
350 -218,050
300 -186,900
-155,750
200 -124,600
150 -93,450
100 - 62,300
50 - 31,150
6,750,
6,000,
5,250,0
4,500,0
3,750,
3,000,
2,250,00
1,500,00
750,00
Inspection Expenditures ($)
0
.05
.10
.15
.20
.25
.30
.35

Possible Courses of Action (Levels of Service)

There are basically three different paths to formulating an inspection program - each one leading to a different trend in the fraction of unsatisfactory stations in the population. In each case the number of stations corrected varies directly with the number of inspections carried out. Each of these program choices and their implications are discussed below.

a) Status Quo

The status quo is defined to be that program which would result in the fraction of unsatisfactory stations in the total population being maintained at a constant value for a period of years. In the case of zero station population growth, this policy could be effected by setting the correction ratio equal to the deterioration ratio. Where there is population growth, the relationship is slightly more complicated and is given in the section "Derivation of Formulae, Sample Size (a)". An expression for the sample size or fraction of the station population which must be inspected to maintain the status quo is also given there.

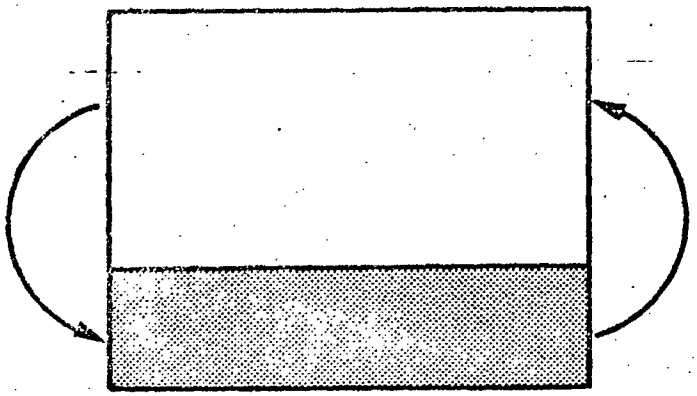
Once a fraction of unsatisfactory stations has been chosen for each license category and defined as adequate regulatory control and the actual fraction unsatisfactory has been brought through a "clean up" inspection program to this level, then the status quo inspection policy will determine the number of inspections necessary each year to maintain control at this level.

b) Decay in Unsatisfactory Fraction

This program would require somewhat more inspections be made than in the case of the status quo. In this way the correction ratio would exceed the deterioration ratio (assuming station growth zero). Table I gives a set of figures over a five year period for a particular license category whose population is assumed to remain constant for simplicity. Here 25% more inspections are made than in the status quo case. The fraction unsatisfactory is found by dividing the number of stations unsatisfactory in a particular year plus the number of stations which deteriorate in the year minus the number of stations corrected in the year by the next years station population. Here column (1) x column (2) plus column (1) x column (3) - column (7), all divided by column (1).

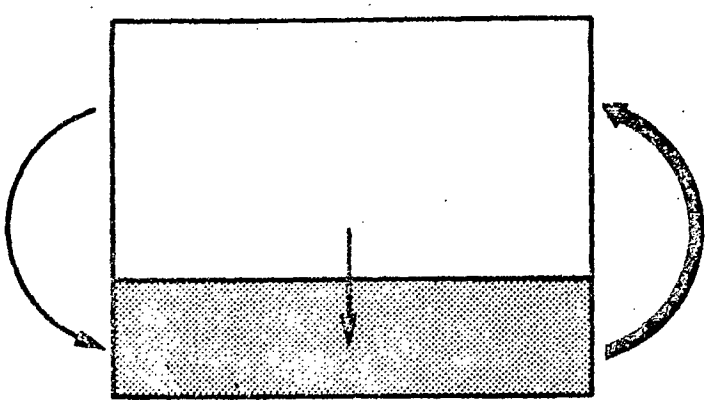
Particular note should be made of the diminishing returns which seem to be apparent in terms of the additional number of inspections required to reduce the unsatisfactory ratio by 1%. For example, it requires 1000 inspections more to reduce the fraction unsatisfactory from .20 to .19, but it requires 1,180 to reduce this fraction from .17 to .16. For the same example, it would require 8,000 inspections to hold the unsatisfactory fraction at .10 and 2000 more inspections to reduce this fraction to .09. These diminishing returns for inspections should most definitely be taken into account when a policy decision is made to choose the level of the unsatisfactory fraction defined to be adequate regulatory controls.

a) Status Quo



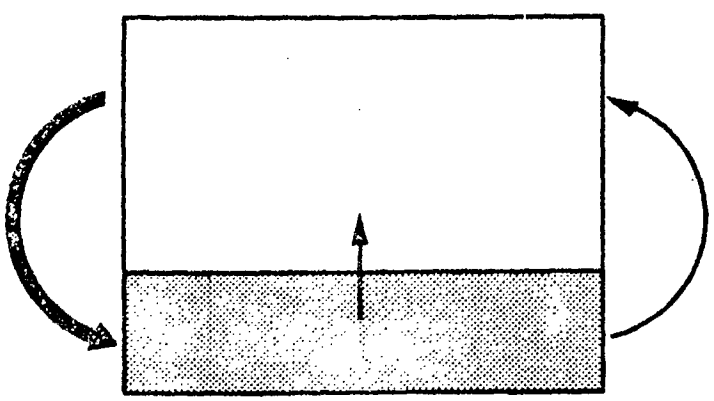
- correction ratio equals deterioration ratio

b) Decay in Unsatisfactory Fraction



- correction ratio greater than deterioration ratio

c) Growth in Unsatisfactory Fraction



- correction ratio less than deterioration ratio

TABLE I

Example Showing Decay in Unsatisfactory Fraction
(25% more Inspections are made than indicated if using the Status Quo Policy; Population Growth Zero for Simplicity)

		Year I	Year 2	Year 3	Year 4	Year 5
(1)	Total Population	20,000	20,000	20,000	20,000	20,000
(2)	Fraction Unsatisfactory	.20	.19	.18	.17	.16
(3)	Deterioration Ratio	.04	.04	.04	.04	.04
(4)	Status Quo Inspections	4,000	4,210	4,450	4,710	5,000
(5)	Plus 25%	1,000	1,050	1,110	1,180	1,250
(6)	Total Insp.	5,000	5,260	5,560	5,890	6,250
(7)	Unsats. Found	1,000	1,000	1,000	1,000	1,000
(8)	Correction Ratio	.05	.05	.05	.05	.05

Notes to TABLE I

1) for decrease in unsatisfactory fraction .20 to .19, 1000 additional inspections required.
.19 to .18, 1050 " "
.18 to .17, 1110 " "
.17 to .16, 1180 " "

2) Unsatisfactory Fraction in any particular year is equal to the fraction in the last year minus the correction ratio plus the deterioration ratio.

3) The number of inspections necessary to maintain the status quo is given below. The formulae is developed in the section "Derivation of Formulae".

$$n = \left(\frac{\text{deterioration ratio}}{\text{fraction unsatisfactory}}\right) \times \text{Station Population}$$

eg. for year 2:

$$n = \left(\frac{.04}{.19}\right)(20{,}000)$$

$$= 4{,}210 \text{ inspections}$$

c) Growth in the Unsatisfactory Fraction

This program would require somewhat less inspections be made than would be the case with the status quo situation.

The level of inspection has never been related to the deterioration ratio when formulating inspection policies and we are concerned that the present level of inspection (chosen independent of the deterioration ratio) gives us a correction ratio lower than the deterioration ratio, again neglecting station growth. Data supporting this statement is contained later under the heading "Determination of the Value for the Deterioration Ratio" in Table 4. There in column (4) it can be seen that the fraction of frequency related discrepancies has been growing since 1968/69.

At present in Ontario Region, we inspect approximately 6.3% of non-compulsory licensed stations which are forecast to number 95,290 stations in the 1973/74 fiscal year. The unsatisfactory fraction estimate is .255 (actual for 1972/73). From this data Table 2 was completed showing how the unsatisfactory fraction would rise over a five year period assuming station growth as forecast in Exhibit #1 given later, and a constant inspection of 6.3% of the population each year and an overall deterioration ratio of 5.6% (an approximate overall average for all license categories). The figure of 5.6% resulted from calculations done under the heading "Determination of the Value of the Deterioration Ratio."

As can be seen from the table, the number of unsatisfactory stations nearly doubles over the five year period (from 24,300 to 40,250) and there is nearly a 29% increase in the unsatisfactory fraction from .255 to .328. This table can be viewed as a forecast of conditions in Ontario Region over the next five years if the present level of inspection continues.

TABLE 2

Example of Growth in Unsatisfactory Fraction

(Data from Ontario Region: Forecast for next five years using existing inspection policy)

		1973/74	1974/75	1975/76	1976/77	1977/78
1)	Non Comp. Licensed Stations (from Exhibit #1)	95,290	101,558	108,043	114,987	122,421
2)	Deterioration Ratio	.056	.056	.056	.056	.056
3)	Inspections Made 6.3% of (1)	6,000	6,390	6,820	7,270	7,730
4)	Unsatisfactory Fraction ((7) + (8) - (5) / (1) for next year)	.255	.276	.295	.313	.828
5)	Unsatisfactories Found & Corrected on Inspection (3) x (4)	1,530	1,760	2,010	2,250	2,540
6)	Correction Ratio (5) / (1)	.0160	.0174	.0186	.0196	.0209
7)	Unsat. Station Population (1) x (4) or last year (7) + (8) - (5)	24,300	28,100	32,020	36,070	40,250
8)	Number Deteriorated (1) x (2)	5,330	5,680	6,060	6,430	6,880

Recommendations

The present inspection program if continued will, we believe, result in conditions detailed in Table 2 where the percentage of unsatisfactory stations increases over a five year period. Thus the present program falls into the category discussed in the section "Growth in Unsatisfactory Fraction" and represents an abdication of the regulatory responsibility of maintaining adequate standards of radio transmission for the benefit of all spectrum users within (and outside) the country.

The recommended course of action for dealing with the non-compulsory station population is to follow the Status Quo Program described before. This inspection program will act to maintain the fraction of unsatisfactory stations in each region of the country to the presently existing level.

There are a number of very valid reasons to recommend the Status Quo Program at this time as listed below.

1) There is a very pressing need to gather data for future management decision-making on this area of regulatory control; however, we do not wish to see this problem (in terms of the percent of unsatisfactory stations in the country) to grow any worse in extent meanwhile. By adopting the Status Quo Program we can at least ensure that the percent of unsatisfactory stations will remain constant and thus that the situation will not degenerate further. At the same time, this program will provide us with data for future decision-making.

2) At the present time we do not want to undertake any drastic clean-up campaigns or "blitz" inspection programs until we have fuller knowledge of the extent of this problem of unsatisfactory stations and can formulate efficient inspection programs to deal with it. We expect the Status Quo Program to provide this information.

3) It is advisable to test the accuracy of the outputs of the model used to determine the level of inspection. The aim here is to make it more sensitive and thus better able to relate the fraction of the station population which must be inspected to the stated goals of regulatory control. The Status Quo Program period would act as a trial period during which time the model could be refined and tested. After the model has proven itself, more major expenditures might be tied to the model outputs as time passes with increasing confidence in its capabilities.

4) While the fraction of the station population inspected is given in the Status Quo Program, an assumption there is that the stations inspected will be chosen randomly. This in turn will result in the fraction of unsatisfactory stations in the population remaining constant. If the district managers choose their samples somewhat selectively however (ie. inspect stations likely to be unsatisfactory) then they are likely to find (and correct) more unsatisfactory stations than would be the case in a random sample. Thus if we

choose the samples somewhat selectively, then the possibility exists of finding and correcting more unsatisfactory stations and reducing the unsatisfactory fraction even though we only do the number of inspections prescribed in the Status Quo Program. Adopting the Status Quo Program thus allows the possibility of reducing the fraction of unsatisfactory stations somewhat.

5) Adoption of the Status Quo Program will allow the Regions sufficient time to determine an optimal trade off point between inspection program costs and fraction of unsatisfactory stations. A relationship between the fraction of stations which must be inspected according to the Status Quo Program versus the fraction of unsatisfactory stations is shown in Graph 1. The equation of the curve, developed in the section "Derivation of Formulae" under the heading "maintaining the unsatisfactory fraction constant" is written below:

$$s = d/r - g$$

where s = fraction of station population inspected
d = deterioration ratio (.056)
r = fraction of stations unsatisfactory
g = annual growth rate (.08)

The curve plotted in Graph 1 is:

$$s = .056/r - .08$$

The positions of the five regions on the curve are also marked.

An examination of the curve shows that it requires a 20% level of inspection to maintain an unsatisfactory fraction of 20% while it requires a 30% level of inspection to maintain the fraction at 15% - 10% additional inspections to maintain a 5% lower fraction. To maintain an unsatisfactory fraction of 10% requires 47% of stations be inspected - 17% additional inspections to maintain a 5% still lower unsatisfactory fraction. Thus it requires a successively greater fraction of the stations be inspected each year to maintain a lower and lower fraction of unsatisfactory stations. At some point the cost for this increased inspection activity is not warranted by the benefits it provides.

Three areas are shown on the graph. The area to the left of the line representing 10% unsatisfactory stations, labelled "Uneconomic Regulatory Control" is the portion of the graph where at this time it is considered too costly for the benefits derived to try to maintain any level of the unsatisfactory fraction. The area to the right of the line representing 20% unsatisfactory stations, labelled "Inadequate Regulatory Control" is that portion of the curve where it is considered that our responsiblity as a regulatory body is not being upheld. The central area of the graph, labelled "Adequate Economic Regulatory Control" is that portion of the graph where the optimal tradeoff point between inspections and fraction of unsatisfactory stations will likely be found.

Adoption of the Status Quo Program will stop the regions from sliding further right (and into the Area of Inadequate Regulatory Control). If no change in inspection program is made, then the rest of the regions will follow Ontario's lead (as detailed in Table 2) further and further into the Area of Inadequate Regulatory Control in the years ahead. Meanwhile, the adoption of the Status Quo Program will allow time to determine an optimal trade off point (not a band as we now have) where regulatory control can be effected both adequately and economically.

Results of Adoption of Status Quo Program: Inspection Workload

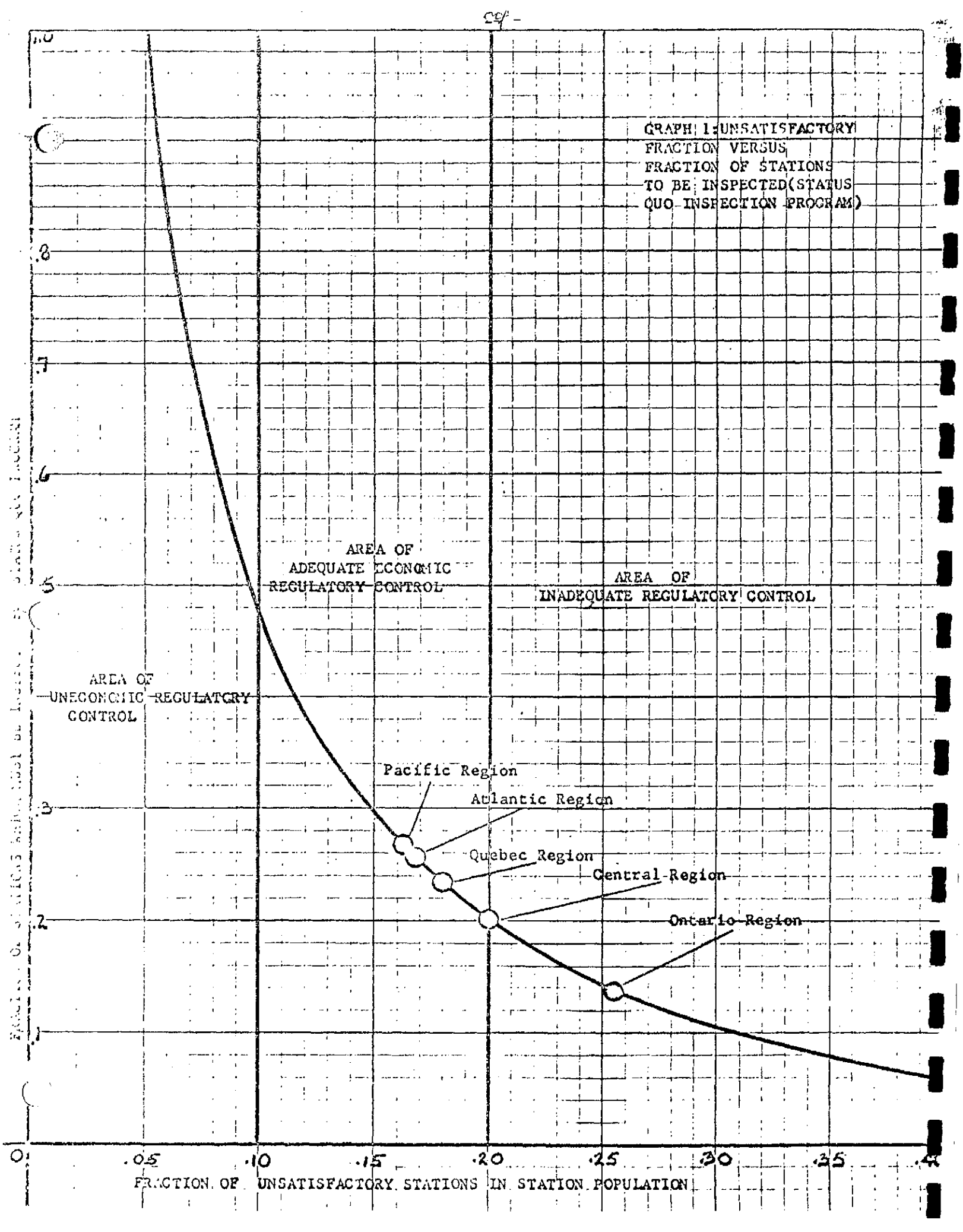
If the Status Quo Program is adopted, Table 6 gives the resulting forecast for the numbers of non-compulsory stations and the inspections required for the next 5 years by region. The figures of Table 6 were calculated using Graph 1 to find the fraction of the station population which must be inspected each year and multiplying this by the forecast station population to find the number of inspections which must be carried out.

Summary

This section of the report has dealt solely with non-compulsory stations. The problem of maintaining the level of station quality as measured by the fraction of unsatisfactory stations in the population has been discussed and a simple mathematical model was developed. Parameters for the model were obtained from existing data sources. Three plans of action were analysed to aid in dealing with the problem and the most effective at this point in time was recommended. The model was used to calculate the number of inspections required under Status Quo Program, the recommended course of action.

TABLE 6: Non-Compulsory Station Forecast: Inspections Necessary for Status Quo Program

Region	Year									
	1973/74		1974/75		1975/76		1976/77		1977/78	
	NonComp. Station Pop.	Status Quo Inspect.	NonComp. Station Pop.	Status Quo Inspect.	NonComp. Station Pop.	Status Quo Inspect.	NonComp. Station Pop.	Status Quo Inspect.	NonComp. Station Pop.	Status Quo Inspect.
Pacific	54,602	14,251	57,333	14,964	60,199	15,712	63,209	16,498	66,369	17,322
Central	73,256	14,651	76,919	15,383	80,765	16,153	84,803	16,960	89,043	17,808
Ontario	95,290	13,817	101,558	14,726	108,043	15,666	114,987	16,674	122,421	17,751
Quebec	50,980	11,725	53,529	12,312	56,205	12,927	59,015	13,573	61,966	14,252
Atlantic	30,343	7,616	31,860	7,997	33,453	8,397	35,126	8,817	36,882	9,257


GRAPH 1: UNSATISFACTORY FRACTION VERSUS FRACTION OF STATIONS TO BE INSPECTED (STATUS QUO INSPECTION PROGRAM)
AREA OF ADEQUATE ECONOMIC REGULATORY CONTROL
AREA OF INADEQUATE REGULATORY CONTROL
AREA OF UNECONOMIC REGULATORY CONTROL
Pacific Region
Atlantic Region
Quebec Region
Central Region
Ontario Region
1.0
.8
.7
.6
.5
.3
.2
.1
0
.05
.10
.15
.20
.25
.30
.35
.4
FRACTION OF UNSATISFACTORY STATIONS IN STATION POPULATION

Derivation of Formulae

In the following derivations we are going to consider a particular radio station license category, "j", (ie. GRS, etc.) over a five year period from year #2 to year #5.

If N_{ij} represents the station population in year i and license category j at the beginning of the year, then:

- at the beginning of the 1st year the station population is N_{1j}
- " " " " " 2nd " " " " " " $N_{2j} = N_{1j}(1+g_j)$
- " " " " " 3rd " " " " " " $N_{3j} = N_{1j}(1+g_j)^2$
- " " " " " 4th " " " " " " $N_{4j} = N_{1j}(1+g_j)^3$
- " " " " " 5th " " " " " " $N_{5j} = N_{1j}(1+g_j)^4$

- where g_j is the annual growth rate of the station population of license category "j".

At the beginning of year 1
the number of unsatisfactory stations is

$$r_{1j}\ N_{1j}$$

and the number of satisfactory stations is

$$(1 - r_{1j})\ N_{1j}$$

where r_{ij} is the fraction of unsatisfactory stations in year i and license category j (see list of Variables and definitions).

List of Variables

Nij population of stations at the end of year "i" in radio station license category j

dj deterioration ratio or fraction of the station population Nij that for various reasons develop discrepancies as listed above during year "i"
(This deterioration ratio is assumed to be constant over the five year forecast period of the model although there will be a different ratio for each of the radio licence categories.)

cij correction ratio or fraction of the station population Nij that corrects its practices over year "i" and thus moves from the unsatisfactory to the satisfactory category of licensees. (It is assumed that the only way an unsatisfactory station will amend its operations is when a D.O.C. inspection is made and discrepancies are found. Thus the number of stations "corrected" each year becomes equal to the number of stations found each year with discrepancies during the inspection program.)

gj annual growth rate as a fraction of the station population Nij

rij fraction of the station population Nij in year "i" and license category "j" that is unsatisfactory

sj fraction of the station population Nij in license category "j" in the sample for the inspection program

At the beginning of year 2
the number of unsatisfactory stations is

$$r_{2j} N_{2j} = r_{2j} N_{1j} (1+g_j)$$

$$r_{2j} N_{1j}(1+g_j) = (r_{1j} - c_{1j} +$$

then:

$$r_{2j} = (r_{1j} - c_{1j} + d_j)/(1+g_j)$$

or the fraction of unsatisfactory stations in year 2 is equal to the fraction unsatisfactory in year 1, r_{1j}, minus the fraction that deteriorated during year 1, dj, divided by the fractional growth in station population $(1 + g_j)$.

At the beginning of year 3
the number of unsatisfactory stations is

$$r_{3j} N_{3j} = r_{3j} N_{1j} (1+g_j)^2$$

$$r_{3j} N_{1j}(1+g_j)^2 = N_{2j}(r_{2j} - c_{2j} + d_j)$$

$$= N_{1j}((r_{1j} - c_{1j} + d_j)/(1+g_j) - c_{2j} + d_j)(1+g_j)$$

$$r_{3j} = ((r_{1j} - c_{1j} + d_j)/(1+g_j) - c_{2j} + d_j)/(1+g_j)$$

Similar but considerably more cumbersome expressions can be derived for r_{4j} & r_{5j}.

Sample Size

a) to maintain the fraction of unsatisfactory stations constant

If a sample is selected on a purely random basis, then out of a sample of size $s_j \; N_{ij}$

- we could expect to find (and correct)

$$s_j \; N_{ij} \; r_{ij}$$

during year i in license class j

During that same year $N_{ij} \; d_j$ stations would become unsatisfactory (since d_j is the fraction of stations which drift from the satisfactory to the unsatisfactory category during year i).

Therefore, the number of unsatisfactory stations at the beginning of the next year would be given by $N_{ij} \; r_{ij} + N_{ij} \; d_j - s_j \; N_{ij} \; r_{ij}$, or the number of unsatisfactory stations at the beginning of the last year, $N_{ij} \; r_{ij}$, plus the number of stations which drifted into the unsatisfactory category during the year, $N_{ij} \; d_j$, minus the number of stations which were inspected, found to be unsatisfactory and were subsequently corrected $s_j \; N_{ij} \; r_{ij}$.

The unsatisfactory fraction next year $r_{i+1,j}$ is given by:

$$r_{i+1,j} = \frac{N_{ij} r_{ij} + N_{ij} d_j - s_j N_{ij} r_{ij}}{N_{i+1,j}}$$

since

$$N_{i+1,j} = N_{ij}(1+g_j)$$

where g_j is the growth factor in station population.

then

$$r_{i+1,j} = \frac{r_{ij} + d_j - s_j r_{ij}}{(1+g_j)}$$

Since we want to maintain the fraction of unsatisfactory stations constant over time, then $r_{i+1,j} = r_{i,j}$

i.e. next year's fraction unsatisfactory equals last year's.

$$r_{ij} = \frac{r_{ij} + d_j - s_j r_{ij}}{1+g_j}$$

$$r_{ij}(1+g_j-1+s_j) = d_j$$

$$\text{or } s_j + g_j = d_j / r_{ij}$$

$$\text{or } s_j = d_j/r_{ij} - g_j$$

Here s_j is the fraction of radio license category j, which must be inspected each year to maintain the fraction unsatisfactory constant over time.

b) to maintain the number of unsatisfactory stations constant.

As given before in a) the number of unsatisfactory stations at the beginning of year $i+1$ can be expressed as below in terms of conditions of year i.

$$N_{ij} r_{ij} + N_{ij} d_j - s_j N_{ij} r_{ij}$$

unsatisfactory stations

The number of stations unsatisfactory is also given by:

$$r_{i+1,j} N_{i+1,j} = r_{i+1,j} N_{ij} (1+g_j)$$

To hold constant the number of stations unsatisfactory, we have:

$$r_{i+1,j}\, N_{ij}(1+g_j) = N_{ij} r_{ij} + N_{ij} d_j - s_j N_{ij} r_{ij}$$

$$r_{i+1,j}\,(1+g_j) = r_{ij} + d_j - s_j r_{ij}$$

$$r_{ij}(s_j - 1) = d_j - r_{i+1,j}(1+g_j)$$

$$s_j = 1 + \frac{d_j - r_{i+1,j}(1+g_j)}{r_{ij}}$$

Here s_j is the fraction of radio license classification j, which must be inspected each year to maintain the number of unsatisfactory stations constant over time.

Determination of the Value for the Deterioration Ratio

In determining values for the deterioration ratios for various licensing categories, a number of different sources were used for information. Although the values found are the best estimates which can be derived at present from the data avilable, they must be considered tentative only. Thus is should be expected that deterioration ratios developed later with more refined data may vary considerably from these initial figures.

The first method used involved the development of a lower bound on the value of the overall deterioration ratio for all radio license categories. To do this we assumed that with the present level of inspection, the fraction of unsatisfactory stations in each region has reached a steady value and thus we assume that the status quo now pertains. It should be stressed that this is not the case and that the fraction of unsatisfactory stations is in reality increasing; however, making the assumption of status quo allows us to calculate a lower bound for the value of the deterioration ratio. Table 3 gives the number of inspections done, total station population, fraction of station population inspected and fraction unsatisfactory for each of the regions for the year 1971/72.

As proved earlier, the number of inspections to maintain the status quo is given by:

$$s = \frac{d}{r}$$

where s is the fraction of stations inspected
where r is the fraction of unsatisfactory stations
where d is the deterioration ratio
(Assuming station growth zero)

As we have assumed that a status quo condition exists in each of the regions, and we have values for s and r for each region, then values for d can be calculated as shown in the next line of Table 3.

The average value for the lower bound of the deterioration ratio just calculated is .0138 or 1.38% and the 99% confidence interval is between 0.0 and .0278, ie., there is a 99% probability that the lower bound of d lies between 0 and 2.78%.

Why this value is a lower bound for d?

In a status quo situation, the sample proportion, s, is given by:

$$s = \frac{d}{r}$$

At present, insufficient inspections are being made to maintain the proportion of unsatisfactory stations constant. Thus we are inspecting a certain fraction of the station population, s^1, which is less than the sample fraction, s, necessary to maintain the fraction of unsatisfactory stations constant over time.

TABLE 3

Regional Data

	Pacific Region	Central Region	Ontario Region	Quebec Region	Atlantic Region	Total
Inspections Completed	4,050	5,167	8,348	4,563	1,340	23,468
Station Population	57,219	76,629	99,400	54,040	31,449	318,737
Fraction of Stations Inspected (s)	.0707	.0674	.0839	.0844	.0426	.0736
Fraction of Unsatisfactory Stations (r)	.164	.200	.255	.181	.169	.184
Lower Bound Value for d	.0116	.0135	.0214	.0153	.0072	.0138

Average value from above for d = .0138

Variance in value for d σ^2 = .0000217

Standard deviation for d σ = .00466

Confidence Interval 99% (3 standard deviations) (0.0, .0278)

.../10

Since $s^1 < s$ & $s = d/r$

& $s^1 = d^1/r$

Then $d^1 = s^1 r$

& $d = sr$

& $d^1 < d$

here d^1 is the lower bound for d the deterioration ratio

The next method used actually develops a value for the deterioration rate from data available in Ontario Region. The value developed is larger than the lower bound for d and so is consistent with the work above. Data was taken from a monitoring station over the last four years as shown in Table 4: "Frequency Measurement Data". The method of calculating the entries of Table 4 is shown in "Notes to Table 4". This data considers only those discrepancies which can be detected from a monitoring station and are thus frequency related. As can be seen from the work leading up to Table 5: "Calculation of Correction Factor to Determine d", the average ratio between total discrepancies and frequency related discrepancies is 1.72. Thus the value of the deterioration ratio found from the monitoring station data (frequency related) must be multiplied by this correction factor 1.72 to find the actual deterioration ratio. As shown in Table 4 the average deterioration ratio is .056 or 5.6% and the 99% confidence interval (three standard deviations) extends from .014 to .098.

Such a wide confidence interval shows again in a mathematical fashion that the value found above for the deterioration ratio should be considered only a best estimate at this time subject to change as more and better data becomes available.

The value used for the deterioration ratio for all classes of radio licenses across the country will thus be taken as 5.6% for calculations used in this proposal.

Notes on Table 4: Frequency Measurement Data

a) Columns (1) and (2) are the raw data obtained directly from the monthly monitoring reports for the years shown.

b) Column (3) is an estimate of the total number of licensed stations within monitoring range for each of the years shown.

c) Column (4) is the fraction of frequency related discrepancies found by dividing column (1) by column (2). Here column (2) is taken as a random sample of the licensed stations within monitoring range and column (1) as the resulting number of discrepancies discovered. The column (4) figure is taken as the fraction of the total licensed stations having frequency related discrepancies.

d) Column (5) is the fraction of frequency related corrections found by dividing column (1) by column (3). Here it is assumed that all infringements found during monitoring are corrected during that year.

e) Column (6) gives the number of unsatisfactory stations in the monitored population found by multiplying column (4) times column (3).

f) Column (7) gives the increase in the number of stations unsatisfactory over the year plus the number corrected, (eg. column (6) 1971/72 - column (6) 1970/71 + column (1)). This is the number of stations which has fallen into the unsatisfactory category during the year (ie. the number that have deteriorated).

g) Column (8) gives the frequency related deterioration ratio found by dividing column (7) by column (3)

h) Column (9) gives the "full" or "corrected" ratio.

The average (corrected) deterioration ratio is .056 or 5.6% and the 99% confidence interval extends from .014 to .098.

.../10b

TABLE 4

FREQUENCY MEASUREMENT DATA

Years	(1) Total Infringement Reported	(2) Total Domestic Frequency Measurements	(3) Monitored Station Population	(4) Fraction of Frequency Related Discrepancies	(5) Fraction of Frequency Related Corrections	(6) Number of Unsatisfactory Stations in Monitored Pop.	(7) Increase in Unsatisfactory Pop. plus Corrected	(8) Freq. Related Deterioration Ratio	(9) Deterioratic Ratio (Corrected)
71/72	367	3408	40600	.108	.009	4395			
70/71	410	4963	37944	.082	.011	3060	1745	.046	.078
69/70	451	6252	35462	.072	.013	2510	1001	.0285	.049
68/69	424	6516	33142	.065	.013	2160	774	.0233	.040

Average d = .056
Standard Deviation = .014
99% Confidence Interval (.014, .098)
(3 standard deviations)

Correction Factor for Deterioration Ratio

The value for the frequency related deterioration ratio is only a portion of the total deterioration ratio previously defined. That deterioration ratio covers deterioration from any of the ten discrepancy types, not just those that are frequency related. The "frequency related deterioration ratio" can be related to the full deterioration ratio by comparing the number of frequency related discrepancies to the total number of discrepancies. Below is a list of the ten discrepancies with the frequency related one circled.

(A.) Off-frequency operation.

(B.) Excessive FM deviation and spurious radiation

C. Power 5% in excess of authorization (including increase in E.R.P. caused from transmission line or antenna changes).

(D.) Unauthorized installation

E. Change of equipment or location without authorization.

(F.) Incorrect operating procedure - identification, superfluous signals, unauthorized use, etc.

G. Inadequate type-approval or model number identification plates.

H. Unsafe installation of transmitting equipment, including antenna structures and antennae.

I. Antenna structures not in accordance with authorization - e.g. height, markings, etc.

J. Station not equipped as required under the Radio Regulations e.g. spare antenna, documents, overmodulation indicator, freq. meter, etc.

The discrepancies circled are those that can be determined from frequency measurements from a monitoring office.

Table 5 below gives the discrepancies by type (A to J) for the Kitchener District Office from June/70 to June/72 and for the Hamilton District Office from July/71 to June/72.

Table 5: Calculation of Correction Factor to Determine d

Discrepancy Types		Hamilton	Kitchener	
* A		67	120	
* B		11	3	
C		2	31	
* D		154	199	
E		46	44	
* F		10	50	
G		47	127	
H		10	2	
I		9	23	
J		72	31	
TOTAL	(1)	428	630	1058
Freq. Related Total	(2)	242	372	614
Correction Factor for d:	(1)/(2)	1.77	1.70	1.72

Average Correction Factor 1.72

DEPARTMENT OF COMMUNICATIONS

PERIOD

Appendix "C"

SUMMARY OF INSPECTIONS, EXAMINATIONS AND INTERFERENCE WORK

FILLED OUT BY ... AT ... ☐ FIELD ☐ REGION

		FIELD USE		H.Q. USE	
		1 NO. OF DAYS	2 NO. OF ITEMS	3 WORKLOAD FACTORS	4 WORKLOAD UNITS
INSPECTIONS					
SHIP STATIONS	(a) Compulsorily fitted radiotelegraph				
	(a) Compulsorily fitted radiotelephone				
	(c) Non-compulsorily fitted				
	(d) Lifeboat (for steamships inspections)				
	(e) Certificates issued as result of (a)				
	(f) Certificates issued as result of (b)				
COAST STATIONS					
AIRCRAFT	(a) Single				
	(b) Multiple				
AERONAUTICAL GROUND STATIONS					
BROADCASTING STATIONS	(a) Broadcasting (sound)				
	(b) Broadcasting (television)				
	(c) Repeater (sound)				
	(d) Low power television re-broadcasting				
	(e) Commercial broadcasting receiving (CATV)				
	(f) Commercial broadcasting receiving (other than CATV)				
LAND STATIONS	(a) Public Commercial (fixed)				
	(b) Public Commercial (mobile)				
	(c) Private Commercial (fixed)				
	(d) Private Commercial (mobile)				
	(e) Government(s) (fixed)				
	(f) Government(s) (mobile)				
	(g) Remote control				
	(h) Experimental				
	(i) Amateur experimental				
	(j) General Radio				
	TOTAL				
EXAMINATIONS					
(a) First, second and special classes					
(b) Radiotelephone – General					
(c) Radiotelephone – Restricted					
(d) Amateur					
(e) Advanced Amateur					
	TOTAL				
INTERFERENCE					
(a) Complaints received					
(b) Complaints completely investigated					
(c) Complaints pending investigation					
(d) Special investigations					
	TOTAL				
WORKLOAD					
(a) Mileage: Car ... No. Cars ... Boat ... Aircraft					
(b) Total number of inspectors					
(c) Effective number of field inspectors					
(d) Total workload units (col. 4)					
(e) Average workload					
	TOTAL				

REMARKS

PART IV

WORKLOAD - MANYEARS - FINANCIAL REQUIREMENTS

PART IV

WORKLOAD - MANYEARS - FINANCIAL REQUIREMENTS

Based on the concept put forth in Part III of this proposal for Regulatory Enforcement Management in the Field, the following exhibits indicate Workload-Manyears-Financial Requirements for the period 1973-78.

ALL REGIONS

A - Total Number of Licensed Stations	1973/74 Station Pop.	1974/75 Station Pop.	1975/76 Station Pop.	1976/77 Station Pop.	1977/78 Station Pop.
(1) Licenses at Beginning of Year	319,066	343,966	376,090	399,117	429,566
(2) New Licenses Issued	39,717	42,498	45,473	48,602	152,062
(3) Licenses Cancelled	(14,817)	(15,855)	(16,965)	(18,153)	(19,424)
(4) Licenses at Year End	343,966	376,090	399,117	429,566	461,169

B - In Field Workload	1973/74 Station Pop.	1973/74 Calls	1974/75 Station Pop.	1974/75 Calls	1975/76 Station Pop.	1975/76 Calls	1976/77 Station Pop.	1976/77 Calls	1977/78 Station Pop.	1977/78 Calls
(5) Compulsory Licensed Stations (5% annual growth to base)	14,595	14,595	15,325	15,325	16,091	16,091	16,896	16,896	17,771	17,771
(6) Non Compulsory Licenses Stations Status Quo Fraction Inspected	304,471	62,040	321,198	65,382	338,665	68,855	310,409	72,522	377,068	76,390
(7) New Licenses (annual growth 7% of base)	39,717	39,717	42,498	42,498	45,473	45,473	48,655	48,655	52,160	52,160
(8) Attended Licenses (annual growth 7% of base)	11,660	11,660	12,476	12,476	13,349	13,349	14,281	14,281	15,282	15,282
(9) Interference Calls (constant 5 years)	26,049	26,049	26,049	26,049	26,049	26,049	26,049	26,049	26,049	26,049
(10) Total Calls (Max/Target)	396,492	154,036	444,596	161,730	439,627	169,817	463,022	178,354	488,212	187,521

Exhibit # 2 - Man Year Requirements	1973/74	1974/75	1975/76	1976/77	1977/78
(1) No Calls Per Inspector					
(2) 15% Increase in Prod.					
(3) No Inspectors Required	249	260	273	287	301
(4) No Inspectors Available	92	249	260	273	287
(5) Inspector Man Years Required	157	11	14	14	14
(6) Admin. 1:5 Support	31.4	2.2	2.8	2.8	2.8
(7) Total MY's Required	188.4	13.2	16.8	16.8	16.8

ATLANTIC REGION

Exhibit # 1 - Workload	1973/74		1974/75		1975/76		1976/77		1977/78	
A - Total Number of Licensed Stations	Station Pop.		Station Pop.		Station Pop.		Station Pop.		Station Pop.	
(1) Licenses at Beginning of Year	31,449		33,549		35,796		38,201		40,775	
(2) New Licenses Issued	3,600		3,852		4,122		4,411		4,720	
(3) Licenses Cancelled	(1,500)		(1,605)		(1,717)		(1,837)		(1,966)	
(4) Licenses at Year End	33,549		35,796		38,201		40,775		43,529	
B - In Field Workload	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls
(5) Compulsory Licensed Stations (5% annual growth to base)	1,106	1,106	1,161	1,161	1,219	1,219	1,280	1,280	1,344	1,344
(6) Non Compulsory Licenses Stations Status Quo Fraction Inspected	30,343	7,616	31,860	7,997	33,453	8,397	35,126	8,817	36,882	9,257
(7) New Licenses (annual growth 7% of base)	3,600	3,600	3,852	3,852	4,122	4,122	4,410	4,410	4,719	4,719
(8) Amended Licenses (annual growth 7% of base)	900	900	963	963	1,030	1,030	1,102	1,102	1,179	1,179
(9) Interference Calls (constant 5 years)	2,926	2,926	2,926	2,926	2,926	2,926	2,926	2,926	2,926	2,926
(10) Total Calls (Max/Target)	38,875	16,148	40,762	16,899	42,750	17,694	44,844	18,485	47,050	19,425

Exhibit # 2 - Man Year Requirements	1973/74	1974/75	1975/76	1976/77	1977/78
(1) No Calls Per Inspector	364	364	364	364	364
(2) 15% Increase in Prod.	419	419	419	419	419
(3) No Inspectors Required	39	40	42	44	46
(4) No Inspectors Available	11	39	40	42	44
(5) Inspector Man Years Required	28	1	2	2	2
(6) Admin. 1:5 Support	5.6	0.2	0.4	0.4	0.4
(7) Total MY's Required	33.6	1.2	2.4	2.4	2.4

IV - 2

Exhibit #3

Atlantic Region

Inspector/Trainee Effectiveness	1973/74	1974/75	1975/76	1976/77	1977/78
(1) Experienced Insp. = 100%	4609	4609	4609	4609	4609
(2) Trainee 1st yr. - 5%	587	21	42	84	42
(3) Trainee 2nd yr. - 40%	-	4693	168	335	670
(4) Trainee 3rd yr. - 80%	-	-	9386	335	670
(5) Trainee 4th yr. - 100%	-	-	-	11732	419
(6) Trainee 5th yr. - 100%	-	-	-	-	11732
(7) Total Calls Available	5196	9323	14205	17095	18142
(8) Total Calls Required	16148	16899	17694	18485	19425
(9) % Effective	.32	.55	.80	.92	.93

IV-3

PACIFIC REGION

Exhibit # 1 - Workload	1973/74 Station Pop.		1974/75 Station Pop.		1975/76 Station Pop.		1976/77 Station Pop.		1977/78 Station Pop.	
A - Total Number of Licensed Stations										
(1) Licenses at Beginning of Year	57,219		60,349		63,698		67,281		71,114	
(2) New Licenses Issued	5,370		5,746		6,148		6,578		7,039	
(3) Licenses Cancelled	(2,240)		(2,397)		(2,565)		(2,745)		(2,937)	
(4) Licenses at Year End	60,349		63,698		67,281		71,114		75,216	
B - In Field Workload	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls
(5) Compulsory Licensed Stations (5% annual growth to base)	2,617	2,617	2,748	2,748	2,885	2,885	3,029	3,029	3,180	3,180
(6) Non Compulsory Licenses Stations Status Quo Fraction Inspected	54,602	14,251	57,332	14,964	60,199	15,712	63,209	16,498	66,369	17,322
(7) New Licenses (annual growth 7% of base)	5,370	5,370	5,746	5,746	6,148	6,148	6,578	6,578	7,038	7,038
(8) Amended Licenses (annual growth 7% of base)	1,340	1,340	1,434	1,434	1,534	1,534	1,641	1,641	1,756	1,756
(9) Interference Calls (constant 5 years)	2,230	2,230	2,230	2,230	2,230	2,230	2,230	2,230	2,230	2,230
(10) Total Calls (Max/Target)	66,159	25,808	69,490	27,122	72,996	28,509	76,687	29,976	80,573	31,526

Exhibit # 2 - Man Year Requirements	1973/74	1974/75	1975/76	1976/77	1977/78
(1) No Calls Per Inspector	598	598	598	598	598
(2) 15% Increase in Prod.	688	688	688	688	688
(3) No Inspectors Required	38	39	41	44	46
(4) No Inspectors Available	11	38	39	41	44
(5) Inspector Man Years Required	27	1	2	3	2
(6) Admin. 1:5 Support	5.4	0.2	0.4	0.6	0.4
(7) Total MY's Required	32.4	1.2	2.4	3.6	2.4

Exhibit #3

Pacific Region

Inspector/Trainee Effectiveness	1973/74	1974/75	1975/76	1976/77	1977/78
(1) Experienced Insp. = 100%	7568	7568	7568	7568	7568
(2) Trainee 1st yr. - 5%	929	34	69	103	69
(3) Trainee 2nd yr. - 40%	-	7430	275	550	826
(4) Trainee 3rd yr. - 80%	-	-	14861	550	1101
(5) Trainee 4th yr. - 100%	-	-	-	18576	688
(6) Trainee 5th yr. - 100%	-	-	-	-	18576
(7) Total Calls Available	8497	15032	22773	27347	28828
(8) Total Calls Required	25808	27122	28509	29976	31526
(9) % Effective	.33	.55	.80	.91	.91

CENTRAL REGION

Exhibit # 1 - Workload	1973/74		1974/75		1975/76		1976/77		1977/78	
A - Total Number of Licensed Stations	Station Pop.		Station Pop.		Station Pop.		Station Pop.		Station Pop.	
(1) Licenses at Beginning of Year	76,629		84,431		92,779		101,711		111,269	
(2) New Licenses Issued	10,402		11,130		11,909		12,743		13,635	
(3) Licenses Cancelled	(2,600)		(2,782)		(2,977)		(3,185)		(3,408)	
(4) Licenses at Year End	84,431		92,779		101,711		111,269		122,407	
B - In Field Workload	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls
(5) Compulsory Licensed Stations (5% annual growth to base)	3,373	3,373	3,542	3,542	3,719	3,719	3,905	3,905	4,100	4,100
(6) Non Compulsory Licenses Stations Status Quo Fraction Inspected	73,256	14,631	76,919	15,383	80,765	16,153	84,803	16,960	89,043	17,808
(7) New Licenses (annual growth 7% of base)	10,402	10,402	11,130	11,130	11,909	11,909	12,743	12,743	13,635	13,635
(8) Amended Licenses (annual growth 7% of base)	4,334	4,334	4,637	4,637	4,962	4,962	5,309	5,309	5,681	5,681
(9) Interference Calls (constant 5 years)	6,923	6,923	6,923	6,923	6,923	6,923	6,923	6,923	6,923	6,923
(10) Total Calls (Max/Target)	98,288	39,683	103,151	41,615	108,278	43,666	113,683	45,840	119,382	48,147

Exhibit # 2 - Man Year Requirements	1973/74	1974/75	1975/76	1976/77	1977/78
(1) No Calls Per Inspector	604	604	604	604	604
(2) 15% Increase in Prod.	695	695	695	695	695
(3) No Inspectors Required	57	60	63	66	69
(4) No Inspectors Available	20	57	60	63	66
(5) Inspector Man Years Required	37	3	3	3	3
(6) Admin. 1:5 Support	7.4	0.6	.6	0.6	0.6
(7) Total MY's Required	44.4	3.6	3.6	3.6	3.6

Exhibit #3

Central Region

Inspector/Trainee Effectiveness	1973/74	1974/75	1975/76	1976/77	1977/78
(1) Experienced Insp. = 100%	13900	13900	13900	13900	13900
(2) Trainee 1st yr. - 5%	1286	70	139	104	104
(3) Trainee 2nd yr. - 40%	-	10286	556	1112	834
(4) Trainee 3rd yr. - 80%	-	-	20572	1112	2224
(5) Trainee 4th yr. - 100%	-	-	-	25715	1390
(6) Trainee 5th yr. - 100%	-	-	-	-	25715
(7) Total Calls Available	15186	24256	35167	41943	44167
(8) Total Calls Required	39683	41615	43666	45840	48147
(9) % Effective	.38	.58	.81	.91	.92

ONTARIO REGION

Exhibit # 1 - Workload A - Total Number of Licensed Stations	1973/74 Station Pop.	1974/75 Station Pop.	1975/76 Station Pop.	1976/77 Station Pop.	1977/78 Station Pop.
(1) Licenses at Beginning of Year	99,729	105,997	112,704	119,881	127,560
(2) New Licenses Issued	10,745	11,498	12,303	13,164	14,085
(3) Licenses Cancelled	(4,477)	(4,791)	(5,126)	(5,485)	(5,869)
(4) Licenses at Year End	105,997	112,704	119,881	127,560	135,776

B - In Field Workload	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls	Station Pop.	Calls
(5) Compulsory Licensed Stations (5% annual growth to base)	4,439	4,439	4,661	4,661	4,894	4,894	5,139	5,139	5,396	5,396
(6) Non Compulsory Licenses Stations Status Quo Fraction Inspected	95,290	13,817	101,558	14,726	108,043	15,666	114,987	16,674	122,421	17,751
(7) New Licenses (annual growth 7% of base)	10,745	10,745	11,498	11,498	12,303	12,303	13,164	13,164	14,085	14,085
(8) Amended Licenses (annual growth 7% of base)	2,686	2,686	2,874	2,874	3,075	3,075	3,290	3,290	3,520	3,520
(9) Interference Calls (constant 5 years)	11,256	11,256	11,256	11,256	11,256	11,256	11,256	11,256	11,256	11,256
(10) Total Calls (Max/Target)	124,416	42,943	131,897	45,015	139,574	47,194	147,836	49,523	156,678	52,008

Exhibit # 2 - Man Year Requirements	1973/74	1974/75	1975/76	1976/77	1977/78
(1) No Calls Per Inspector	603	603	603	603	603
(2) 15% Increase in Prod.	693	693	693	693	693
(3) No Inspectors Required	62	65	68	71	75
(4) No Inspectors Available	35	62	65	68	71
(5) Inspector Man Years Required	27	3	3	3	4
(6) Admin. 1:5 Support	5.4	0.6	0.6	0.6	0.8
(7) Total MY's Required	32.4	3.6	3.6	3.6	4.8

Exhibit #3

Ontario Region

Inspector/Trainee Effectiveness	1973/74	1974/75	1975/76	1976/77	1977/78
(1) Experienced Insp. = 100%	24255	24255	24255	24255	24255
(2) Trainee 1st yr. - 5%	936	104	104	104	139
(3) Trainee 2nd yr. - 40%	-	7484	832	832	832
(4) Trainee 3rd yr. - 80%	-	-	14969	1663	1663
(5) Trainee 4th yr. - 100%	-	-	-	18711	2079
(6) Trainee 5th yr. - 100%	-	-	-	-	18711
(7) Total Calls Available	26191	31843	40160	45565	47679
(8) Total Calls Required	42943	45015	47194	49523	52008
(9) % Effective	.61	.71	.85	.92	.92

TT-9

QUEBEC REGION

Exhibit # 1 - Workload

A - Total Number of Licensed Stations	1973/74 Station Pop.	1974/75 Station Pop.	1975/76 Station Pop.	1976/77 Station Pop.	1977/78 Station Pop.
(1) Licenses at Beginning of Year	54,040	59,640	65,632	72,043	78,902
(2) New Licenses Issued	9,600	10,272	10,991	11,760	12,583
(3) Licenses Cancelled	(4,000)	(4,280)	(4,580)	(4,901)	(5,244)
(4) Licenses at Year End	59,640	65,632	72,043	78,902	86,241

B - In Field Workload	1973/74 Station Pop.	1973/74 Calls	1974/75 Station Pop.	1974/75 Calls	1975/76 Station Pop.	1975/76 Calls	1976/77 Station Pop.	1976/77 Calls	1977/78 Station Pop.	1977/78 Calls
(5) Compulsory Licensed Stations (5% annual growth to base)	3,060	3,060	3,213	3,213	3,374	3,374	3,543	3,543	3,720	3,720
(6) Non Compulsory Licenses Stations Status Quo Fraction Inspected	50,980	11,725	53,529	12,312	56,205	12,927	59,015	13,573	61,966	14,252
(7) New Licenses (annual growth 7% of base)	9,600	9,600	10,272	10,272	10,991	10,991	11,760	11,760	12,583	12,583
(8) Amended Licenses (annual growth 7% of base)	2,400	2,400	2,568	2,568	2,748	2,748	2,940	2,940	3,146	3,146
(9) Interference Calls (constant 5 years)	2,714	2,714	2,714	2,714	2,714	2,714	2,714	2,714	2,714	2,714
(10) Total Calls (Max/Target)	68,754	29,499	72,296	31,079	76,032	32,754	79,977	34,530	84,129	36,415

Exhibit # 2 - Man Year Requirements	1973/74	1974/75	1975/76	1976/77	1977/78
(1) No Calls Per Inspector	483	483	483	483	483
(2) 15% Increase in Prod.	558	558	558	558	558
(3) No Inspectors Required	53	56	59	62	65
(4) No Inspectors Available	15	53	56	59	62
(5) Inspector Man Years Required	38	3	3	3	3
(6) Admin. 1:5 Support	7.6	0.6	0.6	0.6	0.6
(7) Total MY's Required	45.6	3.6	3.6	3.6	3.6

Exhibit #3

Quebec Region

Inspector/Trainee Effectiveness	1973/74	1974/75	1975/76	1976/77	1977/78
(1) Experienced Insp. = 100%	8370	8370	8370	8370	8370
(2) Trainee 1st yr. - 5%	1060	84	84	84	84
(3) Trainee 2nd yr. - 40%	-	8482	670	335	335
(4) Trainee 3rd yr. - 80%	-	-	16963	1339	672
(5) Trainee 4th yr. - 100%	-	-	-	21204	1674
(6) Trainee 5th yr. - 100%	-	-	-	-	21204
(7) Total Calls Available	9430	16936	26087	31332	32339
(8) Total Calls Required	29499	31079	32754	34530	36415
(9) % Effective	.32	.54	.80	.90	.90

IX-11

Notes to Exhibit # 1

(1) Licenses at the beginning of the year are the number of licenses outstanding from the previous year end. A base figure is used for each region forecast for April 1st, 1973.

(2) New licenses issued are projected at an annual increase of 7% over the previous year. The base figures were forecast for each region for the 1973/74 fiscal year. The 7% rate was determined from six years history (1966-1972).

(3) Licenses cancelled are projected at an annual increase of 7% as above. A base for cancellations was set for each region for the 1973/74 fiscal year.

(4) Licenses at the end of the year are the sum of (1) plus (2) minus (3).

(5) Compulsory licensed stations are projected at an annual increase of 5% over the previous year. This is mainly because of the increase in aircraft. Base figures for compulsory licensed stations were forecast by each region for 1973/74.

(6) Non-compulsory licensed stations are determined by (1) minus (5).

(7) New licenses are the same as (2).

(8) Amended licenses are projected at an annual increase of 7% as above.

(9) Interference calls remain constant at the regional values forecast.

(10) The total is (5) + (6) + (7) + (8) + (9).

Maximum is the total number of licensed stations (old, new and amended) plus the total number of interference calls. It is not a performance target.

Target is the workload necessary to effectively manage the spectrum.

Inspections of compulsory, new and amended stations and interference investigations are 100% workload.

Inspections of non-compulsory stations are determined according to the status quo policy formula given below:

The fraction of stations which must be inspected to maintain the status quo is:

$$s = d/r - g$$

where s is the fraction inspected
d is the deterioration ratio
g is the annual station population growth
r is the fraction unsatisfactory

In all regions the annual station population growth as been taken at 8% (hence g = .08), and similarly the deterioration ratio for all regions is 5.6%.

eg. for Pacific Region

$$s = \frac{.056}{.164} - .08$$

$$= .262$$

d = .056
g = .08
r = .164

Thus in **Pacific** Region, to maintain the fraction of unsatisfactory stations constant under the assumption of the study, 26.2% of the non-compulsory station population must be inspected each year.

Notes to Exhibit # 2

(1) Number of calls per inspector is the annual inspector productivity as measured by the number of inspections which an average inspector can complete in one year. The figure is the actual for 1971/72.

(2) 15% Increase in Productivity adds 15% on to the inspector productivity figure given in (1). This increase in productivity will only take place if the acquisition of the additional capital equipment listed in the financial section is approved. As purchase of this equipment is economically sound in terms of reduced total costs it is assumed that approval will be forthcoming and the figures reflect this.

(3) Number of Inspectors Required is given by dividing the Total Calls ((10) of Exhibit # 1) by the inspector productivity (2) of Exhibit #2.

(4) Number of Inspectors Available is the number of inspectors on staff at the start of any year. After 1973/74 it is assumed that we are allowed to hire any additional inspectors required. Thus inspectors required in any year become inspectors available in the year following.

(5) Inspector Man Years Required is the additional number of inspectors required each year for the forecast workload and is found by subtracting (4) from (3).

(6) Administration Support is forecast on the basis of one clerk to 5 inspectors. This has been an historically proven ratio.

(7) Total Man Years Required is the sum of (5) plus (6) and represents the addition to the workforce necessary to undertake the forecast workload.

Notes to Exhibit #3

(1) Experienced Inspectors 100% is the number of inspections which can be carried out in one year by the inspectors on staff as of 1971/72. These inspectors are fully experienced and we would thus expect their productivity to be as shown in line (2) of Exhibit #2. The figure in this line is found by multiplying (4) of Exhibit #2 times (2) of Exhibit #2.

(2) Trainee 1st year - 5%: We expect 1st year trainee inspectors to be only 5% as productive as fully experienced inspectors. This figure is found by multiplying (5) times (2) of Exhibit #2 time 5%.

(3) Trainee 2nd year - 40%: We expect 2nd year trainees to be 40% as effective as fully experienced ones. This figure is found by taking 40% of (2) of Exhibit #2 times the number of inspectors in their second year of training.

(4) (5) & (6)

are calculated in a similar manner.

(7) Total Calls Available is the sum of (1) to (6)

(8) Total Calls Required is given for each region by (10) of Exhibit #1

(9) % Effective is the ratio of (7) Total Calls Available to (8) Total Calls Required.

Inspector Training Program - New Concept Trainees.

Training Modules.

The training program is divided into nine modules, three conducted per year. Module 1 and 9 will be conducted at a central location where all inspector trainees can participate. Module 2 to 8 will be conducted at Field Offices by the training officer and one or more inspectors of the Field Office.

Morse Code.

Morse code instruction is introduced in the first module. The student is expected to continue practicing code between formal training sessions until he is capable of transmitting and receiving 20 W.P.M.

Training evaluation tests, code tests and code instruction will be presented in each module.

Duration of Modules.

Module 1 and 9 are five day modules without practical work. The trainee should gain practical experience on-the-job immediately following the training session (see practical training page 3).

Modules 2 to 8 are three day modules and do not contain practical work, with the exception of completing inspection or application forms, and public relations roll playing schemes. The trainee is expected to put into practice what he has learned immediately following each module.

Assignments will be given at the end of each module to prepare the trainee for the next subject.

Trainee's Record of Achievement.

Radio Inspector Manual 8-3 (Aug 1971) will be used by the trainee to record his accomplishments. The trainee's supervisor will assess the work performed and check off the items in appendix E of the manual as they are completed.

Training Program - Inspector Trainee - Ontario Region

Year

Module 1

Indoctrination

Mutual introduction
outline of training program
organization

Administration

1 documentation
annual leave, sick leave etc.

Regulations

operation of gov't vehicles
safety etc.

Morse Code

Introduction

Interference

sources, investigation, vehicles
public relations

Radio Act, GRR - introduction

Radiotelephone Procedure

Module 2

Inspections Land Stns

Radio regulations
inspection procedure
inspection forms
public relations

Morse Code

test
instruction

Training Evaluation Test

Module 3

Inspections Aeronautica
Mobile Service

scope of inspections
radio regulations
inspection procedure

Morse Code

test
instruction

Training Evaluation Test

Module 4

Examinations

Restricted radio opr.
amateur
radio regulations ITU

Radiotelegraph Procedure

2 transmitting techniques
distress traffic etc

Morse Code - test, instruction

Training Evaluation Test

Module 5

Interference

radio frequency
intermodulation etc.
field strength measurements

Morse Code

Test and instruction

Training Evaluation Test

Module 6

Spectrum Analysis

equipment
emission character.
frequency tolerance
bandwidth
ITU regulations

Morse Code Test

instruction

Training Eval. Test

Module 7

Inspections Ships

compulsory and non-compulsory
ship station regulations, Canada
3 Shipping Act
inspection procedure, certificates

Morse Code - test and instruction

Training Evaluation Test

Module 8

Spectrum Analysis Advanced

interpretation of spectrum
signatures

Morse Code - test and
instruction

Training Evaluation Test

Module 9

Inspections
AM, FM, TV

Broadcast stns
CATV Systems

regulations
inspection
procedure

Morse Code -
Final Test.

Inspector Trainee - Practical Training

Field Office.

Module 1

- Practical demonstration of vehicle equipment operation
- Demonstration of interference investigation techniques
- trainee conducts interference investigations

Module 2

- Demonstration of the operation of inspection equipment (cushman, wattmeter etc)
- Trainee with inspector inspects Land Station
- Trainee conducts Land Station inspections

Module 3

- Trainee with inspector inspects A/C station
- Trainee conducts A/C inspections.

Module 4

- Trainee with inspector prepares for the conduction of restricted radio operator, amateur and advanced amateur examinations
- Trainee conducts examinations

Module 5

- Demonstration of: field strength meter operation, investigating radio frequency and intermodulation interference
- Trainee investigates radio frequency and intermodulation interference

Module 6

- Trainee reports to Monitoring Station for three weeks practical training in spectrum analysis

Module 7

- Trainee with inspector inspects non compulsory and compulsory ships
- Trainee inspects non-compulsory ships

Module 8

Trainee prepares spectrum signature identifying signal, measuring frequency, bandwidth and photographs signature

Module 9

Trainee accompanies inspector during broadcast station and CATV system inspection.

Training Costs - Inspector Trainee

Course Director

Accommodation - three year period

It is assumed that the 5 day modules 1 and 9 will be conducted near the Regional Office and that the three day modules 2 to 8 will be conducted at each Field Office.

Total number of days conducting courses at each Field Office for 3 years = 3 x 21 = 63 days per Field Office.

Accommodation costs @ $29 per day = 63 x 29 = $1827 per Field Office.
Cost for 5 course directors = 5 x 1827 = $9135
Cost for 35 Field Offices = 35 x 9135 = $319,725

Trainee

Accommodation - three year period

Cost for 10 days @ $29 = $290 per trainee
Cost for 173 trainees = 173 x 290 = $ 50,170

Total Accommodation Expenses $369,895

Training Equipment Requirements.

First Year for Each Region

Camera 35 MM	150	
Film	50	
Flip Chart, books, program learning manuals etc.	500	
Code tape cassettes	1000	
6 Cassette recorders	300	
		$2000

Second Year

Slide projector	350	
Projector screen	80	
Flip charts	50	
Code oscillator, hand key and headphone assembly	100	580
		$2580

Total cost per Region

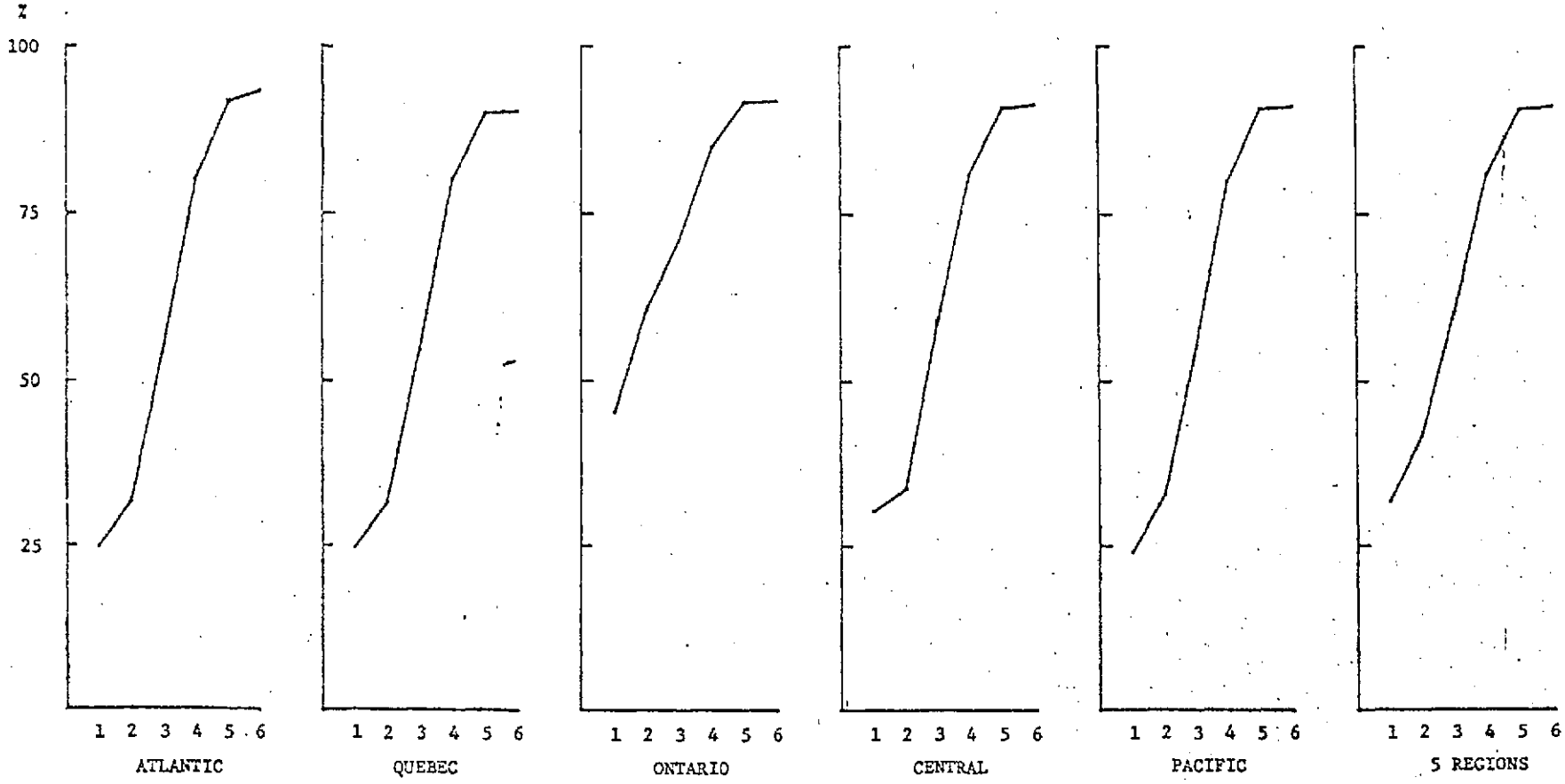
Total equipment cost = 2580X5=$12900

Grand total accommodation plus equipment

Accommodation expenses	369895
Training equipment costs	12900
	$382,795

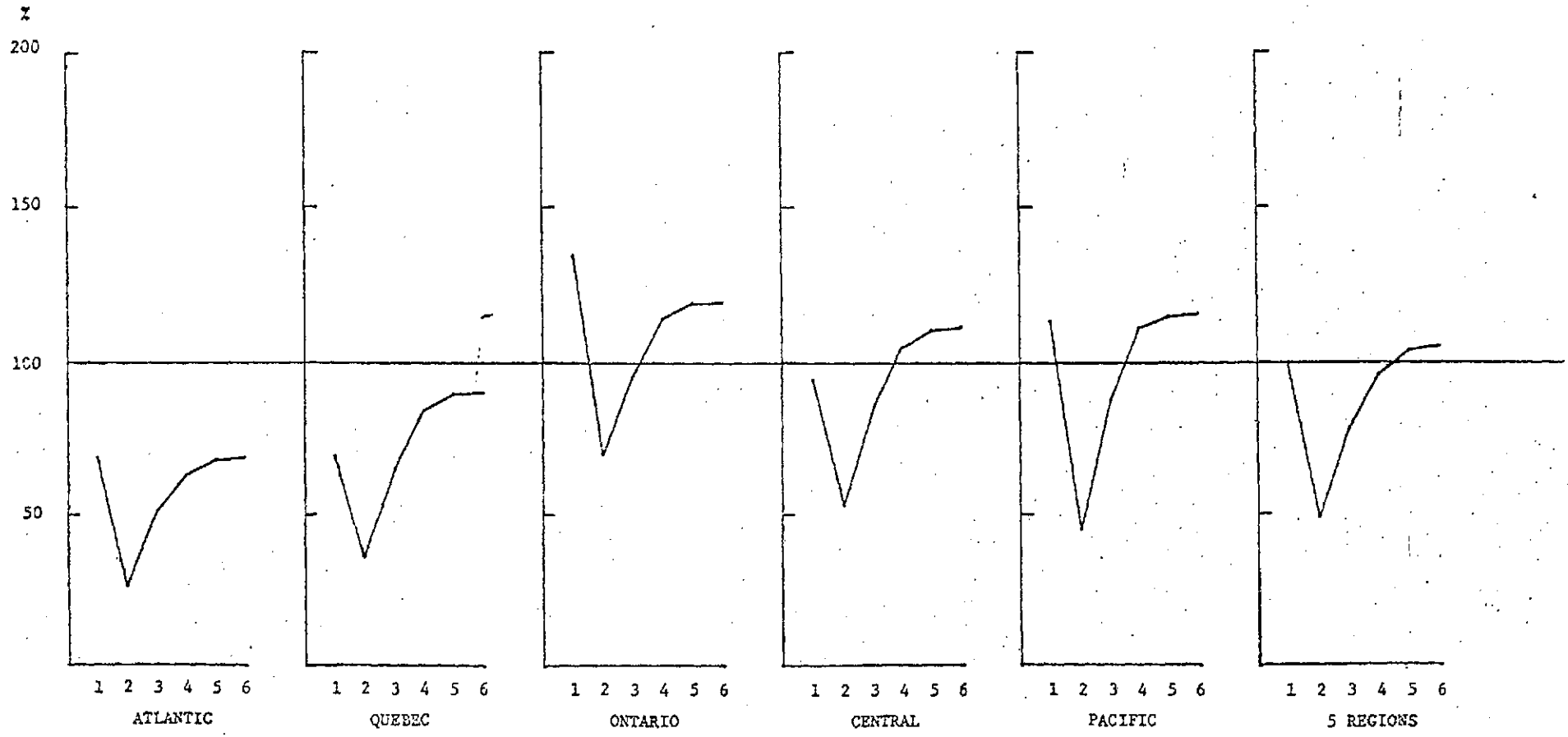
PART V

ANNUAL OPERATIONAL EFFECTIVENESS - ENFORCEMENT



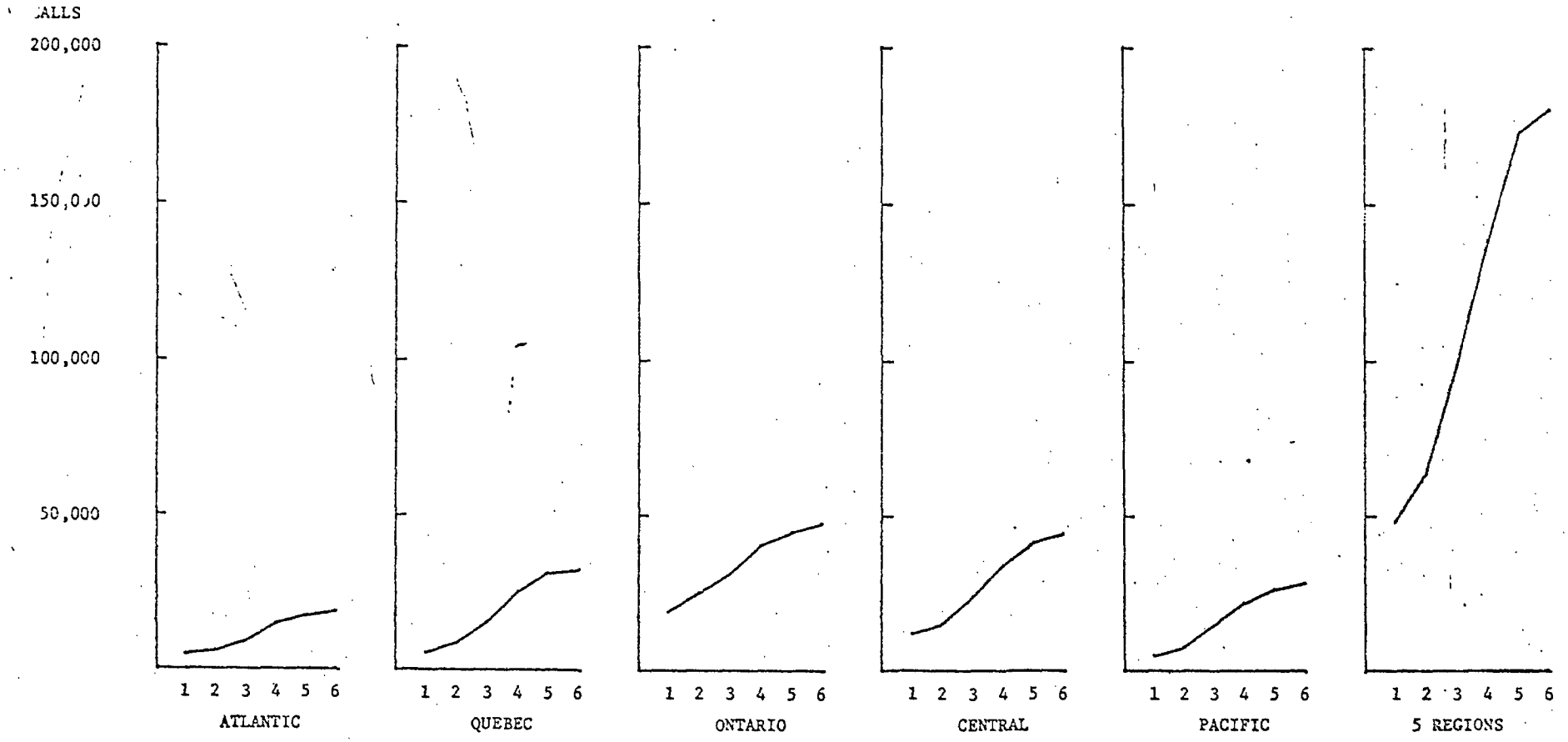
1, 2, 3, 4, 5, 6 REFER TO THE YEARS 1971/72, 1973/74, 1974/75, 1975/76, 1976/77, 1977/78 RESPECTIVELY.

ANNUAL COST PERFORMANCE - ENFORCEMENT



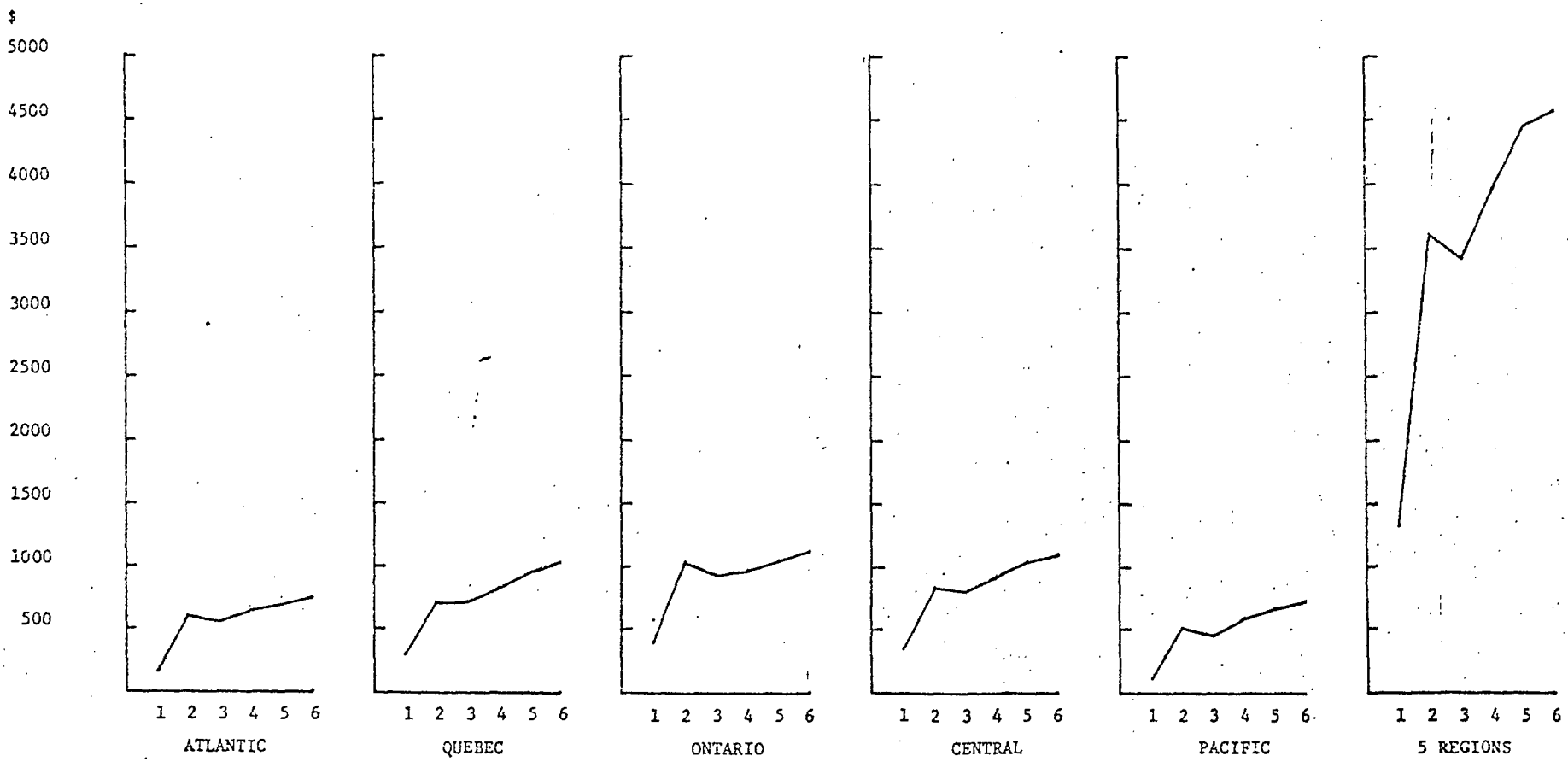
1, 2, 3, 4, 5, 6 REFER TO THE YEARS 1971/72, 1973/74, 1974/75, 1975/76, 1976/77, 1977/78 RESPECTIVELY. BASE: 1971/72 5 REGION TOTAL COST/CALL= 100%

ANNUAL WORKLOAD (CALLS) - ENFORCEMENT



1, 2, 3, 4, 5, 6 REFER TO THE YEARS 1971/72, 1973/74, 1974/75, 1975/76, 1976/77, 1977/78 RESPECTIVELY.

ANNUAL EXPENDITURE - ENFORCEMENT (IN THOUSANDS OF DOLLARS)



1, 2, 3, 4, 5, 6 REFER TO THE YEARS 1971/72, 1973/74, 1974/75, 1975/76, 1976/77, 1977/78 RESPECTIVELY.

	1971/72	1973/74	1974/75	1975/76	1976/77	1977/78
Pacific						
Units	6,280	8,497	15,032	22,773	27,347	28,828
Costs	155,000	511,663	480,851	576,205	662,627	697,637
Cost/Unit	24.60	60.22	32.00	25.30	24.23	24.20
Efficiency Index	113.8	46.5	87.5	110.7	115.6	115.7
Effectiveness Index	24.3	33.0	55.0	80.0	91.0	91.0
TOTAL						
Units	49,251	64,500	97,390	138,392	163,282	171,155
Costs	1,381,000	3,652,321	3,466,191	3,983,324	4,477,040	4,689,719
Cost/Unit	28.00	56.68	35.59	28.78	27.42	27.40
Efficiency Index	100.0	49.4	78.7	97.3	102.1	102.2
Effectiveness Index	31.9	41.9	60.2	81.5	91.5	92.0

ANALYSIS - ENFORCEMENT

	1971/72	1973/74	1974/75	1975/76	1976/77	1977/78
Atlantic						
Units	4,000	5,196	9,323	14,205	17,095	18,142
Costs	162,000	541,972	514,659	623,522	704,357	747,228
Cost/Unit	40.50	104.31	55.20	43.89	41.20	41.19
Efficiency Index	69.1	26.8	50.7	63.8	68.0	68.0
Effectiveness Index	24.8	32.0	55.0	80.0	92.0	93.0
Quebec						
Units	7,277	9,430	16,936	26,087	31,332	32,339
Costs	294,000	732,623	733,695	866,957	984,119	1,014,797
Cost/Unit	40.40	77.69	43.32	33.24	31.40	31.38
Efficiency Index	69.3	36.0	64.6	84.2	89.2	89.2
Effectiveness Index	24.7	32.0	54.0	80.0	90.0	90.0
Ontario						
Units	19,604	26,191	31,843	40,160	45,565	47,679
Costs	410,000	1,054,042	927,212	979,711	1,067,010	1,116,165
Cost/Unit	20.90	40.24	29.12	24.40	23.42	23.41
Efficiency Index	134.0	69.6	96.2	114.8	119.6	119.6
Effectiveness Index	45.7	61.0	71.0	85.0	92.0	92.0
Central						
Units	12,090	15,186	24,256	35,167	41,943	44,167
Costs	360,000	812,021	809,774	936,929	1,058,927	1,113,892
Cost/Unit	29.70	53.47	33.38	26.64	25.25	25.22
Efficiency Index	94.3	52.3	83.8	105.1	110.9	111.0
Effectiveness Index	30.5	38.0	58.0	81.0	91.0	92.0

PART VI

OBJECTIVE SETTING AND PERFORMANCE EVALUATION

PART VI

OBJECTIVE SETTING AND PERFORMANCE EVALUATION

A method has been developed whereby Reguatory Enforcement requirements can be accurately forecasted on a yearly basis in terms of the number of inspections or investigations that are necessary. It follows, therefore, that because of this workload objectives can be established for each inspector, district office and region on a daily, weekly and monthly basis. Once objectives have been set then all that is needed is to establish suitable performance indicators and a method of reporting activity on a monthly basis.

Performance Indicators

The following 18 performance indicators which are pertinent to regulatory enforcement have been developed for the purpose of assessing the degree to which objectives are being achieved.

- Average hours per inspection call
- Average hours per interference call
- Number of Inspectors on calls
- Number calls per Inspector
- Average miles per call
- Ratio Inspection to Interference
- Percentage Interference eliminated
- Percentage Target Calls completed
- Number Compulsory Inspections
- Number Non-Compulsory Inspections
- Average Call rate per inspector (to date)
- Average Call rate per inspector (1971-72)
- Percentage Increase; Percentage Decrease
- Special Investigations
- Field Strength Measurements
- Spectrum Observation Centre frequency measurements
- Monitoring Hours
- Training Man-days

Management Information System (Reporting and Control)

For the purpose of determining performance against objectives, and for analysing regulatory enforcement activity in the field the following reports have been designed to provide a suitable Information System.

- Inspector's Visit Report (Refer Appendix "A") - self-explanatory; completed after each visit

- District Office Monthly Performance Report (Refer Appendix "B") - This report in fact embraces all activity and includes such activities as visits, applications, examinations, etc. The report is reviewed by the Operations Branch at the Regional Office and by District Managers to verify performance against objecgives, as well as analysing trends and substantiating operation standards, such as, time to complete work units.

ADDITIONAL REVENUE -- POSSIBLE SOURCES (Ontario Region used as example.)

When reviewing the cost effectiveness of this proposal it is thought that possibly some consideration might be given to establishing a broader revenue base for the Regional Regulatory Enforcement Programs.

At the present time the public is charged a fee when obtaining a licence to operate radio stations. This is the sole source of revenue within the regions.

Revenue forecasted for the Ontario Region for 1972-73 is estimated at $560,000. The O & M expenditures for the same period are forecasted as 1.5 Million. Thus it will be seen that an unfavourable operating variance of approximately 1 Million will exist and that funds for this amount will have to be provided from departmental resources. Capital programs are not included.

It is realized that the department is providing a service to the public and, in doing this, receives funds from government revenue. However, in this instance it does not seem fair for the general public to bear costs which are generated as a result of the need for inspecting radio stations that are not operating according to departmental standards, nor does it seem fair that they bear the cost of locating the source of interference caused by improper regard for departmental standards.

It would seem reasonable and possibly quite acceptable to the public, if offenders in both instances were assessed a fee for the technical investigations necessitated by these infractions. It is not envisaged that any legal action would be taken against offenders who do not pay the fee, but that in the case of the licensed station, the licence would be suspended; or in the case of interference, type approval of the equipment involved would be withdrawn.

Assuming that the foregoing is acceptable, then a rough estimate of the additional revenue that could be generated, based on the 1972-73 forecast of unsatisfactorily operated stations and interference investigations, is given:

The following charges are based on a load hourly rate of $20/hour for an average visit of 2 hours and 30 minutes or $50/visit.

. Unsatisfactory Stations	- 3,454	x $50 =	$172,700
. Interference Investigations	- 11,256	x $50 =	$562,800
. Total Additional Revenue			735,500

- Regional Monthly Performance Summary

  The Regional Summary provides a comparison of performance against objectives between District Offices and is reviewed nnd analysed similarly to the District Office Monthly Performance Report.

- Regional Standard Hours/Cost Analysis - Inspections

  This report contains an analysis by District Office, which permit Regional standards hours/cost analysis (refer Appendix "D"), to be determined for the various types of inspections being conducted.

- Regional Standard Hours/Cost Analysis - Interference

  As above. (Refer Appendix "E".) (Exeept for Interference)

- Regional Standard Hours/Cost Analysis - Examinations

  As above, except for Examinations,(refer Appendix "F").

Computerized Management Information System

Use of the above reports provides a management information system which at the present time is manual. However, the system has been designed in such a manner as to be readily adapted to computerized operation using the Inspector's Call Report (punch card) as a source document which, when programmed, will eliminate the necessity of preparing the above mentioned reports.

T.F.O.-C.A.L.L.-R.E.P.O.R.T

A	COMPANY/ORGANIZATION	REQUEST FOR ASSISTANCE BY:			
		B	ACTIVITY	C	TYPE OF CALL
	NAME		INSPECTION		REQUESTED
	ADDRESS		INTERFERENCE		PLANNED
	CONTACT		OTHER		DISPATCHED

D	IF INSPECTION TYPE:	SHIPS	ACFT	P.C.BASE	MOB.	B.C.	TV.	FM.	CATV	AMT.	GRS.	OTHER

E PROBLEMS/DISCREPANCY OR INTERFERENCE: CURED: YES? NO?

INSPECTION			INTERFERENCE FROM:	REMARKS TO:
1		9	POWER LINE	
2		10	INTER-MOD	T.V.
3		11	CROSS-MOD	RDO.
4		12	HOUSEHOLD	P/C
5			INDUSTRIAL	OTHER(Specify)
6	This should		SCIENTIFIC	
7	relate to		MEDICAL	
8	Discrep.Code		OTHER	

F ACTION TAKEN AND RESULTS:

G MONITORING FACILITIES USED- DIST.OFFICE | | MONITORING STATION | | VEHICLE | |

H ARRIVAL

DEPARTED AT

TOTAL TIME

OTHER EXPENSES

SIGNATURE DATE

Part VI - APPENDIX "B"

ONTARIO REGION - MONTHLY PERFORMANCE REPORT

DISTRICT TDO DATE Nov/17

A] INSPCTNS

		BROADCAST						AERO		COMMERCIAL				GOV'T		OTHER			MARINE				TOTAL MONTH	TOTAL TO DATE	[illegible]
*	D											15	3												
		AM	FM	TV	CATV	RADIO RPTR	TV RPTR	S.E & M.E	GRND	PUB FXD	PUB MOB	PRIV FXD	PRIV MOB	GOV'T FXD	GOV'T MOB	AMAT	EXP	GRS	COAST STN	R/T COMP	W/T COMP	NON COMP			
	NO	2						3				21	31			2		2					61	864	12.5
	HRS	8·10						1·30				10·05	15·25			2·30		·40					28·10	568·10	

B] INTRFRNC

	PWR LINE TV	PWR LINE RADIO	HOUS-HLD TV	HOUS-HLD RADIO	NOT ON	ISM	INTR MOD	CATV	MATV	OTHER	TOTAL MONTH	TOTAL TO DATE	TOTAL YR. END	% ELIMINATED MONTH	% ELIMINATED DATE
V	15	2	120	22	67	8	12	4	1	41	292	2213	3465	24%	32%
C	4	1	47	9	4	4	3			1	73	727			
H	18·15	1·20	117·10	22·50	20·20	11·35	27·30	10·00	·15	66·40	285·50				

C] OBJCTVS

Total Calls	CURRENT MONTH TAR	CURRENT MONTH ACT	CURRENT MONTH VAR	YEAR TO DATE TAR	YEAR TO DATE ACT	YEAR TO DATE VAR	YEAR END TAR	YEAR END R'FCST	YEAR END VAR
NO	385	353	-32	3080	3077	-3	4720	4685	-35
HRS		314·09			2642				

D] EXAMS.

	1ST	2ND	GEN	ADV	AMTR	RRO	TOTAL MONTH	TOTAL TO DATE
NO				8	6	89	103	573
HRS				12	12	44·30	68·30	486·3[illegible]

E] AUTHRSTTN

	APRVD. PROCSD	TEMP. AUTH.	LIC. ISSUED	LIC. AMND.	PROGRS REPORTS	XMPT CERT.	RRO CERT.	CERT. ENDRST	SAFETY CERTS.	AMT. CERTS ISSUED	LIC CANCEL.	TOTAL
MONTH	457	225	186	146	0	-	31	4	0	8	187	1234
YR. TO DATE	4524	2460	2872	1236	7	-	578	8	62	8	751	12866

F] ADMIN

	REVENUE	OVERTIME	IN - MAIL	OUT	MILES TRVLD
MONTH	9620.72	162	725	1048	10,750
TO DATE	185,447.72	616	6509	10935	77,578

G] * DISCREPANCIES - TOTAL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MONTH																					
TO DATE			1	2	1		5				4										

I] PERFORMANCE INDICATORS

. AVERG HRS PER INSPTN CALL	27	% TARGET CALLS COMPLETED	66%
. AVRG HRS PER INTRFRNC CALL	58	NO COMPULSORY INSPCTNS	5
. NO OF INSPCTRS ON CALLS	4	NO NON-COMPULSORY INSPCTNS	56
. NO CALLS PER INSPCTR	88	AVRG CALL RATE PER INSPCTR (TO DATE)	72
. AVRG MILES PER CALL	30	AVRG CALL RATE PER INSPCTR (1971-72)	55
. RATIO INSPTN TO INTRFRNCE	1 to 4.7	% INCREASE [X] DECREASE [ ]	30%
. % INTRFRNC ELIMINATED	24%		

[H] OTHER STATISTICS

. SPECIAL INVESTIG.	1
. FLD STRNGTH MSMNTS	6
. SOC-F-MEASMNTS	26
. MONIT. HOURS	120
. TRAINING M-DAYS	47

NOTE: CHECK

ONTARIO REGION - MONTHLY PERFORMANCE SUMMARY — MONTH ENDING NOVEMBER 1 9 7 2 — Part VI

DISTRICT	TORONTO		HAMILTON		LONDON		KITCHENER		OTTAWA		KINGSTON		KENORA		S.S.MARIE		THUNDER-B		NORTH-B		APT. TOTAL	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A
A] INSPCTNS : No.Calls		61		272		226		96		104		104		44		55		52		85		1099
No.Hrs.		28.10		165		221.55		71.50		66.08		63.10		20.00		71.30		31.50		53.40		793.13
B] INTRFRNC : No. Visits		292		143		156		65		87		36		11		24		41		42		897
No. Hrs.		285.50		104		145.25		62.25		63.05		27.10		7.30		63.45		40.40		42.22		842.12
C] OBJCTVS : Month	385	353	338	415	257	382	170	161	152	191	79	140	85	55	54	79	46	93	110	127	1676	1996
To Date	3080	3077	3004	2818	2056	1696	1490	1158	757	796	441	536	608	333	436	487	322	367	950	1000	13144	12268
To Go	1640		1051		1025		733		439		467		145		218		230		290		6238	
D] AUTHOR-IZATION : Proceesed & Temp Issued & Amended / Auth. & Lic. Total	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C
	1234	12866	257	3384	221	3304	256	2272	537	4033	166	1484	41	344	72	1441	70	803	148	1203	3002	31134
E] EXAMS : No.Xms		103		4		6		27		24		2		0		1		3		2		172
No.Hrs.		68.30		4.50		8.45		12.25		16.00		1		0		5.00		3.00		4.50		124.20
F] ADMIN. : Revenue		9620.72		1056.00		1104.00		1239.00		2761.00		913.50		258.50		469.00		889.00		625.50		18937.42
Overtime		162		17		19		18		0		0		0		0		25		0		241
Mail-In		745		1346		249		817		1943		129		181		252		299		545		6506
Mail-Out		1048		1056		300		1019		2337		156		135		176		273		382		6882
G] STATISTICS Spcl.Invest.		1		0		0		0		0		0		0		0		0		0		1
(Mo) SOC.Fld.MS		26		3		0		0		0		0		0		0		28		47		104
Fld.Strgth		6		0		19		0		43		19		0		7		26		3		123
Monit.Hrs.		120		10		24.30		0		7		11		0		0		3		16		191.30
Training		47		15		0		0		4		21		5		22		21		3		138
Miles		10750		4518		5264		4957		4346		1897		1936		2818		2536		4241		43263

H] PERFORMANCE INDCTRS	TOR	HAM	LON	KIT	OTW	KING	KEN	SSM	T-B	N-B
Avrg.Hrs.per Inspctn Call	27	1.6	.98	.75	.35	.36	.45	1.3	.37	.38
Avrg.Hrs/Intrfrnc Call	58	1.3	.93	.98	.43	.45	.56	2.6	1.00	1.00
No.Inspctrs on Calls	4	3.5	4	2.6	2.2	2.30	1.1	1.5	1.0	2.50
No.Calls per Inspctr	88	118	95.5	54	87	61	50	52	93	51
Avrg.miles per call	30	11	13.8	31	22	14	36	54.1	27	33
Ratio Insp.to Intrfrnce	1:5	2:1	2:1	1:.6	2:1	3:1	2:1	2:1	1.2:1	2:1
% Target Calls Compltd (yr)	66%	69%	82%	52%	87%	177%	44%	63%	66%	80%
No.Compulsory Inspctns	5	34	0	27	11	0	71	7	13	16
No.Non-Complsry Inspctns	56	238	51	69	93	0	144	48	39	69
% Intrfrnce Eliminated (mo)	24%	40%	46%	37%	32%	71%	67%	50%	78%	36%

	TOR	HAM	LON	KIT	OTW	KING	KEN	SSM	T-B	N-B
.Avrg.Call Rate per Insp.(Mo)	72	86	53	56	63	29	38	40	46	45
.Avrg.Call Rate 1971-72 (Mo)	55	101	64.5	53	43	29	31	36	63	21
.Increase ☐ Decrease ☐	30%+	15%-	19%-	5.7%+	46%+	0%	22%+	11%+	27%-	114%+

T - Target
A - Actual
M - Monthly
C - Cumulative.

ONTARIO REGION - STANDARD HOURS - INSPECTIONS

Part VI APPENDIX "D"

MONTH ENDING 31 NOVEMBER 1972

	STATIONS		BROADCAST						AERO		MARITIME				GOV'T		AMATEUR			MARINE				TOTAL MONTH	TOTAL TO DATE	DATA YEAR
			AM	FM	TV	CATV	RADIO RPTR	TV RPTR	GRND & AIR	GRND	PUB CORR		AIR FXD	PRIV COR	GOV'T FXD	GOV'T MOB	AMAT	EXP	GRS	COAST STN	R/T COMP	W/T COMP	NON COMP			
		NO																								
		HRS																								
1)	Toronto	NO.	2						3				21	31			2		2					61	864	1255
		HRS	8						1				10	5			2							28	568	
2)	Hamilton	NO.				11			21		12		20	115	3	64	6	3	12			2		272	1283	500
		HRS				56			12		18		12	24	3	12	6	3	8			10		165	1774	
3)	London	NO.	1			4			147				5	18									51	226	762	300
		HRS	12			49			102				9	4									45	222		
4)	Kitchener	NO.	2		1				23				23	45			1				1			96	638	1196
		HRS	8		2				8				19	27			1				5			71	704	897
5)	Ottawa	NO.		1		1			9				34	59										104	308	468
		HRS		4		7			8				27	19										66		
6)	Kingston	NO.	1	3	1	1			1				8	53	2	13	1		20					104	357	735
		HRS	3	9	3	7			1				3	16	1	4	1		11					63		
7)	Kenora	NO.								2			8	29	1				4					44	215	465
		HRS								1			6	8	1				2					20	161	348
8)	Sault Ste Marie	NO.	4	1		1				1			2	46										55	361	
		HRS	25	3		15				2			3	22										71		
	Thunder Bay	NO.			1		2		10		1		18	2		3	1		14					52	201	267
		HRS			6		2		10				9						2					31	398	
9)	North Bay	NO.	1		3		2		9	1			13	49			2		5					85	635	690
		HRS	4		5		1		7				8	18					6					53	424	
	TOTAL	NO.	11	5	6	18	4		223	4	13		152	447	6	80	13	3	57		1	2	51	1099	5524	5876
		HRS	62	17	16	135	3		161	4	18		108	146	5	16	12	3	31		5	10	45	793	4020	1245
	STD. HRS.		5.6	3.6	2.8	7.5	0.75		0.726	1.25	1.46		0.71	0.328	0.83	0.21	1	1	0.56		5	5	0.88			
	STD. COST comp. @$20 /hr.		$112.	$72.	$56.	$150.	$15.		$14.52	$25.	$29.20		$14.20	$6.56	$16.60	$4.20	$20.	$20.	$11.20		$100.	$100.	$17.60			

.B] INTERFERNC		PWR LINE		[illegible]		NOT	ISM	INTR	CATV	[illegible]	[illegible]	TOTAL	[illegible]	TOTAL	[illegible]	
		TV	RADIO	TV	RADIO	[illegible]		[illegible]				[illegible]	[illegible]	YR END	[illegible]	[illegible]
	[illegible]															
	[illegible]															
	[illegible]															
1) TORONTO	V	15	2	120	22	67	8	12	4	1	41	292	2213	3465	24%	32%
	C	4	1	47	9	4	4	3			1	73	727			
	H	18.10	1.20	122.1	27.5	20.2	11.35	27.3	10.00	0.15	46.40	285.50				
2) HAMILTON	V	13	2	31	8	31	3	10	5	3	37	143	1130	2000	40%	34%
	C	6	0	14	5	0	2	7	4	2	18	58	438			
	H	14.0	1.2	21.2	3.6	8.6	5.4	5.7	13.4	3.4	26.8	104.0	1085			
3) LONDON	V	69	25	14	5	3		13	15		12	156	961	400		
	C	18	4	1	0	0		2	7		8	40	269	100	46%	62%
	H	45.0	17.30	15.30	3.0	2.3		30.30	20.35		10.50	145.25				
4) KITCHENER	V	16	5	3	4		10	4	8		15	65	517	1027		
	C	4	1		1		2	1	7		8	24	225	450	37%	43%
	H	21.0	3.0	1.25	2		8.75	3.25	9		14	62.25	497	987		
5) OTTAWA	V	20	8	13	18	5	1	2			20	87	488	728	32%	26%
	C	5	3	7	9						4	28	198			
	H	10.27	16.05	7.05	7.43	1.05	1.30	1.40			17.30	63.05				
6 KINGSTON	V	14	7	2		1		1			11	36	179			
	C	4	1	5								10	103	240	71%	61%
	H	14	4.10	1		0.45		1.15			6	27.10				
7) [illegible]	V		2	2		6					1	11	118	168	67%	95%
	C		1	1								2	94			
	H		0.55	2.10		1.55					2.30	7.30	110			
8 [illegible]	V	8	6			1		2			7	24	126	216	50%	50%
	C	4	3								5	12	63			
	H	13.0	32.3			0.30		6.30			11.15	63.45				
9) THUNDER BAY	V		20	2		6					13	41	169	285	78%	118%
	C		20	1							11	32	200			
	H		18	1		1.30					20.10	40.40	329			
10) NORTH BAY	V	11	10	7	2	3			3		6	42	335	550	55%	100%
	C	6	5	1	1	0			4		6	23	335			
	H	10.3	8.15	12.15	0.3	0.52			2.55		7.05	42.22	380			
TOTAL	V	166	87	194	59	123	22	44	35	4	163	897	6236	8839		
	C	51	39	77	25	4	8	13	22	2	61	302	2652	790	34%	43%
	H	146.07	102.57	168.37	44.33	38.03	27.14	75.30	55.54	3.39	162.38	842.02	2401.08	987		
STANDARD HOURS		0.88	21.20	0.87	0.75	0.3	1.22	1.70	1.60	0.85	1.0					
STANDARD COST($20./hr)		$17.60	$24.00	$17.40	$15.00	$6.00	$24.40	$34.00	$32.00	$17.00	$20.00					

ONTARIO REGION - STANDARD HOURS - EXAMINATIONS MONTH ENDING 30 NOVEMBER 1972

EXAMS	1st		2nd		GEN		ADV.		AM		RRO		TOT. No	TOT. H
	R	H	R	H	R	H	R	H	R	H	R	H		
TORONTO							8	12	6	12	89	44	103	68
HAMILTON							1	1	1	2	2	2	4	5
LONDON									2	5	4	4	6	9
KITCHENER											27	12	27	12
OTTAWA							1	2	2	7	21	7	24	16
KINGSTON											2	1	2	1
KENORA														
S. S. MARIE							1	5					1	5
THUNDER BAY									1	2	2	1	3	3
NORTH BAY									1	4	1	1	2	5
TOTALS							11	20	13	32	148	60	162	114
STANDARD HOURS							1.8		2.5		.4			
STANDARD COSTS							$36.		$50.		$8.			

PART VII

ADDITIONAL REVENUE - POSSIBLE SOURCES

PART VII

ADDITIONAL REVENUE -- POSSIBLE SOURCES (Ontario Region used as example.)

When reviewing the cost effectiveness of this proposal it is thought that possibly some consideration might be given to establishing a broader revenue base for the Regional Regulatory Enforcement Programs.

At the present time the public is charged a fee when obtaining a licence to operate radio stations. This is the sole source of revenue within the regions.

Revenue forecasted for the Ontario Region for 1972-73 is estimated at $560,000. The O & M expenditures for the same period are forecasted as 1.5 Million. Thus it will be seen that an unfavourable operating variance of approximately 1 Million will exist and that funds for this amount will have to be provided from departmental resources. Capital programs are not included.

It is realized that the department is providing a service to the public and, in doing this, receives funds from government revenue. However, in this instance it does not seem fair for the general public to bear costs which are generated as a result of the need for inspecting radio stations that are not operating according to departmental standards, nor does it seem fair that they bear the cost of locating the source of interference caused by improper regard for departmental standards.

It would seem reasonable and possibly quite acceptable to the public, if offenders in both instances were assessed a fee for the technical investigations necessitated by these infractions. It is not envisaged that any legal action would be taken against offenders who do not pay the fee, but that in the case of the licensed station, the licence would be suspended; or in the case of interference, type approval of the equipment involved would be withdrawn.

Assuming that the foregoing is acceptable, then a rough estimate of the additional revenue that could be generated, based on the 1972-73 forecast of unsatisfactorily operated stations and interference investigations, is given:

The following charges are based on a load hourly rate of $20/hour for an average visit of 2 hours and 30 minutes or $50/visit.

. Unsatisfactory Stations	- 3,454	x $50 =	$172,700
. Interference Investigations	- 11,256	x $50 =	$562,800
. Total Additional Revenue			735,500