



# Spectrum Control Annual Report 1988/89

DOSP-C

**ADMSR**

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It gives me great pleasure to present the 1988/89 annual report for the Spectrum Control section of the Operations Division (DOSP-C).

This document presents a "State of the Nation" view of the spectrum control activities. While the report is primarily intended to respond to the needs of senior management, it may be of general interest to all employees who are involved in the Spectrum Control activities. It was composed devoid of any regional colouring; primarily from our own perspective, summarizing our observations and concerns along with recommendations which we feel to be appropriate.

The authors comprise a dynamic group within our organization; all of whom have a great deal of experience in these activities from a regional perspective as well as several years within the HQ environment.

An earlier draft of this report was presented at the meeting of the Regional Spectrum Control Managers (SMCC) in August of 89, and following that, it was circulated to the regions for their comments.

I ask that you review this document, and sincerely hope that this effort contributes to a greater understanding of the "big picture". If you find this type of review helpful, please give us your comments and perhaps next year we will be able to provide an enhanced edition of this report.

Andy Cobham

DOSP

## Resources attributed to Spectrum Control

(SMIS)

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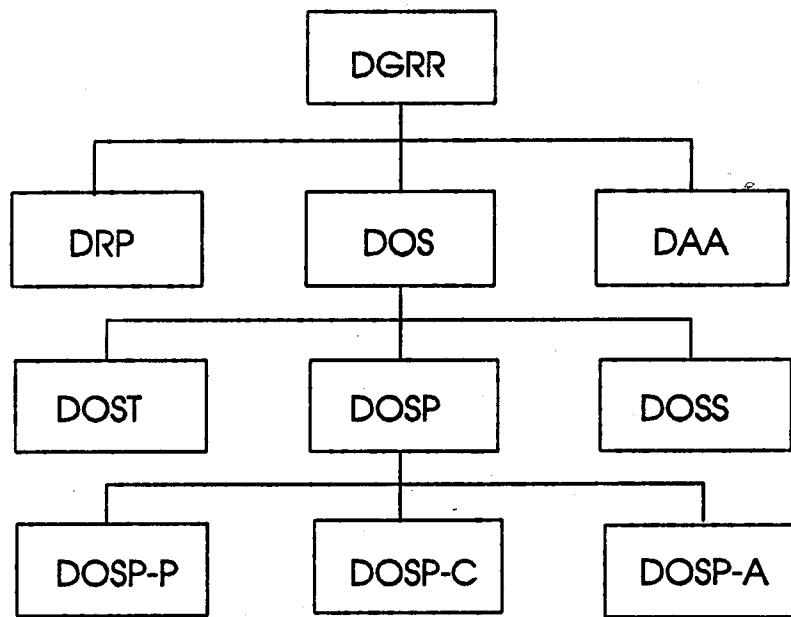
	88/89	87/88	86/87
Ministerial Investigations	1.27	1.59	1.13
Surveillance Services	1.15	5.05	6.25
Radiocommunication Investigations	15.25	15.89	15.36
General Public Investigations	17.89	20.64	23.82
Ship Inspections	5.15	5.53	6.12
Broadcasting Inspections	5.66	5.32	4.24
Sampling - Land Fixed Stations	4.66	6.14	7.17
Licence Compliance	1.42	3.57	4.42
Directed Investigations	15.28	17.79	19.74
Enforcement	1.32	2.32	2.69
Spectrum Surveillance	5.22	1.78	2.39
Total	74.27	85.62	93.33

## Volumes associated to Activities

(SMIS)

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	88/89	87/88	86/87
Ministerial Inquiries	108	97	91
Surveillance Services	72	85	100
Radiocommunication Investigations	5000	5354	5107
General Public Investigations	9053	10407	12406
Ship Inspections	1390	1930	2054
Broadcast Inspections	877	805	690
Sampling - Land Fixed Stations	2775	4225	4949
Licence Compliance	—	10300	8193
Directed Investigations	6668	13820	14556
Enforcement	20	17	30
Spectrum Surveillance	1056	2293	2163
Total	27019	49333	50339



## Mission, Mandate and Structure

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The Spectrum management and Regional Operations Sector is involved primarily in regulatory issues. It is responsible for regional operations of the Department which consists primarily of Spectrum Management but plays an increasing role in regional activities in the area of Communications and Culture.

Spectrum Management and Regional Operations is achieved through:

- Planning
- authorization
- spectrum control
- operations involving other activities of the department

The principal function of Spectrum Control is to maintain the quality of the radio frequency spectrum. The activities through which this goal is achieved are:

- radio station inspections
- surveillance of radio frequencies
- interference investigations
- client interface
- enforcement of the Radio Act and associated regulations

DOSP is responsible for the creation and implementation of programs involving the authorization of radio systems, as well as spectrum control activities. This involves the formulation of policies and procedures as well as the printing and distribution of manuals and publications, (both internal and for the public) that deal with these programs. In addition, DOS-P provides a consultative service (interpretation of policies and regulations, advice on application and authorization of new radio technology) to the public and the regional offices.

DOS-P is divided into three groups:

Spectrum Control	DOSP-C
Authorization	DOSP-A
Publications	DOSP-P

## Spectrum Planning ...

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The main objective of this activity is to provide direction and guidance to the spectrum users and spectrum managers to optimize the efficient utilization of the radio spectrum.

- Engineering<sup>1</sup>

- Client interface

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DOSP-C

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<sup>1</sup> This activity will not be discussed.

## Client Interface

Client Interface at the district office level consists principally of work related to sensitizing the radio spectrum users to issues within the radio environment that may affect them. During this activity, the Department may consult with the client on new policies or regulations which involve them; advising them of our plans and integrating their concerns with our operations.

This activity serves primarily to give spectrum managers the direction that will allow them to enhance the efficiency of spectrum utilization.

Over the last five years, we have witnessed a moderate increase in our resource expenditures in this activity, attaining a current level of 25.18 person years for the fiscal year 88/89.

We presently have no means to measure accurately our level of success here. One of our goals next year is to find methods by which we can measure our rate of success in these activities. We need to know that our efforts are giving us a positive return on the resources we have invested.

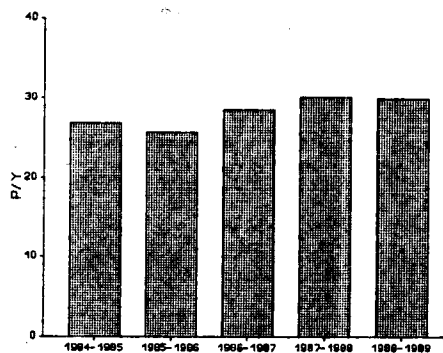


Figure 1

We believe that even though we cannot yet quantify our success in this activity, the visceral feeling is that the resources are well spent. We would like to see the regions concentrate more on Client Interface. By using information obtained from the sampling and investigation activities, client interface activities will be undertaken in a way that allows us to prevent the recurrence of problems identified through our sampling activities.

New reports under development in DOSP-C will allow us to better recognize problems troubling our clientele. This will in turn allow us to correct preemptively many of the causes of those problems that affect the licensee and his radio supplier.



## **Spectrum services**

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Inspections and investigations which are provided as a service to users of radio frequency spectrum on a request basis.

It is made up of the following activities:

- Ministerial Inquiries
- Surveillance Services
- Radiocommunication System - Investigations
- General Public - Investigations
- Ship Inspections
- Broadcasting Inspections

## Ministerial Inquiries

Ministerial Inquiries are those requests for information or complaints made to or received by the minister or deputy minister. Investigations undertaken at the request of the regional directors general are also considered ministerial investigations if the initial request is made by an elected representative of a provincial or federal government.

We had the lowest level of ministerial investigations in five years during the fiscal year 1986/87. The trend towards increased volumes in this activity since the low point of 86/87 could be attributed to the following reasons:

- the discontent expressed by groups of residents concerned with the proliferation of all types of radio antenna systems.
- increases in radio station licence fees
- an increased awareness of radio amateur operation in the community resulting from recent media exposure of interference cases
- the general reduction in services provided to the public from government wide cuts and down-sizing.

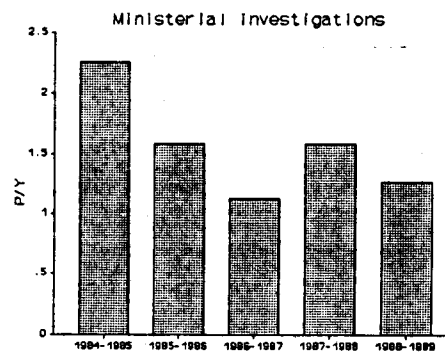


Figure 2

Complaints from groups concerned over the proliferation of antennas are significant since it requires an expenditure of our resources in more than one activity. In answering this type of ministerial, the problem is sometimes only resolved through extensive education and consultation with the concerned groups. These meetings are usually preceded by directed investigations to gather background information.

### Recommendations

It would be advantageous to publish some national guidelines along with an information package (video, brochures) which could give both our inspectors and the general public an insight to the various factors (both technical and political) which play a role in the process of making these radio station/antenna assignments. Additionally, we should increase the visibility of the "Radio and TV Interference Handbook" and make it more readily available.

## Surveillance Services

Spectrum Surveillance Services is a technical service offered to other departments, agencies or industry for studies both in the lab or in the field according to the conditions outlined in RSP 110. The costs of providing these services are normally recovered from the client.

An example of the type of work performed under this activity is monitoring assignments of broadcast stations. This work is undertaken at the request of the CRTC, in order to obtain information for use at the hearings for renewal of broadcasting licences and TCOC's.

As shown in this graph, there was a substantial decline in the amount of resources expended in surveillance services in 1988/89. This was due primarily to a redirection for reporting purposes of work completed by DGEP related to ionospheric sounding stations. The regions are relatively consistent in their work load in this activity, with an average total regional expenditure of just under 2 PY per year, although they have experienced a slightly decreasing trend as well. Regional reductions could be attributed to new monitoring techniques used for performing CRTC assignments.

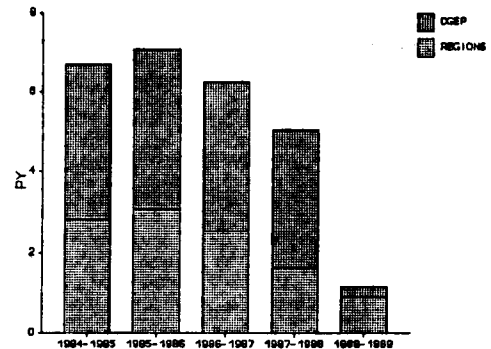


Figure 3

### Recommendation

It might be wise to re-evaluate the decision to re-direct work related to the ionospheric stations from this activity to surveillance (sampling) where it now resides. Surveillance services is a more appropriate place to attribute these resources to than the currently used activity in the quality control KRA (surveillance). Furthermore, the ionospheric activities are subsidized by the interested clients such as the Department of National Defense.

## Radiocommunications Investigations

These investigations are undertaken in order to resolve complaints received from licensees of radiocommunication systems.

Radiocommunication investigations impose the third greatest demand on our resources 15.25 PY fiscal year 88/89 (See figure 4).

The pie chart below (figure 5) shows the distribution of investigations by the source which caused the problem. Almost half of the investigations were caused by discrepancies on the part of other stations and in 26%, no cause was identified. The remaining 25% were caused by sources ranging from CATV systems to Hydro interference or weak signals.

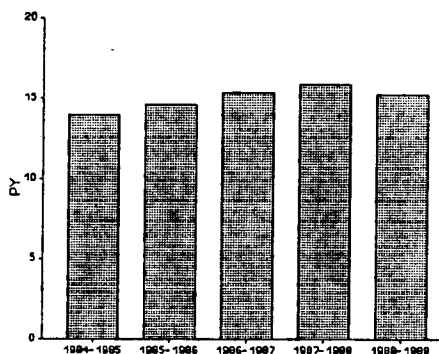


Figure 4

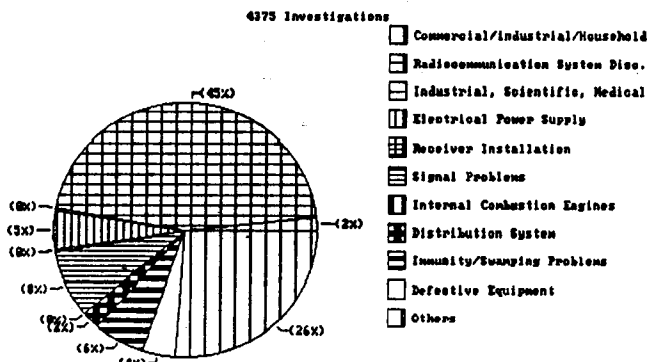


Figure 5 Distribution of Investigations by Sources

Analysis of data (see fig. 6-following page) on the 45% of investigations that implicated stations with discrepancies as the cause infers that spurious (disc. 7) plays an important role in radiocom investigations. This could be indicative of a new trend. As well, in two out of three investigations, operating procedures (8) and unauthorized frequencies (4) played a major role. The suggestion that these 2 discrepancies are so significant in radiocommunication problems is not fully accepted by all spectrum managers, and

warrants further investigation. The fact that 26% of the remaining investigations are closed without identifying the problem has given us cause to question the effectiveness of our discrepancy reporting methods.

Consequently, we have proposed an enhanced method for recording statistics that will allow us to draw a link between stations that exhibit one of our 15 discrepancies and problems that they cause within the radio environment. This will indicate the importance of each discrepancy and enable us to set more realistic danger flags in the sampling program. An additional level of coding that will provide a method to pinpoint the specific culprit at the root of a discrepancy trend is also being introduced. This new procedure should be implemented by next fiscal year. This enhanced problem determining mechanism will provide us with more accurate statistics from which to build a corrective measures programs.

### Radiocomm Discrepancy Breakdown National Summary

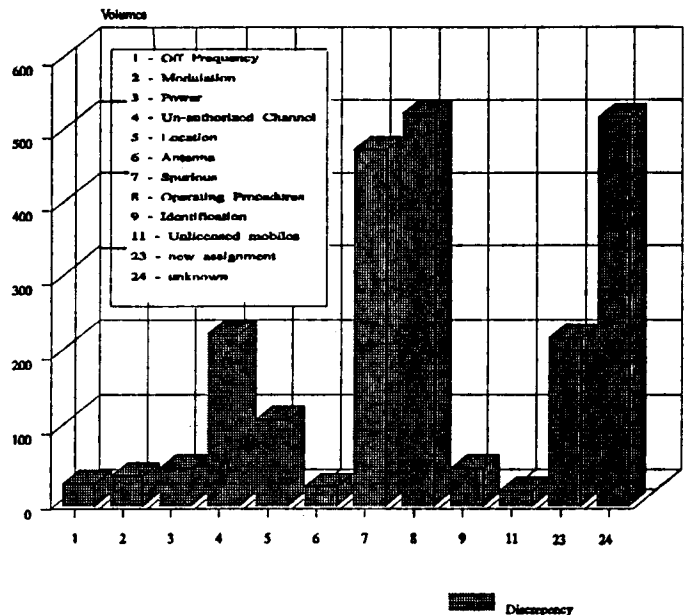


Figure 6

From the present statistics however, we could ask the following questions;

- if procedures are implicated to such a degree in radiocommunication problems, should we consider a land station radio operators certificate? (We need to analyze the cost of the "procedure" problems)
- should we consider information programs (posters, circulars etc.) directed at improving the licensees procedures ?
- should we consider adopting a policy of informing existing licensees each time we authorize another user on their frequency (to avoid unnecessary co-channel complaints)?
- should we enter into an on-air interactive client interface program to educate the public and increase our visibility? (similar to the program currently used in the sampling program in Central Region)?

## General Public Investigations

General Public Investigations are conducted following a complaint from the general public. These investigations usually involve interference to a broadcasting service (see figure 7 - analysis of service affected).

Over the last few years we have succeeded in reducing our involvement in this activity considerably (figure 8). This has been achieved through various methods; our work procedures have changed (more emphasis on telephone interviews before on-site investigations are undertaken), cable TV has continued expanding its territory providing a more interference free closed circuit environment, we have increased our distribution of "self-help" interference publications for the public...

all these factors have contributed to a 36% reduction (P/Y) over 5 years in this activity nationally. We are constantly searching for other methods to further enhance this resource reduction. This year we are exploring the possibility of a cost recovery program directed at the power utilities who are not currently participating in the Hydro Hand-over but cause interference investigations.

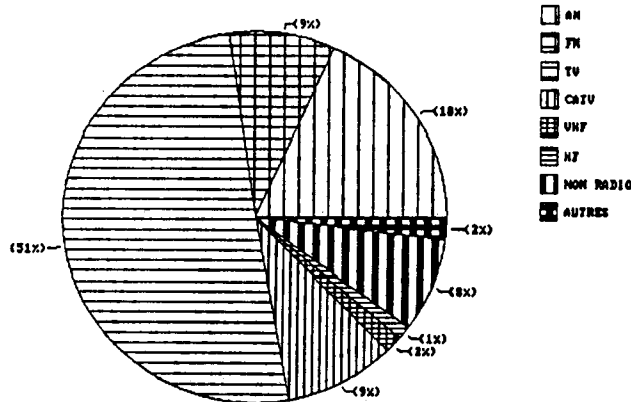


Figure 7 The most affected service is broadcasting.



Figure 8 We have realized a 10 PY (36%) reduction in GPI over the 5 years.

The service currently offered to the utilities in this respect exceeds greatly that which we should be extending. Our responsibility should stop at the point where we are certain that the interference originates from the utility's equipment. We should not have to localize each source as has been the case historically. It is for that reason that we wish to clarify our policy with the utilities. We hope to achieve nationally the level of co-operation that the central region has already attained; that the utilities will undertake to locate and suppress those sources of interference on their lines, with as little assistance from our inspectors as possible.

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### The Gallup Poll of 1988

The Gallup poll undertaken in 1988 to measure the degree of satisfaction that the general public had with the service provided by the department revealed some interesting information. 50% of our clients interviewed stated that an inspector visited them prior to receiving any printed literature. Only 16% of the clients polled received an interference brochure, but of that number, almost 90% were able to resolve their own problem. This kind of information re-enforces what we have for a long time suspected about the value of our "self help" brochures, and should be a message for us to improve our utilization of these valuable resources.



## Ship Inspections

Ship Inspections are conducted at the request of the Canadian Coast Guard to meet Canada's international obligations with respect to certification of vessels under legislation involving the Safety of Life at Sea. These inspections are conducted exclusively on those vessels that are compulsorily fitted with radio equipment. The resources for this activity are recovered in part by a vote net of G&S resources from the Department of Transport.

Over the last few years the amount of work in this area has been diminishing, mainly due to economic factors beyond our control.

The Department of Transport is considering a regulatory requirement for VHF radio installations on all vessels of 8 metres in length or over. There may be a chance that we may be asked to participate in the inspection process of these vessels subject to the new regulation.

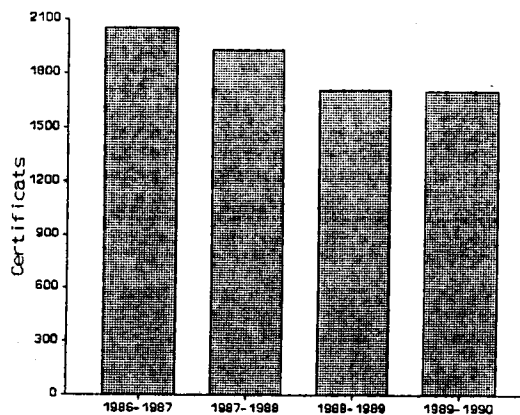


Figure 9 This trend may be reversing itself over the course of the years 1992/93

### Related Publications

This year we began publication of a group of circulars on vessels equipped with INMARSAT and GMDSS installations. These publications will be available in 1990-91, and have been a joint project between the Pacific region and DOS-P.



## Broadcast Inspections

Broadcast inspections are conducted at the request of DGBR in support of the CRTC licence and our TCOC. This information is required from time to time at hearings that are held before licences are renewed.

When the Spectrum Control Model was originally conceived, broadcast inspections were placed in "Spectrum Services" rather than the "Spectrum Quality" KRA. There was insufficient justification, from the perspective of interference investigations caused by broadcaster deficiencies, to continue these inspections. Furthermore, inspections were deemed redundant because of the department's requirement for filing of periodic proofs of performance in support of our TCOC.

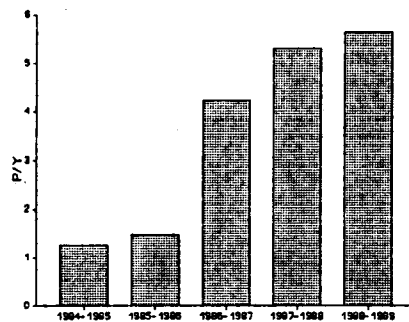


Figure 10

A review of our investigations indicates that there is little evidence to suspect that the broadcasters are responsible for problems experienced by the general public. In 1988/89, only 121 investigations indicated that broadcasters were the subject of an interference complaint, and of those investigations, only 19 identified a broadcaster's technical discrepancy as the cause (figure 11).

A recent change in philosophy which de-emphasized the Proof of Performance in favour of an enhanced inspection program has resulted in the gradual increase in resources as shown in the attached chart. We have seen an increase from 1.26 PY's in 1985 to a current level of 5.66 PY's nationally (figure 10).

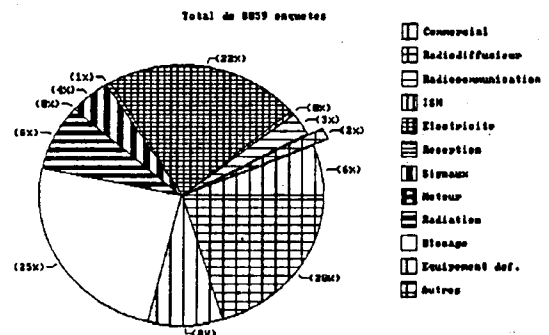


Figure 11 5.66 person years (863 broadcast inspections) for 2% of our investigations.



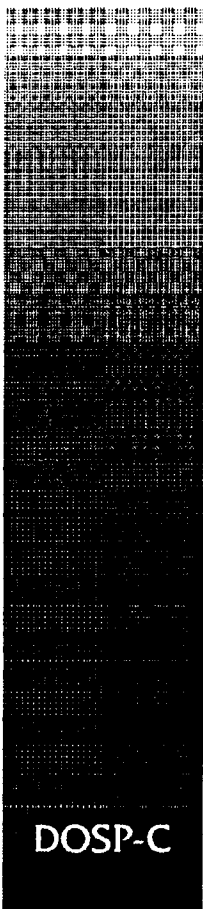
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### Recommendation

Considering the limited return on the investment required by these inspections, we feel that an adjustment in the amount of effort committed to this program must be considered.

It would be more economical to direct our broadcast inspection efforts to only those stations coming up for renewal that have given us cause for concern in the past. If we were to inspect only those stations that the public have complained about over the past year, or those stations whose quality the District Director was uncertain of, we could realize a substantial savings in resources.

**Notes or Comments ....**



DOSP-C



## **Spectrum Quality**

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Spectrum Quality is composed of those activities intended for collecting information relating to spectrum management which can serve to enhance and develop our various programs designed to improve the health of the spectrum .

It is made up of the following activities:

- **Sampling - land fixed**
- **Licence Compliance**
- **Directed Investigations**
- **Enforcement**
- **Spectrum Surveillance**

## Sampling - Land Fixed

This activity consists of the inspection of land fixed stations (as defined by the ITU) which are selected according to a statistically devised random sampling method.

The goal of the activity is to give spectrum managers an idea of the state of the radio environment at the district, regional and national level. This program has only been partially successful for a number of reasons.

The theory and philosophy of a sampling program is complicated and hard to understand for the uninitiated. The program may not have been fully understood by the inspectors responsible for gathering the data at the district office level, and as such discrepancy information was not consistently measured. Consequently, a national roll up was not immediately available and when it was finally obtained, the accuracy and utility of it was questionable. It appears that the district office personnel often have the perception that the program was designed primarily for the national level, and that little meaning can be derived in the districts. For these reasons and others, the multi-tier potential of the program was not understood and the program did not produce the anticipated results.

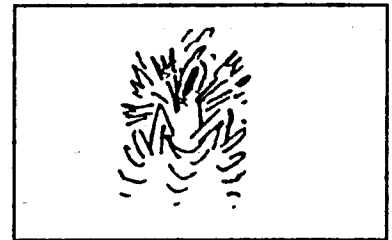


Figure 12

Due to a lack of data, the national report cannot be published.

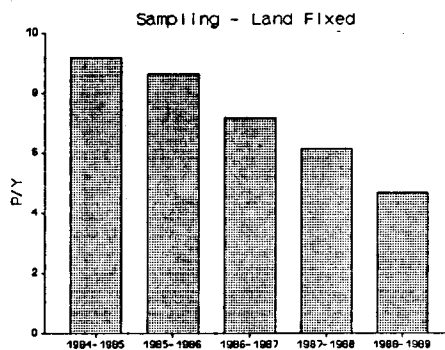


Figure 13

This perception has grown over the years and we have recently observed a pronounced lack of interest in the program. This sentiment peaked in 1986/87 when some regions abandoned their participation in the sampling program in favour of local projects that seemed more urgent. These innovative modifications to the program, while appearing logical at the regional level, leave holes in the national picture that are difficult to explain.

However, we still believe that the sampling program is a valuable and unique method of feedback that we must make work.

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It is evident that we will never obtain the sufficient level of participation needed to salvage this program unless we can convince all participants of its value. To this end, we have already taken steps to enhance the reporting capabilities of the system to give more meaningful information to spectrum managers at the district level to use in their client interface programs with local suppliers. As well, we are developing a simplification to the program which should allow a more consistent participation by all regions with a reduced drain on resources.

#### Recommendation

For the coming year, we will work towards simplifying the sampling program sufficiently to obtain national participation. We will be proposing a new direction that will be structured around a 3 tiered sampling plan, which will allow all regions to contribute equally to a national measurement. Their level of participation can be structured to their available resources, however, the minimum resource requirement will be such to allow all regions to get involved.

We will also explore the possibility of combining the surveillance sampling activity with the survey sampling program in order to give a more homogeneous indication of the level of occurrence of all types of discrepancies; technical, regulatory and operational.

It would be inappropriate to abandon the sampling program before the program has a chance to provide the information it was originally designed to supply.

## Licence Compliance

This activity is designed to measure the ratio of licensed to unlicensed stations in the various services.

Licence compliance gives us two important measurements. First, an indication of the level of licensed/unlicensed spectrum within the various service categories. Unlicensed stations are unauthorized users of the limited frequency bands thereby denying spectrum for legitimate use. Second, unlicensed stations represent revenue owed to the Crown.

Within the regions, licence compliance ratios appear to be within acceptable limits.

Nationally, the figures become more significant, especially for lost revenues. The bar chart (figure 14), using data from regional sources, demonstrates that we need a strategy to provide better methods to recover licence fees.

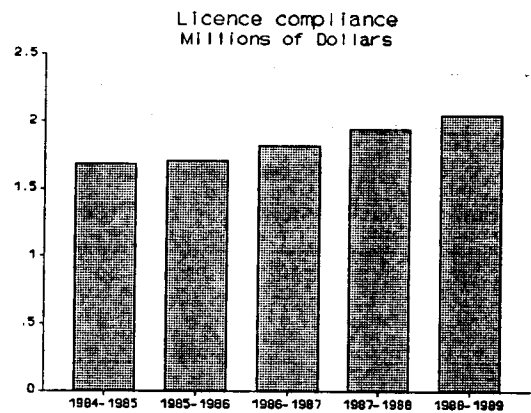


Figure 14

### Recommendation

Our main requirement however is an approach that can be implemented in a consistent manner in all regions that will provide an accurate measurement of compliance in all licence categories. Developed concurrently with this phase of the project, we will need a strategy aimed at raising to an acceptable level, those areas that we find to be unacceptable. The regions have stressed the fact that it makes little sense to repeatedly measure a known problem if have no intention of trying to correct it.

We will be exploring the possibility of offering the use of credit cards as an easy method of paying licence fees as well as exploring the possibility of using the services of collection agencies for recovering outstanding fees from delinquent accounts. It may also be possible to extend the use of warning tickets in this activity.



## Directed Investigations

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This activity is made up a number of different types of investigations, primarily undertaken to supplement that information obtained from the sampling program or to obtain data in areas for which there is no planned activity.

A Directed Investigation is the most flexible activity at the disposal of District Directors. It allows discretionary deployment of resources, permitting district directors to react to situations they feel are significant, such as following up on information obtained from the sampling program or obtaining data in areas for which there is no planned activity.

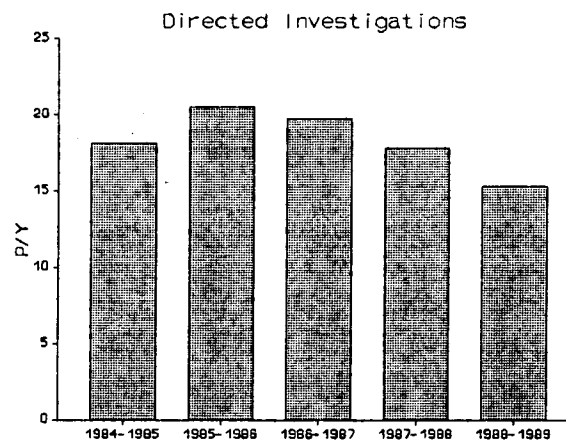


Figure 15

Directed Investigations represent a relatively constant drain on resources over the last 5 years.

Caution must be taken by spectrum managers to consider how and when the directed investigations activity is used. A review of the data captured by the SMIS system indicates to us there are time and volumes charged to 'directed investigations' that should be reported to a more appropriate activity.





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In addition, times recorded on the actual investigation report form appears to be excessive for this activity.

01 AOUT 1989 SOMMAIRE DES ENQUETES DIRIGÉES

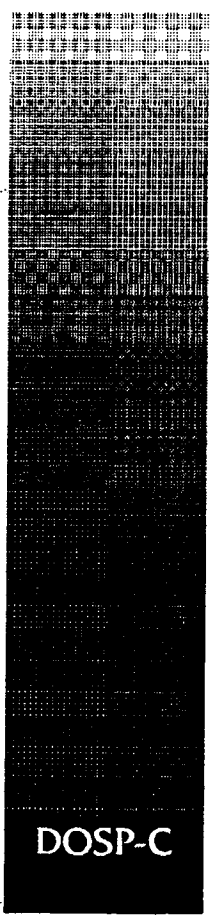
ANNEE FINANCIERE: 88/89  
PERIODE : AVRIL-MARS UNITEES: 0000-9999

ACTIVITES	TEMPS DE		TEMPS DE	
	COMPLETEES	NON COMPLETEES	L'EMPLOYER	DEPLACEMENT
STATISTIQUES	56	67	305.0	125.0
SPECT. OCC.	194	0	2289.0	50.0
REVENUES	1027	20	4718.0	1126.0
AM STNS	87	2	795.0	180.0
FM STNS	84	6	641.0	307.0
TV STNS	145	9	1261.0	552.0
CATV STNS	143	1	1757.0	631.0
TVRO	9	0	20.0	25.0
FIXE TERRE	1261	38	9740.0	2861.0
MOBILE TER	1433	39	7172.0	2932.0
BATEAUX	593	49	2974.0	1576.0
AERONEFS	561	9	1905.0	810.0
SURVEILLANCE	41	1	711.0	25.0
AMATEURS	72	2	746.0	253.0
GRS	414	35	2268.0	861.0
AUTRES	635	0	2389.0	576.0
GRANDS TOTAUX	6755	288	39691.0	12890.0

Table 1 Soon will be available in english - Source program SCORE

NOTE: No decision should be taken based on any reporting system other than the SMIS.

Difficulties observed in reporting under this activity will be resolved through consultations with the regions. Also, the implementation of an electronic inspection/investigation report form (SCOMS) will reduce inappropriate time/volumes reported against this activity.



DOSP-C

## Enforcement

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This activity consists of all tasks associated with the suspension and revocation of licences or legal prosecutions.

During the fiscal year 1988/89, we were involved in 9 enforcement cases nation wide. This involved 1.32 person years and \$8,350.00 expenditure for court costs and legal fees.

When one considers that the total revenue recovered from these activities through fines and penalties was only \$2,600.00, it is clear that this activity is expensive at the individual level. Enforcement in itself only cures the individual case and should not be revenue sensitive. This activity is undertaken as a last resort after all other methods have failed.

Once we have taken this measure, we should try to maximize the deterrent value it can have to future cases. We should ensure that all successful cases are publicised as much as possible.

## Spectrum Surveillance

Spectrum Surveillance consists of the off air measurement of the operational and to a certain degree, the technical characteristics of radio stations. Activities of ionospheric stations are now (perhaps erroneously?) also included here.

We are facing here an activity in full confusion for the following reasons.

- To date we have been unsuccessful in fully understanding the data from this activity. Even in some of the regions that have been expending resources under this activity, the work being done has not been entirely in agreement with the original philosophy of the model. Some regions are performing frequency "loading" work (more of an authorization support) and calling it sampling. Consequently, we have been unable to use this information fully.
- Cuts in resources were felt dramatically in this activity. District directors thought that surveillance sampling was a less significant activity, and as such, resource cuts in a "quality control" area like this would be less damaging than in one of the "service" activities.
- It is not a popular activity from the perspective of performing the work.

In looking at the graph depicting PYs, one must not conclude that the regions have renewed their interest in this activity. The recent increase in resources here is attributable mainly to a misinterpretation or change in the definition of the activity (including the ionospheric sounding activities / see page 8).

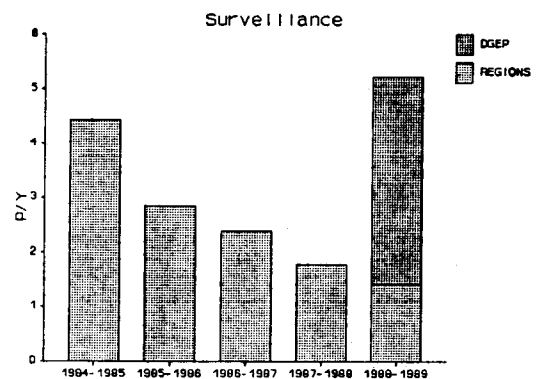


Figure 16



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### Recommendations

We need to get this activity back in line with the original intent and philosophy of the spectrum control model. We should all be referring to the same thing when we talk about "sampling".

Perhaps what we have been doing under the surveillance sampling activity is better suited to a proactive corrective measure program than a purely sensory, discrepancy measuring activity?

The effect that an interactive activity such as the surveillance sampling program can have on the population being assessed is evident. Those regions that had an extensive program in place found that in addition to measuring the occurrence rate of the procedural discrepancies, the increased departmental visibility and interaction with the licensees was actually raising the level of compliance. This, we believe, is what we should be using the surveillance sampling tool for.

To perform the more purely sensory/measurement functions, we believe a melding of the surveillance sampling program with the survey sampling (on site) program would be beneficial.

## **Topics to follow in 1989 - 1990.**

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The SCOMS Project

The inspection program for vessels over 8 metres in length.

The survey on the accuracy of the SMIS volume/resource data.

**Notes or Comments**

