THE PROMOTION SYSTEM

FOR THE

RESEARCH SCIENTIST (SE/RES) CLASSIFICATION

Dr. Robin Reenstra-Bryant
Ministry of State for
Science and Technology
January, 1984

THE PROMOTION SYSTEM

FOR THE

RESEARCH SCIENTIST (SE/RES) CLASSIFICATION

Dr. Robin Reenstra-Bryant
Ministry of State for
Science and Technology
January, 1984

EXECUTIVE SUMMARY

This study was undertaken by the Ministry of State for Science and Technology in response to concerns expressed by the interdepartmental Science ADMs Committee. Specifically, the Committee pointed out that significant morale problems have arisen among members of the government's Research Scientist (RES) classification, because of the structure and administration of the RES promotion system.

Nearly 2000 Ph.D.-level scientists are currently employed by the Public Service Commission in the RES group. These scientists are engaged in diverse areas of research in ten different government departments, and they contribute significantly to the federal government's R&D efforts.

The RES classification system is incumbent-oriented, in that advancement to higher levels is based, in theory, on the merit of the individual scientist. (Most other Public Service Commission classifications are position-oriented, with advancement being dependent on an individual meeting the requirements that are specific to the position.)

Since 1978, however, advancements between levels have been determined not only by individual merit, but also by quota limitations on the number of scientists that can hold positions in the two top levels, RES 03 and RES 04. Within the four levels, however, a "lock-step" system automatically advances the RESs one step each year.

This study examines the RES classification's promotion system in considerable detail. Data on various aspects of the RES group were obtained from Treasury Board, the Public Service Commission and the science departments. As well, the views of the RESs themselves, and their managers, were sought in each of the departments that hire RESs and in all regions of the country; to this end, nearly 300 RESs and 55 science managers were interviewed, and survey responses were obtained from 250 other RESs.

The study found that dissatisfaction among the RESs is indeed real. They see their opportunities for career advancement and recognition hindered by the combination of the quota and lock-step systems, and in particular, they feel that the quotas contradict the very nature of a promotion system that is supposed to be based on merit.

Due to the lock-step system and the current age distribution of the RESs, there is a "bunching" at the top step of the RES 02 and 03 levels, with very substantial proportions of RESs drawing the maximum salaries for their levels, but having little or no chance of promotion. (57% of all RES 02s are at the maximum.) The study also finds that the RESs and their managers share considerable uncertainty over what exactly is required for promotions and how the various criteria, on which the RESs are judged, are valued by the departmental and interdepartmental promotion committees.

The study concludes that the RES promotion system should be redesigned so that merit is more vigorously recognized, and the RESs are more evenly distributed within the levels. The recommendations draw heavily on what are seen to be desirable aspects of the promotion system that is currently being used for other merit-based categories, particularly the Defence Scientist group. Accordingly, it is proposed that:

- A classification system incorporating merit advancement principles, drawing on the desirable aspects of the promotion systems being used by other merit-based categories, should be designed and established for the Research Scientists.

- The present quota and lock-step system should be discontinued, but:

    - The criteria for promotion should be strengthened, and should clearly be oriented to more than research output (in practice as well as theory); accordingly, duties performed by RESs in such areas as contract management, assistance to industry, and so on, should all be given explicit recognition in the promotion criteria.

    - The criteria should be strong enough to distinguish clearly among different levels of productivity, thereby ensuring that a reasonable distribution across the levels within the classification is maintained.

- The performance of all RESs should be assessed in a meaningful way annually, and recommendations for promotion should be based on these evaluations.

- The departmental review committees should make the ultimate promotion decisions for middle level RESs. The IAC should, however, review all higher level promotions. As well, it should establish and regularly review the adequacy of a more stringent set of criteria, and advise TBS on the continued operation of the RES system. Some means of support should be provided to the IAC to perform these tasks.

- The promotion system should be an open one in which the process is clearly defined and communicated to all RESs and the winners of promotions are announced.

- Departments, branches or research institutes should establish incentives like annual peer-reviewed competitions for research papers prepared by the Research Scientists, in order to better recognize the performance of those RESs so engaged.

- Sabbatical leave policies, post doctoral fellowship and support staff availability, conference travel policies, and other similar matters should be re-thought, especially since promotions and salaries would be less of a problem if there were improved compensation, rewards and incentives associated with RESs' efforts.

- In the interim, before implementation of a new RES system, a halt should be brought to the practice of including science managers in the RES classification.

TABLE OF CONTENTS

TABLES

FIGURES

CHAPTER ONE

INTRODUCTION

During the past year or so, MOSST has heard frequent representations that individuals in the Research Scientist (SE/RES or RES) 02 classification level may be unfairly held back in their careers due to quota restrictions on entries to the higher 03 and 04 levels. To begin with, the reward system for the Research Scientists was identified by the Science ADMs' Committee early in 1982 as one of the priority issues to be addressed in MOSST's studies on factors having a negative impact on the "health" of government science. The RES promotion system was also specifically identified as a problem by all of the science managers who were interviewed during MOSST's recent review of aging and other issues related to the availability of scientific personnel in the government.(1)

The quotas for the RES classification are apparently perceived to be a major restriction on career development, which in turn is reported to be causing morale problems and increased departure or turnover rates among the affected scientists. This paper takes a closer look at the quotas and related issues in the RES promotion system in order to assess whether and to what extent there is a problem.

The RES Promotion System:

The Research Scientist classification was created in 1966, and is used to employ highly qualified researchers in most of the science-related departments. The largest single group is employed by Agriculture Canada (See Table 1); but significant numbers are found in the Department of Communications (DOC), Fisheries and Oceans (DFO), Environment (DOE), Energy, Mines and Resources (EMR), and National Health and Welfare (NHW). Small numbers are found in the National Museums (NMC) and the Canadian Grain Commission.

TABLE 1: DISTRIBUTION OF RESEARCH SCIENTISTS IN FEDERAL GOVERNMENT DEPARTMENTS

Department	Number	Percent
Agriculture	701	36 %
Can. Grain Comm.	10	0.5%
DOC	53	3 %
DFO	266	14 %
DOE	356	18 %
EMR	438	22 %
NHW	104	5 %
NMC	27	1.5%
	1955	100 %

Source: Public Service Commission, 1982

This classification system is unique in the public service in that a Ph.D. or its equivalency is a basic requirement. Furthermore, the RES classification is one of two in the public service below the senior management level (2) where the incumbent of a position (not the position) is classified. In practice, this means that a RES 01 can compete for another position, but that position will be labeled "RES 01-03", and the successful candidate will enter it at his/her existing level. According to recent Public Service Commission data (1982), 239 (or 12%) of the RESs are at the 01 level, 1105 (or 56%) are at the 02 level, 520 (or 27%) at the 03 level, and 91 (or 5%) at the 04 level.

The promotion system for the RES group incorporates both a merit review and a quota system. Annually, laboratory and research institute directors assess the relative, cumulative merit of their Research Scientists for promotion. Those scientists who are assessed by the directors to be worthy of promotion to the next level are asked to prepare written documentation of their accomplishments, and this is used by various review committees in later stages of the promotion process. Usually, this means that only those RESs who are at or near the maximum of their level are reviewed each year.

Depending on the department, the files of these individuals are sent to a branch or a regional review committee. Candidates who are approved at these levels are then considered for promotion by a departmental committee and finally an interdepartmental committee. This last group is the Interdepartmental Advisory Committee for the Scientific Research Group (IAC), which is composed of a Director General from each of the departments that hire RESs and is chaired by a National Research Council Vice-President. The IAC reports to Treasury Board Secretariat (TBS).

The review committees assess the scientists on their research and/or development work, publications and papers, management of contracted-out research, and national or international recognition of their expertise. (See Appendix A for a list of current assessment criteria.) The IAC's review, which examines the merit of those RESs who are recommended for promotion by their departments, is done to ensure that similar standards for advancement are being used throughout the government.

While the review committees base their assessments of the scientists' promotion prospects on merit criteria, actual promotions are limited by a set of quotas. Thus, the size of the RES 03 group is limited to 25% of the total authorized RES person-years on a government-wide basis, and the RES 04s are limited to 5% of authorized government RES person-years.(3) RES 01s and 02s make up the remaining 70%, with no prescribed percentages for distribution between the two levels.

These quotas were originally adopted by Treasury Board as guidelines, but have come to be strictly applied. Moreover, these same quotas are also applied to the RES population within most of the departments,(4) though a few of the departments have been permitted to adjust their quotas somewhat to meet special needs.(5) It is important to keep in mind, though, that this quota system, in the way it operates, takes precedence over merit assessments (i.e., merit-based promotions can only take effect if an opening exists due to unfilled quotas at the next higher level).

The RES promotion system has changed since its inception in 1966. At its start, the group was structured so that promotions were based on a combination of both experience, and productivity rankings. As shown in Figure 1, Research Scientists advanced along different productivity paths depending on their years of experience and their productivity ratings. Under this system, more productive scientists could advance more quickly than their less productive contemporaries. Quotas were implied by the system; they were not an explicit feature, and all RESs were potentially eligible for annual promotions.

In 1974, formal quotas for the RES 03 and 04 levels were introduced. As designed then, there were additional, annual merit reviews within each of the four levels. These are depicted in Table 2, with the diagonal lines indicating the merit assessment points where individuals had to be rated as fully satisfactory, superior or outstanding in order to advance to the next step. Quotas were applied to the number of scientists who could be given superior or outstanding ratings, and scientists had to receive these top ratings for at least two consecutive years to be considered for promotion to the next level. Merit-bonuses of nominal amounts were also awarded to productive scientists, but often managers found it easier to split the available funds equally among all RESs, further reducing the amount of the reward to any one individual, and diminishing its status as a recognition of real merit.

TABLE 2: 1974-1977 SE/RES PROMOTION SYSTEM

RES 01	(min)	_____	/ _____	/ _____	/ (max)
RES 02	(min)	_____	/ _____	/ _____	/ (max)
RES 03	(min)	_____	/ _____	/ _____	/ (max)
RES 04	(min)	_____	/ _____	/ _____	(max)

After the 1977-78 contract negotiations with the Professional Institute of the Public Service (the union representing the RES group), TBS changed the promotion system so

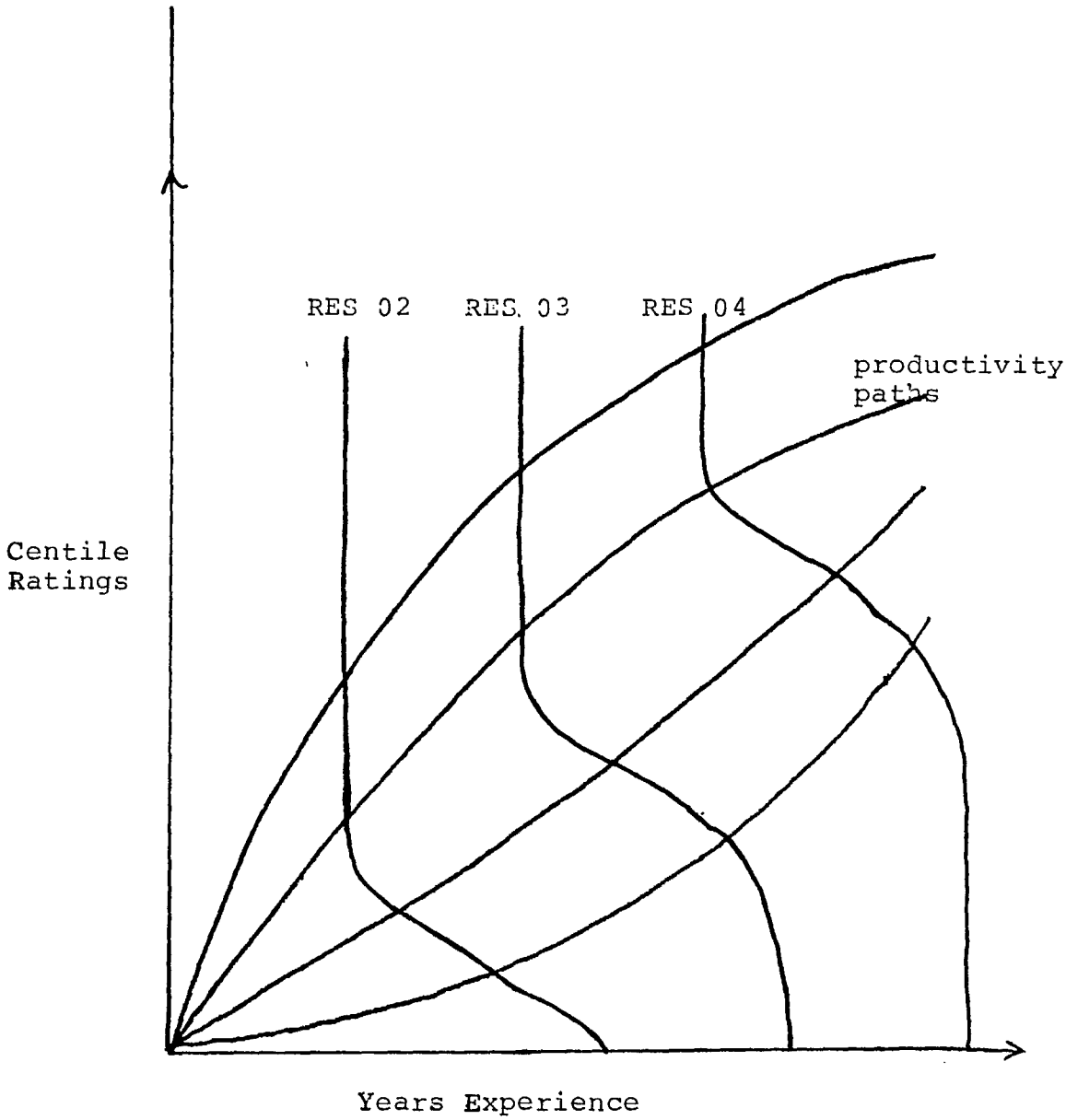
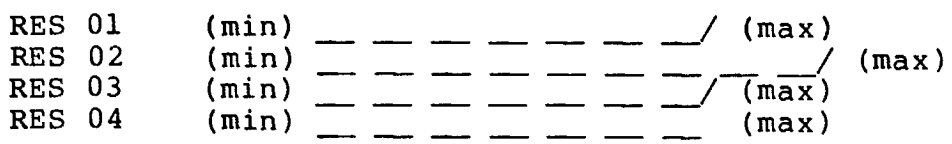


FIGURE 1: TYPICAL DISTRIBUTION OF RES LEVELS ACCORDING TO EXPERIENCE AND PRODUCTIVITY UNDER EARLY RES PROMOTION SYSTEM (1966-1974)

that these intermediate reviews within each level were discarded, leaving only the merit reviews between levels 02 and 03, and 03 and 04. (See Table 3.) Under this system, which is the one currently in use, RESs, up to the maximum of each level, are deemed to be fully satisfactory (i.e., the superior and outstanding ratings are no longer used), and the promotion of individuals from the minimum to the maximum in each level is nearly automatic (one step per year). This "lock-step" approach means that the distinctions of ability within each level have been eliminated, and the number of potential points in the individuals' careers where promotion decisions are made has been reduced by a factor of three.

TABLE 3: 1977-82 SE/RES PROMOTION SYSTEM



__ = the automatic steps within each level

The RES Problem:

As mentioned at the beginning of this paper, many Research Scientists and science managers have recently been voicing dissatisfaction with this current (merit, quota and lock-step) promotion system for the RES group. It is apparently felt that the quota restrictions are working to constrain scientists unduly in their career advancement. In particular, the number of RES 02s that are at the maximum salary of that level is thought to have increased in recent years, and it is generally feared that significant numbers of RES 02s who have satisfied the present criteria for promotion are being denied RES 03 positions due to the quotas. Furthermore, it is feared that these productive scientists who are denied promotion are leaving or are apt to leave the government.

This report considers these and related concerns more closely. Chapter 2 examines the actual views of the Research Scientists and their managers, as expressed in a series of interviews and through questionnaire responses. In Chapter 3, a more detailed analysis of the scientists' views is presented, along with additional data pertaining to issues raised in the interviews. Chapter 4 outlines a series of options that have been proposed to relieve the "bunching" of RES 02s at the maximum of their level, and considers the feasibility of each. Lastly, Chapter 5 presents a series of recommendations that are intended to provide solutions to the RES quota/merit problem.

CHAPTER ONE

FOOTNOTES

(1) This study (Aging and the Availability of Scientific Personnel) was the first of a series of MOSST projects on issues believed to be having a negative effect on the overall health of government science.

(2) The other incumbency-based group within the public service proper is the Defence Scientist (DS) classification. As well, NRC, which is a departmental Crown Corporation not falling directly under the Public Service Commission, utilizes an incumbency-based system for its scientists.

(3) The current (1982) rates of 27% and 5% are percentages of actual employees, and reflect the differences between authorized person-years and the actual number of employees.

(4) In DOE these quotas are also implemented at the Service level.

(5) Due to the small numbers of Research Scientists involved, the Treasury Board currently allows the Department of Communications to have up to 35% of its RESs at the 03 and 04 levels combined, and National Museums to have up to 40% of its RESs combined in the 03 and 04 levels.

CHAPTER TWO

SURVEY OF RESEARCH SCIENTISTS

Concerns with the RES classification and promotion system have filtered up from the scientists to their departmental headquarters, and have been made known in interdepartmental discussions. In order to clarify the specific issues involved, it was decided that it would be useful to go back to the scientists for further information.

To this end, a series of interviews and small group meetings were held with 297 (or 15.2%) of the Research Scientists, and 55 of their managers at the Director and Director General levels, in all of the science-oriented departments and in all regions of Canada. Table 4 below shows the distribution of scientists who were involved in this exercise.

In addition, a brief questionnaire was left at each of the laboratories or institutes visited, so that other research scientists, who were not interviewed, could express their concerns. (See Appendix B for questionnaire.) Tables 5 and 6 show the distribution of the respondents to this questionnaire according to department and level within the RES classification. Completed questionnaires were received from an additional 250 (or 12.8%) of the Research Scientists.

The Research Scientists who were interviewed were (in all but two cases[1]) selected by MOSST on a random basis from lists of the names of the RESs according to level and location. Interviews were limited to the RES 02s and 03s only, as they are the two levels most affected by the promotion system. The choice of laboratories to be visited outside of Ottawa was limited to those having more than 15 RESs, thereby insuring a reasonable number of interviews. Some smaller laboratories were included in the Ottawa-based interviews to ensure coverage of the departments that hire a smaller number of RESs.

This sampling effort brought forth a good mix of individuals. In most locations, groups of 4-5 RESs from the same level (02 or 03) were interviewed together. Within these groups there was generally a good mix of age distributions, tenure in a RES level, tenure in the government, and scientific responsibilities. The respondents to the questionnaire also show a good mix of characteristics, as seen in Appendix C.

TABLE 4: NUMBER OF SCIENTISTS, DIRECTORS AND MANAGERS INTERVIEWED BY DEPARTMENT AND BY LABORATORY/INSTITUTE

Dept.	Laboratory/Location	No. RESs	No. Dirs. & Mgrs.
DOE	Forest Research Centre, Victoria	12	1
	Laurentian Forest Research Centre, Ste. Foy, Quebec	8	2
	National Water Research Institute, Burlington, Ontario	9	4
	Atmospheric Environment Service, Downsview, Ontario	12	1
	Canadian Wildlife Service, Bedford, Nova Scotia	1	
DFO	Ocean Science and Surveys, Patricia Bay, B.C.	12	2
	Pacific Fisheries Research Centre, Nanaimo, B.C.	7	
	Freshwater Research Institute, Winnipeg, Manitoba	12	2
	Bedford Institute of Oceanography, Dartmouth, Nova Scotia	13	4
	Halifax Research Laboratory	8	1
EMR	Geological Survey, Calgary	12	1
	Bedford Institute of Oceanography, Dartmouth, Nova Scotia	6	1
	Geological Survey, Ottawa	15	1
	Canmet, Ottawa	32	6
	Earth Physics Branch, Ottawa	11	1
NHW	Bureau of Drug Research, Ottawa	7	2
	Environmental Health Centre, Ottawa	12	8
	Lab. Centre for Disease Control, Ottawa	12	3
	Food Directorate, Ottawa	12	4
DOC	Communications Research Centre, Shirley's Bay, Ontario	17	3
AGR	Agriculture Research Station, Winnipeg	12	1
	Agriculture Research Station, Ste. Foy, Quebec	15	1
	Chemistry & Biological Div., Ottawa	6	1
	Biosystematics Research Institute, Ottawa	10	2
	Ottawa Research Station, Ottawa	6	1
	Animal Research Institute, Ottawa	10	1
NMC	Ottawa	8	2
TOTALS:		297	55

TABLE 5: NUMBER OF QUESTIONNAIRE RESPONDENTS BY DEPARTMENT AND LABORATORY/INSTITUTE

Dept.	Laboratory/Location	No. Returned Questionnaires
DOE	Pacific Forestry Research Centre, Victoria, B.C.	7
	National Water Research Institute, Burlington, Ontario	22
	Atmospheric Environment Service, Downsview, Ontario	18
	Laurentian Forest Research Centre, Ste. Foy, Quebec	12
EMR	Geological Survey, Calgary	13
	Bedford Institute of Oceanography, Dartmouth, Nova Scotia	7
	Geological Survey, Earth Physics Branch, and Canmet, Ottawa	68
DFO	Halifax Research Laboratory, Halifax	8
	St. Andrews Research Laboratory, St. Andrews, New Brunswick	9
	Bedford Institute of Oceanography, Dartmouth, Nova Scotia	2
	National Water Research Institute, Burlington, Ontario	1
AGR	Ottawa	35
NHW	Ottawa	11
DOC	Ottawa	21
NMC	Ottawa	16
TOTAL:		250

TABLE 6: NUMBER OF QUESTIONNAIRE RESPONDENTS BY LEVEL IN THE RES CLASSIFICATION

Level	No. of Respondents	Respondents as Percent of RESs in Level
1	17	7.1%
2	139	12.6%
3	84	16.2%
4	9	9.8%
	249*	

* One respondent did not indicate his/her RES level.

The Scientists' Concerns

The discussions with Research Scientists and the survey responses consistently pointed out a set of problems with the RES classification system. These are discussed below.

1. Quotas

The most common criticism voiced by those interviewed had to do with the quotas that are currently used to maintain control over advancement. As well, fully 218 (or 88%) of the questionnaire respondents stated that the quotas cause problems in RES promotions. The quotas, which limit the RES 04 level to no more than 5% of all RESs and the 03 level to no more than 25%, are felt to be arbitrary and unrealistic. While many scientists recognize the managers' need to curtail automatic advancement to the top of the classification, they also believe that the 5% and 25% figures contradict the basic theory of the RES incumbency system. If the scientists' advancement is supposed to be based on their cumulative merit, they do not believe they should be denied promotion (once merit criteria are met) on the basis of a quota restriction. As the number of RES 02s reaching the maximum of that level increases, this becomes an even more severe concern.

According to the scientists, the quotas might be reasonably fair if 1) government hiring of RESs was consistent and constant and 2) the consequential age distribution of the

RESs was a normal age distribution. As shown in Table 7, however, the number of RESs hired during the past four years has been anything but consistent. Furthermore, the graph in Figure 2 shows that the age distribution of the RES group does not follow a normal distribution.(2) The quotas, therefore, provide rewards to only the particularly exceptional, with no recognition of other individuals who, according to merit criteria, are also worthy of advancement.

Table 7: NUMBER OF NEW RESs HIRED PER YEAR

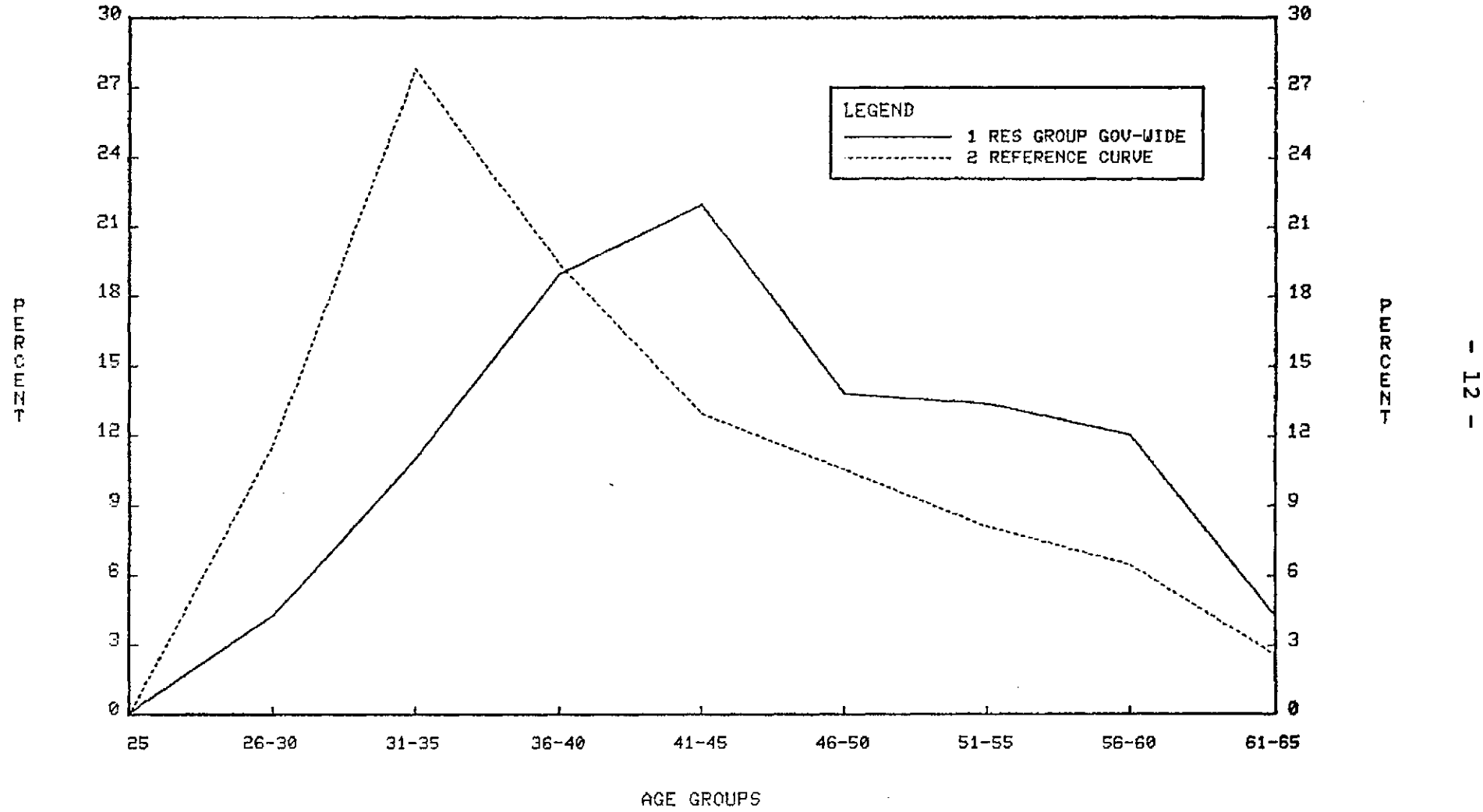
Dept.	1982	1981	1980	1979
AGR	43	32	20	12
EMR	50	42	11	9
DOE	9	10	13	11
NHW	8	3	1	1
DFO	24	6	8	5
DOC	4	5	2	0
NMC	2	1	0	1
TOTAL	140	99	55	39

For the scientists in some of the newer laboratories and institutes (i.e., those established in the late 60's and early 70's), this problem is particularly evident. In these instances, large numbers of young scientists were hired when the facilities were opened, and relatively little hiring has taken place since then. As a result, in some of these locations over 80% of the RES 02 population currently is at the maximum, with little prospect for advancement, given the already filled departmental quotas. (Government-wide, 57% of the RES 02s are currently at the maximum of their level).

If quotas must be maintained, the scientists argue that they should be flexible (with periodic increases and decreases in the percentage limits, based on proportion of highly skilled or older scientists at a particular time in a specific location). Such a system, they believe, would not penalize a scientist just because an unusually large number of good scientists were hired at the same time or during the years immediately preceeding his/her hiring.

In contrast to the RESs, a majority of the managers and directors who were interviewed did not believe that the quotas were denying promotion to many of the truly deserving scientists. While most of the laboratories visited have a few individuals who

FIGURE 2:
AGE DISTRIBUTION OF RESEARCH SCIENTISTS
COMPARED TO A NORMAL DISTRIBUTION



SOURCE : PUBLIC SERVICE COMMISSION, 1983; DECKER AND VAN ATTA, RESEARCH MANAGEMENT, 1973

have been recommended for promotion and denied it because of quota restrictions, these cases, according to most managers, are few when compared to the number of other RES 02s who are at the maximum but are not (despite their belief to the contrary) ready for advancement.

2. Merit Systems

The above findings regarding dissatisfaction with the quotas at first seemed to contradict a second set of findings that revealed that the previous (1974-77) merit system was also unsatisfactory. The discussions with Research Scientists and managers, however, suggested that the main problem with the older merit system was its administration. As designed, all scientists were reviewed at the same time every year - regardless of whether the timing of their research had enabled any results to be obtained since the previous year's review. The evaluation process was also extremely complicated and time-consuming.

Furthermore, the distribution of small amounts of merit-bonus money to the scientists, the unwritten quotas for granting superior and outstanding rankings, and the fact that promotions were tied to receiving those superior and outstanding evaluations in consecutive years, proved to be unacceptable to managers and scientists alike.

The scientists that were interviewed, as well as many of the questionnaire respondents, commented on the need to return to a real merit system - but one that was better administered and not tied into fixed quotas in any way. They argue that, in an incumbency-based system, there is an inherent contradiction of terms if promotions are also based on quotas.

3. RES Promotion Criteria and the Promotion Process

It became apparent during the discussions that the RESs and their managers have different perceptions about the requirements for promotion, and that the RESs often are unaware of how the promotion process works. Across all departments, it appears that very little information about the promotion process is provided to the RESs before they reach the maximum step of the RES 02 level. Thus, until they reach that point, the scientists usually do not have a clear idea of the various criteria that are considered in promotions, how those criteria are applied, or on what type of work they should focus their attention if they want to move ahead.

Most of the RESs who were interviewed are working on the assumption that the number of publications they have authored is counted heavily. They also suspect that the length of time

required for different types of scientific research, the nature of their publications, and the quality of their research are not considered at all, or at best, are considered inadequately. They believe that some promotion review committees are relying on the number of references made to a scientist in citation indices, as a way of measuring merit, and they feel very uneasy about such comparisons.

A few of the RESs, on the other hand, noted the recent promotion of colleagues who are involved in contract management and technology transfer-related activities. To these RESs, the more applied work appears to be currently receiving the heaviest weight by the promotion review committees, with publications and basic research taking a secondary role. While this is a minority view, it is one that is held as strongly in some instances as the "publish or perish" belief is by RESs in other locations.

The Research Scientists also expressed concern that the current statement of criteria used to evaluate their work (see Appendix A) is inadequate. For one thing, the list is considered to be too vague to guarantee equal consideration by different managers. As well, the list omits many types of activities that RESs are asked to perform, such as the public service and display work of RESs at National Museums, regulatory work at Health and Welfare, and laboratory testing work done by particular scientists as a contribution to the "real" research of other scientists.

Many of the managers who were interviewed also admitted to confusion regarding the promotion criteria. Some are hesitant to incorporate all of the criteria into their promotion nominations, because they realize that, in the higher level review committees, it is easier to support nominees who have significant publication records over those who have managed contracts or done other applied scientific work. Both the distance of the departmental and interdepartmental review committees from the work of the scientists, and traditional beliefs regarding the work of research scientists, contribute to this hesitancy on the part of managers.

Many of the RESs who were interviewed believe, further, that promotions from RES 02 to 03, and from RES 03 to 04, have become a reward for the time that scientists have waited at the maximum of their level, rather than a truly merit-based consideration. (In one department, though, the contrary belief that promotions are rare among those near retirement age was expressed.) A majority of the managers are also concerned that the quotas, and the growing numbers of people at the 02 and 03 level maxima, are making it increasingly difficult to promote exceptional individuals who are not at the maximum, or have not been at the maximum for long.

Another indirect effect that quotas are thought to have on the promotion process is a variation in standards for promotion. Since the quotas are filled each year, but the number of vacancies and the number of potential promotion candidates vary (depending on the number of RESs at the maximum), then the level of competition for the promotions will also vary from year to year, as will the level of qualifications necessary for promotion. As one questionnaire respondent commented:

> While a quota system may restrict the number of RES 03 and 04s, there is pressure to use the quota irrespective of whether there are enough qualified people. Thus the best looking (on paper) scientists put forward in a year will be promoted, with no standard to maintain quality from year to year.

In regard to the departmental and interdepartmental review committees, the RESs also believe that these groups may be too far removed from the work of a particular scientist to adequately judge the value of that work. Thus, promotions are often seen as strictly managerial decisions without significant appreciation for the actual research work being evaluated. As professionals, the scientists would feel more assured that the merit or value of their work was being recognized if an outside peer review system (such as exists in universities for faculty tenure decisions) were also introduced. There is a reluctance to give up the higher level (departmental and interdepartmental) reviews completely, though, as many see these review groups as potential appeal committees.

In summary, the RESs and their managers are concerned that the criteria currently used by the review committees to judge different types of research work may be too vague to be applied uniformly. The scientists would basically like to see clearer and better defined criteria so that, 1) they are aware of what they will be judged on, and 2) the review committees have more to guide their decisions than simply the most easily quantified criterion -- the number of publications.

4. Reclassification of RESs

Currently, the RES classification includes scientists doing various types of scientific work (ranging from basic research, to technology transfer, to support of regulatory functions, to research management). While those engaged in full time scientific management have in the past been classified as REMs, the recent conversions of REMS to SMs has left many managers with the belief that a move back to the RES classification is more advantageous than one to the SM group.

This, combined with the fact that many upper level RESs (03s and 04s) have traditionally engaged in some management activities, means that a significant percentage of upper level RESs are doing management work.

The majority of scientists interviewed do not, however, accept the use of the RES classification for people who are basically managing research. They feel that this situation reduces the overall importance of scientific research in the classification, and that the movement of former REMs to the RES 03 ranks (without undergoing the multi-step promotion review process) reduces the chances of promotion for individuals in the RES 02 level. In the RESs' opinion, if someone is only managing research, then they should not take up quota positions and thereby restrict the advancement of scientists who are actually performing research.

Additionally, in some laboratories and institutes, the reduced local opportunity for RES 02 advancement (due to the quotas, and to non-normal age distribution patterns) has resulted in situations where RES 02s have been reclassified to the upper levels of Physical Scientist (PC), Biologist (BI) or other scientific classifications, which have higher maximum salaries than the RES-02 level. Although these classifications are not strictly intended for Ph.D.-level scientists doing scientific research, justification for such reclassification has been granted where scientists are doing work of a more applied nature. In the long run, however, it is felt that this type of reclassification serves merely to increase the morale problems of the remaining RESs.

5. Number of Levels in the RES Classification

The scientists and their managers also expressed a general belief that it would be desirable to divide the existing RES salary ranges into more levels. If combined with a more rigorous merit promotion process, this would work to:

1) provide more points for recognition for valuable work (in title, if not in money) and would extend that recognition throughout the scientists' careers;

2) provide less productive scientists with a clearer idea of the value of their work; and

3) reduce the considerable overlap in pay ranges among the different levels.

6. Recognition

a) Appraisals of Work

Most of the scientists interviewed believe that the RES salary ranges are reasonable and that the monetary rewards of promotion are not their main goal.(3) This said, however, they also are convinced that greater recognition for their work is needed.

At the present time, RESs do undergo annual appraisals, but these do not have much impact on career advancements. They do not directly feed into the promotion process, and many of the scientists who were interviewed stated that they were asked to write their own annual appraisals. The managers also admitted that annual appraisals, as currently implemented, have little bearing on promotion decisions.

In many ways the RESs undergo only one significant merit review in their entire career -- and that happens only if they are put forward for promotion from a RES 02 to a RES 03. Consequently, they feel they receive very little meaningful recognition for their work.

b) Conference Travel

Almost all the scientists who were interviewed, those who answered the questionnaire, and their managers and directors, expressed the view that conference attendance and participation is a vital part of scientific research work. However, current restrictions limit the number of people from a department who can attend a particular conference. This is a particularly difficult situation for scientists from larger departments who are allowed the same number of participants per conference as smaller departments; it also poses problems for scientists who are dispersed through regional laboratories and who will thus have limited contact with those who do attend the conference from their departments. Furthermore, government scientists are often among the few experts in their field in the country, and conference participation is the only way they can keep current in these fields.

The idea that a few representatives of a department can cover a conference is widely seen as unrealistic. Some meetings have multiple sessions in a wide variety of specialties which cannot possibly be covered by (say) two scientists. Moreover, the exchange and useful application of research that has been conducted by government scientists is severely limited by the number of specialists that are permitted to participate. (4)

The scientists and managers recognize that fiscal restraints will decrease the overall number of conferences they may attend. On the other hand, national and international recognition (gained at conferences) are part of the RES promotion criteria, and the RESs and their managers see a basic contradiction between this and restrictions that stop the RESs from attending the conferences that are most useful to their research. The RESs and their managers believe that such travel should, therefore, be considered to be essential travel.

c) Openness of the System

Not only would the scientists like to know more clearly the basis on which they are being evaluated for promotions, many also believe that once promotions have been made, the names of successful scientists should be made public within the department and/or institute. This is done by some of the directors who were interviewed, but it is not the case everywhere. The value of this approach is that scientists who have not yet gone through the promotion process can obtain a better appreciation of the talents that are rewarded, and those who are promoted receive more open recognition for their efforts.

d) Other Recognition

Under a system of limited resources and tight fiscal control, there appears to be little that local directors can do to encourage and motivate their scientists. In one research institute that was visited, however, the idea of an outside peer reviewed competition for the RESs' research papers is being tried. A small cash prize and/or the recognition that the winning scientist receives from his or her colleagues would, it is argued, work to boost low morale, and to stimulate productivity.

CHAPTER TWO

FOOTNOTES

(1) In the two exceptions, interviewees were selected by their Directors who were asked to include individuals at different: stages of their particular level, types of work (applied or basic), ages, and levels of productivity.

(2) The normal age distribution shown in Figure 2 is based on: a constant rate of hiring of scientists between the ages of 25 and 35, early retirement options, 7.9% voluntary attrition, and 5.5% "culling" or removal of unsuitable employees per year.

(3) The one real exception to this was found among the Geological Survey group at the Institute for Sedimentary and Petroleum Geology in Calgary. Regional economics and the market value in the private sector for geologists have put these individuals at a disadvantage.

(4) Comments by one questionnaire respondent.

CHAPTER THREE

ANALYSIS OF SURVEY FINDINGS AND RELATED DATA

Is there a RES Problem?

As described in the previous chapter, the Research Scientists and their managers confirm the initial reports that the existing system is causing morale problems. While some managers feel that the truly deserving RES 02 and 03s are being promoted to the next level, there is no doubt that the majority of all those who were interviewed or who responded to the questionnaire feel that, in principle, the quotas are an arbitrary and unfair practice when applied to a merit system. They also feel that their options for career development are significantly reduced by the combined merit, lock step and quota system, which is resulting in a "bunching" of RESs at the maximum step of the 02 and 03 levels.

An examination of the different departments and research institutes does indeed show that a very large proportion of the RESs are at the maximum for their levels. Within National Museums Canada, for example, 66% of all RES 02s and 88% of RES 03s are at the maximum of their levels. At the National Water Research Institute in Burlington, Ontario, 64% of the RES 02s and 74% of the RES 03s are at their maximum step. On a government-wide basis, 57% (or 626) of the RES 02s, 74% (or 376) of the RES 03s, are receiving the maximum salaries for their levels. (See Table 8). With only an average of 52 individuals per year being promoted from the 02 to the 03 level, and another 7 moving to the 04 level, it is easy to believe that most of these people at the maximum steps will stay there. But will they?

Are RES Careers Being Blocked?

Figure 3, below, projects to 1990 the number of RES 02s who will reach the maximum of their level each year under the lock-step system. Those at the maximum will presumably be awaiting promotion to RES-03 positions, although not all will ultimately be qualified. These projections are based on the rate of arrival at the maximum of the 02 level of only the existing RES 02 population, the continued application of the quota system, and known resignation and retirement rates for RES 03s. They are also based on the assumption that there will be no additional RESs added to the classification or any of the four levels over time.

TABLE 8: SALARY DISTRIBUTION OF RESs BY LEVEL AND STEP

Level 1	Step 1	15	(6.3%)
	Step 2	11	(4.6%)
	Step 3	38	(16.0%)
	Step 4	43	(18.1%)
	Step 5	48	(20.2%)
	Step 6	41	(17.2%)
	Step 7	42	(17.6%)
		238	(100. %)
Level 2	Step 1	8	(0.7%)
	Step 2	12	(1.1%)
	Step 3	45	(4.1%)
	Step 4	77	(7.0%)
	Step 5	62	(5.6%)
	Step 6	62	(5.6%)
	Step 7	114	(10.4%)
	Step 8	96	(8.7%)
	Step 9	626	(56.8%)
		1102	(100. %)
Level 3	Step 1	0	
	Step 2	0	
	Step 3	3	(0.6%)
	Step 4	5	(1.0%)
	Step 5	82	(16.3%)
	Step 6	39	(7.7%)
	Step 7	376	(74.4%)
		505	(100. %)
Level 4	Step 1	0	
	Step 2	0	
	Step 3	0	
	Step 4	0	
	Step 5	12	(15.0%)
	Step 6	5	(6.3%)
	Step 7	63	(78.7%)
		80	(100. %)

Source: Treasury Board, December, 1982.

Note: The totals here differ slightly from those given earlier in this report due to the data referring to different points in time and varying position vacancy rates at those times.

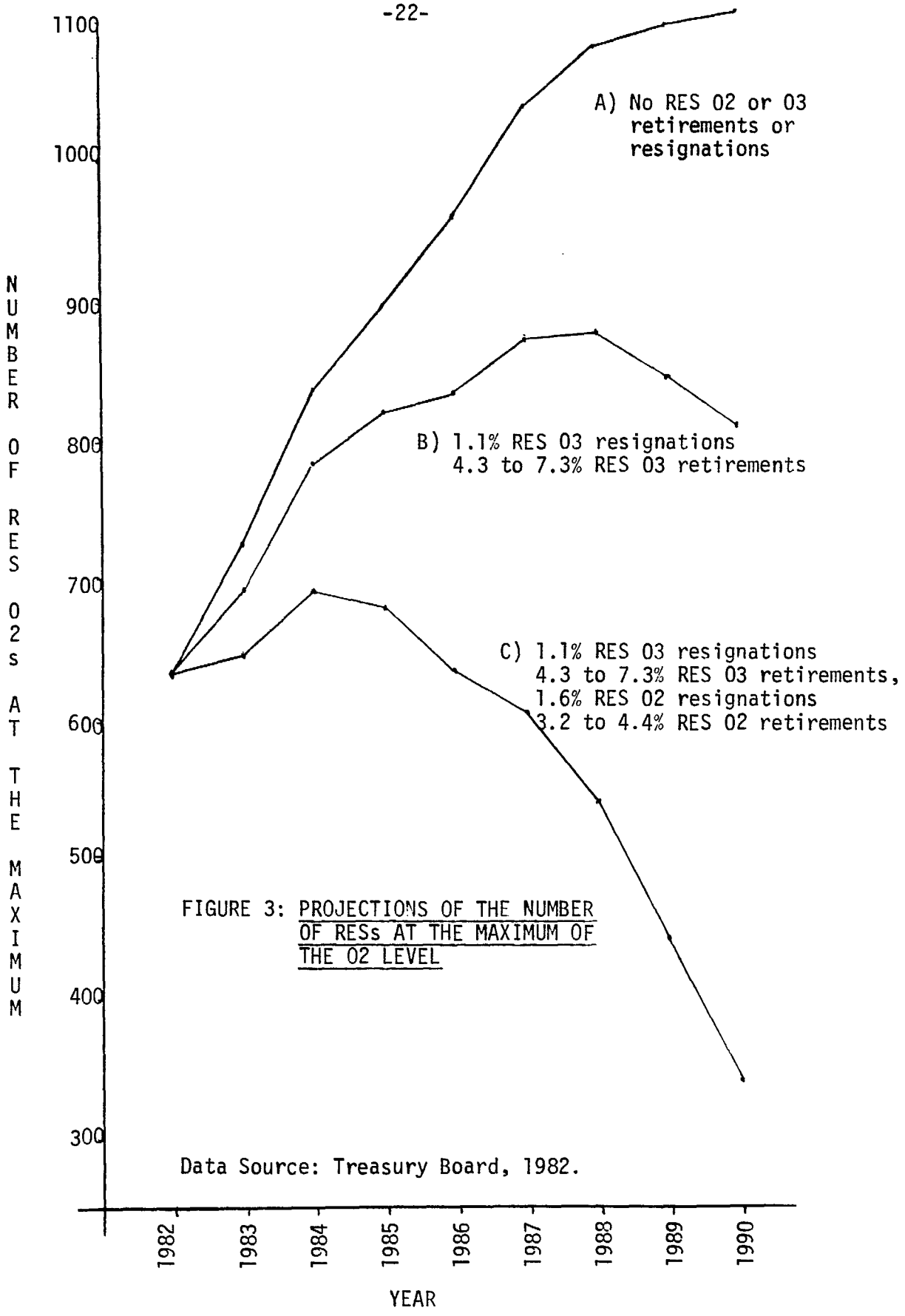


FIGURE 3: PROJECTIONS OF THE NUMBER OF RESs AT THE MAXIMUM OF THE 02 LEVEL

Data Source: Treasury Board, 1982.

Past trends show relatively stable and low resignation rates for the RES 03s (1.1% per year); however, the age distribution of this group suggests that there will be an increase in retirements in the period 1986-1990 (from an average of 4.3% to 7.3% per year). Thus, adding these resignation and retirement rates we find that an average of 5.4% of the RES 03s will be leaving annually in the period between 1981 and 1985, and an average of 8.4% will be leaving each year between 1986 and 1990. This means that, if each RES 03 vacancy is filled by a promoted RES 02, nearly 80% of all existing RES 02s will be at the maximum in 1988, and by 1990 that figure will drop to only 74%. These trends have the impact on the RES 02 population indicated by curve B in Figure 3.

Again, it should be noted that not all of the 626 RES 02s that were at the maximum in 1982 (57%) were necessarily qualified or ready to be promoted to the RES 03 level, nor will all of those who are at the maximum in 1985 or 1990 be worthy of promotion.

Curve C of Figure 3 includes the current retirement and resignation rates (as indicated) for RES 02s, showing a substantial decrease in the population at the RES 02 maximum over the decade. Sixty-three percent of the RES 02s would be at the maximum in 1984 by this projection, while only 31% will be at that level in 1990.

These curves, however, do not reflect any additions to the currently existing RES 02 population. During the decade, RES 01s will be promoted to the middle steps of the RES 02 group, and new RESs will be hired at both the 01 and 02 levels to replace those retiring or resigning from all levels. With the addition of these new Research Scientists, it is expected that the curve for those at the maximum will be between curves B and C, and will probably approach curve B. In other words, a high proportion of RES 02s will remain at the maximum.

Are RESs Leaving Because of the System?

Since we are told that this system has created problems of low morale, and that people might be tempted to seek other employment because of this, we have examined the extent to which RESs are changing their positions from one department to another and the rate at which RES 02s have recently departed from their positions.

Data on the mobility of RESs between departments suggests that to all intents and purposes RESs display very little interdepartmental mobility. Between 1981 and 1983, only one or two RESs per year transfered to other departments.

Data on departures from the federal government are available yearly from 1976 on, allowing us to look at two years in the earlier merit system (1976 and 1977), and also the present merit and quota system (1978-81). The resignation rate for RES 02s in 1976 and 1977 averaged 1.5%, and for 1978-1981 it was 1.6% on average. (Resignation rates are the number leaving each year as a percentage of the group population.)

An examination of this data shows that there is no evidence of increased resignations within the RES 02 level over time. From this information, it is difficult to support the contention that the merit-quota system is creating sufficiently severe problems as to cause RES 02s to leave their jobs.

The value of such information is limited, however. Only those individuals who actually left are included; those who are dissatisfied but remain in their jobs are unknown (particularly those for whom there are limited alternative opportunities in their fields). Additionally, resignation data does not fully explain why the individuals have left; resignations do not always result from dissatisfaction.

Overall, it does appear that there currently is a problem with increasing numbers of RESs at the maximum of their levels and no room for advancement. The situation has not, however, reached proportions where Research Scientists are leaving the government in significant numbers, although this may be partly due to a lack of alternative opportunities in Canada (e.g., in fisheries and some areas of agricultural and environmental science).

The projections given earlier for the late 1980's do indicate that the current situation is likely to improve somewhat with future increases in RES 03 and 04 retirements. This relief will only be temporary, however, as the application of fixed quotas and lock step advancement within levels to a population with an uneven age distribution means that the current situation will eventually recur.

Are Salaries a Problem?

When individuals realize they are blocked from upward career progression, salary considerations usually are the foremost concerns. For the RES group, however, we have been told that salary is not the main consideration, but rather that recognition is important. To review the context in which this situation emerges, we can compare the RESs' salary structure with that of scientists in other groups, in order to assess whether RESs, relatively speaking, are poorly or well rewarded for their work. At similar salary/compensation levels we can compare education

levels and age distributions to determine if the more highly educated RESs are advancing more slowly (i.e., if they reach higher salary levels at an older age) than scientists in other classifications.

1) Salary:

In Figure 4, the salary ranges for Research Scientists are presented by level, and are compared to the salary ranges of several other scientific and engineering classifications. As shown here, the salaries of the 32% of the Research Scientists in the combined 03 and 04 levels are matched by roughly 7% of the Meteorologists (MT), 17% of the Physical Scientists (PC), 4% of the Biologists (BI), 20% of the Engineers (ENG), 7% of the Veterinary Scientists (VS), 5% of the Forestry Scientists (FO), 4% of the Agriculture Scientists (AG) and 0.5% of the Chemists (CH).(1) In the other scientific groups that have an incumbency system, roughly 52% of NRC's scientists and 30% of the Defence Scientists (DS) match the pay ranges of this 30% segment of the RES group.(2) Thus, only NRC's scientists, at first glance, seem comparatively better off.

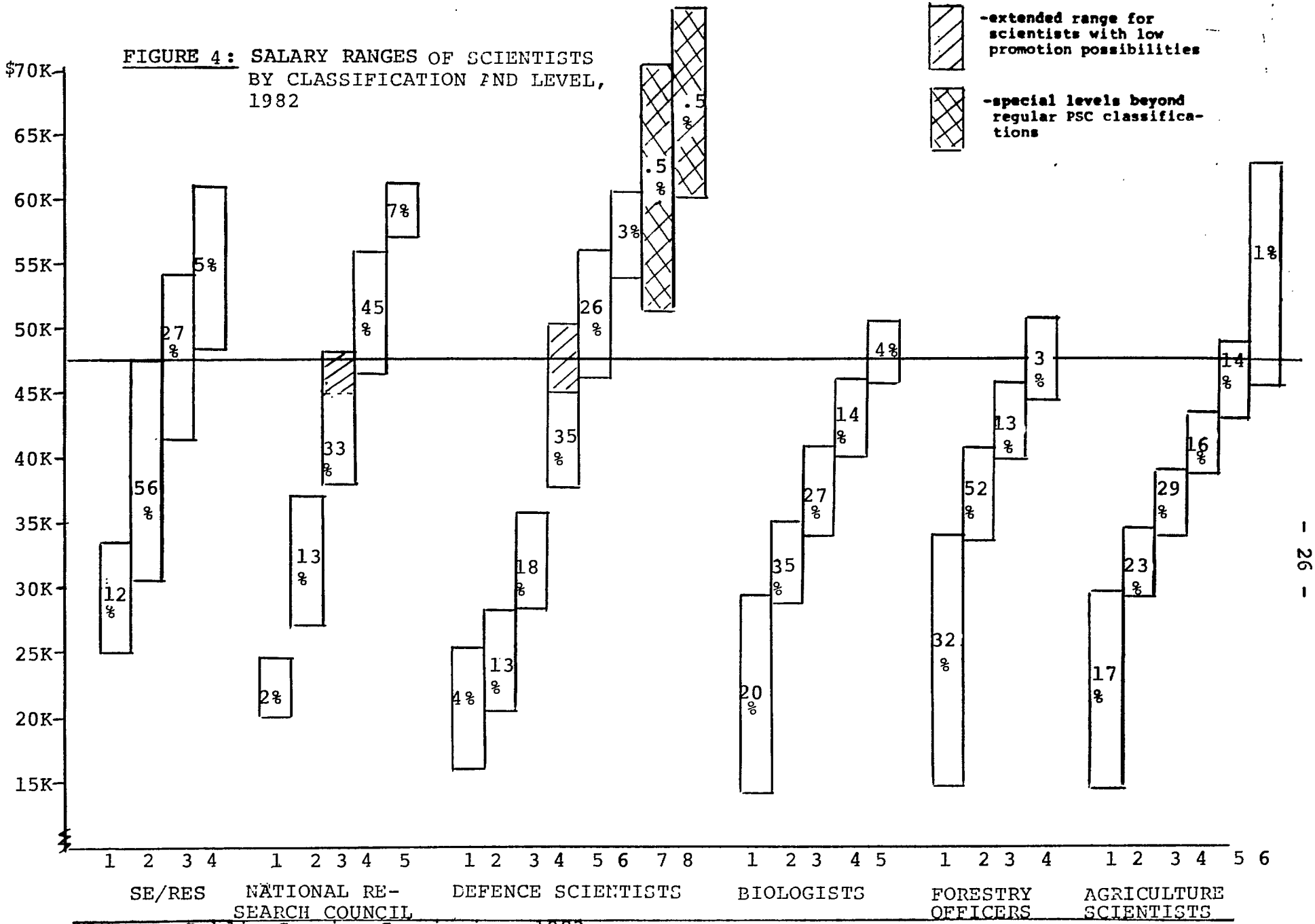
2) Age:

Using 1981 data, Figure 5 compares average age (which is a good proxy for experience) and average salary for each of the levels in the scientific classifications. The results show a very strong (0.92) correlation between these two variables. By this comparison, a year's age or experience is worth roughly $1,180 in terms of increased salary. The RES 01 group is among the oldest for entering scientists, and is paid on a par with scientists in the 02 levels of other classifications. The RES 04 group is receiving salaries comparable to the top-level NRC scientists, and to the top level of the Defence Scientist group (they are of similar age in both cases). When compared to the linear regression line, each of the RES levels is seen to be receiving salaries that are very close to the average or better than average, relative to age.

3) Education:

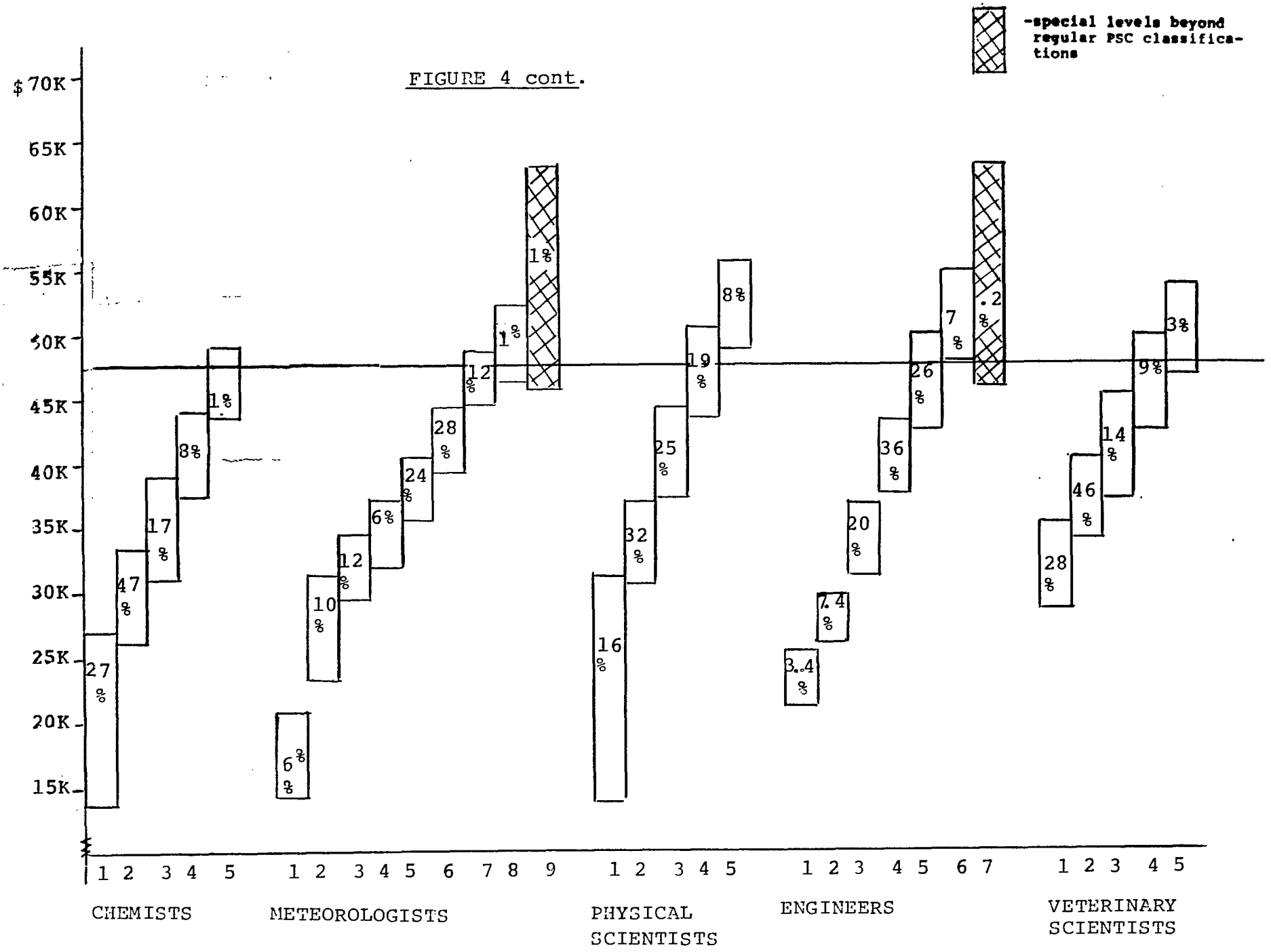
Education data have also been compared for the upper levels of the scientific classifications. Where highest earned degrees are known, we find the percentages of Ph.Ds shown in Table 9. Here we see that the RES, DS, NRC, VS and BI groups are the only ones with more than 50% of their numbers having Ph.Ds. Certainly the educational qualifications of the first three of these groups are in accord with their higher salary distributions and ranges, and their older age distributions. In general, however, there is not a very good correlation between salary and education levels in the various groups. (See Figure 6)

FIGURE 4: SALARY RANGES OF SCIENTISTS BY CLASSIFICATION AND LEVEL, 1982



Source: Public Service Commission, 1983

FIGURE 4 cont.



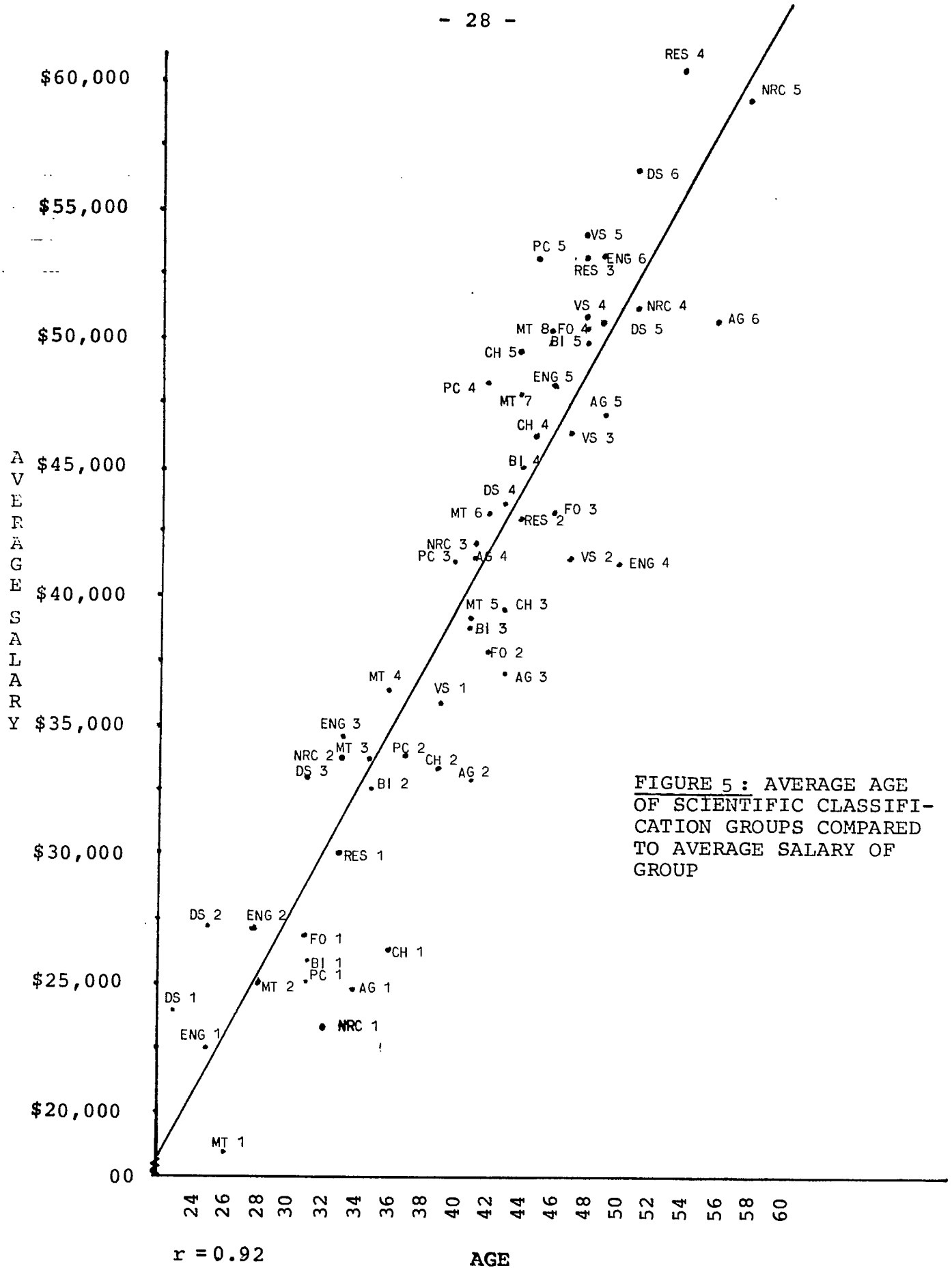


FIGURE 5 : AVERAGE AGE OF SCIENTIFIC CLASSIFICATION GROUPS COMPARED TO AVERAGE SALARY OF GROUP

Source: Public Service Commission, 1983; National Research Council, 1983.

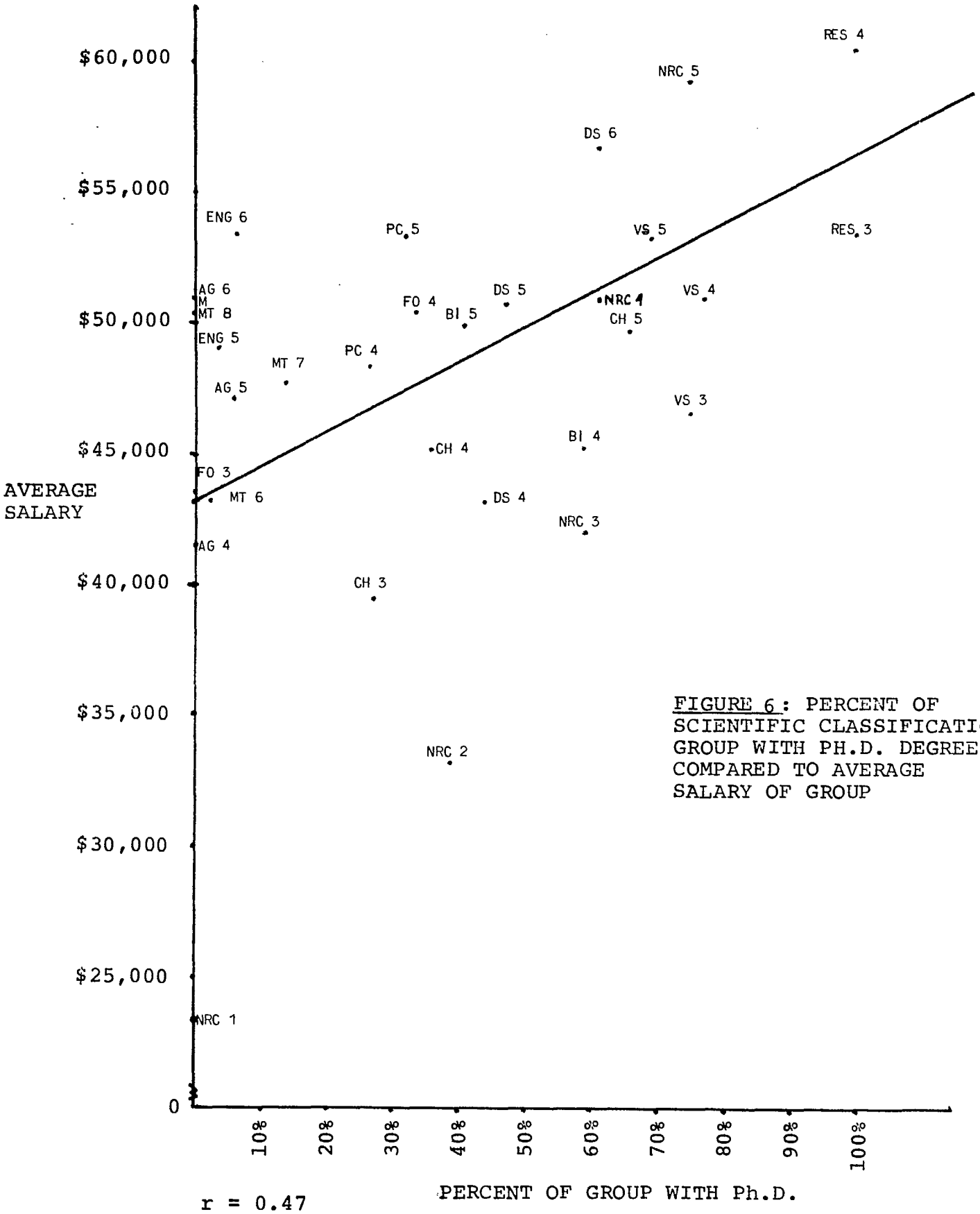


FIGURE 6: PERCENT OF SCIENTIFIC CLASSIFICATION GROUP WITH PH.D. DEGREE COMPARED TO AVERAGE SALARY OF GROUP

r = 0.47

Source: Public Service Commission, 1983; National Research Council, 1983.

It should be noted that Figure 6 does show that entry level RESs and VSs (the two groups with the highest percentages of Ph.Ds.) both start at higher salaries than do other scientific groups. Education does, therefore, seem to be a factor in initial placement. However, Figure 6 also indicates that, after initial placement, the impact of educational level is supplemented by age (or years of experience) as the prime determinant of compensation variations.

From this data, it is clear that the RES group is not significantly disadvantaged salary-wise in comparison with other scientific groups within the government. The data indicate that there is a strong correlation between compensation and age (or years of experience) across all the scientific classifications, including the RES group. Indeed, the RESs do slightly better than the other groups, and, in particular, have their higher educational qualifications at starting levels recognized by higher initial salaries (as, in fact, do other highly qualified groups like the VS category).

TABLE 9: PERCENT OF SCIENTISTS WITH PH.D. DEGREES BY CLASSIFICATION AND LEVEL

RES	03	100%	FO	03	0%	
RES	04	100%	FO	04	33%	
DS	04	43%	SUR	05	0%	
DS	05	47%	SUR	06	27%	
DS	06	61%	SUR	07	0%	
NRC	1	0%	MT	06	2%	
NRC	2	38%	MT	07	13%	
NRC	3	59%	MT	08	0%	
NRC	4	61%	MT	08	100%	(N=1)
NRC	5	75%				
AG	04	0%	PC	04	26%	
AG	05	6%	PC	05	32%	
AG	06	0%				
BI	04	58%	VS	03	75%	
BI	05	41%	VS	04	76%	
			VS	05	69%	
ENG	05	3%	CH	03	27%	
ENG	06	6%	CH	04	36%	
			CH	05	66%	(N=3)

Note: For a list of the classification titles shown here, see Appendix D.
Source: Public Service Commission, 1982.

Are There Other Difficulties With the RES Promotion System?

The above data seem to indicate that RES salary levels do not constitute a problem. This is consistent with the opinions expressed in the interviews and questionnaires described in Chapter 2. Those interviews, however, did raise other concerns which the Research Scientists and their managers have with the RES system. These concerns are examined more fully below.

(1) Quotas

As noted in Chapter 2, the scientists who were contacted overwhelmingly argued that the use of quotas together with a merit-based, incumbency system is artificial and arbitrary. The use of set quotas over an extended period of time would only be appropriate, they claim, 1) if a constant rate of both recruitment and departure of scientists were realized, and 2) if a normal age distribution existed for the RES population in the first place.

Table 10 uses the Table 7 data to show that while there has been a steady growth in the number of RESs recruited recently, the total number of RESs employed, and the number of RESs leaving the Public Service, have fluctuated during the same time period. A steady population (to which constant quotas could be applied without undue consequences) does not seem to exist for this group.

TABLE 10: SIZE OF RES POPULATION, NUMBER OF RES DEPARTURES AND SIZE OF RES RECRUITMENT, 1979-1982

Year	RES Population	RES Departures	RES Recruitment	Net Change Year to Year
1979	1921	89	39	
1980	1893	89	55	-28
1981	1977	107	99	+84
1982	1955	73	140	-22

Source: Public Service Commission, 1983.

Figure 2 in Chapter 2 showed the age distribution of the RES population on a government-wide basis compared to a normal distribution that takes into account mid-career departures and early retirements. Despite the fact that not all older scientists are worthy of being in the highest ranks, the larger proportion of older scientists in the RES distribution versus the normal distribution indicates potential career advancement problems.(3)

In the normal distribution, the oldest 30% include all those over 46 years of age, while for RESs only those over age 51 would be included. Not only, then, does the RES population fluctuate in its size over time, but even its current age distribution does not approximate a normal distribution. Under such a situation, set quotas, applied annually, will not result in an equitable system.

(2) Can a Merit System Work?

The RESs contacted in the study were overwhelmingly in favour of maintaining an incumbency-based system. However, the fact that nearly every scientist and manager interviewed (and a majority of those who filled in the questionnaire) commented on the administrative difficulties of the older RES merit system (1974-78), raises the question of whether a true merit system is administratively feasible for an incumbency-based system (especially when fiscal restraint is required). There is, however, another incumbency-based classification system that is currently in use in the Public Service which provides a comparison. This is the system currently used by the Department of National Defence (DND) for its Defence Scientist (DS) classification. (NRC, which is a departmental Crown corporation not directly subject to Public Service Commission requirements, also uses a similar system). A closer look at that DS system shows that, in fact, it does address most of the concerns and problems that are realized with the RES system.(4)

The Defence Scientist system has seven classified levels. Level 01 is considered the entry level for those with only a Bachelor's degree, 02 is entry level for those with a Master's degree or 2 years of relevant experience (YREs), and 03 is the entry level for those with a Ph.D. or 5 YREs. DS 04 is the working level for experienced officers who have demonstrated the ability to accept responsibility for and successfully conduct specific projects and investigations, and who may be required to plan and coordinate the work of project teams. The DS 05 level is the senior working level for those who have established a recognized reputation for leadership in a complex area of science and technology, and who have consistently demonstrated the ability to generate original and novel solutions and to meet scientific and technological problems that are defined only in broad terms. DS 06s are equated with the RES 04 level of international distinction, and the DS 07 level is reserved for those who are

extremely distinguished in their fields. (It is not expected that many DS 06s will ever reach the DS 07 level, and in fact only 2 out of 546 Defence Scientists (0.4%) were at this level in April, 1983.)

Unlike the RES system, everyone in the DS classification system is reviewed annually; however, the process for doing so does not appear to be as complicated as the old (1974-77) RES merit system due to the fact that there are no strict quotas as to how many people can be at a certain level or rating. Rather, the criteria for what a scientist must have done to enter each level are stringent enough to ensure that only those worthy of promotion are promoted. These criteria also serve to provide that an employee's salary continues to keep pace with his or her rate of professional development subsequent to appointment to a level.

In Appendix E, the criteria for assessing DS promotions are shown. Unlike the RES criteria, those for the DS classification identify the kind of evidence which is associated with promotion to each of the various levels, and at the more senior levels provide separate criteria for each of the different types of DS work (bench science; management; and analyst/generalist assignments). Given the recognized difficulty of comparing RESs who are doing different jobs (i.e., research, contract or research management, regulatory work, etc.), such a multi-pronged system would seem to be appropriate for the RESs.(5)

Furthermore, as Table 11 shows, the Defence Scientists are placed within one of three categories in their evaluations, depending on their rate of professional development. While scientists can be re-evaluated into a different category later (6), it is recognized that Category 1 scientists, because they are developing much more quickly than normal, receive larger than average salary increases. Category 1 scientists normally attain at least the maximum of the DS 05 pay range during their careers, and often attain the DS 06 level. Category 2 scientists (about 70% of the total) are those whose rate of professional development generally conforms to the average for the group. Such employees normally receive one increment per year, up to the double barrier in the DS 04 pay range, and may finish their careers either as DS 04's or DS 05's (on the basis of an increment every other year to the maximum of the DS 04 pay range; or on the basis of an increment every other year to the double barrier in the DS 05 pay range). Category 3 scientists demonstrate a lower than average rate of professional development and may have normal increments delayed for a year at 'single barrier' points. They normally attain the double barrier in the DS 04 pay range as a career end-point salary.

Table 12 shows the number of Defence Scientists by level, category and step during the 1983/84 fiscal year. As

TABLE 11: CAREER PROGRESSION OF DEFENCE SCIENTISTS MEASURED BY YEARS OF RELEVANT EXPERIENCE

Level and Category	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9	Step 10	Step 11	Step 12	Step 13
DS 01													
DS 02 Cat I			1		2								
Cat II			1	2	3								
Cat III			1	2	3								
DS 03 Cat I		3		4	5	6	7						
Cat II		4	5	6	7	8	9						
Cat III		5	6	8	9	11	12						
DS 04 Cat I	8		9		10		11	12	--*	--	--	--	--
Cat II	10	11	12	13	14	15	16	17	19	21	23	25	27
Cat III	14	15	17	18	20	21	23	24	--	--	--	--	--
DS 05 Cat I	13	14	15	16	17	18	20	22	24				
Cat II	18	20	22	24	26	28							
DS 06 Cat I	19	21	23	25	27	--							
DS 07 Cat I	--	--	--										

▯ — "single bar" evaluation points (promotion decisions within a level)
▮ — "double bar" evaluation points (promotion decisions between levels)
*-possible steps applied in rare cases

TABLE 12: NUMBERS OF DEFENCE SCIENTISTS BY LEVEL, CATEGORY AND STEP (APRIL 1, 1983)

Level and Category	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9	Step 10	Step 11	Step 12	Step 13	Totals
DS 01		1												1
DS 02 Cat I														
Cat II			22	24	25									71
Cat III					2									2
Unsatisfactory				1										1
DS 03 Cat I					1	2	2							5
Cat II		18	17	8	11	13	19							86
Cat III			1			1	3							5
DS 04 Cat I	5		7		3	5	2	6	*	--	--	--	--	28
Cat II	13	11	11	15	4	8	9	22	15	7	17	6	11	149
Cat III		1	1	1				19			1	2	1	26
Unsatisfactory										1				1
DS 05 Cat I	4	13	3	4	5	16	6	6	6					63
Cat II	3	5	7	6	15	27	11	4	6					84
Cat III					1	1	2							4
Unsatisfactory			1											1
DS 06 Cat I		4	5	1	6	--								16
Cat II				1										1
DS 07 Cat I	1	1												2

546

▯ - "single bar" evaluation points (promotion decisions within a level)
▮ - "double bar" evaluation points (promotion decisions between levels)
* - possible steps applied in rare cases

indicated, a normal distribution exists among the different categories for the DS 03 and 04 levels, as well as among all of the levels. There is neither the bunching of the RESs nor the automatic climb to higher levels that some fear would happen with the RESs if the strict quotas are eliminated.

While most Category 2 scientists only go as far as the DS 05 level and Category 3s go as far as the DS 04 level, there are a few Category 2 and 3 scientists who have gone one level beyond the norm. In most cases, this is the result of category demotions stemming from reviews that have indicated the scientists' work is not consistent with the more productive category to which they were previously assigned. It should also be noted that there are a few scientists at an unsatisfactory category for several levels. These are individuals who have been assessed as not working at the Category 3 standard for their level and salary step. This rating is seen as an indication that the scientists may be asked to take a demotion if their work does not improve.(7)

As indicated by interviews with Managers of the Defence Scientists, it appears that the DS system of promotion has other features that could help relieve the problems with the RES system. For example, because of the DS system's more numerous steps and levels, only the very best scientists can possibly reach the top during a career of average length. Even moving one step per year, the average scientist can only reach the end of the DS 05 level before retiring, and poorer scientists will advance even more slowly. Overall, salary advancement for DSs is more continuous; and the greater number of career end-point salaries provides for recognition of greater differences among scientists than is provided for by the RES system. Most DSs will be near retirement when they reach their maximum levels. With stringent criteria substituted for the strict quotas used in the RES system, it is clearer to employees that there is room within the system for their growth and development to be recognized by promotion. Senior scientists are not seen as blocking the progress of more junior ones. In general, when combined with routine recruitment of new graduates, a merit system such as the DS system with a large number of steps tends to produce much less bunching of scientists at the maximum of each pay range.

(3) Promotion Criteria and Review Process

In looking more closely at the promotion criteria for the RESs, two things become evident. First, the existing criteria do not include all of the major types of activities that the RESs perform. Some recent additions to the criteria, such as the consideration of contract management and technology transfer work, have relieved this somewhat, though the interviewees and questionnaire responses show that the RESs themselves see little improvement to date.

The second concern with the application of the general criteria is that it is perceived that different review committees stress different types of activities in any given year. The scientist, understandably, is confused regarding what is expected of him or her at any given point of time; and it becomes clear that if a scientist were to change research institutes or departments he/she may encounter a situation where priority is put on different criteria from those applied in his/her previous job.

In regard to the RES promotion review process, the need for numerous levels of review committees is also questionned. As the system currently works, nominations for promotions come from institute or laboratory directors (with input from supervisors or section heads in the larger laboratories). Depending on the organization and level of decentralization of the department, these laboratory nominations are then reviewed in turn by a regional, branch, departmental and, finally, an interdepartmental review committee, the IAC. In some departments, quotas are applied to the branch level nominations, but in every department they are taken into account before the lists of candidates are forwarded to the IAC.

The value of the present IAC involvement in the RES 02-03 promotions is not completely clear. The IAC role seems to be almost perfunctory given that: the quotas are already applied within the departments before the IAC review, only the "bottom" cases on the departmental RES 02-03 promotion lists are examined, and the IAC does not often reject departments' recommendations.

For the upper level promotions (RES 03-04), the IAC does seem to play a more important role, examining each case individually. This more careful application of a government-wide standard seems appropriate, given the high standing as scientists that RES 04s are considered to have attained.

(4) Reclassification of RESs

While it is possible for RES 02s to move to other scientific classifications, progress beyond the RES 02 maximum salary, and then be reclassified laterally to a RES 03 position, this happens infrequently. Scientists who are opting out of the RES group, it seems, are satisfied with the pay and benefits of their new classification, and realize that if they did move back to the RESs they would not advance much further before being blocked again. As long as they can perform research in these other classifications, they will probably be content to remain there. However, for the RESs doing applied work who are essentially performing the same jobs as their colleagues in other classifications (who receive overtime pay, greater vacation time, or other further career advancement incentives), it is only natural that the RESs will compare their case and believe that they are disadvantaged.

An even greater problem, however, appears when either 1) Research Managers (REMs) move back to RES positions (in lieu of being classified as SMs or 2) RES 03 and 04s take on managerial jobs while remaining in the RES group. The RES classification is not currently designed to include managers, and the fact that some managerial work is being performed by individuals at the upper RES levels, means that RES 02s are being blocked from advancement by individuals not performing research.

This problem can be met in one of two ways. First, a viable management classification should be established for scientific research, which would encourage scientists to take on management duties. Interviews with RESs and managers, and questionnaire comments from RESs, both indicate that the current arrangements are not viable for those who might otherwise take on some management duties. The full scope of this issue is beyond this current study, except to point out that management work performed by RESs is blocking the promotion of research-oriented RESs.

The second means of dealing with this reclassification problem would be to establish a second set of criteria for RES promotion on the basis of management duties (as exists for the Defence Scientists). This would also provide incentives for better management.

(5) Number of Levels in the RES Group

The limited number of steps and levels in the RES group has certainly contributed to the problems, especially with the establishment of the automatic lock-step system within each level. As stated previously, the average scientist moving one step per year could expect to reach the top well before retirement. Ignoring the steps that overlap between levels, there are at most 22 steps from the bottom of the RES 01 level to the top of the RES 04 level. In contrast, we have seen that the Defence Scientist classification can include more than 35 steps for its Ph.D. level scientists.

Furthermore, with fourteen steps from RES 01 to the RES 02 maximum, and an automatic lock-step system, the Research Scientist works far longer than his/her Defence Scientist counterpart before having a meaningful performance evaluation. Moreover, by the point that the RES 02 to 03 evaluation does take place, it may be much too late for the scientist to change course in his or her career research, and to change work attitudes or approaches.

(6) Recognition

If scientists perceive (whether realistically or not) that their careers are being blocked, then other recognition or performance incentives might usefully be established. In fact,

studies on the management of scientists suggest that it is only when other aspects of the work environment become intolerable, that scientists start to complain about either career progression or salaries.(8) Thus, while the issue of RES career blockage is indeed real, its prominence may be an indication of greater concerns about the RESs' work environment (i.e., inadequate support staff, unattractive sabattical leave policies, limitations on contact with other experts in their fields through conference travel restrictions, etc.) and general recognition. These other concerns were frequently raised in the interviews and questionnaire responses, and in a broad sense it is clear from the discussions with the RESs that these problems are all inter-related in their impact on the scientists' morale.

CHAPTER THREE

FOOTNOTES

(1) Because of overlapping salary ranges, it is not possible to clearly contrast the RES 02 group (or any other specific RES level) with its counterparts in other classifications.

(2) The data for NRC's scientific classification includes (the highly paid and older) research managers, who are not included in the RES category; it should also be recognized that when the managers were recently reclassified out of the DS group in DND, the percentage of the remaining scientists earning more than the RES 02 level only fell from 33% to 30% of the total DS group. This then compares favourably with the RES group, and shows the likely proportion of managers to scientists in the upper levels of the NRC group.

(3) It should be recalled that there is a strong correlation between age and advancement throughout each of the science classifications.

(4) It is not in the scope of this study to extensively review the satisfaction and utility of the DS and NRC promotion systems. What follows, however, is an explanation of the DS system, derived from interviews with managers of Defence Scientists in each of DND's research establishments in Canada and the DS personnel administrators. From these discussions, it appears that the features of the DS system do meet many of the shortcomings of the RES promotion system. However, any adaptation of the DS system for the RES group would have to be carefully undertaken to insure its suitability, in part or in whole, and to recognize the differences between the RES and DS populations.

(5) The operation and experience of the DS system does suggest, however, that "hybrid" criteria should be established which allow for the review of scientists who are engaged in more than one type of activity. As currently implemented, the DS system evaluates its scientists on the basis of one of three types of work only, and if a scientist switches focus from bench research to management, he/she must wait three years for promotion consideration under the management criteria. In addition, if a scientist manages some work as a

section head while basically remaining a bench scientist throughout his/her career, it is extremely difficult to apply any of the separate sets of criteria for promotion considerations. It is, therefore, recommended by those who manage the DS system that hybrid, or combined, sets of criteria would allow for a review of those who continue to perform more than one type of work throughout their careers, as well as those who are in the transitional role of switching functions.

(6) At the April, 1983 review, 16 DSs (or 3%) received a change of category.

(7) Discussions with the managers of the Defence Scientists disclosed that there is some problem with employee morale that results from the three category labels (mostly among those in Category 3). While Category 3 is intended to be a satisfactory rating, the DSs see it as an indication that they should look for other jobs. The DS managers believe that either a five category system, or one where labels are more descriptive (e.g., outstanding, superior, fully satisfactory...) should be used. A third alternative, in fact, may be to not use labels at all, in describing those who move faster through the pay system than others, in any given year.

(8) Donald Pelz and Frank M. Andrews found in their study, Scientists in Organizations (New York, John Wiley, 1966), that creating status motivation or benefits only affected performance of younger scientists, and had no real effect on older scientists. Harry F. Vincent, et al. found that job satisfaction among U.S. military R&D scientists to be a multi-dimensional factor in their article, "Relationship Between Productivity, Satisfaction, Ability, Age and Salary in a Military R&D Organization", IEEE Transactions on Engineering Management, May, 1982.

CHAPTER FOUR

OPTIONS

Introduction

Throughout this report, detailed consideration has been given to various aspects of the problems with the RES promotion system. This chapter examines, first, a set of four basic structural options for the solution of the RES system problems, and then discusses a variety of alternatives to deal with certain special features of the structural plans. These options and alternatives are listed below, and discussed in greater detail in the pages that follow.

Proposed Options for the RES Promotion System

I. Structural Plans

- A. Change incumbency system to a position-based system.
- B. Maintain existing system.
- C. Establish intermediate levels between existing RES 02 and 03 levels, and between 03 and 04 levels.
- D. Establish a system with features adapted from those of the DS system or other merit-based systems.

II. Other Features

- A. Quotas.
  1. Maintain existing quotas.
  2. Eliminate quotas completely.
  3. Establish flexible quotas based on experience and productivity.
- B. Criteria for Advancement
  1. Maintain existing criteria.
  2. Add other general RES job requirements to the existing criteria list.
  3. Restructure criteria to be more specific to the different RES activities.
- C. Review Committees
  1. Reduce the number and levels of promotion review committee.
  2. Maintain existing committee role and structure.
  3. Allow departmental review committees to make ultimate decisions for middle-level promotions; leave higher level promotions and supervision of the system's operation with the Interdepartmental Advisory Committee.

D. Selection of Candidates for Promotion
   1. Maintain existing system.
   2. Review all candidates automatically.
   3. Allow scientists to submit their own promotion files when they reach a specific level.

E. Input to Promotion Reviews
   1. Maintain existing system.
   2. Formalize an outside peer review process to ensure that the scientific value of an individual's work is recognized.
   3. Formalize an outside peer review process for those seeking promotion to the top level.

Consideration of the Options

1). Structural Plans:

The first structural option raised involves replacing the RES incumbency system with a position-oriented system similar to most other government classifications. This would mean that individuals would have to compete for higher level positions in open competitions, and they would be able to decide themselves when to try and compete at the next level.

The drawback here is that there is less continuity to the scientists' work as they move ahead in a position-oriented group. This is due to the fact that each position and each level have a specific type of work or job description and the individual scientist is, therefore, much less free to direct the course of his/her basic research than under an incumbency system. Due to constraints on finding higher level positions, scientists may not specialize as much, and over the course of their careers, the scientists' expertise in any one area may be reduced. The incumbency system, on the other hand, can foster scientific creativity, and is very strongly favored by the scientists and their managers; any move away from such a system will probably face vigourous opposition from the RESs.

The second structural option is to maintain the status quo. The basic argument in favor of this option is that the system is not likely to get worse. Nonetheless, the basic inconsistencies between the merit and quota aspects of this system would endure, and the quota/lock step combination would continue to create considerable blockage. Other fluctuations in the age distributions and hiring frequencies of scientists in the federal government would also create future career progression blockages.

A third option is to create intermediate levels between the RES 02 and 03, and between the RES 03 and 04 levels, in order to more clearly recognize productivity. One possible scheme for such an approach is diagrammed in Figure 7 and compared to the existing system. Such a plan would allow institute and laboratory directors to promote "in title" those scientists near the top of the 02 and 03 levels that they think are likely to be promoted to the next level. While salary steps would remain the same for these individuals (to keep budget costs constant), their work would be recognized as being superior from that of their colleagues who have advanced to the maximum step of the RES 02 and 03 levels solely on the basis of the lock-step system. The main problem with this option is the fact that it remains tied to the quota system. Individuals in these intermediate steps must still wait for quota positions to become available at the next level. No matter how hard they work, promotions are still based on quotas.

The fourth proposed system seems to address the problems that the three above options fail to solve. This is the establishment of a RES system with features based on those used for DND's Defence Scientists (and at NRC). This plan, as discussed in the previous chapter and diagramed in Tables 11 and 12, eliminates the quotas, yet maintains appropriately balanced proportions of people at the various levels through the use of more explicit criteria for performance and advancement. It maintains an incumbency system which establishes and recognizes an individuals' long-term contributions, distinguishes between different levels of productivity and expertise, and provides periodic evaluations of individuals' work and guidance for their careers.

This is not to suggest that the DS system could be applied to the RESs without careful consideration and without significant alteration. All Defence Scientists work within a single department, which tends to ease administrative difficulties associated with the promotion system. A further advantage is that the number of Defence Scientists is relatively small. In contrast, there are many more RESs, distributed across several departments, and probably performing a greater variety of duties than the DSs. Nevertheless, there appear to be no a priori reasons forbidding application of the essential elements of the DS system to the RESs. Moreover, a mechanism already exists, in the form of the IAC, which could ensure that design and operation of a new DS-based promotion system appropriately reflect the characteristics of the RES category.

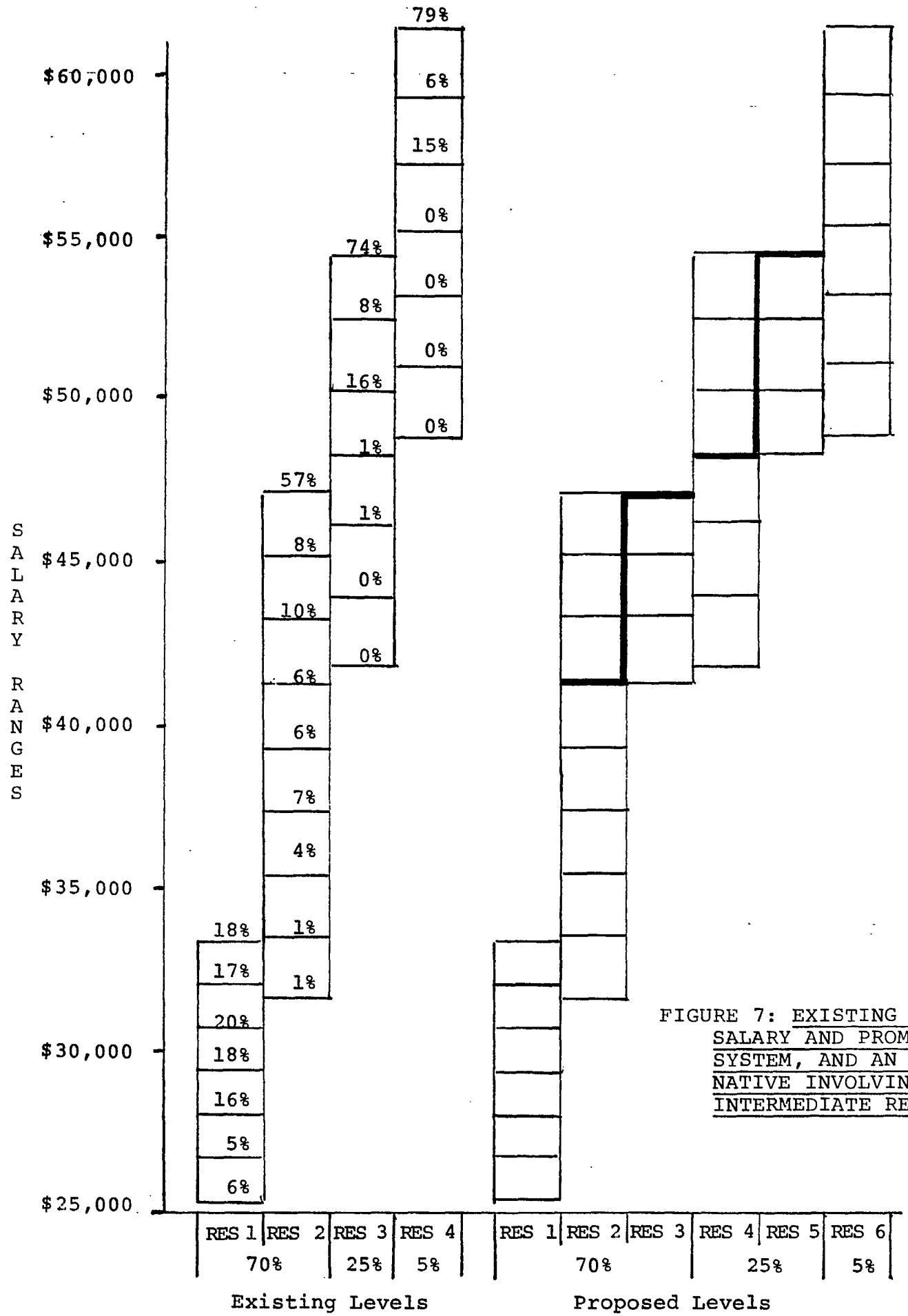


FIGURE 7: EXISTING RES SALARY AND PROMOTION SYSTEM, AND AN ALTERNATIVE INVOLVING INTERMEDIATE RES LEVELS

2. Other Features

A. Quotas

Concerning the quota aspect of the RES system, there are three obvious alternatives: maintenance of the existing quotas, dropping the quotas completely, and establishing more flexible quotas. When considering the option of maintaining the existing quotas, it should be kept in mind that other government classifications do not have quotas like the RES system, but are able to limit the number of individuals at the upper levels. (This includes both the position-oriented classifications as well as DND's Defence Scientist incumbency system.) This, plus the basic inconsistencies of a dual merit and quota system (as stated above), does not make the status-quo a realistic option.

Eliminating quotas can be considered if the criteria for promotion are clear enough to maintain certain proportions at different levels (thereby restricting upper levels to the truly deserving and also limiting any significant increase in financial requirements). That this can be done, while maintaining an incumbency-based approach, is seen with the system used for the Defence Scientist group. However, without a set of strong criteria, rigourously applied to determine merit, fears that everyone could move to the top of the RES 04 position could be realized.

Lastly, the option of flexible quotas based on the level of experience and productivity in each research laboratory or institute has also been proposed. Here, the experience or age distribution of particular groups of RESs would be determined periodically. As large proportions of a particular RES population move toward a promotion point, their quotas could be expanded by the Director to recognize the promotable talent in the larger group. When smaller proportions of the population were reaching promotion stages the quotas would be, similarly, decreased to 1) compensate for other periods when quotas were higher and 2) account for the smaller population being also considered. If the current system is maintained or intermediate levels are created in the existing system, this quota alternative would be a fairer approach than that which currently exists. However, this approach might be very difficult to administer.

b) Criteria for Advancement

There are three obvious alternatives for dealing with the RES promotion criteria: maintenance of the existing criteria, inclusion of other general RES job requirements on the list of criteria, and restructuring of the criteria to be more specific to particular RES activities.

The first of these -- the status quo option -- would probably not work well with any of the structural plans. Existing problems and inequalities would continue. The weighting of certain, more measurable, criteria over others would remain, and the reliance on different criteria by different managers would also be maintained.

The inclusion of other criteria in the list would be a move in the right direction. However, even if the criteria (such as regulatory work, public service duties or testing activities in support of other scientists' research) recognize the full range of RES work, local managers and directors may still find themselves recommending scientists for promotion only to have more centralized review committees unable to compare the publications of scientist A with the regulatory-related research of scientist B.

Option three would restructure the criteria so that scientists involved in basic research, management, regulatory work, public service work, or contract management are evaluated on the basis of what they are doing. It would also permit flexibility so that if a scientists' work changed significantly he/she could begin to be assessed fairly on the new type of work. These more structured criteria could be well integrated with the Defence Scientist-type plan in which quotas are eliminated.

C. Review Committees

With the current system, there is some question over the role of multiple level promotion review boards. At issue is whether an interdepartmental review is needed if the departments are, themselves, bound to the quotas.

Three alternatives here include: the reduction of the number of levels of review involved in all promotion decisions, with departments being ultimately responsible; the maintenance of the existing system involving interdepartmental reviews; and the creation of a split between higher level promotions being done on an intedepartmental level and middle level promotions being focussed at the departmental level.

The middle level RES promotion decisions (i.e., 02 to 03) are not often altered from the departmental to interdepartmental reviews and are not currently examined as closely in this last stage of the process as the higher level (03 to 04) promotions. The middle level changes are, therefore, effectively carried out on a departmental basis now. The elimination of the interdepartmental review for middle level promotions would permit the IAC to devote more of its time to the higher level promotions where international reputations and expert representation of Canada are of greater concern. This argues in favor of the third option.

In any event, attention needs to be given to the IAC's broader role of advising Treasury Board on the operation of the RES system. This becomes particularly important if the favored structural option of this report is adopted -- a development which would place heavy demands on the IAC for designing and implementing the recommended system changes. Ultimately, the role of the IAC should be strengthened to allow it to carry out these elements of its mandate, and sufficient resources should be made available to it for this purpose.

D. Selection of Candidates for Promotion

Three options are also proposed that address the ways in which candidates for promotion are selected. Two of these options -- maintaining the existing system (allowing only managers and institute directors to select candidates they feel are worthy of promotion), and allowing the scientists at the maximum of their level to request consideration and submit their own documentation -- could apply to either the existing RES system, or the existing system expanded by the addition of intermediate levels. From the scientists' perspective and that of a majority of their directors, there is no reason why individuals at or near to maximum of a given level should not be able to request promotion consideration.

Under a RES system which uses the DS merit features, the third option of annually evaluating the performance of all scientists would be automatic. Promotion considerations, based on these automatic annual reviews could then be conducted for all those at or near the maximum of a level, those who have been held back or advanced more quickly than the average, and any other special cases. Some will argue that this is bound to take a large amount of time and be difficult administratively. DND, with over 500 Defence Scientists, is, however, able to evaluate everyone within a month's time (and only one department, as seen in Table 1, has more than this number of RESs).

E. Input to Promotion Reviews

There are also three options in regard to the information on candidates that is considered in the promotion review process. While the existing system could be maintained (whereby scientists prepare their own documentation for evaluation by successive layers of management), procedures that would allow for additional input and evaluation from outside peer review may be possible, and could cover either all proposed promotions or just those at the higher levels.

In the case of the higher level scientists, and under any of the proposed structural plans, the option of outside peer review input is likely to be particularly valuable as a means of evaluating the scientific merit of the individuals' research. The

number of scientists involved at this level of review would not have to be significant enough to unduly encumber the system. If the time involved in administering a peer review for the middle level candidates is not extensive, then it is further suggested that such a review be applied to this level as well.

CHAPTER FIVE

RECOMMENDATIONS

Concerns regarding dissatisfaction of the government's Research Scientists with their promotion system have been confirmed by this study. The system does not appear to adequately recognize or reward the RESs for their scientific expertise and productivity, and the quota and lock-step systems contradict the intent of a merit-based promotion system. There is, as well, a widespread uncertainty among RESs and their managers as to what exactly is required for RES promotions and how the promotion criteria are applied by promotion review committees.

One effect of the operation of the present system is that increased numbers of RESs are at the maximum of their levels, and that these scientists are awaiting promotions that appear less and less probable. This blockage, due to the quota restrictions on the numbers of scientists at the upper levels and the lock-step system of advancement within levels, will be relieved to some extent later in this decade when a larger proportion of scientists start to retire. However, the problem is also apt to recur, since government hiring is neither constant nor results in a normal age distribution.

While action should be taken to revise the RES promotion system, it should be kept in mind that the problems with that system, which have been discussed in this report, are part of a larger set of related issues that have been raised by the scientists. General dissatisfaction regarding conference travel opportunities, contact with other experts in their fields, and support staff have been noted by the scientists as contributing to their general career dissatisfaction.

From the discussion and analysis found in the previous chapters, it is recommended that the following changes in the SE/RES classification promotion process be adopted.

- A classification system incorporating the merit advancement principles of the promotion systems being used by the other merit-based categories (e.g. the Defence Scientist system) should be designed and implemented for the Research Scientists.

- The present quota and lock-step system should be discontinued, but:

  - The criteria for promotion should be strengthened, and should clearly be oriented to more than research output (in practice as well as theory); accordingly, duties performed by RESs in such areas as contract management, assistance to industry, and so on, should all be given explicit recognition in the promotion criteria.

  - The criteria should be strong enough to distinguish clearly among different levels of productivity, thereby ensuring that a reasonable distribution across the levels within the classification is maintained.

- The performance of all RESs should be assessed in a meaningful way annually, and recommendations for promotion should be based on these evaluations.

- The departmental review committees should make the ultimate promotion decisions for middle level RESs. The IAC should, however, review all higher level promotions. As well, it should establish and regularly review the adequacy of a more stringent set of criteria, and advise TBS on the continued operation of the RES system. Some means of support should be provided to the IAC to perform these tasks.

- The promotion system should be an open one in which the process is clearly defined and communicated to all RESs and the winners of promotions are announced.

- Departments, branches, or research institutes should establish incentives like annual peer-reviewed competitions for research papers prepared by the Research Scientists, in order to better recognize the performance of those RESs so engaged.

- Sabbatical leave policies, post doctoral fellowship and support staff availability, conference travel policies, and other similar matters should be re-thought, especially since promotions and salaries would be less of a problem if there were improved compensation, rewards and incentives associated with RESs' efforts.

- In the interim, before implementation of a new RES system, a halt should be brought to the practice of including science managers in the RES classification.

APPENDIX A

CRITERIA USED TO EVALUATE RESEARCH SCIENTISTS

Source: Treasury Board

LEVEL CRITERIA
RESEARCH SCIENTIST LEVEL 3

General Description

This is the level for mature research scientists with cumulative achievement distinctly above average.

Productivity

For a position to be classified at this level the scientist must have made contributions to research or development definitely superior in quality or significance to the normal expectation for a mature research scientist in the field. Such achievement may be evidenced by any of the following:

- authorship or important participation in authorship of an extensive number of research publications of superior quality or significance, collectively demonstrating superior research ability and mastery of a substantial field of specialization;

- authorship or co-authorship of publications authoritatively reviewing substantial fields of scientific knowledge;

- above-average achievement in creative development; for example, in production of patents or of improved varieties or designs;

- an extensive record of successful transfer to industry or to other areas of application of scientific knowledge and of technology, or an extensive record of significant contributions as a scientific authority in the contracting out of scientific activities where extensive and original scientific contributions are required for the definition, execution and evaluation of the activities involved;

FACTEURS DETERMINANTS DU NIVEAU DE CLASSIFICATION
CHERCHEUR SCIENTIFIQUE - NIVEAU 3

Description générale

Le niveau 3 est le niveau auquel sont classés les chercheurs scientifiques d'expérience qui comptent à leur actif des réalisations nettement supérieures à la moyenne.

Réalisations

Tout poste classé à ce niveau doit être occupé par un chercheur scientifique qui a apporté, dans le domaine de la recherche et du développement, des contributions nettement supérieures, en qualité et en importance, à celles que l'on attend normalement d'un chercheur scientifique d'expérience. Ces contributions peuvent prendre l'une ou l'autre des formes suivantes:

- à titre d'auteur ou de co-auteur, la publication d'un grand nombre de travaux de recherche, d'une qualité supérieure ou d'une importance particulière, qui, pris globalement, témoignent d'une nette aptitude à la recherche et d'une maîtrise d'un vaste domaine de spécialisation;

- publication, à titre d'auteur ou de co-auteur, de travaux traitant avec autorité d'importants domaines de connaissances scientifiques;

- preuve manifeste d'une créativité supérieure à la moyenne, par exemple: obtention de brevets ou production de modèles ou de plans scientifiques améliorés;

- un dossier impressionnant d'applications de connaissances scientifiques et technologiques au secteur de l'industrie ou à d'autres domaines, ou un dossier impressionnant de contributions importantes, à titre d'autorité scientifique, dans la passation de marchés pour des travaux scientifiques exigeant un apport original et considérable au niveau de la définition, de l'exécution et de l'évaluation des travaux;

- equivalent contributions in other forms of productivity, such as an extensive record of significant contributions to, or leadership in, group projects or programs, including responsibility for decision-making relative to the planning, scheduling and coordination of activities, and in scientific interpretation.

- apports équivalents sous d'autres formes, par exemple, un dossier considérable attestant de contributions importantes, ou d'initiatives, à l'égard de programmes et de projets de groupe, y compris la responsabilité des décisions en matière de planification, d'échelonnement et de coordination des activités, et dans le domaine de l'interprétation scientifique.

Creativity

The scientist at this level makes significant advances where guidelines and precedents are manifestly inadequate; introduces significant technological innovations; and is a major stimulus to scientific and technological effort in the organization.

Créativité

Le scientifique classé à ce niveau fait preuve d'une grande initiative à défaut de lignes directrices ou de précédents appropriés; il apporte des changements technologiques notables; il favorise grandement l'effort scientifique et technologique de l'organisation.

Recognition

Has attained national or international recognition as an authority in a substantial field of R&D; typically holds office in professional societies or serves on important committees; acts as editor of recognized scientific journal; serves as Canadian delegate at international meetings; and represents the department on major scientific issues.

Renom

Le scientifique de ce niveau est une autorité nationale ou internationale dans un vaste domaine de la R et D; en règle générale, il a un poste de direction dans des associations professionnelles ou est membre de comités importants; il rédige des articles dans des revues scientifiques reconnues; il participe, en qualité de délégué canadien, à des réunions internationales et représente le ministère aux grands débats scientifiques.

Influence

Exercises a strong influence on R&D programs from initial planning to final evaluation; is widely consulted both within and outside the organization on matters associated with more than one field of speciality; and provides a significant degree of leadership in the field of specialization.

Influence

Il a une forte influence sur les programmes de R et D, depuis l'étape de la planification jusqu'à celle de l'évaluation; on le consulte beaucoup au sein et en dehors de l'organisation sur des questions reliées à plusieurs domaines de sa spécialisation; il assume, à un degré élevé, la direction dans le domaine de sa spécialisation.

Nature of Assignments

Assignments at this level are given or approved in terms of general objectives; scientific and technical judgment of a high order is required to integrate components and problems and to achieve results. Guidelines are absent. The scientist may conduct independent research or act as a research leader in a group program.

Nature des affectations

A ce niveau, les affectations sont attribuées ou autorisées du point de vue des objectifs généraux; le chercheur doit faire preuve d'un excellent jugement scientifique et technique pour rassembler des éléments et des problèmes de manière à obtenir les résultats voulus. Il doit travailler sans lignes directrices. Il effectue des recherches individuelles ou dirige des recherches dans le cadre d'un programme attribué à un groupe de chercheurs.

LEVEL DESCRIPTION
RESEARCH SCIENTIST LEVEL 4

General Description

This is the level for research scientists of exceptional attainments.

Productivity

For a position to be classified at this level the research scientist must have a record of continued exceptional contributions to research or development. Such achievement may be evidenced by any of the following:

- authorship or important participation in authorship of an exceptional number of research publications of excellent scientific quality and significance, collectively demonstrating outstanding research ability and leadership in a major field of science;

- authorship or co-authorship of publications authoritatively reviewing complex, important or advanced fields of scientific knowledge;

- exceptional achievement in creative development; for example, in production of highly important patents or of outstanding varieties or designs;

- an exceptional record of successful transfer to industry or to other areas of application of scientific knowledge and of technology, or an exceptional record of significant contributions as a scientific authority in the contracting out of scientific activities where exceptional and original scientific contributions are required for the definition, execution and evaluation of the activities involved;

- equivalent contributions in other forms of productivity.

FACTEURS DETERMINANTS DU
NIVEAU DE CLASSIFICATION
CHERCHEUR SCIENTIFIQUE - NIVEAU 4

Description générale

C'est le niveau accordé à un chercheur scientifique aux réalisations exceptionnelles.

Réalisations

Tout poste classé à ce niveau doit être occupé par un chercheur scientifique qui a un dossier attestant de contributions exceptionnelles et suivies à la recherche ou au développement. Ces contributions peuvent prendre l'une ou l'autre des formes suivantes:

- la publication, à titre d'auteur ou de co-auteur, d'un nombre exceptionnel de travaux de recherche d'une excellente qualité et d'une énorme importance qui, pris globalement, témoignent d'une aptitude remarquable à la recherche et d'initiative dans un domaine scientifique important;

- publication, à titre d'auteur ou de co-auteur, de travaux traitant avec autorité de domaines complexes, importants ou avancés de connaissances scientifiques;

- preuve manifeste d'une créativité supérieure, par exemple en ce qui concerne l'obtention de brevets d'une importance exceptionnelle, ou la production de modèles ou de plans remarquables;

- un dossier exceptionnel d'applications de connaissances scientifiques et technologiques au secteur de l'industrie ou à d'autres domaines, ou un dossier exceptionnel de contributions importantes, à titre d'autorité scientifique, dans la passation de marchés pour des travaux scientifiques exigeant un apport scientifique original et exceptionnel au niveau de la définition, de l'exécution et de l'évaluation des travaux;

- contributions équivalentes sous d'autres formes.

Creativity

The scientist at this level is a prolific source of new ideas and demonstrates exceptional imagination in developing new concepts, techniques, methods or systems.

Recognition

The scientist has attained international recognition in a broad field. Typically, the scientist holds high office in a major scientific organization, serves on international delegations and national commissions, acts as editor or member of the editorial board of a leading international scientific journal, and may have received internationally recognized meritorious awards or has been invited to address senior scientific bodies.

Influence

Receives frequent requests for advice and consultation on matters related to government policy, expenditures of large sums of money, or on important economic and R&D policy decisions. A scientist at this level exercises substantial leadership in directions taken nationally and internationally on R&D programs.

Nature of Assignments

Scientific objectives are given in general terms and assignments demand a high level of scientific originality, coordination and judgment.

Créativité

Le chercheur scientifique de ce niveau se distingue par l'abondance de ses idées nouvelles et fait preuve d'une imagination remarquable lorsqu'il s'agit d'élaborer des concepts, des techniques, des méthodes ou des systèmes.

Renom

Le chercheur scientifique classé à ce niveau jouit d'une réputation internationale dans un vaste domaine. Généralement, il détient un poste élevé dans une importante association scientifique et fait partie de délégations internationales et de commissions nationales; il agit à titre de rédacteur ou fait partie du comité de rédaction d'une des principales revues scientifiques internationales; il a reçu des distinctions honorifiques reconnues dans le monde entier; il a été invité à donner des conférences à d'éminentes associations scientifiques.

Influence

On le consulte souvent sur des questions reliées à des politiques du gouvernement, à des dépenses élevées ou à des décisions importantes en matière d'économie et de politiques de R et D. Le chercheur scientifique de ce niveau assume une direction capitale en ce qui a trait aux programmes nationaux et internationaux de R et D.

Nature des affectations

Les objectifs à atteindre sont désignés en termes généraux, et le chercheur scientifique doit faire preuve de créativité supérieure; il a le jugement et la compétence voulus en matière de coordination.

APPENDIX B

QUESTIONNAIRE

Ministry of State
Science and Technology Canada
Ottawa, Canada
K1A 1A1

Ministère d'État
Sciences et Technologie Canada
Ottawa, Canada
K1A 1A1

Dear Research Scientist:

The Ministry of State for Science and Technology is currently engaged in a study of the SE/RES classification's promotion system, at the request of the Science ADMs Committee. As part of this study we are visiting a number of government laboratories to talk to Research Scientists about their concerns on this topic. Financial considerations prohibit us from talking to all Research Scientists, but we are, nevertheless, interested in all views. Therefore, if you would care to take a few minutes to describe your concerns on the attached pages, and send them to:

Dr. Robin Reenstra-Bryant
Policy Analyst
Government Branch
Ministry of State for Science and Technology
270 Albert Street
Ottawa, Ontario K1A 1A1

we would be happy to include your views in our study. Thank you.

Canada

1) Department/Lab _____ 2) RES 01? ☐ 03? ☐
02? ☐ 04? ☐

3) Age -25 ☐
26-35 ☐
36-45 ☐
46-55 ☐
56-65 ☐

4) Area of Specialty _____
5) Area of Training _____
6) Length of time in the federal government
_____
7) Highest academic degree earned
_____

---

8) Have you worked in other federal laboratories, besides this one, as a RES?
Yes ☐ No ☐
If yes, which labs? _____
_____
Have you worked in other/federal laboratories while a member of other scientific classifications?
Yes ☐ No ☐
If yes, which labs? _____
_____
and which classification(s) & level? _____

9) Have you done research work outside of the federal government?
Yes ☐ No ☐

10) How long have you been in the RES classification? _____

11) How long have you been at your current level in the RES group? _____

12) In your opinion what are the benefits of a classification system like the one for Research Scientists? _____
_____
_____

13) What are the problems that you see with such a classification system?

_____

_____

_____

14) Does the quota aspect of the RES system represent a real problem?

Yes ☐ No ☐

If yes, in what ways? _____

_____

_____

15) In your opinion, what is the average length of time that it takes a RES 02 to meet the qualifications for the next level? _____

_____

On what basis do you hold this belief? _____

_____

_____

16) Under the current RES promotion system, do you feel that your work is adequately assessed?

Yes ☐ No ☐

Do assessments play a major part in a career promotions for RES?

Yes ☐ No ☐

Why? or Why Not? _____

_____

_____

_____

17) Do you receive adequate recognition for

a) publication on non-scientific journals (such as trade journals) Yes ☐ No ☐

b) development work which follows from research previously conducted by yourself or others? Yes ☐ No ☐

c) other work in technology transfer? Yes ☐ No ☐

d) contract management Yes ☐ No ☐

If no, why not _____

_____

_____

18) Do you feel your equipment is reasonably good?

Yes ☐ No ☐

19) Do you feel you have an adequate support staff?

Yes ☐ No ☐

20) Do you feel that you are underpaid relative to:

a) university scientists? Yes ☐ No ☐

b) scientists in private industry? Yes ☐ No ☐

c) other government scientific groups? Yes ☐ No ☐

If yes, which ones?_____

21) Are you interested in moving to the REM or SM classification during your career?

Yes ☐ No ☐

Why?_____

_____

_____

22) Please feel free to comment on any other areas of the RES classification system that may be of concern to you.

Thank you.

APPENDIX C

PROFILE OF QUESTIONNAIRE RESPONDENTS

Twelve percent of the questionnaire respondents were between 26 and 35 years of age, 48% were between 36 and 45, 27% between 46 and 55, and 13% were 56-65. As shown in Table C-1 this compares quite favourably with the age distribution of the total RES population.

TABLE C-1: AGE DISTRIBUTION OF SURVEY RESPONDENTS COMPARED WITH TOTAL RES POPULATION

Age Group	Percent of Survey Respondents	Percent of All RESs in Age Group
25	0%	0.1%
26-35	13%	15.3%
36-45	48%	41.0%
46-55	26%	27.2%
56-65	13%	16.4%
	100%	100 %

Table C-2 shows the number of years that the survey respondents had worked in the government, again indicating a good mixture of experience.

Other background question responses on the survey indicated that 13% had worked elsewhere for the government as a RES, while 86% had not. The respondents were evenly split on the length of time they had worked as RESs in the government; 31% had been RESs for up to 5 years, 24% for 6-10 years, 21% for 11-15 years, and 23% for 16-20 years.

Twenty percent of the respondents stated that they had worked for the government in other classifications before becoming RESs while 78% had not, and 73% stated they had done research work outside of the government while 27% had not.

TABLE C-2: NUMBER OF YEARS RESPONDENTS WORKED FOR THE FEDERAL GOVERNMENT

	Number	Percent
1 - 5 years	44	17.6%
6 - 10 years	50	20.0%
11 - 15 years	56	22.4%
16 - 20 years	35	18.0%
21 - 25 years	22	8.8%
Over 25 years	31	12.4%
No Answer	2	8%
	250	100 %

APPENDIX D

SCIENTIFIC AND ENGINEERING CLASSIFICATION CODES

RES	-	Research Scientist
DS	-	Defence Scientist
NRC (RO)	-	National Research Council's Research Officers
AG	-	Agriculture Scientists
BI	-	Biologists
ENG	-	Engineers
FO	-	Forestry Scientists
SUR	-	Survey Engineers
MT	-	Meteorologists
PC	-	Physical Scientists
VS	-	Veterinarians
CH	-	Chemists

APPENDIX E

CRITERIA USED TO EVALUATE DEFENCE SCIENTISTS

Date of Issue: 15 August, 1982

DS CAREER PERFORMANCE ASSESSMENT PACKAGE

Introduction

1. Throughout 1979 representatives of the Treasury Board, DND and the Professional Institute of the Public Service of Canada negotiated and consulted on the development of a new merit pay plan for the DS Group similar to the pay plan in effect for scientific personnel at the National Research Council. Over a six-month period in mid-1979 an ad hoc work group of DS 6's was assigned the task of developing a set of guidelines for use by managers in the assessment of defence scientists for salary progression and promotion purposes during the merit review process.

2. The development of the guidelines involved, besides the DS 6 ad hoc work group, senior DS managers in CRAD and ORAE, TB officials having responsibilities in the areas of classification, performance evaluation and staff relations, and appropriate officials in the ADM(Per) Group of DND.

3. The main text of this deals concisely, yet comprehensively, with the basic principles and main features of the system of which the new DS Pay Plan is a component. The remainder consists of the following annexes:

a. Annex A. DS Career Performance Assessment Guidelines. This document was the culmination of the work described in paragraph 2. It constitutes a comprehensive exposition of the assessment guidelines and the principles, practical considerations and rationale upon when they are based.

b. Annex B. Glossary. The definition of names of the terms are critical to a proper understanding of this.

.../2

Principles

4. Stated simply, performance assessment is the retrospective comparison of the actual with the expected. However when an employee's work is primarily investigative, exploratory, analytical, developmental or problem-solving in nature it is always difficult, and often impossible, to pre-identify specific expectations. It is particularly difficult in relation to any particular position or period in the future. Yet this kind of work is characteristic of employees in the DS Group.

5. Neither is it possible to make meaningful statements of expectations that would be normal for each particular DS level. The reason is that the levels in the DS Group are broad bands in a continuum of levels of professional development and are not comparatively narrow "steps" in a "staircase" of professional development levels.

6. However review and analysis of the past assessments of employees engaged in defence scientific research, development, and analysis (SR&A) showed that it was feasible to identify, in qualitative terms, the kinds of evidence that managers accept as characteristic of, and minimal for, entry into each level in the DS Group. Furthermore the review showed that there have been definite and consistent rates of advancement through the DS levels in relation to years of relevant experience (YRE) for those whom management assessed as median over extended periods. In other words, it was possible to describe management's normal expectations in relation to YRE and level and these were subsequently judged suitable for use as guidelines in the performance assessment of DS employees. Hence the detailed guidelines in Annex A describe realities, particularly those of the past five years, in terms of managers' general expectations of employees by level and YRE and describe the evidence that managers accept as characteristic of performing up to their expectations. Accordingly, the first basic principle is that DS Performance Assessment will involve comparison of an employee's performance with management's expectations as expressed in the DS Career Performance Assessment Guidelines (Annex A).

7. Another basic principle of DS performance assessment is that each assessment will, in the vast majority of cases, involve consideration of performance over a period longer than the past calendar year. There are a number of reasons why more than a year's work must be reviewed in order to make a fully informed assessment. In the majority of cases the work takes longer then a year to complete and even more time often elapses before its true value and significance become apparent. There are few routine assignments in this group, many unexpected problems arise during the course of a year, and circumstances beyond the DS's control may have a major effect on the progress or even the continuation of tasks and projects. Finally the duties, tasks and accomplishments of any particular year are but a transitory indicator of the kind of work that a

.../3

particular DS is expected to be able to undertake or that a particular DS has carried out successfully. (Guidelines for the manager's use in selecting the appropriate period for a proper assessment are given in the Instructions for the completion of the DS PER).

8. The DS Pay Plan defines the merit review process and specifies that the DS Classification Standard and the DS salary progression guidelines are to be used to determine the classification levels and salaries of employees. The salary progression guidelines establish that salary progression is dependent on assessments of an employee's state of professional development and productivity in relation to management's normal expectations for that employee's YRE and appointment level.

9. The Pay Plan also establishes that the assessment of an employee's state of professional development and productivity will be based on evidence related to three criteria: Effectiveness in Scientific Research, Development and Analysis (SRDA); Effectiveness in Representational and Human Relations Activities; Effectiveness and Productivity in Managerial Activities. The criteria are intended to provide a means of assessing performance in a uniform manner throughout the DS Group. They will also help individual employees to appreciate the basis on which performance is assessed. The relative importance of each criterion will depend on the nature of the work, the level, and the length of experience of the individual and undue significance should not be attached to the order of presentation. The description of these criteria, as found in Annex B to the DS Pay Plan, is repeated in the next three paragraphs.

Effectiveness in Scientific Research Development and Analysis (SRDA)

10. The measures of effectiveness in SRDA are expertise, (the extent to which one is capable of being a source of current, knowledgeable and dependable data, information, opinion and advice); creativity (the extent to which one is the source of new theoretical or experimental approaches; new concepts, instrumentation or systems; adaptations of existing techniques etc. to novel situations; and new ideas and proposals for SRDA whether through in-house work or as scientific authority in contracting-out and technology-transfer activities); productivity (the quality, quantity and value of accomplishments and contributions to the department whether through in-house work or as scientific authority in contracting-out and technology-transfer activities); recognition (the extent to which one's accomplishments and contributions in SRDA are known to and accepted by peers, colleagues and superiors); and influence (the extent to which one has an effect on the quality, scope or direction of SRDA activities, projects, programs, etc).

.../4

Effectiveness in Representational and Human Relations Activities

11. The measure of effectiveness in these activities is acceptance as a communicator, representative, advocate and negotiator in SRDA matters and issues by peers, colleagues and superiors in the home establishment and elsewhere. The more important the matter and issues entrusted to one and the more senior and wider the circle of one's activities the greater is the significance of this criterion. Important areas where this criterion is quite significant are technology-transfer and industrial liaison, scientific liaison with Canadian Forces, other agencies and countries, scientific staff and advisory positions, and contracting-out.

Effectiveness and Productivity in Managerial Activities

12. Managerial activities normally involve, in some combination, the processes of organizing, planning, executing, controlling and evaluating. The measures of effectiveness in these activities are success in harmonizing, coordinating and integrating diversified SRDA resources, functions, projects, activities, etc. and effectiveness in the personnel management of subordinate staff. The co-ordination and integration may be carried out operationally and executively (by "line" personnel and senior officers) or conceptually and consultatively (by "staff" and advisory personnel). The more important and diverse the SRDA functions and the greater the productivity and effectiveness of the functions managed the greater is the significance of success in these activities.

Performance Assessment Categories

13. The DS Pay Plan specifies that the following performance categories will be used in the assessment of the state of professional development and productivity of DS employees:

Category I - The evidence shows the employee's productivity and state of professional development to be exceptional or distinctly superior compared to the normal expectations for the employee's YRE and classification level.

Catetory II - The evidence shows the employee's productivity and state of professional development to be within the normal expectations for the employee's YRE and classification level.

Category III - The evidence shows the employee's productivity and state of professional development to be satisfactory but distinctly less than the normal expectations for the employee's YRE and classification level.

.../5

14. An employee may be considered as "unsatisfactory". This would occur when the evidence shows the employee's productivity and/or state of professional development to be unacceptable by comparison with the normal expectations for the employee's YRE and classification level.

Performance Assessment Guidelines

15. As stated earlier, performance assessment is the retrospective comparison of the actual with the expected. Therefore the key to consistency in performance assessments of a large number of employees engaged in the variety of work typical of the DS Group is a set of practical statements of normal expectations to serve as a common reference for all assessors. The DS Performance Assessment Guidelines are intended to be practical and so they identify expectations in terms of factual evidence of accomplishments, contributions, etc. and they integrate the effects of the many variables affecting performance.

16. An example will show the meaning of the preceeding statement. The PhD degree is accepted as evidence that the holder has met commonly-accepted qualitative expectations of effectiveness in post-graduate research. The PhD can be regarded, therefore, as the factual evidence which represents the combined effect of many variables, both real and abstract. It represents, for each individual, the combined effect of variables such as research capability, creativity, diligence, adequacy of disciplinary knowledge, experimental skill, ability to develop and interpret results, etc.

17. The assessment guidelines have been written in terms of the kinds of evidence that managers expect and accept as the normal combined effects of the Performance Assessment Criteria for various YRE and levels. They therefore identify the kinds of evidence that must be considered by accountable managers, reviewing officers and the DSMRB when an assessment of an employee is to be made for salary progression and promotion purposes. They also identify the kind of evidence that managers will use as reference points in assessing the state of professional development and productivity of employees.

Use of the Guidelines

18. In the DS Pay Plan salary progression within levels depends on the assessment category. The assessment category in turn depends on the comparison of the evidence from an employee's history with the evidence normally expected of an employee with the same YRE and level. If the comparison demonstrates general correspondence between the two the assessment category would be II; if the actual evidence was exceptional or distinctly superior to the normal expectations the assessment category would be I; if the evidence was distinctly less than the normal expectations but still satisfactory the assessment would be III.

.../6

19. It is noted that because in the Guidelines (Annex A) the expectations are related to a few specific YRE, eg. 1, 4, 10 etc., and not to each YRE it is obvious that interpolation will be involved.

20. In brief, the changes from the former system are as follows: the rating categories have been reduced from seven to three, assessments are no longer based on peer comparisons, there is no differentiation on the basis of academic attainments and assessments are in relation to specific qualitative expectations associated with the DS levels and a range of YRE.

21. The critical importance of the guidelines as a common reference point for employees, supervisors, managers, and DSMRB in the performance assessment of DS employees can hardly be over-emphasized. They will not only promote uniformity and consistency of assessments throughout the group but, just as importantly for the future viability of the pay plan, will provide a basis for dialogue and explanations at all levels that will be as common, objective, factual and uniform throughout the group as is possible in this area of personnel management.

Importance of DS Classification Standard

22. One does not for example become promotable to DS 5 at 18 YRE or to DS 4 at 10 YRE by reason of being rated Cat II; rather one is rated Cat II because one is assessed as having attained or very likely to attain at 18 YRE the state of professional development and productivity characteristic of the DS 5, or at 10 YRE that of the DS 4.

Salary Administration

23. An amplification of the Salary Progression Guidelines contained in the DS Pay Plan is provided separately.

ANNEX A
TO DS Career Performance
Assessment Package
DATE OF ISSUE: 15 August, 1982

DS CAREER PERFORMANCE ASSESSMENT GUIDELINES

DS 1 Level

1. Employees may enter the DS Group with a Bachelor's degree and little or no experience in scientific research, development or analysis (SRDA). In the first YRE they are expected to learn the principles and practices of scientific research, development and analysis, gain some knowledge of current advances in a specialty within a field of defence science or technology, and to show aptitude for and the ability to perform SRDA work.

2. Employees in this level will be assessed on the evidence of professional development and productivity available from the employee's performing of SRDA duties.

3. By the end of the first YRE, employees should have demonstrated an aptitude for and the ability to perform SRDA work.

DS 2 Level

4. The evidence required to establish that the DS 2 state of professional development has been reached is satisfactory performance and an official YRE credit of not less than 1.

5. Employees in the DS 2 level are expected to develop their knowledge and understanding in a specialty, of experimental, analytical and research procedures, of military equipment and the military environment, to develop the ability to perform and complete SRDA assignments under general supervision, and to develop the ability to present and defend their work to colleagues, supervisors and clients. They are also expected to provide technical input to technical discussions involving their specialty and to make worthwhile contributions to their team or work unit.

6. Between 3 and 5 YRE, and normally by 4 YRE, employees in the DS 2 level should have acquired a sound understanding of the extent and limitations of existing knowledge and/or applications in a specialty within one of the defence sciences and a good knowledge of experimental/analytical/research methodology in at least one such specialty. They should have demonstrated the ability to perform and complete SRDA assignments in a timely manner under general supervision, and the ability to

present and defend their work before colleagues, supervisors and clients. They should have played an active role in technical discussions involving their specialty.

7. DS 2 employees in the 2-6 YRE range will be assessed on their productivity and the extent to which these expectations of development are being realized, as evidenced in the employee's employment history, in relation to the employee's YRE.

DS 3 Level

8. The evidence required to establish that this state of productivity and development (para 6) has been reached is either a PhD degree or all of the following:

a. a technically meaningful contribution to a SRDA project/study in a defence scientific specialty;

b. an employment history showing at least satisfactory professional development while engaged in SRDA over a 3-year period; and

c. a history of effective working relationships with the supervisor, colleagues, fellow employees and clients.

9. Employees in the DS 3 level and in the 3-12 YRE range are expected to develop and become expert in a specialty in the defence sciences or to become very competent in a range of specialties; to become knowledgeable in the broader aspects of defence SRDA relevant to his specialty such as sub-program goals and objectives, international defence SRDA technology transfer policies, SRDA activities in the private sector; to acquire a working knowledge of relevant military requirements and defence applications and to acquire a basic knowledge of the departmental organization and policies for the management of SRDA.

10. Employees in the 3-12 YRE range are also expected to make identifiable personal contributions to departmental SRDA activities and to their specialty; to begin to demonstrate:

a. the ability to initiate, conduct, supervise and complete original and independent R&D investigations, studies, analyses, etc under direction;

b. the ability to effectively organize and supervise the work and activities of R&D teams of junior professionals and technical support staff; and

c. the ability to present and represent local management's interests relevant to the SRDA activities in which they are involved and to exert a positive influence on others while so engaged.

11. Between 8-14 and normally by 10 YRE DS 3 employees should have become expert in a specialty within the defence sciences or have achieved a high level of competence in a number of specialties. They should have a working level knowledge of the broader context of their work e.g. subprogram goals and objectives, of policies and practices on the transfer and practical application of project results to industry and military use and of relevant military equipment and operational requirements. A basic knowledge of financial and personnel administration, resource planning and expenditure control and a basic knowledge of how SRDA is managed in DND is desirable.

12. Employees should have demonstrated the ability to initiate, perform and complete original SRDA investigations within allotted time and resources and under direction or general supervision the ability to organize and supervise the work and activities of subordinates or teams; the ability to present and represent local management's interests relevant to the activities in which they are involved and to exert a positive influence on others when so engaged and the ability to communicate and work effectively with the immediate supervisor, clients and subordinates on matters important to their assignments or to local management.

13. Employees in this range of YRE will be assessed on their productivity and the extent to which these expectations of development are being realized, as evidenced in the employee's employment history, in relation to the employee's YRE.

Note on DS Levels 1, 2 and 3

14. After introduction of these guidelines new employees who do not meet the requirements for appointment at the DS 2 level by 3 YRE, at the DS 3 level by 7 YRE, or at the DS 4 level by 15 YRE will be reviewed in relation to potential for further development. Unless the employee's assessment indicates that there is definite potential for further development they will be judged as lacking the ability to become a DS 4. In such cases, administrative action will normally be taken to move the employee out of the DS group.

DS 4 Level

15. The evidence required to establish that this state of productivity and professional development (para 11, 12) has been reached is as follows:

a. Definitive evidence of having carried out significant SRDA work under direction or general supervision and a continuing history of personal contributions which earned recognition as being an expert in a specialty or highly competent in a number of specialties.

b. Evidence of interactions as an expert with peers in agencies external to the home organization e.g. other R&D organizations, universities, etc, on matters related to the employee's specialty.

c. Evidence of success in coordinating and/or completing SRDA assignments within allotted resources and time.

d. Evidence of satisfactory oral or written presentations related to the employee's specialty, preferably to audiences including colleagues or clients outside the home organization.

16. Some examples of other evidence that is indicative of this state of development and which therefore augment the above are listed below:

a. An employment history indicative of a generally positive influence on productivity, morale and working relationships in the home organization and with other agencies.

b. Assignments involving the initiation and monitoring, as scientific authority, of one or more research contracts.

c. Instances of contributions being used in decision-making outside the home organization.

d. Participation as a technical representative in tasks, projects or other defence scientific activities at an international level, where such participation is possible and appropriate.

e. Effective leadership of a productive SRDA team or multi-year effectiveness as a task or project leader.

f. Evidence of more than one successful assignment as a technical representative of the home organization or evidence of recognition as a credible consultant and/or advisor in his specialty.

g. Effective execution of scientific advisory, planning, negotiating, coordinating or liaison assignments on behalf of middle management requiring technical insight into the clients' requirements and the capabilities of relevant departmental SRDA activities and resources.

17. Employees whose professional development terminates at level 4 are expected to maintain the level of expertise, abilities, effectiveness and productivity normal for this level, to continue to contribute to the department to the best of their ability, and to respond positively to management requests to take on new assignments arising from operational circumstances and requirements.

18. Employees in the DS 4 level with the knowledge, abilities, talents and initiative needed for further development and advancement will normally increase in their disciplinary expertise and develop their abilities to the full extent that opportunities permit while continuing to make significant contributions to the department and responding positively to management requests to take on new assignments.

19. DS 4s will be assessed on their productivity and on the extent to which these normal expectations of development are being realized, as evidenced in the employee's employment history, taking into account the employee's YRE.

Note on DS 5 and 6 Levels

20. Among employees with 13 YRE or more some will cease to develop professionally at the DS 4 level, some at the DS 5 level and some at the DS 6 level. Documentary records show that the evidence cited to establish that development has progressed beyond the DS 4 stage has been centered on one of the following three kinds of development: scientific, managerial, or analyst/generalist capabilities. The remaining guidelines apply only to advancement past the DS 4 level and will be described in relation to levels 5 and 6 according to the three kinds of development specified above. These guidelines are cumulative, i.e. they are complementary to those applicable to level 4.

DS 5 Level

21. To attain this level on Defence Scientific Merit, and which is normally attained during YRE 19-25, employees are expected to demonstrate an established mastery and leadership in a complex area of science and defence technology or field, definitely superior originality, creativity, and effectiveness in defence research and development, the

ability to positively influence clients, colleagues and superiors on scientific and technological issues and a thorough knowledge of relevant international defence R&D, of relevant military equipment, systems and operations and of DND organization and policies for R&D.

22. The evidence that establishes that this level of scientific productivity and development has been reached is given in the following list. Those items marked with an asterisk are critically important.

*a. A consistent multi-year history of defence R&D contributions which helped to substantially advance a defence scientific field and which earned a reputation as an expert in that field.

b. Evidence of effective participation as the responsible DS in formulating planning, organizing or implementing R&D projects/studies with agencies external to DND at the middle organizational echelons.

c. Substantial scientific or technological participation in or contributions to international defence SRDA activities.

*d. An employment history indicative of a generally positive influence on productivity, morale and working relationships in the home organization and with other agencies.

e. Evidence of successful interactions and negotiations with the private sector on behalf of establishment management.

f. Instances of superior contributions to the department on policy, equipment or operational issues.

g. Evidence of having been selected as an expert to represent departmental interests at national or international consultative meetings.

*h. A consistent multi-year history that is recognized by superiors and peers as demonstrating superior creativity in development or technology applications and is evidenced as individual accomplishments, as contributions to group or team projects, or by exerting strong influence on projects in a consulting role.

i. Sustained history of having attained R&D objectives with reasonable use of time and resources.

23. To attain this level on the basis of Managerial Ability, and which is normally attained during YRE 19-25, employees are expected to be expert in a specialty and demonstrate a current familiarity with several defence scientific fields, the ability to identify and define defence scientific questions of important and to suggest and implement original and workable solutions to problems or to identify new areas for investigations as means of achieving R&D objectives, the ability to manage R&D activities and resources characteristic in nature, scope and level, of a typical DRE Section or comparable-size R&D project; the ability to negotiate on behalf of local management on matters of concern to it, a thorough knowledge of relevant international defence R&D, of military equipment systems and operational factors and of DND organization and policies relevant to R&D, and the ability to positively influence clients, colleagues and superiors on R&D matters that are important at the middle management echelons.

24. The evidence that establishes that managerial ability at this level has been reached is given in the following list. Those items marked with an asterisk are of critical importance.

*a. Consistent multi-year history of significant scientific/technological contributions to group projects including the organization and coordination of the efforts of others, the generation of ideas to be pursued by others, and evidence of high productivity (in terms of reports, hardware, or problems solved) by projects or sections while under his/her management.

*b. Successful management of R&D activities and associated resources typical of the DRE Section or equivalent level, including effective participation in the cyclical budgeting process and effective acquisition and utilization of human resources.

c. Instances of superior contributions to the department on policy, equipment or operational issues.

d. Instances of successful interaction and negotiation with the private sector on behalf of local management.

*e. Instances of effective participation as the responsible DS in formulating, planning, organizing or implementing R&D projects/studies with external agencies at the middle management echelons.

*f. Evidence of more than one successful assignment as a negotiator on matters at the subprogram level.

g. Evidence of having been selected to represent departmental interests at national/international consultative meetings.

*h. An employment history indicative of a generally positive influence on productivity, morale and working relationships in the home organization and with other agencies.

i. Substantial participation in or contributions to international SRDA activities.

25. To attain this level on the basis of Analyst/Generalist Ability and which is normally attained during YRE 19-25, employees are expected to be expert in a specialty and demonstrate a current familiarity with several defence scientific fields and R&D relevant to operational research and scientific analysis in support of departmental programs and missions; the ability to identify and define the fundamental issues in defence scientific fields and to propose practical solutions to military and departmental issues and problems at the middle management echelons; the ability to analyse, review, and articulate the implications of changing scientific, technological, policy and other factors and to provide appropriate inputs at the middle management echelons; the ability to negotiate on behalf of local management on matters of concern to it; a thorough knowledge of relevant international issues and activities, of relevant DND organizational and policy factors, and the ability to positively influence clients, colleagues and superiors at the middle management echelons.

26. The evidence that establishes that analyst/generalist ability at this level has been reached is given in the following list. Those items marked with an asterisk are of critical importance.

*a. Consistent multi-year history of contributions to the department on policy, equipment or operational issues that are recognized by superiors and peers as demonstrating definitely superior analytical perception and judgement in defence scientific matters.

b. Instances of successful interaction and negotiation with the private sector on behalf of local management.

*c. Instances of effective participation as the responsible DS in formulating, planning, organizing or implementing defence projects/studies with external agencies at the middle management echelons.

d. Instances of success as a negotiator at the sub-program level.

e. Evidence of having been selected to represent departmental interests at national/international consultative meetings.

*f. Sustained history of having attained defence scientific objectives with reasonable use of time and resources.

g. Substantial participation in or contributions to international defence scientific activities.

*h. An employment history indicative of a generally positive influence on productivity, morale and working relationships in the home organization and with other agencies.

i. Evidence of selection for advisory, coordinating, or liaison assignments demanding superior skill in representing and promoting the program interests of the home organization.

27. Employees whose professional development terminates at level 5 are expected to maintain the level of expertise, abilities, effectiveness and productivity normal for this level, to continue to contribute to the department to the best of their ability, and to respond positively to management requests to take on new assignments arising from operational circumstances and requirements.

28. Employees in the DS 5 level with the knowledge, abilities, talents and initiative needed for further development and advancement will be expected to increase in their disciplinary expertise and develop their abilities to the full extent that opportunities permit while continuing to make significant contributions to the department and respond positively to management requests to take on new assignments.

29. DS 5s will be assessed on their productivity and on the extent to which these normal expectations of development are being realized, as evidenced in the employee's employment history, taking into account the employee's YRE and type of assignment.

DS 6 Level

30. To attain this level on Defence Scientific Merit employees are expected to demonstrate an exceptional ability to originate and perform R&D work at the forefront of advances in scientific/technological fields of importance to defence, exceptional originality, creativity and effectiveness in technology-base or technology-application activities, a sound knowledge of departmental and international defence R&D policies and problems, a history of continuing exceptional accomplishments and achievements which benefitted the department, and the ability to communicate effectively with and positively influene clients, colleagues and superiors on R&D issues important at the senior departmental echelons.

31. The evidence that establishes that this level of scientific productivity and development has been reached is given in the following list. Those items marked with an asterisk are critically important.

*a. Sustained career history of exceptional contributions to the advancement of a scientific/technological field important to defence or of exceptionally creative contributions to development or technology applications.

*b. Evidence of recognition at the international level as being a leading expert in a field of the defence sciences.

*c. An employment history indicative of a generally positive influence on productivity, morale and working relationships in the home organization and with other agencies.

d. Instances of having effectively represented departmental or national interests of national or international policy-making levels.

e. Instances of success as DND's official negotiator on scientific or technological matters affecting defence R&D policies and programs in scope, nature, direction or magnitude.

f. Sustained history of having met R&D objectives with reasonable use of time and resources.

32. To attain this level on the basis of Managerial Ability employees are expected to demonstrate the ability to provide leadership in the identification, definition, and implementation of new scientific/technological approaches in technology-base and technology-application programs, the ability to manage diversified R&D activities and resources characteristic, in nature, scope and level, of most DRE divisions or projects of comparable magnitude, the ability to represent and negotiate on departmental interests related to technology-base and technology-application policies and programs, R&D policy issues, etc; and extensive knowledge of national and international defence R&D policies, objectives and programs, a sound knowledge of departmental and central agency management and administrative systems affecting resource acquisition and utilization; the ability to communicate effectively with, serve and positively influence senior officials of the department and other organizations on broad issues such as R&D policies and programs, major capital acquisitions and operational or strategic defence matters.

33. The evidence that establishes that managerial ability at this level has been reached is given in the following list. Those items marked with an asterisk are critically important.

*a. Consistent multi-year history of significant scientific/technological contributions to group projects including the organization and coordination of the efforts of others, the generation of ideas to be pursued by others and evidence of satisfactory productivity (in terms of reports, hardware or problems solved) by divisions, large sections or multi-disciplinary project teams under the employee's direction and management.

*b. History of participation in international defence R&D activities as an expert or departmental delegate in a highly complex and significant field.

*c. Evidence of successful management of R&D activities typical of most DRE divisions i.e. diverse in nature and objectives involving major client organizations.

*d. An employment history indicative of a generally positive influence on productivity, morale and working relationships in the home establishment and with other agencies.

e. Assignments as the departmental official representative at national and international discussions and negotiations affecting Canadian defence R&D policies and programs in terms of nature, scope, magnitude or direction.

f. Instances of having effectively represented departmental or national interests at national and international policy-making levels.

34. To attain this level on the basis of Analyst/Generalist Ability employees are expected to demonstrate an extensive knowledge of highly complex fields in operational research, scientific analysis and R&D in support of departmental missions and programs; the ability to identify and define the fundamental issues and propose practical solutions to military and departmental problems at the senior management echelons; the ability to analyse, review and articulate the interrelationships and impact of change on defence issues for use at the senior departmental echelons (e.g., changes in science and technology, in military, governmental and foreign programs and policies); the ability to negotiate on behalf of senior management on matters of concern to it; a thorough knowledge of relevant international issues and activities and of relevant departmental organization and policy factors; a sound knowledge of national and international defence R&D policies and programs, and the ability to communicate effectively with, serve and positively influence senior officers of the department and other organizations on such matters as R&D policies and programs, major capital acquisitions and operational or strategic defence matters.

35. The evidence that establishes that analyst/generalist ability at this level has been reached is given in the following list. Those items marked with an asterisk are critically important.

*a. Consistent multi-year history of contributions to the department on policy, equipment or operational issues that are recognized by superiors and peers as demonstrating exceptional analytical perception and judgement in defence scientific matters.

*b. Evidence of influential analyses or reviews at the senior departmental levels on policy, program, equipment and/or operational issues involving defence scientific considerations.

*c. History of recurring demands on employee to originate broad analyses, reviews or policy studies and papers for consideration by senior departmental management levels or on their behalf for consideration by external agencies.

*d. An employment history indicative of a generally positive influence on productivity, morale and working relationships in the home establishment and with other agencies.

e. Assignments as the departmental official representative at national and international discussions and negotiations affecting Canadian defence R&D policies and programs in terms of nature, scope, magnitude or direction.

f. Instances of having effectively represented departmental or national interests at national or international policy-making levels.

g. Sustained history of having met defence scientific objectives with reasonable use of time and resources.

36. Employees whose professional development terminates at level 6 are expected to maintain the level of expertise, abilities, effectiveness and productivity normal for this level, to continue to contribute to the department to the best of their ability, and to respond positively to management requests to take on new assignments arising from operational circumstances and requirements.

37. Employees in the DS 6 level with the knowledge, abilities, talents and initiative needed for further development and advancement will be expected to increase in their disciplinary expetise and develop their abilities to the full extent that opportunities permit while continuing to make significant contributions to the department and responding positively to management requests to take on new assignments.

38. DS 6s will be assessed on the extent to which these normal expectations of their productivity and development are being realized, as evidenced in the employee's employment history, taking into account the employee's type of assignment.

GLOSSARY

Analyst/Generalist - The term used to identify those whose primary duties are in Scientific Analysis or the other areas described on pg (v) of the DS Classification and Selection Standard. E.g. in ORAE, NDHQ(CRAD).

Assignment - A non-specific term used to avoid the particular connotations, within DND, of words such as tasks, projects, programs, positions etc. It means any duty, work, or responsibility, large or small, short or long, which the employee was responsible for carrying out.

Career Performance - The characteristic or customary way of performing as judged from a retrospective view of productivity and professional development during past employment, with emphasis on the past few years.

Client - A person or organization with whom one has to deal and who is to receive the benefit of the services of oneself or one's own organization.

Consultative Meetings - Meetings of parties having some common and some divergent interests in a spirit of cooperation with the intent of influencing others to change their positions, activities or attitudes. It follows that one who "represents another's interests" at such meetings is responsible for more than passive participation such as liaison, observing, exchanging data, etc.

Current Familiarity in a Field of the Defence Sciences - Thoroughly conversant with the state-of-the-art and recent discoveries, concepts, methods and developments relevant to a particular field.

Defence Sciences - See page I-4, DS Classification Standard.

Defence Scientific Activities - The six types of activity in which defence scientists are employed as defined under "Inclusions" on pp (iv) and (v) of the DS Classification Standard.

Development - See Professional Development.

Direction - See DS Classification Standard, page I-8.

Employment History - The sum of all available information, documentary or otherwise, about the periods, locations, employers, duties, assignments, and responsibilities of a person's past employment and associated evidence indicative of the person's knowledge, abilities, personal qualities and productivity.

Expert - A person with an intensive knowledge and/or unusual ability and who is recognized by superiors and peers as a source of current, knowledgeable and dependable data, information, opinion and advice in that person's area of expertise.

Expertise - Expert skill or knowledge; expertness.

Field - Differences in the scope and depth of knowledge and the importance of scientific/technological contributions are indicated in the guidelines by use of the terms "field", and "specialty". In common usage their meaning varies widely and depends on the author and the context so that by themselves the words are meaningless. As used in the guidelines they have the following significance:

i. field - a branch of defence technology of such a scientific and technological nature that a defence scientist competent in one would not be expected to transfer to another and could not do so without a substantial amount of additional education and a considerable gap in SRDA productivity. Hence most Technical Programs include more than one field while some sub-programs are equivalent to a field and some are not.

ii. specialty - a subject of study or expertise that, compared to a field, is scientifically and technologically limited in scope and is commonly regarded as a specialty by experienced practicioners in relevant fields. It is not necessarily a segment of a particular field or unique to a particular field.

General Direction - See DS Classification Standard, page I-9.

General Supervision - See DS Classification Standard, page I-8.

High Level of Competence, Highly Competent - Considered by superiors and peers to be highly qualified but not necessarily an expert.

Home Organization - One of the following: a DRE, ORAE, NDHQ(CRAD), DSTI, CDLS(L), CDLS(W), DRA(Paris), an organization to which one is seconded.

Human Relations Activities - Activities in the working environment in which a favourable response from other persons to one's personal or official point of view is a desirable contribution or accomplishment. Four levels of effectiveness may be used for convenience:

Basic - ordinary courtesy and effectiveness in dealing with others and effective supervision of technical staff and new junior employees.

Average - communicates effectively with, understands, positively influences, persuades and serves clients, colleagues, immediate supervisor and subordinates on matters important to one's own job and/or home establishment.

High - communicates effectively with, understands, positively influences, persuades and serves clients, colleagues, superiors and subordinates in one's own organization and in external organizations on matters and issues that are important at the establishment divisional level and corresponding levels in other national/international organizations.

Exceptional - can communicate effectively with, understand, influence, persuade and serve senior officials of the department, other departments, the private sector and foreign agencies on broad issues such as R&D policies and programs, major capital acquisitions and operational and strategic defence matters.

Interactions - Reciprocal actions between persons i.e. they act on each other. This may occur in conversations, discussions, meetings, seminars, correspondence etc. The term excludes the various kinds of one-way activities or communications, e.g. acting as observer, listening without feedback.

Level of Competence - Depending on the context it may mean either the classification level or the extent to which the person is considered to be qualified in a subject by superiors and peers.

Mastery - The possession of a high order of knowledge and skill in a subject.

Military Environment - The whole complex of natural, man-made, circumstantial and human factors that affects the performance of man, machines and systems in military service.

Negotiation - The process of resolving the conflicting interests, plans, objectives etc of two or more parties. To negotiate on behalf of another, a person must have been given some discretionary authority for making decisions and commitments and reaching agreement.

Oral or Written Presentations - Oral or written descriptions of one's own work, prepared to impart information and understanding to others not necessarily directly involved in the work. E.g. at seminars, workshops, conferences; establishment scientific and technical reports; publications in recognized journals.

Participation in Defence Scientific Activities at the International Level - Any activity which involves direct communication between DS and their military or civilian counterparts in other countries, whether by means of meetings, conferences, telecommunications or correspondence.

Productivity - The quality of being productive: the capacity to produce. (The extent to which this quality or capacity is possessed by a defence scientist is evidenced by the quality, quantity and value of his/her accomplishments and contributions and the effectiveness of his use of allotted time and resources).

Professional Development - The gradual increase and growth of knowledge, abilities and maturity as a defence scientist.

Project/Study - See DS Classification Standard, page I-7.

R&D - See DS Classification Standard, page I-5.

Representative - A person who speaks or acts for another by delegated authority. The importance of a representative assignment therefore depends on the nature and extent of the delegated authority involved.

Scientific Authority - See DS Classification Standard page I-5.

Specialty - See Field.

SRDA - Acronym for scientific research, development and analysis, the primary duties in the DS Group as defined in the DS Classification Standard, page (iv).

Substantial Participation - Participation that influenced the course of events, decisions, etc in the defence scientific activities which involved the person.

Technical Representative - One who is selected to speak knowledgeably for others on the technical aspects of some activity, problem or issue.

To Exert a Positive Influence - To bring about a more favourable understanding or appreciation of a position or point of view. The ultimate is to completely win another to the position or point of view.