Report of
Task Force on Geophysical Data Centre

by

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Geophysics Division Internal Report 91-1

INTRODUCTION

The task force for the restructuring of the Geophysical Data Centre was initiated because of recent retirements and resignations in the AG&G subdivision, and the large task at hand to convert from the VAX to the SUN platform. This provides an opportunity to build a Data Centre for the future. The Terms of Reference for the task force are given in Appendix 1. It should be noted that in mutual agreement between Gibb, McConnell and the other task force members, it was decided that the task force could operate more independently if McConnell were not the rapporteur, but remained in function as a resource person. This would also avoid perceived interference with his present position as acting head of the Data Centre.

In this report, we will first make some general observations based on the interviews carried out and present thoughts on the philosophy of the Data Centre as we see it. Then, we will proceed to address the points raised in the Terms of Reference (1a to 1e). Finally, a list of specific recommendations is given.

In answering the questions asked by the subdivision management the task force tried to reckon with the boundary conditions imposed by the present day situation. We also took retirement plans into account.

Finally it should be noted that since the installation of the task force several developments took place that affected its work:
- Proposed merge of the Geodynamics and Gravity sections.
- Proposed move of Versatec plotter from ITB to the Data Centre.
- Additional increase in operating costs for VAX 8800.
- Change in PY policy, where the number of PYs is no longer a constraint but the total salary budget is.

Approach:

The task force started out with meetings of the task force members with their respective sections. Based on the response, it was decided that interviews with the section heads and the subdivision chief were necessary. After that, interviews were held with the current staff of the Data Centre, and persons who could potentially be involved in a systems development group. In a later stage discussions were held with many individuals.

Observations:

Numerous interviews with groups and individuals led us to make several observations:

The morale in the Data Centre is low due to a variety of reasons. There is a (perceived?) lack of appreciation by the rest of the subdivision. This is in line with expressed views in other sections that the importance of the Data Centre to the subdivision is only marginal (provided that the data are available). It is in fact true that at present the AG&G subdivision is not the heaviest user of the Data Centre (see statistics for 1990, appendix 2).

At present, the major part of activities in the Data Centre is related to aeromag. Only about 1/2 a Data Centre PY is dedicated to the handling of gravity requests. With the sudden retirement of Dods, a large part of the aeromag subject matter expertise has left the Data Centre. It is the impression of the task force that several parts of the aeromagnetic processing and checking need review as to their effectiveness. In addition we note some duplication of efforts between Contract Surveys and the Data Centre. The overlap between reformatting of data carried out in the Data Centre, and the levelling contracted out for the 200 m grid in cooperation with the provinces is unclear. The task force did not have a chance to talk to Dods, but feels his input may be needed to sort out some of these problems.

All sections expressed the need for a general software/hardware support group resident in the Data Centre. It is clear that the present Data Centre does not have enough programming skills to handle the conversion to UNIX. Therefore, the role of this systems development group for the next 2 years will be in UNIX conversion. However, we also identify the need for subject matter programming expertise in each of the sections.

A general impression is that too few people do too many tasks, throughout the sub-division. This makes it hard to re-allocate resources and impossible to see the restructuring of the Geophysical Data Centre independent of the organization of the rest of the subdivision. This is true from the point of view of the philosophy of the role of the Data Centre and its interaction with other sections, as well as from a practical point of view when

moving people. In addition, plans for a merge of the gravity and geodynamics sections have become more firm. This has some consequences for the structure of the Data Centre. Therefore, it was felt necessary to at least address some issues that are, strictly speaking, beyond our mandate, in order to be able to fulfil our mandate. However, it is not the task force's intention to reorganize the subdivision.

There are not many cooperative links between the different sections in the AG&G subdivision. As a result, not much appreciation exists for things happening in other sections. This problem can only be solved through project management, where members of different sections work on one project. A new organisation of the data centre cannot resolve this difficulty.

PHILOSOPHY OF THE GEOPHYSICAL DATA CENTRE

The key points in the restructuring of the Geophysical Data Centre are the functions it should perform and its links to the other sections in the subdivision. The most important tasks of the Data Centre should be to provide a gravity and magnetic data storage, retrieval and display facility and to maintain the integrity of the data. The Data Centre is responsible for distribution of the data, firstly to the public, and then to the Geophysics Division and other divisions.

The Geophysical Data Centre will operate on a cost-recovery basis. We believe that also internal users outside the Geophysics Division should pay for the service they receive.

Management should take the public relations function of the Geophysical Data Centre seriously, and allocate resources to increase its visibility. For example, the GID open house flyer (What GID can do for you!!) is much more appealing than the Data Centres' catalogue of products and services.

To provide high quality service, the Data Centre should continuously be developing better/new products. Therefore, and because the UNIX platform is located in the Data Centre, the most logical location for a systems development group would be in the Data Centre. However, because each of the sections has a need for programming expertise of their own, it is not wise to concentrate all computer related work permanently in the Data Centre. In order for the Data Centre to represent us well nationally and internationally, stronger ties are needed between the Applications Section and the Data Centre. At present, methods to better interpret potential field data are being developed in the Applications Section but do not find their way into Data Centre products. Only close ties with scientific developments and the implementation of e.g. Maps-On-Demand and network data access can make the Data Centre an internationally respected organisation. This is also necessary to improve the motivation of personnel,

because the future of Data Centre is perceived as a dead-end, button-pushing operation.

At present we note an asymmetry between gravity and aeromagnetic data handling. To improve this situation, the Data Centre should be responsible only for data base development and management, but not for data homogenization (levelling etc.). The distinction between gravity and magnetic data handling can be very small, especially in display and retrieval. In the future, this difference may become even smaller, because aerogravity will become available and the GSC might contract out surveys to refly parts of Canada.

Although the Data Centre will have a general function for hardware/software support, each section will need its own CS/PC, e.g. Applications for the Stardent and Geodynamics for the HP. Those persons work in close relation with the scientists in the sections, and placing them in the Data Centre would be counter productive.

DATA CENTRE PRIORITY TASKS

Several tasks, related to the conversion of the software and databases from the VAX to the SUN, need to be completed in short term. To practically coordinate this conversion, the involvement of only a limited number of programmers is advisable. Although this will mean that the conversion will take up to 2 years, it will lead to a more cohesive system. Most software will need considerable rewriting to become fully up-to-date. It is essential to upgrade the software during the conversion, because otherwise we would end up with software that is essentially 10 years old and has been converted from Cyber to VAX and from VAX to SUN; the conversion effort would then be a waste of time. In the meantime, increased costs on the VAX 8800 should be passed on to the users of the Data Centre.

The following items have been identified as urgent once the Sun system is operative (effectively at present):

1 Sun system operation and maintenance
2 Conversion of processing, data base and display software to SUN UNIX platform
3 Versatec plotter operation
4 Aeromag index data base
5 Request processing
6 Training of staff
7 OGS data

Remarks:
1) Includes set up of additional workstations, maintenance of network, making backups, etc. (Rupert/Janveau)

2) A list of hardware and software used in the subdivision has been compiled by the task force and is available from the chairperson. In our view, the conversion to UNIX has been imposed by management and requires:

Gravity:	ORACLE, Network adjustment, Reduction, Netplot, Plotsys (Buck/Kane/Rupert). Interactive retrieval (Buck)
Aeromag:	If needed to reduce VAX costs, the Contract Surveys group could convert software "as is". Rewriting can be done later. However, the programs will need considerable rewriting, because most software is old. Evaluation of aeromag data, duplication of efforts etc. (Tod/Keating/Roest/others)
Data Centre:	Interactive grid adjustments Gravity editing/ship profile editing (Halpenny) Plotsys, develop Maps-on-Demand and Network Data Access (Rupert/others)

All major programs should be tested and documented properly. A short term minimum requirement could be a set of user instructions on how to invoke and use the new software.

3) Versatec plotter and tape units will require an operator in the near future. It is possible to combine this function with standard request processing or clerical support.

4) The need for an Index Data Base for aeromag has to be evaluated (Buck, Kane, Lawley, Rupert, Tod). Potentially it could save time in request handling. The gravity Project Data Base can be used as a guide.

5) Priorities for the Data Centre should be set by a working level committee. We also note that some of processing can be streamlined. We do not identify an immediate need to stop request processing during the conversion to UNIX, but recommend that this be done if necessary.

6) Training is required for current/new staff of Data Centre, e.g. Versatec Operating and Maintenance, SUN hardware/software, etc.

7) The OGS levelled data become available in flight line format in September. Maps and gridded data will be released this month. We understand that the Data Centre will be responsible for distribution. No clear idea exists of what this involves. In any case, the PGW levelling software should be evaluated for future use on data in other provinces (Keating, Stone, Tod, others)

DATA CENTRE ACTIVITIES

Services provided by the Data Centre, after the UNIX conversion is completed should include:

Data maintenance
Data and documentation archive
Standard request processing
customized request processing
compilation of Geophysical Atlas Maps
compilation of NESS maps
compilation of open file maps, GLIMPCE, Basin Atlas, etc.
Compilation of special maps such as Costa Rica, Bolivia etc.

System development
Database development
Display software development
Access and retrieval software
Standard processing software

Computers and peripherals operation
SUN system managing
Versatec plotter operation and maintenance
Tape unit operation and maintenance
Sub-division training in use of Network and SUN system
General network maintenance

Long term:

- Additional geophysical data:
  - Radiometric
  - Satellite images (ERS-1)
  - Satellite Gravity/Geoid data
  - Rock properties: -Densities
    -Paleomagnetic data

- ...

ORGANIZATION OF DATA CENTRE

In order to perform the immediate tasks at hand, it is proposed that a systems development group be located in the Data Centre. For the next 2 years this group will have to focus on conversion and rewriting of software for processing, database and retrieval of aeromag and gravity data. This group should also contain the expertise on ORACLE and other data base systems in use. In view of the relocation of the Versatec plotter and anticipated tape handling requirements, an operator should be included. After these 2 years, the group may be reduced in size, and could provide overall support for the other sections as well. Practically this may mean that some people are seconded to the systems development group for a period of 1 to 2 year, and then return to their own sections.

The processing of requests should be streamlined, with most internal standard requests being handled by the users themselves. A menu driven system will be developed to allow data retrieval and display by users on the network.

The (term) position of a clerk is indispensable, but this person should also perform some standard request processing. Alternatively, the position of operator could be combined with processing.

The acceptance and maintenance of data into the data base has to be overseen by a subject matter expert. This person does not necessarily have to be located in or report to the Data Centre.

We propose data processing, common formatting, levelling etc. of aeromag data be the responsibility of the Contract Surveys group (Anderson, Butt). At the same time, data base development personnel be moved into the Data Centre (Kane, Buck). It is essential that a second person becomes familiar with ORACLE system development and software maintenance.

This leads to the following proposed organization of the Data Centre:

Head (PC)

Systems Development	Data Management & Services
Head Systems Programmer (PC)	
ORACLE Programmer (PC/CS)	Data Management/Maintenance (PC)
Support Programmer (CS)	Request Processor (EG)
System Manager (CS)	Clerical Support (CR)
Peripheral Operator (CS)	

To ensure continuity in the leadership in the Data Centre, the task force recommends very strongly that the new head of the data centre should potentially fill that position for a longer period of time. Therefore, we feel that Ken McConnell is not the right person to head the Data Centre since he has expressed his desire to retire in 2 years. Making him head of the Data Centre is in our view postponing the problem. However, McConnell will be invaluable as a resource person reporting to the subdivision chief, and could play a very active role in providing guidance and advice in organizing the new Data Centre. We see as his main responsibilities not the day-to-day management, but he should be a member of a committee to be formed to set Data Centre priorities, interface with GID, advise on data base design etc.

The conversion and upgrading effort performed by the systems development group should be supervised by James Rupert, and overseen by a group of experts.

Although we realise that the staffing situation is uncertain, the task force has the opinion that the data centre, and for that matter the subdivision, cannot function without hiring new staff:

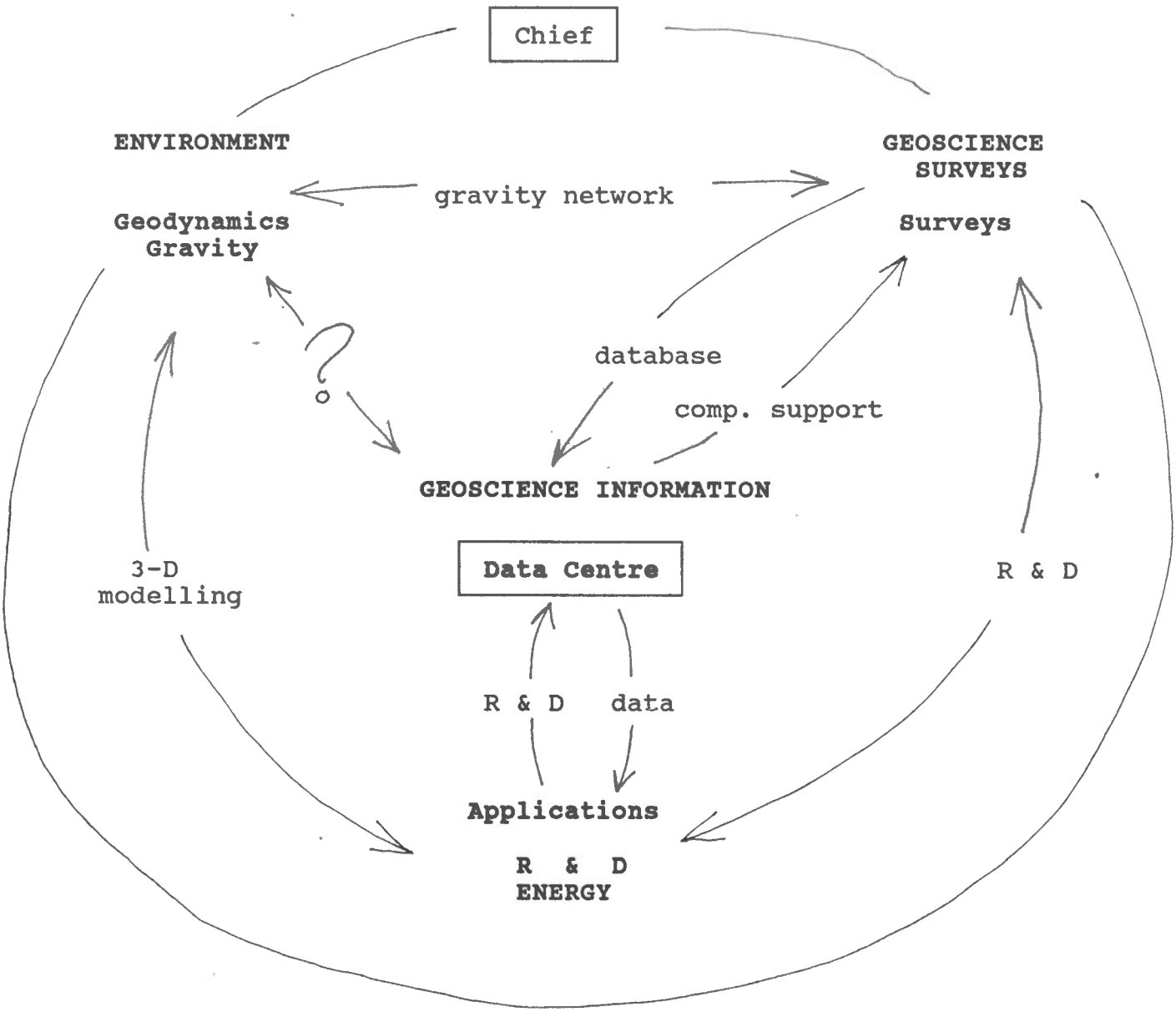
Data Centre Head (PC)
Data Centre Programmer (CS) - applications
- ORACLE
- FORTRAN, C
- UNIX

Clerical Support (CR) Most probably a term position
Geodynamics Section (PC) Processing and HP Manager
Applications Section (CS-2 or PC) Programmer

It may be preferable to employ the CS-2 currently being hired for the Applications Section in the Data Centre, because of the specific requirements mentioned in the advertisement. A PC/CS should than be hired at the same time for the Applications Section to work on the Stardent.

INTERFACE WITH REST OF THE SUBDIVISION

How the Data Centre should interface with the rest of the subdivision depends very much on the organization of the sections within the subdivision. In view of the merge of the gravity and geodynamics sections, it is the taskforce's opinion that in that case a more balanced subdivision can be created when the gravity surveys group is merged with the aeromag surveys group, to form a potential field surveys group. The geodynamics/gravity section could then be comprised of geodynamics, standards and instrumentation. In the schematic below, the sections are characterized by the main program themes.



The strongest ties would exist between the Data Centre and the surveys group, because both sections work on the same databases. The interaction with Applications is in the research and development, and the data retrieval. The development of a maps on demand system, as well as a menu driven data retrieval and display system should allow most users in the geophysics division to limit their demands on the data services group.

Other divisions, but especially CGD is a heavy user of Data Centre (Mike Thomas, Dave Forsyth, and until recently Larry Sobczak). Once a user friendly system is in place to do most requests, and after allowing time for training, it is felt that the Data Centre should charge other divisions for requests handled by Data Centre staff. AGC is paying its yearly contribution of 25 K for this year, but will be reviewing this for the next fiscal year. It would definitely look better if CGD and other divisions also put some money into the Data Centre.

LOCATION

Although many individuals expressed the thought that "togetherness breeds contentment", the present situation on campus (with several smaller buildings) makes it impossible to have each group completely together. In the short term, people in the systems development group, working on the UNIX conversion should be located inside the Data Centre. This is important because the tasks of the system development group are seen as a team effort, where different members have overlapping abilities. It will also facilitate changing the old reporting hierarchy and the setting of priorities. Similarly, Anderson and Butt should move to the Contract Surveys Group, where they work closer to their supervisor.

PRIORITY SETTING

As a subdivision service group, the data centre must be responsive to the needs of the users. These needs should be perceived as serving a worthwhile purpose and must have the support of the subdivision. A mechanism must be provided to ensure that services are being provided, new products are being developed, data integrity is being maintained, and that requirements of the users are being addressed. We propose to form committee with members of each section to operate at a working level and provide the much needed liaison between the various sections.

RECOMMENDATIONS

UNIX Conversion, upgrading

- Conversion from the VAX to SUN takes place over 2 years, with only a limited number of programmers involved. Project managed by James Rupert. Take the opportunity to rewrite and streamline software. If VAX costs are rising too quickly, it could be considered to convert some CPU intensive programs (Contract Surveys group) directly to SUN, and streamline later. However it would be preferable to charge Data Centre users for CPU time.

- If necessary, customized requests and/or request from other divisions should stop for 3-6 months, while concentrating on system and data conversion.

- Develop maps-on-demand and user friendly network access (display/retrieval) system for internal (GSC) users. Charge users external to the Geophysics Division for those requests that can be done by themselves.

- Evaluate need for, and develop aeromag index data base on ORACLE, to interface with system software.

- Assess work load involved with operating of Versatec plotter and tape drives (backups etc.) in Data Centre. At present this task can be performed by system manager (Janveau), but we estimate that in the future 1/2 a PY is needed.

Organisation

- Head of Data Centre. The task force does not want to identify a single individual as the new head of the data centre. However, we note that several members of the current staff could do an excellent job, especially with guidance by Ken McConnell during the first year.

- Appoint a clerk, preferably on a term position

- Software/Hardware Systems Group formed in Data Centre, but also a resident CS/PC in each section. After about 2 years, reduce size of Systems Group.

- Move aeromag processing and homogenization to Surveys Group.

- Have McConnell function as a resource person, reporting to chief.

Prioritization and monitoring

- Form a committee to prioritize Data Centre tasks.

- Have a group of experts evaluate the aeromag situation, processing, verification of levelling, PGW software for future use etc.

- Form a systems group of all computer experts of each sections to meet once a month or so, in order to avoid duplication of efforts, and ensure as much as possible compatibility of hardware etc.

- Form a data base design group to develop suitable structure of the levelled aeromag database, storage and retrieval philosophy etc.

Finally we recommend that the task force should remain in existence to monitor the implementation of accepted recommendations.

Government of Canada / Gouvernement du Canada

MEMORANDUM NOTE DE SERVICE

To / À

W. Roest
J.D. Rupert
D.B. Hearty
W. Petrachenko
J. Tod
W.F. Miles
R.K. McConnell

From / De

R.A. Gibb

Security Classification – Classification de sécurité	
Our File – Notre référence	GS2802-1
Your File – Votre référence	
Date	April 4, 1991

Subject / Objet

TASK FORCE ON GEOPHYSICAL DATA CENTRE (GDC)

1. Yesterday I met with the section heads in our subdivision to discuss changes in organization necessitated by recent staff retirements and resignations. With respect to the Geophysical Data Centre we have decided to form a task force which will examine all data processing activities in the subdivision and make recommendations to help us restructure the GDC.

2. I am asking each of you to serve on the task force and I would like Walter to serve as chairperson. McConnell's role will be to act as rapporteur and resource person. You will note that, with the exception of the rapporteur, the task force is made up of younger staff members who have a stake in the future of our Data Centre. We expect that they will take take pride in building a unit which not only serves their data needs but which will represent them well nationally and internationally.

3. The terms of reference for the task force are attached. Please advise me immediately if you are unable to serve.

R.A. Gibb

R.A.Gibb

c.c. D.J. Teskey
R.A.F. Grieve
A. Lambert

Canada

TASK FORCE ON THE RESTRUCTURING OF THE GDC

TERMS OF REFERENCE

1. The task force should examine all current and foreseen data processing activities in the AGG Subdivision and make recommendations on the following issues:

   (a) Which activities should be carried out within the framework of the Data Centre? Currently the activities are:

   Standard request processing
   Special request processing
   Some hardware systems maintenance (Microvaxes, Sun system, and various peripherals)
   Some software maintenance (aeromagnetics)
   Some software development (mostly one-shot for special requests)
   Compilation of NESS maps
   Compilation of some other aeromagnetic and gravity maps
   Compilation of Open File maps
   Maintenance of aeromagnetic data base
   Homogenization (levelling and common formatting of aeromagnetic data)
   Maintenance of document archives for aeromag and gravity

   (b) How should the Data Centre be organized to carry out the recommended activities?

   (c) How should the Data Centre interface with the rest of the subdivision as well as other divisions in GSC?

   (d) Is the present location of the Data Centre suitable to carry out the proposed new mandate? If not, where should it be accommodated?

   (e) Since the Data Centre is primarily a service group, how do we set priorities for the proposed activities?

2. The task force should begin on April 8, 1991. A final report should be delivered by April 30, 1991. The tight timeframe and deadline are necessary because of the high priority assigned to restructuring the Data Centre.

3. The task force should interview sections/groups/individuals in the Subdivision to gather input for their recommendations.

4. The recommendations of the task force will be considered by the subdivision management committee (Gibb, Grieve, Teskey, Lambert & McConnell) and decisions rendered shortly thereafter.

APPENDIX 2

1990 - 1991 ANNUAL REPORT
Geophysical Data Centre
* Magnetics Request Statistics
APRIL 01 1990 to MARCH 31 1991 MAGNETIC DATA REQUEST REPORT
Produced on APR/19/91

Number of Requests By Source :

	---- Invoiced ---- #	Revenue	-- Non-invoiced -- #	Revenue	----- Total ----- #	Revenue
Government agencies (Federal/Internal)..	0	$ 0.00	103	$ 80,554.05	103	$ 80,554.05
Government agencies (Federal/External)..	0	$ 0.00	3	$ 1,050.00	3	$ 1,050.00
Government agencies (Provincial).....	11	$ 7,888.50	9	$ 1,052.00	19	$ 8,940.50
Government agencies (Foreign).....	1	$ 180.00	8	$ 82.00	9	$ 262.00
Universities.....	4	$ 2,790.17	13	$ 586.55	17	$ 3,376.72
Oil & Mineral Exploration Companies.....	60	$ 39,694.38	44	$ 2,029.60	104	$ 41,903.98
Geophysical consultants.....	63	$ 38,002.40	32	$ 2,280.00	96	$ 40,282.40
General Public and Other.....	0	$ 0.00	2	$ 2.00	2	$ 2.00
TOTAL...	139	$ 88,555.45	214	$ 87,816.20	353	$ 176,371.65

	Number of Requests	Number of Maps/Products
REQUEST for PROFILE DATA.....	68	2,780
All Fields maps.....		137
Total Field maps.....		2,643
Vertical Gradient maps.....		0
REQUEST for GRIDDED DATA.....	90	1,214
TF/RES standard maps.....		889
TF/RES custom maps.....		279
VG standard maps.....		44
VG custom maps.....		2
REQUESTS for MAPS.....	97	1,462
PUBLISHED maps.....		1,111
STANDARD computer generated maps.....		28
CUSTOMIZED computer generated maps...		260
COLOUR maps.....	(79)	(276)
OTHER maps.....		63
REQUESTS for OTHER NON-MAP PRODUCTS		
OTHER PRODUCTS.....	131	278
CONSULTATION REQUESTS.....	493	

NUMBER of RECORDS for DIGITAL DATA:

Records Listed.....	0
Records to Tape.....	200,222,532
Records Plotted.....	97,380,130

NOTE - * A request may comprise more than one data type

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MAGNETIC DATA REQUEST STATISTIC REPORT

1. "COSTS" BY DATA TYPE

ANNUAL REPORT: APRIL 01 1990 to MARCH 31 1991

DATA TYPE	EXTERNAL REQUESTS: INVOICED	NON-INVOICED	TOTAL	INTERNAL REQUESTS NON-INVOICED	TOTAL EXTERNAL + INTERNAL
DIGITAL DATA					
PROFILE DATA	$ 37,160.01	+ $ 2,325.00 =	$ 39,485.01	$ 30,097.05	$ 69,582.06
GRIDDED DATA	33,613.21	4,018.15	37,631.36	11,385.00	49,016.36
TOTAL DIGITAL DATA	$ 70,773.22	+ $ 6,343.15 =	$ 77,116.37	$ 41,482.05	$ 118,598.42
MAP PRODUCTS	17,548.55	752.00	18,300.55	39,043.00	57,343.55
NON-MAP PRODUCTS	233.68	166.00	399.68	30.00	429.68
TOTAL	$ 88,555.45	+ $ 7,261.15 =	$ 95,816.60	$ 80,555.05	$ 176,371.65

2. SUMMARY STATISTIC REPORT

NOTE: Since some requests comprise more than one data type, the total no. of requests does not equal the total no. of requests by data type.

MAGNETIC DATA REQUEST STATISTICS FOR THE PERIOD: APRIL 01 1991 to MARCH 31 1991

	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	ANNUAL REPORT APR 01 1989 MAR 31 1990	ANNUAL REPORT APR 01 1990 MAR 31 1991
NO. OF REQUESTS														
EXTERNAL	31	20	14	21	12	11	24	27	21	27	23	18	223	249
INTERNAL	9	15	6	11	2	2	12	9	2	12	12	12	123	104
TOTAL REQUESTS	40	35	20	32	14	13	36	36	23	39	35	30	346	353
REQUEST CHARGES														
INVOICED	$ 5,057.71	$ 5,481.00	$ 3,407.30	$ 8,457.44	$ 4,811.20	$ 3,655.40	$ 9,386.14	$ 8,480.21	$16,458.82	$11,308.44	$ 6,231.64	$ 5,820.15	$107,614.37	$ 88,555.45
NON-INVOICED	5,463.00	5,148.00	2,250.00	7,483.00	3,717.00	2,020.00	22,556.85	12,210.15	1,207.00	3,951.15	5,094.30	16,690.75	96,440.24	87,816.20
TOTAL "$" VALUE	$10,520.71	$10,629.00	$ 5,657.30	15,940.44	8,528.20	5,675.40	31,942.99	20,690.36	17,665.82	15,259.59	11,325.94	22,510.90	$204,054.61	$176,371.65
COLOURED MAPS:	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT
# OF REQUESTS	3+ 4= 7	2+ 6= 8	1+ 2= 3	3+ 6= 9	1+ 1= 2	2+ 0= 2	3+ 5= 8	7+ 2= 9	3+ 2= 5	5+ 4= 9	5+ 5= 10	1+ 6= 7	n/a 109	11+15= 79
# OF MAPS PROD.	3+12= 15	2+ 9= 11	1+ 6= 7	27+15= 42	2+ 4= 6	5+ 0= 5	11+ 7= 18	32+17= 49	9+ 6= 15	28+ 6= 34	22+15= 37	2+35= 37	n/a 309	52+56= 276
INT. BY DIV.:														
# OF REQUESTS	9	15	6	11	2	2	12	9	2	12	12	12	123	104
TOTAL "$" VALUE	$ 5,370.00	$ 5,136.00	$ 2,100.00	$ 6,576.00	$ 2,290.00	$ 490.00	$22,221.85	$11,128.15	$ 1,200.00	$ 3,230.00	$ 4,657.30	$16,130.75	$ 59,972.60	$ 80,555.05
# OF REQUESTS BY DATA TYPE:	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN= TOT	EX+IN=TOT	EX+IN= TOT	EX +IN = TOT
PROFILE DATA	5+ 1= 6	4+ 0= 4	5+ 0= 5	6+ 3= 9	4+ 1= 5	2+ 2= 4	7+ 2= 9	3+ 2= 5	3+ 0= 3	6+ 1= 7	2+ 2= 4	4+ 3= 7	n/a 65	51+ 17= 68
GRIDDED DATA	4+ 4= 8	5+ 1= 6	3+ 2= 5	7+ 1= 8	4+ 0= 4	6+ 0= 6	4+ 4= 8	6+ 4= 10	9+ 0= 9	5+ 7= 12	7+ 2= 9	4+ 1= 5	n/a 115	64+ 26= 90
MAP PRODUCTS	3+ 4= 8	3+13= 16	1+ 4= 5	3+ 6= 9	2+ 1= 3	5+ 0= 5	4+ 6= 10	11+ 2= 13	5+ 2= 7	7+ 5= 12	6+ 6= 12	2+ 7= 9	n/a 138	52+ 56= 108
NON-MAP PRODUCT	20+ 1= 21	13+ 2= 15	5+ 0= 5	7+ 1= 8	4+ 0= 4	3+ 0= 3	12+ 1= 13	12+ 2= 14	7+ 0= 7	15+ 1= 16	12+ 2= 14	11+ 1= 12	n/a 59	121+ 11= 132
TOT. BY D.TYPE:	43	41	20	34	16	18	40	42	26	47	39	33	377	398
CONSULTATIONS	35	36	24	23	27	35	48	67	28	61	63	46	390	493

* IN+NO=TOT : EXTERNAL REQUESTS CAN BE EITHER INVOICED OR NON-INVOICED WHERE: INVOICED REQUESTS + NON-INVOICED REQUESTS = TOTAL REQUESTS
Situations arise whereby an EXTERNAL request is processed and is not invoiced, such as when a client cannot read a tape and the order is reprocessed at no additional cost to the client.

filename=ANNUAL91.REP

Geophysics Division
MAGNETIC REQUEST STATISTICS

Internal Requests by Division

04/10/91

Division/Subdivision	Invoiced #	Invoiced Revenue	Non-Invoiced #	Non-Invoiced Revenue	Total #	Total Revenue
AGC	0	$ 0.00	5	$ 1,966.00	5	$ 1,966.00
CCRS	0	$ 0.00	1	$ 800.00	1	$ 800.00
CGD	0	$ 0.00	23	$ 16,625.00	23	$ 16,625.00
CGG (CENTRE GEOSCIEN	0	$ 0.00	1	$ 600.00	1	$ 600.00
CPGD	0	$ 0.00	1	$ 225.00	1	$ 225.00
CPGD/PGC	0	$ 0.00	4	$ 1,450.00	4	$ 1,450.00
GE0/AGG/GDC	0	$ 0.00	1	$ 825.00	1	$ 825.00
GEO/AGG	0	$ 0.00	1	$ 1,625.00	1	$ 1,625.00
GEO/AGG/AEROMAG	0	$ 0.00	8	$ 4,374.30	8	$ 4,374.30
GEO/AGG/APPL	0	$ 0.00	15	$ 2,750.00	15	$ 2,750.00
GEO/AGG/GDC	0	$ 0.00	2	$ 2,425.00	3	$ 2,425.00
GEO/AGG/GDC PGW	0	$ 0.00	1	$ 12,880.00	1	$ 12,880.00
GEO/AGG/GDC/PGW	0	$ 0.00	4	$ 9,774.40	4	$ 9,774.40
GEO/AGG/GDC/PGW	0	$ 0.00	1	$ 3,205.00	1	$ 3,205.00
GEO/AGG/GDC/PGW	0	$ 0.00	1	$ 6,080.50	1	$ 6,080.50
GSC	0	$ 0.00	4	$ 702.00	4	$ 702.00
GSC/CGD Potential Fi	0	$ 0.00	1	$ 225.00	1	$ 225.00
ISPG	0	$ 0.00	3	$ 526.00	3	$ 526.00
ISPS	0	$ 0.00	1	$ 105.00	1	$ 105.00
LCSD	0	$ 0.00	15	$ 7,601.85	15	$ 7,601.85
MRD	0	$ 0.00	9	$ 3,310.00	9	$ 3,310.00
QGC/CGQ	0	$ 0.00	1	$ 400.00	1	$ 400.00
QGS	0	$ 0.00	1	$ 2,100.00	1	$ 2,100.00

0	$ 0.00	104	$ 80,575.05	105	$ 80,575.05

GEOPHYSICAL DATA CENTRE
GRAVITY REQUEST STATISTICS
1990-1991

During the fiscal year 1990-1991, 294 requests for gravity data products and services were processed by the Geophysical Data Centre. This consists of 140 external requests and 154 internal requests.

The 140 external requests include 84 which were invoiced generating a total revenue of $16,024.00. The value of all other external and internal requests is $58,561.00, based on charges for external services.

Attached is a breakdown of requests by source, number of requests by type and number of products by output medium. Please note the following;

1. Published Maps include Open File maps, GMS maps and Manuscript maps.

2. Customized computer generated plots include;

   a) VERSATEC colour plots - 84 requests, 202 plots

   b) OPTRONICS colour screens - 5 requests, 13 plots

   c) Custom Data Plots - 22 requests, 176 plots
      includes - posted data plots
               - special purpose distribution diagrams

   d) VERSATEC blackline contours - 30 requests, 83 plots

Also attached is breakdown of internal usage by GSC divisions, indicated by external user prices for services rendered. Also attached is a customer report for all clients.

Geophysical Data Centre
Gravity Request Statistics *
GRAVITY REQUESTS STATISTICS - 1990-1991
Produced on 05/04/91

Number of Requests By Source :

	Invoiced #	Invoiced Revenue	Non-invoiced #	Non-invoiced Revenue	Total #	Total Revenue
Government agencies (Federal/Internal)	0	$ 0.00	154	$ 49,680.50	154	$ 49,680.50
Government agencies (Federal/External)	1	$ 284.46	9	$ 1,581.00	10	$ 1,865.46
Government agencies (Provincial)	7	$ 1,058.67	5	$ 4,275.00	12	$ 5,333.67
Government agencies (Foreign)	2	$ 349.12	4	$ 696.00	6	$ 1,045.12
Universities	4	$ 1,409.46	8	$ 1,587.11	12	$ 2,996.57
Oil & mineral exploration companies ..	32	$ 6,227.14	7	$ 36.00	39	$ 6,263.14
Geophysical consultants	28	$ 5,843.92	12	$ 387.50	40	$ 6,231.42
General public & other	10	$ 851.53	11	$ 318.00	21	$ 1,169.53
Total --->	84	$ 16,024.30	210	$ 58,561.11	294	$ 74,585.41

Number of Requests by Type :

Production requests :

Anomaly data	73
Base station data	19
Earth tide computation	4
Computer programs	8
Open file maps	13
Manuscript maps	13
Gravity map series	1
Interpolated gravity values	5
Other	61

Customized requests :

Colour (VERSATEC) Maps.....	84
Contouring	30
Digital terrain	4

Number of Requests By Output Medium :

Published maps	63
Customized computer generated maps ...	499
Grid files	32
Profiles	49
Records listed	2,577
Records plotted	150,085
Records to tape	4,139,033
Records to disk	77,652

Geophysics Division
GRAVITY REQUEST STATISTICS

Internal Requests by Division

04/05/91

Division/Subdivision	Invoiced #	Invoiced Revenue	Non-Invoiced #	Non-Invoiced Revenue	Total #	Total Revenue
AGC	0	$ 0.00	1	$ 200.00	1	$ 200.00
AGG	0	$ 0.00	1	$ 120.00	1	$ 120.00
AGG/Applications	0	$ 0.00	9	$ 1,781.00	9	$ 1,781.00
AGG/Field Group	0	$ 0.00	46	$ 12,606.50	46	$ 12,606.50
AGG/Standards	0	$ 0.00	5	$ 1,750.00	5	$ 1,750.00
CGD	0	$ 0.00	47	$ 16,990.00	47	$ 16,990.00
CGQ	0	$ 0.00	3	$ 610.00	3	$ 610.00
CPGD	0	$ 0.00	7	$ 1,700.00	7	$ 1,700.00
GDC	0	$ 0.00	3	$ 2,050.00	3	$ 2,050.00
Geophysics	0	$ 0.00	1	$ 500.00	1	$ 500.00
GSC	0	$ 0.00	2	$ 500.00	2	$ 500.00
GSC GEOSCAN	0	$ 0.00	1	$ 1.00	1	$ 1.00
ISPG	0	$ 0.00	4	$ 406.00	4	$ 406.00
ISPS	0	$ 0.00	1	$ 200.00	1	$ 200.00
MRD	0	$ 0.00	3	$ 1,200.00	3	$ 1,200.00
PGC	0	$ 0.00	18	$ 8,816.00	18	$ 8,816.00
TS	0	$ 0.00	1	$ 200.00	1	$ 200.00
U.Q.A.M.	0	$ 0.00	1	$ 50.00	1	$ 50.00
	0	$ 0.00	154	$ 49,680.50	154	$ 49,680.50

Geophysics Division

Request Database Customer Report

GRAVITY REQUESTS STATISTICS - 1990-1991

04/05/91

GRAVITY REQUESTS STATISTICS - 1990-1991

04/05/91

Request type - external

Number	Customer Name	Company Name	Agy	Date In	Date Out		Charge
71	R. Addison	Canadian Seabed Research Ltd.	8	06/05/90	06/05/90		
29	R. Ashley	BHP - Utah Mines Ltd - Exploration	6	05/29/90	05/29/90	$	58.15
74	D. Atkinson	Indian & Northern Affairs	2	09/27/90	09/27/90		
66	J. Biczak	Manitoba Mineral Resources Ltd.	6	08/09/90	08/09/90	$	29.25
26	A. Boronowski	RSGM	7	05/01/90	05/15/90	$	15.90
25	P. Bowman	AES	3	04/12/90	04/12/90	$	10.80
16	P. Bowman	AES	2	05/10/90	05/1_/90		
79	P. Bowman	AES	3	09/21/90	09/21/90	$	21.60
139	P. Bowman	AES	2	01/29/91	07/03/91	$	284.46
103	E. Buhlman	Noranda Exploration Co. Ltd.	6	11/01/90	11/07/90	$	676.60
102	D. Bulling	LCT Inc.	6	11/07/90	11/13/90	$	62.87
99	J. Campbell		7	11/05/90	11/05/90	$	25.52
38	T. Coyle		0	06/18/90	06/19/90		
39	A. Dallmann	Geoterrex Ltd	6	06/18/90	06/19/90		
116	D. Delikaraoglou	EMR	2	12/02/90	12/10/90		
53	R. Desbiens	Geosig Inc.	7	07/17/90	07/17/90	$	45.16
73	R. Desbiens	Geosig Inc.	7	08/14/90	08/16/90		
34	Z. Doborzynski	Esso Resources Canada	6	05/05/90	06/06/90	$	95.97
81	P. Eick	Conoco Inc.	6	09/14/90	09/25/90	$	45.00
111	P. Eick	Conoco Inc.	6	11/09/90	11/23/90	$	20.00
72	T. Elliot	Union Pacific Resources	6	08/15/90	08/16/90	$	18.70
75	G. Eng	Wintershall Canada Ltd.	8	08/27/90	08/27/90		
24	E. Farquhar	U.D.L.	7	04/20/90	04/23/90	$	280.00
108	P.L. Fenety		7	11/21/90	11/21/90		
45	P.K. Fullagar	Western Mining Corporation Ltd	6	06/16/90	06/28/90	$	550.00
140	J.P. Gadras	LES DESSINS GEODES	7	02/08/91	02/28/91	$	200.00
78	D. Gagnon	Nova Corp. of Alberta	8	09/12/90	09/14/90	$	132.85
96	H. Geiger	University of Calgary	5	10/29/90	10/30/90		
129	M. Godbout	BHP-UTAH INTERNATIONAL	6	11/15/90	01/09/91	$	250.00
41	C. Gravel	OMER	3	06/14/90	06/26/90	$	240.00
82	C. Gravel	OMER	3	08/28/90	09/28/90	$	500.00
3	V.K. Gupta	OGS	3	04/01/90	04/04/90		
30	V.K. Gupta	OGS	3	05/29/90	05/30/90		
50	V.K. Gupta	OGS	3	07/10/90	07/12/90		
59	V.K. Gupta	OGS	3	07/20/90	07/25/90		
110	V.K. Gupta	OGS	3	11/21/90	11/21/90		
86	J. Hansen	Geotest	7	09/20/90	10/03/90	$	300.00
4	E. Heinonen		8	04/11/90	04/12/90		
22	E. Heinonen		7	04/24/90	04/24/90	$	16.20
118	R.M. Hendry	BEDFORD INSTITUTE OF OCEANOGRAPHY	2	12/01/90	12/10/90		
130	Y. Hong	UNIVERSITY OF TORONTO	5	01/28/91	01/30/91	$	600.00
126	K. Howieson	TELSA-10	7	11/28/90	12/20/90		
128	K. Howieson	TELSA-10	7	12/17/90	01/08/91	$	297.00
100	A. Huhtala	Paterson, Grant & Watson Ltd.	7	11/07/90	11/07/90	$	20.80
143	B. Isbell	U.B.C.	5	03/09/91	03/22/91		

GRAVITY REQUESTS STATISTICS - 1990-1991

04/05/91

Request type - external

Number	Customer Name	Company Name	Agy	Date In	Date Out		Charge
83	S. Itoua	IRS	8	09/28/90	09/28/90		
10	M. Ivans	Ascaro Exploration Co of Canada Ltd	6	05/08/90	05/10/90	$	10.00
13	F. Jagodits	Phelps Dodge Corporation of Canada Ltd	8	05/11/90	05/15/90	$	85.25
52	M. Jarowicz	Chevron Canada	6	07/13/90	07/13/90	$	27.90
61	I. Johnson	Scintrex Ltd.	7	08/01/90	08/02/90	$	14.65
117	B. Jones	P. GEOP.	8	12/01/90	12/10/90		
62	A. Kadylo	Chevron Canada Resources	6	08/02/90	08/02/90		
68	A. Kadylo	Chevron Canada Resources Ltd.	6	08/09/90	08/13/90	$	587.95
67	A. King	Geophysicon Ltd.	7	08/09/90	08/09/90	$	53.70
9	J. Klein	Cominco Exploration	6	05/08/90	05/10/90	$	10.00
35	J. KLEIN	COMINCO LTD	6	06/01/90	07/06/90	$	1,147.55
119	A. Kleusberg	UNIVERSITY OF NEW BRUNSWICK	5	12/10/90	12/10/90		
54	B. Klinkenberg	U.B.C.	5	07/12/90	07/18/90	$	160.50
63	R. Labonte		8	08/08/90	08/08/90		
70	R. Labonte		8	08/13/90	08/15/90	$	37.70
2		Cominco Expolorations	6	04/03/90	04/03/90		
112	L. Lindsay	British Petroleum Resources Can. Ltd.	6	11/29/90	11/29/90		
14	J. Lowenstein	Intertechnology	8	05/15/90	05/15/90	$	10.80
27	I. MacLeod	Geosoft Inc	8	05/14/90	05/15/90	$	84.35
124	P. Marr	PROSPECTOR	8	11/27/90	11/27/90		
43	P. Master		0	06/25/90	06/28/90	$	84.15
91	B. Maxwell	Conoco Inc.	6	10/19/90	10/24/90	$	333.70
106	B. Maxwell	Conoco Canada	6	11/15/90	11/16/90	$	44.47
46	R.F. Mereu	Dept of Geology, U of Western Ontario	5	06/05/90	07/05/90	$	185.80
87	D. Milbert	National Geodetic Survey	4	09/26/90	10/09/90		
114	T. Miles	NORTHEAST EXPLORATION SERVICES LTD.	6	12/04/90	12/06/90	$	11.66
42	C. Millett	Falconbridge Ltd	6	06/25/90	06/27/90	$	74.30
17	J.D. Mollard	J.D. Mollard and Associates Ltd	7	04/09/90	04/17/90	$	400.00
33	R. Moose	NOAA/NOS/G&GS/NGS	4	06/04/90	06/05/90	$	49.17
44	R. Moose	NOAA	4	06/26/90	06/27/90	$	299.95
80	N. Moreau	Geosig Inc.	7	09/20/90	09/21/90	$	26.53
40	J. Mostert	Amoco Canada Petroleum Co. Ltd.	6	06/15/90	06/22/90	$	25.00
142	K. Mousseau	CANADA CENTRE FOR SURVEYING	2	03/19/91	03/19/91		
120	P. Mrstik	GEOSURV INC.	7	12/02/90	12/10/90		
109	R. Murdie	Dept. of Earth Sciences	5	11/13/90	11/19/90		
15	R. Mussakowski	Ontario Centre for Remote Sensing	3	05/15/90	05/16/90	$	36.82
31		University of Tennessee Library	5	06/01/90	06/01/90		
56		DMAAC	4	07/31/90	08/09/90		
65		Chevron Canada Resources	6	08/09/90	08/09/90	$	18.70
5	J. Norland	Glebe High School	8	04/23/90	04/23/90		
19	G. Ostapovitch	Cameco Inc	6	04/06/90	04/12/90	$	47.10
95	I. Owsianka	Newmont Australia Ltd.	6	10/18/90	10/18/90		
97	I. Owsianka	Newmont Australia Ltd.	6	10/30/90	11/01/90	$	252.50
6	B. Paige	Paige Geotechnical Services Reg'd	7	04/30/90	04/30/90		
51	W. Passmore	Union Gas Ltd	6	07/12/90	07/13/90	$	32.85

GRAVITY REQUESTS STATISTICS - 1990-1991

04/05/91

Request type - external

Number	Customer Name	Company Name	Agy	Date In	Date Out		Charge
125	A. PATERSON, GRA	PGW	7	11/08/90	11/13/90	$	31.81
90	W.R. Pelletier	University of Toronto	5	10/15/90	10/18/90	$	463.16
138	J.W. Pierce	GEOPHYSICAL EXPLORATION & DEVELOPMENT	7	02/07/91	02/20/91	$	338.00
113	L. Pipe	CHEVRON CANADA RESOURCES	6	11/19/90	12/06/90	$	12.00
55	G. Posehn	Intera Technologies Ltd.	8	07/17/90	07/18/90	$	89.78
98	B. Powell	Cominco Inc.	6	10/31/90	11/01/90	$	41.20
28	P. Provencher	Esso Canada	8	05/28/90	05/28/90		
94	E. Putter		2	10/25/90	10/29/90		
12	D. Pyszczek		4	05/08/90	05/09/90		
7	S. Reford		8	05/01/90	05/01/90	$	280.00
1	J. Rehkoph		7	04/03/90	04/03/90		
8	M. Rheault		7	05/02/90	05/03/90		
89	M. Rheault		7	10/10/90	10/18/90	$	1,407.20
93	M. Rheault		7	10/10/90	10/29/90	$	1,001.20
136	D. Robock	AQUA TERRA CONSULTANTS LTD.	7	02/12/91	02/18/91	$	50.00
141	D. Robock	AQUA TERRA CONSULTANTS	7	03/18/91	03/18/91	$	100.00
132	D. Rogowski	AQUATERRA	7	01/15/91	01/17/91	$	65.66
131	D. Rogowski	AQUATERRA	7	01/23/91	01/28/91		
84	A. Ruiter	Chevron Canada Resources	6	09/28/90	09/28/90	$	44.21
104	A. Ruiter	Chevron Canada	6	11/13/90	11/13/90		
64	T. Sanders	Excel Geophysics	7	08/08/90	08/08/90		
105	E. Sanders		7	11/15/90	11/15/90	$	25.50
134	J. Santo	SPR CONTROL SYSTEMS LTD.	8	02/13/91	02/13/91	$	115.00
60	T. Saunders	Excel Geophysics Inc.	7	07/27/90	07/30/90	$	66.70
88	P. Schimpeler	Pearson, Deridder & Johnson	6	10/09/90	10/11/90		
121	K.P. Schwarz	THE UNIVERSITY OF CALGARY	5	12/02/90	12/10/90		
122	M. Sideris	THE UNIVERSITY OF CALGARY	5	12/02/90	12/10/90		
101	J. Smith	Mobil Exploration & Prod. Services Inc.	6	10/26/90	10/30/90	$	375.00
49	A. Specter	Alan Specter & Associates	7	07/04/90	07/04/90		
135	H. Sunkel		4	02/18/91	02/18/91		
20	N. Szabo	Cominci Inc	6	04/17/90	04/17/90	$	35.00
32	R Testa	MCE	2	06/01/90	06/01/90		
48	R. Testa	Directorate of Geographic Operations	2	07/05/90	07/11/90		
57	R. Testa	Directorate of Geog. Operations	2	08/02/90	08/02/90		
36	R. Thompson	Hawker-Sidley Canada	8	06/06/90	06/11/90	$	10.80
37	M. Tilkov	COMINCO LTD\	6	06/15/90	06/18/90	$	75.00
77		Tisdall Resources	8	08/30/90	08/30/90	$	5.00
123	D. Tomsons	AECL	8	11/27/90	12/13/90		
76	D. Tortosa	OGS	3	07/17/90	08/27/90	$	239.45
92	J.F. Touborg	J.F. Touborg Consultants Inc.	7	10/24/90	10/29/90	$	431.00
21	J. Turner	Minequest Exploration Accosiates Ltd	7	04/19/90	04/23/90	$	306.50
85	J. Turner	Minequest Exploration	7	09/25/90	09/27/90	$	45.64
107	J. Turner	Minequest Exploration	7	11/16/90	11/16/90		
11		Geology Office, Dept of Indian Affairs	3	05/08/90	05/19/90	$	10.00
47	T. Urquhart	UDL	7	07/05/90	07/05/90	$	20.05

GRAVITY REQUESTS STATISTICS - 1990-1991

04/05/91

Request type - external

Number	Customer Name	Company Name	Agy	Date In	Date Out		Charge
69	H.D. Valliant	Lacoste Romberg Inc.	8	08/10/90	09/13/90		
115	P. Vanlcek	UNIVERSITY OF NEW BRUNSWICK	5	12/02/90	12/10/90		
18	H.F. Vuori		7	04/03/90	04/03/90	$	16.20
23	H.F. Vuori		7	04/17/90	04/24/90	$	243.00
144	M. Weber	LCT HOUSTON	7	03/26/91	03/20/91		
137	M. Wunder	NORANDA EXPLORATION	6	02/01/91	02/13/91	$	403.26
58	M. Zukiwski	Usher Canada Ltd.	6	07/16/90	07/19/90	$	811.25

Number of external requests 142

Total charges ..... $ 16,108.45

GRAVITY REQUESTS STATISTICS - 1990-1991

04/05/91

Request type - internal

Number	Customer Name	Company Name	Agy	Date In	Date Out	Charge
5106	C. Antonuk	U.Q.A.M.	1	10/17/90	10/17/90	
5118	D. Baril	CGD	1	12/07/90	12/10/90	
5119	C. Bergstein	AGG/Applications	1	12/12/90	12/12/90	
5144	C. Bergstein	AGG/Applications	1	02/21/91	02/22/91	
5150	C. Bergstein	AGG/Applications	1	03/18/91	03/20/91	
5139	M. Berry	Geophysics	1	02/01/91	02/07/91	
5039	A.W. Blake	TS	1	05/30/90	06/06/90	
5001	J.B. Boyd	AGG/Field Group	1	04/03/90	04/04/90	
5005	J.B. Boyd	AGG/Field Group	1	04/04/90	04/05/90	
5032	J.B. Boyd	AGG/Field Group	1	06/01/90	06/01/90	
5066	J.B. Boyd	AGG/Field Group	1	07/23/90	07/23/90	
5081	J.B. Boyd	AGG/Field Group	1	09/11/90	09/12/90	
5149	D. Boyle	MRD	1	02/28/91	03/05/91	
5073	J. Broome	CGD	1	08/28/90	08/28/90	
5084	K. Coflin	ISPG	1	09/27/90	09/27/90	
5013	R. Cooper	AGG/Field Group	1	04/24/90	04/26/90	
5018	R. Cooper	AGG/Field Group	1	05/01/90	05/07/90	
5017	R. Cooper	AGG/Field Group	1	05/02/90	05/03/90	
5029	R. Cooper	AGG/Field Group	1	05/29/90	05/30/90	
5037	R. Cooper	AGG/Field Group	1	05/30/90	06/05/90	
5045	R. Cooper	AGG/Field Group	1	06/06/90	06/08/90	
5088	R. Cooper	AGG/Field Group	1	10/02/90	10/15/90	
5089	R. Cooper	AGG/Field Group	1	10/02/90	10/04/90	
5094	R. Cooper	AGG/Field Group	1	10/02/90	10/05/90	
5095	R. Cooper	AGG/Field Group	1	10/02/90	10/15/90	
5096	R. Cooper	AGG/Field Group	1	10/09/90	10/12/90	
5100	R. Cooper	AGG/Field Group	1	10/12/90	10/18/90	
5101	R. Cooper	AGG/Field Group	1	10/12/90	10/18/90	
5102	R. Cooper	AGG/Field Group	1	10/12/90	10/18/90	
5110	R. Cooper	AGG/Field Group	1	11/05/90	11/05/90	
5128	R. Cooper	AGG/Field Group	1	12/04/90	01/18/91	
5137	R. COOPER	AGG/Field Group	1	01/30/91	02/01/91	
5138	R. Cooper	AGG/Field Group	1	01/30/91	02/01/91	
5103	D. Cormier	ISPG	1	10/18/90	10/18/90	
5004	D. Coulter	CGD	1	04/05/90	04/09/90	
5016	D. Coulter	CGD	1	05/02/90	05/03/90	
5026	D. Coulter	CGD	1	05/23/90	05/23/90	
5047	S.D. Dods	GDC	1	06/12/90	06/15/90	
5050	S.D. Dods	GDC	1	06/12/90	06/15/90	
5092	S.D. Dods	GDC	1	10/02/90	10/10/90	
5148	H. Dupuy	GSC	1	02/12/91	03/01/91	
5145	R. Emslie	CGD	1	02/04/91	02/20/91	
5042	K Fadaie	AGG/Applications	1	06/06/90	06/07/90	
5055	K. Fadaie	AGG/Applications	1	06/19/90	06/20/90	
5059	K. Fadaie	AGG/Applications	1	06/22/90	06/27/90	

GRAVITY REQUESTS STATISTICS - 1990-1991

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Request type - internal

Number	Customer Name	Company Name	Agy	Date In	Date Out	Charge
5134	T. Feininger	CGO	1	01/14/91	01/14/91	
5053	D. Forsyth	CGD	1	06/12/90	06/20/90	
5078	D. Forsyth	CGD	1	08/30/90	09/17/90	
5091	D. Forsyth	CGD	1	10/09/90	10/10/90	
5097	D. Forsyth	CGD	1	10/11/90	10/12/90	
5104	D. Forsyth	CGD	1	11/02/90	11/09/90	
5116	D. Forsyth	CGD	1	11/19/90	11/27/90	
5113	S. Gandhi	MRD	1	11/15/90	11/19/90	
5129	S. Gandhi	MRD	1	01/15/91	01/18/91	
5022	A. Goodacre	AGG/Applications	1	05/08/90	05/14/90	
5048	A. Goodacre	AGG/Applications	1	06/11/90	06/15/90	
5056	B. Grover	CGD	1	06/08/90	06/14/90	
5082	B. Grover	CGD	1	09/25/90	10/01/90	
5009	D. Halliday	AGG/Field Group	1	04/09/90	04/17/90	
5105	D.W. Halliday	AGG/Field Group	1	10/18/90	10/24/90	
5142	D. Halliday	AGG/Field Group	1	02/07/91	02/18/91	
5015	J. Halpenny	AGG/Field Group	1	04/27/90	04/27/90	
5054	J. Halpenny	AGG/Field Group	1	06/19/90	06/20/90	
5057	J. Halpenny	AGG/Field Group	1	06/25/90	06/26/90	
5061	J. Halpenny	AGG/Field Group	1	07/05/90	07/09/90	
5151	J. Halpenny	AGG/Field Group	1	03/18/91	03/20/91	
5060	C. Harrison	ISPG	1	06/15/90	06/27/90	
5033	D.B. Hearty	AGG/Field Group	1	05/15/90	05/25/90	
5027	D.B. Hearty	AGG/Field Group	1	05/23/90	05/23/90	
5034	D.B. Hearty	AGG/Field Group	1	05/24/90	05/25/90	
5040	D.B. Hearty	AGG/Field Group	1	05/30/90	06/04/90	
5041	D.B. Hearty	AGG/Field Group	1	05/30/90	06/04/90	
5031	D.B. Hearty	AGG/Field Group	1	06/06/90	06/26/90	
5046	D.B. Hearty	AGG/Field Group	1	06/08/90	06/11/90	
5049	D.B. Hearty	AGG/Field Group	1	06/12/90	06/15/90	
5051	D.B. Hearty	AGG/Field Group	1	06/15/90	06/18/90	
5065	D.B. Hearty	AGG/Field Group	1	07/19/90	07/19/90	
5072	D.B. Hearty	AGG/Field Group	1	07/31/90	08/08/90	
5076	D.B. Hearty	AGG/Field Group	1	09/04/90	09/04/90	
5098	D.B. Hearty	AGG/Field Group	1	10/09/90	10/15/90	
5099	D.B. Hearty	AGG/Field Group	1	10/17/90	10/17/90	
5154	D.B. Hearty	AGG/Field Group	1	03/18/91	03/26/91	
5140	R. Hildebrand	CGD	1	02/05/91	2/12/91	
5122	T. Kopf-Johnson	GSC GEOSCAN	1	01/03/91	/03/91	
5153	T. Leiheminant	CGD	1	03/21/91	03/25/91	
5135	B.D. Loncarevic	AGC	1	12/02/90	12/10/90	
5155	C. Lowe	PGC	1	03/22/91	03/28/91	
5152	S. Lucas	CGD	1	03/10/91	03/21/91	
5025	H. Lyatsky	CPGD	1	05/16/90	05/17/90	
5038	H. Lyatsky	CPGD	1	06/01/90	06/05/90	

GRAVITY REQUESTS STATISTICS - 1990-1991

04/05/91

Request type - internal

Number	Customer Name	Company Name	Agy	Date In	Date Out	Charge
5063	H. Lyatsky	CPGD	1	07/04/90	07/11/90	
5068	H. Lyatsky	CPGD	1	07/24/90	07/26/90	
5071	H. Lyatsky	CPGD	1	08/02/90	08/08/90	
5074	H. Lyatsky	CPGD	1	08/27/90	09/07/90	
5075	H. Lyatsky	CPGD	1	08/29/90	09/07/90	
5010	R.K. McConnell	AGG/Standards	1	04/12/90	04/18/90	
5036	R.K. McConnell	AGG/Standards	1	05/08/90	05/15/90	
5044	R.K. McConnell	AGG/Standards	1	06/05/90	06/06/90	
5064	R.K. McConnell	AGG/Standards	1	07/10/90	07/18/90	
5115	R.K. McConnell	AGG/Standards	1	11/09/90	11/14/90	
5003	P. McGrath	CGD	1	04/02/90	04/04/90	
5011	P. McGrath	CGD	1	04/02/90	04/05/90	
5007	P. McGrath	CGD	1	04/09/90	04/12/90	
5146	P. McGrath	CGD	1	02/04/91	02/22/91	
5147	D. Mortimer	CGD	1	02/21/91	03/01/91	
5019	L. Nadeau	CGQ	1	05/02/90	05/03/90	
5136	D. Nagy	AGG/Applications	1	12/02/90	12/10/90	
5008	D. Odowd	CGD	1	04/10/90	04/17/90	
5117	T. Peterson	GSC	1	11/30/90	12/05/90	
5002	G. Ross	ISPS	1	04/04/90	04/05/90	
5014	G. Ross	ISPG	1	04/24/90	04/26/90	
5123	K. Schryjver	CGQ	1	12/13/90	01/04/91	
5024	D. Seeman	PGC	1	05/08/90	05/15/90	
5030	D Seeman	PGC	1	05/24/90	05/28/90	
5035	D. Seemann	PGC	1	05/31/90	05/31/90	
5062	D. Seemann	PGC	1	06/15/90	07/10/90	
5070	D.A. Seemann	PGC	1	07/30/90	07/31/90	
5077	D. Seemann	PGC	1	09/06/90	09/11/90	
5080	D.A. Seemann	PGC	1	09/14/90	09/24/90	
5111	D. Seemann	PGC	1	11/09/90	11/14/90	
5112	D. Seemann	PGC	1	11/09/90	11/14/90	
5120	D Seemann	PGC	1	11/30/90	12/13/90	
5121	D. Seemann	PGC	1	01/02/91	01/03/91	
5124	D. Seemann	PGC	1	01/04/91	01/08/91	
5125	D. Seemann	PGC	1	01/04/91	01/08/91	
5131	D. Seemann	PGC	1	01/11/91	01/16/91	
5132	D. Seemann	PGC	1	01/21/91	01/29/91	
5133	D. Seemann	PGC	1	01/22/91	01/29/91	
5143	D. Seemann	PGC	1	02/12/91	02/18/91	
5067	L.W. Sobczak	CGD	1	07/17/90	07/22/90	
5069	L.W. Sobczak	CGD	1	07/26/90	07/31/90	
5083	L.W. Sobczak	CGD	1	08/27/90	09/29/90	
5087	L.W. Sobczak	CGD	1	09/27/90	10/14/90	
5085	L. Sobczak	CGD	1	10/01/90	10/13/90	
5090	L.W. Sobczak	CGD	1	10/05/90	10/10/90	

GRAVITY REQUESTS STATISTICS - 1990-1991

04/05/91

Request type - internal

Number	Customer Name	Company Name	Agy	Date In	Date Out	Charge
5108	L.W. Sobczak	CGD	1	10/05/90	10/31/90	
5093	L.W. Sobczak	CGD	1	10/11/90	10/12/90	
5107	L.W. Sobczak	CGD	1	10/18/90	10/23/90	
5012	M.D. Thomas	CGD	1	04/09/90	04/17/90	
5020	M.D. Thomas	CGD	1	04/25/90	05/03/90	
5021	M.D. Thomas	CGD	1	05/07/90	05/11/90	
5023	M.D. Thomas	CGD	1	05/09/90	05/15/90	
5043	M.D. Thomas	CGD	1	06/05/90	06/08/90	
5052	M.D. Thomas	CGD	1	06/05/90	06/18/90	
5058	M.D. Thomas	CGD	1	06/22/90	06/27/90	
5079	M.D. Thomas	CGD	1	09/04/90	09/17/90	
5086	M.D. Thomas	CGD	1	10/04/90	10/15/90	
5109	M.D. Thomas	CGD	1	10/30/90	10/31/90	
5114	M.D. Thomas	CGD	1	11/20/90	11/20/90	
5126	M.D. Thomas	CGD	1	01/04/91	01/01/91	
5130	M.D. Thomas	CGD	1	01/09/91	01/16/91	
5127	M.D. Thomas	CGD	1	01/14/91	01/16/91	
5141	M.D. Thomas	CGD	1	02/11/91	02/12/91	
5028	L. Warren	AGG	1	05/07/90	05/09/90	

Number of internal requests 154

Total charges ..... $ 0.00

*** Summary ***

Number of External Requests ...		142
Number of Internal Requests ...		154
Total number of requests		296
Total Charges	$	16,108.45