Memo

To:	CCB
From:	Jin Wang
Date:	August 1, 2000
Subject:	PIDC 7.0 - CSCI 6: System Monitoring - Performance Report - CSC 6.2.4
Sponsor:	Bob Woodward

Abstract

This memo proposes to install the PIDC 7.0 version of software package *vidc-perf* (CSC 6.2.4, Performance Report), into PIDC Operations. PIDC 7.0 will form the basis for IDC Release 3.0, which will be delivered, installed and validated at the International Data Centre (IDC) in the autumn of 2000. Notable change in CSC 6.2.4 for PIDC 7 is that six more functions are added into the performance report.

Statement of Objective

The objective of this proposal is to install a PIDC 7.0 version of CSC 6.2.4 software**,** *vidc-perf*, into PIDC operations to satisfy the requirements for CSC 6.2: Performance Monitoring for the R3.0 delivery to the IDC (Table 2 in Appendix B) as identified in the R3.0 Systems Requirements Review (SRR) (Bowman *et al*., 1998; Gault, 1999, 2000).

Summary of Proposed Change

This proposal proposes to install a software component, *vidc-perf* (CSC 6.2.4 performance report), of the CSCI 6: System Monitoring (Kung, 2000) that is listed in Table 1 in Appendix A, into the PIDC 7.0 operations. This includes the patches listed in Table 3 in Appendix C. There are no database schema changes for CSC 6.2.4 in this release**.** The entire PIDC 7.0 release, including patches, was built in a common environment by MSO SCM in San Diego. It was built on a Sun Ultra machine under Solaris 2.7 using Oracle 8.1.5.0.0 and Tuxedo 6.5. Software was integrated on the PIDC Integration Testbed following the integration plan for PIDC 7.0 (Skov, 2000).

The following changes are made for software *vidc-perf* (CSC 6.2.4: Performance Report)

Six Perl or PL/SQL scripts have been added in the existing performance report package to generate the following metrics:

- Timeliness of event bulletins (*bulletin-timeliness.sql*)
- Bulletin data export subscriptions (*bulletin-subs.sql*)
- Hydroacoustic detections and associations (*hydro-eval.pl*)
- Automatic detections by station (*detection-perf-sta.sql*)
- Cumulative mb distribution (*mb-cumulative.sql*)
- Location ellipse distribution (*loc_ellipse.pl*)

Expected Benefits

This release of software addresses requirements defined at the SRR for R3.0 (Bowman *et al*., 1998; Gault, 1999, 2000). More metrics will be generated with the new release of the performance report package. The new metrics generated by this new release of the performance report package will allow improved monitoring of the system.

Possible Risks and Dependencies

There are some dependencies to run this package:

1) Program *Bullcomp* must be accessible through user's UNIX **PATH** environment variable.

2) Perl and Perl utility packages *getpar.pl, libgeog.pl, open3.pl,* and *ora_select.pl* must be accessible through user's UNIX **PATH** environment variable.

3) Users must have privileges to create tables and views in the working database account "**perfdbs**", defined in the par file "*vidc-perf.par*".

4) The working database must have a database link to the operational databases, such as SEL1, SEL2, SEL3, REB, and IDCX.

5) The table **bullcomp** is the only table that must be constructed ahead of time. Create **bullcomp** table using IDC database schema described in IDC Documentation (Roger *et al.,* 1999) if this table doesn't exist in database account "**perfdbs**".

6) Log files of pipeline operation must be available to users.

More explanations can be found in the man page which is included in Appendix D.

Because this software will truncate, create, replace, and drop some temporary database tables/views when it is running. There is a risk if those temporary tables/views happen to have the same name as existing tables/views, then the existing tables/views will be damaged, or the program will fail to generate the related metrics. This risk can be mitigated through using a special-purpose database account. Table 4 in Appendix E lists all temporary tables that are involved in truncating, creating, and dropping transactions. Some of those table names can be defined in the par file, *vidc-perf.par*, and a SQL script, *vidc-perf-top-definitions.sql* in directory */cmss/perf/perf-mon/sql*. Table 5 in Appendix E lists all temporary views.

No outstanding problems were identified during testing.

Summary of Testing

All functions in the package were unit tested before release. CSC 6.2.4 software component operated as expected in the unit testing.

CSC 6.2.4 software component, *vidc-perf*, is an off-line application. Some functions of this package assume that bulletins SEL1, SEL2, SEL3, and REB are available for the time period to be analyzed. On the testbed, however, no REB was available during the time period that this package was to be tested. Therefore, integration testing was performed on the PIDC operations system. All functions in the package work correctly, and performance metrics are generated successfully.

Output metrics of system performance for three-day period (2000095-2000097) are listed in Appendix F.

Schedule and Plan for Implementation

This software was installed to PIDC operations as part of patch PIDC-7.0.93. The rest of PIDC 7.0 was installed into PIDC operations beginning July 10, 2000, following the plan outlined by Skov *et al.* (2000).

Costs and Resources Required for Implementation

The patch containing this software component has already been installed, so no further effort is required.

References

Bowman. J.R, W.E. Farrell, A. Gault, G. Beall and D. Salzberg, Systems Requirements Review: International Data Centre Release 2.1 and 3.0, Technical Report SAIC-98/3038-Rev. 1, 1998.

Bowman, J.R., D. Brown, J. Carter, W.E. Farrell, B. MacRitchie, G. Novosel, and D. Williams, Database Schema, SAIC-99/3009 (IDC5.1.1Rev1), 1999.

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Hedeline, B., M.Skov and M. Zatloukal, PIDC Integration Test Plan, CMR Technical Report CMR-00/06, March 2000.

Kung, Y., PIDC 7.0-CSCI 6: System Monitoring, CCB-PRO-00/17, 2000.

Skov, M., PIDC Integration Plan for Establishing the PIDC 7.0 Testing Environment, CMR Technical Report CMR-00/05, March 2000.

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Appendix A: Software Components for CSCI 6: System Monitoring

Table 1 shows a summary of testing of the software components of CSCI 6 (Kung, 2000). The software discussed in this memo, *vidc-perf*, is the component CSC 6.2.4.

Table 1: Computer Software Components for CSCI 6: System Monitoring

CSCI/CSC			Unit Tested	Integration Tested on PIDC Testbed	Fixed Data Set
6 System Monitoring					
6.1	System Monitoring				
	6.1.1	run_stacap (sh)	yes	yes	n/a
	6.1.2	stacap	yes	yes	n/a
6.2	Performance Monitoring				
	6.2.1	BullComp	no	yes	n/a
	6.2.2	ExAnComp	no	yes	n/a
	6.2.3	ops_status	no	yes	n/a
	6.2.4	Performance report	yes	yes	n/a
	6.2.5	Xlogger (& runLogger)	no	yes	n/a
6.3	Threshold Monitoring (TM)				
	6.3.1	AddTMStation	no	yes	n/a
	6.3.2	CreateTMSession	no	yes	n/a
	6.3.3	DeleteTMStation	no	yes	n/a
	6.3.4	imconv	no	yes	n/a
	6.3.5	LoopCopy	no	yes	n/a
	6.3.6	rdf2cdf	no	yes	n/a
	6.3.7	smk	no	yes	n/a
	6.3.8	tm_beambasic (FORTRAN)	no	yes	n/a
	6.3.9	tm_globrec (FORTRAN)	no	yes	n/a
	6.3.10	tm_stast (FORTRAN)	no	yes	n/a
	6.3.11	TMmap	no	yes	n/a
	6.3.12	TMthreshold	no	yes	n/a
6.4	Threshold Monitoring Scripts		no	yes	n/a

Table 1: Computer Software Components for CSCI 6: System Monitoring

CSCI/CSC			Unit Tested	Integration Tested on PIDC Testbed	Fixed Data Set
	6.4.1	checkpar (sh)	no	yes	n/a
	6.4.2	CopyPSFile (sh)	no	yes	n/a
	6.4.3	detplot (sh)	no	yes	n/a
	6.4.4	loopuptime (sh)	no	yes	n/a
	6.4.5	makecdf.2562 (sh)	no	yes	n/a
	6.4.6	plotuptime (sh)	no	yes	n/a
	6.4.7	replotuptime (sh)	no	yes	n/a
	6.4.8	TMbulletin (sh)	no	yes	n/a
	6.4.9	TMcron (sh)	no	yes	n/a
	6.4.10	TMenv.sh (sh)	no	yes	n/a
	6.4.11	TMpostreb (sh)	no	yes	n/a
	6.4.12	TMprod (sh)	no	yes	n/a
	6.4.13	tmstatus (sh)	no	yes	n/a
6.5	Fixed Data Set Scripts				
	6.5.1	DFX_StaPro (Perl)	no	yes	n/a
	6.5.2	fds_evch (Perl/Tk)	no	yes	n/a
	6.5.3	fds_recall (Perl/Tk)	no	yes	n/a
	6.5.4	fds_undo_recall (Perl)	no	yes	n/a
	6.5.5	net_proc (Perl)	no	yes	n/a
	6.5.6	run_evch_131.csh	no	yes	n/a
	6.5.7	run_evch_148.csh	no	yes	n/a
	6.5.8	run_evch_150.csh	no	yes	n/a
	6.5.9	run_recall_131.csh	no	yes	n/a
	6.5.10	run_recall_148.csh	no	yes	n/a
	6.5.11	run_recall_150.csh	no	yes	n/a
	6.5.12	run_reg_131.csh	no	yes	n/a
	6.5.13	run_reg_148.csh	no	yes	n/a
	6.5.14	run_reg_150.csh	no	yes	n/a
	6.5.15	runREGWF (csh)	no	yes	n/a
	6.5.16	sta_proc (Perl)	no	yes	n/a

Table 1: Computer Software Components for CSCI 6: System Monitoring

CSCI/CSC		Unit Tested	Integration Tested on PIDC Testbed	Fixed Data Set
6.5.17	stubborn_rsh_killer (Perl)	no	yes	n/a

Appendix B: R3 Requirements for CSC 6.2.4: Performance Report

The following requirements for **system monitoring** were identified at the Systems Requirements Review for R3. All requirements are met in this release except for 'Web Use' which was not implemented as the web log file is not configured for a periodic (i.e., daily/weekly/monthly) output format.

Table 2: R3 Requirements for CSCI 6.2: Performance Monitoring

CSCI/CSC			REQUIREMENTS
6 System Monitoring			
6.2	Performance Monitoring		
	6.2.4	performance report	• SQL scripts shall be provided to compute the following metrics • Timeliness • Bulletin data export subscriptions • Web use • Hydroacoustic events • Hydroacoustic associations • Automatic detections by station • Cumulative mb descriptions • Location ellipses

Appendix C: Related Patches to PIDC 7.0

Table 3 lists the related patches for CSC 6.2.4 to PIDC 7.0.

Table 3: Related Patches to PIDC 7.0

Release	Products	Description	Date
PIDC_7.0.67	vidc-perf	Adds six more performance metrics	06/12/00
PIDC_7.0.93	vidc-perf	Fix some bugs for Patch PIDC_7.0.67	07/20/00

Appendix D: Man Page of Software *vidc-perf*

NAME

vidc-perf - Script for preparing IDC system performance report.

SYNOPSIS

vidc-perf *start_day=day1 end_day=day2 par=filename*

DESCRIPTION

vidc-perf is a top-level script that shall read the control parameter file and call other individual SQL or Perl scripts to generate performance metrics.

PARAMETERS

Control parameters for **vidc-perf** must be in the form *par=val*, as is the style for the *getpar.pl* command-line parser, used by **vidc-perf**. It's a good idea to create a parameter file containing one parameter per line. Any parameters listed after *par=filename* will override the values given in the parameter file *filename*. Some of the parameter values, such as *LOGDIR* are site-dependent parameters. Some parameters, such as *phase_change* are flags for computing individual metrics (1:yes, 0:no). Note that a parameter file is included with the release. All parameters are listed below.

ENVIRONMENT PARAMETERS

BINDIR The directory where the binary code of the program *BullComp* locate. Default = */cmss/rel/bin*.

PERFHOME The home directory where this package locate. Default = */cmss/perf/perfmon*.

SQLDIR The directory where sql scripts of this package locate. Default = */cmss/perf/perfmon/sql*.

BLKDIR The directory where blockage files of hydroacoustic stations locate. Default = */cmss/config/earth_specs/BLK_OSO*.

LOGDIR The directory where log files of station data availability locate. Default = */reports/workspace/primary*.

LINKDIR The directory where log files of NDC link status. Default = */reports/daily/link*.

OUTDIR The directory where output files locate. Default = *./ (current directory)*.

bullcomp_par The path and filename of parfile for BullComp. It is the same file of the par file for **vidc-perf**. Default = */cmss/perf/perfmon/par/vidc-perf.par*.

DATABASE PARAMETERS

perfdbs The database account used for this performance monitoring scripts. User must have writing permission in this database, and can access databases defined below. Required parameter in the format *username/passward@host*. Default = *NULL*.

autodbs The database containing the information of automatic system output. Default = *SEL3.*. Note: don't miss the dot '.' after 'SEL3'.

truedbs The database containing the information of analyst reviewed results. Default = *REB.*. Note: don't miss the dot '.' after 'REB'.

staticdbs The database containing the static information of stations and instruments. Default = *static.*. Note: don't miss the dot '.' after 'static'.

lebdbs The database containing the discard event information. Default = *leb.*. Note: don't miss the dot '.' after 'leb'.

xdbs The database containing the information not included in above databases, such as message system. Default = *idcx.*. Note: don't miss the dot '.' after 'idcx'.

primary_net The network name of the primary network in databases. Default = *CUR_PRI*.

auxiliary_net The network name of the auxiliary network in databases. Default = *CUR_AUX*.

hydro_net The network name of the hydroacoustic stations in databases. Default = *CUR_HYD*.

infra_net The network name of the infrasonic stations in databases. Default = *CUR_INF*.

substable The table to store subscription information. Default = *idcx.subs*.

prodtable The table to store product criteria. Default = *idcx.productcriteria*.

home_id The local IP address of E-mail host. Default = *ctbto.org*.

bullcomp The table to store output of the program *BullComp*. It is a table that must exist before running the program. Default = *bullcomp*.

arrival1 The arrival table in the automatic database. This parameter is only used for the program *BullComp*. Default = *SEL3.arrival*.

arrival2 The arrival table in the analyst reviewed database. This parameter is only used for the program *BullComp*. Default = *REB.arrival*.

assoc1 The association table in the automatic database. This parameter is only used for the program *BullComp*. Default = *SEL3.assoc*.

assoc2 The association table in the analyst reviewed database. This parameter is only used for the program *BullComp*. Default = *REB.assoc*.

origin1 The origin table in the automatic database. This parameter is only used for the program *BullComp*. Default = *SEL3.origin*.

origin2 The origin table in the analyst reviewed database. This parameter is only used for the program *BullComp*. Default = *REB.origin*.

origerr1 The origin error table in the automatic database. This parameter is only used for the program *BullComp*. Default = *SEL3.origin*.

origerr2 The origin table in the analyst reviewed database. This parameter is only used for the program *BullComp*. Default = *REB.origin*.

FLAGS TO GENERATE PERFORMANCE METRICS

phase_change = <0|1> Flag to compute metrics of phase changes between **autodbs** and **truedbs**. Default = 1.

event_change = <0|1> Flag to compute metrics of event changes between **autodbs** and **truedbs**. Default = 1.

event_w_aux = <0|1> Flag to compute metrics of events which use auxiliary data. Default = 1.

event_mag = <0|1> Flag to compute metrics of events with different magnitude measurement. Default = 1.

depth_info = <0|1> Flag to compute metrics of events constrained by depth information. Default = 1.

station_list = <0|1> Flag to get station list. Default = 1.

message_info = <0|1> Flag to compute metrics of message handling performance. Default = 1.

data_volume = <0|1> Flag to compute data volume received, it needs LONG time to get result. Default = 1.

station_cap = <0|1> Flag to compute metrics of station capability. Default = 1.

NDC_link = <0|1> Flag to compute metrics of NDC links with IDC. Default = 1.

bull_time = <0|1> Flag to compute metrics of timeliness of event bulletin. Default = 1.

bull_subs = <0|1> Flag to get metrics of bulletin export subscriptions. Default = 1.

web_use = <0|1> Flag to get metrics of web use statistics (not available at this time). Default = 0.

hydro_eval = <0|1> Flag to get metrics of hydroacoustic detection and association. Default = 1.

sta_detection = <0|1> Flag to get metrics of automatic detection by station. Default = 1.

mb_cum = <0|1> Flag to get metrics of cumulative mb distributions. Default = 1.

loc_ellipse = <0|1> Flag to get metrics of location ellipse distribution. Default = 1.

SEE ALSO

BullComp(1), getpar(3)

DIAGNOSTICS

None.

AUTHOR

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Appendix E: Temporary Database Tables and Views

When running software *vidc-perf*, some temporary database tables/views will be created, replaced, truncated, and dropped. Special caution should be paid to those table/view names to avoid damaging the existing database. Table 4 lists the temporary table names. Some of table names can be defined in the par file, */cmss/perf/perfmon/par/vidc-pef.par*, and a SQL script, */cmss/perf/perfmon/sql/vidc-perf-top-definitions.sql*. Table 5 lists the temporary view names.

Table 4: Temporary Database Tables

Default Table Name	Action			Defining Variable
	create	truncate	drop	
detected_idcpr	x		x	an_detected
missed_idcpr	x		x	an_missed
an_splits_idcpr	x		x	an_splits
bullcomp		x		bullcomp
bullcomp_matches	x		x	bullcomp_matches
reb_det_wc	x		x	det_wc
reb_det_wc_1	x		x	det_wc_1
misses_idcpr	x		x	ex_misses
splits_idcpr	x		x	ex_splits
table13	x	x	x	table13_details
table13_summary	x	x	x	table13_summary
table13_summary_p	x		x	table13_summary_push
table14_summary	x	x	x	table14_summary
data_volume	x		x	
mag_summary	x		x	
NonWaveformSUM	x		x	
REB_lag	x		x	
SEL1_lag	x		x	
SEL1_lag_0	x		x	
SEL1_lag_1	x		x	
SEL1_lag_2	x		x	
SEL2_lag	x		x	
SEL2_lag_0	x		x	
SEL2_lag_1	x		x	

Table 4: Temporary Database Tables (Continued)

Default Table Name	Action			Defining Variable
	create	truncate	drop	
SEL2_lag_2	x		x	
SEL3_lag	x		x	
SEL3_lag_0	x		x	
SEL3_lag_1	x		x	
SEL3_lag_2	x		x	
sta_summary	x		x	
subs_count_0	x		x	
subs_count_1	x		x	
tmp_mb	x		x	
WaveformSUM	x		x	

Table 5: Temporary Database Views

View Name	Action		
	create	replace	drop
ADD_N	x	x	
ASSOC_def	x	x	
ASSOC_nodef	x	x	
DET	x	x	
DET_sta	x	x	
DISASSOC1	x	x	
DISASSOC2	x	x	
NONWAVEFORM	x	x	x
NonWaveformDone	x	x	x
NonWaveformFormat_Err	x	x	x
NonWaveformNoData	x	x	x
NonWaveformTotal	x	x	x
NonWaveformUnknown	x	x	x

Table 5: Temporary Database Views (Continued)

View Name	Action		
	create	**replace**	**drop**
REASON_tem	x	x	x
REQUEST_tem	x	x	x
WAVEFORM	x	x	x
WaveformDone	x	x	x
WaveformFormat_Err	x	x	x
WaveformNoData	x	x	x
WaveformOffline	x	x	x
WaveformStandby	x	x	x
WaveformTotal	x	x	x
WaveformUnknown	x	x	x

Appendix F: Testing Results

All functions in the software package *vidc-perf* were unit tested before release to the PIDC Integration Testbed. The testing was performed under Solaris 2.7, Oracle 8.1.5.0.0.

CSC 6.2.4 software component, *vidc-perf*, is an off-line application. Some functions of this package assume that bulletins SEL1, SEL2, SEL3, and REB are available for the time period to be analyzed. On the testbed, however, no REB was available during the time period that this package was to be tested. Therefore, integration testing was performed on the PIDC operations system. All functions in the package work correctly, and performance metrics are generated successfully.

The output metrics are listed below. The first 10 metrics are the existing functions of this package in Release 2. The rest of metrics are new functions of this software.

```
(1) Summary of Phase Changes

DESCRIPTION                           COUNT PER_DAY REB_PERCENT
------------------------------- ---------- ------- -----------
UNMODIFIED                              530   176.7        31.8
ADDED DETECTION                         261    87.0        15.7
MODIFIED                                875   291.7        52.5
  RE-TIMED                              541   180.3        32.5
  ADDED ASSOCIATION                     435   145.0        26.1
  RENAMED                               143    47.7         8.6
DISASSOCIATED                           113    37.7         6.8
TOTAL REB                              1666   555.3       100.0


(2) Summary of Event Solution Changes During the Analyst Review
-----------------------------------------------------------------
DESCRIPTION                         COUNT PER_DAY REB_PERCENT
----------------------------- ---------- ------- -----------
ANALYST EVENTS                        136    45.3       100.0
AUTOMATIC EVENTS                      260    86.7       191.2
DETECTED EVENTS                       127    42.3        93.4
ADDED EVENTS                            9     3.0         6.6
DISCARDED EVENTS                      134    44.7        98.5
  FALSE                                30    10.0        22.1
  FEW Data                             69    23.0        50.7
  FALSE (SPLIT)                        10     3.3         7.4
  UNKNOWN                              25     8.3        18.4
REB SPLIT EVENTS                       10     3.3         7.4
-------------------------------------------------------------------


(3) Events with auxiliary data
----------------------------
EVENT_WITH_AUX REB_PERCENT
-------------- -----------
            87        64.0
---------------------------
(4) Summary of Magnitudes Reported in the REB
```

MB	REB_PERCENT	ML	REB_PERCENT	MS	REB_PERCENT
133	97.8	43	31.6	51	37.5

(5) Depth Constraints for REB Events

TYPE_CONSTRAINTS	COUNTS	REB_PERCENT
DEPTH PHASES	26	19.1
FREE	39	28.7
RESTRAINED BY ANALYST	50	36.8
RESTRAINED AUTOMATIC	21	15.4

This table shows the number and percentage of REB events of which focal depths were constrained using depth phases, unconstrained (free), constrained by analyst, and by automatic system.

(6) Station List
Primary Seismic Stations

CODE	LAT	LON	NAME	COUNTRY	ELEMENTS
ABKT	37.93	58.12	Alibek	Turkmenistan	1
ARCES	69.53	25.51	ARCESS	Norway	26
ASAR	-23.67	133.90	Alice Springs	Australia	20
BDFB	-15.64	-48.01	Brasilia	Brazil	1
BGCA	5.18	18.42	Bogoin	Central African Republic	1
BJT	40.02	116.17	Baijiatuan	China	1
BOSA	-28.61	25.26	Boshof	South Africa	1
BRAR	39.85	32.76	Belbasi	Turkey	7
CMAR	18.46	98.94	Chiang Mai	Thailand	24
CPUP	-26.33	-57.33	Villa Florida	Paraguay	1
DBIC	6.67	-4.86	Dimbokro	Ivory Coast	1
ESDC	39.68	-3.96	Sonseca	Spain	26
FINES	61.44	26.08	FINESS	Finland	16
GERES	48.85	13.70	GERESS	Germany	25
HIA	49.27	119.74	Hailar	China	1
ILAR	64.77	-146.89	Eielson	U.S.A.	20
KBZ	43.73	42.90	Khabaz	Russia	1
KSAR	37.44	127.88	Wonju	South Korea	26
LPAZ	-16.29	-68.13	La Paz	Bolivia	1
MAW	-67.60	62.87	Mawson	Antarctica	1
MJAR	36.54	138.21	Matsushiro	Japan	7
NOA	61.04	11.21	NORSAR	Norway	42
NRIS	69.01	88.00	Norilsk	Russia	1
NVAR	38.43	-118.30	Mina Array	U.S.A.	14
PDAR	42.77	-109.56	Pinedale	U.S.A.	14
PDYAR	59.66	112.44	Peleduy	Russia	10
PLCA	-40.73	-70.55	Paso Flores	Argentina	1
ROSC	4.85	-74.32	El Rosal	Colombia	1
SCHQ	54.83	-66.83	Schefferville	Canada	1
STKA	-31.88	141.60	Stephens Creek	Australia	1
TXAR	29.33	-103.67	TXAR	U.S.A.	17
ULM	50.25	-95.88	Lac du Bonnet	Canada	1

VNDA	-77.51	161.85	Vanda	Antarctica	1
WRA	-19.94	134.34	Warramunga	Australia	20
YKA	62.49	-114.61	Yellowknife	Canada	22
ZAL	53.94	84.80	Zalesovo	Russia	1

Auxiliary Seismic Stations

CODE	LAT	LON	NAME	COUNTRY	ELEMENTS
ALQ	34.94	-106.46	Albuquerque	U.S.A.	1
ARU	56.43	58.56	Arti	Russia	1
ATTU	52.88	173.16	Attu	U.S.A.	1
BBB	52.18	-128.11	Bella Bella	Canada	1
BORG	64.75	-21.33	Borgarfjordur	Iceland	1
CTA	-20.09	146.25	Charters Towers	Australia	1
DAVOS	46.84	9.79	Davos	Switzerland	1
DLBC	58.44	-130.03	Dease Lake	Canada	1
EIL	29.67	34.95	Eilat	Israel	1
EKA	55.33	-3.16	Eskdalemuir	U.K.	20
ELK	40.74	-115.24	Elko	U.S.A.	1
FITZ	-18.10	125.64	Fitzroy Crossing	Australia	1
FITZ	-18.10	125.64	Fitzroy Crossing	Australia	1
FRB	63.75	-68.55	Iqaluit	Canada	1
HFS	60.13	13.70	Hagfors	Sweden	8
INK	68.31	-133.52	Inuvik	Canada	1
JCJ	27.10	142.18	Chichijima	Japan	1
JHJ	33.12	139.82	Hachijojima	Japan	1
JKA	44.12	142.60	Kamikawa-asahi	Japan	1
JNU	33.12	130.88	Ohita	Japan	1
JOW	26.83	128.29	Kunigami	Japan	1
JTS	10.29	-84.95	Las Juntas	Costa Rica	1
KDAK	57.78	-152.58	Kodiak Island	USA	1
KVAR	43.96	42.70	Kislovodsk	Russia	4
LBTB	-25.02	25.60	Lobatse	Botswana	1
MLR	45.49	25.94	Muntele Rosu	Romania	1
MRNI	33.01	35.39	Meron	Israel	1
MSEY	-4.67	55.48	Mahe	Seychelles	1
NEW	48.26	-117.12	Newport	U.S.A.	1
NIL	33.65	73.25	Nilore	Pakistan	1
NNA	-11.99	-76.84	Nana	Peru	1
OBN	55.12	36.60	Obninsk	Russia	1
PFO	33.61	-116.46	Pinon Flat	U.S.A.	1
RPN	-27.13	-109.33	Rapanui	Chile	1
SADO	44.77	-79.14	Sadowa	Canada	1
SPITS	78.18	16.37	Spitsbergen	Norway	9
SUR	-32.38	20.81	Sutherland	South Africa	1
TKL	35.66	-83.77	Tuckaleechee Caverns	U.S.A.	1
VRAC	49.31	16.59	Vranov	Czech Republic	1

Hydroacoustic Stations

CODE	LAT	LON	NAME	COUNTRY	ELEMENTS
ASC23	-8.07	-14.42	Ascension Island	U.S.A.	1
ASC24	-8.06	-14.45	Ascension Island	U.S.A.	1
ASC25	-8.95	-14.65	Ascension Island	U.S.A.	1
ASC26	-8.95	-14.62	Ascension Island	U.S.A.	1

PSUR	36.30	-122.39	Point Sur	U.S.A.	1
VIB	53.25	-132.54	Van Inlet	Canada	1
WK30	19.41	165.86	Wake Island	U.S.A.	1
WK31	17.93	167.50	Wake Island	U.S.A.	1

Infrasonic Stations

CODE	LAT	LON	NAME	COUNTRY	ELEMENTS
DLIAR	35.87	-106.33	DOE Prot Infr Array	U.S.A.	5
ISM	50.20	-96.03	Lac du Bonnet	Canada	4
LSAR	35.87	-106.33	Los Alamos	U.S.A.	4
PDIAR	42.77	-109.59	Pinedale	U.S.A.	4
SGAR	37.02	-113.62	St. George	U.S.A.	4
TXIAR	29.33	-103.67	TXIAR	U.S.A.	5
WRAI	-19.94	134.23	Warramunga	Australia	7

(7) Summary of Message Performance

Message System Performance for Non-Waveform Requests

IDATE	DONE	FORMAT_ERR	NO_DATA	UNKNOWN	TOTAL	SUC_PERCENT
2000095		12			12	100.0
2000096		12			12	100.0
2000097		12			12	100.0
Totals		36		0	36	100.0

Message System performance for Waveform Requests

IDATE	DONE	FORMAT_ERR	NO_DATA	OFF_LINE	STANDBY	UNKNOWN	TOTAL	SUC_PERCENT
2000095	677	4	202		3		880	99.7
2000096	679		195				874	100.0
2000097	508		203				711	100.0
Totals	1864	4	600	0	3	0	2465	99.9

(8) Summary of Data Volume Received

DESCRIPTION	MB_PERDAY
Auxiliary seismic	196.43
Hydroacoustic	139.96
Infrasonic	82.50
Primary seismic	3623.73

(9) Summary of Station Capability

Sta	Full	Partial	Low	None
ABKT	0.00	0.00	0.00	100.00
ARCES	99.00	0.00	0.00	1.00
ASAR	97.67	0.00	0.00	2.33
ASC23	0.00	0.00	0.00	100.00
ASC24	0.00	0.00	0.00	100.00
ASC25	0.00	0.00	0.00	100.00
ASC26	0.00	0.00	0.00	100.00
BDFB	95.33	0.33	0.33	4.00
BGCA	89.33	0.00	0.00	10.67
BJT	100.00	0.00	0.00	0.00
BOSA	99.00	0.00	1.00	0.00
BRAR	97.33	0.00	0.00	2.67
CMAR	100.00	0.00	0.00	0.00
CPUP	99.00	0.00	0.00	1.00
DBIC	99.00	0.00	0.33	0.67
DLIAR	99.33	0.00	0.00	0.67
ESDC	97.33	0.00	0.00	2.67
FINES	99.00	0.00	0.00	1.00
GERES	98.33	0.00	0.00	1.67
HIA	98.67	0.33	0.00	1.00
ILAR	100.00	0.00	0.00	0.00
ISM	0.00	100.00	0.00	0.00
KBZ	0.00	0.00	0.00	100.00
KSAR	100.00	0.00	0.00	0.00
LPAZ	97.00	0.00	0.33	2.33
LSAR	0.00	0.00	0.00	100.00
MAW	96.67	0.00	0.00	3.33
MJAR	93.00	0.00	0.00	7.00
NOA	98.33	0.33	0.00	1.33
NRIS	0.00	0.00	0.00	100.00
NVAR	59.33	1.00	1.00	39.00
PDAR	58.33	16.00	1.00	24.33
PDIAR	94.00	0.00	0.00	6.00
PDYAR	12.67	79.33	4.33	3.33
PLCA	95.00	0.00	0.00	4.67
PSUR	0.00	0.00	0.00	100.00
ROSC	0.00	0.00	0.00	100.00
SCHQ	86.00	0.00	0.00	14.00
SGAR	0.00	0.00	0.00	100.00
STKA	98.33	0.00	0.00	1.67
TXAR	100.00	0.00	0.00	0.00
TXIAR	0.00	0.00	0.00	100.00
ULM	86.00	0.00	0.00	14.00
VIB	85.67	0.00	0.00	14.33
VNDA	93.67	0.00	0.33	5.33
WK30	100.00	0.00	0.00	0.00
WK31	100.00	0.00	0.00	0.00
WRA	0.00	0.00	0.00	100.00
WRAI	85.00	0.00	0.00	15.00
YKA	78.00	1.33	0.33	20.00
ZAL	71.67	0.00	0.00	28.33

Numbers in this metrics represent the percentages of time in each capability for primary stations. Capability categories are based on signal gain(SG), defined as the ratio of signal gain to the maximum theoretically possible

for the station. Categories are: Full: SG>=90%;
Partial: 70%<=SG<90%; Low<70%; Null:no data.

(10) Summary of Communication Link Uptimes

Origin	Bandwidth (kbit/sec)	Average Uptime (%)
CHN_NDC	56.0	100.0
JPN_NDC	64.0	100.0
NOR_NDC	256.0	100.0
PTS_IDC	512.0	100.0
RUS_NDC	64.0	100.0
USA_NDC	1544.0	100.0

Numbers in this metrics represent simple average percentages
based on frequent sampling throughout each day.

(11) Bulletin-Timeliness (hour)

EVENT_DATE	SEL1_DONE	SEL2_DONE	SEL3_DONE	REB_DONE
2000/04/04	2.0	6.1	12.2	62.9
2000/04/05	2.0	6.1	12.2	141.0
2000/04/06	2.0	6.1	12.2	140.1

SEL1_DONE, SEL2_DONE and SEL3_DONE are defined as the 90% of the events were finished after the origin time for the events. REB_DONE is defined as ‘RebDone’ time recorded in ‘leb.allocate_hour’ for each day.

(12) Bulletin-Subscriptions

PRODUCT	SCHEDULE	SUBSCRIPTIONS
REB	24	9
SEL1	24	3
SEL2	24	2
Others	24	2

This table shows the numbers of bulletins distributed to subscribers. The entry ‘Others’ represents customized bulletins.

(13) Summary of Hydroacustic Station Performance

Total number of REB events in this time period:	136
Expected number of REB events with hydro detections:	94
Observed number of REB events with hydro detections:	38

Expected number of unblocked stations	Number of observed stations

	=0	=1	=2	=3	=4	=5	=6	=7	=8
0	42	0	0	0	0	0	0	0	0
1	2	0	0	0	0	0	0	0	0
2	11	4	4	1	0	0	0	0	0
3	12	1	13	0	0	0	0	0	0
4	26	0	14	0	0	0	0	0	0
5	2	0	0	0	0	0	0	0	0
6	1	0	1	0	0	0	0	0	0
7	1	0	0	0	0	0	0	0	0
8	1	0	0	0	0	0	0	0	0

The metrics represents number of events in each category.

Station	Expected-events	Observed-events
ASC23	13	0
ASC24	14	0
ASC25	12	0
ASC26	18	0
PSUR	64	0
VIB	36	1
WK30	80	37
WK31	80	34

(14) Detection Performance for Each Stations

STA	DET_N	ASSO_DF	ASSO_NDF	DISASSO	ADD_N
ABKT					
ARCES	475	50	3	41	9
ASAR	1471	100	6	115	13
BDFB	357	19		7	3
BGCA	391	41	4	26	
BJT	597	16	1	28	4
BOSA	365	13	1	12	1
BRAR	334	20	5	16	4
CMAR	1567	77		66	9
CPUP	540	16		17	4
DBIC	352	21	2	12	6
ESDC	435	30	1	22	
FINES	572	59	5	40	7
GERES	978	40	2	95	3
HIA	471	27	2	33	6
ILAR	1246	98	10	109	7
KBZ					
KSAR	768	31	5	34	2
LPAZ	334	28		19	6
MAW	352	6		5	2
MJAR	468	33		16	2
MNV					
NOA	972	33	4	60	14
NRIS					

PDAR	687	43	3	55	14
PDY					
PLCA	722	23		36	2
ROSC					
SCHQ	302	16		8	5
STKA	1098	36		46	7
TXAR	1059	75	7	93	11
ULM	523	22		13	4
VNDA	627	24		29	2
WRA					
YKA	2125	89	4	88	8
ZAL	471	15	2	8	4
DLIAR	23				
LSAR	175				
PDIAR	162				
SGAR	115				
TXIAR					
WRAI					
ASC23					
ASC24					
ASC25					
ASC26					
NZL01					
NZL06					
PSUR					
VIB	26				1
WK30	191		32	5	37
WK31	465		31	19	34
AFI					
ALQ					
AQU					
ARU	131	11			2
ATTU	13	3	2		2
BBB	7	1			1
BORG					
CTA					
DAV					
DAVOS	39	6		3	5
DLBC	52	3			
EIL	30	6		0	3
EKA	67	10		1	
ELK	22	3		2	
FITZ	147	25	1	3	5
FRB	39	7		0	
FURI					
GNI					
HFS	42	9	1	3	
HNR					
INK	162	28		4	4
JCJ	35	9	1	0	3
JHJ	31	7	1		5
JKA	47	10	1	1	3
JNU	216	8		1	3
JOW	155	2		2	5
JTS					
KDAK					
KIEV					
KVAR	90	8	5	5	3
LBTB	13	4		0	2

LSZ					
MA2					
MLR	22	2	1		3
MSEY					
NEW	23	3		1	1
NIL	44	9		1	4
NNA	2				
NWAO					
OBN	37	3	2		
PARD					
PFO	23	5		1	1
PMG					
PTGA					
RAR					
RPN					
SADO	32	3		0	2
SDV					
SFJ					
SNZO					
SPITS	40	3			1
SUR	10	2	1		2
TKL	42		1		
TSUM					
ULN					
VRAC	65	4			4
YAK					
YSS					

(15) Mb cumulative distributions

MAG	NUM
2.00	133
2.10	133
2.20	133
2.30	132
2.40	132
2.50	132
2.60	132
2.70	132
2.80	132
2.90	131
3.00	130
3.10	128
3.20	121
3.30	120
3.40	110
3.50	98
3.60	86
3.70	72
3.80	60
3.90	49
4.00	41
4.10	29
4.20	18
4.30	12
4.40	10

4.50	9
4.60	5
4.70	4
4.80	2
4.90	2
5.00	2
5.10	1
5.20	1
5.30	0
5.40	0
5.50	0
5.60	0
5.70	0
5.80	0
5.90	0
6.00	0
6.10	0
6.20	0
6.30	0
6.40	0
6.50	0
6.60	0
6.70	0
6.80	0
6.90	0
7.00	0

(16) Summary of Location Ellipses

Ellipse area (km^2)	Ndef 3-5	6-8	9-11	12-14	>=15
area<= 1000	0	2	2	0	24
1000 <area<= 2000	1	1	4	11	16
2000 <area<= 3000	0	5	7	6	0
3000 <area<= 4000	1	4	0	0	0
4000 <area<= 5000	3	5	0	0	0
5000 <area<= 10000	15	7	3	0	0
area> 10000	17	2	0	0	0