Annex 5 List of equipment provided by Japanese side

Date of Registration in JICA Office D/M/Y	Description/Name of Equipment /Goods	Specification・Standard	Qtty	(Yen/Peso) Unit Price	Provider	User	Condition after Cooperation of Survey/Technical transfer				Transfer・Return Date D/M/Y	Receiver	Receipt Date D/M/Y	Reference
							Transfer	Return	Others	Approval Document No. Date (D/M/Y)				
16/8/04	Computer	IBM ThinkCenter A50 817513A	1	P 76,600.00	Contronics Computer Center, Inc.		O				29/3/06	PHIVOLCS		
		Intel Pentium 4 Processor 2.8・400 MHz FSB,												
		256 MB Memory, Chipset 865GV, 40 GB Ultra ATA/100 ×2,												
		3.5" 1.44MB FDD, 5 X CD・W Drive, Intel Extrem Graphics 2 DVMT,												
		Soundmax Cadenza, Ethernet 10Base・T/100Base・TX,												
		2 USB 2.0 (front), 4 USB 2.0 (back), External Microphone,												
		Standard 104 Keyboard, USB Optical Mouse,												
		IBM 17" LCD Monitor 6734AB1, Windows XP Professional												
11/2/04	CPU	Intel Pentium 4 Processor 2.80GHz	1	P 44,350.00	Data Core Computer Systems		O				29/3/06	PHIVOLCS		
	Motherboard	ASUS P4P800・E Deluxe wifi motherboard	1									PHIVOLCS		
	Memory	512MB PC400 DDR SDRAM	1									PHIVOLCS		
	Monitor	LG Flatron T710SH 17" Color monitor	1									PHIVOLCS		
	Harddisk	Seagate 160GB, 7200ppm/8MB	1									PHIVOLCS		
	Case	Amp8866BlackMidTowerCase 400W	1									PHIVOLCS		
	Keyboard & mouse	Logitech Keyboard & mouse PS/2 Combo	1									PHIVOLCS		
	Floppy Drive	Floppy disk drive, black 1.44MB	1									PHIVOLCS		
	Modem	D・link56K V.90 PCI modem	1									PHIVOLCS		
	OS	Windows XP Home Edition	1									PHIVOLCS		
11/2/04	CD Drive	LG GCE・8526B (CD・RW)	1									PHIVOLCS		

Date of Registration in JICA Office D/M/Y	Description/Name of Equipment /Goods	Specification・Standard	Qtty	(Yen/Peso) Unit Price	Provider	User	Condition after Cooperation of Survey/Technical transfer				Transfer・Return Date D/M/Y	Receiver	Receipt Date D/M/Y	Reference
							Transfer	Return	Others	Approval Document No. Date (D/M/Y)				
	USBtoSerial	USB to Serial	1									PHIVOLCS		
14/2/04	Motherboard	Intel D915AGL i915G, LGA775	1	P 36,490.00	PC Evotech Corp.		O				29/3/06	PHIVOLCS		
	CPU	Intel Pentium 4 Processor 2.80GHz	1									PHIVOLCS		
	Memory	Kingston PC400 DDR 512MB	1									PHIVOLCS		
	Harddisk	Seagate 120GB 7200ppm/8MB	1									PHIVOLCS		
	CD Drive	Iomega DVD+RW/+R/CD Internal Combo	1									PHIVOLCS		
	Case	8606 Case 400W Black	1									PHIVOLCS		
	Floppy Drive	Sony/Panasonic 1.44FDD (Black)	1									PHIVOLCS		
28/12/05	PC Parts	Processor	28	P 10,745.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		Intel Pentium 4: 3.0GHz, 2MB, 800MHz, L2 Cache												
		Mother Board	28	P 3,990.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		ASUS P5GL-MX : Audio, Video, LAN LGA 775												
		Memory Card	28	P 2,514.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		512MB DDR 400												
		Hard Disk Drive	28	P 4,330.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		120GB 7200RPM 2MB												
		CD Writer	28	P 1,149.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		53X32X52												
28/12/05	PC Parts - Cont'd. -	Floppy Diskette Drive	28	P 362.00	Information Products Corp.		O				29/3/06	PHIVOLCS		

Date of Registration in JICA Office D/M/Y	Description/Name of Equipment /Goods	Specification·Standard	Qtty	(Yen/Peso) Unit Price	Provider	User	Condition after Cooperation of Survey/Technical transfer				Transfer · Return Date D/M/Y	Receiver	Receipt Date D/M/Y	Reference
							Transfer	Return	Others	Approval Document No. Date (D/M/Y)				
		1.44 MB												
		VIDEO Card	28	P 3,805.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		GeForece 128MB 128BIT 6200PCI Express												
		Modem	28	P 362.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		Internal Modem 56K												
		Casing	28	P 1,596.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		P4 ATX Black												
		Keyboard	28	P 0.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		PS/2 with Optical Mouse												
28/12/05	PC Parts - Cont'd. -	Monitor	28	P 5,000.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		17" Color Monitor (Flat Screen)												
		Powwer Supply	28	P 0.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		350Watts Dual Fan												
		Speaker	28	P 421.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		A4 Tech AS125 Multimedia												
		UPS	28	P 1,862.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		650VA UPS with AVR												
		Software	28	P 5,425.00	Information Products Corp.		O				29/3/06	PHIVOLCS		
		MS Windows XP Home OEM												

Annex 6 Local Operation Expenses borne by the Japanese Side

Project name: Project for Improvement of Earthquake and Volcano Monitoring System

Unit: Peso

No.	Category	*JFY 2004	*JFY 2005	Total Amount
1	Expert's Local Cost, General Local Cost	21,737.50	7,500.00	29,237.50
2	Carried Equipment	157,440.00	1,163,708.00	1,321,148.00
	Total	179,177.50	1,171,208.00	1,350,385.50

*JFY: Japanese Fiscal Year (from April to March)

† From April to December 2005

Annex 7 Assignment of Counterpart Personnel

No.	Name	The Post at assigned	Filed for the Project	Period of Assignment		Remarks (reason of change)
				From	To	
1	Dr. Renato U. SOLIDUM, Jr.	Director, PHIVOLCS	Geology, Volcanology	Mar/30/04	Present	
2	Dr. Bartolome C. BAUTISTA	Chief, Seismological Observation & Earthquake Prediction Division	Seismology	Mar/30/04	Feb/28/05	PHIVOLCS promotion
3	Dr. Bartolome C. BAUTISTA	Deputy Director, PHIVOLCS	Seismology	Mar/01/05	Present	
4	Mr. Ishmael C. NARAG	Officer-in-charge, Seismological Observation & Earthquake Prediction Division	Seismology	Mar/01/05	Present	
5	Dr. Ernesto G. CORPUZ	Chief, Volcano Monitoring & Eruption Prediction Division	Volcanology	Mar/30/04	Present	
6	Mr. Ishmael C. NARAG	Supervising Science Research Specialist, Seismological Observation & Earthquake Prediction Division	Seismology	Mar/30/04	Feb/28/05	PHIVOLCS promotion
7	Mr. Enrico MANGAO	Senior Science Research Specialist	Seismology	Mar/30/04	Present	
8	Dr. Baby Jane T. PUNONGBAYAN	Senior Science Research Specialist	Seismology	Mar/30/04	Present	
9	Ms. Esmeralda L. BANGANAN	Science Research Specialist II	Seismology	Mar/30/04	Present	
10	Mr. Danny MARTINEZ	Science Research Specialist I	Instrumentation	Mar/30/04	Present	
11	Ms. Vilma C. HERNANDEZ	Science Research Assistant	Seismology	Mar/30/04	Present	
12	Mr. Rey LUMBANG	Science Research Analyst	Instrumentation	Mar/30/04	Present	
13	Mr. Melquiades S. FIGUEROA, II	Instrumentation Engineer	Instrumentation	Mar/30/04	Present	
14	Mr. Artemio LUIS, Jr.	Science Research Assistant	Instrumentation	Mar/30/04	Present	
15	Mr. Eduardo LAGUERTO	Senior Science Research Specialist	Volcanology	Mar/30/04	Present	
16	Ms. Kathleen L. PAPIONA	Science Research Analyst	Seismology	Mar/30/04	Present	
17	Ms. Janila B. de OCAMPO	Science Research Specialist II	Seismology	Mar/30/04	Present	
18	Ms. Myleen E. CARLOS	Science Research Analyst	Seismology	Mar/30/04	Present	
19	Mr. Arnold A. MELOSANTOS	Senior Science Research Specialist	Seismology	Mar/30/04	Present	
20	Ms. Ma. Antonia V. BORNAS	Senior Science Research Specialist	Geology, Volcanology	Mar/30/04	Present	
21	Mr. Roberto B. TIGLAO	Science Research Assistant	Seismology	Mar/30/04	Present	

Annex 8 Allocation of Budget by the Philippines side

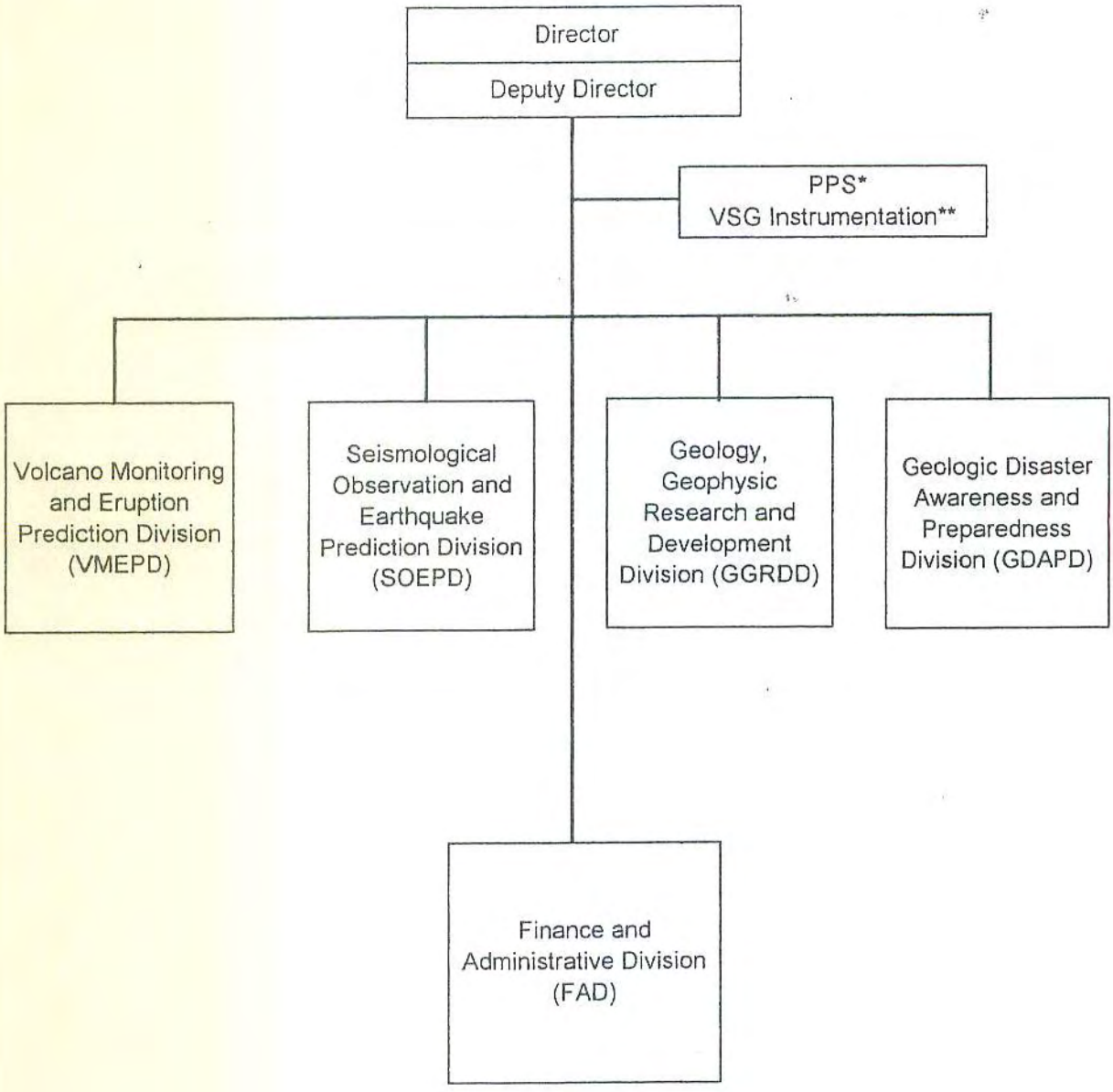
Project name: Project for Improvement of Earthquake and Volcano Monitoring System

(Unit: thousand pesos)

Category	2004	2005	Total
Travelling Expenses	850	900	1,750
Office Supplies	900	900	1,800
Utilities (Water, Power)	2,500	3,000	5,500
Communication (Telephone, internet satellite)	2,260	2,500	4,760
Transportation and Delivery	75	100	175
Repair and Maintenance			
-IT Eqpt. & Software	300	350	650
-Technical Eqpt.	400	450	850
- Motor Vehicles	150	155	305
Taxes (VAT)		7,500	7,500
Total	7,435	15,855	23,290

Annex 9 Organization Chart of the PHIVOLCS and the Department of the Science and Technology

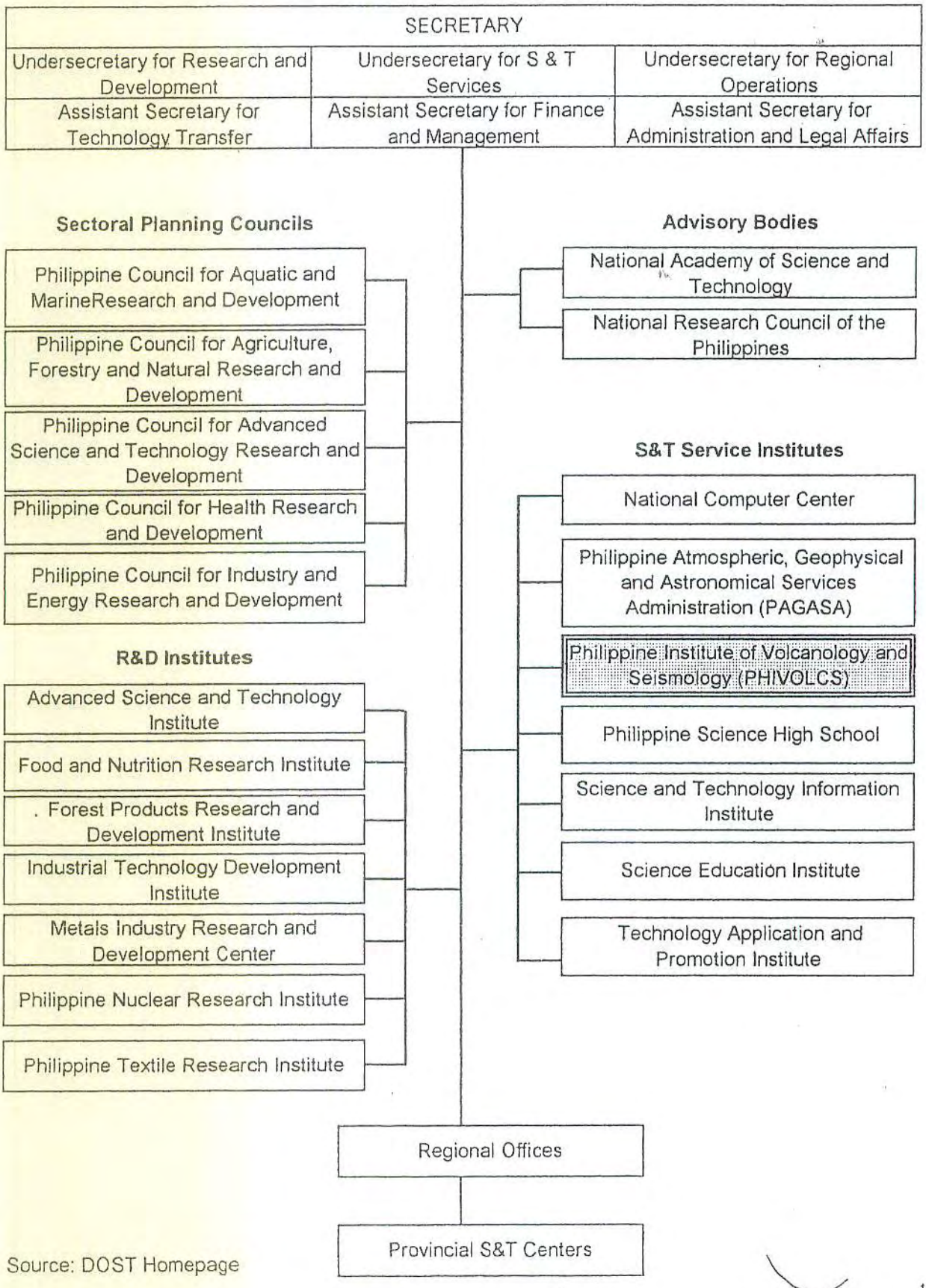
(1) Organization Chart of the Philippine Institute of Volcanology and seismology (PHIVOLCS)



* Planning and Programming Section
** Volcanological, Seismological & Geological Instrumentation Section

Annex 9 Organization Chart of the PHIVOLCS and the Department of the Science and Technology

(2) Organizational Chart of the Department of Science and Technology (DOST)



Source: DOST Homepage

Annex 10 Plan of Operations

PROJECT TITLE: Project for Improvement of Earthquake and Volcano Monitoring System

ACTIVITIES	2004										2005												2006		
	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1-1. To recognize change of products (hypocenter/ magnitude) caused by observation data differences on quality and quantity.						→																			
1-2. To conduct studies to develop magnitude formula with maximum amplitudes.						→																			
1-3. To modify other formulas than magnitude formula.						→																			
2-1. To acquire and disseminate know-how on usage of existing data analysis software.						→																			
2-2. To modify existing data analysis software for proper operation in PHIVOLCS.						→																			
3-1. To understand the process flow of seismic data centralized PHIVOLCS main office.						→																			
3-2. To understand data processing systems including operating systems.					←								→												
3-3. To disseminate JMA's experiences and knowledge on computer programs and management of observation data.					←								→												
3-4. To conduct studies to develop software to manage observation data in PHIVOLCS.					←								→												
4-1. To hold seminar on seismology needed for data analysis.						←												→							
4-2. To disseminate JMA's experiences and knowledge on development of data analysis software and related know-how to design programs.											←														→
4-3. To conduct studies for the processing and analysis of geodetic data gathered by PHIVOLCS.					←																				→
4-4. To conduct studies to develop software to analyze seismic data in PHIVOLCS											←														→
Short term expert (Volcanology)					←	→																			
Short term expert (Seismology 3)											←	→													
Short term expert (Seismology 4)																	←	→							
Training in Japan (Seismic data processing 2)								←					→												
Training in Japan (Seismic data processing 3)																				←					→

Annex 11 FLOWCHART OF "DATA SEISMIC ANALYSIS" AND "DATA HANDLING SOFTWARES"

Daily Extraction and Analysis of Satellite Waveform
From ringbuffers (IP 192.168.100.105 and IP 192.168.100.104) using ATLAS

↓

Below is a sample output of P and S time arrivals, amplitude, duration and date of event extracted using ATLAS

```
20051101005543901 9 0866121E1260 681  10                                                    0
$1
CAUP NM  SPZ  P 0200511010056 2174        6
$
ABRA NM  SPZ  P 0200511010056 0916        6                  0   112
$
APYP NM  SPZ  P 0200511010056 0548        6                  0   192
$
APYP NM  SPN   6200511010056          2270 S 0
$
BOLP NM  SPZ  P 0200511010056 3104        6
$
BBPS NM  SPZ  P 0200511010056 0848        6                  0   175
$
BBPS NM  SPN   6200511010056          2794 S 0
$
SGCP NM  SPZ  P 0200511010056 0465        6
$
SGCP NM  SPE   6200511010056          2106 S 0
$
BALP NM  SPZ  P 0200511010056 3732        6
$
SGCP NM  SPN   6200511010056              6    13590          0
```

↓

Nano

'Nano' program converts the above file phase readings into PHIVOLCS phase format reading, which is shown below

↓

```
P200511010418 0821
Stations  P       hh  min   sec      S       hh  min   sec      Amplitude  Duration
ABRA      eP      04  18    44.37    eS      04  18    53.83    19680.00   133.00      L
APYP      eP      04  18    48.62                               115.00                 L
SGCP      eP      04  18    59.74                               99.00                  L
BOLP      eP      04  19    01.31    eS      04  19    25.57                193.00     L
CAUP      eP      04  19    03.03                                                       L
SCZP      eP      04  19    09.22                               179.00                 L
BALP      eP      04  19    13.60                                                       L
BBPS      eP      04  19    17.94                                                       L
POLP      eP      04  19    27.34                                                       L
LUBP      eP      04  19    38.99                                                       L
BOAC      eP      04  19    47.28                                                       L
PVCP      eP      04  19    55.88                                                       L
SJMP      eP      04  19    56.57                                                       L
BUSP      eP      04  20    01.81                                                       L
ENPP      eP      04  20    11.25                                                       L
```

↓

Integration of phase reading from manned and unmanned seismic stations
(Phase IIb and Phase I)

20051201-0055.EQP	2KB	EQP File
20051201-0149.EQP	2KB	EQP File
20051201-0153.EQP	2KB	EQP File
20051201-0333.EQP	2KB	EQP File
20051201-0553.EQP	2KB	EQP File
20051201-0735.EQP	2KB	EQP File
20051201-1127.EQP	2KB	EQP File
20051201-1152.EQP	2KB	EQP File
20051201-1310.EQP	2KB	EQP File
20051201-1934.EQP	2KB	EQP File
20051201-2103.EQP	2KB	EQP File
20051201-2238.EQP	2KB	EQP File
20051201-2301.EQP	3KB	EQP File
20051202-0252.EQP	2KB	EQP File
20051202-0259.EQP	2KB	EQP File
20051202-0438.EQP	2KB	EQP File
20051202-0442.EQP	2KB	EQP File
20051202-0938.EQP	2KB	EQP File
20051202-1149.EQP	2KB	EQP File
20051202-1420.EQP	2KB	EQP File
20051202-1442.EQP	2KB	EQP File
20051202-1622.EQP	2KB	EQP File
20051202-1658.EQP	2KB	EQP File
20051202-1659.EQP	2KB	EQP File

```
[Version]6.4
[Date-Time of Occ.]
      20051205  14:56:12.70  (GMT)
[Stations used]
      GQP*  5616.59
      POL  5635.08  5653.00  63
      PVC  5636.71        78
      AUQ  5640.31
      BAL  5644.03
      BOA  5644.85        78
      CAU  5653.08
      PGP*  5658.00
      LUB  5701.23        36
      SJM*  5704.22
      APY  5707.16
[Result]
       4  14.836  123.349  32.72 14 56 12.70  0.77
      IT   LAT    LON     DEPTH HR MIN SEC    RMS
       4  14.836  123.349  32.72 14 56 12.70  0.77

      ERR  DEG    DEG     KM        SEC
          0.027   0.031  4.96      0.43

      STA TOA  AZIM  DELTA RESp  RESs  OBSp  OBSs
CALCpCALCs
      STATION NOT IN LIST
      POL  83.2 265.8  1.37 -0.59  0.16 22.38 40.30 22.96 40.14
      PVC  83.2 147.3  1.46 -0.26  0.00 24.01  0.00 24.27  0.00
      AUQ  83.2 203.6  1.64  0.74  0.00 27.61  0.00 26.87  0.00
      BAL  83.2 298.0  1.93  0.28  0.00 31.33  0.00 31.06  0.00
      BOA  57.1 227.1  2.00  0.12  0.00 32.15  0.00 32.03  0.00
      CAU  57.1 324.7  2.52  0.99  0.00 40.38  0.00 39.39  0.00
      STATION NOT IN LIST
      LUB  56.9 250.3  3.20 -0.62  0.00 48.53  0.00 49.16  0.00
      STATION NOT IN LIST
      APY  56.9 326.3  3.63 -0.75  0.00 54.46  0.00 55.21  0.00
[Magnitude]
      (Ms):2.2(Ml):2.6(Mb):3.8
[Nearest places]
       255 kms. N 85° E of Quezon City
        90 kms. N 31° E of DAET (CAMARINES NORTE)
        88 kms. N 45° E of PARACALE (CAMARINES NORTE)
        32 kms. S  2° W of EAST LUZON TRANSFORM FAULT

[Intensity]
[Filename-Info No.]
      20051205-1456.EQP 1
```


```
 . /S 2005 1111000428.62  15.344  119.351 9  15 3.5  4.6 3.3   0.78 0.022  .033 2.58
PIVS 2005 1111041537.09   8.583  124.571 32  4 2.9  4.1 2.6   0.81 0.063  .044 6.56
PIVS 2005 1111152530.65  14.070  122.935 1   8 2.6  3.9 2.3   0.59 0.030  .022 1.90
PIVS 2005 1111195358.93  13.259  120.244 29 11 2.8  4.0 2.5   0.80 0.024  .027 2.98
PIVS 2005 1111195848.41  12.489  123.623 8  30 4.1  5.1 4.2   0.64 0.012  .013 2.01
PIVS 2005 1111203300.91  10.663  125.545 22  7 3.2  4.3 3.0   0.76 0.021  .040 2.34
PIVS 2005 1112045200.68   9.597  126.352 12 19 4.2  5.2 4.4   0.55 0.012  .023 1.31
PIVS 2005 1112085928.22  12.433  123.611 12 22 3.7  4.8 3.7   0.65 0.014  .016 2.21 F  MASBATE - INTENSITY III
PIVS 2005 1112202833.72  12.446  123.647 1  27 3.9  4.9 3.9   0.62 0.013  .012 2.24 F  MASBATE - INTENSITY II
```

Hypocenter Catalogue

Description:

"Hypo" program - Program that automatically converts plotted earthquakes into PHIVOLCS hypocenter format parameter

Annex 12 PHIVOLCS Magnitude Estimation

PHIVOLCS applies three methods in the estimation of the magnitude of an event. The first method, a duration magnitude estimation, is based on an empirical formula developed by the institute which uses the distance of the epicenter of the event to the recording station (km) and the length of the recorded earthquake (sec). The length of the recorded earthquake is based on the duration of the event from the onset of the earthquake to the time it approaches the original background level of ground motion. Based on comparison with magnitude values for earthquakes within the Philippines determined by the National Earthquake Information Center of the US Geological Survey, the magnitude value using this method does not deviate significantly with NEIC values. However, since this method requires the duration of the event, there would be a significant delay in the determination of the magnitude especially for very large events since it would require a longer time before the record of the event finishes.

The second method, an amplitude magnitude estimation, determines the Richter local magnitude (mL) of the event based on the recorded maximum amplitude and the distance of the epicenter to the recording station. The formula is already a built-in feature in the current Atlas processing software of Nanometrics and utilizes waveform data from the satellite stations. The waveform needs to be transformed to a waveform record of the event as it would be recorded by a Wood-Anderson seismograph. This amplitude value strictly follows the original theoretical framework of the estimation of the local magnitude of an event. However, the local magnitude scale has a saturation level of magnitude 5.0 and above. This means that it would not give accurate values for earthquakes with magnitudes beyond magnitude 5.0. For events whose initial calculation of the magnitude falls within this magnitude range, the duration magnitude is used to counter-check the value.

The third method, a moment magnitude estimation, determines the size of the earthquake based on the amount of deformation due to the earthquake event . This could be determined using the full record of earthquakes from broadband instruments. The advantage of the moment magnitude scale is a favored method for the estimation of the magnitude especially for very large earthquakes because this does not saturate at all. A method has been developed to estimate the moment magnitude based only the record of the primary wave instead of the full waveform of the earthquake. This method, Mwp, reduces significantly the amount of time to compute for the moment magnitude. However, the present broadband stations are not linked to the Data Receiving Center of the institute so it is not possible to determine the moment magnitude for fast determination and prompt dissemination. Broadband stations are often located in areas where the level of ground vibration especially those generated by human activity is less. In most cases, an Internet connection is not available in these areas. This method is only applied upon receiving the complete broadband records from the seismic stations equipped with broadband instruments. With this, the institute now sets the linkage of the broadband stations as an important target.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