87046

Name of Traveler/Division	Dates of Travel	Countries Visited
DAVID REX NICHOLS AMG	Dec. 3, 1987 Dec. 18, 1987	CHINA

Names of Others Accompanying Traveler and Affiliation

Heimi Espino - Litton Field
Services Engineer
Dennis Woodard - SSI Field Engineer
Seismic Sound Sources

Key Counterpart Personnel and Affiliation

Zhang Zai Chao
Instruments Engineer
Second Marine Geological Investigation
Brigade & Ministry of Geology and Mineral
Resources

Purpose of Trip or Title and Sponsor of Meeting Attended

See Attached A

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Summary of Trip Discussions and Activities

See Attached B

Benefits to USGS/DOI Mission or Foreign Policy Objectives

Funding for Data Processing

Problems Encountered, Actions Taken (If Any), Responsible Personnel

NONE

Conclusions and Recommendations

See Attached B

Distribution: Original + 2 copies to AD/EG (MS 106); 1 Copy to OIG (MS 917); Division Copies

Short Report 12/24/87

China 87

Nichols December 3 - December 18, 1987 UNDP USGS

Nangang Base, Fendou V

High-Res Acceptance for China

General Observations

Test Procedures and Documents

Suggestions

A

REQUEST OF THE GOVERNMENT OF THE PEOPLE'S REPUBLIC OF CHINA
(CPR/85/044)

JOB DESCRIPTION

1.	Project Title:	Marine Engineering Geological Investigation in the Pearl-River-Mouth Basin of South China Sea
2.	Post Key Code Number:	CPR-I20-5-044-60-x
3.	Requesting Ministry:	Ministry of Geology and Mineral Resources
4.	Post Title:	Consultant in shallow water marine geophysics
5.	Duration:	I month, November/December 1987
6.	Duty Station:	Guagzhou
7.	Purpose of Project:	To introduce up-to-date instruments and equipmen for marine engineering geological investigation, to give scientific evaluation on the engineering geological conditions using theories, and to pre pare technical reports on the results.
8.	Duties:	The expert is to participate in offshore operati to assist in the installation, adjustment and operation of shallow geophysical instrument and equipment. to formulate operational regulations and quality control standards. (Copying and publication of of the data obtained during the undertaking of t project should be agreed by the department con- cerned of the People's Republic of China.)
9.	Qualifications:	He should be a highly qualified expert in marine geophysical work, with 15 years experience, who (a) familiar with the principles, the testing an operation and maintenance of instruments for geo physical surveys; (b) well acquainted with advan techniques and up-to-date processes, and experie in the collection and interpretation of geologic data; (c) well established in the specialized fi of marine geohazard survey: (d) able to maintain existing equipment to obtain high quality data i practical work and to give technical training to China's technical personnel to enable them to re the world advanced level in theoretical and prac work.
10.	Language:	English

11. Background information: The Pearl-River-Mouth-Basin exhibits complex engineering geological conditions because of the great thickness of sediments. The Chinese engineers and technical personnel lack experience in the acquisition of engineering geological data by means of shallow geophysical techniques, and they are unfamiliar with some of the instruments and equipment being used. There are no established operation procedures and/or quality control standards in China.

A

This report will be a short synopsis of my U.N. consultancy to the 2nd Brigade at Nangang Base and aboard R/V Fendou V. This is only an informative outline and a complete edition will be sent to distribution upon completion. I would like to report first on specific contract obligations and acceptance of equipment followed by observations and recommendations.

I arrived Guangzhou December 4th and was met by Mr. Feng Zhiqiang and SueLi. Formalities were exchanged and a restful afternoon spent in the DongFang. On the morning of December 5th a short meeting with Mr. Feng, Mr. Zhang, Mr Yao and SueLi was had at the hotel to discuss overall project objectives and the "plan." My specific ideas and recommendations were to be addressed to Mr. Yao and Mr. Long while onboard with Mr. Zhang acting as an engineer/interpreter. Mr. Yao was overall co-ordinator of daily activities and "plan" diversions. Mr. Zhang is a very knowledgeable and capable engineer who worked very hard to assure my thoughts and recommendations were presented respectively. He had a fine grasp on the scope of the job and was helpful in all respects. It was only through his and SueLi's efforts that my job was made possible. December 5th afternoon was spent checking shipment from Litton and SSI. All gear was present and looked in good shape. Water guns were brought to the boat and Mr. Woodard, (SSI) installed aboard. Testing of firing circuit and both guns at the dock was accomplished by late afternoon and I was satisfied the H20 gun package was complete. Mr. Woodard, (SSI) and I discussed problems with air supply cleanliness and found several 60 micron filters to install "in line" with the air hose supply. All spares checked complete and the Chinese were very impressed with Mr. Woodard. While testing the guns at dock the lab was surveyed for general problem areas. One of great importance was finding the Hi-Cut filter network in the DFSV was only 128 HZ. This being to low a frequency for the water gun, I suggested finding 256 HZ chips. None were found. However, x2 FM boards were located which multi-plies the face value of the High-Cut alias filter by two. Therefore a 128 is 256 Hz on a x2 card. The x2 boards belong on Fendou IV and the Fendou V has ordered the correct chips through USGS, Woods Hole. December 6, 7. and the morning of the 8th were spent doing streamer package installation and lectures on the Syntron leveler system. This was done by Nichols and Espino (Litton) while Mr. Woodard and Mr. Zhang instructed the gun mechanics. The Litton package was checked for completeness and all wiring was correct. Mr. Espino went above and beyond the call of duty by repairing some gear aboard Fendou IV. The Chinese were very impressed with Mr. Espino and hope to see him again. On December 8th 3:00pm. Fendou V set sail for sea trials and acceptance tests. Enclosed you will find a DFSV log of 5 columns:

Column 1 - File #
2 - Input gain constant - FM board
3 - Test signal level
4 - Processed noise level at computer center CPR
5 - Noise level calculated from camera records aboard Fendou V

A brief outline of the streamer acceptance follows:

Thirty five different instrument settings were used to make the test accurate. All combinations of system gain circuits were tried to find best test range. Although Litton states a 1 uv noise level should be obtained with this streamer we could only get 5.73 uv for our best, noise level. Discussions with Steve Bledsoe (LRS) about possible disclaimers signed by Chinese are in progress but no information is available at this time. Littons streamer engineer Mr. Goodchild did state to me on December 23 that the (system noise generation) of one group is luv. All ambient noise levels should be added to that figure for proper ratios. Its his belief that the Chinese wanted the highest sensitivity level possible, and they should be willing to accept a higher noise level to obtain that. I feel the Chinese misunderstood that under tow configuration the streamer should be able to achieve less than or equal to 1 uv noise. This 1 uv level is only the (system noise generation) of 1 group or channel. We do plan to do further testing in the spring. Except for this one point the entire Litton package worked perfectly. The package is complete in my estimation. In summary, the streamer was tested at different tow speeds and depths to monitor any differences. Twenty three streamer channels were then compared to a known signal level generated by the DFSV which was applied to ch. #24. A comparison was then measured between the (test level vs. the actual level) and computed from reading peak to peak from an oscillograph record. The tapes were then taken to the computer lab and dumped. Actual noise levels computed by processing were an order of magnitude higher than the field computation. It is my opinion that the high sensitivity ratio 10.1 to 1 is worth trade offs in a somewhat higher noise level. After streamer noise tests were completed a test line was run using first the 80 cu. in. then the 15 cu. in. for sources. Approximately 20 km of test data were recorded. Two of these tapes were sent to Denver for processing. The data looked very good on camera. A question about 200 km of data acquisition was discussed by Mr. Yao and myself. It was discovered that his was not in the original "plan." Mr. Yao stated that due to weather and other circumstances we could not accomplish this task. Also, Mr. Yao and myself thought that processing of the test data should be completed before the 200 km's in order to locate potential problems such as correct offset etc... Mr. Yao shows a good working methodolgy of High-Res Geophysics. We were able to discuss the Chinese High-Res package and what its limits are as far as shot spacing, internal timing and sample rate. Mr. Yao understands that the weak link in the High-Res package is two fold. One is the repetition rate of the 80 cu. in. gun of 4 sec. max. The other is the "record" length of the DFSV. It takes the DFSV 3.2 seconds to write a 2 sec. record. If the navigation team is firing on distance the ship must remain below 3.3 knots to obtain 24 fold coverage. My opinion is to use the 80 cu. in. gun for 12 fold data only and the 15 cu. in. for 24 fold. All these options were discussed with Feng, Yao, Long, and SueLi.

Their decisions will be made as far as system configuration when the spring program begins. After completing the actual data acquisition portion of the test cruise I was asked to look at the EG&G side-scan crosstalk problem. The 900 joule sparker puts noise onto the paper record of the SMS 960 side scan. Being somewhat familiar with this problem I can state that it is a common problem with multi-disiplinary cruises using instruments close in bandwidth. Many discussions about the SMS 960 system ensued. Chinese stated that 2 years ago the records looked great (no xtalk), after servicing in the states this year, (now have xtalk). Why? I called EG&G on return about this finding and discussed with the engineer who installed this system and my suspicions were correct. Two years ago the SMS 960 was used in deep water. At that time the offset of the S.S. fish from the sparker electrode was a substantial distance. Our testing was done in 15 - 40 meters, (shallow) water!! Shallow water multi-system operations is an almost impossible task when using side scan. Therefore my recommendation to Feng and Yao is that unless a long separation distance can be achieved, one should do only side scan in shallow water if a clean record is required. The xtalk problem is not electricaly generated in the lab, it is in the water column. After this test was done we returned to Nangang December 14 and discussed our findings on December 15 with Mr. Feng.

My final duties included signing acceptance documents, briefing a group including Feng, Long, Yao, Zhang, Madam Liu, Ying and several others on my recommendations for further preparations of this High-Res system. I made many recommendations at this meeting and feel that the Brigade really appreciated the input. I did notice several changes suggested by the Frydecky report had been accomplished! In general I feel the Fendou V is now ready for High-Res data acquisition. As far as organizational problems with the Chinese 2nd Brigade I can only say that this person needs another trip to the area to properly understand. I do feel that the Fendou V has a very professional level of operation and I was treated first class.

It was a splendid pleasure working with these people.

Summary of suggestions and modifications onboard:

1. Changed DFSV to record in the non-data protect mode vs. data protect. Needed this to speed up the time interval between shots for 24 fold coverage.

2. Installed x2 FM boards for hi-frequency gain 128 HZ vs 256 HZ.
   Proper filters have been purchased and should be installed ASAP on the xl FM and DM boards.

3. Tested Datasonics 3.5 system with EG&G and Benthos streamers.
   Datasonics pre-amp filter box is bad. Freitas notified. Possible easy replacement.

4. Technicians onboard expressed need of schematics to properly maintain equipment. Example; SMS 960. I agree. Called EG&G Harry Maxfield and possible document clearance in 6 months for the Chinese system. Please inform Mr. Feng of this.
   Datasonics systems should have two copies of each manual as well as schematics. Please check.

5. Water gun acceptance test
   Streamer acceptance test
   Syntron leveler test

6. Suggested a technical library onboard.
   All manuals in central location.

7. Initiated an inventory of every piece of equipment and its spares and expendables.

8. Repaired streamer test equipment onboard Fendou V.
   Installed 2 PC cards for video and printer.

9. Chinese disliked previous Litton rep. They suggested a possible apology letter from Litton stating regret the gentleman was so rude (may be in order.)

10. Suggested A.C. power strips installed in lab.
    Many plugs had ground lug missing. Must standarize lab A.C. recepticles and plugs.

11. Lab onboard needs to replace much twisted pair wire with coax. Need many connectors and 500 ft. of RG 58.

To Yao:

12. Streamer offset vs. water depth. Dr. John Grow says for hi-res never have offset greater than the water depth.

To Yao:

13. Water gun tests:
For optimum signal processing in hi-resolution MiYoungLi-(Denver) states that test must be done in deep water. >500m, and the calibrated hydrophone needs to be at the same receiving depth as the streamer would be for data acquisition.

14. Letter of recommendation to:
Espino
Woodard

15. The Nangang group onboard are excellent together. It was an extreme pleasure to work with every one of them and a formal UNDP package will follow soon.

Thanks,

Dave Nichols

[illegible]数字地震仪班报

110 mb.

测线______ 总天数______ 日期 1987.12.11 开工时间______ 收工时间______

DFS V

Log

震件号	时间	航向	航速	磁带盘号	水深	尾标偏移	电缆沉放深度 1	2	3	4	5	6	7	8	
33			#	2		#	3			#4			#	5	
34										Processed				No Ship	
35	道数	道间距(米)	航速(节)	记录格式	航迹到炮点中心	第一道中心距离(米)	仪器增益			计算机处理					[illegible]
1	24	12.5	3	2^6	100		x4			14.71				7.8	电缆深度[illegible](不同)
2				2^6			x1			9.22				5.0	第23道记录空白
3				2^6			x16			7.84				7.0	第24道转入33道记
4				2^4			x4			8.32				6.0	记录长度2秒
5				2^4			x1			9.05				6.0	
6				2^4			x16			4.66				7.0	
7				2^8			x1			10.22				8.0	
8			6	2^6			x4			7.83				7.8	
9				2^6			x1			6.37				5.0	
10				2^6			x16			8.59				6.8	
11				2^4			x4			8.86				8.5	
12				2^4			x1			10.98				7.0	
13				2^4			x16			9.66				9.5	
14				2^8			x1			8.34				5.0	
15				2^6	200		x4			6.72				6.0	
16				2^6			x16		8.3	6.8				7.6	
17				2^6			x1			7.61				4.0	
18				2^4			x4			8.04				4.0	
19				2^4			x16			6.37				5.47	
20				2^4			x1			7.16				3.0	
21				2^8			x1			9.33				5.5	
22			3	2^6			x4			7.07				4.3	
23				2^6			x16			7.31				6.4Mb	
24				2^6			x1			12.43				8.0Mb	
25				2^4			x4			7.74				4.8Mb	
26				2^4			x16			7.38				3.8Mb	
27				2^4			x1			7.38				4.16Mb	

Recorded

Field

Computer

FROM PAPER