Daya Bay RPC Gas System Installation at EH#1

Lu Changguo

Our original gas system installation plan from last Muon installation workshop (July 14, 2010, IHEP):

WBS	Task Name	Start	Finish	Activity location	Work description for gas system
6.4.6	EH1 Install RPC Gas Mixing System	10/8/2010	11/5/2010	gas/mixing rooms, E.H.	(1)Install gas mix and control crates, (2)Install GCs, (3)test software,
					(4)Temporally install gas distribution/digital bubbler system in gas room and test,
					(5)lay gas pipe in gas/mix rooms and E.H. (6) Connect to DCS interface box.
6.4.7	EH1 Install Gas Distribution & Digital Bubblers	11/5/2010	11/30/2010	RPC support struc. E.H.	Move gas distribution/digital bubbler racks to RPC support structure.
6.4.8	EH1 Install & Route Gas Lines in Tray	11/30/2010	12/7/2010	RPC support struc. E.H.	Cut, label and route plastic gas tubing in tray.
6.8	EH1 RPC: Connect Utilities to Modules	12/21/2010	1/10/2011	RPC support struc. E.H.	Connect gas tubing to RPC modules/gas distribution crates.
6.9.2	EH1 Route Cables & Gas Lines in Flex Tray	1/18/2011	2/1/2011	E.H.	Lay one flexible gas hose in flex tray.
6.9.3	EH1 Run & Test Completed RPC Array	2/2/2011	3/30/2011	Gas room, E.H.	Monitor/debug digital bubbler and GC operation

Progress of gas system installation

Submitted TCF forms for gas system installation and received approval:

DYBProject-doc-409 (Installation of RPC gas system in the gas mixing room w/o Isobutane)

DYB Task Control Form

主题（Subject）	Installation of RPC gas system in the gas mixing room at E.H.#1 (w/o Isobutane in the system)		
子系统 （Subsystem）	Muon/RPC	负责人 (Subsystem Manager)	R. Hackenburg C. Yang
实施负责人 (Responsible person)	Changguo Lu	日期(Date)	Oct. 8-27, 2010
编号(WBS No.)	1.9.9.2.1	页数(No. Pages)	4
抄送(CC)	Xiaonan Li, Charles Person, Jiawen Zhang		
关键词(Key words)	RPC, gas system, gas mixing system, gas control system, gas distribution system, digital bubbler		

实施计划（Description of work to be performed）：

This is the task control form for installation of gas control/mixing system at Daya Bay Near Hall, gas mixing room.

Daya Bay RPC gas system includes gas mixing system, gas control system, gas distribution system and gas analysis system (GC) and the gas pipelines. In this TCF we only deal with the first three parts of the gas system.

Prerequisites for the gas system installation:

1. Deliver all gas system shipping packages (on four pellets) to gas mixing room underground;

TCF forms for gas system installation

DYBProject-doc-410 (Installation for two gas chromatograph systems)

DYB Task Control Form

主题（Subject）	**Installation for two gas chromatograph (GC) systems in the gas mixing room of E.H.#1**		
子系统 （Subsystem）	Muon/RPC	负责人 (Subsystem Manager)	R. Hackenburg C. Yang
实施负责人 (Responsible person)	Changguo Lu	日期(Date)	Oct. 8-15, 2010
编号(WBS No.)	1.9.9.2.1	页数(No. Pages)	4
抄送(CC)	Xiaonan Li, Charles Person, Jiawen Zhang		
关键词(Key words)	RPC, gas system, GC		

实施计划（Description of work to be performed）：

This is the task control form for installation of 2 gas chromatograph system at Daya Bay Near Hall, gas mixing room.

GC430 is a commercial equipment. The manufacture was Varian, now is Bruker. The original P.O. includes the service charge for its installation. The warranty will be expired by 10/21/2010, thus we have to finish this installation before that date, otherwise we have to pay additional service charge.

The installation steps:

(1) Set up a desk for the GC430 and a PC according to manufacturer's specs in gas mixing room (see

List of the work done so far

1. Install gas mixing and control crates in gas room
   As we planed the gas mixing and control crates have been installed in gas room.

List of the work done so far (cont'd)

2. Install two gas chromatograph systems

Bruker field service engineer Hong Xiangdong came to Daya Bay EH#1 on 10/11 to install the GC.

One GC is working properly, the other GC has a defect electro-magnetic valve (leak) that needs to be replaced. The replacement part will be delivered in 4 to 6 weeks.

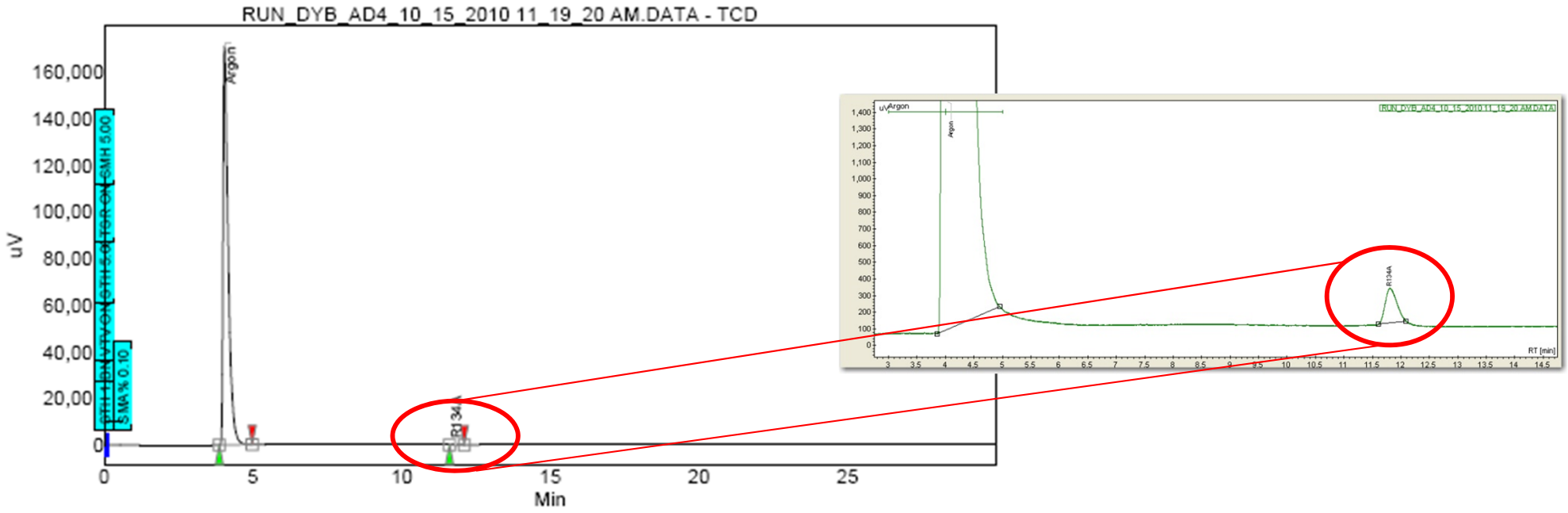
Luo Xiaolan and Xu Jilei are using the GC to analyze the gas sample from AD (see next page for the test result).

GC test result for gas sample from AD

Chromatogram : RUN_DYB_AD4_10_15_2010 11_19_20 AM_channel1

System : Dayabay-near
Method : Dayabay-near
User : admin

Acquired : 10/15/2010 11:20:07 AM
Processed : 10/15/2010 3:24:44 PM
Printed : 10/15/2010 4:49:06 PM



Peak results :

Index	Name	Height [uV]	Time [Min]	Area [uV.Min]	Area(Raw) [%]
1	Argon	171055.8	4.03	33549.3	99.856
2	R134A	208.1	11.81	48.5	0.144
Total		171263.9		33597.8	100.000

Calibration fact:
R134A:Ar = 0.571 : 1
R134A/Ar = 0.144/99.856*0.571
= 0.0823%
(Very preliminary result)

Temporally install the gas distribution/digital bubblers in gas room and test

The gas distribution/digital bubblers eventually will be installed on the RPC module supporting structure. Since the utility installation work on the supporting frame has not started yet, for the testing purpose we have to install gas distribution/bubblers in the gas room.

All 7 sets of gas distribution/digital bubblers crates are mounted on one rack as shown on left. Filled with silicon oil, all channels are bubbling. When AD's white oil arrives we'll replace the present silicon oil with the white oil to reduce the viscosity, thus to improve the quality of the bubble.

Gas switchover panels, manifolds and pipes

IHEP gas system installation team, lead by Sun Hanshen, has performed superb job to install all these utilities.

Gas switchover panels, manifolds and pipes (cont'd)






Remaining jobs for the first step of gas system installation

- Thoroughly check the leakage of the gas system and make a report to Daya Bay LSO/SO, if approved we'll bring Isobutane into the system and bring the full gas system into operation;
- W/O Isobutane we'll run the system continuously to test its stability;
- Work with DGUT group connect gas system signal cables into their Detector Control Interface Box and check the signal correctness;
- Running bubbler readout GUI program, check its stability;
- Running GC sequence at the same time with the bubbler GUI, check there is no interference.

If everything mentioned here is going well, we'll be ready to move on to the next step of gas system installation: Install gas distribution/digital bubbler system onto RPC supporting platform; laying gas tubing into the utility tray under the supporting frame; ….

Special thanks to
Strong support from LIM Xiaonan;
US/China LSO/SO;
IHEP gas installation team, especially its group leader Sun Hanshen;
BNL group for handling the gas system shipment and delivering the entire gas system into the E.H. #1 gas room w/o breaking a single piece of equipment;
IHEP graduate student Xu Jilei to participate the entire gas system installation.