**Fermilab**
**FY2002 Self-assessment**
**Process Assessment Report**
**For**
**Division/Section** ___Particle Physics Division___

**Date** ___September 26, 2002___

Division/Section performing assessment

Particle Physics Division

Name of organization that owns assessed process

Technical Centers Department

Organization Strategy

We are assessing the Alignment and Metrology Group's log books. The log books provide a record of work performed, raw numbers from the measurements performed, results calculated from the raw numbers and various sign-offs that are required by our QA program. The logbooks allow one to understand what was measured and how the final results were calculated. This information is essential to the organization as the interpretation of many of the measurements we make at Fermilab are complex and impact the detectors and accelerators we build in subtle ways. The ability to re-examine measurements and calculations helps to identify or exclude a potential source of problems. The ability to compare the current location of an object to an historical location can also be useful for re-establishing operating conditions, etc. When objects have moved, access to the numbers and calculations that support the measurement often provide significant insight.

Names of Personnel on Assessment team

Ronald Ray, Technical Centers Department Head

Name of process assessed

Alignment and Metrology Group log books.

Brief description of process to be assessed

The Alignment and Metrology Group keeps detailed logs of all field measurements. The device measured, physical setup, and details of the survey are noted. Numbers measured in the field are written down along with intermediate calculations. In this sense they are identical to experimental logbooks taken by a researcher. The books are strong, well-bound Boorum and Pease Hardcover 1602 1/2 300-Q. although on occasion the smaller 8 1/2 X 11 versions are used. Notes can be recorded in pencil or ink.
When a crew takes a set of measurements, the following information is recorded:

1. Crew Chief
2. Names of Crew Members
3. Initials of Crew Members

a. All Crew Members have read the relevant request, understand what they are to measure, the technique to be used, and any safety issues for the job.
b. If there is any breakdown at that point the job is to aborted as a QA measure

4. Date of Measurement
5. Location
6. Actual Field Notes

The devices used are calibrated on a regular basis and a separate logbook is kept with the device records. For some devices, such as the gyroscope, the calibration is checked in the field before and after each measurement and those results are recorded as well.

1. Are metrics associated with this process? If so, what are they?

To assess the Alignment and Metrology Group's logbooks, 5 random alignment jobs will be selected from their online database. The assessment will check that:

1) The database correctly identifies the logbook and logbook pages containing the measurements and calculations for each jobs;

2) The relevant logbook can be located within 5 minutes;

3) The logbook entries are clear, complete and contain a sign-off by a responsible person on the data and calculations contained within.

A grade will be assigned based on the number of times all of these conditions are met:

5 out of 5 - *Outstanding*
4 out of 5 - *Excellent*
3 out of 5 - *Good*
2 out of 5 - *Marginal*
1 out of 5 - *Unsatisfactory*

2. What are the names of the procedures associated with this process?

   None

3. Are these procedures being followed? Are they current?

   N/A

4. Describe the methodology used to assess this process.

   Job requests are submitted to the Alignment and Metrology Group (AMG) electronically and are stored in a database. The database records the request, the requestor, a description of the request, the date, and the crew assigned to the job. A request number is also assigned. At the completion of the job, the log book and log book pages containing the measurements and calculations is added to the database. The database can be searched by request number, requestor name or by words contained in the job description.

   The methodology used to assess the AMG logbooks consisted of randomly selecting 5 jobs from the database. The first step of the assessment was to verify that the database entry pointed to a specific logbook. The next step was to quickly locate the actual logbook and verify that the location specified in the database contained the information for that job. Finally, the contents of the logbook for each job were examined for completeness, clarity and appropriate sign-off.

5. Results of the assessment:

   The AMG group has amassed a huge inventory of numerical data and calculations resulting from their work over the years. Based on this assessment, they do an outstanding job of managing this data. The jobs that were randomly selected from the database span nearly 10 years, from 1993 to March of 2002. Normally, these assessments only cover the previous 3 years, but because this is the first such assessment we chose to look back even farther. In each case the database entry pointed to the correct logbook and logbook pages. In each case, the correct logbook was located in less than 5 minutes. It should be noted that the logbooks are stored in fireproof cabinets that are scattered throughout the AMG office. It would be more efficient to store them all in one place, but space considerations make this difficult. The logbook entries were examined in detail for each of the 5 jobs. For a given job, the logbook entries can span many pages. On every logbook page that was examined the task manager had signed off, indicating that the information and calculations had been checked. In each case the sign-off date was included. In one instance the task manager's initials did not accompany the sign-off, but his initials appeared next to the sign-offs on adjacent pages for the job in question.

   It is often the case that particular alignment jobs make use of measurements from previous jobs. One of the jobs examined involved alignment of stochastic cooling tanks in the Antiproton Accumulator ring. Each tank contains 4 tooling balls and the positions of the tooling balls on each tank have been measured in the past. The logbook entries containing the previous measurements of the tooling balls on each tank were properly referenced in the logbook entry.

The only real opportunity for improvement noted is that some of the logbooks are not indexed in the front of each book. An effort is currently underway to correct this minor deficiency that in no way compromises one's ability to locate information for a given job quickly.

The database printout and the associated logbook pages from the most recent of the examined jobs are appended. The appended information corresponds to a job from 2002 to perform as-found measurements on a calorimeter for the completed KTeV experiment.

Based on the metric described above, the AMG logbooks satisfied the criteria for all 5 of the examined jobs. This leads to an assessment of Outstanding.

Identified opportunities for improvement

The only noted opportunity for improvement was minor and was already in the process of being addressed at the time of this assessment.

Schedule for implementation of improvements

Status of improvements from previous assessment

Attachments (supporting data, worksheets, reports, etc.

Request # : 4070 Date : 27-MAR-02
Project # : 3832 Crew # : 3
Area : KTEV
Log Book # : 123-11 Page # : 136-143
File Backup To Diskette (Y/N) : N Vax Filename :
Job Completion (Y/N) : Y

Note is checked (Y/N) : N Checked by :
Note or file is put inside the basket (Y/N) : Y

Description
As found measurements of CsI Crystal Array relative to itself and the tooling balls as per Ed Blucher.

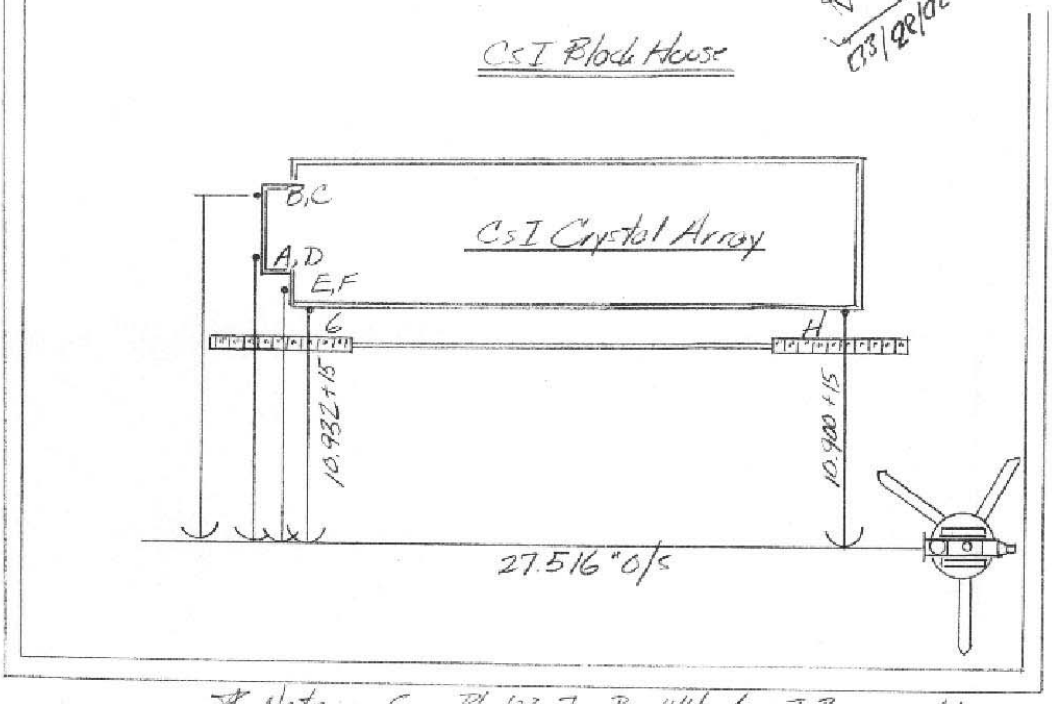
Bk 123-11
Pg# 4070
T/B #3832

# CsI Calorimeter
## As Found "Y"

MO/RLW/AR
5/27/02

CsI Block House

CT3/28/02




★ Note: See Bk 123-7; Pg. 144 for T.B. corr. #'s

★ Note: Bucked-in on G & H design Δ and read A-F.

| STA | Reading (-) STR | SCL | MIC | CORR | O/S | Reading (+) STR | SCL | MIC | CORR | O/S | Design | Δ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | 15.0 | 10.9 | .032 | 1.584 | -27.516 | | | | | | 0.000 | |
| H | 15.0 | 10.9 | .000 | 1.616 | -27.516 | | | | | | -0.000 | |
| A | | | | | | 15.0 | 14.3 | .001 | (.784) | .001 | | |
| B | | | | | | 27.0 | 16.0 | .014 | (5.479) | .019 | | |
| C | | | | | | " | 15.9 | .059 | (5.345) | .098 | | |
| D | | | | | | 15.0 | 14.2 | .031 | (1.685) | .053 | | |
| E | | | | | | " | 12.9 | .009 | (.355) | .038 | | |
| F | | | | | | " | 12.8 | .001 | (.340) | .005 | | |
| G | | | | | | 15.0 | 10.9 | .033 | 1.584 | .001 | .000 | EC=.001 |

MO/RLW/AR
3/27/02

# CsI Calorimeter

As Found "X"

4/28/02

BK 123-11
Req# 4070
Proj #3832

| STA | Reading (−) STV | SCL | MIC | COER | o/s | Reading (+) STV | SCL | MIC | COER | o/s | Design | Δ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 3.0 | 6.3 | .079 | 45.568 | -54.967 | | | | | | .000 | |
| B | " | 6.3 | .075 | 45.595 | -54.970 | | | | | | | |
| C | " | 6.3 | .080 | 45.564 | -54.934 | | | | | Avg | | |
| D | " | 6.3 | .090 | 45.547 | -54.937 | | | | | -54.952 | -54.952 | |
| E | " | 12.3 | .000 | 39.637 | -54.937 | | | | | | | |
| F | " | 12.3 | .055 | 39.610 | -54.965 | | | | | | | |
| 6? | " | 13.9 | .090 | 37.966 | -54.956 | | | | | | | |
| Ref Scale (Zero Pt.) | | | | | -54.952 | — | 19.2 | .075 | | -35.677 | | |
| | — | 18.4 | .080 | | -54.157 | | | | | | | |
| A | | | | | | 3.0 | 5.6 | .007 | 45.568 | .018 | .015 | .003 |
| Ref Scale | — | 2.0 | .065 | | -37.742 | | | | | | -35.677 | |
| 6 | | | | | | (.250) | | .034 | | -37.958 | -37.966 | .008 |
| L. Scribes | | | | | | | | | | | | |
| 1 | | | | | | | | (.055) | | -37.797 | | |
| 2 | | | | | | | | (.055) | | -37.797 | | |
| 3 | | | | | | | | (.056) | | -37.798 | | |
| 4 | | | | | | | | (.056) | | -37.798 | | |
| 5 | | | | | | | | (.060) | | -37.802 | | |
| 6 | | | | | | | | (.060) | | -37.802 | | |
| 7 | | | | | | | | (.065) | | -37.807 | | |
| 8 | | | | | | | | (.066) | | -37.808 | | |
| 9 | | | | | | | | (.065) | | -37.807 | | |
| 10 | | | | | | | | (.066) | | -37.808 | | |
| 11 | | | | | | | | (.068) | | -37.810 | | |
| 12 | | | | | | | | (.070) | | -37.812 | | |
| 13 | | | | | | | | (.071) | | -37.813 | | |
| 14 | | | | | | | | (.070) | | -37.812 | | |
| 15 | | | | | | | | (.075) | | -37.817 | | |
| 16 | | | | | | | | (.074) | | -37.816 | | |
| 17 | | | | | | | | (.076) | | -37.818 | | |
| 18 | | | | | | | | (.075) | | -37.817 | | |
| 19 | | | | | | | | (.080) | | -37.822 | | |
| 20 | | | | | | | | (.080) | | -37.822 | | |
| 21 | | | | | | | | (.080) | | -37.822 | | |
| 22 | | | | | | | | (.081) | | -37.823 | | |
| 23 | | | | | | | | (.081) | | -37.823 | | |
| 24 | | | | | | | | | | | Covered | |
| 25 | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | |

PK 123-11
Req# 4070
Trg# 3532

# CsI Calorimeter

## As Found "X".

03/28/02 MO/RLW/AR 3/27/02

| STA | Reading (-) STR | SCL | MIC | CORR | O/S | Reading (+) STR | SCL | MIC | CORR | O/S | DESIGN | Δ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref Scale | – | 2.0 | .065 | | -37.742 | | | | | | | Tg. 137 |
| B.L. Scribes | | | | | | | | | | | | |
| 27 | | | | | | | | (.085) | | -37.827 | | |
| 28 | | | | | | | | (.085) | | -37.827 | | |
| 29 | | | | | | | | (.086) | | -37.828 | | |
| 30 | | | | | | | | (.090) | | -37.832 | | |
| 31 | | | | | | | | (.090) | | -37.832 | | |
| 32 | | | | | | | | (.091) | | -37.833 | | |
| 33 | | | | | | | | (.092) | | -37.834 | | |
| 34 | | | | | | | | (.092) | | -37.834 | | |
| 35 | | | | | | | | (.094) | | -37.836 | | |
| 36 | | | | | | | | (.094) | | -37.836 | | |
| 37 | | | | | | | | (.095) | | -37.837 | | |
| 38 | | | | | | | | (.098) | | -37.840 | | |
| Ref Scale | | | | | | – | 2.0 | .069 | | -35.673 | -35.677 | E.C. = .004 |
| Checks 1 | – | 2.0 | .080 | | -37.757 | | | (.040) | | -37.797 | | .000 |
| 10 | | | | | | | | (.054) | | -37.811 | | .003 |
| 20 | | | | | | | | (.064) | | -37.821 | | .001 |
| 30 | | | | | | | | (.075) | | -37.832 | | .000 |
| 38 | | | | | | | | (.077) | | -37.834 | | .006 |
| 6 | | | | | | (250) | | .050 | | -37.957 | -37.958 | E.C. = .001 |
| Ref. Scale | (64.0) | (3.1) | (.091) | | 31.514 | | | | | | -35.677 | Tg. 137 |
| H | | | | | | | | | | | | |
| | (37.683) | 6.2 | .027 | | 31.477 | 3.0 | 6.1 | .090 | (40.673) | .031 | | |
| Ref Scale | (64.0) | (9.3) | (.080) | | 37.653 | (64.0) | (3.1) | (.050) | | -35.673 | -35.677 | E.C. = .004 |
| B.R. Scribes | | | | | | | | | | | | |
| 1 | | | | | | | | .072 | | 37.725 | | |
| 2 | | | | | | | | .055 | | 37.708 | | |
| 3 | | | | | | | | .064 | | 37.717 | | |
| 4 | | | | | | | | .045 | | 37.696 | | |
| 5 | | | | | | | | .060 | | 37.713 | | |
| 6 | | | | | | | | .065 | | 37.718 | | |
| 7 | | | | | | | | .057 | | 37.710 | | |
| 8 | | | | | | | | .055 | | 37.708 | | |

MO/RLW/AR
3/27/02

# CsI Calorimeter

## As Found "Y"

07/28/02

Bk 123-11
Req # 4070
Proj # 3832

| STA | Reading (-) STK | SCL | MIC | CORR | O/S | Reading (+) STK | SCL | MIC | CORR | O/S | DESIGN | Δ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.R. Scatter | | | | | 37.653 | | | | | | | |
| 9 | | | | | | | | | | | Out of Mic Range | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | | | .099 | | 37.752 | | |
| 12 | | | | | | | | .071 | | 37.724 | | |
| 13 | | | | | | | | .062 | | 37.715 | | |
| 14 | | | | | | | | .084 | | 37.737 | | |
| 15 | | | | | | | | .099 | | 37.752 | | |
| 16 | | | | | | | | .087 | | 37.740 | | |
| 17 | | | | | | | | .095 | | 37.748 | | |
| 18 | | | | | | | | .095 | | 37.748 | | |
| 19 | | | | | | | | .092 | | 37.745 | | |
| 20 | | | | | | | | .088 | | 37.741 | | |
| 21 | | | | | | | | .075 | | 37.728 | | |
| 22 | | | | | | | | .065 | | 37.718 | | |
| 23 | | | | | | | | .064 | | 37.717 | | |
| 24 | | | | | | | | .035 | | 37.688 | | |
| 25 | | | | | | | | .056 | | 37.709 | | |
| 26 | | | | | | | | .030 | | 37.683 | | |
| 27 | | | | | | | | .035 | | 37.688 | | |
| 28 | | | | | | | | .055 | | 37.708 | | |
| 29 | | | | | | | | .060 | | 37.713 | | |
| 30 | | | | | | | | .027 | | 37.680 | | |
| 31 | | | | | | | | (.010) | | 37.643 | | |
| 32 | | | | | | | | .025 | | 37.678 | | |
| 33 | | | | | | | | .015 | | 37.668 | | |
| 34 | | | | | | | | .020 | | 37.673 | | |
| 35 | | | | | | | | .027 | | 37.680 | | |
| 36 | | | | | | | | .032 | | 37.685 | | |
| 37 | | | | | | | | .032 | | 37.685 | | |
| 38 | | | | | | | | .020 | | 37.673 | | |
| Ref Scale | | | | | | (64.0) | (9.3) | (.030) | | -35.677 | -35.677 | E.C. = .000 |
| | (64.0) | (9.3) | (.090) | | 37.713 | | | | | | | |
| B.R. Scatter 9 | | | | | | | | .042 | | 37.755 | | |
| 10 | | | | | | | | .065 | | 37.788 | | |
| Checks 2 | | | | | | | | (.010) | | 37.703 | | .005 |
| 20 | | | | | | | | .023 | | 37.736 | | .005 |
| 30 | | | | | | | | (.040) | | 37.673 | | .007 |
| 38 | | | | | | | | (.046) | | 37.667 | | .007 |
| Ref Scale | | | | | | (64.0) | (9.3) | (.091) | | -35.678 | -35.677 | E.C. = .001 |

BV 123-11
Req# 4070
Proj #3832

# CsI Calorimeter

## As Found "2"

03/28/02 MO/RLW/AR 3/27/02

| STA | BS(+) STK | BS(+) SCL | BS(+) MIC | BS(+) CORR | HI | FS(-) STK | FS(-) SCL | FS(-) MIC | FS(-) CORR | ELEV | DESIGN | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | .250 | 2.3 | .063 | (2.463) | 0.150 | | | | | | .000 | BAR |
| Bott. Scribe | | | | | | | | | | | | |
| 1 | | | | | | | | .379 | | -.229 | | |
| 2 | | | | | | | | .379 | | -.229 | | |
| 3 | | | | | | | | .380 | | -.230 | | |
| 4 | | | | | | | | .384 | | -.234 | | |
| 5 | | | | | | | | .385 | | -.235 | | |
| 6 | | | | | | | | .383 | | -.233 | | |
| 7 | | | | | | | | .383 | | -.233 | | |
| 8 | | | | | | | | .382 | | -.232 | | |
| 9 | | | | | | | | .385 | | -.235 | | |
| 10 | | | | | | | | .387 | | -.237 | | |
| 11 | | | | | | | | .385 | | -.235 | | |
| 12 | | | | | | | | .384 | | -.234 | | |
| 13 | | | | | | | | .385 | | -.234 | | |
| 14 | | | | | | | | .384 | | -.234 | | |
| 15 | | | | | | | | .385 | | -.235 | | |
| 16 | | | | | | | | .386 | | -.236 | | |
| 17 | | | | | | | | .388 | | -.238 | | |
| 18 | | | | | | | | .390 | | -.240 | | |
| 19 | | | | | | | | .387 | | -.237 | | |
| 20 | | | | | | | | .390 | | -.240 | | |
| 21 | | | | | | | | .388 | | -.238 | | |
| 22 | | | | | | | | .391 | | -.241 | | |
| 23 | | | | | | | | .390 | | -.240 | | |
| 24 | | | | | | | | .390 | | -.240 | | |
| 25 | | | | | | | | .390 | | -.240 | | |
| 26 | | | | | | | | .393 | | -.243 | | |
| 27 | | | | | | | | .385 | | -.235 | | |
| 28 | | | | | | | | .393 | | -.243 | | |
| 29 | | | | | | | | .395 | | -.245 | | |
| 30 | | | | | | | | .395 | | -.245 | | |
| 31 | | | | | | | | .394 | | -.244 | | |
| 32 | | | | | | | | .397 | | -.247 | | |
| 33 | | | | | | | | .397 | | -.247 | | |
| 34 | | | | | | | | .395 | | -.245 | | |
| 35 | | | | | | | | .399 | | -.249 | | |
| 36 | | | | | | | | .398 | | -.248 | | |
| 37 | | | | | | | | .396 | | -.246 | | |
| 38 | | | | | | | | .400 | | -.250 | | |

(cont.)

MO/RLW/AR
3/27/02

# CsI Calorimeter

As Found "Z"

03/28/02

BK123-11
Req# 4070
Proj# 3832

*Note: on Top of blocks A is 1" in and B is 5" in except @ 1+3E which are 2" in.

| STA | BS(+) STN | BS(+) SCL | BS(+) MIC | BS(+) CORR | HI | FS(-) STN | FS(-) SCL | FS(-) MIC | FS(-) CORR | ELEV | RESIDUAL | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 395 | | 0.166 | | | | | | -.229 | |
| G | | | | | | .250 | 2.3 | .079 | (2.463) | .000 | .000 | E.C.=.000 |
| check 10 | | | | | | | | 400 | | -.234 | | .003 |
| G | .250 | 1.9 | .473 | (2.463) | .160 | | | | | | .000 | |
| H | | | | | | .250 | 2.5 | .000 | (2.569) | -.021 | .000 | |
| G | .250 | 2.4 | .080 | (2.569) | .140 | .250 | 1.9 | .463 | (2.463) | .000 | .000 | E.C.=.000 |
| A | 25.0 | 18.2 | .065 | (2.463) | 40.802 | 25.0 | 13.5 | .072 | 2.236 | -.006 | .000 | |
| B | | | | | | " | 13.0 | .095 | 2.720 | -.013 | " | |
| F | | | | | | 18.0 | 10.0 | .060 | 2.744 | -.002 | " | |
| B | 18.0 | 20.0 | .111 | 2.744 | 40.853 | 25.0 | 13.1 | .044 | 2.720 | -.011 | " | |
| A | | | | | | " | 13.6 | .012 | 2.236 | -.001 | " | |
| G | | | | | | " | 18.3 | .017 | (2.463) | -.001 | " | E.C.=.001 |
| | 61.0 | 17.9 | .095 | (2.463) | 76.532 | | | | | | .000 | |
| 38 A | | | | | | | 1.5 | .000 | | 75.012 | | |
| B | | | | | | | | .000 | | 75.012 | | |
| 37 A | | | | | | | | .018 | | 75.014 | | |
| B | | | | | | | | .020 | | 75.012 | | |
| 36 A | | | | | | | | .021 | | 75.011 | | |
| B | | | | | | | | .023 | | 75.009 | | |
| 35 A | | | | | | | | .030 | | 75.002 | | |
| B | | | | | | | | .032 | | 75.000 | | |
| 34 A | | | | | | | | .025 | | 75.007 | | |
| B | | | | | | | | .027 | | 75.005 | | |
| 33 A | | | | | | | | .026 | | 75.006 | | |
| B | | | | | | | | .030 | | 75.002 | | |
| 32 A | | | | | | | | .030 | | 75.002 | | |
| B | | | | | | | | .034 | | 74.998 | | |
| 31 A | | | | | | | | .034 | | 74.998 | | |
| B | | | | | | | | .037 | | 74.995 | | |
| 30 A | | | | | | | | .035 | | 74.997 | | |
| B | | | | | | | | .036 | | 74.996 | | |
| 29 A | | | | | | | | .025 | | 75.007 | | |
| B | | | | | | | | .032 | | 75.000 | | |

RV 123-11
Req #4070
Job #3822

# CsI Calorimeter

## As Found "Z"

03/28/02 MO/RLW/AR 3/27/02

| STA | BS(+) STK | BS(+) SCL | BS(+) MIC | BS(+) CORR | HI | FS(-) STK | FS(-) SCL | FS(-) MIC | FS(-) CORR | ELEV | DESIGN | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 76.532 | | | | | | | Pg. 141 |
| 28A | | | | | | | 1.5 | .033 | | 74.999 | | |
| B | | | | | | | | .035 | | 74.997 | | |
| 27A | | | | | | | | .029 | | 74.998 | | |
| B | | | | | | | | .029 | | 74.993 | | |
| 26A | | | | | | | | .034 | | 74.998 | | |
| B | | | | | | | | .036 | | 74.996 | | |
| 25A | | | | | | | | .035 | | 74.997 | | |
| B | | | | | | | | .036 | | 74.996 | | |
| 24A | | | | | | | | .030 | | 75.002 | | |
| B | | | | | | | | .035 | | 74.997 | | |
| 23A | | | | | | | | .022 | | 75.010 | | |
| B | | | | | | | | .027 | | 75.005 | | |
| 22A | | | | | | | | .021 | | 75.011 | | |
| B | | | | | | | | .030 | | 75.002 | | |
| 21A | | | | | | | | .017 | | 75.015 | | |
| B | | | | | | | | .027 | | 75.005 | | |
| 20A | | | | | | | | .021 | | 75.011 | | |
| B | | | | | | | | .025 | | 75.007 | | |
| 19A | | | | | | | | .025 | | 75.007 | | |
| B | | | | | | | | .022 | | 75.000 | | |
| 18A | | | | | | | | .024 | | 75.008 | | |
| B | | | | | | | | .026 | | 75.006 | | |
| 17A | | | | | | | | .015 | | 75.017 | | |
| B | | | | | | | | .022 | | 75.010 | | |
| 16A | | | | | | | | .025 | | 75.007 | | |
| B | | | | | | | | .030 | | 75.002 | | |
| 15A | | | | | | | | .018 | | 75.014 | | |
| B | | | | | | | | .027 | | 75.005 | | |
| 14A | | | | | | | | .020 | | 75.012 | | |
| B | | | | | | | | .026 | | 75.006 | | |
| 13A | | | | | | | | .025 | | 75.007 | | |
| B | | | | | | | | .027 | | 75.005 | | |
| 12A | | | | | | | | .024 | | 75.008 | | |
| B | | | | | | | | .027 | | 75.005 | | |
| 11A | | | | | | | | .022 | | 75.010 | | |
| B | | | | | | | | .027 | | 75.005 | | |
| 10A | | | | | | | | .022 | | 75.010 | | |
| B | | | | | | | | .026 | | 75.006 | | |
| 9A | | | | | | | | .019 | | 75.012 | | |
| B | | | | | | | | .020 | | 75.012 | | |