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Informal Report

**AGS Experiment 945A
Radiation Damage in Metals at Liquid Helium
Temperature by GeV Protons**

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Department of Advanced Technology

**Brookhaven National Laboratory
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ABSTRACT

The purpose of this experiment was to provide data for the validation and improvement of models used in computer codes which are being used to predict radiation-induced damage in target and blanket materials of APT and similar technologies when the materials are irradiated with GeV-range protons. The experiment was performed at the BNL AGS at liquid helium temperatures, employing a commercially-available flow cryostat for the mounting of the samples. The shaft of the cryostat is mounted on a 2.75-inch conflat flange around which the vacuum chamber was constructed. The target chamber of the vacuum vessel was a six-inch diameter six-way cross. Two flanges on this cross were for the 0.010-inch beam windows; a third flange was for the cryostat mount; a fourth flange was for the vacuum valve and turbo-roughing pump assembly; a fifth flange was for the vacuum gauge assembly, and the sixth flange was for the electrical feedthrough for the instrumentation wires to the data-acquisition system. Target samples were prepared from copper and tungsten wire and mounted to the cryostat tip. Each sample consisted of 0.002-inch diameter wire, wrapped around U-shaped posts, and anchored to OFHC copper bases. The U-shaped posts were made of anodized aluminum threaded rods which insulated the wires electrically while providing good thermal contact to the base. The radiation damage was determined indirectly by measuring changes in the resistivities of the samples using the four-wire current reversal technique. The temperature of the target assembly was monitored during the experiments by a Cernox™ model CX-1070-AA-4L resistor attached to the copper base. The data-acquisition instrumentation used to measure the resistance changes of the sample wires was also used to measure the resistance of the Cernox™ resistor as well. A series of experiments were performed with both 1.94-GeV and 1.10-GeV protons with the sample wires at 4.7 K to "freeze" the radiation-induced defects into the samples in order to measure the defect-induced changes in electrical resistivity.

Resistance changes due to point-defect production were measured to be on the order of 2-3 $\mu\Omega/TP_i$ for copper and 60-90 $\mu\Omega/TP_i$ for tungsten, easily measurable with the present instrumentation ($TP = 10^{12}$ protons incident on target). Activation foils and an integrating current transformer were used to measure the total proton fluence for each experiment, and beam spot size estimates were made from analyses of the activity distributions of the activation foils and the videotapes of the beam line phosphor upstream of the target. The proton beam spot diameters so estimated were 1.6 cm for the 1.94-GeV experiments and 2.4 cm for the 1.10-GeV experiments. An engineering analysis of the experimental data was performed to convert the raw experimental measurements into measured electrical resistivity increases of the samples in order to compare to calculations of the predicted resistivity increases of the samples due to defect production in the wire samples. The measured resistivity increases for both copper and tungsten were found to compare well with predicted resistivity increases that were calculated from radiation damage parameters in the literature. The ratios of the measured-to-calculated resistivity increases vs. the measured resistivity increases were calculated for each of the thirteen data points. The tungsten ratio was nearly unity for the 1.94-GeV proton data and fell to 0.78 for the 1.10-GeV data. The copper ratios were not as good, ranging from 0.62 for the 1.94-GeV-proton data to 0.57 for the 1.10-GeV data. The predictions always exceeded the measured resistivity increases; the comparisons improved with increasing atomic number of the sample and with increasing proton energy over the range of atomic numbers and proton energies investigated.

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BACKGROUND AND OBJECTIVES

The purpose of this report is to provide a brief description of AGS Experiment 945A which was conducted to provide data for the validation and improvement of models used in computer codes which are being used to predict proton radiation damage in APT materials and to document and distribute the experimental data that was generated during the experiment. The experimental data have been made available to participants in a collaboration of several organizations who will work together to analyze the experimental data, perform coordinated Monte Carlo and molecular dynamics simulations of the experiments, determine the most pressing needs for model development and improvement, and generally advance the state-of-the-art of radiation damage simulations, both experimentally and calculationally, for application to the needs of the spallation physics community in general and the APT project in particular.

DESCRIPTION OF CRYOSTAT ASSEMBLY

A cryostat assembly for the cryogenic radiation-damage experiment at the BNL AGS was designed and assembled, employing a commercially-available flow cryostat for the mounting of the sample holder assembled at LANL. The cryostat can be used as a double-pipe liquid-nitrogen or liquid-helium flow system to deliver a metered flow of a liquid cryogen to an oxygen-free high-conductivity (OFHC) copper mounting surface onto which a test sample can be attached. The end-mount is 0.75-inch diameter and has a 1/4-28 threaded end to mount a test fixture. A thermal shield was mounted around the end of the cryostat to reflect incoming thermal radiation in order to achieve temperatures below 10 K. The cryostat is 24-inches long, accepts a standard screw-on capillary tube transfer line and has a heated exhaust to vent the boil-off gas. The transfer line and the cryostat are matched. The transfer line has a standard siphon bayonet on one end and a product supply bayonet on the other end to deliver the cryogen directly to the inside face of the OFHC mount at the end of the cryostat where the samples are mounted. The vapor returns in the annulus formed between the outer surface of the supply bayonet and the inside surface of the cryostat, offering additional thermal ballast to the liquid cryogen. The helium gas exits through the heated vent, and is directed through a calibrated gas flow meter to monitor and control the product supply flow rate. The transfer line has a vacuum jacket with super insulation, inside of which are two capillary tubes; one is for cryogen delivery to the cryostat and the other is to supply liquid helium to surround and thermally insulate the supply capillary. This is called the shroud flow. The shroud flow is exhausted and metered through a gas flow meter identical to the one which meters the cryostat exhaust. The transfer line is equipped with two non adjustable pressure relief valves to protect against over pressurization of the transfer line and the cryostat. The cryostat can operate continuously for more than 13 hours from a 60-liter helium dewar.

DESCRIPTION OF VACUUM CHAMBER

The shaft of the cryostat is provided with a 2.75-inch conflat flange, around which a vacuum chamber was constructed. A vacuum bellows provided for fine alignment adjustment of the cryostat

inside of, and relative to, the vacuum chamber in order to position a target in the proton beam. The entire vacuum chamber was constructed with UHV conflat components. The business end of the vacuum chamber was a six-inch diameter six-way cross. Two flanges on this cross were for the 0.010-inch beam windows; a third flange was for the cryostat mount; a fourth flange was for the vacuum valve and turbo-roughing pump assembly; a fifth flange was for the vacuum gauge assembly, and the sixth flange was for the electrical feedthrough for the instrumentation wires to the data-acquisition system. After the cryostat assembly for the cryogenic radiation-damage experiment had been fully instrumented, a full simulation test was performed under a vacuum with flowing liquid helium. The vacuum chamber could pump down to 10^{-8} Torr at room temperature, and could achieve 10^{-9} Torr with liquid helium flowing and the vacuum chamber isolated from the turbomolecular pump. The temperature at the surface of the OFHC mounting block at the tip of the cryostat was measured to be 4.3 K and the temperature in the base of the sample holder was measured to be 4.7 K.

DESCRIPTION OF TEST SAMPLES AND TEMPERATURE SENSOR

The target wire samples (Cu, Al, W) were prepared at BNL by LANL staff and mounted to the cryostat tip. Each sample consisted of 0.002-inch diameter wire, wrapped around U-shaped posts, and anchored to OFHC copper bases with Stycast™ epoxy. The U-shaped posts were made of anodized aluminum threaded rods (80 threads per inch) which insulated the wires electrically while providing good thermal contact to the base. The wire was wrapped on every third thread on the posts. The wire wraps were anchored to the threaded rods with Stycast™ epoxy as well. The ends of the tungsten, copper and aluminum wire samples were terminated mechanically to copper pigtailed and potted in electrically-conductive epoxy. The copper pigtailed were then soft soldered to the four-wire source and sense leads which connect to the instrumentation penetration and from there to the data-acquisition system. All three of the samples were installed on the cryostat and wired to the data-acquisition system for shakedown testing at both room temperature and at cryogenic temperatures. The aluminum sample was not successfully connected to the copper pigtailed due to the extreme fragility of the aluminum wire itself and was removed. The electrical connections of the tungsten sample exhibited degradation after cooldown. However, the defective tungsten test sample was diagnosed and repaired in place. A second copper test sample was installed in the cryostat in place of the aluminum test sample which provided the experiment with three test samples for the experiment, two copper samples and one tungsten sample. During the experiments, the proton beam was focused so that the illumination area was entirely enveloped by the wire wraps, thus illuminating only a fraction of the total wire length but by the entire proton beam. The temperature of the target assembly was monitored during the experiments by a Cernox™ resistive sensor mounted in a hole which had been drilled in the OFHC copper base. The Cernox™ resistance thermometer was chosen for this application because of its superior thermal stability at cryogenic temperatures, its precise factory calibration, its thermal sensitivity at liquid helium temperatures, and its resistance to damage in high radiation environments. The data-acquisition instrumentation which was used to measure the resistance changes of the sample wires by a four-wire current-reversal technique was used to measure the resistance of the Cernox™ thermal resistor as well.

CHRONOLOGY OF PROTON RUN

Installation of the radiation-damage apparatus and associated hardware into the AGS U-line began on 3/10/99. The apparatus was surveyed in place and fixed to mechanical stops on the traversing rails; the accuracy of repositioning the assembly to the stops was measured to be 0.005-inch. Installation of all hardware and electrical cables to the trailer was completed on 3/12/99. After the SNS run was completed (3/13/99 to 3/15/99), access to the beam line was regained and a final dry run at room temperature was performed in the AGS U-line to verify that all systems were functioning properly after the installation. This was accomplished at 1630 hours on 3/15/99. Beam tuning at 1.94-GeV was conducted through the night of 3/15/99 and beam was delivered on-target at 0725 hours on 3/16/99. Three one-hour irradiations were planned for this beam energy. However, the third irradiation at 1.94-GeV was terminated early due to an upset condition in the liquid helium delivery system. The cause of this upset was subsequently identified to be the result of debris in the bottom of the liquid helium dewar which migrated to the suction end of the transfer line, causing a sudden reduction in the total liquid helium supply flow rate to the transfer line shroud and the cryostat from four liters per hour to two liters per hour. In order to protect the test samples from possible damage as a result of undercooling, the third run at 1.94-GeV was terminated after 13 minutes of beam at 1345 hours on 3/16/99. The test samples had heated to between 7.2 to 7.7 K due to the reduction in liquid helium flow, causing the copper samples to partially anneal. Although the data from the two copper samples was of no value for this prematurely terminated 13-minute run as a result of their partial anneal, the tungsten sample was unaffected and data were taken on the tungsten sample prior to the anneal to room temperature. At the end of the 1.94-GeV irradiation and prior to the start of the 1.10-GeV irradiation, the specimens were warmed (annealed) to room temperature. The beam was tuned to 1.10-GeV, and the beam was delivered on-target at 1140 hours on 3/17/99. The liquid helium dewar had been replaced with a fresh dewar and liquid helium supply to the cryostat proceeded without incident. Although three one-hour irradiations were also planned for this beam energy, only two irradiations were performed due to schedule constraints. The 1.10-GeV irradiation was terminated at 1500 hours on 3/17/99.

DISCUSSION OF TEST RESULTS

A discussion of the test results follows. In general, the temperatures of the samples were maintained at 4.7 K and the test chamber maintained a vacuum in the 10^{-9} Torr range. At 1.94-GeV, the copper samples were irradiated twice (150 minutes of beam) and the tungsten sample was irradiated thrice (163 minutes of beam). At 1.10-GeV, all three samples were irradiated twice (135 minutes of beam). The resistance measurements were of high precision, accurate, and reproducible. Resistance changes due to point-defect production were measured to be on the order of $2\text{-}3\ \mu\Omega/\text{TP}_i$ for copper and $60\text{-}90\ \mu\Omega/\text{TP}_i$ for tungsten, easily measurable with the present instrumentation ($\text{TP} = 10^{12}$ protons incident on target). A comparison of the results of the total-proton dosimetry by both activation foil analysis and integrating beam current transformer output for each of the five irradiations is given in Table 1. The activation foils were analyzed for ^{24}Na at BNL and for ^{22}Na at LANL. The results of the two independent activation foil analyses are in excellent agreement; the results for total protons are identical to three significant figures for two of the foils (5B, 6B) and the

results for the other three foils (5A, 5C, 6A) agree to within 1% for total protons. The Bergoz™ model ICT-122-070-20:1 integrating current transformer results for total protons for the two irradiations at 1.10-GeV are within 2% on the high side of the activation foil results. Confidence in the proton fluence for the five irradiations is very high. The column labeled UXF3-GPM are the results from a integrating current transformer located in the beam line upstream of the Bergoz™ integrating current transformer; the differences between the UXF3-GPM and Bergoz™ transformers are an indication of the beam losses between the two positions at these low proton energies. The ^{24}Na activation foil data were used in the engineering analysis results to be presented in this report. R. Cooper (Bechtel-Nevada) and G. Morgan (LANL) are analyzing the videotapes of the target phosphor for illumination distribution and the activation foils to determine the activity distribution. Both distributions will be used to finalize the estimates of the beam spot sizes on the targets to complete the engineering analyses of the data. The data from the videotapes of the target phosphor (analyzed by R. Cooper, et al.) agree with the initial visual estimates of the beam spot sizes for the two energies. The activation foil results (G. Morgan, et al.) have not been fully evaluated, but a preliminary evaluation of the results supports the beam spot size estimates used in the preliminary data analyses presented in this report.

Table 1
Results of Proton Dosimetry For AGS Experiment 945A

Test	^{24}Na Activity	^{22}Na Activity	Bergoz™ Coil	UXF3 GPM
1.94 GeV-1 (Foil 5A)	3.22×10^{15}	3.28×10^{15}	-----	3.94×10^{15}
1.94 GeV-2 (Foil 5B)	2.34×10^{15}	2.34×10^{15}	-----	2.95×10^{15}
1.94 GeV-3 (Foil 5C)	4.95×10^{14}	5.00×10^{14}	-----	5.86×10^{14}
1.10 GeV-1 (Foil 6A)	3.75×10^{14}	3.73×10^{14}	3.83×10^{14}	1.52×10^{15}
1.10 GeV-2 (Foil 6B)	1.01×10^{15}	1.01×10^{15}	1.04×10^{15}	4.40×10^{15}

A preliminary engineering analysis of the experimental data was performed to convert the raw experimental measurements into measured electrical resistivity increases of the samples in order to compare to calculations of the predicted resistivity increases of the samples due to defect production in the wire samples. The data are presented in Figure 1 as measured resistivity increases for both copper and tungsten vs. the resistivity increases that are calculated from parameters in the literature. The data are presented again in Figure 2 as ratios of the measured-to-calculated resistivity increases vs. the measured resistivity increases for each of the thirteen data points. The tungsten ratio is nearly unity for the 1.94-GeV proton data and falls to 0.78 for the 1.10-GeV data. The copper ratios are not as good, ranging from 0.62 for the 1.94-GeV-proton data to 0.57 for the 1.10-

Figure 2. Comparison of the Ratios of the Measured Resistivity Increases of the Wire Samples to the Calculated Increases Due to 1.94 and 1.10 GeV Proton Irradiations vs. the Measured Resistivity Increases (based upon measurements of ^{24}Na activity in aluminum activation foils; resistivity in units of $\Omega\text{-cm}$).

GeV data. The predictions exceed the measured resistivity increases; the comparisons improve with increasing atomic number of the sample (Z) and with increasing proton energy over the range of Z and proton energy investigated. The experimental data and the parameters that went into the calculations of the predicted resistivity increases are tabulated in Table 2 which is an EXCEL spreadsheet. All the variables and their respective dimensions are defined in the spreadsheet. All formulae used in the engineering analyses are similarly defined in Table 2. It is worth repeating that the beam spot areas used in the analyses, A_i , may yet be changed when the data from the analyses of the activation foils have been evaluated. The magnitude of the possible changes is not expected to be large and the effects as manifested through the measured-to-calculated resistivity ratios will be offsetting because both the measured and calculated resistivities are inversely proportional to A_i .

CONTENTS OF APPENDICES

The bulk of the report consists of appendices to transmit and archive the results of the experiment. Appendix 1 contains the run sheets which were filled out manually during data acquisition in the beam line and later converted to electronic format after a quality control check. The resistance and proton fluence data indicated in bold face on these sheets are those used in Table 2. Appendices 2, 3 and 4 contain the raw data for samples Copper-1, Copper-2 and Tungsten, as imported to EXCEL from text files. These have been converted from currents and voltages to resistance, and these are the resistances recorded on the run sheets in Appendix 1 and in Table 2.

Table 2

EXCEL Spreadsheet for Preliminary Engineering Analysis of Experimental Data from AGS Experiment 945A:
Radiation Damage in Metals at Liquid Helium Temperature

ID	R ₀ (ohm)	R (ohm)	A _h	A _i	D _w (cm)	H	N _w	L ₀ (cm)	L _h (cm)	L _i (cm)	(R - R ₀)	P _i (foil)	sigma,d	rho/FP	d(rho) _{calc}	d(rho) _{mea}	dRHO _{m/c}	P/cm ²
CU1-19-1	0.146877	0.148047	10.53	2.01	0.00508	2.94	60	221.12	216.36	41.30	0.00117	3.22e+15	3.00e-21	2.40e-04	7.497e-10	5.739e-10	0.7654778	1.60e+15
CU1-19-2	0.146877	0.148868	10.53	2.01	0.00508	2.94	60	221.12	216.36	41.30	0.001991	5.56e+15	3.00e-21	2.40e-04	1.295e-09	9.766e-10	0.7543955	2.77e+15
CU1-11-1	0.147189	0.147295	10.53	4.52	0.00508	2.94	60	221.12	216.36	92.87	0.000106	3.75e+14	3.24e-21	2.40e-04	4.196e-11	2.312e-11	0.551043	8.30e+13
CU1-11-2	0.147189	0.147604	10.53	4.52	0.00508	2.94	60	221.12	216.36	92.87	0.000415	1.39e+15	3.24e-21	2.40e-04	1.555e-10	9.052e-11	0.5820284	3.08e+14
CU2-19-1	0.13824	0.139398	10	2.01	0.00508	2.94	56	196.8	192.59	38.71	0.001158	3.22e+15	3.00e-21	2.40e-04	7.497e-10	6.060e-10	0.8082955	1.60e+15
CU2-19-2	0.13824	0.140215	10	2.01	0.00508	2.94	56	196.8	192.59	38.71	0.001975	5.56e+15	3.00e-21	2.40e-04	1.295e-09	1.034e-09	0.7983803	2.77e+15
CU2-11-1	0.138547	0.138647	10	4.52	0.00508	2.94	56	196.8	192.59	87.05	0.0001	3.75e+14	3.24e-21	2.40e-04	4.196e-11	2.327e-11	0.5546187	8.30e+13
CU2-11-2	0.138547	0.138944	10	4.52	0.00508	2.94	56	196.8	192.59	87.05	0.000397	1.39e+15	3.24e-21	2.40e-04	1.555e-10	9.239e-11	0.5940205	3.08e+14
W-19-1	4.683816	4.721101	9.81	2.01	0.00508	2.78	58	208.09	206.82	42.38	0.037285	3.22e+15	8.81e-21	2.00e-03	1.836e-08	1.782e-08	0.9710362	1.60e+15
W-19-2	4.683816	4.747345	9.81	2.01	0.00508	2.78	58	208.09	206.82	42.38	0.063529	5.56e+15	8.81e-21	2.00e-03	3.170e-08	3.037e-08	0.9581961	2.77e+15
W-19-3	4.683816	4.75453	9.81	2.01	0.00508	2.78	58	208.09	206.82	42.38	0.070714	6.06e+15	8.81e-21	2.00e-03	3.455e-08	3.381e-08	0.9785656	3.01e+15
W-11-1	4.72274	4.725175	9.81	4.52	0.00508	2.78	58	208.09	206.82	95.29	0.002435	3.75e+14	8.25e-21	2.00e-03	8.896e-10	5.176e-10	0.5819012	8.30e+13
W-11-2	4.72274	4.732809	9.81	4.52	0.00508	2.78	58	208.09	206.82	95.29	0.010069	1.39e+15	8.25e-21	2.00e-03	3.297e-09	2.141e-09	0.649162	3.08e+14

R₀: Initial resistance
R: Irradiated resistance
A_h: Area of wire harp
A_i: Area of beam spot
D_w: Wire diameter
H: Height of harp
N_w: Number of wires
L₀: Total wire length
L_h: Wire on harp

L_i: Length of wire illuminated, = (A/A_h)*L_h
(R-R₀): Change in resistance
P_i (foil): Total protons delivered
sigma,d: Displacement cross section
rho/FP: Resistivity/Frenkel pair
d(rho)_{calc}: Resistivity increase, calc., = 0.65*(P/cm²)*(sigma,d)*(rho/FP)
d(rho)_{mea}: Resistivity increase, meas., = (R-R₀)*(3.14*D_w²/4)/L_i
dRHO_{m/c}: Resistivity ratio, = d(rho)_{mea}/d(rho)_{calc}
P/cm²: Protons/unit area, = P_i (foil)/A_i

Cu1: R₀ and R data are at 10 mA source current.
Cu2: R₀ and R data are at 10 mA source current.
W: R₀ and R data are at 1 mA source current.

APPENDIX 1
EXPERIMENT RUN SHEETS

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/15/99, 1630 hours
Proton energy: pre-1.94 GeV
Cumulative irradiation time: 0
Cumulative fluence: 0
Activation foil identification: none

Room Temperature Resistance

Cu #1: Nominal resistance at 300 K is 18 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	18.002148	18.000804
Standard deviation (Ω):	0.0001144	2.0488×10^{-5}
Temperature (K):	290.82	290.78

Cu #2: Nominal resistance at 300 K is 17 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	17.315271	17.314081
Standard deviation (Ω):	0.00010412	3.0088×10^{-5}
Temperature (K):	290.88	290.74

W: Nominal resistance at 300 K is 60 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	59.986642	59.979019
Standard deviation (Ω):	0.00064685	0.00014088
Temperature (K):	290.85	290.74

Notes: These data were taken following installation of the apparatus in the U-line to evaluate the condition of the samples.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/16/99, 0600 hours
Proton energy: pre-1.94 GeV
Cumulative irradiation time: 0
Cumulative fluence: 0
Activation foil identification: none

Cryogenic Temperature Resistance

Cu #1: Nominal resistance at 5 K is 0.150 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.146877	0.146877	0.146876
Standard deviation (Ω):	1.409×10^{-6}	5.5044×10^{-7}	6.3207×10^{-7}
Temperature (K):	4.784	4.785	4.785

Cu #2: Nominal resistance at 5 K is 0.140 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.138240	0.138240	0.138240
Standard deviation (Ω):	1.1783×10^{-6}	5.1583×10^{-7}	5.2773×10^{-7}
Temperature (K):	4.786	4.786	4.786

W: Nominal resistance at 5 K is 4.700 Ω

Source current (mA):	0.5	1.0	2.0
Resistance (Ω):	4.683817	4.683816	4.683718
Standard deviation (Ω):	1.4371×10^{-5}	1.0598×10^{-5}	1.1247×10^{-5}
Temperature (K):	4.787	4.787	4.787

Notes: LHe started at 0500 hours. Started data acquisition at 0600 hours. Data acquisition completed at 0630 hours. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/16/99, 0725 hours (first run)
Proton energy: 1.94 GeV
Cumulative irradiation time: 90 minutes
Cumulative fluence: **3.22×10^{15}** (**^{24}Na activation**), 3.28×10^{15} (^{22}Na activation),
 3.94×10^{15} (UXF3)
Activation foil identification: 5A

Cryogenic Temperature Resistance

Cu #1: Nominal resistance at 5 K is 0.150 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.148048	0.148047	0.148048
Standard deviation (Ω):	1.1633×10^{-6}	5.2858×10^{-7}	3.7631×10^{-7}
Temperature (K):	4.763	4.762	4.764

Cu #2: Nominal resistance at 5 K is 0.140 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.139400	0.139398	0.139398
Standard deviation (Ω):	8.9797×10^{-7}	3.5355×10^{-7}	4.1268×10^{-7}
Temperature (K):	4.775	4.777	4.778

W: Nominal resistance at 5 K is 4.700 Ω

Source current (mA):	0.5	1.0	2.0
Resistance (Ω):	4.721110	4.721101	4.720945
Standard deviation (Ω):	9.7792×10^{-6}	4.9594×10^{-6}	7.4193×10^{-6}
Temperature (K):	4.777	4.777	4.777

Notes: Bergoz coil is disabled. UXF3 (upstream of WD1) is reading 1.1×10^{12} p/spill every 1.4 seconds. The estimate is that Bergoz/UXF3 ~ 0.8 . The irradiation started at 0725 hours, ended at 0855 hours. Started data acquisition at 1000 hours; completed at 1030 hours. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/16/99, 1106 hours (second run)
Proton energy: 1.94 GeV
Cumulative irradiation time: 150 minutes
Cumulative fluence: **5.56×10^{15}** (^{24}Na activation), 5.62×10^{15} (^{22}Na activation),
 6.89×10^{15} (UXF3)
Activation foil identification: 5B

Cryogenic Temperature Resistance

Cu #1: Nominal resistance at 5 K is 0.150 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.148869	0.148868	0.148868
Standard deviation (Ω):	9.1222×10^{-7}	5.9903×10^{-7}	5.6651×10^{-7}
Temperature (K):	4.791	4.790	4.790

Cu #2: Nominal resistance at 5 K is 0.140 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.140216	0.140215	0.140215
Standard deviation (Ω):	8.105×10^{-7}	5.2625×10^{-7}	5.0756×10^{-7}
Temperature (K):	4.790	4.790	4.790

W: Nominal resistance at 5 K is 4.700 Ω

Source current (mA):	0.5	1.0	2.0
Resistance (Ω):	4.747354	4.747345	4.747202
Standard deviation (Ω):	1.0294×10^{-5}	6.3057×10^{-6}	7.5646×10^{-6}
Temperature (K):	4.790	4.789	4.790

Notes: Irradiation started at 1106 hours. Irradiation ended at 1206 hours. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/16/99, 1333 hours (third run)
 Proton energy: 1.94 GeV
 Cumulative irradiation time: 163 minutes
 Cumulative fluence: **6.06×10^{15}** (²⁴Na activation), 6.12×10^{15} (²²Na activation),
 7.48×10^{15} (UXF3)
 Activation foil identification: 5C

Cryogenic Temperature Resistance

Cu #1: Nominal resistance at 5 K is 0.150 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.148760	0.148755	xxxxxx
Standard deviation (Ω):	1.7283×10^{-6}	9.9034×10^{-7}	xxxxxx
Temperature (K):	7.141	7.206	xxxxxx

Cu #2: Nominal resistance at 5 K is 0.140 Ω

Source current (mA):	5	10	15	1
Resistance (Ω):	0.140026	0.139988	xxxxxx	0.140024
Standard deviation (Ω):	2.0743×10^{-6}	1.2202×10^{-6}	xxxxxx	4.4325×10^{-6}
Temperature (K):	7.28	7.67	xxxxxx	7.33

W: Nominal resistance at 5 K is 4.700 Ω

Source current (mA):	0.5	1.0	2.0
Resistance (Ω):	4.754621	4.754530	4.754415
Standard deviation (Ω):	1.5157×10^{-5}	8.856×10^{-6}	1.4665×10^{-5}
Temperature (K):	7.58	7.43	7.48

Notes: Irradiation started at 1333 hours. Irradiation was terminated at 1345 hours due to a sudden reduction in LHe flow from 4 lphr to 2 lphr. The Bergoz readings are: NTRIG = 489, C2F = -169.482, C3F = -180.117, C2B = 3.333, C3B = 2.191. Coil 2 = 4.54×10^{14} protons, coil 3 = 4.49×10^{14} protons, for an average of 4.52×10^{14} protons. UXF3 gives 5.86×10^{14} protons for this run. There were two consecutive runs at 0.5 mA on the tungsten sample which gave false readings. The reading was repeated until a correct reading was made. The two false readings are still in the data base, uncorrected. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/16/99, 1600 hours
Proton energy: post-1.94 GeV
Cumulative irradiation time: 163 minutes
Cumulative fluence: **6.06×10^{15}** (**^{24}Na activation**), 6.12×10^{15} (^{22}Na activation),
 7.48×10^{15} (UXF3)
Activation foil identification: 5A, 5B, 5C

Room Temperature Resistance

Cu #1: Nominal resistance at 300 K is 18 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	17.67165	17.66832
Standard deviation (Ω):	0.0023	0.00169
Temperature (K):	290.23	290.29

Cu #2: Nominal resistance at 300 K is 17 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	17.04075	17.076771
Standard deviation (Ω):	0.00479	0.00757
Temperature (K):	290.69	291.34

W: Nominal resistance at 300 K is 60 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	59.617638	59.805468
Standard deviation (Ω):	0.032612	0.03737
Temperature (K):	292.23	293.04

Notes: These temperatures may not be at steady state; the samples may still be colder, still in a warm-up transient. This is supported by the standard deviations. Only ten readings were taken per batch to minimize the effect of the room temperature variations on the standard deviation. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/17/99, 0830 hours
Proton energy: pre-1.10 GeV
Cumulative irradiation time: 0
Cumulative fluence: 0
Activation foil identification: none

Room Temperature Resistance

Cu #1: Nominal resistance at 300 K is 18 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	17.973918	17.972512
Standard deviation (Ω):	0.00011876	3.0824×10^{-5}
Temperature (K):	290	290

Cu #2: Nominal resistance at 300 K is 17 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	17.288274	17.287024
Standard deviation (Ω):	9.9049×10^{-5}	3.9359×10^{-5}
Temperature (K):	291	290

W: Nominal resistance at 300 K is 60 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	59.931729	59.923370
Standard deviation (Ω):	1.9778×10^{-4}	2.2418×10^{-4}
Temperature (K):	290	291

Notes: This is the warm data after 1.94-GeV and prior to 1.10-GeV. The apparatus had overnight to equilibrate to room temperature.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/17/99, 1000 hours
Proton energy: pre-1.10 GeV
Cumulative irradiation time: 0
Cumulative fluence: 0
Activation foil identification: none

Cryogenic Temperature Resistance

Cu #1: Nominal resistance at 5 K is 0.150 Ω

Source current (mA):	5	10	15	10 (at 1025 hours)
Resistance (Ω):	0.147189	0.147189	0.147189	0.147190
Standard deviation (Ω):	9.086×10^{-7}	4.8123×10^{-7}	4.9868×10^{-7}	4.7249×10^{-7}
Temperature (K):	4.728	4.728	4.728	4.727

Cu #2: Nominal resistance at 5 K is 0.140 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.138547	0.138547	0.138547
Standard deviation (Ω):	1.1993×10^{-6}	5.7923×10^{-7}	3.844×10^{-7}
Temperature (K):	4.728	4.728	4.727

W: Nominal resistance at 5 K is 4.700 Ω

Source current (mA):	0.5	1.0	2.0
Resistance (Ω):	4.722742	4.722740	4.722625
Standard deviation (Ω):	1.9556×10^{-5}	1.5127×10^{-5}	1.6891×10^{-5}
Temperature (K):	4.727	4.727	4.727

Notes: Entry into beam line at 0800 hours. Started LHe flow at 0910 hours. The dewar has 54 liters. The vacuum is 5×10^{-8} Torr. The Cernox reads 4.82 K at 0940 hours, 4.72 K at 0950 hours, 4.727 K at 0954 hours. The data acquisition was started at 1000 hours and finished at 1030 hours. The last measurement was made to see if there was a measurable temperature transient in the wires over the 30 minute time interval. None was measured. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/17/99, 1140 hours (first run)
 Proton energy: 1.10 GeV
 Cumulative irradiation time: 60 minutes
 Cumulative fluence: **3.75×10^{14}** (²⁴Na activation), 3.73×10^{14} (²²Na activation),
 1.52×10^{15} (UXF3), 3.83×10^{14} (Bergoz)
 Activation foil identification: 6A

Cryogenic Temperature Resistance

Cu #1: Nominal resistance at 5 K is 0.150 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.147295	0.147295	0.147294
Standard deviation (Ω):	1.2954×10^{-6}	4.5629×10^{-7}	5.5046×10^{-7}
Temperature (K):	4.716	4.718	4.719

Cu #2: Nominal resistance at 5 K is 0.140 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.138647	0.138647	0.138646
Standard deviation (Ω):	6.7566×10^{-7}	4.3243×10^{-7}	5.3004×10^{-7}
Temperature (K):	4.719	4.719	4.720

W: Nominal resistance at 5 K is 4.700 Ω

Source current (mA):	0.5	1.0	1.0	2.0
Resistance (Ω):	4.725175	4.725175	4.725175	4.725060
Standard deviation (Ω):	6.9794×10^{-6}	5.9327×10^{-6}	5.7838×10^{-6}	1.277×10^{-5}
Temperature (K):	4.720	4.720	4.720	4.721

Notes: The vacuum is holding at 2×10^{-8} Torr. Beam started at 1140 hours, ended at 1240 hours. Start data acquisition at 1305 hours, finish at 1330 hours. The Bergoz readings are: NTRIG = 1281, C2F = -53.574, C3F = -55.999, C2B = 3.438, C3B = 1.949. Coil 2 = 3.926×10^{14} protons, coil 3 = 3.739×10^{14} protons, for an average of 3.83×10^{14} protons. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/17/99, 1345 hours (second run)
Proton energy: 1.10 GeV
Cumulative irradiation time: 135 minutes
Cumulative fluence: **1.39x10¹⁵ (²⁴Na activation)**, 1.39x10¹⁵ (²²Na activation),
5.92x10¹⁵ (UXF3), 1.42x10¹⁵ (Bergoz)
Activation foil identification: 6B

Cryogenic Temperature Resistance

Cu #1: Nominal resistance at 5 K is 0.150 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.147605	0.147604	0.147604
Standard deviation (Ω):	5.2927×10^{-7}	5.0473×10^{-7}	4.0219×10^{-7}
Temperature (K):	4.726	4.727	4.726

Cu #2: Nominal resistance at 5 K is 0.140 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.138946	0.138944	0.138945
Standard deviation (Ω):	8.8777×10^{-7}	3.6685×10^{-7}	3.3223×10^{-7}
Temperature (K):	4.726	4.726	4.727

W: Nominal resistance at 5 K is 4.700 Ω

Source current (mA):	0.5	1.0	2.0
Resistance (Ω):	4.732822	4.732809	4.732626
Standard deviation (Ω):	8.4794x10 ⁻⁶	5.3722x10 ⁻⁶	8.1206x10 ⁻⁶
Temperature (K):	4.727	4.726	4.727

Notes: Vacuum is holding at 9.5×10^{-9} Torr at the start of data acquisition. The beam was started at 1345 hours, shut off at 1500 hours and data acquisition started at 1530 hours. The Bergoz readings are: NTRIG = 2987, C2F = -62.97, C3F = -64.976, C2B = 3.335, C3B = 2.635. Coil 2 = 1.065×10^{15} protons, coil 3 = 1.017×10^{15} protons, for an average of 1.041×10^{15} protons. There were 54 liters of LHe at 0900 hours, 21 liters left at 1600 hours, 33 liters in 7 hours ~ 4.7 lphr. At this consumption rate, the LHe would have lasted until 2030 hours. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 3/19/99, 1345 hours
Proton energy: post-1.10 GeV
Cumulative irradiation time: 135 minutes
Cumulative fluence: **1.39×10^{15}** (**^{24}Na activation**), 1.39×10^{15} (^{22}Na activation),
 5.92×10^{15} (UXF3), 1.42×10^{15} (Bergoz)
Activation foil identification: 6A, 6B

Room Temperature Resistance

Cu #1: Nominal resistance at 300 K is 18 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	17.9428937	17.9408250
Standard deviation (Ω):	6.00068×10^{-4}	9.12000×10^{-5}
Temperature (K):	290.1	290.0

Cu #2: Nominal resistance at 300 K is 17 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	17.2573124	17.2555178
Standard deviation (Ω):	1.19776×10^{-4}	8.29000×10^{-5}
Temperature (K):	290.0	290.0

W: Nominal resistance at 300 K is 60 Ω

Source current (mA):	0.05	0.50
Resistance (Ω):	59.825758	59.815396
Standard deviation (Ω):	2.96171×10^{-4}	2.12581×10^{-4}
Temperature (K):	289.9	290.0

Notes: The apparatus has had 46 hours to warm up to room temperature and stabilize.
Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

RADIATION DAMAGE BY ENERGETIC PROTONS

Date, time: 6/22/99, 1535 hours
Proton energy: post-1.10 GeV
Cumulative irradiation time: 135 minutes
Cumulative fluence: **1.39×10^{15}** (^{24}Na activation), 1.39×10^{15} (^{22}Na activation),
 5.92×10^{15} (UXF3), 1.42×10^{15} (Bergoz)
Activation foil identification: 6A, 6B

Cryogenic Temperature Resistance

Cu #1: Nominal resistance at 5 K is 0.150 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.146908	0.146908	0.146906
Standard deviation (Ω):	1.1006×10^{-6}	6.0296×10^{-7}	5.9648×10^{-7}
Temperature (K):	4.827	4.828	4.828

Cu #2: Nominal resistance at 5 K is 0.140 Ω

Source current (mA):	5	10	15
Resistance (Ω):	0.138270	0.138270	0.138268
Standard deviation (Ω):	1.4595×10^{-6}	7.5048×10^{-7}	5.9523×10^{-7}
Temperature (K):	4.829	4.829	4.829

W: Nominal resistance at 5 K is 4.700 Ω

Source current (mA):	0.5	1.0	2.0
Resistance (Ω):	4.726346	4.726338	4.726189
Standard deviation (Ω):	1.9156×10^{-5}	1.1016×10^{-5}	1.5547×10^{-5}
Temperature (K):	4.829	4.829	4.829

Notes: Vacuum is holding at 6.3×10^{-9} Torr at the start of data acquisition. Samples were at room temperature under vacuum for three months since the end of the experiments in March 1999. Resistances and proton fluences shown in bold face are those used in the EXCEL spreadsheet analyses.

APPENDIX 2

**EXCEL DATA FILE OF RESISTANCE MEASUREMENTS
OF COPPER SAMPLE #1**

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= 0	Time on target= 0				
Pre-irradiation resistivity data at room temperature prior to testing at 1.94 GeV							
5.000259E-05	-9.004734E-04				3/16/99 4:30:13		
-5.000479E-05	8.998994E-04				3/16/99 4:30:16		
-5.000480E-05	8.999057E-04				3/16/99 4:30:19		
5.000259E-05	-9.004365E-04				3/16/99 4:30:22		
5.000264E-05	-9.004270E-04				3/16/99 4:30:25		
-5.000479E-05	8.999270E-04				3/16/99 4:30:27		
-5.000475E-05	8.999286E-04				3/16/99 4:30:30		
5.000265E-05	-9.004010E-04				3/16/99 4:30:33		
5.000263E-05	-9.004022E-04				3/16/99 4:30:36		
-5.000476E-05	8.999429E-04				3/16/99 4:30:39		
-5.000478E-05	8.999686E-04				3/16/99 4:30:41		
5.000263E-05	-9.004001E-04				3/16/99 4:30:44		
5.000261E-05	-9.003764E-04				3/16/99 4:30:47		
-5.000479E-05	8.999804E-04				3/16/99 4:30:50		
-5.000479E-05	8.999896E-04				3/16/99 4:30:53		
5.000258E-05	-9.003662E-04				3/16/99 4:30:56		
5.000255E-05	-9.003553E-04				3/16/99 4:30:58		
-5.000484E-05	8.999866E-04				3/16/99 4:31:01		
-5.000479E-05	8.999893E-04				3/16/99 4:31:04		
5.000259E-05	-9.003582E-04				3/16/99 4:31:07		
5.000261E-05	-9.003430E-04				3/16/99 4:31:10		
-5.000480E-05	9.000028E-04				3/16/99 4:31:13		
-5.000475E-05	9.000077E-04				3/16/99 4:31:15		
5.000264E-05	-9.003421E-04				3/16/99 4:31:18		
5.000267E-05	-9.003451E-04				3/16/99 4:31:21		
-5.000484E-05	9.000224E-04				3/16/99 4:31:24		
-5.000484E-05	9.000029E-04				3/16/99 4:31:27		
5.000263E-05	-9.003367E-04				3/16/99 4:31:30		
5.000265E-05	-9.003339E-04				3/16/99 4:31:32		
-5.000489E-05	9.000130E-04				3/16/99 4:31:35		
-5.000482E-05	9.000247E-04				3/16/99 4:31:38		
5.000264E-05	-9.003148E-04				3/16/99 4:31:41		
5.000263E-05	-9.003165E-04				3/16/99 4:31:44		
-5.000487E-05	9.000174E-04				3/16/99 4:31:47		
-5.000487E-05	9.000211E-04				3/16/99 4:31:49		
5.000265E-05	-9.003195E-04				3/16/99 4:31:52		
5.000265E-05	-9.003129E-04				3/16/99 4:31:55		
-5.000487E-05	9.000277E-04				3/16/99 4:31:58		
-5.000486E-05	9.000422E-04				3/16/99 4:32:01		
5.000268E-05	-9.003136E-04				3/16/99 4:32:03		
5.000372E-05	9.001744E-04	18.0021479	1.144000E-04	4.501228E-08	3/16/99 4:32:08	60.51873176	290.8158508

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= 0		Time on target= 0			
Pre-irradiation resistivity data at room temperature prior to testing at 1.94 GeV							
5.000234E-04	-9.001292E-03				3/16/99 4:33:36		
-5.000625E-04	9.001025E-03				3/16/99 4:33:39		
-5.000627E-04	9.001088E-03				3/16/99 4:33:42		
5.000239E-04	-9.001255E-03				3/16/99 4:33:45		
5.000241E-04	-9.001278E-03				3/16/99 4:33:48		
-5.000629E-04	9.001083E-03				3/16/99 4:33:50		
-5.000628E-04	9.001064E-03				3/16/99 4:33:53		
5.000241E-04	-9.001259E-03				3/16/99 4:33:56		
5.000236E-04	-9.001271E-03				3/16/99 4:33:59		
-5.000624E-04	9.001101E-03				3/16/99 4:34:02		
-5.000621E-04	9.001103E-03				3/16/99 4:34:05		
5.000237E-04	-9.001250E-03				3/16/99 4:34:07		
5.000233E-04	-9.001245E-03				3/16/99 4:34:10		
-5.000627E-04	9.001100E-03				3/16/99 4:34:13		
-5.000627E-04	9.001108E-03				3/16/99 4:34:16		
5.000233E-04	-9.001234E-03				3/16/99 4:34:19		
5.000235E-04	-9.001237E-03				3/16/99 4:34:22		
-5.000630E-04	9.001118E-03				3/16/99 4:34:24		
-5.000624E-04	9.001150E-03				3/16/99 4:34:27		
5.000241E-04	-9.001229E-03				3/16/99 4:34:30		
5.000242E-04	-9.001221E-03				3/16/99 4:34:33		
-5.000625E-04	9.001146E-03				3/16/99 4:34:36		
-5.000624E-04	9.001158E-03				3/16/99 4:34:38		
5.000241E-04	-9.001201E-03				3/16/99 4:34:41		
5.000239E-04	-9.001232E-03				3/16/99 4:34:44		
-5.000628E-04	9.001159E-03				3/16/99 4:34:47		
-5.000629E-04	9.001130E-03				3/16/99 4:34:50		
5.000238E-04	-9.001225E-03				3/16/99 4:34:53		
5.000239E-04	-9.001219E-03				3/16/99 4:34:55		
-5.000625E-04	9.001160E-03				3/16/99 4:34:58		
-5.000624E-04	9.001145E-03				3/16/99 4:35:01		
5.000241E-04	-9.001188E-03				3/16/99 4:35:04		
5.000244E-04	-9.001191E-03				3/16/99 4:35:07		
-5.000627E-04	9.001199E-03				3/16/99 4:35:10		
-5.000626E-04	9.001203E-03				3/16/99 4:35:12		
5.000240E-04	-9.001187E-03				3/16/99 4:35:15		
5.000239E-04	-9.001195E-03				3/16/99 4:35:18		
-5.000628E-04	9.001198E-03				3/16/99 4:35:21		
-5.000631E-04	9.001194E-03				3/16/99 4:35:24		
5.000241E-04	-9.001176E-03				3/16/99 4:35:27		
5.000433E-04	9.001181E-03	18.0008040	2.048795E-05	4.500985E-06	3/16/99 4:35:31	60.52448279	290.783838

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 0 Time on target= 0							
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
5.000198E-03	-7.364354E-04				3/16/99 6:10:08		
-5.000710E-03	7.324545E-04				3/16/99 6:10:11		
-5.000709E-03	7.324722E-04				3/16/99 6:10:14		
5.000200E-03	-7.364356E-04				3/16/99 6:10:17		
5.000194E-03	-7.364339E-04				3/16/99 6:10:19		
-5.000712E-03	7.325089E-04				3/16/99 6:10:22		
-5.000711E-03	7.324807E-04				3/16/99 6:10:25		
5.000199E-03	-7.363978E-04				3/16/99 6:10:28		
5.000200E-03	-7.364033E-04				3/16/99 6:10:31		
-5.000708E-03	7.324935E-04				3/16/99 6:10:34		
-5.000704E-03	7.324978E-04				3/16/99 6:10:36		
5.000205E-03	-7.363924E-04				3/16/99 6:10:39		
5.000204E-03	-7.363935E-04				3/16/99 6:10:42		
-5.000711E-03	7.325069E-04				3/16/99 6:10:45		
-5.000710E-03	7.325169E-04				3/16/99 6:10:48		
5.000202E-03	-7.363815E-04				3/16/99 6:10:51		
5.000202E-03	-7.363938E-04				3/16/99 6:10:53		
-5.000715E-03	7.325289E-04				3/16/99 6:10:56		
-5.000709E-03	7.325128E-04				3/16/99 6:10:59		
5.000202E-03	-7.363790E-04				3/16/99 6:11:02		
5.000206E-03	-7.363730E-04				3/16/99 6:11:05		
-5.000720E-03	7.325240E-04				3/16/99 6:11:08		
-5.000717E-03	7.325200E-04				3/16/99 6:11:10		
5.000198E-03	-7.363952E-04				3/16/99 6:11:13		
5.000196E-03	-7.363936E-04				3/16/99 6:11:16		
-5.000714E-03	7.325092E-04				3/16/99 6:11:19		
-5.000712E-03	7.325105E-04				3/16/99 6:11:22		
5.000198E-03	-7.363851E-04				3/16/99 6:11:24		
5.000201E-03	-7.364064E-04				3/16/99 6:11:27		
-5.000710E-03	7.325064E-04				3/16/99 6:11:30		
-5.000712E-03	7.325077E-04				3/16/99 6:11:33		
5.000207E-03	-7.363997E-04				3/16/99 6:11:36		
5.000209E-03	-7.364085E-04				3/16/99 6:11:39		
-5.000710E-03	7.325060E-04				3/16/99 6:11:41		
-5.000711E-03	7.325118E-04				3/16/99 6:11:44		
5.000201E-03	-7.363990E-04				3/16/99 6:11:47		
5.000195E-03	-7.364131E-04				3/16/99 6:11:50		
-5.000720E-03	7.325098E-04				3/16/99 6:11:53		
-5.000718E-03	7.325046E-04				3/16/99 6:11:56		
5.000199E-03	-7.363983E-04				3/16/99 6:11:58		
5.000457E-03	7.344525E-04	0.1468771	1.408990E-06	3.672594E-06	3/16/99 6:12:02	4871.355652	4.783801866

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 0 Time on target= 0							
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
9.999786E-03	-1.470755E-03				3/16/99 6:12:55		
-1.000001E-02	1.466751E-03				3/16/99 6:12:58		
-1.000001E-02	1.466760E-03				3/16/99 6:13:01		
9.999790E-03	-1.470752E-03				3/16/99 6:13:04		
9.999787E-03	-1.470756E-03				3/16/99 6:13:06		
-1.000001E-02	1.466753E-03				3/16/99 6:13:09		
-1.000001E-02	1.466752E-03				3/16/99 6:13:12		
9.999796E-03	-1.470748E-03				3/16/99 6:13:15		
9.999792E-03	-1.470741E-03				3/16/99 6:13:18		
-1.000001E-02	1.466781E-03				3/16/99 6:13:21		
-1.000001E-02	1.466782E-03				3/16/99 6:13:23		
9.999792E-03	-1.470727E-03				3/16/99 6:13:26		
9.999787E-03	-1.470718E-03				3/16/99 6:13:29		
-1.000001E-02	1.466763E-03				3/16/99 6:13:32		
-1.000001E-02	1.466792E-03				3/16/99 6:13:35		
9.999796E-03	-1.470719E-03				3/16/99 6:13:38		
9.999794E-03	-1.470742E-03				3/16/99 6:13:40		
-1.000001E-02	1.466786E-03				3/16/99 6:13:43		
-1.000000E-02	1.466794E-03				3/16/99 6:13:46		
9.999792E-03	-1.470721E-03				3/16/99 6:13:49		
9.999791E-03	-1.470728E-03				3/16/99 6:13:52		
-1.000001E-02	1.466776E-03				3/16/99 6:13:54		
-1.000001E-02	1.466775E-03				3/16/99 6:13:57		
9.999790E-03	-1.470729E-03				3/16/99 6:14:00		
9.999792E-03	-1.470730E-03				3/16/99 6:14:03		
-1.000001E-02	1.466775E-03				3/16/99 6:14:06		
-1.000000E-02	1.466767E-03				3/16/99 6:14:09		
9.999802E-03	-1.470739E-03				3/16/99 6:14:11		
9.999796E-03	-1.470742E-03				3/16/99 6:14:14		
-1.000001E-02	1.466768E-03				3/16/99 6:14:17		
-1.000001E-02	1.466774E-03				3/16/99 6:14:20		
9.999799E-03	-1.470731E-03				3/16/99 6:14:23		
9.999793E-03	-1.470741E-03				3/16/99 6:14:26		
-1.000002E-02	1.466756E-03				3/16/99 6:14:28		
-1.000001E-02	1.466763E-03				3/16/99 6:14:31		
9.999798E-03	-1.470739E-03				3/16/99 6:14:34		
9.999794E-03	-1.470746E-03				3/16/99 6:14:37		
-1.000002E-02	1.466760E-03				3/16/99 6:14:40		
-1.000001E-02	1.466768E-03				3/16/99 6:14:43		
9.999800E-03	-1.470769E-03				3/16/99 6:14:45		
9.999902E-03	1.468754E-03	0.1468769	5.504442E-07	1.468754E-05	3/16/99 6:14:49	4869.915504	4.784598992

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= 0		Time on target= 0			
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
1.499891E-02	-2.205240E-03				3/16/99 6:15:31		
-1.500321E-02	2.201363E-03				3/16/99 6:15:34		
-1.500315E-02	2.201368E-03				3/16/99 6:15:37		
1.499899E-02	-2.205222E-03				3/16/99 6:15:40		
1.499897E-02	-2.205265E-03				3/16/99 6:15:43		
-1.500311E-02	2.201333E-03				3/16/99 6:15:45		
-1.500307E-02	2.201340E-03				3/16/99 6:15:48		
1.499903E-02	-2.205226E-03				3/16/99 6:15:51		
1.499904E-02	-2.205235E-03				3/16/99 6:15:54		
-1.500308E-02	2.201393E-03				3/16/99 6:15:57		
-1.500311E-02	2.201386E-03				3/16/99 6:16:00		
1.499906E-02	-2.205224E-03				3/16/99 6:16:02		
1.499909E-02	-2.205229E-03				3/16/99 6:16:05		
-1.500306E-02	2.201386E-03				3/16/99 6:16:08		
-1.500309E-02	2.201390E-03				3/16/99 6:16:11		
1.499904E-02	-2.205221E-03				3/16/99 6:16:14		
1.499902E-02	-2.205235E-03				3/16/99 6:16:17		
-1.500305E-02	2.201385E-03				3/16/99 6:16:19		
-1.500302E-02	2.201385E-03				3/16/99 6:16:22		
1.499900E-02	-2.205237E-03				3/16/99 6:16:25		
1.499903E-02	-2.205252E-03				3/16/99 6:16:28		
-1.500310E-02	2.201369E-03				3/16/99 6:16:31		
-1.500309E-02	2.201341E-03				3/16/99 6:16:33		
1.499909E-02	-2.205236E-03				3/16/99 6:16:36		
1.499902E-02	-2.205251E-03				3/16/99 6:16:39		
-1.500304E-02	2.201343E-03				3/16/99 6:16:42		
-1.500306E-02	2.201338E-03				3/16/99 6:16:45		
1.499909E-02	-2.205242E-03				3/16/99 6:16:48		
1.499907E-02	-2.205264E-03				3/16/99 6:16:50		
-1.500310E-02	2.201324E-03				3/16/99 6:16:53		
-1.500306E-02	2.201357E-03				3/16/99 6:16:56		
1.499901E-02	-2.205256E-03				3/16/99 6:16:59		
1.499906E-02	-2.205272E-03				3/16/99 6:17:02		
-1.500306E-02	2.201327E-03				3/16/99 6:17:05		
-1.500309E-02	2.201334E-03				3/16/99 6:17:07		
1.499901E-02	-2.205265E-03				3/16/99 6:17:10		
1.499903E-02	-2.205270E-03				3/16/99 6:17:13		
-1.500305E-02	2.201322E-03				3/16/99 6:17:16		
-1.500305E-02	2.201326E-03				3/16/99 6:17:19		
1.499905E-02	-2.205263E-03				3/16/99 6:17:22		
1.500106E-02	2.203300E-03	0.1468764	6.320717E-07	3.305173E-05	3/16/99 6:17:26	4868.532384	4.785364954

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
5.000209E-03	-7.428750E-04				3/16/99 10:01:50		
-5.000430E-03	7.376950E-04				3/16/99 10:01:53		
-5.000430E-03	7.377207E-04				3/16/99 10:01:56		
5.000212E-03	-7.428525E-04				3/16/99 10:01:59		
5.000210E-03	-7.428661E-04				3/16/99 10:02:02		
-5.000432E-03	7.377282E-04				3/16/99 10:02:04		
-5.000430E-03	7.377274E-04				3/16/99 10:02:07		
5.000209E-03	-7.428499E-04				3/16/99 10:02:10		
5.000211E-03	-7.428520E-04				3/16/99 10:02:13		
-5.000435E-03	7.377332E-04				3/16/99 10:02:16		
-5.000432E-03	7.377370E-04				3/16/99 10:02:18		
5.000209E-03	-7.428279E-04				3/16/99 10:02:21		
5.000209E-03	-7.428263E-04				3/16/99 10:02:24		
-5.000435E-03	7.377596E-04				3/16/99 10:02:27		
-5.000437E-03	7.377405E-04				3/16/99 10:02:30		
5.000214E-03	-7.428134E-04				3/16/99 10:02:33		
5.000211E-03	-7.428223E-04				3/16/99 10:02:35		
-5.000436E-03	7.377616E-04				3/16/99 10:02:38		
-5.000436E-03	7.377683E-04				3/16/99 10:02:41		
5.000213E-03	-7.428088E-04				3/16/99 10:02:44		
5.000209E-03	-7.428003E-04				3/16/99 10:02:47		
-5.000437E-03	7.377758E-04				3/16/99 10:02:50		
-5.000436E-03	7.377837E-04				3/16/99 10:02:52		
5.000208E-03	-7.427954E-04				3/16/99 10:02:55		
5.000209E-03	-7.427922E-04				3/16/99 10:02:58		
-5.000444E-03	7.377907E-04				3/16/99 10:03:01		
-5.000445E-03	7.377883E-04				3/16/99 10:03:04		
5.000208E-03	-7.427835E-04				3/16/99 10:03:07		
5.000209E-03	-7.427937E-04				3/16/99 10:03:09		
-5.000442E-03	7.378012E-04				3/16/99 10:03:12		
-5.000447E-03	7.378142E-04				3/16/99 10:03:15		
5.000206E-03	-7.427880E-04				3/16/99 10:03:18		
5.000208E-03	-7.427751E-04				3/16/99 10:03:21		
-5.000447E-03	7.377944E-04				3/16/99 10:03:24		
-5.000447E-03	7.378048E-04				3/16/99 10:03:26		
5.000210E-03	-7.427655E-04				3/16/99 10:03:29		
5.000210E-03	-7.427717E-04				3/16/99 10:03:32		
-5.000450E-03	7.378291E-04				3/16/99 10:03:35		
-5.000452E-03	7.378221E-04				3/16/99 10:03:38		
5.000208E-03	-7.427630E-04				3/16/99 10:03:41		
5.000324E-03	7.402900E-04	0.1480484	1.163321E-06	3.701707E-06	3/16/99 10:03:45	4909.106288	4.763057497

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
9.999874E-03	-1.482884E-03				3/16/99 10:04:51		
-9.999847E-03	1.478042E-03				3/16/99 10:04:54		
-9.999844E-03	1.478035E-03				3/16/99 10:04:57		
9.999876E-03	-1.482864E-03				3/16/99 10:05:00		
9.999874E-03	-1.482863E-03				3/16/99 10:05:02		
-9.999850E-03	1.478043E-03				3/16/99 10:05:05		
-9.999849E-03	1.478052E-03				3/16/99 10:05:08		
9.999879E-03	-1.482848E-03				3/16/99 10:05:11		
9.999875E-03	-1.482863E-03				3/16/99 10:05:14		
-9.999847E-03	1.478066E-03				3/16/99 10:05:17		
-9.999842E-03	1.478064E-03				3/16/99 10:05:19		
9.999879E-03	-1.482847E-03				3/16/99 10:05:22		
9.999872E-03	-1.482840E-03				3/16/99 10:05:25		
-9.999848E-03	1.478078E-03				3/16/99 10:05:28		
-9.999845E-03	1.478078E-03				3/16/99 10:05:31		
9.999879E-03	-1.482825E-03				3/16/99 10:05:33		
9.999874E-03	-1.482843E-03				3/16/99 10:05:36		
-9.999852E-03	1.478077E-03				3/16/99 10:05:39		
-9.999848E-03	1.478074E-03				3/16/99 10:05:42		
9.999880E-03	-1.482830E-03				3/16/99 10:05:45		
9.999873E-03	-1.482815E-03				3/16/99 10:05:48		
-9.999856E-03	1.478078E-03				3/16/99 10:05:50		
-9.999855E-03	1.478085E-03				3/16/99 10:05:53		
9.999871E-03	-1.482815E-03				3/16/99 10:05:56		
9.999869E-03	-1.482814E-03				3/16/99 10:05:59		
-9.999855E-03	1.478095E-03				3/16/99 10:06:02		
-9.999850E-03	1.478092E-03				3/16/99 10:06:05		
9.999873E-03	-1.482822E-03				3/16/99 10:06:07		
9.999872E-03	-1.482808E-03				3/16/99 10:06:10		
-9.999854E-03	1.478104E-03				3/16/99 10:06:13		
-9.999854E-03	1.478102E-03				3/16/99 10:06:16		
9.999870E-03	-1.482798E-03				3/16/99 10:06:19		
9.999870E-03	-1.482792E-03				3/16/99 10:06:22		
-9.999854E-03	1.478106E-03				3/16/99 10:06:24		
-9.999853E-03	1.478112E-03				3/16/99 10:06:27		
9.999866E-03	-1.482787E-03				3/16/99 10:06:30		
9.999865E-03	-1.482786E-03				3/16/99 10:06:33		
-9.999858E-03	1.478129E-03				3/16/99 10:06:36		
-9.999859E-03	1.478115E-03				3/16/99 10:06:38		
9.999868E-03	-1.482776E-03				3/16/99 10:06:41		
9.999862E-03	1.480454E-03	0.1480474	5.285845E-07	1.480425E-05	3/16/99 10:06:45	4911.533216	4.761733726

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
1.499804E-02	-2.223103E-03				3/16/99 10:07:47		
-1.500010E-02	2.218081E-03				3/16/99 10:07:50		
-1.500010E-02	2.218070E-03				3/16/99 10:07:53		
1.499816E-02	-2.223095E-03				3/16/99 10:07:56		
1.499813E-02	-2.223087E-03				3/16/99 10:07:59		
-1.500013E-02	2.218075E-03				3/16/99 10:08:01		
-1.500012E-02	2.218083E-03				3/16/99 10:08:04		
1.499815E-02	-2.223097E-03				3/16/99 10:08:07		
1.499816E-02	-2.223090E-03				3/16/99 10:08:10		
-1.500011E-02	2.218092E-03				3/16/99 10:08:13		
-1.500011E-02	2.218098E-03				3/16/99 10:08:16		
1.499818E-02	-2.223087E-03				3/16/99 10:08:18		
1.499823E-02	-2.223069E-03				3/16/99 10:08:21		
-1.500014E-02	2.218110E-03				3/16/99 10:08:24		
-1.500011E-02	2.218105E-03				3/16/99 10:08:27		
1.499822E-02	-2.223078E-03				3/16/99 10:08:30		
1.499819E-02	-2.223091E-03				3/16/99 10:08:32		
-1.500013E-02	2.218113E-03				3/16/99 10:08:35		
-1.500014E-02	2.218120E-03				3/16/99 10:08:38		
1.499821E-02	-2.223082E-03				3/16/99 10:08:41		
1.499822E-02	-2.223070E-03				3/16/99 10:08:44		
-1.500016E-02	2.218115E-03				3/16/99 10:08:47		
-1.500015E-02	2.218112E-03				3/16/99 10:08:49		
1.499824E-02	-2.223071E-03				3/16/99 10:08:52		
1.499826E-02	-2.223058E-03				3/16/99 10:08:55		
-1.500019E-02	2.218143E-03				3/16/99 10:08:58		
-1.500019E-02	2.218145E-03				3/16/99 10:09:01		
1.499831E-02	-2.223059E-03				3/16/99 10:09:04		
1.499831E-02	-2.223059E-03				3/16/99 10:09:06		
-1.500014E-02	2.218157E-03				3/16/99 10:09:09		
-1.500013E-02	2.218148E-03				3/16/99 10:09:12		
1.499832E-02	-2.223053E-03				3/16/99 10:09:15		
1.499835E-02	-2.223045E-03				3/16/99 10:09:18		
-1.500011E-02	2.218162E-03				3/16/99 10:09:20		
-1.500010E-02	2.218148E-03				3/16/99 10:09:23		
1.499832E-02	-2.223042E-03				3/16/99 10:09:26		
1.499833E-02	-2.223020E-03				3/16/99 10:09:29		
-1.500013E-02	2.218180E-03				3/16/99 10:09:32		
-1.500011E-02	2.218184E-03				3/16/99 10:09:35		
1.499838E-02	-2.223010E-03				3/16/99 10:09:37		
1.499918E-02	2.220595E-03	0.1480477	3.763133E-07	3.330729E-05	3/16/99 10:09:42	4907.743266	4.763801478

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.94 GeV Time on target= 2.5 hours							
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
5.000196E-03	-7.470468E-04				3/16/99 12:51:53		
-5.000491E-03	7.417456E-04				3/16/99 12:51:56		
-5.000487E-03	7.417376E-04				3/16/99 12:51:59		
5.000202E-03	-7.470551E-04				3/16/99 12:52:01		
5.000200E-03	-7.470485E-04				3/16/99 12:52:04		
-5.000495E-03	7.417392E-04				3/16/99 12:52:07		
-5.000495E-03	7.417460E-04				3/16/99 12:52:10		
5.000194E-03	-7.470509E-04				3/16/99 12:52:13		
5.000195E-03	-7.470485E-04				3/16/99 12:52:16		
-5.000492E-03	7.417441E-04				3/16/99 12:52:18		
-5.000493E-03	7.417463E-04				3/16/99 12:52:21		
5.000197E-03	-7.470398E-04				3/16/99 12:52:24		
5.000195E-03	-7.470312E-04				3/16/99 12:52:27		
-5.000499E-03	7.417506E-04				3/16/99 12:52:30		
-5.000498E-03	7.417610E-04				3/16/99 12:52:33		
5.000194E-03	-7.470298E-04				3/16/99 12:52:35		
5.000194E-03	-7.470312E-04				3/16/99 12:52:38		
-5.000502E-03	7.417607E-04				3/16/99 12:52:41		
-5.000501E-03	7.417655E-04				3/16/99 12:52:44		
5.000199E-03	-7.470332E-04				3/16/99 12:52:47		
5.000198E-03	-7.470354E-04				3/16/99 12:52:50		
-5.000506E-03	7.417726E-04				3/16/99 12:52:52		
-5.000510E-03	7.417640E-04				3/16/99 12:52:55		
5.000194E-03	-7.470257E-04				3/16/99 12:52:58		
5.000200E-03	-7.470295E-04				3/16/99 12:53:01		
-5.000505E-03	7.417692E-04				3/16/99 12:53:04		
-5.000506E-03	7.417758E-04				3/16/99 12:53:06		
5.000195E-03	-7.470316E-04				3/16/99 12:53:09		
5.000193E-03	-7.470162E-04				3/16/99 12:53:12		
-5.000508E-03	7.417684E-04				3/16/99 12:53:15		
-5.000504E-03	7.417554E-04				3/16/99 12:53:18		
5.000196E-03	-7.470232E-04				3/16/99 12:53:21		
5.000194E-03	-7.470118E-04				3/16/99 12:53:23		
-5.000509E-03	7.417644E-04				3/16/99 12:53:26		
-5.000502E-03	7.417793E-04				3/16/99 12:53:29		
5.000199E-03	-7.470242E-04				3/16/99 12:53:32		
5.000196E-03	-7.470229E-04				3/16/99 12:53:35		
-5.000504E-03	7.417843E-04				3/16/99 12:53:38		
-5.000506E-03	7.417800E-04				3/16/99 12:53:40		
5.000194E-03	-7.470238E-04				3/16/99 12:53:43		
5.000348E-03	7.443967E-04	0.1488690	9.122245E-07	3.722270E-06	3/16/99 12:53:47	4859.360401	4.790454298

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.94 GeV Time on target= 2.5 hours							
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
9.999855E-03	-1.491276E-03				3/16/99 12:54:40		
-9.999881E-03	1.486039E-03				3/16/99 12:54:43		
-9.999879E-03	1.486046E-03				3/16/99 12:54:46		
9.999856E-03	-1.491283E-03				3/16/99 12:54:49		
9.999851E-03	-1.491275E-03				3/16/99 12:54:52		
-9.999881E-03	1.486040E-03				3/16/99 12:54:54		
-9.999874E-03	1.486052E-03				3/16/99 12:54:57		
9.999854E-03	-1.491267E-03				3/16/99 12:55:00		
9.999852E-03	-1.491261E-03				3/16/99 12:55:03		
-9.999881E-03	1.486042E-03				3/16/99 12:55:06		
-9.999881E-03	1.486058E-03				3/16/99 12:55:09		
9.999857E-03	-1.491270E-03				3/16/99 12:55:11		
9.999853E-03	-1.491256E-03				3/16/99 12:55:14		
-9.999885E-03	1.486055E-03				3/16/99 12:55:17		
-9.999883E-03	1.486059E-03				3/16/99 12:55:20		
9.999855E-03	-1.491260E-03				3/16/99 12:55:23		
9.999850E-03	-1.491247E-03				3/16/99 12:55:26		
-9.999890E-03	1.486058E-03				3/16/99 12:55:28		
-9.999884E-03	1.486067E-03				3/16/99 12:55:31		
9.999852E-03	-1.491248E-03				3/16/99 12:55:34		
9.999845E-03	-1.491243E-03				3/16/99 12:55:37		
-9.999894E-03	1.486076E-03				3/16/99 12:55:40		
-9.999890E-03	1.486059E-03				3/16/99 12:55:42		
9.999854E-03	-1.491243E-03				3/16/99 12:55:45		
9.999853E-03	-1.491246E-03				3/16/99 12:55:48		
-9.999896E-03	1.486096E-03				3/16/99 12:55:51		
-9.999893E-03	1.486065E-03				3/16/99 12:55:54		
9.999852E-03	-1.491231E-03				3/16/99 12:55:57		
9.999850E-03	-1.491235E-03				3/16/99 12:55:59		
-9.999895E-03	1.486083E-03				3/16/99 12:56:02		
-9.999890E-03	1.486102E-03				3/16/99 12:56:05		
9.999854E-03	-1.491233E-03				3/16/99 12:56:08		
9.999852E-03	-1.491222E-03				3/16/99 12:56:11		
-9.999897E-03	1.486086E-03				3/16/99 12:56:14		
-9.999895E-03	1.486087E-03				3/16/99 12:56:16		
9.999853E-03	-1.491209E-03				3/16/99 12:56:19		
9.999845E-03	-1.491211E-03				3/16/99 12:56:22		
-9.999903E-03	1.486101E-03				3/16/99 12:56:25		
-9.999893E-03	1.486102E-03				3/16/99 12:56:28		
9.999851E-03	-1.491224E-03				3/16/99 12:56:31		
9.999870E-03	1.488658E-03	0.1488677	5.990340E-07	1.488644E-05	3/16/99 12:56:35	4860.554356	4.789790814

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.94 GeV Time on target= 2.5 hours							
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
1.499823E-02	-2.235628E-03				3/16/99 12:57:27		
-1.500081E-02	2.230283E-03				3/16/99 12:57:30		
-1.500084E-02	2.230301E-03				3/16/99 12:57:33		
1.499826E-02	-2.235611E-03				3/16/99 12:57:36		
1.499831E-02	-2.235603E-03				3/16/99 12:57:38		
-1.500079E-02	2.230279E-03				3/16/99 12:57:41		
-1.500080E-02	2.230298E-03				3/16/99 12:57:44		
1.499830E-02	-2.235624E-03				3/16/99 12:57:47		
1.499835E-02	-2.235622E-03				3/16/99 12:57:50		
-1.500078E-02	2.230289E-03				3/16/99 12:57:53		
-1.500081E-02	2.230274E-03				3/16/99 12:57:55		
1.499834E-02	-2.235615E-03				3/16/99 12:57:58		
1.499837E-02	-2.235597E-03				3/16/99 12:58:01		
-1.500082E-02	2.230300E-03				3/16/99 12:58:04		
-1.500083E-02	2.230288E-03				3/16/99 12:58:07		
1.499835E-02	-2.235595E-03				3/16/99 12:58:10		
1.499832E-02	-2.235601E-03				3/16/99 12:58:12		
-1.500082E-02	2.230296E-03				3/16/99 12:58:15		
-1.500085E-02	2.230303E-03				3/16/99 12:58:18		
1.499834E-02	-2.235590E-03				3/16/99 12:58:21		
1.499836E-02	-2.235586E-03				3/16/99 12:58:24		
-1.500081E-02	2.230315E-03				3/16/99 12:58:27		
-1.500082E-02	2.230296E-03				3/16/99 12:58:29		
1.499836E-02	-2.235583E-03				3/16/99 12:58:32		
1.499836E-02	-2.235603E-03				3/16/99 12:58:35		
-1.500081E-02	2.230318E-03				3/16/99 12:58:38		
-1.500083E-02	2.230311E-03				3/16/99 12:58:41		
1.499832E-02	-2.235598E-03				3/16/99 12:58:44		
1.499836E-02	-2.235589E-03				3/16/99 12:58:46		
-1.500082E-02	2.230319E-03				3/16/99 12:58:49		
-1.500084E-02	2.230316E-03				3/16/99 12:58:52		
1.499834E-02	-2.235576E-03				3/16/99 12:58:55		
1.499834E-02	-2.235585E-03				3/16/99 12:58:58		
-1.500084E-02	2.230332E-03				3/16/99 12:59:00		
-1.500084E-02	2.230345E-03				3/16/99 12:59:03		
1.499836E-02	-2.235588E-03				3/16/99 12:59:06		
1.499834E-02	-2.235589E-03				3/16/99 12:59:09		
-1.500086E-02	2.230336E-03				3/16/99 12:59:12		
-1.500086E-02	2.230333E-03				3/16/99 12:59:15		
1.499842E-02	-2.235565E-03				3/16/99 12:59:17		
1.499958E-02	2.232952E-03	0.1488676	5.665143E-07	3.349343E-05	3/16/99 12:59:22	4860.619498	4.789754623

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.94 GeV Time on target= approximately 13 minutes							
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
5.000194E-03	-7.471881E-04				3/16/99 14:47:01		
-5.000486E-03	7.405450E-04				3/16/99 14:47:04		
-5.000484E-03	7.405431E-04				3/16/99 14:47:07		
5.000198E-03	-7.471870E-04				3/16/99 14:47:10		
5.000196E-03	-7.471808E-04				3/16/99 14:47:12		
-5.000487E-03	7.405534E-04				3/16/99 14:47:15		
-5.000484E-03	7.405435E-04				3/16/99 14:47:18		
5.000198E-03	-7.471736E-04				3/16/99 14:47:21		
5.000200E-03	-7.471701E-04				3/16/99 14:47:24		
-5.000486E-03	7.405541E-04				3/16/99 14:47:27		
-5.000486E-03	7.405530E-04				3/16/99 14:47:29		
5.000197E-03	-7.471604E-04				3/16/99 14:47:32		
5.000198E-03	-7.471559E-04				3/16/99 14:47:35		
-5.000490E-03	7.405486E-04				3/16/99 14:47:38		
-5.000485E-03	7.405455E-04				3/16/99 14:47:41		
5.000203E-03	-7.471615E-04				3/16/99 14:47:44		
5.000202E-03	-7.471764E-04				3/16/99 14:47:46		
-5.000485E-03	7.405554E-04				3/16/99 14:47:49		
-5.000487E-03	7.405423E-04				3/16/99 14:47:52		
5.000202E-03	-7.471604E-04				3/16/99 14:47:55		
5.000199E-03	-7.471573E-04				3/16/99 14:47:58		
-5.000494E-03	7.405495E-04				3/16/99 14:48:01		
-5.000492E-03	7.405466E-04				3/16/99 14:48:03		
5.000202E-03	-7.471548E-04				3/16/99 14:48:06		
5.000204E-03	-7.471512E-04				3/16/99 14:48:09		
-5.000493E-03	7.405399E-04				3/16/99 14:48:12		
-5.000492E-03	7.405423E-04				3/16/99 14:48:15		
5.000204E-03	-7.471524E-04				3/16/99 14:48:17		
5.000204E-03	-7.471495E-04				3/16/99 14:48:20		
-5.000493E-03	7.405448E-04				3/16/99 14:48:23		
-5.000495E-03	7.405390E-04				3/16/99 14:48:26		
5.000204E-03	-7.471513E-04				3/16/99 14:48:29		
5.000203E-03	-7.471498E-04				3/16/99 14:48:32		
-5.000492E-03	7.405383E-04				3/16/99 14:48:34		
-5.000491E-03	7.405397E-04				3/16/99 14:48:37		
5.000203E-03	-7.471407E-04				3/16/99 14:48:40		
5.000203E-03	-7.471500E-04				3/16/99 14:48:43		
-5.000490E-03	7.405409E-04				3/16/99 14:48:46		
-5.000492E-03	7.405366E-04				3/16/99 14:48:49		
5.000202E-03	-7.471551E-04				3/16/99 14:48:51		
5.000345E-03	7.438532E-04	0.1487604	1.728267E-06	3.719487E-06	3/16/99 14:48:56	2536.556033	7.141233313

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.94 GeV Time on target= approximately 13 minutes							
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
9.999860E-03	-1.490839E-03				3/16/99 14:49:47		
-9.999864E-03	1.484242E-03				3/16/99 14:49:50		
-9.999858E-03	1.484247E-03				3/16/99 14:49:53		
9.999855E-03	-1.490839E-03				3/16/99 14:49:56		
9.999853E-03	-1.490834E-03				3/16/99 14:49:58		
-9.999868E-03	1.484248E-03				3/16/99 14:50:01		
-9.999864E-03	1.484250E-03				3/16/99 14:50:04		
9.999858E-03	-1.490817E-03				3/16/99 14:50:07		
9.999856E-03	-1.490820E-03				3/16/99 14:50:10		
-9.999861E-03	1.484252E-03				3/16/99 14:50:13		
-9.999858E-03	1.484243E-03				3/16/99 14:50:15		
9.999858E-03	-1.490814E-03				3/16/99 14:50:18		
9.999854E-03	-1.490810E-03				3/16/99 14:50:21		
-9.999866E-03	1.484245E-03				3/16/99 14:50:24		
-9.999863E-03	1.484262E-03				3/16/99 14:50:27		
9.999860E-03	-1.490806E-03				3/16/99 14:50:30		
9.999855E-03	-1.490802E-03				3/16/99 14:50:32		
-9.999863E-03	1.484254E-03				3/16/99 14:50:35		
-9.999862E-03	1.484262E-03				3/16/99 14:50:38		
9.999858E-03	-1.490784E-03				3/16/99 14:50:41		
9.999854E-03	-1.490788E-03				3/16/99 14:50:44		
-9.999865E-03	1.484253E-03				3/16/99 14:50:47		
-9.999861E-03	1.484255E-03				3/16/99 14:50:49		
9.999857E-03	-1.490786E-03				3/16/99 14:50:52		
9.999855E-03	-1.490783E-03				3/16/99 14:50:55		
-9.999866E-03	1.484271E-03				3/16/99 14:50:58		
-9.999868E-03	1.484269E-03				3/16/99 14:51:01		
9.999858E-03	-1.490775E-03				3/16/99 14:51:03		
9.999854E-03	-1.490775E-03				3/16/99 14:51:06		
-9.999871E-03	1.484274E-03				3/16/99 14:51:09		
-9.999868E-03	1.484271E-03				3/16/99 14:51:12		
9.999859E-03	-1.490779E-03				3/16/99 14:51:15		
9.999855E-03	-1.490769E-03				3/16/99 14:51:18		
-9.999869E-03	1.484264E-03				3/16/99 14:51:20		
-9.999867E-03	1.484278E-03				3/16/99 14:51:23		
9.999859E-03	-1.490754E-03				3/16/99 14:51:26		
9.999854E-03	-1.490747E-03				3/16/99 14:51:29		
-9.999871E-03	1.484265E-03				3/16/99 14:51:32		
-9.999870E-03	1.484279E-03				3/16/99 14:51:35		
9.999858E-03	-1.490741E-03				3/16/99 14:51:37		
9.999861E-03	1.487526E-03	0.1487547	9.903400E-07	1.487490E-05	3/16/99 14:51:42	2502.857794	7.205578947

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu#1 Beam Energy=0 Time on target= 0							
Room Temperature measurement between 1.94 and 1.1 GeV							
5.000254E-05	-6.720092E-04				3/16/99 16:15:36		
-5.000591E-05	1.095673E-03				3/16/99 16:15:39		
-5.000589E-05	1.095563E-03				3/16/99 16:15:42		
5.000254E-05	-6.721345E-04				3/16/99 16:15:45		
5.000260E-05	-6.721794E-04				3/16/99 16:15:47		
-5.000590E-05	1.095254E-03				3/16/99 16:15:50		
-5.000591E-05	1.095161E-03				3/16/99 16:15:53		
5.000254E-05	-6.723096E-04				3/16/99 16:15:56		
5.000256E-05	-6.723601E-04				3/16/99 16:15:59		
-5.000590E-05	1.094873E-03				3/16/99 16:16:02		
-5.000598E-05	1.094777E-03				3/16/99 16:16:04		
5.000260E-05	-6.725420E-04				3/16/99 16:16:07		
5.000260E-05	-6.725937E-04				3/16/99 16:16:10		
-5.000590E-05	1.094488E-03				3/16/99 16:16:13		
-5.000594E-05	1.094394E-03				3/16/99 16:16:16		
5.000256E-05	-6.727791E-04				3/16/99 16:16:19		
5.000257E-05	-6.728648E-04				3/16/99 16:16:21		
-5.000597E-05	1.094116E-03				3/16/99 16:16:24		
-5.000600E-05	1.094030E-03				3/16/99 16:16:27		
5.000251E-05	-6.730475E-04				3/16/99 16:16:30		
5.000425E-05	8.836575E-04	17.6716486	2.389723E-03	4.418069E-08	3/16/99 16:16:34	60.62429609	290.2292498

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu#1 Beam Energy=0 Time on target= 0							
Room Temperature measurement between 1.94 and 1.1 GeV							
5.000224E-04	-8.624823E-03				3/16/99 16:17:20		
-5.000730E-04	9.042940E-03				3/16/99 16:17:23		
-5.000730E-04	9.042917E-03				3/16/99 16:17:26		
5.000221E-04	-8.625301E-03				3/16/99 16:17:29		
5.000230E-04	-8.625524E-03				3/16/99 16:17:32		
-5.000727E-04	9.042854E-03				3/16/99 16:17:34		
-5.000720E-04	9.042903E-03				3/16/99 16:17:37		
5.000231E-04	-8.626126E-03				3/16/99 16:17:40		
5.000230E-04	-8.626334E-03				3/16/99 16:17:43		
-5.000723E-04	9.042989E-03				3/16/99 16:17:46		
-5.000725E-04	9.043043E-03				3/16/99 16:17:49		
5.000221E-04	-8.627069E-03				3/16/99 16:17:51		
5.000219E-04	-8.627347E-03				3/16/99 16:17:54		
-5.000726E-04	9.043206E-03				3/16/99 16:17:57		
-5.000733E-04	9.043311E-03				3/16/99 16:18:00		
5.000227E-04	-8.628155E-03				3/16/99 16:18:03		
5.000223E-04	-8.628428E-03				3/16/99 16:18:06		
-5.000723E-04	9.043629E-03				3/16/99 16:18:08		
-5.000728E-04	9.043740E-03				3/16/99 16:18:11		
5.000235E-04	-8.629371E-03				3/16/99 16:18:14		
5.000476E-04	8.835000E-03	17.6683177	1.688824E-03	4.418703E-06	3/16/99 16:18:18	60.61359529	290.2886144

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= none		Time on target= none			
Room temperature data after over-night warm up after 1.94GeV							
5.000223E-05	-8.990694E-04				3/17/99 8:37:54		
-5.000406E-05	8.984294E-04				3/17/99 8:37:57		
-5.000404E-05	8.984438E-04				3/17/99 8:38:00		
5.000227E-05	-8.990719E-04				3/17/99 8:38:03		
5.000228E-05	-8.990641E-04				3/17/99 8:38:06		
-5.000409E-05	8.984534E-04				3/17/99 8:38:09		
-5.000406E-05	8.984469E-04				3/17/99 8:38:11		
5.000228E-05	-8.990467E-04				3/17/99 8:38:14		
5.000231E-05	-8.990522E-04				3/17/99 8:38:17		
-5.000408E-05	8.984529E-04				3/17/99 8:38:20		
-5.000406E-05	8.984569E-04				3/17/99 8:38:23		
5.000229E-05	-8.990446E-04				3/17/99 8:38:26		
5.000229E-05	-8.990396E-04				3/17/99 8:38:28		
-5.000410E-05	8.984520E-04				3/17/99 8:38:31		
-5.000409E-05	8.984674E-04				3/17/99 8:38:34		
5.000230E-05	-8.990507E-04				3/17/99 8:38:37		
5.000231E-05	-8.990614E-04				3/17/99 8:38:40		
-5.000412E-05	8.984741E-04				3/17/99 8:38:42		
-5.000411E-05	8.984635E-04				3/17/99 8:38:45		
5.000233E-05	-8.990528E-04				3/17/99 8:38:48		
5.000232E-05	-8.990385E-04				3/17/99 8:38:51		
-5.000415E-05	8.984668E-04				3/17/99 8:38:54		
-5.000413E-05	8.984652E-04				3/17/99 8:38:57		
5.000233E-05	-8.990335E-04				3/17/99 8:38:59		
5.000233E-05	-8.990388E-04				3/17/99 8:39:02		
-5.000416E-05	8.984737E-04				3/17/99 8:39:05		
-5.000415E-05	8.984696E-04				3/17/99 8:39:08		
5.000236E-05	-8.990204E-04				3/17/99 8:39:11		
5.000237E-05	-8.990143E-04				3/17/99 8:39:14		
-5.000414E-05	8.984865E-04				3/17/99 8:39:16		
-5.000416E-05	8.984989E-04				3/17/99 8:39:19		
5.000239E-05	-8.990285E-04				3/17/99 8:39:22		
5.000236E-05	-8.990263E-04				3/17/99 8:39:25		
-5.000418E-05	8.984861E-04				3/17/99 8:39:28		
-5.000420E-05	8.984846E-04				3/17/99 8:39:30		
5.000233E-05	-8.990078E-04				3/17/99 8:39:33		
5.000233E-05	-8.990122E-04				3/17/99 8:39:36		
-5.000412E-05	8.984990E-04				3/17/99 8:39:39		
-5.000416E-05	8.985112E-04				3/17/99 8:39:42		
5.000232E-05	-8.989938E-04				3/17/99 8:39:45		
5.000322E-05	8.987537E-04	17.9739182	1.187639E-04	4.494053E-08	3/17/99 8:39:49	60.59897298	290.3697699

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= none		Time on target= none			
Room temperature data after over-night warm up after 1.94GeV							
5.000199E-04	-8.987354E-03				3/17/99 8:41:35		
-5.000551E-04	8.986471E-03				3/17/99 8:41:37		
-5.000552E-04	8.986476E-03				3/17/99 8:41:40		
5.000208E-04	-8.987323E-03				3/17/99 8:41:43		
5.000208E-04	-8.987324E-03				3/17/99 8:41:46		
-5.000554E-04	8.986532E-03				3/17/99 8:41:49		
-5.000556E-04	8.986547E-03				3/17/99 8:41:51		
5.000213E-04	-8.987325E-03				3/17/99 8:41:54		
5.000212E-04	-8.987290E-03				3/17/99 8:41:57		
-5.000554E-04	8.986594E-03				3/17/99 8:42:00		
-5.000554E-04	8.986599E-03				3/17/99 8:42:03		
5.000205E-04	-8.987251E-03				3/17/99 8:42:06		
5.000202E-04	-8.987248E-03				3/17/99 8:42:08		
-5.000558E-04	8.986609E-03				3/17/99 8:42:11		
-5.000556E-04	8.986640E-03				3/17/99 8:42:14		
5.000200E-04	-8.987229E-03				3/17/99 8:42:17		
5.000196E-04	-8.987229E-03				3/17/99 8:42:20		
-5.000565E-04	8.986666E-03				3/17/99 8:42:23		
-5.000564E-04	8.986658E-03				3/17/99 8:42:25		
5.000200E-04	-8.987240E-03				3/17/99 8:42:28		
5.000201E-04	-8.987222E-03				3/17/99 8:42:31		
-5.000562E-04	8.986689E-03				3/17/99 8:42:34		
-5.000561E-04	8.986675E-03				3/17/99 8:42:37		
5.000202E-04	-8.987219E-03				3/17/99 8:42:40		
5.000198E-04	-8.987212E-03				3/17/99 8:42:42		
-5.000563E-04	8.986657E-03				3/17/99 8:42:45		
-5.000560E-04	8.986662E-03				3/17/99 8:42:48		
5.000203E-04	-8.987235E-03				3/17/99 8:42:51		
5.000205E-04	-8.987242E-03				3/17/99 8:42:54		
-5.000558E-04	8.986663E-03				3/17/99 8:42:57		
-5.000556E-04	8.986672E-03				3/17/99 8:42:59		
5.000208E-04	-8.987239E-03				3/17/99 8:43:02		
5.000206E-04	-8.987232E-03				3/17/99 8:43:05		
-5.000568E-04	8.986693E-03				3/17/99 8:43:08		
-5.000568E-04	8.986693E-03				3/17/99 8:43:11		
5.000206E-04	-8.987204E-03				3/17/99 8:43:13		
5.000206E-04	-8.987237E-03				3/17/99 8:43:16		
-5.000566E-04	8.986740E-03				3/17/99 8:43:19		
-5.000563E-04	8.986709E-03				3/17/99 8:43:22		
5.000205E-04	-8.987195E-03				3/17/99 8:43:25		
5.000382E-04	8.986942E-03	17.9725122	3.082429E-05	4.493821E-06	3/17/99 8:43:29	60.58894375	290.425457

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= pre-1.1GeV		Time on target= 0			
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
5.000180E-03	-7.379192E-04				3/17/99 10:01:09		
-5.000678E-03	7.340835E-04				3/17/99 10:01:12		
-5.000674E-03	7.340877E-04				3/17/99 10:01:15		
5.000176E-03	-7.379201E-04				3/17/99 10:01:18		
5.000177E-03	-7.379383E-04				3/17/99 10:01:20		
-5.000676E-03	7.341012E-04				3/17/99 10:01:23		
-5.000682E-03	7.340887E-04				3/17/99 10:01:26		
5.000180E-03	-7.379286E-04				3/17/99 10:01:29		
5.000180E-03	-7.379318E-04				3/17/99 10:01:32		
-5.000678E-03	7.340950E-04				3/17/99 10:01:35		
-5.000677E-03	7.340910E-04				3/17/99 10:01:37		
5.000185E-03	-7.379306E-04				3/17/99 10:01:40		
5.000181E-03	-7.379268E-04				3/17/99 10:01:43		
-5.000672E-03	7.340986E-04				3/17/99 10:01:46		
-5.000672E-03	7.340947E-04				3/17/99 10:01:49		
5.000190E-03	-7.379316E-04				3/17/99 10:01:51		
5.000191E-03	-7.379365E-04				3/17/99 10:01:54		
-5.000680E-03	7.340734E-04				3/17/99 10:01:57		
-5.000676E-03	7.340898E-04				3/17/99 10:02:00		
5.000185E-03	-7.379311E-04				3/17/99 10:02:03		
5.000187E-03	-7.379393E-04				3/17/99 10:02:06		
-5.000678E-03	7.340902E-04				3/17/99 10:02:08		
-5.000686E-03	7.340893E-04				3/17/99 10:02:11		
5.000178E-03	-7.379358E-04				3/17/99 10:02:14		
5.000179E-03	-7.379320E-04				3/17/99 10:02:17		
-5.000689E-03	7.340918E-04				3/17/99 10:02:20		
-5.000686E-03	7.340833E-04				3/17/99 10:02:23		
5.000180E-03	-7.379452E-04				3/17/99 10:02:25		
5.000183E-03	-7.379310E-04				3/17/99 10:02:28		
-5.000686E-03	7.340899E-04				3/17/99 10:02:31		
-5.000686E-03	7.340778E-04				3/17/99 10:02:34		
5.000181E-03	-7.379339E-04				3/17/99 10:02:37		
5.000181E-03	-7.379451E-04				3/17/99 10:02:39		
-5.000693E-03	7.340911E-04				3/17/99 10:02:42		
-5.000690E-03	7.340863E-04				3/17/99 10:02:45		
5.000185E-03	-7.379294E-04				3/17/99 10:02:48		
5.000183E-03	-7.379245E-04				3/17/99 10:02:51		
-5.000686E-03	7.340890E-04				3/17/99 10:02:54		
-5.000683E-03	7.340957E-04				3/17/99 10:02:56		
5.000178E-03	-7.379267E-04				3/17/99 10:02:59		
5.000432E-03	7.360106E-04	0.1471894	9.085980E-07	3.680373E-06	3/17/99 10:03:03	4974.351282	4.727875166

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= pre-1.1GeV		Time on target= 0			
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
9.999781E-03	-1.473804E-03				3/17/99 10:03:37		
-9.999990E-03	1.469933E-03				3/17/99 10:03:40		
-9.999986E-03	1.469921E-03				3/17/99 10:03:43		
9.999787E-03	-1.473823E-03				3/17/99 10:03:46		
9.999783E-03	-1.473818E-03				3/17/99 10:03:49		
-9.999993E-03	1.469919E-03				3/17/99 10:03:52		
-9.999996E-03	1.469933E-03				3/17/99 10:03:54		
9.999782E-03	-1.473801E-03				3/17/99 10:03:57		
9.999782E-03	-1.473810E-03				3/17/99 10:04:00		
-9.999994E-03	1.469946E-03				3/17/99 10:04:03		
-9.999990E-03	1.469937E-03				3/17/99 10:04:06		
9.999787E-03	-1.473808E-03				3/17/99 10:04:09		
9.999784E-03	-1.473796E-03				3/17/99 10:04:11		
-9.999997E-03	1.469940E-03				3/17/99 10:04:14		
-9.999989E-03	1.469947E-03				3/17/99 10:04:17		
9.999796E-03	-1.473806E-03				3/17/99 10:04:20		
9.999787E-03	-1.473788E-03				3/17/99 10:04:23		
-9.999994E-03	1.469945E-03				3/17/99 10:04:26		
-9.999987E-03	1.469935E-03				3/17/99 10:04:28		
9.999787E-03	-1.473805E-03				3/17/99 10:04:31		
9.999785E-03	-1.473810E-03				3/17/99 10:04:34		
-9.999997E-03	1.469944E-03				3/17/99 10:04:37		
-9.999992E-03	1.469944E-03				3/17/99 10:04:40		
9.999783E-03	-1.473813E-03				3/17/99 10:04:43		
9.999776E-03	-1.473810E-03				3/17/99 10:04:45		
-9.999993E-03	1.469945E-03				3/17/99 10:04:48		
-9.999991E-03	1.469933E-03				3/17/99 10:04:51		
9.999778E-03	-1.473816E-03				3/17/99 10:04:54		
9.999784E-03	-1.473820E-03				3/17/99 10:04:57		
-1.000000E-02	1.469933E-03				3/17/99 10:04:59		
-9.999997E-03	1.469922E-03				3/17/99 10:05:02		
9.999785E-03	-1.473816E-03				3/17/99 10:05:05		
9.999777E-03	-1.473831E-03				3/17/99 10:05:08		
-1.000000E-02	1.469920E-03				3/17/99 10:05:11		
-9.999998E-03	1.469930E-03				3/17/99 10:05:14		
9.999783E-03	-1.473829E-03				3/17/99 10:05:16		
9.999778E-03	-1.473809E-03				3/17/99 10:05:19		
-1.000000E-02	1.469925E-03				3/17/99 10:05:22		
-9.999991E-03	1.469949E-03				3/17/99 10:05:25		
9.999779E-03	-1.473814E-03				3/17/99 10:05:28		
9.999889E-03	1.471873E-03	0.1471890	4.812300E-07	1.471865E-05	3/17/99 10:05:32	4975.007658	4.727525453

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= pre-1.1GeV Time on target= 0							
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
1.499867E-02	-2.209844E-03				3/17/99 10:06:13		
-1.500279E-02	2.206020E-03				3/17/99 10:06:16		
-1.500276E-02	2.206033E-03				3/17/99 10:06:19		
1.499871E-02	-2.209831E-03				3/17/99 10:06:22		
1.499870E-02	-2.209844E-03				3/17/99 10:06:24		
-1.500275E-02	2.206049E-03				3/17/99 10:06:27		
-1.500278E-02	2.206016E-03				3/17/99 10:06:30		
1.499867E-02	-2.209833E-03				3/17/99 10:06:33		
1.499866E-02	-2.209866E-03				3/17/99 10:06:36		
-1.500279E-02	2.205991E-03				3/17/99 10:06:39		
-1.500280E-02	2.206016E-03				3/17/99 10:06:41		
1.499864E-02	-2.209847E-03				3/17/99 10:06:44		
1.499863E-02	-2.209843E-03				3/17/99 10:06:47		
-1.500277E-02	2.206009E-03				3/17/99 10:06:50		
-1.500279E-02	2.206031E-03				3/17/99 10:06:53		
1.499867E-02	-2.209840E-03				3/17/99 10:06:55		
1.499868E-02	-2.209850E-03				3/17/99 10:06:58		
-1.500272E-02	2.206011E-03				3/17/99 10:07:01		
-1.500268E-02	2.206000E-03				3/17/99 10:07:04		
1.499871E-02	-2.209874E-03				3/17/99 10:07:07		
1.499869E-02	-2.209835E-03				3/17/99 10:07:10		
-1.500276E-02	2.206026E-03				3/17/99 10:07:12		
-1.500274E-02	2.206032E-03				3/17/99 10:07:15		
1.499863E-02	-2.209861E-03				3/17/99 10:07:18		
1.499865E-02	-2.209827E-03				3/17/99 10:07:21		
-1.500279E-02	2.206051E-03				3/17/99 10:07:24		
-1.500278E-02	2.206035E-03				3/17/99 10:07:27		
1.499861E-02	-2.209848E-03				3/17/99 10:07:29		
1.499864E-02	-2.209830E-03				3/17/99 10:07:32		
-1.500276E-02	2.206025E-03				3/17/99 10:07:35		
-1.500275E-02	2.206030E-03				3/17/99 10:07:38		
1.499868E-02	-2.209869E-03				3/17/99 10:07:41		
1.499870E-02	-2.209905E-03				3/17/99 10:07:43		
-1.500277E-02	2.205983E-03				3/17/99 10:07:46		
-1.500271E-02	2.205983E-03				3/17/99 10:07:49		
1.499871E-02	-2.209876E-03				3/17/99 10:07:52		
1.499872E-02	-2.209844E-03				3/17/99 10:07:55		
-1.500275E-02	2.206030E-03				3/17/99 10:07:58		
-1.500272E-02	2.206039E-03				3/17/99 10:08:00		
1.499865E-02	-2.209832E-03				3/17/99 10:08:03		
1.500071E-02	2.207935E-03	0.1471887	4.986790E-07	3.312054E-05	3/17/99 10:08:07	4974.859401	4.727604436

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= pre-1.1GeV Time on target= 0							
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
9.999767E-03	-1.473958E-03				3/17/99 10:24:28		
-1.000001E-02	1.469806E-03				3/17/99 10:24:31		
-1.000000E-02	1.469807E-03				3/17/99 10:24:34		
9.999774E-03	-1.473951E-03				3/17/99 10:24:36		
9.999773E-03	-1.473934E-03				3/17/99 10:24:39		
-1.000000E-02	1.469823E-03				3/17/99 10:24:42		
-9.999996E-03	1.469822E-03				3/17/99 10:24:45		
9.999786E-03	-1.473938E-03				3/17/99 10:24:48		
9.999776E-03	-1.473931E-03				3/17/99 10:24:51		
-1.000000E-02	1.469849E-03				3/17/99 10:24:53		
-9.999998E-03	1.469854E-03				3/17/99 10:24:56		
9.999775E-03	-1.473922E-03				3/17/99 10:24:59		
9.999771E-03	-1.473923E-03				3/17/99 10:25:02		
-1.000000E-02	1.469852E-03				3/17/99 10:25:05		
-1.000001E-02	1.469843E-03				3/17/99 10:25:08		
9.999771E-03	-1.473922E-03				3/17/99 10:25:10		
9.999769E-03	-1.473913E-03				3/17/99 10:25:13		
-1.000000E-02	1.469853E-03				3/17/99 10:25:16		
-1.000000E-02	1.469848E-03				3/17/99 10:25:19		
9.999777E-03	-1.473912E-03				3/17/99 10:25:22		
9.999773E-03	-1.473914E-03				3/17/99 10:25:24		
-1.000001E-02	1.469847E-03				3/17/99 10:25:27		
-1.000001E-02	1.469839E-03				3/17/99 10:25:30		
9.999775E-03	-1.473910E-03				3/17/99 10:25:33		
9.999769E-03	-1.473919E-03				3/17/99 10:25:36		
-1.000002E-02	1.469846E-03				3/17/99 10:25:39		
-1.000001E-02	1.469852E-03				3/17/99 10:25:41		
9.999775E-03	-1.473923E-03				3/17/99 10:25:44		
9.999774E-03	-1.473908E-03				3/17/99 10:25:47		
-1.000001E-02	1.469840E-03				3/17/99 10:25:50		
-1.000001E-02	1.469848E-03				3/17/99 10:25:53		
9.999780E-03	-1.473917E-03				3/17/99 10:25:56		
9.999769E-03	-1.473911E-03				3/17/99 10:25:58		
-1.000001E-02	1.469862E-03				3/17/99 10:26:01		
-1.000001E-02	1.469866E-03				3/17/99 10:26:04		
9.999775E-03	-1.473911E-03				3/17/99 10:26:07		
9.999775E-03	-1.473918E-03				3/17/99 10:26:10		
-1.000001E-02	1.469844E-03				3/17/99 10:26:13		
-1.000001E-02	1.469840E-03				3/17/99 10:26:15		
9.999779E-03	-1.473912E-03				3/17/99 10:26:18		
9.999890E-03	1.471882E-03	0.1471898	4.724915E-07	1.471860E-05	3/17/99 10:26:22	4976.104152	4.726941434

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= 1.1 GeV		Time on target= 60 minutes			
Data at the end of the first irradiation at 1.1 GeV							
5.000182E-03	-7.389393E-04				3/17/99 13:08:54		
-5.000607E-03	7.341379E-04				3/17/99 13:08:57		
-5.000607E-03	7.341566E-04				3/17/99 13:09:00		
5.000185E-03	-7.389294E-04				3/17/99 13:09:03		
5.000182E-03	-7.389092E-04				3/17/99 13:09:06		
-5.000610E-03	7.341609E-04				3/17/99 13:09:08		
-5.000612E-03	7.341665E-04				3/17/99 13:09:11		
5.000186E-03	-7.388820E-04				3/17/99 13:09:14		
5.000184E-03	-7.388778E-04				3/17/99 13:09:17		
-5.000615E-03	7.342024E-04				3/17/99 13:09:20		
-5.000614E-03	7.342068E-04				3/17/99 13:09:23		
5.000188E-03	-7.388629E-04				3/17/99 13:09:25		
5.000180E-03	-7.388573E-04				3/17/99 13:09:28		
-5.000618E-03	7.342114E-04				3/17/99 13:09:31		
-5.000615E-03	7.342059E-04				3/17/99 13:09:34		
5.000184E-03	-7.388419E-04				3/17/99 13:09:37		
5.000188E-03	-7.388338E-04				3/17/99 13:09:40		
-5.000618E-03	7.342442E-04				3/17/99 13:09:42		
-5.000615E-03	7.342579E-04				3/17/99 13:09:45		
5.000188E-03	-7.388228E-04				3/17/99 13:09:48		
5.000185E-03	-7.388119E-04				3/17/99 13:09:51		
-5.000620E-03	7.342654E-04				3/17/99 13:09:54		
-5.000624E-03	7.342472E-04				3/17/99 13:09:56		
5.000184E-03	-7.388049E-04				3/17/99 13:09:59		
5.000183E-03	-7.387890E-04				3/17/99 13:10:02		
-5.000626E-03	7.342894E-04				3/17/99 13:10:05		
-5.000625E-03	7.342742E-04				3/17/99 13:10:08		
5.000175E-03	-7.387775E-04				3/17/99 13:10:11		
5.000175E-03	-7.387778E-04				3/17/99 13:10:13		
-5.000632E-03	7.343011E-04				3/17/99 13:10:16		
-5.000630E-03	7.343059E-04				3/17/99 13:10:19		
5.000183E-03	-7.387730E-04				3/17/99 13:10:22		
5.000184E-03	-7.387750E-04				3/17/99 13:10:25		
-5.000629E-03	7.342887E-04				3/17/99 13:10:28		
-5.000629E-03	7.343057E-04				3/17/99 13:10:30		
5.000185E-03	-7.387500E-04				3/17/99 13:10:33		
5.000184E-03	-7.387589E-04				3/17/99 13:10:36		
-5.000633E-03	7.343245E-04				3/17/99 13:10:39		
-5.000632E-03	7.343348E-04				3/17/99 13:10:42		
5.000179E-03	-7.387575E-04				3/17/99 13:10:45		
5.000402E-03	7.365355E-04	0.1472953	1.295436E-06	3.683029E-06	3/17/99 13:10:49	4996.253959	4.716250275

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= 1.1 GeV		Time on target= 60 minutes			
Data at the end of the first irradiation at 1.1 GeV							
9.999803E-03	-1.475119E-03				3/17/99 13:11:34		
-9.999961E-03	1.470745E-03				3/17/99 13:11:37		
-9.999958E-03	1.470751E-03				3/17/99 13:11:40		
9.999808E-03	-1.475131E-03				3/17/99 13:11:43		
9.999802E-03	-1.475122E-03				3/17/99 13:11:45		
-9.999963E-03	1.470751E-03				3/17/99 13:11:48		
-9.999962E-03	1.470754E-03				3/17/99 13:11:51		
9.999810E-03	-1.475104E-03				3/17/99 13:11:54		
9.999803E-03	-1.475107E-03				3/17/99 13:11:57		
-9.999970E-03	1.470763E-03				3/17/99 13:12:00		
-9.999969E-03	1.470768E-03				3/17/99 13:12:02		
9.999804E-03	-1.475103E-03				3/17/99 13:12:05		
9.999799E-03	-1.475095E-03				3/17/99 13:12:08		
-9.999968E-03	1.470768E-03				3/17/99 13:12:11		
-9.999965E-03	1.470770E-03				3/17/99 13:12:14		
9.999803E-03	-1.475104E-03				3/17/99 13:12:17		
9.999800E-03	-1.475095E-03				3/17/99 13:12:19		
-9.999972E-03	1.470778E-03				3/17/99 13:12:22		
-9.999971E-03	1.470769E-03				3/17/99 13:12:25		
9.999803E-03	-1.475108E-03				3/17/99 13:12:28		
9.999800E-03	-1.475088E-03				3/17/99 13:12:31		
-9.999979E-03	1.470785E-03				3/17/99 13:12:34		
-9.999972E-03	1.470781E-03				3/17/99 13:12:36		
9.999798E-03	-1.475072E-03				3/17/99 13:12:39		
9.999793E-03	-1.475089E-03				3/17/99 13:12:42		
-9.999983E-03	1.470794E-03				3/17/99 13:12:45		
-9.999980E-03	1.470794E-03				3/17/99 13:12:48		
9.999793E-03	-1.475071E-03				3/17/99 13:12:51		
9.999792E-03	-1.475075E-03				3/17/99 13:12:53		
-9.999985E-03	1.470810E-03				3/17/99 13:12:56		
-9.999977E-03	1.470788E-03				3/17/99 13:12:59		
9.999796E-03	-1.475087E-03				3/17/99 13:13:02		
9.999793E-03	-1.475080E-03				3/17/99 13:13:05		
-9.999983E-03	1.470793E-03				3/17/99 13:13:07		
-9.999980E-03	1.470787E-03				3/17/99 13:13:10		
9.999793E-03	-1.475082E-03				3/17/99 13:13:13		
9.999790E-03	-1.475066E-03				3/17/99 13:13:16		
-9.999986E-03	1.470784E-03				3/17/99 13:13:19		
-9.999983E-03	1.470802E-03				3/17/99 13:13:22		
9.999789E-03	-1.475080E-03				3/17/99 13:13:24		
9.999886E-03	1.472935E-03	0.1472952	4.562880E-07	1.472924E-05	3/17/99 13:13:29	4992.582791	4.718192347

Copper1.xls

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.1 GeV Time on target= 135 minutes							
End of second and last irradiation at 1.1 GeV							
5.000189E-03	-7.403216E-04				3/17/99 15:29:11		
-5.000414E-03	7.358276E-04				3/17/99 15:29:14		
-5.000415E-03	7.358165E-04				3/17/99 15:29:16		
5.000189E-03	-7.403141E-04				3/17/99 15:29:19		
5.000191E-03	-7.403152E-04				3/17/99 15:29:22		
-5.000419E-03	7.358298E-04				3/17/99 15:29:25		
-5.000417E-03	7.358330E-04				3/17/99 15:29:28		
5.000189E-03	-7.403159E-04				3/17/99 15:29:31		
5.000188E-03	-7.403140E-04				3/17/99 15:29:33		
-5.000420E-03	7.358322E-04				3/17/99 15:29:36		
-5.000420E-03	7.358328E-04				3/17/99 15:29:39		
5.000190E-03	-7.403090E-04				3/17/99 15:29:42		
5.000188E-03	-7.403064E-04				3/17/99 15:29:45		
-5.000423E-03	7.358489E-04				3/17/99 15:29:48		
-5.000421E-03	7.358374E-04				3/17/99 15:29:50		
5.000193E-03	-7.403104E-04				3/17/99 15:29:53		
5.000193E-03	-7.403051E-04				3/17/99 15:29:56		
-5.000425E-03	7.358387E-04				3/17/99 15:29:59		
-5.000423E-03	7.358438E-04				3/17/99 15:30:02		
5.000192E-03	-7.403011E-04				3/17/99 15:30:05		
5.000192E-03	-7.403034E-04				3/17/99 15:30:07		
-5.000428E-03	7.358368E-04				3/17/99 15:30:10		
-5.000429E-03	7.358408E-04				3/17/99 15:30:13		
5.000194E-03	-7.403041E-04				3/17/99 15:30:16		
5.000190E-03	-7.403010E-04				3/17/99 15:30:19		
-5.000434E-03	7.358448E-04				3/17/99 15:30:21		
-5.000429E-03	7.358437E-04				3/17/99 15:30:24		
5.000193E-03	-7.403037E-04				3/17/99 15:30:27		
5.000192E-03	-7.402992E-04				3/17/99 15:30:30		
-5.000432E-03	7.358401E-04				3/17/99 15:30:33		
-5.000435E-03	7.358393E-04				3/17/99 15:30:36		
5.000189E-03	-7.403132E-04				3/17/99 15:30:38		
5.000191E-03	-7.402983E-04				3/17/99 15:30:41		
-5.000436E-03	7.358430E-04				3/17/99 15:30:44		
-5.000436E-03	7.358467E-04				3/17/99 15:30:47		
5.000192E-03	-7.402984E-04				3/17/99 15:30:50		
5.000190E-03	-7.403003E-04				3/17/99 15:30:53		
-5.000440E-03	7.358446E-04				3/17/99 15:30:55		
-5.000440E-03	7.358413E-04				3/17/99 15:30:58		
5.000193E-03	-7.403002E-04				3/17/99 15:31:01		
5.000309E-03	7.380724E-04	0.1476054	5.292717E-07	3.690587E-06	3/17/99 15:31:05	4977.762953	4.726058357

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1 Beam Energy= 1.1 GeV		Time on target= 135 minutes					
End of second and last irradiation at 1.1 GeV							
9.999865E-03	-1.478250E-03				3/17/99 15:31:53		
-9.999826E-03	1.473786E-03				3/17/99 15:31:56		
-9.999825E-03	1.473779E-03				3/17/99 15:31:59		
9.999869E-03	-1.478253E-03				3/17/99 15:32:02		
9.999864E-03	-1.478261E-03				3/17/99 15:32:04		
-9.999831E-03	1.473785E-03				3/17/99 15:32:07		
-9.999828E-03	1.473792E-03				3/17/99 15:32:10		
9.999868E-03	-1.478266E-03				3/17/99 15:32:13		
9.999864E-03	-1.478262E-03				3/17/99 15:32:16		
-9.999836E-03	1.473779E-03				3/17/99 15:32:19		
-9.999833E-03	1.473785E-03				3/17/99 15:32:21		
9.999863E-03	-1.478259E-03				3/17/99 15:32:24		
9.999857E-03	-1.478254E-03				3/17/99 15:32:27		
-9.999840E-03	1.473799E-03				3/17/99 15:32:30		
-9.999835E-03	1.473792E-03				3/17/99 15:32:33		
9.999859E-03	-1.478251E-03				3/17/99 15:32:36		
9.999854E-03	-1.478244E-03				3/17/99 15:32:38		
-9.999841E-03	1.473782E-03				3/17/99 15:32:41		
-9.999837E-03	1.473783E-03				3/17/99 15:32:44		
9.999858E-03	-1.478233E-03				3/17/99 15:32:47		
9.999855E-03	-1.478241E-03				3/17/99 15:32:50		
-9.999841E-03	1.473789E-03				3/17/99 15:32:53		
-9.999841E-03	1.473786E-03				3/17/99 15:32:55		
9.999858E-03	-1.478252E-03				3/17/99 15:32:58		
9.999855E-03	-1.478243E-03				3/17/99 15:33:01		
-9.999841E-03	1.473794E-03				3/17/99 15:33:04		
-9.999838E-03	1.473785E-03				3/17/99 15:33:07		
9.999858E-03	-1.478241E-03				3/17/99 15:33:10		
9.999857E-03	-1.478242E-03				3/17/99 15:33:12		
-9.999845E-03	1.473783E-03				3/17/99 15:33:15		
-9.999841E-03	1.473790E-03				3/17/99 15:33:18		
9.999855E-03	-1.478234E-03				3/17/99 15:33:21		
9.999854E-03	-1.478237E-03				3/17/99 15:33:24		
-9.999837E-03	1.473794E-03				3/17/99 15:33:26		
-9.999834E-03	1.473791E-03				3/17/99 15:33:29		
9.999854E-03	-1.478237E-03				3/17/99 15:33:32		
9.999848E-03	-1.478242E-03				3/17/99 15:33:35		
-9.999844E-03	1.473792E-03				3/17/99 15:33:38		
-9.999841E-03	1.473802E-03				3/17/99 15:33:41		
9.999851E-03	-1.478243E-03				3/17/99 15:33:43		
9.999848E-03	1.476018E-03	0.1476040	5.047303E-07	1.475999E-05	3/17/99 15:33:48	4976.947725	4.726492284

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#1		Beam Energy= 1.1 GeV		Time on target= 135 minutes			
End of second and last irradiation at 1.1 GeV							
1.499791E-02	-2.216392E-03				3/17/99 15:34:33		
-1.499979E-02	2.211412E-03				3/17/99 15:34:36		
-1.499980E-02	2.211429E-03				3/17/99 15:34:39		
1.499794E-02	-2.216391E-03				3/17/99 15:34:42		
1.499796E-02	-2.216374E-03				3/17/99 15:34:44		
-1.499984E-02	2.211419E-03				3/17/99 15:34:47		
-1.499982E-02	2.211432E-03				3/17/99 15:34:50		
1.499799E-02	-2.216379E-03				3/17/99 15:34:53		
1.499800E-02	-2.216385E-03				3/17/99 15:34:56		
-1.499986E-02	2.211436E-03				3/17/99 15:34:59		
-1.499987E-02	2.211432E-03				3/17/99 15:35:01		
1.499801E-02	-2.216377E-03				3/17/99 15:35:04		
1.499802E-02	-2.216368E-03				3/17/99 15:35:07		
-1.499986E-02	2.211444E-03				3/17/99 15:35:10		
-1.499989E-02	2.211456E-03				3/17/99 15:35:13		
1.499804E-02	-2.216387E-03				3/17/99 15:35:16		
1.499806E-02	-2.216379E-03				3/17/99 15:35:18		
-1.499986E-02	2.211447E-03				3/17/99 15:35:21		
-1.499985E-02	2.211446E-03				3/17/99 15:35:24		
1.499805E-02	-2.216364E-03				3/17/99 15:35:27		
1.499804E-02	-2.216371E-03				3/17/99 15:35:30		
-1.499987E-02	2.211448E-03				3/17/99 15:35:33		
-1.499985E-02	2.211441E-03				3/17/99 15:35:35		
1.499805E-02	-2.216374E-03				3/17/99 15:35:38		
1.499802E-02	-2.216359E-03				3/17/99 15:35:41		
-1.499992E-02	2.211470E-03				3/17/99 15:35:44		
-1.499994E-02	2.211471E-03				3/17/99 15:35:47		
1.499804E-02	-2.216348E-03				3/17/99 15:35:50		
1.499802E-02	-2.216363E-03				3/17/99 15:35:52		
-1.499995E-02	2.211464E-03				3/17/99 15:35:55		
-1.499993E-02	2.211463E-03				3/17/99 15:35:58		
1.499811E-02	-2.216351E-03				3/17/99 15:36:01		
1.499811E-02	-2.216375E-03				3/17/99 15:36:04		
-1.499994E-02	2.211460E-03				3/17/99 15:36:06		
-1.499996E-02	2.211467E-03				3/17/99 15:36:09		
1.499812E-02	-2.216370E-03				3/17/99 15:36:12		
1.499811E-02	-2.216371E-03				3/17/99 15:36:15		
-1.500000E-02	2.211479E-03				3/17/99 15:36:18		
-1.500002E-02	2.211481E-03				3/17/99 15:36:21		
1.499808E-02	-2.216348E-03				3/17/99 15:36:23		
1.499896E-02	2.213911E-03	0.1476042	4.021889E-07	3.320661E-05	3/17/99 15:36:28	4977.053861	4.726435783

Copper1.xls

Copper1.xls

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu1 Beam Energy=1.1 GeV Time on target= 135 mimutes							
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
5.000389E-03	-7.278614E-04				6/22/99 15:42:00		
-5.001009E-03	7.414288E-04				6/22/99 15:42:02		
-5.001006E-03	7.414328E-04				6/22/99 15:42:05		
5.000391E-03	-7.278644E-04				6/22/99 15:42:08		
5.000391E-03	-7.278864E-04				6/22/99 15:42:11		
-5.001013E-03	7.414072E-04				6/22/99 15:42:14		
-5.001016E-03	7.413976E-04				6/22/99 15:42:17		
5.000390E-03	-7.278665E-04				6/22/99 15:42:19		
5.000388E-03	-7.278707E-04				6/22/99 15:42:22		
-5.001017E-03	7.414132E-04				6/22/99 15:42:25		
-5.001012E-03	7.413949E-04				6/22/99 15:42:28		
5.000394E-03	-7.278852E-04				6/22/99 15:42:31		
5.000387E-03	-7.278749E-04				6/22/99 15:42:33		
-5.001022E-03	7.414106E-04				6/22/99 15:42:36		
-5.001018E-03	7.413955E-04				6/22/99 15:42:39		
5.000397E-03	-7.278950E-04				6/22/99 15:42:42		
5.000395E-03	-7.278738E-04				6/22/99 15:42:45		
-5.001024E-03	7.414184E-04				6/22/99 15:42:48		
-5.001022E-03	7.413976E-04				6/22/99 15:42:50		
5.000395E-03	-7.278926E-04				6/22/99 15:42:53		
5.000393E-03	-7.278802E-04				6/22/99 15:42:56		
-5.001021E-03	7.414109E-04				6/22/99 15:42:59		
-5.001018E-03	7.413926E-04				6/22/99 15:43:02		
5.000394E-03	-7.278886E-04				6/22/99 15:43:05		
5.000387E-03	-7.278848E-04				6/22/99 15:43:07		
-5.001015E-03	7.414022E-04				6/22/99 15:43:10		
-5.001013E-03	7.414035E-04				6/22/99 15:43:13		
5.000391E-03	-7.278985E-04				6/22/99 15:43:16		
5.000392E-03	-7.279035E-04				6/22/99 15:43:19		
-5.001014E-03	7.414047E-04				6/22/99 15:43:22		
-5.001015E-03	7.414093E-04				6/22/99 15:43:24		
5.000390E-03	-7.279006E-04				6/22/99 15:43:27		
5.000389E-03	-7.278806E-04				6/22/99 15:43:30		
-5.001022E-03	7.414053E-04				6/22/99 15:43:33		
-5.001021E-03	7.413934E-04				6/22/99 15:43:36		
5.000387E-03	-7.279159E-04				6/22/99 15:43:39		
5.000385E-03	-7.278858E-04				6/22/99 15:43:41		
-5.001022E-03	7.414006E-04				6/22/99 15:43:44		
-5.001017E-03	7.413959E-04				6/22/99 15:43:47		
5.000389E-03	-7.279063E-04				6/22/99 15:43:50		
5.000704E-03	7.346458E-04	0.1469085	1.100554E-06	3.673772E-06	6/22/99 15:43:54	4793.950906	4.827258697

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu1 Beam Energy=1.1 GeV Time on target= 135 minutes							
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
9.999970E-03	-1.462402E-03				6/22/99 15:45:20		
-1.000027E-02	1.475789E-03				6/22/99 15:45:23		
-1.000027E-02	1.475802E-03				6/22/99 15:45:26		
9.999976E-03	-1.462410E-03				6/22/99 15:45:28		
9.999967E-03	-1.462390E-03				6/22/99 15:45:31		
-1.000028E-02	1.475814E-03				6/22/99 15:45:34		
-1.000027E-02	1.475808E-03				6/22/99 15:45:37		
9.999977E-03	-1.462398E-03				6/22/99 15:45:40		
9.999970E-03	-1.462380E-03				6/22/99 15:45:42		
-1.000028E-02	1.475805E-03				6/22/99 15:45:45		
-1.000028E-02	1.475836E-03				6/22/99 15:45:48		
9.999968E-03	-1.462387E-03				6/22/99 15:45:51		
9.999963E-03	-1.462362E-03				6/22/99 15:45:54		
-1.000028E-02	1.475813E-03				6/22/99 15:45:57		
-1.000028E-02	1.475832E-03				6/22/99 15:45:59		
9.999969E-03	-1.462359E-03				6/22/99 15:46:02		
9.999963E-03	-1.462350E-03				6/22/99 15:46:05		
-1.000028E-02	1.475819E-03				6/22/99 15:46:08		
-1.000028E-02	1.475838E-03				6/22/99 15:46:11		
9.999965E-03	-1.462374E-03				6/22/99 15:46:14		
9.999961E-03	-1.462364E-03				6/22/99 15:46:16		
-1.000029E-02	1.475826E-03				6/22/99 15:46:19		
-1.000028E-02	1.475824E-03				6/22/99 15:46:22		
9.999970E-03	-1.462348E-03				6/22/99 15:46:25		
9.999962E-03	-1.462375E-03				6/22/99 15:46:28		
-1.000029E-02	1.475845E-03				6/22/99 15:46:31		
-1.000028E-02	1.475833E-03				6/22/99 15:46:33		
9.999971E-03	-1.462358E-03				6/22/99 15:46:36		
9.999966E-03	1.310438E+01				6/22/99 15:46:39		
-1.000028E-02	1.475683E-03				6/22/99 15:46:41		
-1.000028E-02	1.475814E-03				6/22/99 15:46:44		
9.999967E-03	-1.462405E-03				6/22/99 15:46:47		
9.999968E-03	-1.462375E-03				6/22/99 15:46:50		
-1.000028E-02	1.475819E-03				6/22/99 15:46:53		
-1.000028E-02	1.475822E-03				6/22/99 15:46:56		
9.999973E-03	-1.462393E-03				6/22/99 15:46:58		
9.999967E-03	-1.462394E-03				6/22/99 15:47:01		
-1.000028E-02	1.475817E-03				6/22/99 15:47:04		
-1.000027E-02	1.475829E-03				6/22/99 15:47:07		
9.999973E-03	-1.462366E-03				6/22/99 15:47:10		
1.000012E-02	3.290421E-01	32.9037970	1.427840E+02	1.469115E-05	6/22/99 15:47:14	4793.72	4.827390232

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu1 Beam Energy=1.1 GeV Time on target= 135 mimutes							
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
9.999963E-03	-1.462402E-03				6/22/99 15:48:14		
-1.000027E-02	1.475771E-03				6/22/99 15:48:16		
-1.000027E-02	1.475762E-03				6/22/99 15:48:19		
9.999977E-03	-1.462411E-03				6/22/99 15:48:22		
9.999976E-03	-1.462405E-03				6/22/99 15:48:25		
-1.000027E-02	1.475773E-03				6/22/99 15:48:28		
-1.000027E-02	1.475788E-03				6/22/99 15:48:31		
9.999973E-03	-1.462389E-03				6/22/99 15:48:33		
9.999963E-03	-1.462401E-03				6/22/99 15:48:36		
-1.000028E-02	1.475771E-03				6/22/99 15:48:39		
-1.000027E-02	1.475805E-03				6/22/99 15:48:42		
9.999973E-03	-1.462383E-03				6/22/99 15:48:45		
9.999965E-03	-1.462384E-03				6/22/99 15:48:48		
-1.000028E-02	1.475797E-03				6/22/99 15:48:50		
-1.000028E-02	1.475811E-03				6/22/99 15:48:53		
9.999971E-03	-1.462386E-03				6/22/99 15:48:56		
9.999965E-03	-1.462388E-03				6/22/99 15:48:59		
-1.000028E-02	1.475788E-03				6/22/99 15:49:02		
-1.000028E-02	1.475793E-03				6/22/99 15:49:05		
9.999977E-03	-1.462392E-03				6/22/99 15:49:07		
9.999969E-03	-1.462385E-03				6/22/99 15:49:10		
-1.000028E-02	1.475808E-03				6/22/99 15:49:13		
-1.000027E-02	1.475811E-03				6/22/99 15:49:16		
9.999967E-03	-1.462384E-03				6/22/99 15:49:19		
9.999964E-03	-1.462375E-03				6/22/99 15:49:22		
-1.000029E-02	1.475808E-03				6/22/99 15:49:24		
-1.000029E-02	1.475804E-03				6/22/99 15:49:27		
9.999964E-03	-1.462379E-03				6/22/99 15:49:30		
9.999964E-03	-1.462387E-03				6/22/99 15:49:33		
-1.000029E-02	1.475825E-03				6/22/99 15:49:36		
-1.000028E-02	1.475814E-03				6/22/99 15:49:38		
9.999971E-03	-1.462385E-03				6/22/99 15:49:41		
9.999962E-03	-1.462393E-03				6/22/99 15:49:44		
-1.000028E-02	1.475815E-03				6/22/99 15:49:47		
-1.000028E-02	1.475806E-03				6/22/99 15:49:50		
9.999967E-03	-1.462378E-03				6/22/99 15:49:53		
9.999960E-03	-1.462393E-03				6/22/99 15:49:55		
-1.000029E-02	1.475794E-03				6/22/99 15:49:58		
-1.000028E-02	1.475811E-03				6/22/99 15:50:01		
9.999979E-03	-1.462402E-03				6/22/99 15:50:04		
1.000012E-02	1.469094E-03	0.1469076	6.029610E-07	1.469126E-05	6/22/99 15:50:08	4793.067034	4.827762252

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. on Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu1 Beam Energy=1.1 GeV Time on target= 135 minutes							
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
1.500124E-02	-2.197149E-03				6/22/99 15:50:58		
-1.500674E-02	2.211221E-03				6/22/99 15:51:01		
-1.500676E-02	2.211201E-03				6/22/99 15:51:04		
1.500137E-02	-2.197173E-03				6/22/99 15:51:06		
1.500141E-02	-2.197171E-03				6/22/99 15:51:09		
-1.500663E-02	2.211188E-03				6/22/99 15:51:12		
-1.500659E-02	2.211204E-03				6/22/99 15:51:15		
1.500138E-02	-2.197143E-03				6/22/99 15:51:18		
1.500139E-02	-2.197161E-03				6/22/99 15:51:21		
-1.500664E-02	2.211224E-03				6/22/99 15:51:23		
-1.500669E-02	2.211233E-03				6/22/99 15:51:26		
1.500141E-02	-2.197147E-03				6/22/99 15:51:29		
1.500147E-02	-2.197156E-03				6/22/99 15:51:32		
-1.500660E-02	2.211218E-03				6/22/99 15:51:35		
-1.500665E-02	2.211239E-03				6/22/99 15:51:38		
1.500142E-02	-2.197124E-03				6/22/99 15:51:40		
1.500145E-02	-2.197160E-03				6/22/99 15:51:43		
-1.500660E-02	2.211223E-03				6/22/99 15:51:46		
-1.500657E-02	2.211225E-03				6/22/99 15:51:49		
1.500139E-02	-2.197138E-03				6/22/99 15:51:52		
1.500139E-02	-2.197166E-03				6/22/99 15:51:54		
-1.500664E-02	2.211246E-03				6/22/99 15:51:57		
-1.500663E-02	2.211211E-03				6/22/99 15:52:00		
1.500143E-02	-2.197141E-03				6/22/99 15:52:03		
1.500142E-02	-2.197133E-03				6/22/99 15:52:06		
-1.500663E-02	2.211227E-03				6/22/99 15:52:09		
-1.500666E-02	2.211235E-03				6/22/99 15:52:11		
1.500136E-02	-2.197118E-03				6/22/99 15:52:14		
1.500145E-02	-2.197117E-03				6/22/99 15:52:17		
-1.500664E-02	2.211241E-03				6/22/99 15:52:20		
-1.500661E-02	2.211247E-03				6/22/99 15:52:23		
1.500141E-02	-2.197134E-03				6/22/99 15:52:26		
1.500145E-02	-2.197135E-03				6/22/99 15:52:28		
-1.500655E-02	2.211185E-03				6/22/99 15:52:31		
-1.500654E-02	2.211207E-03				6/22/99 15:52:34		
1.500141E-02	-2.197142E-03				6/22/99 15:52:37		
1.500140E-02	-2.197166E-03				6/22/99 15:52:40		
-1.500659E-02	2.211197E-03				6/22/99 15:52:43		
-1.500660E-02	2.211245E-03				6/22/99 15:52:45		
1.500145E-02	-2.197149E-03				6/22/99 15:52:48		
1.500402E-02	2.204184E-03	0.1469062	5.964840E-07	3.307182E-05	6/22/99 15:52:52	4792.657526	4.827995612

APPENDIX 3

**EXCEL DATA FILE OF RESISTANCE MEASUREMENTS
OF COPPER SAMPLE #2**

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 0	Time on target= 0				
Pre-irradiation resistivity data at room temperature prior to testing at 1.94 GeV							
5.000259E-05	-8.657660E-04				3/16/99 4:37:18		
-5.000510E-05	8.659028E-04				3/16/99 4:37:21		
-5.000513E-05	8.659079E-04				3/16/99 4:37:23		
5.000263E-05	-8.657481E-04				3/16/99 4:37:26		
5.000261E-05	-8.657446E-04				3/16/99 4:37:29		
-5.000514E-05	8.659243E-04				3/16/99 4:37:32		
-5.000515E-05	8.659352E-04				3/16/99 4:37:35		
5.000263E-05	-8.657223E-04				3/16/99 4:37:38		
5.000263E-05	-8.657177E-04				3/16/99 4:37:40		
-5.000514E-05	8.659471E-04				3/16/99 4:37:43		
-5.000512E-05	8.659476E-04				3/16/99 4:37:46		
5.000264E-05	-8.657050E-04				3/16/99 4:37:49		
5.000267E-05	-8.657146E-04				3/16/99 4:37:52		
-5.000515E-05	8.659608E-04				3/16/99 4:37:55		
-5.000518E-05	8.659583E-04				3/16/99 4:37:57		
5.000264E-05	-8.656872E-04				3/16/99 4:38:00		
5.000263E-05	-8.656959E-04				3/16/99 4:38:03		
-5.000516E-05	8.659776E-04				3/16/99 4:38:06		
-5.000521E-05	8.659770E-04				3/16/99 4:38:09		
5.000259E-05	-8.656680E-04				3/16/99 4:38:12		
5.000262E-05	-8.656831E-04				3/16/99 4:38:14		
-5.000521E-05	8.659771E-04				3/16/99 4:38:17		
-5.000519E-05	8.659776E-04				3/16/99 4:38:20		
5.000263E-05	-8.656800E-04				3/16/99 4:38:23		
5.000260E-05	-8.656743E-04				3/16/99 4:38:26		
-5.000520E-05	8.659876E-04				3/16/99 4:38:28		
-5.000518E-05	8.659964E-04				3/16/99 4:38:31		
5.000261E-05	-8.656846E-04				3/16/99 4:38:34		
5.000263E-05	-8.656633E-04				3/16/99 4:38:37		
-5.000516E-05	8.659989E-04				3/16/99 4:38:40		
-5.000512E-05	8.659965E-04				3/16/99 4:38:43		
5.000264E-05	-8.656540E-04				3/16/99 4:38:45		
5.000269E-05	-8.656528E-04				3/16/99 4:38:48		
-5.000513E-05	8.659988E-04				3/16/99 4:38:51		
-5.000512E-05	8.660099E-04				3/16/99 4:38:54		
5.000271E-05	-8.656538E-04				3/16/99 4:38:57		
5.000271E-05	-8.656548E-04				3/16/99 4:39:00		
-5.000520E-05	8.660288E-04				3/16/99 4:39:02		
-5.000517E-05	8.660226E-04				3/16/99 4:39:05		
5.000274E-05	-8.656396E-04				3/16/99 4:39:08		
5.000390E-05	8.658311E-04	17.3152706	1.041166E-04	4.329498E-08	3/16/99 4:39:12	60.50701688	290.8810806

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 0 Time on target= 0							
Pre-irradiation resistivity data at room temperature prior to testing at 1.94 GeV							
5.000234E-04	-8.657561E-03				3/16/99 4:40:15		
-5.000655E-04	8.657989E-03				3/16/99 4:40:18		
-5.000649E-04	8.658011E-03				3/16/99 4:40:21		
5.000233E-04	-8.657548E-03				3/16/99 4:40:24		
5.000231E-04	-8.657568E-03				3/16/99 4:40:26		
-5.000649E-04	8.658045E-03				3/16/99 4:40:29		
-5.000646E-04	8.658015E-03				3/16/99 4:40:32		
5.000239E-04	-8.657554E-03				3/16/99 4:40:35		
5.000239E-04	-8.657574E-03				3/16/99 4:40:38		
-5.000648E-04	8.658040E-03				3/16/99 4:40:41		
-5.000652E-04	8.658041E-03				3/16/99 4:40:43		
5.000241E-04	-8.657552E-03				3/16/99 4:40:46		
5.000244E-04	-8.657565E-03				3/16/99 4:40:49		
-5.000655E-04	8.658084E-03				3/16/99 4:40:52		
-5.000654E-04	8.658066E-03				3/16/99 4:40:55		
5.000241E-04	-8.657569E-03				3/16/99 4:40:58		
5.000242E-04	-8.657547E-03				3/16/99 4:41:00		
-5.000658E-04	8.658082E-03				3/16/99 4:41:03		
-5.000652E-04	8.658084E-03				3/16/99 4:41:06		
5.000232E-04	-8.657531E-03				3/16/99 4:41:09		
5.000231E-04	-8.657522E-03				3/16/99 4:41:12		
-5.000653E-04	8.658074E-03				3/16/99 4:41:15		
-5.000648E-04	8.658102E-03				3/16/99 4:41:17		
5.000237E-04	-8.657554E-03				3/16/99 4:41:20		
5.000238E-04	-8.657530E-03				3/16/99 4:41:23		
-5.000652E-04	8.658100E-03				3/16/99 4:41:26		
-5.000651E-04	8.658126E-03				3/16/99 4:41:29		
5.000233E-04	-8.657490E-03				3/16/99 4:41:32		
5.000232E-04	-8.657522E-03				3/16/99 4:41:34		
-5.000652E-04	8.658099E-03				3/16/99 4:41:37		
-5.000649E-04	8.658130E-03				3/16/99 4:41:40		
5.000234E-04	-8.657542E-03				3/16/99 4:41:43		
5.000239E-04	-8.657544E-03				3/16/99 4:41:46		
-5.000652E-04	8.658106E-03				3/16/99 4:41:48		
-5.000655E-04	8.658119E-03				3/16/99 4:41:51		
5.000237E-04	-8.657525E-03				3/16/99 4:41:54		
5.000241E-04	-8.657544E-03				3/16/99 4:41:57		
-5.000657E-04	8.658108E-03				3/16/99 4:42:00		
-5.000656E-04	8.658111E-03				3/16/99 4:42:03		
5.000238E-04	-8.657520E-03				3/16/99 4:42:05		
5.000444E-04	8.657810E-03	17.3140807	3.008804E-05	4.329294E-06	3/16/99 4:42:10	60.53214081	290.7412201

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 0	Time on target= 0				
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
5.000195E-03	-6.988397E-04				3/16/99 6:18:21		
-5.000706E-03	6.836869E-04				3/16/99 6:18:23		
-5.000706E-03	6.836767E-04				3/16/99 6:18:26		
5.000203E-03	-6.988511E-04				3/16/99 6:18:29		
5.000198E-03	-6.988559E-04				3/16/99 6:18:32		
-5.000707E-03	6.836998E-04				3/16/99 6:18:35		
-5.000710E-03	6.836975E-04				3/16/99 6:18:38		
5.000202E-03	-6.988376E-04				3/16/99 6:18:40		
5.000204E-03	-6.988168E-04				3/16/99 6:18:43		
-5.000707E-03	6.837132E-04				3/16/99 6:18:46		
-5.000707E-03	6.837052E-04				3/16/99 6:18:49		
5.000201E-03	-6.988175E-04				3/16/99 6:18:52		
5.000205E-03	-6.988097E-04				3/16/99 6:18:54		
-5.000709E-03	6.837025E-04				3/16/99 6:18:57		
-5.000707E-03	6.837269E-04				3/16/99 6:19:00		
5.000202E-03	-6.988070E-04				3/16/99 6:19:03		
5.000200E-03	-6.988265E-04				3/16/99 6:19:06		
-5.000706E-03	6.837251E-04				3/16/99 6:19:09		
-5.000707E-03	6.837245E-04				3/16/99 6:19:11		
5.000202E-03	-6.988087E-04				3/16/99 6:19:14		
5.000200E-03	-6.987994E-04				3/16/99 6:19:17		
-5.000709E-03	6.837092E-04				3/16/99 6:19:20		
-5.000706E-03	6.837150E-04				3/16/99 6:19:23		
5.000202E-03	-6.988158E-04				3/16/99 6:19:26		
5.000202E-03	-6.988200E-04				3/16/99 6:19:28		
-5.000709E-03	6.837150E-04				3/16/99 6:19:31		
-5.000705E-03	6.837181E-04				3/16/99 6:19:34		
5.000205E-03	-6.988172E-04				3/16/99 6:19:37		
5.000203E-03	-6.988309E-04				3/16/99 6:19:40		
-5.000715E-03	6.837076E-04				3/16/99 6:19:43		
-5.000710E-03	6.837094E-04				3/16/99 6:19:45		
5.000202E-03	-6.988236E-04				3/16/99 6:19:48		
5.000204E-03	-6.988128E-04				3/16/99 6:19:51		
-5.000710E-03	6.837033E-04				3/16/99 6:19:54		
-5.000711E-03	6.837030E-04				3/16/99 6:19:57		
5.000199E-03	-6.988108E-04				3/16/99 6:20:00		
5.000202E-03	-6.988315E-04				3/16/99 6:20:02		
-5.000712E-03	6.837103E-04				3/16/99 6:20:05		
-5.000706E-03	6.837059E-04				3/16/99 6:20:08		
5.000202E-03	-6.988230E-04				3/16/99 6:20:11		
5.000455E-03	6.912653E-04	0.1382405	1.178252E-06	3.456636E-06	3/16/99 6:20:15	4867.324016	4.786034461

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 0	Time on target= 0				
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
9.999787E-03	-1.389999E-03				3/16/99 6:21:10		
-1.000001E-02	1.374765E-03				3/16/99 6:21:13		
-1.000001E-02	1.374772E-03				3/16/99 6:21:16		
9.999796E-03	-1.390011E-03				3/16/99 6:21:18		
9.999794E-03	-1.390003E-03				3/16/99 6:21:21		
-1.000001E-02	1.374759E-03				3/16/99 6:21:24		
-1.000001E-02	1.374765E-03				3/16/99 6:21:27		
9.999800E-03	-1.389997E-03				3/16/99 6:21:30		
9.999794E-03	-1.389987E-03				3/16/99 6:21:33		
-1.000001E-02	1.374778E-03				3/16/99 6:21:35		
-1.000000E-02	1.374788E-03				3/16/99 6:21:38		
9.999797E-03	-1.389983E-03				3/16/99 6:21:41		
9.999790E-03	-1.389976E-03				3/16/99 6:21:44		
-1.000002E-02	1.374807E-03				3/16/99 6:21:47		
-1.000001E-02	1.374793E-03				3/16/99 6:21:50		
9.999798E-03	-1.389984E-03				3/16/99 6:21:52		
9.999794E-03	-1.389966E-03				3/16/99 6:21:55		
-1.000001E-02	1.374812E-03				3/16/99 6:21:58		
-1.000001E-02	1.374802E-03				3/16/99 6:22:01		
9.999799E-03	-1.389968E-03				3/16/99 6:22:04		
9.999789E-03	-1.389979E-03				3/16/99 6:22:07		
-1.000002E-02	1.374800E-03				3/16/99 6:22:09		
-1.000002E-02	1.374805E-03				3/16/99 6:22:12		
9.999797E-03	-1.389959E-03				3/16/99 6:22:15		
9.999793E-03	-1.389979E-03				3/16/99 6:22:18		
-1.000002E-02	1.374816E-03				3/16/99 6:22:21		
-1.000002E-02	1.374822E-03				3/16/99 6:22:24		
9.999796E-03	-1.389957E-03				3/16/99 6:22:26		
9.999791E-03	-1.389954E-03				3/16/99 6:22:29		
-1.000002E-02	1.374833E-03				3/16/99 6:22:32		
-1.000001E-02	1.374831E-03				3/16/99 6:22:35		
9.999792E-03	-1.389950E-03				3/16/99 6:22:38		
9.999784E-03	-1.389963E-03				3/16/99 6:22:40		
-1.000002E-02	1.374826E-03				3/16/99 6:22:43		
-1.000002E-02	1.374812E-03				3/16/99 6:22:46		
9.999789E-03	-1.389943E-03				3/16/99 6:22:49		
9.999781E-03	-1.389968E-03				3/16/99 6:22:52		
-1.000002E-02	1.374815E-03				3/16/99 6:22:55		
-1.000002E-02	1.374820E-03				3/16/99 6:22:57		
9.999787E-03	-1.389961E-03				3/16/99 6:23:00		
9.999903E-03	1.382388E-03	0.1382401	5.158274E-07	1.382377E-05	3/16/99 6:23:04	4867.497871	4.785938117

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 0		Time on target= 0			
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
1.499905E-02	-2.081237E-03				3/16/99 6:23:57		
-1.500317E-02	2.066267E-03				3/16/99 6:24:00		
-1.500318E-02	2.066247E-03				3/16/99 6:24:03		
1.499900E-02	-2.081232E-03				3/16/99 6:24:06		
1.499901E-02	-2.081233E-03				3/16/99 6:24:09		
-1.500317E-02	2.066241E-03				3/16/99 6:24:12		
-1.500317E-02	2.066237E-03				3/16/99 6:24:14		
1.499900E-02	-2.081238E-03				3/16/99 6:24:17		
1.499905E-02	-2.081244E-03				3/16/99 6:24:20		
-1.500306E-02	2.066228E-03				3/16/99 6:24:23		
-1.500306E-02	2.066229E-03				3/16/99 6:24:26		
1.499907E-02	-2.081255E-03				3/16/99 6:24:28		
1.499906E-02	-2.081229E-03				3/16/99 6:24:31		
-1.500314E-02	2.066218E-03				3/16/99 6:24:34		
-1.500309E-02	2.066262E-03				3/16/99 6:24:37		
1.499902E-02	-2.081227E-03				3/16/99 6:24:40		
1.499903E-02	-2.081264E-03				3/16/99 6:24:43		
-1.500310E-02	2.066235E-03				3/16/99 6:24:45		
-1.500312E-02	2.066217E-03				3/16/99 6:24:48		
1.499903E-02	-2.081243E-03				3/16/99 6:24:51		
1.499903E-02	-2.081240E-03				3/16/99 6:24:54		
-1.500316E-02	2.066241E-03				3/16/99 6:24:57		
-1.500311E-02	2.066249E-03				3/16/99 6:25:00		
1.499905E-02	-2.081244E-03				3/16/99 6:25:02		
1.499905E-02	-2.081246E-03				3/16/99 6:25:05		
-1.500314E-02	2.066241E-03				3/16/99 6:25:08		
-1.500310E-02	2.066244E-03				3/16/99 6:25:11		
1.499902E-02	-2.081228E-03				3/16/99 6:25:14		
1.499907E-02	-2.081243E-03				3/16/99 6:25:17		
-1.500315E-02	2.066270E-03				3/16/99 6:25:20		
-1.500318E-02	2.066256E-03				3/16/99 6:25:22		
1.499906E-02	-2.081235E-03				3/16/99 6:25:25		
1.499907E-02	-2.081241E-03				3/16/99 6:25:28		
-1.500318E-02	2.066251E-03				3/16/99 6:25:31		
-1.500310E-02	2.066250E-03				3/16/99 6:25:34		
1.499911E-02	-2.081264E-03				3/16/99 6:25:36		
1.499915E-02	-2.081288E-03				3/16/99 6:25:39		
-1.500308E-02	2.066229E-03				3/16/99 6:25:42		
-1.500308E-02	2.066232E-03				3/16/99 6:25:45		
1.499912E-02	-2.081259E-03				3/16/99 6:25:48		
1.500109E-02	2.073743E-03	0.1382395	5.277285E-07	3.110846E-05	3/16/99 6:25:52	4866.804817	4.78632222

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
5.000203E-03	-7.048609E-04				3/16/99 10:10:59		
-5.000508E-03	6.892365E-04				3/16/99 10:11:02		
-5.000509E-03	6.892460E-04				3/16/99 10:11:05		
5.000207E-03	-7.048659E-04				3/16/99 10:11:08		
5.000211E-03	-7.048634E-04				3/16/99 10:11:11		
-5.000513E-03	6.892372E-04				3/16/99 10:11:13		
-5.000517E-03	6.892446E-04				3/16/99 10:11:16		
5.000207E-03	-7.048528E-04				3/16/99 10:11:19		
5.000208E-03	-7.048476E-04				3/16/99 10:11:22		
-5.000512E-03	6.892465E-04				3/16/99 10:11:25		
-5.000511E-03	6.892547E-04				3/16/99 10:11:28		
5.000208E-03	-7.048470E-04				3/16/99 10:11:30		
5.000206E-03	-7.048452E-04				3/16/99 10:11:33		
-5.000515E-03	6.892621E-04				3/16/99 10:11:36		
-5.000513E-03	6.892756E-04				3/16/99 10:11:39		
5.000208E-03	-7.048378E-04				3/16/99 10:11:42		
5.000211E-03	-7.048313E-04				3/16/99 10:11:45		
-5.000514E-03	6.892567E-04				3/16/99 10:11:47		
-5.000515E-03	6.892564E-04				3/16/99 10:11:50		
5.000210E-03	-7.048248E-04				3/16/99 10:11:53		
5.000211E-03	-7.048408E-04				3/16/99 10:11:56		
-5.000520E-03	6.892731E-04				3/16/99 10:11:59		
-5.000520E-03	6.892733E-04				3/16/99 10:12:01		
5.000212E-03	-7.048287E-04				3/16/99 10:12:04		
5.000210E-03	-7.048260E-04				3/16/99 10:12:07		
-5.000521E-03	6.892778E-04				3/16/99 10:12:10		
-5.000520E-03	6.892766E-04				3/16/99 10:12:13		
5.000210E-03	-7.048251E-04				3/16/99 10:12:16		
5.000208E-03	-7.048047E-04				3/16/99 10:12:18		
-5.000527E-03	6.892769E-04				3/16/99 10:12:21		
-5.000524E-03	6.892879E-04				3/16/99 10:12:24		
5.000209E-03	-7.048123E-04				3/16/99 10:12:27		
5.000209E-03	-7.048126E-04				3/16/99 10:12:30		
-5.000527E-03	6.892938E-04				3/16/99 10:12:33		
-5.000527E-03	6.892860E-04				3/16/99 10:12:35		
5.000207E-03	-7.048137E-04				3/16/99 10:12:38		
5.000208E-03	-7.048052E-04				3/16/99 10:12:41		
-5.000525E-03	6.893031E-04				3/16/99 10:12:44		
-5.000519E-03	6.893009E-04				3/16/99 10:12:47		
5.000211E-03	-7.048012E-04				3/16/99 10:12:50		
5.000363E-03	6.970503E-04	0.1393999	8.979743E-07	3.485510E-06	3/16/99 10:12:54	4887.767112	4.77474805

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
9.999855E-03	-1.401701E-03				3/16/99 10:13:47		
-9.999881E-03	1.386228E-03				3/16/99 10:13:49		
-9.999875E-03	1.386225E-03				3/16/99 10:13:52		
9.999860E-03	-1.401703E-03				3/16/99 10:13:55		
9.999854E-03	-1.401697E-03				3/16/99 10:13:58		
-9.999880E-03	1.386226E-03				3/16/99 10:14:01		
-9.999875E-03	1.386221E-03				3/16/99 10:14:04		
9.999858E-03	-1.401694E-03				3/16/99 10:14:06		
9.999854E-03	-1.401695E-03				3/16/99 10:14:09		
-9.999885E-03	1.386235E-03				3/16/99 10:14:12		
-9.999879E-03	1.386230E-03				3/16/99 10:14:15		
9.999859E-03	-1.401680E-03				3/16/99 10:14:18		
9.999852E-03	-1.401697E-03				3/16/99 10:14:20		
-9.999884E-03	1.386228E-03				3/16/99 10:14:23		
-9.999884E-03	1.386237E-03				3/16/99 10:14:26		
9.999858E-03	-1.401686E-03				3/16/99 10:14:29		
9.999852E-03	-1.401684E-03				3/16/99 10:14:32		
-9.999893E-03	1.386228E-03				3/16/99 10:14:35		
-9.999888E-03	1.386240E-03				3/16/99 10:14:37		
9.999852E-03	-1.401677E-03				3/16/99 10:14:40		
9.999847E-03	-1.401680E-03				3/16/99 10:14:43		
-9.999887E-03	1.386246E-03				3/16/99 10:14:46		
-9.999882E-03	1.386244E-03				3/16/99 10:14:49		
9.999847E-03	-1.401676E-03				3/16/99 10:14:52		
9.999850E-03	-1.401686E-03				3/16/99 10:14:54		
-9.999885E-03	1.386235E-03				3/16/99 10:14:57		
-9.999881E-03	1.386248E-03				3/16/99 10:15:00		
9.999853E-03	-1.401678E-03				3/16/99 10:15:03		
9.999847E-03	-1.401671E-03				3/16/99 10:15:06		
-9.999885E-03	1.386236E-03				3/16/99 10:15:09		
-9.999883E-03	1.386243E-03				3/16/99 10:15:11		
9.999858E-03	-1.401672E-03				3/16/99 10:15:14		
9.999854E-03	-1.401668E-03				3/16/99 10:15:17		
-9.999883E-03	1.386249E-03				3/16/99 10:15:20		
-9.999882E-03	1.386239E-03				3/16/99 10:15:23		
9.999856E-03	-1.401667E-03				3/16/99 10:15:26		
9.999850E-03	-1.401667E-03				3/16/99 10:15:28		
-9.999896E-03	1.386253E-03				3/16/99 10:15:31		
-9.999895E-03	1.386252E-03				3/16/99 10:15:34		
9.999845E-03	-1.401662E-03				3/16/99 10:15:37		
9.999869E-03	1.393960E-03	0.1393978	3.535543E-07	1.393939E-05	3/16/99 10:15:41	4883.417654	4.77714219

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
1.499840E-02	-2.098758E-03				3/16/99 10:16:29		
-1.500086E-02	2.083082E-03				3/16/99 10:16:31		
-1.500086E-02	2.083088E-03				3/16/99 10:16:34		
1.499845E-02	-2.098763E-03				3/16/99 10:16:37		
1.499849E-02	-2.098758E-03				3/16/99 10:16:40		
-1.500083E-02	2.083104E-03				3/16/99 10:16:43		
-1.500081E-02	2.083086E-03				3/16/99 10:16:46		
1.499856E-02	-2.098768E-03				3/16/99 10:16:48		
1.499856E-02	-2.098764E-03				3/16/99 10:16:51		
-1.500077E-02	2.083104E-03				3/16/99 10:16:54		
-1.500076E-02	2.083116E-03				3/16/99 10:16:57		
1.499857E-02	-2.098767E-03				3/16/99 10:17:00		
1.499858E-02	-2.098764E-03				3/16/99 10:17:02		
-1.500082E-02	2.083102E-03				3/16/99 10:17:05		
-1.500080E-02	2.083104E-03				3/16/99 10:17:08		
1.499852E-02	-2.098748E-03				3/16/99 10:17:11		
1.499850E-02	-2.098768E-03				3/16/99 10:17:14		
-1.500078E-02	2.083096E-03				3/16/99 10:17:17		
-1.500081E-02	2.083117E-03				3/16/99 10:17:19		
1.499849E-02	-2.098728E-03				3/16/99 10:17:22		
1.499853E-02	-2.098752E-03				3/16/99 10:17:25		
-1.500079E-02	2.083113E-03				3/16/99 10:17:28		
-1.500080E-02	2.083117E-03				3/16/99 10:17:31		
1.499852E-02	-2.098744E-03				3/16/99 10:17:34		
1.499854E-02	-2.098738E-03				3/16/99 10:17:36		
-1.500082E-02	2.083102E-03				3/16/99 10:17:39		
-1.500081E-02	2.083090E-03				3/16/99 10:17:42		
1.499852E-02	-2.098742E-03				3/16/99 10:17:45		
1.499850E-02	-2.098744E-03				3/16/99 10:17:48		
-1.500085E-02	2.083099E-03				3/16/99 10:17:51		
-1.500082E-02	2.083115E-03				3/16/99 10:17:53		
1.499857E-02	-2.098760E-03				3/16/99 10:17:56		
1.499857E-02	-2.098750E-03				3/16/99 10:17:59		
-1.500083E-02	2.083124E-03				3/16/99 10:18:02		
-1.500085E-02	2.083123E-03				3/16/99 10:18:05		
1.499853E-02	-2.098748E-03				3/16/99 10:18:08		
1.499855E-02	-2.098741E-03				3/16/99 10:18:10		
-1.500088E-02	2.083133E-03				3/16/99 10:18:13		
-1.500091E-02	2.083118E-03				3/16/99 10:18:16		
1.499853E-02	-2.098742E-03				3/16/99 10:18:19		
1.499967E-02	2.090929E-03	0.1393983	4.126809E-07	3.136336E-05	3/16/99 10:18:23	4882.698441	4.77753845

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 1.94 GeV		Time on target= 2.5 hours			
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
5.000201E-03	-7.088585E-04				3/16/99 13:00:27		
-5.000557E-03	6.934063E-04				3/16/99 13:00:30		
-5.000558E-03	6.933986E-04				3/16/99 13:00:33		
5.000201E-03	-7.088667E-04				3/16/99 13:00:36		
5.000201E-03	-7.088590E-04				3/16/99 13:00:39		
-5.000564E-03	6.934123E-04				3/16/99 13:00:41		
-5.000565E-03	6.934264E-04				3/16/99 13:00:44		
5.000201E-03	-7.088505E-04				3/16/99 13:00:47		
5.000201E-03	-7.088429E-04				3/16/99 13:00:50		
-5.000562E-03	6.934145E-04				3/16/99 13:00:53		
-5.000562E-03	6.934326E-04				3/16/99 13:00:56		
5.000196E-03	-7.088405E-04				3/16/99 13:00:58		
5.000200E-03	-7.088365E-04				3/16/99 13:01:01		
-5.000563E-03	6.934300E-04				3/16/99 13:01:04		
-5.000566E-03	6.934276E-04				3/16/99 13:01:07		
5.000199E-03	-7.088351E-04				3/16/99 13:01:10		
5.000203E-03	-7.088343E-04				3/16/99 13:01:13		
-5.000573E-03	6.934268E-04				3/16/99 13:01:15		
-5.000572E-03	6.934416E-04				3/16/99 13:01:18		
5.000201E-03	-7.088332E-04				3/16/99 13:01:21		
5.000201E-03	-7.088308E-04				3/16/99 13:01:24		
-5.000568E-03	6.934395E-04				3/16/99 13:01:27		
-5.000572E-03	6.934371E-04				3/16/99 13:01:30		
5.000212E-03	-7.088211E-04				3/16/99 13:01:32		
5.000212E-03	-7.088279E-04				3/16/99 13:01:35		
-5.000566E-03	6.934437E-04				3/16/99 13:01:38		
-5.000565E-03	6.934443E-04				3/16/99 13:01:41		
5.000210E-03	-7.088192E-04				3/16/99 13:01:44		
5.000209E-03	-7.088242E-04				3/16/99 13:01:47		
-5.000572E-03	6.934563E-04				3/16/99 13:01:49		
-5.000571E-03	6.934609E-04				3/16/99 13:01:52		
5.000209E-03	-7.088148E-04				3/16/99 13:01:55		
5.000204E-03	-7.088128E-04				3/16/99 13:01:58		
-5.000570E-03	6.934509E-04				3/16/99 13:02:01		
-5.000570E-03	6.934622E-04				3/16/99 13:02:04		
5.000207E-03	-7.087995E-04				3/16/99 13:02:06		
5.000203E-03	-7.088160E-04				3/16/99 13:02:09		
-5.000565E-03	6.934717E-04				3/16/99 13:02:12		
-5.000564E-03	6.934651E-04				3/16/99 13:02:15		
5.000205E-03	-7.088161E-04				3/16/99 13:02:18		
5.000385E-03	7.011347E-04	0.1402161	8.105003E-07	3.505973E-06	3/16/99 13:02:22	4859.840047	4.790187722

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 1.94 GeV		Time on target= 2.5 hours			
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
9.999827E-03	-1.409817E-03				3/16/99 13:03:06		
-9.999918E-03	1.394470E-03				3/16/99 13:03:09		
-9.999917E-03	1.394478E-03				3/16/99 13:03:12		
9.999831E-03	-1.409810E-03				3/16/99 13:03:15		
9.999829E-03	-1.409798E-03				3/16/99 13:03:17		
-9.999915E-03	1.394457E-03				3/16/99 13:03:20		
-9.999909E-03	1.394465E-03				3/16/99 13:03:23		
9.999834E-03	-1.409803E-03				3/16/99 13:03:26		
9.999835E-03	-1.409806E-03				3/16/99 13:03:29		
-9.999914E-03	1.394473E-03				3/16/99 13:03:32		
-9.999909E-03	1.394451E-03				3/16/99 13:03:34		
9.999833E-03	-1.409805E-03				3/16/99 13:03:37		
9.999832E-03	-1.409814E-03				3/16/99 13:03:40		
-9.999916E-03	1.394466E-03				3/16/99 13:03:43		
-9.999913E-03	1.394475E-03				3/16/99 13:03:46		
9.999833E-03	-1.409805E-03				3/16/99 13:03:49		
9.999827E-03	-1.409798E-03				3/16/99 13:03:51		
-9.999922E-03	1.394474E-03				3/16/99 13:03:54		
-9.999922E-03	1.394469E-03				3/16/99 13:03:57		
9.999831E-03	-1.409791E-03				3/16/99 13:04:00		
9.999827E-03	-1.409801E-03				3/16/99 13:04:03		
-9.999921E-03	1.394476E-03				3/16/99 13:04:05		
-9.999912E-03	1.394469E-03				3/16/99 13:04:08		
9.999836E-03	-1.409798E-03				3/16/99 13:04:11		
9.999832E-03	-1.409809E-03				3/16/99 13:04:14		
-9.999921E-03	1.394471E-03				3/16/99 13:04:17		
-9.999918E-03	1.394474E-03				3/16/99 13:04:20		
9.999835E-03	-1.409790E-03				3/16/99 13:04:22		
9.999833E-03	-1.409798E-03				3/16/99 13:04:25		
-9.999926E-03	1.394495E-03				3/16/99 13:04:28		
-9.999922E-03	1.394477E-03				3/16/99 13:04:31		
9.999836E-03	-1.409784E-03				3/16/99 13:04:34		
9.999829E-03	-1.409790E-03				3/16/99 13:04:37		
-9.999926E-03	1.394478E-03				3/16/99 13:04:39		
-9.999925E-03	1.394488E-03				3/16/99 13:04:42		
9.999835E-03	-1.409784E-03				3/16/99 13:04:45		
9.999833E-03	-1.409790E-03				3/16/99 13:04:48		
-9.999923E-03	1.394475E-03				3/16/99 13:04:51		
-9.999917E-03	1.394480E-03				3/16/99 13:04:54		
9.999836E-03	-1.409804E-03				3/16/99 13:04:56		
9.999875E-03	1.402136E-03	0.1402154	5.262513E-07	1.402125E-05	3/16/99 13:05:01	4860.54928	4.789793634

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 1.94 GeV		Time on target= 2.5 hours			
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
1.499851E-02	-2.110938E-03				3/16/99 13:05:38		
-1.500141E-02	2.095531E-03				3/16/99 13:05:41		
-1.500145E-02	2.095510E-03				3/16/99 13:05:43		
1.499851E-02	-2.110951E-03				3/16/99 13:05:46		
1.499852E-02	-2.110970E-03				3/16/99 13:05:49		
-1.500141E-02	2.095489E-03				3/16/99 13:05:52		
-1.500141E-02	2.095489E-03				3/16/99 13:05:55		
1.499853E-02	-2.110964E-03				3/16/99 13:05:58		
1.499853E-02	-2.110950E-03				3/16/99 13:06:00		
-1.500148E-02	2.095499E-03				3/16/99 13:06:03		
-1.500147E-02	2.095503E-03				3/16/99 13:06:06		
1.499847E-02	-2.110945E-03				3/16/99 13:06:09		
1.499850E-02	-2.110937E-03				3/16/99 13:06:12		
-1.500148E-02	2.095497E-03				3/16/99 13:06:15		
-1.500147E-02	2.095511E-03				3/16/99 13:06:17		
1.499850E-02	-2.110954E-03				3/16/99 13:06:20		
1.499854E-02	-2.110954E-03				3/16/99 13:06:23		
-1.500149E-02	2.095520E-03				3/16/99 13:06:26		
-1.500150E-02	2.095530E-03				3/16/99 13:06:29		
1.499853E-02	-2.110922E-03				3/16/99 13:06:31		
1.499852E-02	-2.110909E-03				3/16/99 13:06:34		
-1.500151E-02	2.095531E-03				3/16/99 13:06:37		
-1.500146E-02	2.095551E-03				3/16/99 13:06:40		
1.499852E-02	-2.110933E-03				3/16/99 13:06:43		
1.499853E-02	-2.110935E-03				3/16/99 13:06:46		
-1.500149E-02	2.095508E-03				3/16/99 13:06:48		
-1.500148E-02	2.095530E-03				3/16/99 13:06:51		
1.499857E-02	-2.110915E-03				3/16/99 13:06:54		
1.499856E-02	-2.110913E-03				3/16/99 13:06:57		
-1.500146E-02	2.095562E-03				3/16/99 13:07:00		
-1.500145E-02	2.095533E-03				3/16/99 13:07:03		
1.499857E-02	-2.110914E-03				3/16/99 13:07:05		
1.499856E-02	-2.110909E-03				3/16/99 13:07:08		
-1.500146E-02	2.095546E-03				3/16/99 13:07:11		
-1.500145E-02	2.095571E-03				3/16/99 13:07:14		
1.499853E-02	-2.110899E-03				3/16/99 13:07:17		
1.499857E-02	-2.110903E-03				3/16/99 13:07:20		
-1.500143E-02	2.095568E-03				3/16/99 13:07:22		
-1.500143E-02	2.095590E-03				3/16/99 13:07:25		
1.499858E-02	-2.110882E-03				3/16/99 13:07:28		
1.500000E-02	2.103229E-03	0.1402153	5.075611E-07	3.154855E-05	3/16/99 13:07:32	4860.358854	4.789899435

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 1.94 GeV		Time on target= approximately 13 minutes			
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
5.000193E-03	-7.088767E-04				3/16/99 14:52:35		
-5.000528E-03	6.914972E-04				3/16/99 14:52:38		
-5.000530E-03	6.915132E-04				3/16/99 14:52:40		
5.000194E-03	-7.088857E-04				3/16/99 14:52:43		
5.000193E-03	-7.088709E-04				3/16/99 14:52:46		
-5.000531E-03	6.915075E-04				3/16/99 14:52:49		
-5.000529E-03	6.915065E-04				3/16/99 14:52:52		
5.000195E-03	-7.088693E-04				3/16/99 14:52:55		
5.000198E-03	-7.088630E-04				3/16/99 14:52:57		
-5.000532E-03	6.915138E-04				3/16/99 14:53:00		
-5.000530E-03	6.915014E-04				3/16/99 14:53:03		
5.000203E-03	-7.088475E-04				3/16/99 14:53:06		
5.000202E-03	-7.088602E-04				3/16/99 14:53:09		
-5.000533E-03	6.915036E-04				3/16/99 14:53:11		
-5.000530E-03	6.915073E-04				3/16/99 14:53:14		
5.000200E-03	-7.088446E-04				3/16/99 14:53:17		
5.000198E-03	-7.088545E-04				3/16/99 14:53:20		
-5.000536E-03	6.915153E-04				3/16/99 14:53:23		
-5.000535E-03	6.915243E-04				3/16/99 14:53:26		
5.000197E-03	-7.088295E-04				3/16/99 14:53:28		
5.000198E-03	-7.088486E-04				3/16/99 14:53:31		
-5.000531E-03	6.915289E-04				3/16/99 14:53:34		
-5.000528E-03	6.915323E-04				3/16/99 14:53:37		
5.000198E-03	-7.088399E-04				3/16/99 14:53:40		
5.000195E-03	-7.088305E-04				3/16/99 14:53:43		
-5.000535E-03	6.915142E-04				3/16/99 14:53:45		
-5.000533E-03	6.915213E-04				3/16/99 14:53:48		
5.000193E-03	-7.088331E-04				3/16/99 14:53:51		
5.000196E-03	-7.088308E-04				3/16/99 14:53:54		
-5.000534E-03	6.915171E-04				3/16/99 14:53:57		
-5.000534E-03	6.915130E-04				3/16/99 14:54:00		
5.000202E-03	-7.088271E-04				3/16/99 14:54:02		
5.000205E-03	-7.088264E-04				3/16/99 14:54:05		
-5.000531E-03	6.915193E-04				3/16/99 14:54:08		
-5.000527E-03	6.915207E-04				3/16/99 14:54:11		
5.000202E-03	-7.088167E-04				3/16/99 14:54:14		
5.000198E-03	-7.088133E-04				3/16/99 14:54:16		
-5.000532E-03	6.915138E-04				3/16/99 14:54:19		
-5.000528E-03	6.915058E-04				3/16/99 14:54:22		
5.000202E-03	-7.088038E-04				3/16/99 14:54:25		
5.000365E-03	7.001787E-04	0.1400255	2.074308E-06	3.501029E-06	3/16/99 14:54:29	2464.791349	7.280323826

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 1.94 GeV		Time on target= approximately 13 minutes			
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
9.999727E-04	-1.486439E-04				3/16/99 14:55:06		
-9.999903E-04	1.313998E-04				3/16/99 14:55:09		
-9.999900E-04	1.314041E-04				3/16/99 14:55:12		
9.999729E-04	-1.486423E-04				3/16/99 14:55:15		
9.999728E-04	-1.486345E-04				3/16/99 14:55:18		
-9.999900E-04	1.314209E-04				3/16/99 14:55:21		
-9.999899E-04	1.314049E-04				3/16/99 14:55:23		
9.999729E-04	-1.486311E-04				3/16/99 14:55:26		
9.999727E-04	-1.486408E-04				3/16/99 14:55:29		
-9.999907E-04	1.314178E-04				3/16/99 14:55:32		
-9.999904E-04	1.314148E-04				3/16/99 14:55:35		
9.999729E-04	-1.486355E-04				3/16/99 14:55:38		
9.999721E-04	-1.486295E-04				3/16/99 14:55:40		
-9.999913E-04	1.314153E-04				3/16/99 14:55:43		
-9.999910E-04	1.314043E-04				3/16/99 14:55:46		
9.999730E-04	-1.486226E-04				3/16/99 14:55:49		
9.999726E-04	-1.486269E-04				3/16/99 14:55:52		
-9.999914E-04	1.314203E-04				3/16/99 14:55:55		
-9.999910E-04	1.314116E-04				3/16/99 14:55:57		
9.999735E-04	-1.486196E-04				3/16/99 14:56:00		
9.999726E-04	-1.486115E-04				3/16/99 14:56:03		
-9.999915E-04	1.314211E-04				3/16/99 14:56:06		
-9.999910E-04	1.314082E-04				3/16/99 14:56:09		
9.999727E-04	-1.486216E-04				3/16/99 14:56:12		
9.999719E-04	-1.486215E-04				3/16/99 14:56:14		
-9.999912E-04	1.314280E-04				3/16/99 14:56:17		
-9.999905E-04	1.314257E-04				3/16/99 14:56:20		
9.999725E-04	-1.486086E-04				3/16/99 14:56:23		
9.999727E-04	-1.486156E-04				3/16/99 14:56:26		
-9.999912E-04	1.314290E-04				3/16/99 14:56:28		
-9.999910E-04	1.314356E-04				3/16/99 14:56:31		
9.999727E-04	-1.485998E-04				3/16/99 14:56:34		
9.999722E-04	-1.486110E-04				3/16/99 14:56:37		
-9.999914E-04	1.314433E-04				3/16/99 14:56:40		
-9.999910E-04	1.314368E-04				3/16/99 14:56:43		
9.999730E-04	-1.486006E-04				3/16/99 14:56:45		
9.999727E-04	-1.485962E-04				3/16/99 14:56:48		
-9.999915E-04	1.314472E-04				3/16/99 14:56:51		
-9.999915E-04	1.314397E-04				3/16/99 14:56:54		
9.999729E-04	-1.485980E-04				3/16/99 14:56:57		
9.999818E-04	1.400210E-04	0.1400235	4.432540E-06	1.400163E-07	3/16/99 14:57:01	2440.791841	7.328614702

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 1.94 GeV Time on target= approximately 13 minutes							
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
9.999817E-03	-1.408456E-03				3/16/99 15:10:35		
-9.999936E-03	1.391303E-03				3/16/99 15:10:38		
-9.999936E-03	1.391329E-03				3/16/99 15:10:41		
9.999814E-03	-1.408442E-03				3/16/99 15:10:44		
9.999809E-03	-1.408420E-03				3/16/99 15:10:46		
-9.999936E-03	1.391329E-03				3/16/99 15:10:49		
-9.999931E-03	1.391338E-03				3/16/99 15:10:52		
9.999814E-03	-1.408413E-03				3/16/99 15:10:55		
9.999816E-03	-1.408400E-03				3/16/99 15:10:58		
-9.999933E-03	1.391346E-03				3/16/99 15:11:01		
-9.999931E-03	1.391349E-03				3/16/99 15:11:03		
9.999821E-03	-1.408380E-03				3/16/99 15:11:06		
9.999821E-03	-1.408395E-03				3/16/99 15:11:09		
-9.999928E-03	1.391352E-03				3/16/99 15:11:12		
-9.999925E-03	1.391361E-03				3/16/99 15:11:15		
9.999820E-03	-1.408377E-03				3/16/99 15:11:17		
9.999821E-03	-1.408376E-03				3/16/99 15:11:20		
-9.999945E-03	1.391351E-03				3/16/99 15:11:23		
-9.999935E-03	1.391353E-03				3/16/99 15:11:26		
9.999821E-03	-1.408364E-03				3/16/99 15:11:29		
9.999812E-03	-1.408357E-03				3/16/99 15:11:32		
-9.999940E-03	1.391357E-03				3/16/99 15:11:34		
-9.999936E-03	1.391356E-03				3/16/99 15:11:37		
9.999817E-03	-1.408355E-03				3/16/99 15:11:40		
9.999812E-03	-1.408355E-03				3/16/99 15:11:43		
-9.999936E-03	1.391370E-03				3/16/99 15:11:46		
-9.999932E-03	1.391350E-03				3/16/99 15:11:49		
9.999822E-03	-1.408371E-03				3/16/99 15:11:51		
9.999815E-03	-1.408346E-03				3/16/99 15:11:54		
-9.999938E-03	1.391350E-03				3/16/99 15:11:57		
-9.999931E-03	1.391353E-03				3/16/99 15:12:00		
9.999825E-03	-1.408345E-03				3/16/99 15:12:03		
9.999819E-03	-1.408343E-03				3/16/99 15:12:06		
-9.999935E-03	1.391356E-03				3/16/99 15:12:08		
-9.999932E-03	1.391354E-03				3/16/99 15:12:11		
9.999824E-03	-1.408348E-03				3/16/99 15:12:14		
9.999819E-03	-1.408354E-03				3/16/99 15:12:17		
-9.999941E-03	1.391341E-03				3/16/99 15:12:20		
-9.999938E-03	1.391343E-03				3/16/99 15:12:22		
9.999819E-03	-1.408339E-03				3/16/99 15:12:25		
9.999876E-03	1.399862E-03	0.1399879	1.220174E-06	1.399824E-05	3/16/99 15:12:29	2282.997873	7.670793084

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu#2		Beam Energy=0		Time on target= 0			
Room Temperature measurement between 1.94 and 1.1 GeV							
5.000243E-05	-8.718563E-04				3/16/99 16:19:00		
-5.000595E-05	8.317844E-04				3/16/99 16:19:03		
-5.000598E-05	8.319706E-04				3/16/99 16:19:06		
5.000245E-05	-8.715097E-04				3/16/99 16:19:09		
5.000243E-05	-8.713997E-04				3/16/99 16:19:11		
-5.000604E-05	8.325639E-04				3/16/99 16:19:14		
-5.000606E-05	8.327345E-04				3/16/99 16:19:17		
5.000247E-05	-8.710710E-04				3/16/99 16:19:20		
5.000250E-05	-8.709600E-04				3/16/99 16:19:23		
-5.000602E-05	8.333074E-04				3/16/99 16:19:26		
-5.000607E-05	8.335066E-04				3/16/99 16:19:28		
5.000249E-05	-8.706229E-04				3/16/99 16:19:31		
5.000250E-05	-8.705156E-04				3/16/99 16:19:34		
-5.000606E-05	8.340669E-04				3/16/99 16:19:37		
-5.000606E-05	8.342159E-04				3/16/99 16:19:40		
5.000252E-05	-8.703014E-04				3/16/99 16:19:43		
5.000250E-05	-8.702662E-04				3/16/99 16:19:45		
-5.000599E-05	8.346008E-04				3/16/99 16:19:48		
-5.000601E-05	8.347015E-04				3/16/99 16:19:51		
5.000249E-05	-8.702466E-04				3/16/99 16:19:54		
5.000425E-05	8.521101E-04	17.0407532	4.789497E-03	4.262732E-08	3/16/99 16:19:58	60.54076116	290.6932602

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu#2 Beam Energy=0 Time on target= 0							
Room Temperature measurement between 1.94 and 1.1 GeV							
5.000221E-04	-8.550298E-03				3/16/99 16:20:38		
-5.000726E-04	8.516567E-03				3/16/99 16:20:40		
-5.000725E-04	8.517224E-03				3/16/99 16:20:43		
5.000234E-04	-8.551997E-03				3/16/99 16:20:46		
5.000232E-04	-8.552606E-03				3/16/99 16:20:49		
-5.000729E-04	8.519193E-03				3/16/99 16:20:52		
-5.000723E-04	8.519864E-03				3/16/99 16:20:54		
5.000227E-04	-8.554401E-03				3/16/99 16:20:57		
5.000228E-04	-8.555017E-03				3/16/99 16:21:00		
-5.000726E-04	8.521887E-03				3/16/99 16:21:03		
-5.000728E-04	8.522612E-03				3/16/99 16:21:06		
5.000229E-04	-8.556872E-03				3/16/99 16:21:09		
5.000228E-04	-8.557507E-03				3/16/99 16:21:11		
-5.000726E-04	8.524726E-03				3/16/99 16:21:14		
-5.000728E-04	8.525470E-03				3/16/99 16:21:17		
5.000224E-04	-8.559452E-03				3/16/99 16:21:20		
5.000224E-04	-8.560114E-03				3/16/99 16:21:23		
-5.000728E-04	8.527651E-03				3/16/99 16:21:26		
-5.000729E-04	8.528394E-03				3/16/99 16:21:28		
5.000225E-04	-8.562147E-03				3/16/99 16:21:31		
5.000477E-04	8.539200E-03	17.0767706	7.574052E-03	4.273043E-06	3/16/99 16:21:35	60.4254218	291.3361482

Copper2.xls

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= none Time on target= none							
Room temperature data after over-night warm up after 1.94GeV							
5.000206E-04	-8.644212E-03				3/17/99 8:47:15		
-5.000577E-04	8.644106E-03				3/17/99 8:47:18		
-5.000581E-04	8.644076E-03				3/17/99 8:47:21		
5.000212E-04	-8.644250E-03				3/17/99 8:47:24		
5.000208E-04	-8.644237E-03				3/17/99 8:47:26		
-5.000582E-04	8.644087E-03				3/17/99 8:47:29		
-5.000577E-04	8.644090E-03				3/17/99 8:47:32		
5.000209E-04	-8.644273E-03				3/17/99 8:47:35		
5.000212E-04	-8.644264E-03				3/17/99 8:47:38		
-5.000577E-04	8.644105E-03				3/17/99 8:47:41		
-5.000576E-04	8.644111E-03				3/17/99 8:47:43		
5.000210E-04	-8.644243E-03				3/17/99 8:47:46		
5.000211E-04	-8.644243E-03				3/17/99 8:47:49		
-5.000577E-04	8.644104E-03				3/17/99 8:47:52		
-5.000578E-04	8.644141E-03				3/17/99 8:47:55		
5.000210E-04	-8.644223E-03				3/17/99 8:47:57		
5.000207E-04	-8.644234E-03				3/17/99 8:48:00		
-5.000582E-04	8.644147E-03				3/17/99 8:48:03		
-5.000585E-04	8.644162E-03				3/17/99 8:48:06		
5.000209E-04	-8.644236E-03				3/17/99 8:48:09		
5.000207E-04	-8.644235E-03				3/17/99 8:48:12		
-5.000585E-04	8.644167E-03				3/17/99 8:48:14		
-5.000585E-04	8.644180E-03				3/17/99 8:48:17		
5.000208E-04	-8.644232E-03				3/17/99 8:48:20		
5.000207E-04	-8.644242E-03				3/17/99 8:48:23		
-5.000587E-04	8.644185E-03				3/17/99 8:48:26		
-5.000587E-04	8.644188E-03				3/17/99 8:48:29		
5.000203E-04	-8.644207E-03				3/17/99 8:48:31		
5.000205E-04	-8.644223E-03				3/17/99 8:48:34		
-5.000586E-04	8.644195E-03				3/17/99 8:48:37		
-5.000588E-04	8.644195E-03				3/17/99 8:48:40		
5.000206E-04	-8.644265E-03				3/17/99 8:48:43		
5.000207E-04	-8.644246E-03				3/17/99 8:48:46		
-5.000588E-04	8.644178E-03				3/17/99 8:48:48		
-5.000586E-04	8.644188E-03				3/17/99 8:48:51		
5.000203E-04	-8.644259E-03				3/17/99 8:48:54		
5.000205E-04	-8.644250E-03				3/17/99 8:48:57		
-5.000590E-04	8.644201E-03				3/17/99 8:49:00		
-5.000590E-04	8.644212E-03				3/17/99 8:49:02		
5.000202E-04	-8.644224E-03				3/17/99 8:49:05		
5.000395E-04	8.644195E-03	17.2870241	3.935861E-05	4.322451E-06	3/17/99 8:49:09	60.58316055	290.4575769

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= pre-1.1GeV		Time on target= 0			
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
5.000167E-03	-7.000423E-04				3/17/99 10:08:59		
-5.000692E-03	6.855439E-04				3/17/99 10:09:02		
-5.000695E-03	6.855723E-04				3/17/99 10:09:04		
5.000170E-03	-7.000474E-04				3/17/99 10:09:07		
5.000172E-03	-7.000535E-04				3/17/99 10:09:10		
-5.000691E-03	6.855428E-04				3/17/99 10:09:13		
-5.000690E-03	6.855622E-04				3/17/99 10:09:16		
5.000174E-03	-7.000426E-04				3/17/99 10:09:19		
5.000178E-03	-7.000206E-04				3/17/99 10:09:21		
-5.000690E-03	6.855542E-04				3/17/99 10:09:24		
-5.000697E-03	6.855536E-04				3/17/99 10:09:27		
5.000179E-03	-7.000294E-04				3/17/99 10:09:30		
5.000183E-03	-7.000218E-04				3/17/99 10:09:33		
-5.000696E-03	6.855576E-04				3/17/99 10:09:35		
-5.000691E-03	6.855697E-04				3/17/99 10:09:38		
5.000182E-03	-7.000291E-04				3/17/99 10:09:41		
5.000175E-03	-7.000301E-04				3/17/99 10:09:44		
-5.000682E-03	6.855762E-04				3/17/99 10:09:47		
-5.000685E-03	6.855654E-04				3/17/99 10:09:50		
5.000182E-03	-7.000181E-04				3/17/99 10:09:52		
5.000180E-03	-7.000219E-04				3/17/99 10:09:55		
-5.000681E-03	6.855728E-04				3/17/99 10:09:58		
-5.000685E-03	6.855665E-04				3/17/99 10:10:01		
5.000180E-03	-7.000195E-04				3/17/99 10:10:04		
5.000182E-03	-7.000230E-04				3/17/99 10:10:07		
-5.000686E-03	6.855755E-04				3/17/99 10:10:09		
-5.000686E-03	6.855706E-04				3/17/99 10:10:12		
5.000184E-03	-7.000166E-04				3/17/99 10:10:15		
5.000183E-03	-7.000310E-04				3/17/99 10:10:18		
-5.000683E-03	6.855860E-04				3/17/99 10:10:21		
-5.000681E-03	6.855817E-04				3/17/99 10:10:24		
5.000183E-03	-7.000079E-04				3/17/99 10:10:26		
5.000178E-03	-7.000103E-04				3/17/99 10:10:29		
-5.000692E-03	6.855848E-04				3/17/99 10:10:32		
-5.000695E-03	6.855751E-04				3/17/99 10:10:35		
5.000180E-03	-7.000129E-04				3/17/99 10:10:38		
5.000178E-03	-7.000266E-04				3/17/99 10:10:40		
-5.000693E-03	6.855720E-04				3/17/99 10:10:43		
-5.000691E-03	6.855891E-04				3/17/99 10:10:46		
5.000180E-03	-7.000191E-04				3/17/99 10:10:49		
5.000434E-03	6.927974E-04	0.1385475	1.199258E-06	3.464322E-06	3/17/99 10:10:53	4974.969991	4.727545519

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= pre-1.1GeV		Time on target= 0					
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
9.999768E-03	-1.392687E-03				3/17/99 10:11:28		
-1.000000E-02	1.378201E-03				3/17/99 10:11:31		
-9.999995E-03	1.378194E-03				3/17/99 10:11:34		
9.999773E-03	-1.392700E-03				3/17/99 10:11:37		
9.999773E-03	-1.392711E-03				3/17/99 10:11:40		
-1.000000E-02	1.378207E-03				3/17/99 10:11:42		
-9.999996E-03	1.378211E-03				3/17/99 10:11:45		
9.999778E-03	-1.392707E-03				3/17/99 10:11:48		
9.999771E-03	-1.392704E-03				3/17/99 10:11:51		
-1.000000E-02	1.378188E-03				3/17/99 10:11:54		
-9.999997E-03	1.378215E-03				3/17/99 10:11:57		
9.999773E-03	-1.392713E-03				3/17/99 10:11:59		
9.999770E-03	-1.392718E-03				3/17/99 10:12:02		
-1.000000E-02	1.378206E-03				3/17/99 10:12:05		
-1.000000E-02	1.378201E-03				3/17/99 10:12:08		
9.999777E-03	-1.392700E-03				3/17/99 10:12:11		
9.999774E-03	-1.392714E-03				3/17/99 10:12:14		
-1.000000E-02	1.378208E-03				3/17/99 10:12:16		
-1.000000E-02	1.378189E-03				3/17/99 10:12:19		
9.999771E-03	-1.392713E-03				3/17/99 10:12:22		
9.999765E-03	-1.392716E-03				3/17/99 10:12:25		
-1.000001E-02	1.378196E-03				3/17/99 10:12:28		
-1.000000E-02	1.378206E-03				3/17/99 10:12:30		
9.999775E-03	-1.392705E-03				3/17/99 10:12:33		
9.999768E-03	-1.392710E-03				3/17/99 10:12:36		
-1.000000E-02	1.378213E-03				3/17/99 10:12:39		
-9.999998E-03	1.378188E-03				3/17/99 10:12:42		
9.999783E-03	-1.392725E-03				3/17/99 10:12:45		
9.999774E-03	-1.392722E-03				3/17/99 10:12:47		
-9.999999E-03	1.378183E-03				3/17/99 10:12:50		
-9.999990E-03	1.378195E-03				3/17/99 10:12:53		
9.999781E-03	-1.392726E-03				3/17/99 10:12:56		
9.999778E-03	-1.392708E-03				3/17/99 10:12:59		
-1.000000E-02	1.378192E-03				3/17/99 10:13:02		
-9.999998E-03	1.378193E-03				3/17/99 10:13:04		
9.999782E-03	-1.392725E-03				3/17/99 10:13:07		
9.999779E-03	-1.392721E-03				3/17/99 10:13:10		
-1.000000E-02	1.378191E-03				3/17/99 10:13:13		
-1.000000E-02	1.378197E-03				3/17/99 10:13:16		
9.999784E-03	-1.392732E-03				3/17/99 10:13:19		
9.999887E-03	1.385456E-03	0.1385471	5.792271E-07	1.385449E-05	3/17/99 10:13:23	4974.413082	4.727842235

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= pre-1.1GeV Time on target= 0							
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
1.499861E-02	-2.085521E-03				3/17/99 10:13:57		
-1.500289E-02	2.071090E-03				3/17/99 10:14:00		
-1.500285E-02	2.071097E-03				3/17/99 10:14:03		
1.499868E-02	-2.085514E-03				3/17/99 10:14:05		
1.499867E-02	-2.085511E-03				3/17/99 10:14:08		
-1.500283E-02	2.071090E-03				3/17/99 10:14:11		
-1.500289E-02	2.071090E-03				3/17/99 10:14:14		
1.499863E-02	-2.085507E-03				3/17/99 10:14:17		
1.499868E-02	-2.085534E-03				3/17/99 10:14:20		
-1.500281E-02	2.071073E-03				3/17/99 10:14:22		
-1.500283E-02	2.071095E-03				3/17/99 10:14:25		
1.499870E-02	-2.085525E-03				3/17/99 10:14:28		
1.499872E-02	-2.085567E-03				3/17/99 10:14:31		
-1.500289E-02	2.071066E-03				3/17/99 10:14:34		
-1.500289E-02	2.071076E-03				3/17/99 10:14:37		
1.499870E-02	-2.085537E-03				3/17/99 10:14:39		
1.499867E-02	-2.085542E-03				3/17/99 10:14:42		
-1.500283E-02	2.071076E-03				3/17/99 10:14:45		
-1.500283E-02	2.071062E-03				3/17/99 10:14:48		
1.499870E-02	-2.085541E-03				3/17/99 10:14:51		
1.499877E-02	-2.085542E-03				3/17/99 10:14:54		
-1.500281E-02	2.071058E-03				3/17/99 10:14:56		
-1.500282E-02	2.071072E-03				3/17/99 10:14:59		
1.499877E-02	-2.085558E-03				3/17/99 10:15:02		
1.499876E-02	-2.085535E-03				3/17/99 10:15:05		
-1.500276E-02	2.071068E-03				3/17/99 10:15:08		
-1.500277E-02	2.071062E-03				3/17/99 10:15:10		
1.499877E-02	-2.085551E-03				3/17/99 10:15:13		
1.499874E-02	-2.085529E-03				3/17/99 10:15:16		
-1.500284E-02	2.071088E-03				3/17/99 10:15:19		
-1.500285E-02	2.071084E-03				3/17/99 10:15:22		
1.499873E-02	-2.085539E-03				3/17/99 10:15:25		
1.499875E-02	-2.085538E-03				3/17/99 10:15:27		
-1.500282E-02	2.071060E-03				3/17/99 10:15:30		
-1.500280E-02	2.071061E-03				3/17/99 10:15:33		
1.499864E-02	-2.085539E-03				3/17/99 10:15:36		
1.499869E-02	-2.085514E-03				3/17/99 10:15:39		
-1.500288E-02	2.071068E-03				3/17/99 10:15:42		
-1.500283E-02	2.071096E-03				3/17/99 10:15:44		
1.499871E-02	-2.085505E-03				3/17/99 10:15:47		
1.500077E-02	2.078305E-03	0.1385465	3.844021E-07	3.117612E-05	3/17/99 10:15:51	4975.396127	4.727318518

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 1.1 GeV Time on target= 60 minutes							
Data at the end of the first irradiation at 1.1 GeV							
5.000179E-03	-7.006942E-04				3/17/99 13:16:38		
-5.000673E-03	6.859018E-04				3/17/99 13:16:41		
-5.000667E-03	6.858916E-04				3/17/99 13:16:44		
5.000185E-03	-7.006988E-04				3/17/99 13:16:47		
5.000183E-03	-7.007027E-04				3/17/99 13:16:50		
-5.000666E-03	6.858881E-04				3/17/99 13:16:52		
-5.000670E-03	6.858854E-04				3/17/99 13:16:55		
5.000187E-03	-7.007054E-04				3/17/99 13:16:58		
5.000187E-03	-7.007150E-04				3/17/99 13:17:01		
-5.000668E-03	6.858961E-04				3/17/99 13:17:04		
-5.000667E-03	6.858838E-04				3/17/99 13:17:07		
5.000188E-03	-7.007182E-04				3/17/99 13:17:09		
5.000185E-03	-7.007131E-04				3/17/99 13:17:12		
-5.000676E-03	6.858759E-04				3/17/99 13:17:15		
-5.000674E-03	6.858640E-04				3/17/99 13:17:18		
5.000187E-03	-7.007281E-04				3/17/99 13:17:21		
5.000187E-03	-7.007254E-04				3/17/99 13:17:23		
-5.000670E-03	6.858718E-04				3/17/99 13:17:26		
-5.000678E-03	6.858804E-04				3/17/99 13:17:29		
5.000186E-03	-7.007156E-04				3/17/99 13:17:32		
5.000188E-03	-7.007303E-04				3/17/99 13:17:35		
-5.000676E-03	6.858655E-04				3/17/99 13:17:38		
-5.000674E-03	6.858647E-04				3/17/99 13:17:40		
5.000191E-03	-7.007329E-04				3/17/99 13:17:43		
5.000188E-03	-7.007429E-04				3/17/99 13:17:46		
-5.000674E-03	6.858539E-04				3/17/99 13:17:49		
-5.000676E-03	6.858569E-04				3/17/99 13:17:52		
5.000183E-03	-7.007437E-04				3/17/99 13:17:55		
5.000181E-03	-7.007527E-04				3/17/99 13:17:57		
-5.000680E-03	6.858445E-04				3/17/99 13:18:00		
-5.000679E-03	6.858423E-04				3/17/99 13:18:03		
5.000181E-03	-7.007484E-04				3/17/99 13:18:06		
5.000181E-03	-7.007535E-04				3/17/99 13:18:09		
-5.000679E-03	6.858384E-04				3/17/99 13:18:12		
-5.000681E-03	6.858248E-04				3/17/99 13:18:14		
5.000178E-03	-7.007594E-04				3/17/99 13:18:17		
5.000182E-03	-7.007584E-04				3/17/99 13:18:20		
-5.000675E-03	6.858246E-04				3/17/99 13:18:23		
-5.000672E-03	6.858074E-04				3/17/99 13:18:26		
5.000185E-03	-7.007737E-04				3/17/99 13:18:29		
5.000429E-03	6.932969E-04	0.1386475	6.756555E-07	3.466750E-06	3/17/99 13:18:33	4990.809186	4.719131517

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 1.1 GeV Time on target= 60 minutes							
Data at the end of the first irradiation at 1.1 GeV							
9.999790E-03	-1.393962E-03				3/17/99 13:19:08		
-9.99979E-03	1.378950E-03				3/17/99 13:19:11		
-9.99976E-03	1.378949E-03				3/17/99 13:19:13		
9.999787E-03	-1.393952E-03				3/17/99 13:19:16		
9.999786E-03	-1.393956E-03				3/17/99 13:19:19		
-9.99978E-03	1.378950E-03				3/17/99 13:19:22		
-9.99978E-03	1.378937E-03				3/17/99 13:19:25		
9.999787E-03	-1.393949E-03				3/17/99 13:19:28		
9.999786E-03	-1.393959E-03				3/17/99 13:19:30		
-9.99990E-03	1.378944E-03				3/17/99 13:19:33		
-9.999987E-03	1.378946E-03				3/17/99 13:19:36		
9.999787E-03	-1.393966E-03				3/17/99 13:19:39		
9.999787E-03	-1.393968E-03				3/17/99 13:19:42		
-9.999988E-03	1.378932E-03				3/17/99 13:19:44		
-9.999988E-03	1.378933E-03				3/17/99 13:19:47		
9.999787E-03	-1.393978E-03				3/17/99 13:19:50		
9.999783E-03	-1.393970E-03				3/17/99 13:19:53		
-9.999988E-03	1.378932E-03				3/17/99 13:19:56		
-9.999985E-03	1.378923E-03				3/17/99 13:19:59		
9.999794E-03	-1.393988E-03				3/17/99 13:20:01		
9.999784E-03	-1.393988E-03				3/17/99 13:20:04		
-9.999988E-03	1.378925E-03				3/17/99 13:20:07		
-9.999900E-03	1.378932E-03				3/17/99 13:20:10		
9.999787E-03	-1.393985E-03				3/17/99 13:20:13		
9.999787E-03	-1.393974E-03				3/17/99 13:20:16		
-9.999955E-03	1.378932E-03				3/17/99 13:20:18		
-9.999986E-03	1.378921E-03				3/17/99 13:20:21		
9.999786E-03	-1.393973E-03				3/17/99 13:20:24		
9.999779E-03	-1.393971E-03				3/17/99 13:20:27		
-9.999991E-03	1.378924E-03				3/17/99 13:20:30		
-9.999988E-03	1.378925E-03				3/17/99 13:20:33		
9.999787E-03	-1.393968E-03				3/17/99 13:20:35		
9.999781E-03	-1.393988E-03				3/17/99 13:20:38		
-9.999996E-03	1.378930E-03				3/17/99 13:20:41		
-9.999990E-03	1.378925E-03				3/17/99 13:20:44		
9.999790E-03	-1.393975E-03				3/17/99 13:20:47		
9.999784E-03	-1.393989E-03				3/17/99 13:20:49		
-9.999955E-03	1.378926E-03				3/17/99 13:20:52		
-9.999990E-03	1.378931E-03				3/17/99 13:20:55		
9.999788E-03	-1.393988E-03				3/17/99 13:20:58		
9.999887E-03	1.386453E-03	0.1386468	4.324323E-07	1.386444E-05	3/17/99 13:21:02	4990.220825	4.719443203

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 1.1 GeV Time on target= 60 minutes							
Data at the end of the first irradiation at 1.1 GeV							
1.499875E-02	-2.087280E-03				3/17/99 13:21:30		
-1.500277E-02	2.072303E-03				3/17/99 13:21:33		
-1.500272E-02	2.072334E-03				3/17/99 13:21:36		
1.499873E-02	-2.087270E-03				3/17/99 13:21:38		
1.499875E-02	-2.087273E-03				3/17/99 13:21:41		
-1.500278E-02	2.072322E-03				3/17/99 13:21:44		
-1.500275E-02	2.072304E-03				3/17/99 13:21:47		
1.499885E-02	-2.087283E-03				3/17/99 13:21:50		
1.499891E-02	-2.087293E-03				3/17/99 13:21:53		
-1.500270E-02	2.072280E-03				3/17/99 13:21:55		
-1.500265E-02	2.072294E-03				3/17/99 13:21:58		
1.499881E-02	-2.087285E-03				3/17/99 13:22:01		
1.499882E-02	-2.087273E-03				3/17/99 13:22:04		
-1.500274E-02	2.072308E-03				3/17/99 13:22:07		
-1.500274E-02	2.072315E-03				3/17/99 13:22:10		
1.499883E-02	-2.087287E-03				3/17/99 13:22:12		
1.499887E-02	-2.087310E-03				3/17/99 13:22:15		
-1.500270E-02	2.072298E-03				3/17/99 13:22:18		
-1.500271E-02	2.072306E-03				3/17/99 13:22:21		
1.499876E-02	-2.087283E-03				3/17/99 13:22:24		
1.499880E-02	-2.087298E-03				3/17/99 13:22:26		
-1.500270E-02	2.072299E-03				3/17/99 13:22:29		
-1.500269E-02	2.072290E-03				3/17/99 13:22:32		
1.499878E-02	-2.087281E-03				3/17/99 13:22:35		
1.499883E-02	-2.087282E-03				3/17/99 13:22:38		
-1.500272E-02	2.072275E-03				3/17/99 13:22:41		
-1.500270E-02	2.072281E-03				3/17/99 13:22:43		
1.499881E-02	-2.087308E-03				3/17/99 13:22:46		
1.499886E-02	-2.087304E-03				3/17/99 13:22:49		
-1.500279E-02	2.072301E-03				3/17/99 13:22:52		
-1.500276E-02	2.072303E-03				3/17/99 13:22:55		
1.499878E-02	-2.087310E-03				3/17/99 13:22:58		
1.499880E-02	-2.087303E-03				3/17/99 13:23:00		
-1.500275E-02	2.072268E-03				3/17/99 13:23:03		
-1.500273E-02	2.072279E-03				3/17/99 13:23:06		
1.499885E-02	-2.087323E-03				3/17/99 13:23:09		
1.499879E-02	-2.087326E-03				3/17/99 13:23:12		
-1.500274E-02	2.072276E-03				3/17/99 13:23:15		
-1.500276E-02	2.072263E-03				3/17/99 13:23:17		
1.499882E-02	-2.087352E-03				3/17/99 13:23:20		
1.500077E-02	2.079796E-03	0.1386459	5.300420E-07	3.119876E-05	3/17/99 13:23:24	4989.208866	4.719979445

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 1.1 Gev		Time on target= 135 minutes			
End of second and last irradiation at 1.1 GeV							
5.000185E-03	-7.022329E-04				3/17/99 15:37:15		
-5.000493E-03	6.873282E-04				3/17/99 15:37:18		
-5.000495E-03	6.873362E-04				3/17/99 15:37:21		
5.000191E-03	-7.022188E-04				3/17/99 15:37:24		
5.000195E-03	-7.022324E-04				3/17/99 15:37:27		
-5.000498E-03	6.873356E-04				3/17/99 15:37:29		
-5.000498E-03	6.873407E-04				3/17/99 15:37:32		
5.000195E-03	-7.022185E-04				3/17/99 15:37:35		
5.000195E-03	-7.022213E-04				3/17/99 15:37:38		
-5.000499E-03	6.873410E-04				3/17/99 15:37:41		
-5.000497E-03	6.873352E-04				3/17/99 15:37:43		
5.000194E-03	-7.022191E-04				3/17/99 15:37:46		
5.000196E-03	-7.022146E-04				3/17/99 15:37:49		
-5.000498E-03	6.873307E-04				3/17/99 15:37:52		
-5.000497E-03	6.873377E-04				3/17/99 15:37:55		
5.000194E-03	-7.022173E-04				3/17/99 15:37:58		
5.000197E-03	-7.022214E-04				3/17/99 15:38:00		
-5.000501E-03	6.873396E-04				3/17/99 15:38:03		
-5.000502E-03	6.873401E-04				3/17/99 15:38:06		
5.000190E-03	-7.022011E-04				3/17/99 15:38:09		
5.000193E-03	-7.022087E-04				3/17/99 15:38:12		
-5.000500E-03	6.873435E-04				3/17/99 15:38:15		
-5.000501E-03	6.873409E-04				3/17/99 15:38:17		
5.000194E-03	-7.022046E-04				3/17/99 15:38:20		
5.000195E-03	-7.022013E-04				3/17/99 15:38:23		
-5.000503E-03	6.873439E-04				3/17/99 15:38:26		
-5.000503E-03	6.873496E-04				3/17/99 15:38:29		
5.000195E-03	-7.022120E-04				3/17/99 15:38:32		
5.000192E-03	-7.022080E-04				3/17/99 15:38:34		
-5.000504E-03	6.873512E-04				3/17/99 15:38:37		
-5.000502E-03	6.873563E-04				3/17/99 15:38:40		
5.000189E-03	-7.022089E-04				3/17/99 15:38:43		
5.000190E-03	-7.022012E-04				3/17/99 15:38:46		
-5.000506E-03	6.873555E-04				3/17/99 15:38:49		
-5.000505E-03	6.873544E-04				3/17/99 15:38:51		
5.000188E-03	-7.021907E-04				3/17/99 15:38:54		
5.000189E-03	-7.021906E-04				3/17/99 15:38:57		
-5.000507E-03	6.873474E-04				3/17/99 15:39:00		
-5.000505E-03	6.873524E-04				3/17/99 15:39:03		
5.000190E-03	-7.021877E-04				3/17/99 15:39:06		
5.000347E-03	6.947768E-04	0.1389457	8.877651E-07	3.474092E-06	3/17/99 15:39:10	4977.358203	4.72627378

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 1.1 GeV Time on target= 135 minutes							
End of second and last irradiation at 1.1 GeV							
9.999841E-03	-1.396855E-03				3/17/99 15:39:54		
-9.999856E-03	1.381990E-03				3/17/99 15:39:57		
-9.999852E-03	1.381986E-03				3/17/99 15:40:00		
9.999845E-03	-1.396852E-03				3/17/99 15:40:03		
9.999841E-03	-1.396858E-03				3/17/99 15:40:05		
-9.999862E-03	1.381992E-03				3/17/99 15:40:08		
-9.999858E-03	1.381985E-03				3/17/99 15:40:11		
9.999841E-03	-1.396855E-03				3/17/99 15:40:14		
9.999838E-03	-1.396862E-03				3/17/99 15:40:17		
-9.999868E-03	1.381998E-03				3/17/99 15:40:20		
-9.999860E-03	1.381998E-03				3/17/99 15:40:22		
9.999843E-03	-1.396856E-03				3/17/99 15:40:25		
9.999841E-03	-1.396846E-03				3/17/99 15:40:28		
-9.999867E-03	1.381990E-03				3/17/99 15:40:31		
-9.999862E-03	1.381998E-03				3/17/99 15:40:34		
9.999845E-03	-1.396844E-03				3/17/99 15:40:37		
9.999841E-03	-1.396854E-03				3/17/99 15:40:39		
-9.999873E-03	1.381998E-03				3/17/99 15:40:42		
-9.999868E-03	1.382005E-03				3/17/99 15:40:45		
9.999843E-03	-1.396847E-03				3/17/99 15:40:48		
9.999844E-03	-1.396855E-03				3/17/99 15:40:51		
-9.999875E-03	1.382001E-03				3/17/99 15:40:54		
-9.999870E-03	1.381997E-03				3/17/99 15:40:56		
9.999848E-03	-1.396842E-03				3/17/99 15:40:59		
9.999840E-03	-1.396841E-03				3/17/99 15:41:02		
-9.999865E-03	1.382000E-03				3/17/99 15:41:05		
-9.999859E-03	1.382008E-03				3/17/99 15:41:08		
9.999848E-03	-1.396835E-03				3/17/99 15:41:10		
9.999841E-03	-1.396846E-03				3/17/99 15:41:13		
-9.999867E-03	1.382008E-03				3/17/99 15:41:16		
-9.999865E-03	1.382017E-03				3/17/99 15:41:19		
9.999843E-03	-1.396834E-03				3/17/99 15:41:22		
9.999840E-03	-1.396842E-03				3/17/99 15:41:25		
-9.999873E-03	1.382013E-03				3/17/99 15:41:27		
-9.999869E-03	1.382004E-03				3/17/99 15:41:30		
9.999841E-03	-1.396828E-03				3/17/99 15:41:33		
9.999838E-03	-1.396832E-03				3/17/99 15:41:36		
-9.999874E-03	1.382011E-03				3/17/99 15:41:39		
-9.999869E-03	1.382013E-03				3/17/99 15:41:42		
9.999842E-03	-1.396830E-03				3/17/99 15:41:44		
9.999854E-03	1.389423E-03	0.1389443	3.668466E-07	1.389402E-05	3/17/99 15:41:49	4977.205595	4.726355012

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2		Beam Energy= 1.1 Gev		Time on target= 135 minutes			
End of second and last irradiation at 1.1 GeV							
1.499814E-02	-2.091649E-03				3/17/99 15:42:19		
-1.500055E-02	2.076512E-03				3/17/99 15:42:22		
-1.500053E-02	2.076497E-03				3/17/99 15:42:24		
1.499823E-02	-2.091674E-03				3/17/99 15:42:27		
1.499827E-02	-2.091687E-03				3/17/99 15:42:30		
-1.500054E-02	2.076519E-03				3/17/99 15:42:33		
-1.500055E-02	2.076524E-03				3/17/99 15:42:36		
1.499824E-02	-2.091663E-03				3/17/99 15:42:38		
1.499824E-02	-2.091663E-03				3/17/99 15:42:41		
-1.500055E-02	2.076508E-03				3/17/99 15:42:44		
-1.500052E-02	2.076495E-03				3/17/99 15:42:47		
1.499832E-02	-2.091670E-03				3/17/99 15:42:50		
1.499830E-02	-2.091676E-03				3/17/99 15:42:53		
-1.500052E-02	2.076506E-03				3/17/99 15:42:55		
-1.500049E-02	2.076513E-03				3/17/99 15:42:58		
1.499832E-02	-2.091678E-03				3/17/99 15:43:01		
1.499831E-02	-2.091686E-03				3/17/99 15:43:04		
-1.500050E-02	2.076492E-03				3/17/99 15:43:07		
-1.500054E-02	2.076505E-03				3/17/99 15:43:10		
1.499832E-02	-2.091688E-03				3/17/99 15:43:12		
1.499835E-02	-2.091682E-03				3/17/99 15:43:15		
-1.500063E-02	2.076521E-03				3/17/99 15:43:18		
-1.500059E-02	2.076516E-03				3/17/99 15:43:21		
1.499833E-02	-2.091679E-03				3/17/99 15:43:24		
1.499833E-02	-2.091678E-03				3/17/99 15:43:26		
-1.500059E-02	2.076506E-03				3/17/99 15:43:29		
-1.500060E-02	2.076515E-03				3/17/99 15:43:32		
1.499829E-02	-2.091677E-03				3/17/99 15:43:35		
1.499828E-02	-2.091674E-03				3/17/99 15:43:38		
-1.500062E-02	2.076525E-03				3/17/99 15:43:41		
-1.500065E-02	2.076517E-03				3/17/99 15:43:44		
1.499826E-02	-2.091673E-03				3/17/99 15:43:46		
1.499828E-02	-2.091674E-03				3/17/99 15:43:49		
-1.500064E-02	2.076525E-03				3/17/99 15:43:52		
-1.500063E-02	2.076535E-03				3/17/99 15:43:55		
1.499825E-02	-2.091648E-03				3/17/99 15:43:58		
1.499829E-02	-2.091634E-03				3/17/99 15:44:00		
-1.500062E-02	2.076547E-03				3/17/99 15:44:03		
-1.500066E-02	2.076572E-03				3/17/99 15:44:06		
1.499826E-02	-2.091608E-03				3/17/99 15:44:09		
1.499943E-02	2.084093E-03	0.1389448	3.322316E-07	3.126022E-05	3/17/99 15:44:13	4976.698551	4.72662494

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= Cu#2 Beam Energy= 0 Time on target= 0							
Post irradiation resistance measurements at ambient temperature in the U-line							
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
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-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
5.000000E-05	-8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		
-5.000000E-05	8.630000E-04				3/19/99 13:49:00		

Copper2.xls

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu2		Beam Energy=1.1 GeV		Time on target= 135 minutes			
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
5.000385E-03	-6.997061E-04				6/22/99 15:54:26		
-5.001007E-03	6.831721E-04				6/22/99 15:54:29		
-5.001002E-03	6.831689E-04				6/22/99 15:54:32		
5.000392E-03	-6.996979E-04				6/22/99 15:54:35		
5.000388E-03	-6.996996E-04				6/22/99 15:54:38		
-5.001017E-03	6.832168E-04				6/22/99 15:54:40		
-5.001006E-03	6.831957E-04				6/22/99 15:54:43		
5.000391E-03	-6.996790E-04				6/22/99 15:54:46		
5.000396E-03	-6.996665E-04				6/22/99 15:54:49		
-5.001015E-03	6.832199E-04				6/22/99 15:54:52		
-5.001003E-03	6.832273E-04				6/22/99 15:54:55		
5.000398E-03	-6.996771E-04				6/22/99 15:54:57		
5.000399E-03	-6.996827E-04				6/22/99 15:55:00		
-5.001007E-03	6.832322E-04				6/22/99 15:55:03		
-5.001002E-03	6.832330E-04				6/22/99 15:55:06		
5.000398E-03	-6.996454E-04				6/22/99 15:55:09		
5.000398E-03	-6.996767E-04				6/22/99 15:55:12		
-5.001007E-03	6.832476E-04				6/22/99 15:55:14		
-5.001009E-03	6.832255E-04				6/22/99 15:55:17		
5.000398E-03	-6.996553E-04				6/22/99 15:55:20		
5.000402E-03	-6.996552E-04				6/22/99 15:55:23		
-5.001017E-03	6.832439E-04				6/22/99 15:55:26		
-5.001010E-03	6.832491E-04				6/22/99 15:55:28		
5.000400E-03	-6.996537E-04				6/22/99 15:55:31		
5.000402E-03	-6.996671E-04				6/22/99 15:55:34		
-5.001009E-03	6.832483E-04				6/22/99 15:55:37		
-5.001007E-03	6.832442E-04				6/22/99 15:55:40		
5.000395E-03	-6.996555E-04				6/22/99 15:55:43		
5.000391E-03	-6.996502E-04				6/22/99 15:55:45		
-5.001016E-03	6.832472E-04				6/22/99 15:55:48		
-5.001010E-03	6.832278E-04				6/22/99 15:55:51		
5.000392E-03	-6.996768E-04				6/22/99 15:55:54		
5.000388E-03	-6.996576E-04				6/22/99 15:55:57		
-5.001015E-03	6.832341E-04				6/22/99 15:56:00		
-5.001015E-03	6.832442E-04				6/22/99 15:56:02		
5.000397E-03	-6.996549E-04				6/22/99 15:56:05		
5.000399E-03	-6.996719E-04				6/22/99 15:56:08		
-5.001013E-03	6.832179E-04				6/22/99 15:56:11		
-5.001017E-03	6.832360E-04				6/22/99 15:56:14		
5.000397E-03	-6.996597E-04				6/22/99 15:56:17		
5.000703E-03	6.914480E-04	0.1382702	1.459505E-06	3.457728E-06	6/22/99 15:56:21	4791.712063	4.828534525

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu2		Beam Energy=1.1 GeV		Time on target= 135 minutes			
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
9.999965E-03	-1.390990E-03				6/22/99 15:57:48		
-1.000027E-02	1.374464E-03				6/22/99 15:57:51		
-1.000027E-02	1.374456E-03				6/22/99 15:57:54		
9.999964E-03	-1.390971E-03				6/22/99 15:57:57		
9.999961E-03	-1.390984E-03				6/22/99 15:58:00		
-1.000027E-02	1.374464E-03				6/22/99 15:58:03		
-1.000027E-02	1.374462E-03				6/22/99 15:58:05		
9.999975E-03	-1.390933E-03				6/22/99 15:58:08		
9.999977E-03	-1.390960E-03				6/22/99 15:58:11		
-1.000028E-02	1.374475E-03				6/22/99 15:58:14		
-1.000027E-02	1.374489E-03				6/22/99 15:58:17		
9.999972E-03	-1.390951E-03				6/22/99 15:58:20		
9.999970E-03	-1.390925E-03				6/22/99 15:58:22		
-1.000028E-02	1.374498E-03				6/22/99 15:58:25		
-1.000028E-02	1.374512E-03				6/22/99 15:58:28		
9.999972E-03	-1.390926E-03				6/22/99 15:58:31		
9.999964E-03	-1.390936E-03				6/22/99 15:58:34		
-1.000028E-02	1.374529E-03				6/22/99 15:58:37		
-1.000027E-02	1.374504E-03				6/22/99 15:58:39		
9.999974E-03	-1.390937E-03				6/22/99 15:58:42		
9.999968E-03	-1.390934E-03				6/22/99 15:58:45		
-1.000027E-02	1.374487E-03				6/22/99 15:58:48		
-1.000027E-02	1.374500E-03				6/22/99 15:58:51		
9.999963E-03	-1.390943E-03				6/22/99 15:58:54		
9.999964E-03	-1.390921E-03				6/22/99 15:58:56		
-1.000028E-02	1.374515E-03				6/22/99 15:58:59		
-1.000027E-02	1.374492E-03				6/22/99 15:59:02		
9.999965E-03	-1.390926E-03				6/22/99 15:59:05		
9.999966E-03	-1.390930E-03				6/22/99 15:59:08		
-1.000028E-02	1.374512E-03				6/22/99 15:59:10		
-1.000027E-02	1.374514E-03				6/22/99 15:59:13		
9.999972E-03	-1.390933E-03				6/22/99 15:59:16		
9.999965E-03	-1.390924E-03				6/22/99 15:59:19		
-1.000027E-02	1.374497E-03				6/22/99 15:59:22		
-1.000026E-02	1.374513E-03				6/22/99 15:59:25		
9.999974E-03	-1.390934E-03				6/22/99 15:59:27		
9.999969E-03	-1.390929E-03				6/22/99 15:59:30		
-1.000028E-02	1.374511E-03				6/22/99 15:59:33		
-1.000028E-02	1.374499E-03				6/22/99 15:59:36		
9.999969E-03	-1.390924E-03				6/22/99 15:59:39		
1.000012E-02	1.382718E-03	0.1382701	7.504761E-07	1.382729E-05	6/22/99 15:59:43	4791.834145	4.828464928

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=Cu2		Beam Energy=1.1 GeV		Time on target= 135 minutes			
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
1.500141E-02	-2.082530E-03				6/22/99 16:01:46		
-1.500667E-02	2.066658E-03				6/22/99 16:01:49		
-1.500662E-02	2.066645E-03				6/22/99 16:01:52		
1.500145E-02	-2.082534E-03				6/22/99 16:01:54		
1.500147E-02	-2.082506E-03				6/22/99 16:01:57		
-1.500656E-02	2.066678E-03				6/22/99 16:02:00		
-1.500653E-02	2.066677E-03				6/22/99 16:02:03		
1.500151E-02	-2.082474E-03				6/22/99 16:02:06		
1.500150E-02	-2.082484E-03				6/22/99 16:02:08		
-1.500663E-02	2.066708E-03				6/22/99 16:02:11		
-1.500661E-02	2.066728E-03				6/22/99 16:02:14		
1.500145E-02	-2.082449E-03				6/22/99 16:02:17		
1.500144E-02	-2.082463E-03				6/22/99 16:02:20		
-1.500667E-02	2.066714E-03				6/22/99 16:02:23		
-1.500666E-02	2.066728E-03				6/22/99 16:02:25		
1.500143E-02	-2.082460E-03				6/22/99 16:02:28		
1.500141E-02	-2.082464E-03				6/22/99 16:02:31		
-1.500667E-02	2.066728E-03				6/22/99 16:02:34		
-1.500667E-02	2.066730E-03				6/22/99 16:02:37		
1.500150E-02	-2.082430E-03				6/22/99 16:02:40		
1.500150E-02	-2.082429E-03				6/22/99 16:02:42		
-1.500663E-02	2.066721E-03				6/22/99 16:02:45		
-1.500659E-02	2.066735E-03				6/22/99 16:02:48		
1.500141E-02	-2.082444E-03				6/22/99 16:02:51		
1.500145E-02	-2.082453E-03				6/22/99 16:02:54		
-1.500660E-02	2.066727E-03				6/22/99 16:02:57		
-1.500666E-02	2.066717E-03				6/22/99 16:02:59		
1.500146E-02	-2.082448E-03				6/22/99 16:03:02		
1.500149E-02	-2.082463E-03				6/22/99 16:03:05		
-1.500666E-02	2.066697E-03				6/22/99 16:03:08		
-1.500661E-02	2.066732E-03				6/22/99 16:03:11		
1.500141E-02	-2.082452E-03				6/22/99 16:03:13		
1.500147E-02	-2.082461E-03				6/22/99 16:03:16		
-1.500660E-02	2.066709E-03				6/22/99 16:03:19		
-1.500662E-02	2.066700E-03				6/22/99 16:03:22		
1.500149E-02	-2.082439E-03				6/22/99 16:03:25		
1.500145E-02	-2.082451E-03				6/22/99 16:03:28		
-1.500661E-02	2.066699E-03				6/22/99 16:03:30		
-1.500655E-02	2.066715E-03				6/22/99 16:03:33		
1.500147E-02	-2.082460E-03				6/22/99 16:03:36		
1.500404E-02	2.074586E-03	0.1382685	5.952319E-07	3.112714E-05	6/22/99 16:03:40	4791.685813	4.82854949

APPENDIX 4

EXCEL DATA FILE OF RESISTANCE MEASUREMENTS OF TUNGSTEN SAMPLE

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W		Beam Energy= 0	Time on target= 0				
Pre-irradiation resistivity data at room temperature prior to testing at 1.94 GeV							
5.000260E-05	-2.999824E-03				3/16/99 4:43:25		
-5.000525E-05	2.999311E-03				3/16/99 4:43:28		
-5.000522E-05	2.999278E-03				3/16/99 4:43:31		
5.000263E-05	-2.999803E-03				3/16/99 4:43:34		
5.000266E-05	-2.999823E-03				3/16/99 4:43:37		
-5.000531E-05	2.999312E-03				3/16/99 4:43:39		
-5.000530E-05	2.999314E-03				3/16/99 4:43:42		
5.000266E-05	-3.000096E-03				3/16/99 4:43:45		
5.000261E-05	-2.999833E-03				3/16/99 4:43:48		
-5.000536E-05	2.999325E-03				3/16/99 4:43:51		
-5.000537E-05	2.999345E-03				3/16/99 4:43:54		
5.000263E-05	-2.999809E-03				3/16/99 4:43:57		
5.000262E-05	-2.999811E-03				3/16/99 4:44:00		
-5.000539E-05	2.999323E-03				3/16/99 4:44:02		
-5.000536E-05	2.999322E-03				3/16/99 4:44:05		
5.000264E-05	-2.999785E-03				3/16/99 4:44:08		
5.000267E-05	-2.999777E-03				3/16/99 4:44:11		
-5.000540E-05	2.999322E-03				3/16/99 4:44:14		
-5.000543E-05	2.999339E-03				3/16/99 4:44:17		
5.000266E-05	-2.999807E-03				3/16/99 4:44:19		
5.000266E-05	-2.999812E-03				3/16/99 4:44:22		
-5.000538E-05	2.999333E-03				3/16/99 4:44:25		
-5.000541E-05	2.999358E-03				3/16/99 4:44:28		
5.000263E-05	-2.999792E-03				3/16/99 4:44:31		
5.000264E-05	-2.999775E-03				3/16/99 4:44:33		
-5.000542E-05	2.999339E-03				3/16/99 4:44:36		
-5.000544E-05	2.999364E-03				3/16/99 4:44:39		
5.000261E-05	-2.999780E-03				3/16/99 4:44:42		
5.000260E-05	-2.999758E-03				3/16/99 4:44:45		
-5.000544E-05	2.999368E-03				3/16/99 4:44:48		
-5.000539E-05	2.999346E-03				3/16/99 4:44:50		
5.000262E-05	-2.999765E-03				3/16/99 4:44:53		
5.000260E-05	-2.999775E-03				3/16/99 4:44:56		
-5.000539E-05	2.999367E-03				3/16/99 4:44:59		
-5.000535E-05	2.999348E-03				3/16/99 4:45:02		
5.000258E-05	-2.999796E-03				3/16/99 4:45:05		
5.000259E-05	-2.999775E-03				3/16/99 4:45:07		
-5.000538E-05	2.999322E-03				3/16/99 4:45:10		
-5.000539E-05	2.999350E-03				3/16/99 4:45:13		
5.000267E-05	-2.999801E-03				3/16/99 4:45:16		
5.000400E-05	2.999572E-03	59.986642	6.468464E-04	1.499909E-07	3/16/99 4:45:20	60.51329333	290.8461293

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W		Beam Energy= 0		Time on target= 0			
Pre-irradiation resistivity data at room temperature prior to testing at 1.94 GeV							
5.000226E-04	-2.999193E-02				3/16/99 4:46:14		
-5.000673E-04	2.999209E-02				3/16/99 4:46:17		
-5.000671E-04	2.999213E-02				3/16/99 4:46:20		
5.000240E-04	-2.999218E-02				3/16/99 4:46:23		
5.000242E-04	-2.999220E-02				3/16/99 4:46:25		
-5.000661E-04	2.999209E-02				3/16/99 4:46:28		
-5.000665E-04	2.999214E-02				3/16/99 4:46:31		
5.000241E-04	-2.999223E-02				3/16/99 4:46:34		
5.000241E-04	-2.999222E-02				3/16/99 4:46:37		
-5.000671E-04	2.999221E-02				3/16/99 4:46:40		
-5.000674E-04	2.999217E-02				3/16/99 4:46:42		
5.000241E-04	-2.999223E-02				3/16/99 4:46:45		
5.000239E-04	-2.999220E-02				3/16/99 4:46:48		
-5.000668E-04	2.999227E-02				3/16/99 4:46:51		
-5.000668E-04	2.999219E-02				3/16/99 4:46:54		
5.000242E-04	-2.999224E-02				3/16/99 4:46:57		
5.000242E-04	-2.999218E-02				3/16/99 4:46:59		
-5.000667E-04	2.999227E-02				3/16/99 4:47:02		
-5.000666E-04	2.999220E-02				3/16/99 4:47:05		
5.000240E-04	-2.999228E-02				3/16/99 4:47:08		
5.000239E-04	-2.999221E-02				3/16/99 4:47:11		
-5.000666E-04	2.999216E-02				3/16/99 4:47:13		
-5.000669E-04	2.999233E-02				3/16/99 4:47:16		
5.000239E-04	-2.999227E-02				3/16/99 4:47:19		
5.000239E-04	-2.999222E-02				3/16/99 4:47:22		
-5.000674E-04	2.999234E-02				3/16/99 4:47:25		
-5.000675E-04	2.999228E-02				3/16/99 4:47:27		
5.000240E-04	-2.999227E-02				3/16/99 4:47:30		
5.000244E-04	-2.999222E-02				3/16/99 4:47:33		
-5.000673E-04	2.999229E-02				3/16/99 4:47:36		
-5.000670E-04	2.999229E-02				3/16/99 4:47:39		
5.000237E-04	-2.999228E-02				3/16/99 4:47:42		
5.000237E-04	-2.999224E-02				3/16/99 4:47:44		
-5.000670E-04	2.999234E-02				3/16/99 4:47:47		
-5.000670E-04	2.999233E-02				3/16/99 4:47:50		
5.000237E-04	-2.999229E-02				3/16/99 4:47:53		
5.000238E-04	-2.999223E-02				3/16/99 4:47:56		
-5.000678E-04	2.999249E-02				3/16/99 4:47:59		
-5.000678E-04	2.999247E-02				3/16/99 4:48:01		
5.000235E-04	-2.999226E-02				3/16/99 4:48:04		
5.000455E-04	2.999224E-02	59.979019	1.408803E-04	1.499755E-05	3/16/99 4:48:08	60.5318003	290.7431149

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W	Beam Energy= 0	Time on target= 0					
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
5.000231E-04	-2.343763E-03				3/16/99 6:27:43		
-5.000764E-04	2.340531E-03				3/16/99 6:27:46		
-5.000759E-04	2.340528E-03				3/16/99 6:27:49		
5.000233E-04	-2.343739E-03				3/16/99 6:27:51		
5.000234E-04	-2.343710E-03				3/16/99 6:27:54		
-5.000759E-04	2.340558E-03				3/16/99 6:27:57		
-5.000756E-04	2.340568E-03				3/16/99 6:28:00		
5.000235E-04	-2.343709E-03				3/16/99 6:28:03		
5.000238E-04	-2.343706E-03				3/16/99 6:28:06		
-5.000759E-04	2.340567E-03				3/16/99 6:28:08		
-5.000760E-04	2.340570E-03				3/16/99 6:28:11		
5.000235E-04	-2.343705E-03				3/16/99 6:28:14		
5.000231E-04	-2.343718E-03				3/16/99 6:28:17		
-5.000757E-04	2.340572E-03				3/16/99 6:28:20		
-5.000750E-04	2.340566E-03				3/16/99 6:28:23		
5.000239E-04	-2.343697E-03				3/16/99 6:28:25		
5.000238E-04	-2.343695E-03				3/16/99 6:28:28		
-5.000759E-04	2.340580E-03				3/16/99 6:28:31		
-5.000759E-04	2.340597E-03				3/16/99 6:28:34		
5.000234E-04	-2.343698E-03				3/16/99 6:28:37		
5.000232E-04	-2.343708E-03				3/16/99 6:28:39		
-5.000763E-04	2.340612E-03				3/16/99 6:28:42		
-5.000765E-04	2.340582E-03				3/16/99 6:28:45		
5.000224E-04	-2.343695E-03				3/16/99 6:28:48		
5.000226E-04	-2.343701E-03				3/16/99 6:28:51		
-5.000770E-04	2.340590E-03				3/16/99 6:28:54		
-5.000760E-04	2.340593E-03				3/16/99 6:28:56		
5.000234E-04	-2.343685E-03				3/16/99 6:28:59		
5.000231E-04	-2.343702E-03				3/16/99 6:29:02		
-5.000760E-04	2.340580E-03				3/16/99 6:29:05		
-5.000759E-04	2.340600E-03				3/16/99 6:29:08		
5.000233E-04	-2.343676E-03				3/16/99 6:29:11		
5.000228E-04	-2.343684E-03				3/16/99 6:29:13		
-5.000765E-04	2.340616E-03				3/16/99 6:29:16		
-5.000766E-04	2.340607E-03				3/16/99 6:29:19		
5.000227E-04	-2.343683E-03				3/16/99 6:29:22		
5.000235E-04	-2.343703E-03				3/16/99 6:29:25		
-5.000767E-04	2.340593E-03				3/16/99 6:29:28		
-5.000765E-04	2.340590E-03				3/16/99 6:29:30		
5.000227E-04	-2.343663E-03				3/16/99 6:29:33		
5.000497E-04	2.342141E-03	4.683817	1.437081E-05	1.171179E-06	3/16/99 6:29:37	4865.927039	4.786808843

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W		Beam Energy= 0		Time on target= 0			
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
9.999669E-04	-4.685302E-03				3/16/99 6:30:24		
-1.000003E-03	4.682180E-03				3/16/99 6:30:26		
-1.000003E-03	4.682181E-03				3/16/99 6:30:29		
9.999680E-04	-4.685329E-03				3/16/99 6:30:32		
9.999675E-04	-4.685323E-03				3/16/99 6:30:35		
-1.000003E-03	4.682180E-03				3/16/99 6:30:38		
-1.000003E-03	4.682197E-03				3/16/99 6:30:41		
9.999665E-04	-4.685290E-03				3/16/99 6:30:43		
9.999661E-04	-4.685291E-03				3/16/99 6:30:46		
-1.000003E-03	4.682212E-03				3/16/99 6:30:49		
-1.000003E-03	4.682181E-03				3/16/99 6:30:52		
9.999664E-04	-4.685239E-03				3/16/99 6:30:55		
9.999663E-04	-4.685260E-03				3/16/99 6:30:58		
-1.000003E-03	4.682233E-03				3/16/99 6:31:00		
-1.000003E-03	4.682245E-03				3/16/99 6:31:03		
9.999664E-04	-4.685250E-03				3/16/99 6:31:06		
9.999658E-04	-4.685256E-03				3/16/99 6:31:09		
-1.000004E-03	4.682229E-03				3/16/99 6:31:12		
-1.000003E-03	4.682269E-03				3/16/99 6:31:15		
9.999661E-04	-4.685251E-03				3/16/99 6:31:17		
9.999659E-04	-4.685263E-03				3/16/99 6:31:20		
-1.000004E-03	4.682228E-03				3/16/99 6:31:23		
-1.000004E-03	4.682222E-03				3/16/99 6:31:26		
9.999673E-04	-4.685285E-03				3/16/99 6:31:29		
9.999671E-04	-4.685247E-03				3/16/99 6:31:32		
-1.000003E-03	4.682212E-03				3/16/99 6:31:34		
-1.000002E-03	4.682241E-03				3/16/99 6:31:37		
9.999677E-04	-4.685267E-03				3/16/99 6:31:40		
9.999666E-04	-4.685278E-03				3/16/99 6:31:43		
-1.000003E-03	4.682219E-03				3/16/99 6:31:46		
-1.000003E-03	4.682278E-03				3/16/99 6:31:49		
9.999665E-04	-4.685226E-03				3/16/99 6:31:51		
9.999666E-04	-4.685264E-03				3/16/99 6:31:54		
-1.000004E-03	4.682251E-03				3/16/99 6:31:57		
-1.000003E-03	4.682234E-03				3/16/99 6:32:00		
9.999670E-04	-4.685247E-03				3/16/99 6:32:03		
9.999662E-04	-4.685257E-03				3/16/99 6:32:06		
-1.000003E-03	4.682234E-03				3/16/99 6:32:08		
-1.000002E-03	4.682210E-03				3/16/99 6:32:11		
9.999671E-04	-4.685263E-03				3/16/99 6:32:14		
9.999849E-04	4.683746E-03	4.683816	1.059776E-05	4.683665E-06	3/16/99 6:32:18	4866.117557	4.78670321

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 0 Time on target= 0							
Pre-irradiation resistivity data at liquid helium temperature prior to testing at 1.94 GeV							
2.000134E-03	-9.370262E-03				3/16/99 6:33:02		
-2.000581E-03	9.367980E-03				3/16/99 6:33:05		
-2.000581E-03	9.367941E-03				3/16/99 6:33:08		
2.000143E-03	-9.370252E-03				3/16/99 6:33:10		
2.000142E-03	-9.370309E-03				3/16/99 6:33:13		
-2.000573E-03	9.367908E-03				3/16/99 6:33:16		
-2.000575E-03	9.367885E-03				3/16/99 6:33:19		
2.000150E-03	-9.370258E-03				3/16/99 6:33:22		
2.000146E-03	-9.370269E-03				3/16/99 6:33:25		
-2.000574E-03	9.367894E-03				3/16/99 6:33:27		
-2.000572E-03	9.367941E-03				3/16/99 6:33:30		
2.000139E-03	-9.370284E-03				3/16/99 6:33:33		
2.000144E-03	-9.370340E-03				3/16/99 6:33:36		
-2.000571E-03	9.367911E-03				3/16/99 6:33:39		
-2.000569E-03	9.367865E-03				3/16/99 6:33:42		
2.000149E-03	-9.370429E-03				3/16/99 6:33:44		
2.000151E-03	-9.370378E-03				3/16/99 6:33:47		
-2.000573E-03	9.367883E-03				3/16/99 6:33:50		
-2.000576E-03	9.367841E-03				3/16/99 6:33:53		
2.000141E-03	-9.370408E-03				3/16/99 6:33:56		
2.000141E-03	-9.370305E-03				3/16/99 6:33:58		
-2.000577E-03	9.367926E-03				3/16/99 6:34:01		
-2.000572E-03	9.367963E-03				3/16/99 6:34:04		
2.000139E-03	-9.370273E-03				3/16/99 6:34:07		
2.000140E-03	-9.370303E-03				3/16/99 6:34:10		
-2.000580E-03	9.367996E-03				3/16/99 6:34:13		
-2.000575E-03	9.367969E-03				3/16/99 6:34:15		
2.000137E-03	-9.370231E-03				3/16/99 6:34:18		
2.000138E-03	-9.370221E-03				3/16/99 6:34:21		
-2.000574E-03	9.367950E-03				3/16/99 6:34:24		
-2.000571E-03	9.367957E-03				3/16/99 6:34:27		
2.000147E-03	-9.370289E-03				3/16/99 6:34:30		
2.000145E-03	-9.370368E-03				3/16/99 6:34:32		
-2.000574E-03	9.367908E-03				3/16/99 6:34:35		
-2.000578E-03	9.367935E-03				3/16/99 6:34:38		
2.000144E-03	-9.370316E-03				3/16/99 6:34:41		
2.000143E-03	-9.370367E-03				3/16/99 6:34:44		
-2.000577E-03	9.367915E-03				3/16/99 6:34:47		
-2.000578E-03	9.367874E-03				3/16/99 6:34:49		
2.000138E-03	-9.370362E-03				3/16/99 6:34:52		
2.000359E-03	9.369117E-03	4.683718	1.124679E-05	1.874159E-05	3/16/99 6:34:56	4865.633809	4.78697144

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
5.000228E-04	-2.360925E-03				3/16/99 10:19:28		
-5.000604E-04	2.360579E-03				3/16/99 10:19:31		
-5.000604E-04	2.360580E-03				3/16/99 10:19:34		
5.000239E-04	-2.360928E-03				3/16/99 10:19:36		
5.000238E-04	-2.360916E-03				3/16/99 10:19:39		
-5.000607E-04	2.360604E-03				3/16/99 10:19:42		
-5.000613E-04	2.360614E-03				3/16/99 10:19:45		
5.000235E-04	-2.360912E-03				3/16/99 10:19:48		
5.000234E-04	-2.360896E-03				3/16/99 10:19:51		
-5.000616E-04	2.360612E-03				3/16/99 10:19:53		
-5.000611E-04	2.360626E-03				3/16/99 10:19:56		
5.000234E-04	-2.360891E-03				3/16/99 10:19:59		
5.000235E-04	-2.360874E-03				3/16/99 10:20:02		
-5.000611E-04	2.360647E-03				3/16/99 10:20:05		
-5.000609E-04	2.360632E-03				3/16/99 10:20:08		
5.000241E-04	-2.360882E-03				3/16/99 10:20:10		
5.000239E-04	-2.360873E-03				3/16/99 10:20:13		
-5.000611E-04	2.360641E-03				3/16/99 10:20:16		
-5.000609E-04	2.360640E-03				3/16/99 10:20:19		
5.000238E-04	-2.360882E-03				3/16/99 10:20:22		
5.000237E-04	-2.360882E-03				3/16/99 10:20:25		
-5.000607E-04	2.360635E-03				3/16/99 10:20:27		
-5.000604E-04	2.360629E-03				3/16/99 10:20:30		
5.000243E-04	-2.360862E-03				3/16/99 10:20:33		
5.000241E-04	-2.360875E-03				3/16/99 10:20:36		
-5.000606E-04	2.360625E-03				3/16/99 10:20:39		
-5.000607E-04	2.360621E-03				3/16/99 10:20:41		
5.000238E-04	-2.360867E-03				3/16/99 10:20:44		
5.000239E-04	-2.360873E-03				3/16/99 10:20:47		
-5.000617E-04	2.360644E-03				3/16/99 10:20:50		
-5.000611E-04	2.360631E-03				3/16/99 10:20:53		
5.000245E-04	-2.360878E-03				3/16/99 10:20:56		
5.000246E-04	-2.360879E-03				3/16/99 10:20:58		
-5.000610E-04	2.360628E-03				3/16/99 10:21:01		
-5.000609E-04	2.360638E-03				3/16/99 10:21:04		
5.000246E-04	-2.360878E-03				3/16/99 10:21:07		
5.000243E-04	-2.360869E-03				3/16/99 10:21:10		
-5.000611E-04	2.360648E-03				3/16/99 10:21:13		
-5.000614E-04	2.360631E-03				3/16/99 10:21:15		
5.000244E-04	-2.360874E-03				3/16/99 10:21:18		
5.000424E-04	2.360756E-03	4.721110	9.779165E-06	1.180478E-06	3/16/99 10:21:22	4882.934766	4.777408232

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
9.999716E-04	-4.721160E-03				3/16/99 10:22:20		
-9.999922E-04	4.720867E-03				3/16/99 10:22:22		
-9.999919E-04	4.720867E-03				3/16/99 10:22:25		
9.999728E-04	-4.721169E-03				3/16/99 10:22:28		
9.999719E-04	-4.721161E-03				3/16/99 10:22:31		
-9.999926E-04	4.720887E-03				3/16/99 10:22:34		
-9.999924E-04	4.720885E-03				3/16/99 10:22:36		
9.999723E-04	-4.721152E-03				3/16/99 10:22:39		
9.999725E-04	-4.721152E-03				3/16/99 10:22:42		
-9.999935E-04	4.720894E-03				3/16/99 10:22:45		
-9.999931E-04	4.720899E-03				3/16/99 10:22:48		
9.999722E-04	-4.721136E-03				3/16/99 10:22:51		
9.999716E-04	-4.721146E-03				3/16/99 10:22:53		
-9.999936E-04	4.720915E-03				3/16/99 10:22:56		
-9.999938E-04	4.720918E-03				3/16/99 10:22:59		
9.999730E-04	-4.721131E-03				3/16/99 10:23:02		
9.999722E-04	-4.721134E-03				3/16/99 10:23:05		
-9.999943E-04	4.720913E-03				3/16/99 10:23:08		
-9.999939E-04	4.720926E-03				3/16/99 10:23:10		
9.999726E-04	-4.721128E-03				3/16/99 10:23:13		
9.999719E-04	-4.721111E-03				3/16/99 10:23:16		
-9.999942E-04	4.720909E-03				3/16/99 10:23:19		
-9.999940E-04	4.720923E-03				3/16/99 10:23:22		
9.999720E-04	-4.721113E-03				3/16/99 10:23:25		
9.999716E-04	-4.721124E-03				3/16/99 10:23:27		
-9.999940E-04	4.720914E-03				3/16/99 10:23:30		
-9.999940E-04	4.720922E-03				3/16/99 10:23:33		
9.999721E-04	-4.721123E-03				3/16/99 10:23:36		
9.999720E-04	-4.721121E-03				3/16/99 10:23:39		
-9.999938E-04	4.720919E-03				3/16/99 10:23:42		
-9.999936E-04	4.720930E-03				3/16/99 10:23:44		
9.999721E-04	-4.721111E-03				3/16/99 10:23:47		
9.999715E-04	-4.721110E-03				3/16/99 10:23:50		
-9.999936E-04	4.720925E-03				3/16/99 10:23:53		
-9.999932E-04	4.720911E-03				3/16/99 10:23:56		
9.999716E-04	-4.721106E-03				3/16/99 10:23:58		
9.999715E-04	-4.721108E-03				3/16/99 10:24:01		
-9.999936E-04	4.720923E-03				3/16/99 10:24:04		
-9.999935E-04	4.720912E-03				3/16/99 10:24:07		
9.999721E-04	-4.721116E-03				3/16/99 10:24:10		
9.999828E-04	4.721019E-03	4.721101	4.959436E-06	4.720933E-06	3/16/99 10:24:14	4884.065312	4.776785446

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= 90 minutes							
First data acquisition after irradiation by 1.94GeV protons for 90 minutes at 4.7K.							
2.000155E-03	-9.443652E-03				3/16/99 10:25:14		
-2.000459E-03	9.443033E-03				3/16/99 10:25:17		
-2.000459E-03	9.443066E-03				3/16/99 10:25:19		
2.000159E-03	-9.443656E-03				3/16/99 10:25:22		
2.000159E-03	-9.443675E-03				3/16/99 10:25:25		
-2.000462E-03	9.442995E-03				3/16/99 10:25:28		
-2.000459E-03	9.443030E-03				3/16/99 10:25:31		
2.000155E-03	-9.443674E-03				3/16/99 10:25:34		
2.000156E-03	-9.443682E-03				3/16/99 10:25:36		
-2.000467E-03	9.443069E-03				3/16/99 10:25:39		
-2.000470E-03	9.443037E-03				3/16/99 10:25:42		
2.000157E-03	-9.443670E-03				3/16/99 10:25:45		
2.000160E-03	-9.443676E-03				3/16/99 10:25:48		
-2.000466E-03	9.443025E-03				3/16/99 10:25:51		
-2.000465E-03	9.442988E-03				3/16/99 10:25:53		
2.000159E-03	-9.443739E-03				3/16/99 10:25:56		
2.000157E-03	-9.443734E-03				3/16/99 10:25:59		
-2.000461E-03	9.442965E-03				3/16/99 10:26:02		
-2.000463E-03	9.442959E-03				3/16/99 10:26:05		
2.000156E-03	-9.443707E-03				3/16/99 10:26:08		
2.000159E-03	-9.443735E-03				3/16/99 10:26:10		
-2.000459E-03	9.442982E-03				3/16/99 10:26:13		
-2.000459E-03	9.442971E-03				3/16/99 10:26:16		
2.000162E-03	-9.443705E-03				3/16/99 10:26:19		
2.000160E-03	-9.443709E-03				3/16/99 10:26:22		
-2.000461E-03	9.442998E-03				3/16/99 10:26:25		
-2.000459E-03	9.442991E-03				3/16/99 10:26:27		
2.000159E-03	-9.443761E-03				3/16/99 10:26:30		
2.000162E-03	-9.443750E-03				3/16/99 10:26:33		
-2.000462E-03	9.443041E-03				3/16/99 10:26:36		
-2.000463E-03	9.443002E-03				3/16/99 10:26:39		
2.000162E-03	-9.443733E-03				3/16/99 10:26:41		
2.000164E-03	-9.443765E-03				3/16/99 10:26:44		
-2.000458E-03	9.442929E-03				3/16/99 10:26:47		
-2.000455E-03	9.442921E-03				3/16/99 10:26:50		
2.000166E-03	-9.443769E-03				3/16/99 10:26:53		
2.000167E-03	-9.443801E-03				3/16/99 10:26:56		
-2.000457E-03	9.442947E-03				3/16/99 10:26:58		
-2.000457E-03	9.442981E-03				3/16/99 10:27:01		
2.000166E-03	-9.443730E-03				3/16/99 10:27:04		
2.000310E-03	9.443356E-03	4.720945	7.419321E-06	1.888965E-05	3/16/99 10:27:08	4883.417583	4.77714223

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= 2.5 hours							
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
5.000235E-04	-2.374452E-03				3/16/99 13:08:35		
-5.000640E-04	2.373314E-03				3/16/99 13:08:38		
-5.000639E-04	2.373323E-03				3/16/99 13:08:40		
5.000237E-04	-2.374445E-03				3/16/99 13:08:43		
5.000239E-04	-2.374449E-03				3/16/99 13:08:46		
-5.000642E-04	2.373351E-03				3/16/99 13:08:49		
-5.000642E-04	2.373342E-03				3/16/99 13:08:52		
5.000238E-04	-2.374441E-03				3/16/99 13:08:55		
5.000238E-04	-2.374443E-03				3/16/99 13:08:57		
-5.000644E-04	2.373336E-03				3/16/99 13:09:00		
-5.000644E-04	2.373321E-03				3/16/99 13:09:03		
5.000239E-04	-2.374449E-03				3/16/99 13:09:06		
5.000238E-04	-2.374478E-03				3/16/99 13:09:09		
-5.000649E-04	2.373295E-03				3/16/99 13:09:12		
-5.000647E-04	2.373294E-03				3/16/99 13:09:14		
5.000239E-04	-2.374492E-03				3/16/99 13:09:17		
5.000240E-04	-2.374512E-03				3/16/99 13:09:20		
-5.000640E-04	2.373266E-03				3/16/99 13:09:23		
-5.000638E-04	2.373265E-03				3/16/99 13:09:26		
5.000242E-04	-2.374503E-03				3/16/99 13:09:29		
5.000241E-04	-2.374515E-03				3/16/99 13:09:31		
-5.000641E-04	2.373252E-03				3/16/99 13:09:34		
-5.000641E-04	2.373260E-03				3/16/99 13:09:37		
5.000232E-04	-2.374517E-03				3/16/99 13:09:40		
5.000235E-04	-2.374499E-03				3/16/99 13:09:43		
-5.000642E-04	2.373276E-03				3/16/99 13:09:45		
-5.000642E-04	2.373269E-03				3/16/99 13:09:48		
5.000236E-04	-2.374483E-03				3/16/99 13:09:51		
5.000236E-04	-2.374481E-03				3/16/99 13:09:54		
-5.000643E-04	2.373290E-03				3/16/99 13:09:57		
-5.000645E-04	2.373298E-03				3/16/99 13:10:00		
5.000232E-04	-2.374458E-03				3/16/99 13:10:02		
5.000231E-04	-2.374453E-03				3/16/99 13:10:05		
-5.000645E-04	2.373308E-03				3/16/99 13:10:08		
-5.000641E-04	2.373309E-03				3/16/99 13:10:11		
5.000237E-04	-2.374454E-03				3/16/99 13:10:14		
5.000231E-04	-2.374450E-03				3/16/99 13:10:17		
-5.000646E-04	2.373322E-03				3/16/99 13:10:19		
-5.000641E-04	2.373324E-03				3/16/99 13:10:22		
5.000234E-04	-2.374434E-03				3/16/99 13:10:25		
5.000440E-04	2.373886E-03	4.747354	1.029432E-05	1.187043E-06	3/16/99 13:10:29	4860.524309	4.789807508

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= 2.5 hours							
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
9.999704E-04	-4.747810E-03				3/16/99 13:11:03		
-9.999952E-04	4.746704E-03				3/16/99 13:11:06		
-9.999945E-04	4.746722E-03				3/16/99 13:11:09		
9.999711E-04	-4.747823E-03				3/16/99 13:11:12		
9.999707E-04	-4.747826E-03				3/16/99 13:11:15		
-9.999953E-04	4.746711E-03				3/16/99 13:11:17		
-9.999948E-04	4.746720E-03				3/16/99 13:11:20		
9.999711E-04	-4.747820E-03				3/16/99 13:11:23		
9.999709E-04	-4.747813E-03				3/16/99 13:11:26		
-9.999955E-04	4.746718E-03				3/16/99 13:11:29		
-9.999953E-04	4.746724E-03				3/16/99 13:11:32		
9.999708E-04	-4.747800E-03				3/16/99 13:11:35		
9.999705E-04	-4.747818E-03				3/16/99 13:11:37		
-9.999960E-04	4.746724E-03				3/16/99 13:11:40		
-9.999957E-04	4.746713E-03				3/16/99 13:11:43		
9.999708E-04	-4.747841E-03				3/16/99 13:11:46		
9.999708E-04	-4.747833E-03				3/16/99 13:11:49		
-9.999962E-04	4.746698E-03				3/16/99 13:11:51		
-9.999957E-04	4.746688E-03				3/16/99 13:11:54		
9.999709E-04	-4.747841E-03				3/16/99 13:11:57		
9.999704E-04	-4.747841E-03				3/16/99 13:12:00		
-9.999961E-04	4.746698E-03				3/16/99 13:12:03		
-9.999959E-04	4.746694E-03				3/16/99 13:12:06		
9.999706E-04	-4.747846E-03				3/16/99 13:12:08		
9.999704E-04	-4.747841E-03				3/16/99 13:12:11		
-9.999960E-04	4.746700E-03				3/16/99 13:12:14		
-9.999950E-04	4.746694E-03				3/16/99 13:12:17		
9.999712E-04	-4.747827E-03				3/16/99 13:12:20		
9.999707E-04	-4.747828E-03				3/16/99 13:12:23		
-9.999956E-04	4.746716E-03				3/16/99 13:12:25		
-9.999954E-04	4.746720E-03				3/16/99 13:12:28		
9.999708E-04	-4.747798E-03				3/16/99 13:12:31		
9.999705E-04	-4.747802E-03				3/16/99 13:12:34		
-9.999950E-04	4.746700E-03				3/16/99 13:12:37		
-9.999943E-04	4.746705E-03				3/16/99 13:12:39		
9.999708E-04	-4.747821E-03				3/16/99 13:12:42		
9.999700E-04	-4.747834E-03				3/16/99 13:12:45		
-9.999960E-04	4.746678E-03				3/16/99 13:12:48		
-9.999957E-04	4.746677E-03				3/16/99 13:12:51		
9.999705E-04	-4.747835E-03				3/16/99 13:12:54		
9.999831E-04	4.747265E-03	4.747345	6.305727E-06	4.747176E-06	3/16/99 13:12:58	4861.455256	4.789290377

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= 2.5 hours							
Second cold data acquisition at 1.94 GeV after 2.5 hours irradiation							
2.000151E-03	-9.496679E-03				3/16/99 13:13:36		
-2.000488E-03	9.495145E-03				3/16/99 13:13:39		
-2.000486E-03	9.495152E-03				3/16/99 13:13:42		
2.000149E-03	-9.496648E-03				3/16/99 13:13:45		
2.000153E-03	-9.496662E-03				3/16/99 13:13:47		
-2.000487E-03	9.495197E-03				3/16/99 13:13:50		
-2.000484E-03	9.495254E-03				3/16/99 13:13:53		
2.000153E-03	-9.496558E-03				3/16/99 13:13:56		
2.000155E-03	-9.496602E-03				3/16/99 13:13:59		
-2.000490E-03	9.495225E-03				3/16/99 13:14:01		
-2.000489E-03	9.495274E-03				3/16/99 13:14:04		
2.000154E-03	-9.496577E-03				3/16/99 13:14:07		
2.000155E-03	-9.496560E-03				3/16/99 13:14:10		
-2.000485E-03	9.495251E-03				3/16/99 13:14:13		
-2.000486E-03	9.495292E-03				3/16/99 13:14:16		
2.000154E-03	-9.496585E-03				3/16/99 13:14:18		
2.000155E-03	-9.496583E-03				3/16/99 13:14:21		
-2.000485E-03	9.495246E-03				3/16/99 13:14:24		
-2.000481E-03	9.495285E-03				3/16/99 13:14:27		
2.000154E-03	-9.496568E-03				3/16/99 13:14:30		
2.000154E-03	-9.496601E-03				3/16/99 13:14:33		
-2.000479E-03	9.495240E-03				3/16/99 13:14:35		
-2.000483E-03	9.495178E-03				3/16/99 13:14:38		
2.000152E-03	-9.496628E-03				3/16/99 13:14:41		
2.000154E-03	-9.496664E-03				3/16/99 13:14:44		
-2.000486E-03	9.495230E-03				3/16/99 13:14:47		
-2.000486E-03	9.495238E-03				3/16/99 13:14:49		
2.000152E-03	-9.496557E-03				3/16/99 13:14:52		
2.000153E-03	-9.496575E-03				3/16/99 13:14:55		
-2.000482E-03	9.495306E-03				3/16/99 13:14:58		
-2.000485E-03	9.495272E-03				3/16/99 13:15:01		
2.000155E-03	-9.496549E-03				3/16/99 13:15:04		
2.000154E-03	-9.496584E-03				3/16/99 13:15:06		
-2.000478E-03	9.495238E-03				3/16/99 13:15:09		
-2.000480E-03	9.495272E-03				3/16/99 13:15:12		
2.000156E-03	-9.496572E-03				3/16/99 13:15:15		
2.000158E-03	-9.496569E-03				3/16/99 13:15:18		
-2.000488E-03	9.495283E-03				3/16/99 13:15:21		
-2.000484E-03	9.495285E-03				3/16/99 13:15:23		
2.000154E-03	-9.496591E-03				3/16/99 13:15:26		
2.000319E-03	9.495919E-03	4.747202	7.564638E-06	1.899491E-05	3/16/99 13:15:30	4860.969239	4.789560332

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= approximately 13 minutes							
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
5.000226E-04	-2.378296E-03				3/16/99 14:58:08		
-5.000594E-04	2.376555E-03				3/16/99 14:58:10		
-5.000598E-04	2.376561E-03				3/16/99 14:58:13		
5.000228E-04	3.503903E+01				3/16/99 14:58:16		
5.000231E-04	-2.378462E-03				3/16/99 14:58:19		
-5.000602E-04	2.376525E-03				3/16/99 14:58:21		
-5.000600E-04	2.376553E-03				3/16/99 14:58:24		
5.000231E-04	-2.378347E-03				3/16/99 14:58:27		
5.000235E-04	-2.378318E-03				3/16/99 14:58:30		
-5.000599E-04	2.376549E-03				3/16/99 14:58:33		
-5.000595E-04	2.376550E-03				3/16/99 14:58:35		
5.000232E-04	-2.378323E-03				3/16/99 14:58:38		
5.000234E-04	-2.378336E-03				3/16/99 14:58:41		
-5.000601E-04	2.376559E-03				3/16/99 14:58:44		
-5.000599E-04	2.376562E-03				3/16/99 14:58:47		
5.000234E-04	-2.378313E-03				3/16/99 14:58:50		
5.000232E-04	-2.378310E-03				3/16/99 14:58:52		
-5.000602E-04	2.376576E-03				3/16/99 14:58:55		
-5.000605E-04	2.376574E-03				3/16/99 14:58:58		
5.000231E-04	-2.378323E-03				3/16/99 14:59:01		
5.000230E-04	-2.378319E-03				3/16/99 14:59:04		
-5.000604E-04	2.376589E-03				3/16/99 14:59:07		
-5.000603E-04	2.376581E-03				3/16/99 14:59:09		
5.000231E-04	-2.378304E-03				3/16/99 14:59:12		
5.000227E-04	-2.378307E-03				3/16/99 14:59:15		
-5.000603E-04	2.376578E-03				3/16/99 14:59:18		
-5.000606E-04	2.376583E-03				3/16/99 14:59:21		
5.000229E-04	-2.378290E-03				3/16/99 14:59:24		
5.000227E-04	-2.378300E-03				3/16/99 14:59:26		
-5.000614E-04	2.376589E-03				3/16/99 14:59:29		
-5.000611E-04	2.376587E-03				3/16/99 14:59:32		
5.000228E-04	-2.378308E-03				3/16/99 14:59:35		
5.000235E-04	-2.378312E-03				3/16/99 14:59:38		
-5.000613E-04	2.376581E-03				3/16/99 14:59:40		
-5.000613E-04	2.376576E-03				3/16/99 14:59:43		
5.000239E-04	-2.378316E-03				3/16/99 14:59:46		
5.000239E-04	-2.378309E-03				3/16/99 14:59:49		
-5.000612E-04	2.376586E-03				3/16/99 14:59:52		
-5.000610E-04	2.376583E-03				3/16/99 14:59:55		
5.000233E-04	-2.378311E-03				3/16/99 14:59:57		
5.000418E-04	8.782937E-01	1756.442191	7.635430E+03	1.188824E-06	3/16/99 15:00:02	2416.030697	7.379418476

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= approximately 13 minutes							
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
9.999715E-04	-4.755299E-03				3/16/99 15:00:29		
-9.999925E-04	4.753565E-03				3/16/99 15:00:32		
-9.999924E-04	4.753566E-03				3/16/99 15:00:34		
9.999716E-04	-4.755307E-03				3/16/99 15:00:37		
9.999711E-04	-4.755288E-03				3/16/99 15:00:40		
-9.999929E-04	4.753567E-03				3/16/99 15:00:43		
-9.999928E-04	4.753554E-03				3/16/99 15:00:46		
9.999714E-04	-4.755320E-03				3/16/99 15:00:48		
9.999708E-04	-4.755317E-03				3/16/99 15:00:51		
-9.999936E-04	4.753554E-03				3/16/99 15:00:54		
-9.999931E-04	4.753565E-03				3/16/99 15:00:57		
9.999715E-04	-4.755323E-03				3/16/99 15:01:00		
9.999715E-04	-4.755337E-03				3/16/99 15:01:03		
-9.999941E-04	4.753563E-03				3/16/99 15:01:05		
-9.999932E-04	4.753545E-03				3/16/99 15:01:08		
9.999721E-04	-4.755338E-03				3/16/99 15:01:11		
9.999713E-04	-4.755323E-03				3/16/99 15:01:14		
-9.999939E-04	4.753558E-03				3/16/99 15:01:17		
-9.999936E-04	4.753560E-03				3/16/99 15:01:20		
9.999714E-04	-4.755327E-03				3/16/99 15:01:22		
9.999707E-04	-4.755352E-03				3/16/99 15:01:25		
-9.999939E-04	4.753551E-03				3/16/99 15:01:28		
-9.999939E-04	4.753579E-03				3/16/99 15:01:31		
9.999708E-04	-4.755349E-03				3/16/99 15:01:34		
9.999709E-04	-4.755347E-03				3/16/99 15:01:36		
-9.999935E-04	4.753541E-03				3/16/99 15:01:39		
-9.999929E-04	4.753570E-03				3/16/99 15:01:42		
9.999713E-04	-4.755339E-03				3/16/99 15:01:45		
9.999708E-04	-4.755356E-03				3/16/99 15:01:48		
-9.999933E-04	4.753548E-03				3/16/99 15:01:51		
-9.999932E-04	4.753554E-03				3/16/99 15:01:53		
9.999719E-04	-4.755361E-03				3/16/99 15:01:56		
9.999715E-04	-4.755360E-03				3/16/99 15:01:59		
-9.999935E-04	4.753551E-03				3/16/99 15:02:02		
-9.999933E-04	4.753532E-03				3/16/99 15:02:05		
9.999718E-04	-4.755368E-03				3/16/99 15:02:08		
9.999708E-04	-4.755363E-03				3/16/99 15:02:10		
-9.999936E-04	4.753544E-03				3/16/99 15:02:13		
-9.999933E-04	4.753538E-03				3/16/99 15:02:16		
9.999712E-04	-4.755367E-03				3/16/99 15:02:19		
9.999823E-04	4.754446E-03	4.754530	8.856021E-06	4.754368E-06	3/16/99 15:02:23	2391.578925	7.430594946

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= approximately 13 minutes							
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
2.000152E-03	-9.511435E-03				3/16/99 15:02:53		
-2.000456E-03	9.509066E-03				3/16/99 15:02:56		
-2.000453E-03	9.509047E-03				3/16/99 15:02:59		
2.000159E-03	-9.511450E-03				3/16/99 15:03:02		
2.000159E-03	-9.511442E-03				3/16/99 15:03:04		
-2.000457E-03	9.509078E-03				3/16/99 15:03:07		
-2.000457E-03	9.509082E-03				3/16/99 15:03:10		
2.000156E-03	-9.511463E-03				3/16/99 15:03:13		
2.000157E-03	-9.511446E-03				3/16/99 15:03:16		
-2.000458E-03	9.509046E-03				3/16/99 15:03:19		
-2.000457E-03	9.509041E-03				3/16/99 15:03:21		
2.000156E-03	-9.511483E-03				3/16/99 15:03:24		
2.000156E-03	-9.511460E-03				3/16/99 15:03:27		
-2.000459E-03	9.509080E-03				3/16/99 15:03:30		
-2.000457E-03	9.509078E-03				3/16/99 15:03:33		
2.000153E-03	-9.511515E-03				3/16/99 15:03:36		
2.000156E-03	-9.511503E-03				3/16/99 15:03:38		
-2.000456E-03	9.509030E-03				3/16/99 15:03:41		
-2.000455E-03	9.509052E-03				3/16/99 15:03:44		
2.000153E-03	-9.511470E-03				3/16/99 15:03:47		
2.000156E-03	-9.511482E-03				3/16/99 15:03:50		
-2.000452E-03	9.509051E-03				3/16/99 15:03:52		
-2.000452E-03	9.509090E-03				3/16/99 15:03:55		
2.000158E-03	-9.511489E-03				3/16/99 15:03:58		
2.000157E-03	-9.511530E-03				3/16/99 15:04:01		
-2.000452E-03	9.509014E-03				3/16/99 15:04:04		
-2.000449E-03	9.509043E-03				3/16/99 15:04:07		
2.000157E-03	-9.511566E-03				3/16/99 15:04:09		
2.000155E-03	-9.511571E-03				3/16/99 15:04:12		
-2.000456E-03	9.509011E-03				3/16/99 15:04:15		
-2.000454E-03	9.509018E-03				3/16/99 15:04:18		
2.000155E-03	-9.511632E-03				3/16/99 15:04:21		
2.000152E-03	-9.511587E-03				3/16/99 15:04:24		
-2.000455E-03	9.509002E-03				3/16/99 15:04:26		
-2.000453E-03	9.509032E-03				3/16/99 15:04:29		
2.000154E-03	-9.511590E-03				3/16/99 15:04:32		
2.000156E-03	-9.511584E-03				3/16/99 15:04:35		
-2.000455E-03	9.509066E-03				3/16/99 15:04:38		
-2.000455E-03	9.509074E-03				3/16/99 15:04:41		
2.000155E-03	-9.511589E-03				3/16/99 15:04:43		
2.000305E-03	9.510282E-03	4.754415	1.466538E-05	1.902356E-05	3/16/99 15:04:47	2366.425852	7.48431714

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= approximately 13 minutes							
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
5.000227E-04	-2.378479E-03				3/16/99 15:05:24		
-5.000629E-04	2.376515E-03				3/16/99 15:05:27		
-5.000627E-04	2.376502E-03				3/16/99 15:05:30		
5.000231E-04	-2.378483E-03				3/16/99 15:05:32		
5.000230E-04	-2.378488E-03				3/16/99 15:05:35		
-5.000628E-04	2.376512E-03				3/16/99 15:05:38		
-5.000630E-04	2.376508E-03				3/16/99 15:05:41		
5.000230E-04	-2.378486E-03				3/16/99 15:05:44		
5.000223E-04	-2.378495E-03				3/16/99 15:05:47		
-5.000631E-04	2.376516E-03				3/16/99 15:05:49		
-5.000632E-04	2.376522E-03				3/16/99 15:05:52		
5.000231E-04	-2.378489E-03				3/16/99 15:05:55		
5.000234E-04	-2.378488E-03				3/16/99 15:05:58		
-5.000633E-04	2.376507E-03				3/16/99 15:06:01		
-5.000633E-04	2.376505E-03				3/16/99 15:06:03		
5.000228E-04	-2.378496E-03				3/16/99 15:06:06		
5.000227E-04	-2.378499E-03				3/16/99 15:06:09		
-5.000639E-04	2.376503E-03				3/16/99 15:06:12		
-5.000635E-04	2.080038E+01				3/16/99 15:06:14		
5.000234E-04	-2.378659E-03				3/16/99 15:06:17		
5.000234E-04	-2.378538E-03				3/16/99 15:06:20		
-5.000638E-04	2.376489E-03				3/16/99 15:06:23		
-5.000631E-04	2.376483E-03				3/16/99 15:06:26		
5.000232E-04	-2.378516E-03				3/16/99 15:06:29		
5.000226E-04	-2.378510E-03				3/16/99 15:06:31		
-5.000634E-04	2.376504E-03				3/16/99 15:06:34		
-5.000628E-04	2.376498E-03				3/16/99 15:06:37		
5.000234E-04	-2.378525E-03				3/16/99 15:06:40		
5.000235E-04	-2.378522E-03				3/16/99 15:06:43		
-5.000629E-04	2.376484E-03				3/16/99 15:06:46		
-5.000627E-04	2.376491E-03				3/16/99 15:06:48		
5.000232E-04	-2.378520E-03				3/16/99 15:06:51		
5.000233E-04	-2.378521E-03				3/16/99 15:06:54		
-5.000631E-04	2.376498E-03				3/16/99 15:06:57		
-5.000632E-04	2.376490E-03				3/16/99 15:07:00		
5.000231E-04	-2.378506E-03				3/16/99 15:07:02		
5.000231E-04	-2.378519E-03				3/16/99 15:07:05		
-5.000634E-04	2.376495E-03				3/16/99 15:07:08		
-5.000635E-04	2.376486E-03				3/16/99 15:07:11		
5.000230E-04	-2.378514E-03				3/16/99 15:07:14		
5.000431E-04	5.223275E-01	1044.564130	4.532425E+03	1.188853E-06	3/16/99 15:07:18	2341.281487	7.539148779

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.94 GeV Time on target= approximately 13 minutes							
Run aborted after 13 minutes at 1.94 GeV due to upset conditions in LHe supply flow rate							
5.000223E-04	-2.378523E-03				3/16/99 15:07:26		
-5.000638E-04	2.376511E-03				3/16/99 15:07:29		
-5.000635E-04	2.376507E-03				3/16/99 15:07:32		
5.000223E-04	-2.378522E-03				3/16/99 15:07:35		
5.000225E-04	-2.378507E-03				3/16/99 15:07:38		
-5.000635E-04	2.376501E-03				3/16/99 15:07:40		
-5.000635E-04	2.376503E-03				3/16/99 15:07:43		
5.000226E-04	-2.378523E-03				3/16/99 15:07:46		
5.000226E-04	-2.378526E-03				3/16/99 15:07:49		
-5.000642E-04	2.376505E-03				3/16/99 15:07:52		
-5.000642E-04	2.376501E-03				3/16/99 15:07:54		
5.000227E-04	-2.378524E-03				3/16/99 15:07:57		
5.000224E-04	-2.378519E-03				3/16/99 15:08:00		
-5.000639E-04	2.376499E-03				3/16/99 15:08:03		
-5.000643E-04	2.376504E-03				3/16/99 15:08:06		
5.000224E-04	-2.378520E-03				3/16/99 15:08:09		
5.000227E-04	-2.378523E-03				3/16/99 15:08:11		
-5.000645E-04	2.376503E-03				3/16/99 15:08:14		
-5.000648E-04	2.376510E-03				3/16/99 15:08:17		
5.000222E-04	-2.378513E-03				3/16/99 15:08:20		
5.000224E-04	-2.378534E-03				3/16/99 15:08:23		
-5.000648E-04	2.376510E-03				3/16/99 15:08:26		
-5.000645E-04	2.376500E-03				3/16/99 15:08:28		
5.000231E-04	-2.378532E-03				3/16/99 15:08:31		
5.000231E-04	-2.378532E-03				3/16/99 15:08:34		
-5.000648E-04	2.376504E-03				3/16/99 15:08:37		
-5.000648E-04	2.376504E-03				3/16/99 15:08:40		
5.000231E-04	-2.378539E-03				3/16/99 15:08:43		
5.000232E-04	-2.378540E-03				3/16/99 15:08:45		
-5.000642E-04	2.376502E-03				3/16/99 15:08:48		
-5.000643E-04	2.376499E-03				3/16/99 15:08:51		
5.000228E-04	-2.378533E-03				3/16/99 15:08:54		
5.000226E-04	-2.378540E-03				3/16/99 15:08:57		
-5.000644E-04	2.376541E-03				3/16/99 15:09:00		
-5.000643E-04	2.376445E-03				3/16/99 15:09:02		
5.000230E-04	-2.378603E-03				3/16/99 15:09:05		
5.000235E-04	-2.378519E-03				3/16/99 15:09:08		
-5.000640E-04	2.376498E-03				3/16/99 15:09:11		
-5.000639E-04	2.376463E-03				3/16/99 15:09:14		
5.000233E-04	-2.378598E-03				3/16/99 15:09:16		
5.000435E-04	2.377517E-03	4.754621	1.515653E-05	1.188869E-06	3/16/99 15:09:21	2324.625839	7.576108456

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=W Beam Energy=0		Time on target= 0					
Room Temperature measurement between 1.94 and 1.1 GeV							
5.000253E-05	-3.064542E-03				3/16/99 16:22:35		
-5.000599E-05	2.892743E-03				3/16/99 16:22:38		
-5.000603E-05	2.893095E-03				3/16/99 16:22:41		
5.000260E-05	-3.065153E-03				3/16/99 16:22:44		
5.000259E-05	-3.065352E-03				3/16/99 16:22:47		
-5.000601E-05	2.894130E-03				3/16/99 16:22:49		
-5.000599E-05	2.894475E-03				3/16/99 16:22:52		
5.000254E-05	-3.065969E-03				3/16/99 16:22:55		
5.000250E-05	-3.066184E-03				3/16/99 16:22:58		
-5.000603E-05	2.895554E-03				3/16/99 16:23:01		
-5.000598E-05	2.895897E-03				3/16/99 16:23:04		
5.000253E-05	-3.066820E-03				3/16/99 16:23:06		
5.000254E-05	-3.067068E-03				3/16/99 16:23:09		
-5.000605E-05	2.896983E-03				3/16/99 16:23:12		
-5.000603E-05	2.897339E-03				3/16/99 16:23:15		
5.000259E-05	-3.067681E-03				3/16/99 16:23:18		
5.000256E-05	-3.067937E-03				3/16/99 16:23:21		
-5.000599E-05	2.898436E-03				3/16/99 16:23:23		
-5.000604E-05	2.898785E-03				3/16/99 16:23:26		
5.000258E-05	-3.068605E-03				3/16/99 16:23:29		
5.000429E-05	2.981137E-03	59.617638	3.261179E-02	1.491976E-07	3/16/99 16:23:33	60.26658068	292.2257381

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=W Beam Energy=0		Time on target= 0					
Room Temperature measurement between 1.94 and 1.1 GeV							
5.000228E-04	-2.995831E-02				3/16/99 16:24:05		
-5.000726E-04	2.979495E-02				3/16/99 16:24:08		
-5.000721E-04	2.979826E-02				3/16/99 16:24:11		
5.000230E-04	-2.996753E-02				3/16/99 16:24:13		
5.000231E-04	-2.997062E-02				3/16/99 16:24:16		
-5.000728E-04	2.980792E-02				3/16/99 16:24:19		
-5.000730E-04	2.981113E-02				3/16/99 16:24:22		
5.000224E-04	-2.998000E-02				3/16/99 16:24:25		
5.000221E-04	-2.998309E-02				3/16/99 16:24:27		
-5.000734E-04	2.982120E-02				3/16/99 16:24:30		
-5.000735E-04	2.982454E-02				3/16/99 16:24:33		
5.000222E-04	-2.999291E-02				3/16/99 16:24:36		
5.000224E-04	-2.999612E-02				3/16/99 16:24:39		
-5.000742E-04	2.983458E-02				3/16/99 16:24:42		
-5.000741E-04	2.983792E-02				3/16/99 16:24:44		
5.000232E-04	-3.000585E-02				3/16/99 16:24:47		
5.000227E-04	-3.000901E-02				3/16/99 16:24:50		
-5.000732E-04	2.984792E-02				3/16/99 16:24:53		
-5.000735E-04	2.985133E-02				3/16/99 16:24:56		
5.000225E-04	-3.001881E-02				3/16/99 16:24:59		
5.000479E-04	2.990560E-02	59.805468	3.736468E-02	1.496897E-05	3/16/99 16:25:03	60.12281769	293.0351358

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W		Beam Energy= none		Time on target= none			
Room temperature data after over-night warm up after 1.94GeV							
5.000221E-05	-2.997125E-03				3/17/99 8:50:14		
-5.000474E-05	2.996473E-03				3/17/99 8:50:17		
-5.000475E-05	2.996436E-03				3/17/99 8:50:20		
5.000228E-05	-2.997138E-03				3/17/99 8:50:23		
5.000229E-05	-2.997111E-03				3/17/99 8:50:25		
-5.000475E-05	2.996465E-03				3/17/99 8:50:28		
-5.000477E-05	2.996469E-03				3/17/99 8:50:31		
5.000231E-05	-2.997145E-03				3/17/99 8:50:34		
5.000233E-05	-2.997136E-03				3/17/99 8:50:37		
-5.000477E-05	2.996460E-03				3/17/99 8:50:39		
-5.000475E-05	2.996449E-03				3/17/99 8:50:42		
5.000237E-05	-2.997114E-03				3/17/99 8:50:45		
5.000241E-05	-2.997133E-03				3/17/99 8:50:48		
-5.000476E-05	2.996462E-03				3/17/99 8:50:51		
-5.000475E-05	2.996453E-03				3/17/99 8:50:54		
5.000235E-05	-2.997114E-03				3/17/99 8:50:56		
5.000238E-05	-2.997114E-03				3/17/99 8:50:59		
-5.000473E-05	2.996460E-03				3/17/99 8:51:02		
-5.000472E-05	2.996476E-03				3/17/99 8:51:05		
5.000237E-05	-2.997131E-03				3/17/99 8:51:08		
5.000239E-05	-2.997124E-03				3/17/99 8:51:11		
-5.000476E-05	2.996487E-03				3/17/99 8:51:13		
-5.000475E-05	2.996505E-03				3/17/99 8:51:16		
5.000236E-05	-2.997120E-03				3/17/99 8:51:19		
5.000237E-05	-2.997129E-03				3/17/99 8:51:22		
-5.000482E-05	2.996477E-03				3/17/99 8:51:25		
-5.000479E-05	2.996477E-03				3/17/99 8:51:28		
5.000241E-05	-2.997109E-03				3/17/99 8:51:30		
5.000237E-05	-2.997119E-03				3/17/99 8:51:33		
-5.000475E-05	2.996487E-03				3/17/99 8:51:36		
-5.000474E-05	2.996484E-03				3/17/99 8:51:39		
5.000241E-05	-2.997118E-03				3/17/99 8:51:42		
5.000239E-05	-2.997125E-03				3/17/99 8:51:45		
-5.000476E-05	2.996483E-03				3/17/99 8:51:47		
-5.000475E-05	2.996487E-03				3/17/99 8:51:50		
5.000240E-05	-2.997133E-03				3/17/99 8:51:53		
5.000241E-05	-2.997150E-03				3/17/99 8:51:56		
-5.000473E-05	2.996496E-03				3/17/99 8:51:59		
-5.000470E-05	2.996478E-03				3/17/99 8:52:01		
5.000241E-05	-2.997128E-03				3/17/99 8:52:04		
5.000356E-05	2.996800E-03	59.931729	1.977810E-04	1.498508E-07	3/17/99 8:52:08	60.58293736	290.4588167

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= none Time on target= none							
Room temperature data after over-night warm up after 1.94GeV							
5.000204E-04	-2.996422E-02				3/17/99 8:53:30		
-5.000606E-04	2.996351E-02				3/17/99 8:53:33		
-5.000606E-04	2.996357E-02				3/17/99 8:53:36		
5.000208E-04	-2.996435E-02				3/17/99 8:53:38		
5.000201E-04	-2.996434E-02				3/17/99 8:53:41		
-5.000604E-04	2.996361E-02				3/17/99 8:53:44		
-5.000608E-04	2.996357E-02				3/17/99 8:53:47		
5.000203E-04	-2.996444E-02				3/17/99 8:53:50		
5.000204E-04	-2.996442E-02				3/17/99 8:53:53		
-5.000609E-04	2.996353E-02				3/17/99 8:53:55		
-5.000609E-04	2.996352E-02				3/17/99 8:53:58		
5.000205E-04	-2.996448E-02				3/17/99 8:54:01		
5.000202E-04	-2.996457E-02				3/17/99 8:54:04		
-5.000609E-04	2.996366E-02				3/17/99 8:54:07		
-5.000610E-04	2.996364E-02				3/17/99 8:54:09		
5.000206E-04	-2.996455E-02				3/17/99 8:54:12		
5.000208E-04	-2.996458E-02				3/17/99 8:54:15		
-5.000609E-04	2.996368E-02				3/17/99 8:54:18		
-5.000611E-04	2.996364E-02				3/17/99 8:54:21		
5.000200E-04	-2.996458E-02				3/17/99 8:54:24		
5.000206E-04	-2.996460E-02				3/17/99 8:54:26		
-5.000611E-04	2.996373E-02				3/17/99 8:54:29		
-5.000606E-04	2.996372E-02				3/17/99 8:54:32		
5.000213E-04	-2.996469E-02				3/17/99 8:54:35		
5.000213E-04	-2.996473E-02				3/17/99 8:54:38		
-5.000604E-04	2.996364E-02				3/17/99 8:54:40		
-5.000604E-04	2.996375E-02				3/17/99 8:54:43		
5.000211E-04	-2.996473E-02				3/17/99 8:54:46		
5.000213E-04	-2.996477E-02				3/17/99 8:54:49		
-5.000611E-04	2.996375E-02				3/17/99 8:54:52		
-5.000609E-04	2.996374E-02				3/17/99 8:54:55		
5.000205E-04	-2.996474E-02				3/17/99 8:54:57		
5.000207E-04	-2.996473E-02				3/17/99 8:55:00		
-5.000610E-04	2.996376E-02				3/17/99 8:55:03		
-5.000614E-04	2.996378E-02				3/17/99 8:55:06		
5.000208E-04	-2.996472E-02				3/17/99 8:55:09		
5.000206E-04	-2.996477E-02				3/17/99 8:55:12		
-5.000618E-04	2.996378E-02				3/17/99 8:55:14		
-5.000617E-04	2.996388E-02				3/17/99 8:55:17		
5.000206E-04	-2.996469E-02				3/17/99 8:55:20		
5.000408E-04	2.996413E-02	59.923370	2.241765E-04	1.498337E-05	3/17/99 8:55:24	60.57488402	290.5035561

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= pre-1.1 GeV Time on target= 0							
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
5.000204E-04	-2.362694E-03				3/17/99 10:16:47		
-5.000747E-04	2.360482E-03				3/17/99 10:16:49		
-5.000743E-04	2.360474E-03				3/17/99 10:16:52		
5.000212E-04	-2.362699E-03				3/17/99 10:16:55		
5.000215E-04	-2.362694E-03				3/17/99 10:16:58		
-5.000738E-04	2.360481E-03				3/17/99 10:17:01		
-5.000741E-04	2.360485E-03				3/17/99 10:17:04		
5.000209E-04	-2.362722E-03				3/17/99 10:17:06		
5.000210E-04	-2.362696E-03				3/17/99 10:17:09		
-5.000746E-04	2.360482E-03				3/17/99 10:17:12		
-5.000740E-04	2.360508E-03				3/17/99 10:17:15		
5.000211E-04	-2.362695E-03				3/17/99 10:17:18		
5.000214E-04	-2.362675E-03				3/17/99 10:17:20		
-5.000737E-04	2.360508E-03				3/17/99 10:17:23		
-5.000736E-04	2.360522E-03				3/17/99 10:17:26		
5.000209E-04	-2.362686E-03				3/17/99 10:17:29		
5.000212E-04	-2.362686E-03				3/17/99 10:17:32		
-5.000742E-04	2.360526E-03				3/17/99 10:17:35		
-5.000745E-04	2.360536E-03				3/17/99 10:17:37		
5.000207E-04	-2.362648E-03				3/17/99 10:17:40		
5.000214E-04	-2.362657E-03				3/17/99 10:17:43		
-5.000744E-04	2.360528E-03				3/17/99 10:17:46		
-5.000738E-04	2.360509E-03				3/17/99 10:17:49		
5.000218E-04	-2.362657E-03				3/17/99 10:17:52		
5.000218E-04	-2.362684E-03				3/17/99 10:17:54		
-5.000739E-04	2.360527E-03				3/17/99 10:17:57		
-5.000737E-04	2.360528E-03				3/17/99 10:18:00		
5.000213E-04	-2.362668E-03				3/17/99 10:18:03		
5.000213E-04	-2.362676E-03				3/17/99 10:18:06		
-5.000744E-04	2.360529E-03				3/17/99 10:18:09		
-5.000744E-04	2.360542E-03				3/17/99 10:18:11		
5.000216E-04	-2.362674E-03				3/17/99 10:18:14		
5.000217E-04	-2.362652E-03				3/17/99 10:18:17		
-5.000745E-04	2.360534E-03				3/17/99 10:18:20		
-5.000746E-04	2.360528E-03				3/17/99 10:18:23		
5.000210E-04	-2.362647E-03				3/17/99 10:18:26		
5.000209E-04	-2.362687E-03				3/17/99 10:18:28		
-5.000746E-04	2.360555E-03				3/17/99 10:18:31		
-5.000746E-04	2.360541E-03				3/17/99 10:18:34		
5.000208E-04	-2.362627E-03				3/17/99 10:18:37		
5.000477E-04	2.361596E-03	4.722742	1.955632E-05	1.180905E-06	3/17/99 10:18:41	4976.237834	4.726870248

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= pre-1.1 GeV Time on target= 0							
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
9.999648E-04	-4.723672E-03				3/17/99 10:19:17		
-1.000002E-03	4.721646E-03				3/17/99 10:19:20		
-1.000001E-03	4.721624E-03				3/17/99 10:19:22		
9.999657E-04	-4.723698E-03				3/17/99 10:19:25		
9.999650E-04	-4.723687E-03				3/17/99 10:19:28		
-1.000003E-03	4.721618E-03				3/17/99 10:19:31		
-1.000003E-03	4.721638E-03				3/17/99 10:19:34		
9.999648E-04	-4.723713E-03				3/17/99 10:19:36		
9.999640E-04	-4.723710E-03				3/17/99 10:19:39		
-1.000003E-03	4.721605E-03				3/17/99 10:19:42		
-1.000003E-03	4.721603E-03				3/17/99 10:19:45		
9.999651E-04	-4.723722E-03				3/17/99 10:19:48		
9.999650E-04	-4.723709E-03				3/17/99 10:19:51		
-1.000002E-03	4.721571E-03				3/17/99 10:19:53		
-1.000002E-03	4.721616E-03				3/17/99 10:19:56		
9.999657E-04	-4.723704E-03				3/17/99 10:19:59		
9.999651E-04	-4.723709E-03				3/17/99 10:20:02		
-1.000003E-03	4.721604E-03				3/17/99 10:20:05		
-1.000002E-03	4.721613E-03				3/17/99 10:20:08		
9.999662E-04	-4.723690E-03				3/17/99 10:20:10		
9.999652E-04	-4.723715E-03				3/17/99 10:20:13		
-1.000003E-03	4.721611E-03				3/17/99 10:20:16		
-1.000002E-03	4.721607E-03				3/17/99 10:20:19		
9.999656E-04	-4.723746E-03				3/17/99 10:20:22		
9.999649E-04	-4.723732E-03				3/17/99 10:20:24		
-1.000003E-03	4.721569E-03				3/17/99 10:20:27		
-1.000002E-03	4.721607E-03				3/17/99 10:20:30		
9.999658E-04	-4.723721E-03				3/17/99 10:20:33		
9.999656E-04	-4.723724E-03				3/17/99 10:20:36		
-1.000002E-03	4.721635E-03				3/17/99 10:20:39		
-1.000002E-03	4.721584E-03				3/17/99 10:20:41		
9.999656E-04	-4.723736E-03				3/17/99 10:20:44		
9.999656E-04	-4.723757E-03				3/17/99 10:20:47		
-1.000002E-03	4.721641E-03				3/17/99 10:20:50		
-1.000002E-03	4.721591E-03				3/17/99 10:20:53		
9.999655E-04	-4.723706E-03				3/17/99 10:20:56		
9.999650E-04	-4.723745E-03				3/17/99 10:20:58		
-1.000002E-03	4.721654E-03				3/17/99 10:21:01		
-1.000002E-03	4.721619E-03				3/17/99 10:21:04		
9.999655E-04	-4.723682E-03				3/17/99 10:21:07		
9.999838E-04	4.722663E-03	4.722740	1.512730E-05	4.722573E-06	3/17/99 10:21:11	4975.491816	4.72726755

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= pre-1.1 GeV Time on target= 0							
This is the cold data acquisition at 4.72K prior to irradiation at 1.1 GeV							
2.000118E-03	-9.447686E-03				3/17/99 10:21:37		
-2.000565E-03	9.446063E-03				3/17/99 10:21:40		
-2.000564E-03	9.446070E-03				3/17/99 10:21:43		
2.000127E-03	-9.447685E-03				3/17/99 10:21:45		
2.000132E-03	-9.447651E-03				3/17/99 10:21:48		
-2.000560E-03	9.446028E-03				3/17/99 10:21:51		
-2.000558E-03	9.446037E-03				3/17/99 10:21:54		
2.000121E-03	-9.447750E-03				3/17/99 10:21:57		
2.000129E-03	-9.447660E-03				3/17/99 10:22:00		
-2.000558E-03	9.446136E-03				3/17/99 10:22:02		
-2.000559E-03	9.446045E-03				3/17/99 10:22:05		
2.000122E-03	-9.447613E-03				3/17/99 10:22:08		
2.000120E-03	-9.447670E-03				3/17/99 10:22:11		
-2.000563E-03	9.446087E-03				3/17/99 10:22:14		
-2.000566E-03	9.446148E-03				3/17/99 10:22:17		
2.000121E-03	-9.447677E-03				3/17/99 10:22:19		
2.000123E-03	-9.447690E-03				3/17/99 10:22:22		
-2.000568E-03	9.446122E-03				3/17/99 10:22:25		
-2.000568E-03	9.446100E-03				3/17/99 10:22:28		
2.000121E-03	-9.447596E-03				3/17/99 10:22:31		
2.000125E-03	-9.447588E-03				3/17/99 10:22:34		
-2.000568E-03	9.446275E-03				3/17/99 10:22:36		
-2.000573E-03	9.446157E-03				3/17/99 10:22:39		
2.000123E-03	-9.447532E-03				3/17/99 10:22:42		
2.000121E-03	-9.447506E-03				3/17/99 10:22:45		
-2.000565E-03	9.446211E-03				3/17/99 10:22:48		
-2.000561E-03	9.446262E-03				3/17/99 10:22:50		
2.000126E-03	-9.447588E-03				3/17/99 10:22:53		
2.000127E-03	-9.447557E-03				3/17/99 10:22:56		
-2.000571E-03	9.446160E-03				3/17/99 10:22:59		
-2.000563E-03	9.446180E-03				3/17/99 10:23:02		
2.000130E-03	-9.447687E-03				3/17/99 10:23:05		
2.000127E-03	-9.447652E-03				3/17/99 10:23:07		
-2.000562E-03	9.446053E-03				3/17/99 10:23:10		
-2.000562E-03	9.446086E-03				3/17/99 10:23:13		
2.000126E-03	-9.447586E-03				3/17/99 10:23:16		
2.000127E-03	-9.447574E-03				3/17/99 10:23:19		
-2.000559E-03	9.446095E-03				3/17/99 10:23:22		
-2.000558E-03	9.446166E-03				3/17/99 10:23:24		
2.000127E-03	-9.447541E-03				3/17/99 10:23:27		
2.000344E-03	9.446874E-03	4.722625	1.689062E-05	1.889694E-05	3/17/99 10:23:31	4976.097765	4.726944835

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W		Beam Energy= 1.2 GeV		Time on target= 60 minutes			
Data at the end of the first irradiation at 1.2 GeV							
5.000211E-04	-2.363556E-03				3/17/99 13:24:25		
-5.000734E-04	2.362062E-03				3/17/99 13:24:28		
-5.000729E-04	2.362064E-03				3/17/99 13:24:31		
5.000210E-04	-2.363556E-03				3/17/99 13:24:34		
5.000220E-04	-2.363552E-03				3/17/99 13:24:37		
-5.000736E-04	2.362088E-03				3/17/99 13:24:39		
-5.000735E-04	2.362087E-03				3/17/99 13:24:42		
5.000221E-04	-2.363542E-03				3/17/99 13:24:45		
5.000219E-04	-2.363522E-03				3/17/99 13:24:48		
-5.000734E-04	2.362108E-03				3/17/99 13:24:51		
-5.000735E-04	2.362108E-03				3/17/99 13:24:54		
5.000224E-04	-2.363513E-03				3/17/99 13:24:56		
5.000219E-04	-2.363498E-03				3/17/99 13:24:59		
-5.000734E-04	2.362115E-03				3/17/99 13:25:02		
-5.000731E-04	2.362124E-03				3/17/99 13:25:05		
5.000221E-04	-2.363497E-03				3/17/99 13:25:08		
5.000219E-04	-2.363499E-03				3/17/99 13:25:10		
-5.000730E-04	2.362115E-03				3/17/99 13:25:13		
-5.000735E-04	2.362116E-03				3/17/99 13:25:16		
5.000216E-04	-2.363509E-03				3/17/99 13:25:19		
5.000217E-04	-2.363495E-03				3/17/99 13:25:22		
-5.000733E-04	2.362131E-03				3/17/99 13:25:25		
-5.000726E-04	2.362122E-03				3/17/99 13:25:27		
5.000224E-04	-2.363501E-03				3/17/99 13:25:30		
5.000224E-04	-2.363507E-03				3/17/99 13:25:33		
-5.000728E-04	2.362124E-03				3/17/99 13:25:36		
-5.000726E-04	2.362128E-03				3/17/99 13:25:39		
5.000224E-04	-2.363500E-03				3/17/99 13:25:42		
5.000227E-04	-2.363505E-03				3/17/99 13:25:44		
-5.000732E-04	2.362114E-03				3/17/99 13:25:47		
-5.000731E-04	2.362116E-03				3/17/99 13:25:50		
5.000226E-04	-2.363514E-03				3/17/99 13:25:53		
5.000226E-04	-2.363511E-03				3/17/99 13:25:56		
-5.000735E-04	2.362121E-03				3/17/99 13:25:58		
-5.000734E-04	2.362114E-03				3/17/99 13:26:01		
5.000226E-04	-2.363524E-03				3/17/99 13:26:04		
5.000227E-04	-2.363529E-03				3/17/99 13:26:07		
-5.000738E-04	2.362089E-03				3/17/99 13:26:10		
-5.000745E-04	2.362111E-03				3/17/99 13:26:13		
5.000220E-04	-2.363523E-03				3/17/99 13:26:15		
5.000477E-04	2.362813E-03	4.725175	6.979432E-06	1.181523E-06	3/17/99 13:26:20	4988.760772	4.720216954

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.1 GeV Time on target= 60 minutes							
Data at the end of the first irradiation at 1.1 GeV							
9.999664E-04	-4.725873E-03				3/17/99 13:27:14		
-1.000001E-03	4.724303E-03				3/17/99 13:27:17		
-1.000000E-03	4.724303E-03				3/17/99 13:27:20		
9.999662E-04	-4.725895E-03				3/17/99 13:27:23		
9.999657E-04	-4.725886E-03				3/17/99 13:27:26		
-1.000001E-03	4.724301E-03				3/17/99 13:27:29		
-1.000001E-03	4.724307E-03				3/17/99 13:27:31		
9.999665E-04	-4.725897E-03				3/17/99 13:27:34		
9.999661E-04	-4.725910E-03				3/17/99 13:27:37		
-1.000001E-03	4.724275E-03				3/17/99 13:27:40		
-1.000001E-03	4.724271E-03				3/17/99 13:27:43		
9.999664E-04	-4.725942E-03				3/17/99 13:27:46		
9.999661E-04	-4.725946E-03				3/17/99 13:27:48		
-1.000001E-03	4.724259E-03				3/17/99 13:27:51		
-1.000000E-03	4.724263E-03				3/17/99 13:27:54		
9.999669E-04	-4.725939E-03				3/17/99 13:27:57		
9.999663E-04	-4.725950E-03				3/17/99 13:28:00		
-1.000001E-03	4.724258E-03				3/17/99 13:28:03		
-1.000001E-03	4.724231E-03				3/17/99 13:28:05		
9.999668E-04	-4.725978E-03				3/17/99 13:28:08		
9.999663E-04	-4.725968E-03				3/17/99 13:28:11		
-1.000002E-03	4.724214E-03				3/17/99 13:28:14		
-1.000001E-03	4.724211E-03				3/17/99 13:28:17		
9.999663E-04	-4.725985E-03				3/17/99 13:28:19		
9.999662E-04	-4.725989E-03				3/17/99 13:28:22		
-1.000002E-03	4.724213E-03				3/17/99 13:28:25		
-1.000001E-03	4.724189E-03				3/17/99 13:28:28		
9.999670E-04	-4.726002E-03				3/17/99 13:28:31		
9.999664E-04	-4.726006E-03				3/17/99 13:28:34		
-1.000002E-03	4.724183E-03				3/17/99 13:28:36		
-1.000002E-03	4.724179E-03				3/17/99 13:28:39		
9.999672E-04	-4.726026E-03				3/17/99 13:28:42		
9.999665E-04	-4.726017E-03				3/17/99 13:28:45		
-1.000001E-03	4.724187E-03				3/17/99 13:28:48		
-1.000001E-03	4.724168E-03				3/17/99 13:28:51		
9.999672E-04	-4.726010E-03				3/17/99 13:28:53		
9.999657E-04	-4.726034E-03				3/17/99 13:28:56		
-1.000002E-03	4.724181E-03				3/17/99 13:28:59		
-1.000001E-03	4.724168E-03				3/17/99 13:29:02		
9.999662E-04	-4.726019E-03				3/17/99 13:29:05		
9.999838E-04	4.725098E-03	4.725175	5.932730E-06	4.725017E-06	3/17/99 13:29:09	4988.640685	4.720280612

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W		Beam Energy= 1.1 GeV		Time on target= 60 minutes			
Data at the end of the first irradiation at 1.1 GeV							
9.999656E-04	-4.726015E-03				3/17/99 13:29:12		
-1.000002E-03	4.724173E-03				3/17/99 13:29:15		
-1.000002E-03	4.724198E-03				3/17/99 13:29:18		
9.999662E-04	-4.726017E-03				3/17/99 13:29:21		
9.999656E-04	-4.726020E-03				3/17/99 13:29:23		
-1.000002E-03	4.724164E-03				3/17/99 13:29:26		
-1.000002E-03	4.724180E-03				3/17/99 13:29:29		
9.999658E-04	-4.726024E-03				3/17/99 13:29:32		
9.999657E-04	-4.726013E-03				3/17/99 13:29:35		
-1.000003E-03	4.724191E-03				3/17/99 13:29:38		
-1.000002E-03	4.724156E-03				3/17/99 13:29:40		
9.999663E-04	-4.726027E-03				3/17/99 13:29:43		
9.999661E-04	-4.726029E-03				3/17/99 13:29:46		
-1.000003E-03	4.724177E-03				3/17/99 13:29:49		
-1.000002E-03	4.724172E-03				3/17/99 13:29:52		
9.999659E-04	-4.726028E-03				3/17/99 13:29:55		
9.999659E-04	-4.726032E-03				3/17/99 13:29:57		
-1.000002E-03	4.724170E-03				3/17/99 13:30:00		
-1.000002E-03	4.724166E-03				3/17/99 13:30:03		
9.999663E-04	-4.726046E-03				3/17/99 13:30:06		
9.999662E-04	-4.726033E-03				3/17/99 13:30:09		
-1.000002E-03	4.724139E-03				3/17/99 13:30:12		
-1.000002E-03	4.724145E-03				3/17/99 13:30:14		
9.999665E-04	-4.726048E-03				3/17/99 13:30:17		
9.999661E-04	-4.726065E-03				3/17/99 13:30:20		
-1.000003E-03	4.724141E-03				3/17/99 13:30:23		
-1.000002E-03	4.724123E-03				3/17/99 13:30:26		
9.999666E-04	-4.726085E-03				3/17/99 13:30:28		
9.999662E-04	-4.726084E-03				3/17/99 13:30:31		
-1.000002E-03	4.724112E-03				3/17/99 13:30:34		
-1.000002E-03	4.724109E-03				3/17/99 13:30:37		
9.999665E-04	-4.726098E-03				3/17/99 13:30:40		
9.999658E-04	-4.726101E-03				3/17/99 13:30:43		
-1.000002E-03	4.724117E-03				3/17/99 13:30:45		
-1.000002E-03	4.724094E-03				3/17/99 13:30:48		
9.999665E-04	-4.726101E-03				3/17/99 13:30:51		
9.999662E-04	-4.726106E-03				3/17/99 13:30:54		
-1.000002E-03	4.724098E-03				3/17/99 13:30:57		
-1.000001E-03	4.724080E-03				3/17/99 13:31:00		
9.999665E-04	-4.726111E-03				3/17/99 13:31:02		
9.999841E-04	4.725100E-03	4.725175	5.783772E-06	4.725019E-06	3/17/99 13:31:07	4987.828427	4.720711262

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W		Beam Energy= 1.1 GeV		Time on target= 60 minutes			
Data at the end of the first irradiation at 1.1 GeV							
2.000127E-03	-9.452584E-03				3/17/99 13:32:15		
-2.000564E-03	9.450922E-03				3/17/99 13:32:17		
-2.000558E-03	9.450897E-03				3/17/99 13:32:20		
2.000139E-03	-9.452682E-03				3/17/99 13:32:23		
2.000133E-03	-9.452602E-03				3/17/99 13:32:26		
-2.000565E-03	9.450866E-03				3/17/99 13:32:29		
-2.000562E-03	9.450843E-03				3/17/99 13:32:32		
2.000137E-03	-9.452632E-03				3/17/99 13:32:34		
2.000128E-03	-9.452620E-03				3/17/99 13:32:37		
-2.000571E-03	9.450948E-03				3/17/99 13:32:40		
-2.000569E-03	9.450981E-03				3/17/99 13:32:43		
2.000131E-03	-9.452518E-03				3/17/99 13:32:46		
2.000134E-03	-9.452538E-03				3/17/99 13:32:49		
-2.000564E-03	9.450936E-03				3/17/99 13:32:51		
-2.000566E-03	9.450892E-03				3/17/99 13:32:54		
2.000133E-03	-9.452686E-03				3/17/99 13:32:57		
2.000137E-03	-9.452686E-03				3/17/99 13:33:00		
-2.000561E-03	9.450932E-03				3/17/99 13:33:03		
-2.000561E-03	9.450957E-03				3/17/99 13:33:06		
2.000136E-03	-9.452498E-03				3/17/99 13:33:08		
2.000135E-03	-9.452506E-03				3/17/99 13:33:11		
-2.000563E-03	9.450993E-03				3/17/99 13:33:14		
-2.000560E-03	9.450981E-03				3/17/99 13:33:17		
2.000133E-03	-9.452524E-03				3/17/99 13:33:20		
2.000129E-03	-9.452551E-03				3/17/99 13:33:22		
-2.000561E-03	9.450944E-03				3/17/99 13:33:25		
-2.000555E-03	9.450911E-03				3/17/99 13:33:28		
2.000130E-03	-9.452637E-03				3/17/99 13:33:31		
2.000134E-03	-9.452657E-03				3/17/99 13:33:34		
-2.000559E-03	9.450943E-03				3/17/99 13:33:37		
-2.000557E-03	9.450926E-03				3/17/99 13:33:39		
2.000140E-03	-9.452678E-03				3/17/99 13:33:42		
2.000137E-03	-9.452723E-03				3/17/99 13:33:45		
-2.000560E-03	9.450845E-03				3/17/99 13:33:48		
-2.000554E-03	9.450866E-03				3/17/99 13:33:51		
2.000140E-03	-9.452622E-03				3/17/99 13:33:54		
2.000139E-03	-9.452598E-03				3/17/99 13:33:56		
-2.000559E-03	9.450917E-03				3/17/99 13:33:59		
-2.000558E-03	9.450911E-03				3/17/99 13:34:02		
2.000143E-03	-9.452626E-03				3/17/99 13:34:05		
2.000348E-03	9.451764E-03	4.725060	1.277009E-05	1.890685E-05	3/17/99 13:34:09	4986.978958	4.721161775

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.1 GeV		Time on target= 135 minutes					
End of second and last irradiation at 1.1 GeV							
5.000220E-04	-2.367571E-03				3/17/99 15:45:02		
-5.000575E-04	2.365617E-03				3/17/99 15:45:05		
-5.000571E-04	2.365634E-03				3/17/99 15:45:08		
5.000225E-04	-2.367583E-03				3/17/99 15:45:10		
5.000225E-04	-2.367588E-03				3/17/99 15:45:13		
-5.000581E-04	2.365631E-03				3/17/99 15:45:16		
-5.000580E-04	2.365630E-03				3/17/99 15:45:19		
5.000225E-04	-2.367578E-03				3/17/99 15:45:22		
5.000228E-04	-2.367581E-03				3/17/99 15:45:25		
-5.000578E-04	2.365624E-03				3/17/99 15:45:27		
-5.000572E-04	2.365637E-03				3/17/99 15:45:30		
5.000228E-04	-2.367568E-03				3/17/99 15:45:33		
5.000230E-04	-2.367556E-03				3/17/99 15:45:36		
-5.000576E-04	2.365633E-03				3/17/99 15:45:39		
-5.000580E-04	2.365655E-03				3/17/99 15:45:41		
5.000227E-04	-2.367546E-03				3/17/99 15:45:44		
5.000231E-04	-2.367557E-03				3/17/99 15:45:47		
-5.000584E-04	2.365649E-03				3/17/99 15:45:50		
-5.000583E-04	2.365652E-03				3/17/99 15:45:53		
5.000227E-04	-2.367550E-03				3/17/99 15:45:56		
5.000228E-04	-2.367558E-03				3/17/99 15:45:58		
-5.000579E-04	2.365646E-03				3/17/99 15:46:01		
-5.000575E-04	2.365663E-03				3/17/99 15:46:04		
5.000231E-04	-2.367552E-03				3/17/99 15:46:07		
5.000224E-04	-2.367550E-03				3/17/99 15:46:10		
-5.000581E-04	2.365658E-03				3/17/99 15:46:13		
-5.000581E-04	2.365652E-03				3/17/99 15:46:15		
5.000228E-04	-2.367551E-03				3/17/99 15:46:18		
5.000231E-04	-2.367547E-03				3/17/99 15:46:21		
-5.000581E-04	2.365656E-03				3/17/99 15:46:24		
-5.000579E-04	2.365660E-03				3/17/99 15:46:27		
5.000226E-04	-2.367545E-03				3/17/99 15:46:30		
5.000227E-04	-2.367557E-03				3/17/99 15:46:32		
-5.000582E-04	2.365645E-03				3/17/99 15:46:35		
-5.000580E-04	2.365648E-03				3/17/99 15:46:38		
5.000228E-04	-2.367541E-03				3/17/99 15:46:41		
5.000228E-04	-2.367552E-03				3/17/99 15:46:44		
-5.000583E-04	2.365657E-03				3/17/99 15:46:47		
-5.000578E-04	2.365657E-03				3/17/99 15:46:49		
5.000236E-04	-2.367540E-03				3/17/99 15:46:52		
5.000403E-04	2.366602E-03	4.732822	8.479429E-06	1.183396E-06	3/17/99 15:46:56	4976.458532	4.726752732

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W Beam Energy= 1.1 GeV Time on target= 135 minutes							
End of second and last irradiation at 1.1 GeV							
9.999712E-04	-4.733664E-03				3/17/99 15:47:34		
-9.999903E-04	4.731771E-03				3/17/99 15:47:37		
-9.999899E-04	4.731776E-03				3/17/99 15:47:40		
9.999721E-04	-4.733666E-03				3/17/99 15:47:42		
9.999714E-04	-4.733669E-03				3/17/99 15:47:45		
-9.999914E-04	4.731781E-03				3/17/99 15:47:48		
-9.999910E-04	4.731773E-03				3/17/99 15:47:51		
9.999714E-04	-4.733674E-03				3/17/99 15:47:54		
9.999715E-04	-4.733684E-03				3/17/99 15:47:57		
-9.999913E-04	4.731759E-03				3/17/99 15:47:59		
-9.999906E-04	4.731775E-03				3/17/99 15:48:02		
9.999718E-04	-4.733672E-03				3/17/99 15:48:05		
9.999714E-04	-4.733676E-03				3/17/99 15:48:08		
-9.999914E-04	4.731776E-03				3/17/99 15:48:11		
-9.999910E-04	4.731781E-03				3/17/99 15:48:14		
9.999712E-04	-4.733666E-03				3/17/99 15:48:16		
9.999713E-04	-4.733667E-03				3/17/99 15:48:19		
-9.999913E-04	4.731779E-03				3/17/99 15:48:22		
-9.999909E-04	4.731786E-03				3/17/99 15:48:25		
9.999715E-04	-4.733655E-03				3/17/99 15:48:28		
9.999712E-04	-4.733663E-03				3/17/99 15:48:30		
-9.999920E-04	4.731780E-03				3/17/99 15:48:33		
-9.999914E-04	4.731785E-03				3/17/99 15:48:36		
9.999721E-04	-4.733662E-03				3/17/99 15:48:39		
9.999718E-04	-4.733673E-03				3/17/99 15:48:42		
-9.999922E-04	4.731783E-03				3/17/99 15:48:45		
-9.999917E-04	4.731779E-03				3/17/99 15:48:47		
9.999714E-04	-4.733659E-03				3/17/99 15:48:50		
9.999707E-04	-4.733666E-03				3/17/99 15:48:53		
-9.999924E-04	4.731762E-03				3/17/99 15:48:56		
-9.999919E-04	4.731770E-03				3/17/99 15:48:59		
9.999711E-04	-4.733662E-03				3/17/99 15:49:02		
9.999706E-04	-4.733677E-03				3/17/99 15:49:04		
-9.999929E-04	4.731786E-03				3/17/99 15:49:07		
-9.999925E-04	4.731768E-03				3/17/99 15:49:10		
9.999712E-04	-4.733644E-03				3/17/99 15:49:13		
9.999705E-04	-4.733656E-03				3/17/99 15:49:16		
-9.999927E-04	4.731783E-03				3/17/99 15:49:19		
-9.999922E-04	4.731783E-03				3/17/99 15:49:21		
9.999715E-04	-4.733665E-03				3/17/99 15:49:24		
9.999814E-04	4.732721E-03	4.732809	5.372182E-06	4.732638E-06	3/17/99 15:49:28	4977.072556	4.726425831

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID= W		Beam Energy= 1.1 Gev		Time on target= 135 minutes			
End of second and last irradiation at 1.1 GeV							
2.000136E-03	-9.467946E-03				3/17/99 15:49:57		
-2.000445E-03	9.465304E-03				3/17/99 15:49:59		
-2.000445E-03	9.465341E-03				3/17/99 15:50:02		
2.000132E-03	-9.467921E-03				3/17/99 15:50:05		
2.000135E-03	-9.467961E-03				3/17/99 15:50:08		
-2.000445E-03	9.465319E-03				3/17/99 15:50:11		
-2.000442E-03	9.465318E-03				3/17/99 15:50:14		
2.000146E-03	-9.467988E-03				3/17/99 15:50:16		
2.000142E-03	-9.467971E-03				3/17/99 15:50:19		
-2.000443E-03	9.465335E-03				3/17/99 15:50:22		
-2.000441E-03	9.465283E-03				3/17/99 15:50:25		
2.000144E-03	-9.467986E-03				3/17/99 15:50:28		
2.000144E-03	-9.467961E-03				3/17/99 15:50:31		
-2.000445E-03	9.465373E-03				3/17/99 15:50:33		
-2.000444E-03	9.465353E-03				3/17/99 15:50:36		
2.000145E-03	-9.467933E-03				3/17/99 15:50:39		
2.000141E-03	-9.468008E-03				3/17/99 15:50:42		
-2.000445E-03	9.465251E-03				3/17/99 15:50:45		
-2.000442E-03	9.465220E-03				3/17/99 15:50:47		
2.000151E-03	-9.468128E-03				3/17/99 15:50:50		
2.000149E-03	-9.468111E-03				3/17/99 15:50:53		
-2.000448E-03	9.465289E-03				3/17/99 15:50:56		
-2.000446E-03	9.465182E-03				3/17/99 15:50:59		
2.000151E-03	-9.468157E-03				3/17/99 15:51:02		
2.000152E-03	-9.468094E-03				3/17/99 15:51:04		
-2.000444E-03	9.465194E-03				3/17/99 15:51:07		
-2.000442E-03	9.465208E-03				3/17/99 15:51:10		
2.000150E-03	-9.468073E-03				3/17/99 15:51:13		
2.000147E-03	-9.468029E-03				3/17/99 15:51:16		
-2.000442E-03	9.465212E-03				3/17/99 15:51:19		
-2.000442E-03	9.465204E-03				3/17/99 15:51:21		
2.000145E-03	-9.468050E-03				3/17/99 15:51:24		
2.000149E-03	-9.468120E-03				3/17/99 15:51:27		
-2.000443E-03	9.465168E-03				3/17/99 15:51:30		
-2.000442E-03	9.465134E-03				3/17/99 15:51:33		
2.000150E-03	-9.468144E-03				3/17/99 15:51:36		
2.000151E-03	-9.468105E-03				3/17/99 15:51:38		
-2.000446E-03	9.465178E-03				3/17/99 15:51:41		
-2.000446E-03	9.465185E-03				3/17/99 15:51:44		
2.000147E-03	-9.468119E-03				3/17/99 15:51:47		
2.000295E-03	9.466646E-03	4.732626	8.120628E-06	1.893611E-05	3/17/99 15:51:51	4975.968079	4.727013897

Tungsten.xls

Tungsten.xls

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=W Beam Energy=1.1 GeV Time on target= 135 minutes							
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
5.000430E-04	-2.375393E-03				6/22/99 16:06:08		
-5.001054E-04	2.351652E-03				6/22/99 16:06:11		
-5.001052E-04	2.351676E-03				6/22/99 16:06:13		
5.000432E-04	-2.375359E-03				6/22/99 16:06:16		
5.000430E-04	-2.375368E-03				6/22/99 16:06:19		
-5.001064E-04	2.351687E-03				6/22/99 16:06:22		
-5.001060E-04	2.351688E-03				6/22/99 16:06:25		
5.000425E-04	-2.375367E-03				6/22/99 16:06:27		
5.000435E-04	-2.375383E-03				6/22/99 16:06:30		
-5.001060E-04	2.351679E-03				6/22/99 16:06:33		
-5.001056E-04	2.351690E-03				6/22/99 16:06:36		
5.000434E-04	-2.375335E-03				6/22/99 16:06:39		
5.000436E-04	-2.375370E-03				6/22/99 16:06:42		
-5.001058E-04	2.351686E-03				6/22/99 16:06:44		
-5.001057E-04	2.351704E-03				6/22/99 16:06:47		
5.000430E-04	-2.375334E-03				6/22/99 16:06:50		
5.000439E-04	-2.375355E-03				6/22/99 16:06:53		
-5.001064E-04	2.351721E-03				6/22/99 16:06:56		
-5.001058E-04	2.351700E-03				6/22/99 16:06:59		
5.000432E-04	-2.375361E-03				6/22/99 16:07:01		
5.000440E-04	-2.375344E-03				6/22/99 16:07:04		
-5.001063E-04	2.351683E-03				6/22/99 16:07:07		
-5.001061E-04	2.351718E-03				6/22/99 16:07:10		
5.000430E-04	-2.375342E-03				6/22/99 16:07:13		
5.000432E-04	-2.375373E-03				6/22/99 16:07:16		
-5.001058E-04	2.351701E-03				6/22/99 16:07:18		
-5.001058E-04	2.351705E-03				6/22/99 16:07:21		
5.000437E-04	-2.375349E-03				6/22/99 16:07:24		
5.000436E-04	-2.375351E-03				6/22/99 16:07:27		
-5.001056E-04	2.351717E-03				6/22/99 16:07:30		
-5.001056E-04	2.351666E-03				6/22/99 16:07:33		
5.000436E-04	-2.375327E-03				6/22/99 16:07:35		
5.000432E-04	-2.375334E-03				6/22/99 16:07:38		
-5.001056E-04	2.351716E-03				6/22/99 16:07:41		
-5.001057E-04	2.351717E-03				6/22/99 16:07:44		
5.000436E-04	-2.375348E-03				6/22/99 16:07:47		
5.000437E-04	-2.375336E-03				6/22/99 16:07:49		
-5.001063E-04	2.351722E-03				6/22/99 16:07:52		
-5.001063E-04	2.351723E-03				6/22/99 16:07:55		
5.000430E-04	-2.375354E-03				6/22/99 16:07:58		
5.000746E-04	2.363526E-03	4.726346	1.915638E-05	1.181946E-06	6/22/99 16:08:02	4791.056318	4.828908413

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=W		Beam Energy=1.1 GeV		Time on target= 135 minutes			
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
9.999841E-04	-4.738236E-03				6/22/99 16:09:18		
-1.000027E-03	4.714446E-03				6/22/99 16:09:21		
-1.000026E-03	4.714450E-03				6/22/99 16:09:24		
9.999841E-04	-4.738243E-03				6/22/99 16:09:27		
9.999837E-04	-4.738264E-03				6/22/99 16:09:30		
-1.000028E-03	4.714512E-03				6/22/99 16:09:33		
-1.000027E-03	4.714470E-03				6/22/99 16:09:35		
9.999840E-04	-4.738239E-03				6/22/99 16:09:38		
9.999836E-04	-4.738249E-03				6/22/99 16:09:41		
-1.000028E-03	4.714509E-03				6/22/99 16:09:44		
-1.000027E-03	4.714496E-03				6/22/99 16:09:47		
9.999842E-04	-4.738213E-03				6/22/99 16:09:49		
9.999836E-04	-4.738215E-03				6/22/99 16:09:52		
-1.000028E-03	4.714528E-03				6/22/99 16:09:55		
-1.000027E-03	4.714502E-03				6/22/99 16:09:58		
9.999843E-04	-4.738203E-03				6/22/99 16:10:01		
9.999842E-04	-4.738219E-03				6/22/99 16:10:04		
-1.000027E-03	4.714508E-03				6/22/99 16:10:06		
-1.000027E-03	4.714512E-03				6/22/99 16:10:09		
9.999850E-04	-4.738227E-03				6/22/99 16:10:12		
9.999844E-04	-4.738240E-03				6/22/99 16:10:15		
-1.000028E-03	4.714495E-03				6/22/99 16:10:18		
-1.000027E-03	4.714511E-03				6/22/99 16:10:21		
9.999846E-04	-4.738241E-03				6/22/99 16:10:23		
9.999839E-04	-4.738239E-03				6/22/99 16:10:26		
-1.000028E-03	4.714490E-03				6/22/99 16:10:29		
-1.000028E-03	4.714512E-03				6/22/99 16:10:32		
9.999842E-04	-4.738238E-03				6/22/99 16:10:35		
9.999833E-04	-4.738232E-03				6/22/99 16:10:38		
-1.000028E-03	4.714477E-03				6/22/99 16:10:40		
-1.000028E-03	4.714482E-03				6/22/99 16:10:43		
9.999835E-04	-4.738244E-03				6/22/99 16:10:46		
9.999836E-04	-4.738237E-03				6/22/99 16:10:49		
-1.000029E-03	4.714504E-03				6/22/99 16:10:52		
-1.000028E-03	4.714526E-03				6/22/99 16:10:54		
9.999843E-04	-4.738220E-03				6/22/99 16:10:57		
9.999837E-04	-4.738226E-03				6/22/99 16:11:00		
-1.000028E-03	4.714498E-03				6/22/99 16:11:03		
-1.000028E-03	4.714510E-03				6/22/99 16:11:06		
9.999843E-04	-4.738254E-03				6/22/99 16:11:09		
1.000006E-03	4.726365E-03	4.726338	1.101649E-05	4.726410E-06	6/22/99 16:11:13	4790.650399	4.829139903

Current (A)	Voltage (V)	Res.(ohms)	Std. Dev. Of Ω	Power (W)	Date/time	Cernox (ohms)	Cernox (K) 4th order poly.
Sample ID=W		Beam Energy=1.1 GeV		Time on target= 135 minutes			
post-irradiation cooldown data after 1.1 GeV runs and after 3-month room temperature anneal							
2.000268E-03	-9.465684E-03				6/22/99 16:12:26		
-2.000833E-03	9.444249E-03				6/22/99 16:12:28		
-2.000829E-03	9.444217E-03				6/22/99 16:12:31		
2.000279E-03	-9.465803E-03				6/22/99 16:12:34		
2.000277E-03	-9.465745E-03				6/22/99 16:12:37		
-2.000826E-03	9.444135E-03				6/22/99 16:12:40		
-2.000826E-03	9.444216E-03				6/22/99 16:12:43		
2.000283E-03	-9.465710E-03				6/22/99 16:12:45		
2.000275E-03	-9.465787E-03				6/22/99 16:12:48		
-2.000825E-03	9.444185E-03				6/22/99 16:12:51		
-2.000829E-03	9.444253E-03				6/22/99 16:12:54		
2.000282E-03	-9.465694E-03				6/22/99 16:12:57		
2.000283E-03	-9.465758E-03				6/22/99 16:13:00		
-2.000819E-03	9.444208E-03				6/22/99 16:13:02		
-2.000818E-03	9.444302E-03				6/22/99 16:13:05		
2.000279E-03	-9.465702E-03				6/22/99 16:13:08		
2.000288E-03	-9.465699E-03				6/22/99 16:13:11		
-2.000821E-03	9.444213E-03				6/22/99 16:13:14		
-2.000826E-03	9.444167E-03				6/22/99 16:13:17		
2.000281E-03	-9.465715E-03				6/22/99 16:13:19		
2.000282E-03	-9.465763E-03				6/22/99 16:13:22		
-2.000822E-03	9.444279E-03				6/22/99 16:13:25		
-2.000822E-03	9.444239E-03				6/22/99 16:13:28		
2.000284E-03	-9.465719E-03				6/22/99 16:13:31		
2.000283E-03	-9.465767E-03				6/22/99 16:13:34		
-2.000816E-03	9.444287E-03				6/22/99 16:13:36		
-2.000825E-03	9.444322E-03				6/22/99 16:13:39		
2.000283E-03	-9.465715E-03				6/22/99 16:13:42		
2.000283E-03	-9.465657E-03				6/22/99 16:13:45		
-2.000822E-03	9.444331E-03				6/22/99 16:13:48		
-2.000822E-03	9.444283E-03				6/22/99 16:13:51		
2.000286E-03	-9.465810E-03				6/22/99 16:13:53		
2.000286E-03	-9.465775E-03				6/22/99 16:13:56		
-2.000831E-03	9.444331E-03				6/22/99 16:13:59		
-2.000830E-03	9.444246E-03				6/22/99 16:14:02		
2.000280E-03	-9.465709E-03				6/22/99 16:14:05		
2.000281E-03	-9.465688E-03				6/22/99 16:14:07		
-2.000820E-03	9.444242E-03				6/22/99 16:14:10		
-2.000828E-03	9.444327E-03				6/22/99 16:14:13		
2.000281E-03	-9.465682E-03				6/22/99 16:14:16		
2.000553E-03	9.454990E-03	4.726189	1.554656E-05	1.891525E-05	6/22/99 16:14:20	4790.495053	4.829228504