09-06094

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Title:	PRAD0368: DE-9 Sandwich Shot Report
Author(s):	Alexander Saunders
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PRAD0368-Sandwich-DE9 Sandwich

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- [✓] Proposal
- [WA] Slides From Proposal Presentaion
- [✓] LANSCE APP. Form
- [✓] DE Shot Plan
- [✓] YAA App.
- [✓] Contained Shot Request
- [✓] Safety and Security Review
- [WA] Drawing ← NO
- [✓] Cartoon of Shot Set-Up
- [✓] Laser Layout
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Result Section

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- [✓] Timing Sheet
- [✓] Magnet Settings for Dynamic
- [✓] Scope Trace of Proton Pulses
- [✓] Charge and Time of Each Proton Pulse in Dynamic in Magnet
- [✓] Safety Checklist
- [✓] Laser Results
- [✓] Printout of Every Frame of Dynamic
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Cast of Characters

Shot number: 368
DE-9 Sandwich

Experimenter in Charge: Alexander Saunders
Principle Investigator: Dan Hooks
High Explosives Person in Charge: Mark Marr-Lyon
Firing Site Leader: Robert Lopez
Secondary FSL: Joe Bainbridge
Laser Person in Charge: N/A
Camera Point of Contact: Paul Nedrow
Analysis Lead: Christopher Morris
Safety Watch: Eduardo Campos
Data Acquisition System Point of Contact: Neil Thompson
Experimental Area Manager: Leo Bitteker

PRAD Core Team

Joe Bainbridge, Bethany Brooks, Eduardo Campos, Jose Domingez, Camilo Espinoza, Jeremy Fait, Gary Grim, Gary Hogan, Brian Hollander, Nicholas King, Kris Kwiatkowski, Douglas Lewis, Julian Lopez, Robert Lopez, Luke Lovro, Fesseha Mariam, Mark Marr-Lyon, Wendy McNeil, Alfred Meidinger, Frank Merrill, Deborah Morley, Christopher Morris, Matthew Murray, Paul Nedrow, Paul Rightley, Alexander Saunders, Cynthia Schwartz, Amy Tainter, Terry N. Thompson, Dale Tupa, Joshua Tybo, Aleksandra Vidisheva

Experiment Team

Tariq Aslam, Dan Hooks, Ed Kober, Maria Rightley, Paul Rightley

Proton Radiography Proposal Form

Submit to: Los Alamos National Laboratory, LANSCE User Office, Los Alamos, NM 87545
UNCLASSIFIED materials to MS H831, CLASSIFIED materials to MS H803

Title:	***(To be completed by LANSCE)***	
	Number	**Date Received**
IHE/Polymer Interactions (U)		

Name of Shot Series
Number of shots previously fired in this series: 0 Classification level: U (presumed)
Number of dynamic shots proposed: Needs proofing ? Has been proofed
Number of static measurements proposed (describe):

Principal Investigator: Maria Rightley Citizenship: US
Institution & Address: X-4, MS T086
Phone: 665-650 Fax: 667-4420 E-mail: mright@lanl.gov

Co-Investigators (attach additional sheets if necessary)	**Institution**	**Citizenship**	**E-mail Address**
Paul Rightley	HX-3, LANL	US	pright@lanl.gov
Ed Kober	T-14, LANL	US	emk@lanl.gov
Tariq Aslam	DE-9, LANL	US	aslam@lanl.gov

Primary pRad Team Contact: **Paul Rightley**

Estimated amount of beam time for static and dynamic experiments: **approximately one week**
Dates Desired: during a run cycle Impossible Dates:
Milestone requirements from external programs (describe):

For statistical purposes, please categorize your proposal:

RESEARCH AREA (check all that apply)	**FUNDING AGENCY (check all that apply)**
[ ] Defense Science	[X] DOE/DP (campaign)
[ ] Engineering	[ ] LDRD (title)
[X] Materials Science	[ ] DOD
[ ] Medical Applications	[ ] Industry (describe)
[ ] Nuclear Physics	[ ] Other US Gov't:
[ ] Other:	[ ] Other:

PROTON RADIOGRAPHY SAFETY & EXPERIMENTAL DETAILS

Shot Configuration

[X] Explosive Experiment
_____PBX 9502, booster, intiation system_____

[ ] Gas handling systems (specify):
_____
_____

HE weight (TNT eqv.) _____ (<____ lbs) TBD Type: see above

Fire set requirements (specify proposed detonator and special fire set needs):
_____ER400 or line wave generator (still TBD)_____

Firing Temperature (specify acceptable range): ambient

Inert Materials

Material:
___tantalum or steel or suitable alternative_____

Quantity:
_____still TBD_____

Radiographic Configuration

Minimum Field of View:

Minimum # of Frames: 15

Timing requirements ~17 frames in 5 mu-s

Explosive: **See above**

Spacing:

[X] 4' vessel, -I system, two planes ~14-21 radiograph times, 120 mm FOV

[ ] 6' vessel, -I system, two image planes ~14-21 radiograph times, 120 mm FOV

[X] 4'vessel, -I X3 system, one image plane, 5-7 radiograph times, 40 mm FOV

Optical magnification (specify):
_____magnifier on all but original experiment_____

Scintillator requirements (specify):
_____

Static Measurements

Motion Control:
_____(for all) whatever is necessary to properly baseline the experiment – no special requirements

Alignment:
_____

Describe Radioactive Materials:
_____N/A_____

KHKHJ

PROTON RADIOGRAPHY SAFETY & EXPERIMENTAL DETAILS (Continued)

Diagnostics

- ☐ VISAR (minimum number of measurement points):
- ☐ Pins (specify material, type number and readout requirements):
  _____
  _____
- ☐ Other:
  _____

Safety

- ☐ Proposed experiment known to be outside existing authorization basis (if yes, explain):
  _____
  _____
  _____
- ☐ Proposed experiment introduces known hazards outside existing HCP (if yes, explain):
  _____
  _____
  _____

Status

- ☐ Parts have been designed.
- ☐ Parts have been designed, not fabricated. Specify expected fabrication date: _____
- ☐ Parts have been fabricated, ready for proof or experiment.

Pre-shot Calculations

- ☐ Pre-shot calculations have been completed (describe):
  _____
  _____
  _____
  _____
- ☐ Pre-shot calculations have not been completed (expected completion date):
  _____
  _____
  _____

I certify that the above information is correct to the best of my knowledge. **E-mail submission by the Principal Investigator constitutes signature. Do not follow up with a hard copy.**

_____	_____	_____
Signature	Printed name	Date

DETAILED DESCRIPTION OF THE EXPERIMENT OR ACTIVITY

(Describe the science of engineering research being addressed, importance, and a description of how this experiment campaign will contribute to the progress of this research.)

In using the DSD (Detonation Shock Dynamics) model for high explosive burn, a necessary component is knowing whether inert materials adjacent to the high explosive confine the explosive, and if they do confine it, the degree to which they confine it (which is expressed as a "confinement angle" in the DSD input). In addition to needing that information to most appropriately model an explosive's behavior, some previously conducted experiments that included both IHE (specifically, PBX 9502) and polymer layers had some some unexpected behavior, and it is unclear whether that experiment was in some way anamolous, or whether what appeared to happen would repeatedly happen. We are hopeful that this experiment would be able to provide information on both fronts.

Our thoughts about this experiment are admittedly preliminary at this point, and details still need to be worked out, but we can give you an idea of what we are currently thinking at this point -- it would either be a sandwich or puck type geometry, both of which have been shot successfully at pRad in the past, with a polymer layer between the HE and the confining metal layer on one side. After an initial experiment with nominal 120 mm FOV to check timing and location, subsequent experiments would be conducted with the "microscope" (40 mm FOV) so that we could zoom in on the interfaces between metal/polymer/HE. Given a nominal detonation velocity of 7.7 mm/microseconds, this means that the detonation wave should be in the FOV for about 5.2 microseconds. Concentrating all 17 of the best camera frames in this time frame gives a manageable 300 nanosecond interframe time.

As we study this further, the design would be better defined.

LANSCE Approval Form
Explosives Operations in Area C

Starting Date of Activity: 23 June 2009
PRAD Proposal Number: 20081904
PRAD Shot Number: 368
HE Shot Plan Number: H3851 / LNSC-10555-DE3
Description: PBX-9502 Sandwich

Vessel Experiment:
VAA approved vessel: Yes
HE ≤ 10-lbs TNT-equivalent: Yes

Powder Gun Experiment:
Propellant ≤ 350-g Class 1.3: NA

Dynamic MAR Experiment:
Requirements of ASE 3.5.2 met: ~~Yes~~ NA

Experiment Technical and Safety Review complete: Yes

PRAD EIC Authorization:

Signature _____ Date: 23 June 2009

Print A. Saunders

DE-3 HE PIC Authorization:

Signature _____ Date: 23 June 2009

Print Mark Marr-Lyon

LANSCE Area B/C AM Authorization:

Signature _____ Date: 23 June 2009

Print Leo Bitteker

Shot Plan

WFO Shot Number:	LNSC-10555, 10556-DE3	**Release Date:**	6-17-09 KM		
Shot/Series Title:	PBX-9502 sandwich	Originator's shot # (optional):	H3851 - 3852		
Estimated Number of shots:	2	Past shot reference (optional):			
Lead Experimenter(s):	Mark MacLyon	**Group:**	DE-3	**Phone:**	4-0841
Experiment Program Code/Cost Account:	J3DP 0000 0000				
Firing Lead (s):	Robert Lopez	**Group:**	DE-3	**Phone:**	7-0393
Firing Site:	pRad	**Owning Group:**	DE-3	**Phone:**	7-3225
Max. Quantity HE per test:	500g				
Clearance Plan:	pRad				
Desired Test Date(s):	6/22/09				
IWD# and WPF# : Specify applicable document # (s) & expiration date(s) or note as NEW and in progress:	IWD: IWD-DE3-53-003-P100-0001 WPF: N/A WASTE IS THE RESPONSIBILITY OF P DIVISION AT PRAD				
Classified Shot: ☐ YES ☒ NO	If YES create classified shot addendum per classified document requirements				
☐ After Hours Contingency Plan	Required for shots executed after normal working hours. (defined as 4:30 PM)				

WFO Services Requested:	☐ RCT ☐ WMC ☐ Heavy Equipment ☒ Access Control	☐ IH ☐ Fire Department ☐ Fire Mitigation Review ☐ Environmental	☐ Other (Specify):

Brief Shot Description/Objectives: Attach sketches and drawings as necessary.

RP-2 detonator, LWG, Comp B booster, PBX-9502 and PBX-9501 sandwiched between steel anvils.

High Explosive Operations Safety Officer (HE OSO): Shot Plan fire mitigation review. Provide comments as appropriate:

shot screened out

P. M. Martz — HE OSO approval for shot setup to proceed — Date 6-17-09

Firing Site Leader (FSL): The FSL is the final authority on all operations of safety and procedure during firing site operations. The FSL ensures safety and technical aspects for executing the shots are complete.

FSL approval — Date 6-17-09

Classification Review: (**IF REQUIRED BY TSM LEAD EXPERIMENTER,** refer to K. Jones e-mail of 5/2/05)

☒ Unclassified	☐ Restricted Data	**Authorized Derivative Classifier:**
☐ Confidential	☐ Formerly Restricted Data	Signature
☐ Secret	☐ National Security Information	Name: Mark MacLyon Date: 6/17/09
☐ Unclassified Controlled Nuclear Information (UCNI)		Title: TSM
		Derived From: NA

Line Management (or Designee) Signature _____ **Date** 17 JUNE 2009

Firing Site Leader is responsible for keeping original record with Site records
WFO makes, distributes and keeps copy of completed form

CONTAINED SHOT REQUEST
PBX-9502 Sandwich (File name: 9502_sandwich_17Jun2009.pdf)

DATE: 17 June, 2009

REQUESTOR: Mark Marr-Lyon, DE-3, 4-0841

LOCATION OF OPERATIONS: Area C/LANSCE/pRad

VESSEL TO BE USED
6 feet in diameter, 5 port, 2" thick walls (6-2-5-1)
Over-pressure Test: Shot H3841 was 6.83 kg TNT equivalent and had 0.25" windows
Visual inspection since last shot: No change
Date of last magnaflux: 24 March 2009 with no relevant indications.
Number of shots since last magnaflux: 1
HE Mass since last magnaflux: 6.0533 kg (13.3475 lbs)
TNT Equivalent since last magnaflux: 6.8342 kg (15.0695 lbs)

SHOT TO BE FIRED
Explosive: PBX-9502 (310 g), PBX-9501 (120 g), Comp. B (17 g), Line wave generator (8 g of XTX-8003), RP-2 detonator
Metal weight: The top and bottom steel anvils (see attached drawing) are estimated at about 30 pounds each, and the frame is estimated to be about 30 pounds total.
Configuration: An 8-mm thick slab of PBX-9502 and a 3-mm thick slab of PBX-9501 are sandwiched between two large pieces of steel which are pressed together in a steel frame. The PBX-9502 is initiated along one edge with a line wave generator and a Comp. B booster rod. The shot is oriented in the pRad beam such that the detonation wave can be observed as it propagates through the explosive.

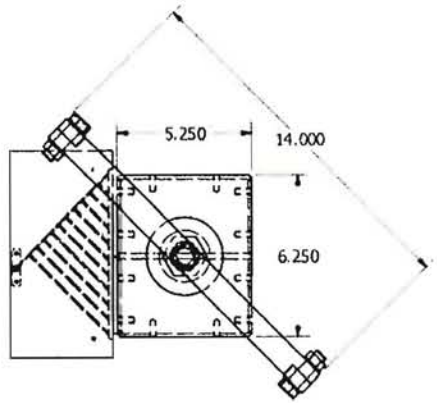
Fragment protection: Our usual amount of RHA and aluminum plates will be placed on the bottom of the vessel for protection. Additional armor will be placed directly above and below the shot to slow the large steel pieces. There is no material between the HE and the beamline windows that will fly and impact the windows.

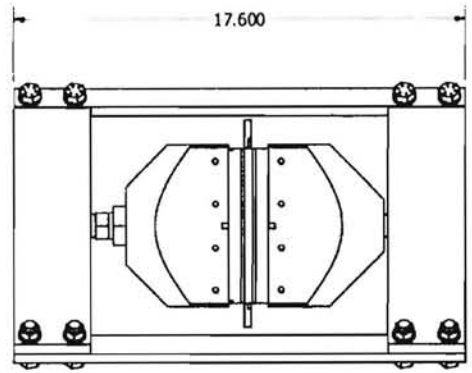
Beamline windows: 1/4" thick aluminum windows will be used on the beamlines.

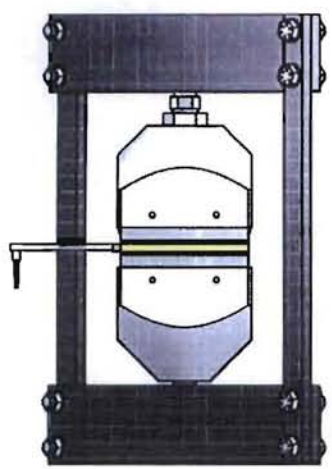
PROOF TEST
Shot number(s): H3479, H3489-3490, H3541-3543, H3632, H3803
Results of proof: The sandwich configuration has been fired several times, and though some early shots produced some damage to the vessel, the later shots did not. A sandwich shot in this configuration, but without the PBX-9501, was fired in 2008 and no damage to the vessel was observed.

REQUESTED SHOTS
Number of shots: 2
Shot numbers: H3851-3852
Proposed shot dates: The first shot will be fired around 6/23/2009, and the second later in July 2009 after a 3-week maintenance period at LANSCE.

CONTAINED SHOT REQUEST CLASSIFICATION REVIEW
Classification Level: Unclassified
Authorized Derivative Classifier: Mark Marr-Lyon, DE-3







DRAWN 109712	11/5/2008				
CHECKED		TITLE			
QA					
MFG					
APPROVED		SIZE B		DWG NO	REV
		SCALE		SHEET 2 OF 2	

From: Paul Rightley <pright@lanl.gov>
Subject: **Contained shot request approval**
Date: June 22, 2009 11:21:15 AM MDT
To: Mark Marr-Lyon <mmarr@lanl.gov>
Cc: "john C. Dallman" <dallman@lanl.gov>, Leo Bitteker <lbj@lanl.gov>

Mark,

As the delegated Vessel Approving Authority, I approve the firing of shot H3851 (9502 sandwich) at pRad before 23 June 2009.

The HE load for this shot does not represent a risk regarding blast loading of the vessel. Also, the fragment distribution for such a shot is well understood from the previously fired H3803.

Paul

--

Paul Rightley, Deputy Group Leader, DE-3, MS P940
Los Alamos National Laboratory Los Alamos, NM 87545
Phone: (505)667-0460 Fax: (505)665-3359

Proton Radiography Experiment Safety and Security Review Checklist

PRAD shot number 368 Title DE-9 Sandwich

Review Date 6/23/09 Shot Date 6/23/09

Review must be performed within two weeks of shot date.

Table 1: Requirements of the Accelerator Safety Envelope (ASE): Require USI to violate or modify

Table 2: Requirements of the Safety Analysis Document: Require USI to violate or modify

Table 3: Requirements of LANL Safety Documents: Require Hazard Analysis and Management Approval to violate or modify

Table 4: Requirements of LANL Security documents: Require Management Approval to violate or modify

Brief Unclassified Description of experiment, including sample material, form, and quantity: HE sandwich w/ 2 steel plates

Required Facility Configuration (e.g. magnifier vs. –I lens; powder gun vs. 6-foot vessel): Standard PRAD -I 6 ft vessel

Required Beam parameters (e.g. standard PRAD; video mode): Standard

All SMEs participating in review:

Table 1a: Requirements of Accelerator Safety Envelope (ASE):

Number	Question	Yes	No	Requirements if YES	SME Inits.
1	ASE section 3.1.1.5 "Line X/B/C Beam Delivery Mode" will NOT be satisfied?		X	Outside of Safety Envelope: USI to proceed	
2	Outer vessel NOT qualified to greater than 150% of HE load in this shot?		X	Outside of Safety Envelope: USI to proceed	
3	Outer vessel NOT qualified for this shot by Vessel Approving Authority?		X	Outside of Safety Envelope: USI to proceed	
4	Total HE load greater than 10.0 lbs TNT equivalent?		X	Outside of Safety Envelope: USI to proceed	
5	Total propellant load in powder gun greater than 350 g Class 1.3 propellant?		X	Outside of Safety Envelope: USI to proceed	
6	Total Material at Risk (MAR) of greater than 12.0 Plutonium-Equivalent Grams (PEG)?		X	Outside of Safety Envelope: USI to proceed	

Table 1b: Additional requirements of ASE if MAR >= 0.1 PEG

Number	Question	Yes	No	Requirements if YES	SME Inits.
1	Total MAR in target assembly greater than 11.0 PEG?		X	Outside of Safety Envelope: USI to proceed	
2	Any MAR in non-metallic form, including powders?		X	Outside of Safety Envelope: USI to proceed	
3	Total HE in target assembly greater than 30 g?		X	Outside of Safety Envelope: USI to proceed	

Table 2: Requirements of Safety Analysis Document (SAD):

Number	Question	Yes	No	Requirements if YES	SME Inits.
1	New experiment configuration not covered by SAD?		X	Outside of Safety Analysis: Hazard Analysis and USI to proceed	
2	Change to building design not consistent with SAD?		X	Outside of Safety Analysis: Hazard Analysis and USI to proceed	
3	Explosives or detonators NOT approved by Laboratory Explosives Review Committee?		X	Outside of Safety Analysis: Hazard Analysis and USI to proceed	
4	Firing circuits or firing circuit test equipment NOT approved by Explosives Instrument Review Committee?		X	Outside of Safety Analysis: Hazard Analysis and USI to proceed	
5	Flammable gases would result in greater than 50% of flammability limit if released into vessel and backfilled with air?		X	Outside of Safety Analysis: Hazard Analysis and USI to proceed	
6	Low voltage detonators on this shot?		X	Outside of Safety Analysis: Hazard Analysis and USI to proceed	
7	No containment for this shot?		X	Outside of Safety Analysis: Hazard Analysis and USI to proceed	
8	New hazards due to materials or equipment inside containment vessel?		X	Review for new hazards	

Table 3: Requirements of LANL Safety Documents

Number	Question	Yes	No	Requirements if YES	SME Inits.
1	Shot contains more than 100 lbs of DU?		X	Hazard analysis and management approval required	
2	Shot contains hazardous materials other than lead, silver, DU, or transuranics?		X	Hazard analysis, management approval, and waste profile required	
3	This shot contains lead, silver, or DU materials?		X	Hazard analysis, management approval, and waste profile required	
4	Lasers not covered by VISAR IWD required for this shot?		X	LSO Review required	
5	Pins NOT approved by EIRC required?		X	EIRC approval required	
6	Flammable gasses required in vessel?		X	Hazard analysis and management approval required	
7	Will some HE NOT be burned after dynamic event?		X	Hazard analysis and management approval required	
8	New chemicals required for this shot?		X	Hazard analysis required	
9	Internal pressure vessel?		X	Test pressure vessel to 110% for remote fill or 150% for manual fill	
10	Will hazardous waste be generated without an identified disposal path?		X	Submit waste profile to Waste Coordinator before experiment	
11	Unlisted or uninspected electrical equipment?		X	ESO review	
12	Will radioactive materials be produced that cannot be stored in radioactive materials cabinet in Area C?		X	RP-1 review required	
13	Any work not covered by P25-IWD-07-42 (PRAD IWD) and IWD-DE3-53-003-P100-0001 (HE IWD)?		X	Assess uncovered work and implement controls	

Table 4: Security Review

Number	Question	Yes	No	Requirements if YES	SME Inits.
1	Any special handling due to security concerns?		X	DC Review; Activity Security Plan	
2	Has experiment NOT been DC or SAFE-7 reviewed?		X	DC review	
3	Does experiment involve cleared or uncleared foreign nationals?		X	Escort and computer use requirements	
4	Does this shot require overnight classified supervision?		X	Arrange for overnight supervision	

Any new hazards or vulnerabilities not listed above?

NO

Summarize requirements from tables above, including new training requirements:

None.

Approval by Experiment Safety Review Committee

EIC _____ Date 6/23/09
Experimenter in Charge

HE PIC _____ Date 6/23/09
High Explosives Person in Charge

EAM _____ Date 23 June 2009
Experimental Area Manager

New review required if initial review is more than two weeks before activity:

Proton Radiography
Science Based Stockpile Stewardship

42953 | 6/23/2009 8:10:49 AM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Beam Line Change

Beam Line Changed to 2009-DE9 Sandwich

```
Beam Line Title: 2009-DE9 Sandwich - 06/23/2009 - 6 Foot [113]
Comment: 2009-DE9 Sandwich
Mode: 4 Quad -I
Vessel: 6 Foot
Collimator IL0: 9.5 mr Taper
Collimator IL1: 10 mr Taper
Collimator IL2: N/A
Window IL0: 250 mill Al
Window Object Up: N/A
Window Object Down: N/A
Window Up IL1: 250 mill Al
Window Down IL1: 20 mil AL (NG)
Window IL2: 62.5 mil Al
Converter IL0: Beam Ion Chamber
Converter IL1: 1.9 mm LSO, 2x3
Converter IL2: 2.2 mm 9 element LSO mosaic
Location: LANSCE, Line C, Cave
Key: 113
Date Created: 6/23/2009
```

Basic Filters	Content Filters
○ By Date ○ Last 10 ○ Today ○ This Week ○ This Month ◉ This Year ○ All	Date Range Start 8/31/2009 / 9/1/2009 End ☐ Name EIC ☑ Text Entry Beam Line Change ☑ Activity No PRAD0368 - Sandwich - DE9 Sandwich ☐ Expt Family Miscellaneous ☐ Pic Type Other ☐ Run No ☐ Pic No

Check checkboxes to select content filters ("" , * , ? chars allowed).

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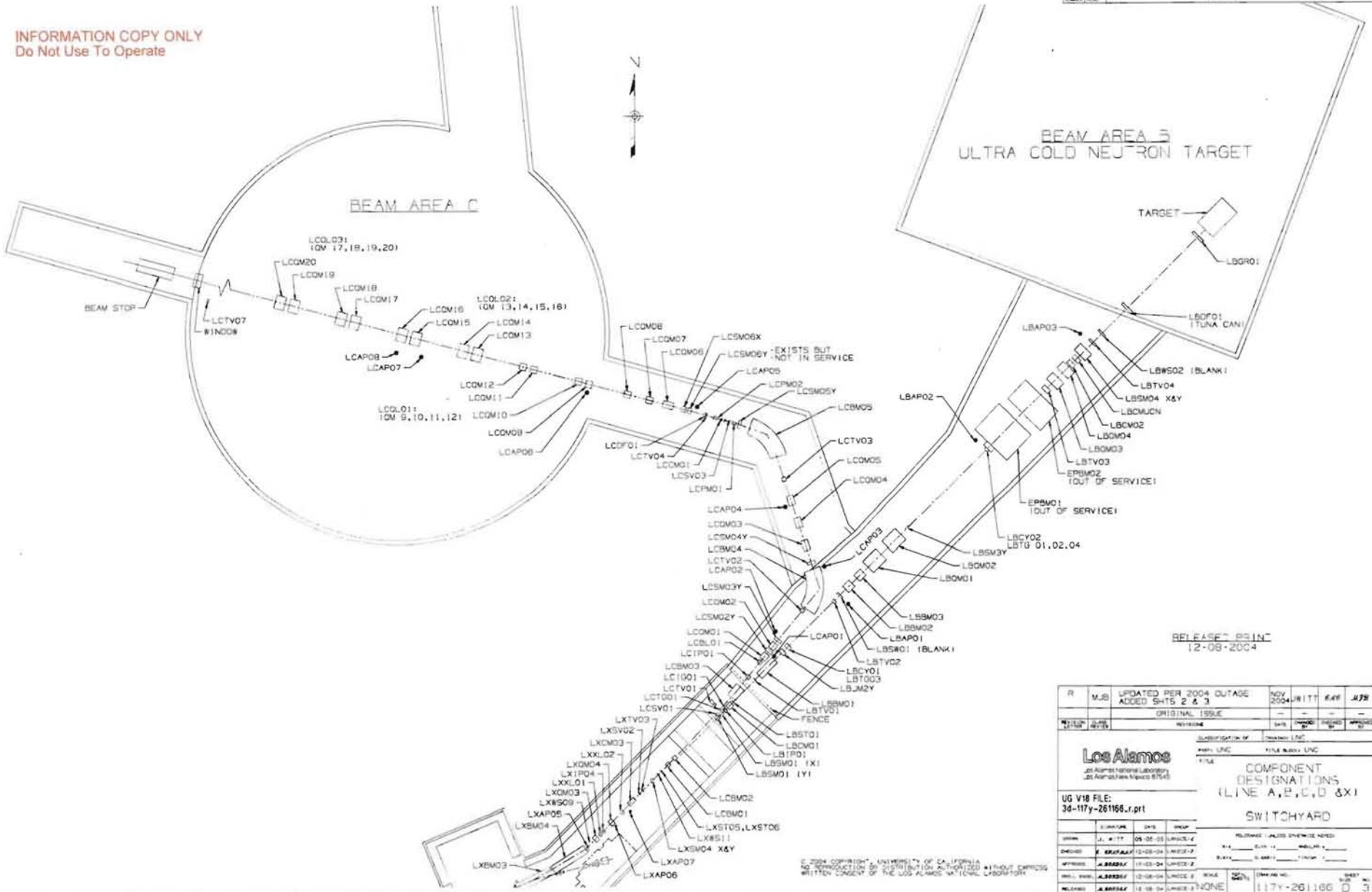

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12-08-2004

A	MJB	UPDATED PER 2004 OUTAGE ADDED SHTS 2 & 3	NOV 2004	JWITT	KAF	JWH
		ORIGINAL ISSUE	—	—	—	—
REVISION LETTER	ZONE REVISED	REVISIONS	DATE	DRAWN BY	CHECKED BY	APPROVED BY

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

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TITLE
COMPONENT DESIGNATIONS (LINE A,B,C,D &X)
SWITCHYARD

	SIGNATURE	DATE	GROUP
DRAWN	J. WITT	05-05-03	LANSCE-7
CHECKED	K. KRAFFT	12-08-04	LANSCE-7
APPROVED	J. WOOD	11-03-04	LANSCE-7
REL. ENGR.	J. WOOD	12-08-04	LANSCE-3
RELEASED	J. WOOD	12-08-04	LANSCE-3

SCALE: NONE
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SHEET 3 OF 3 REV. D

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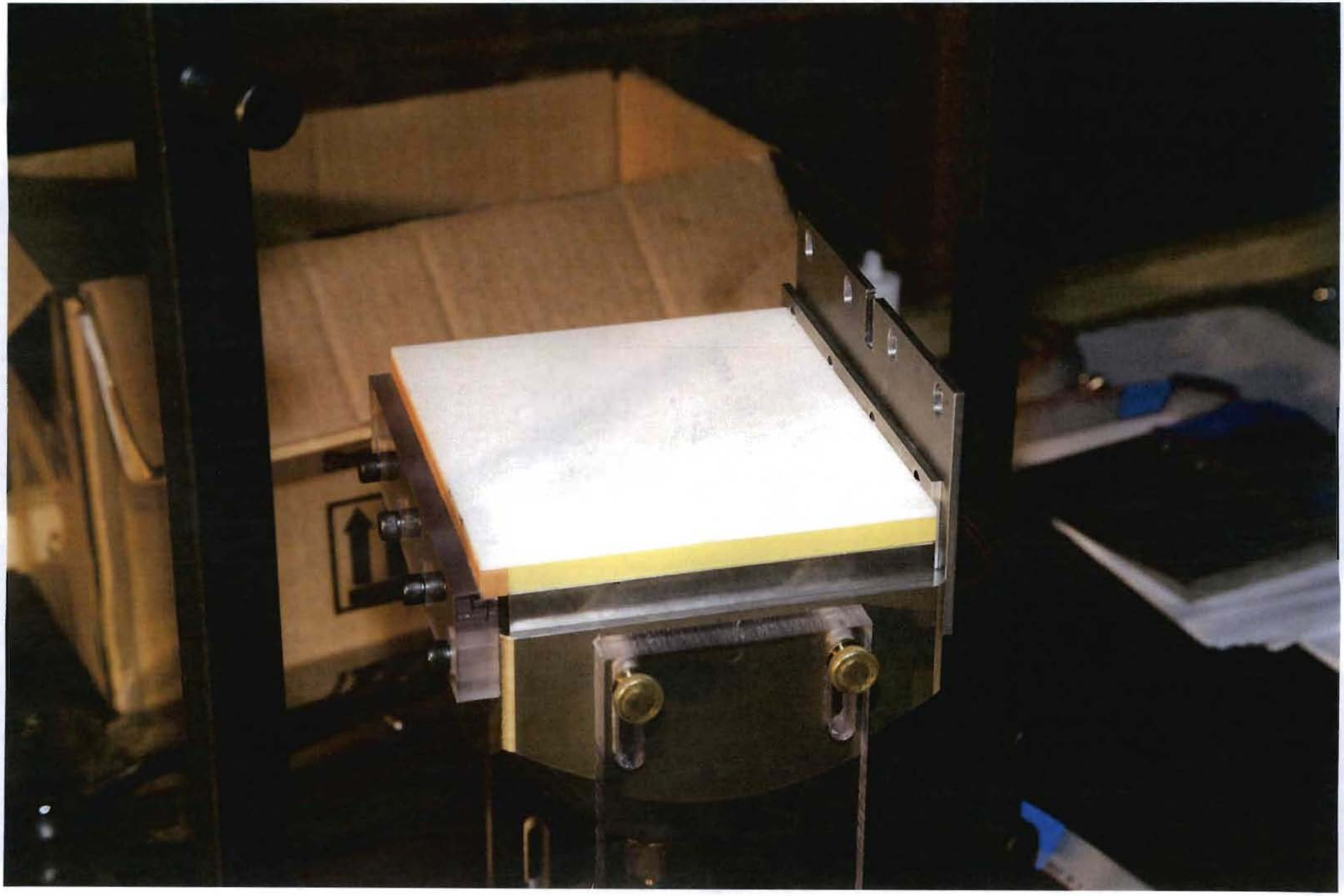
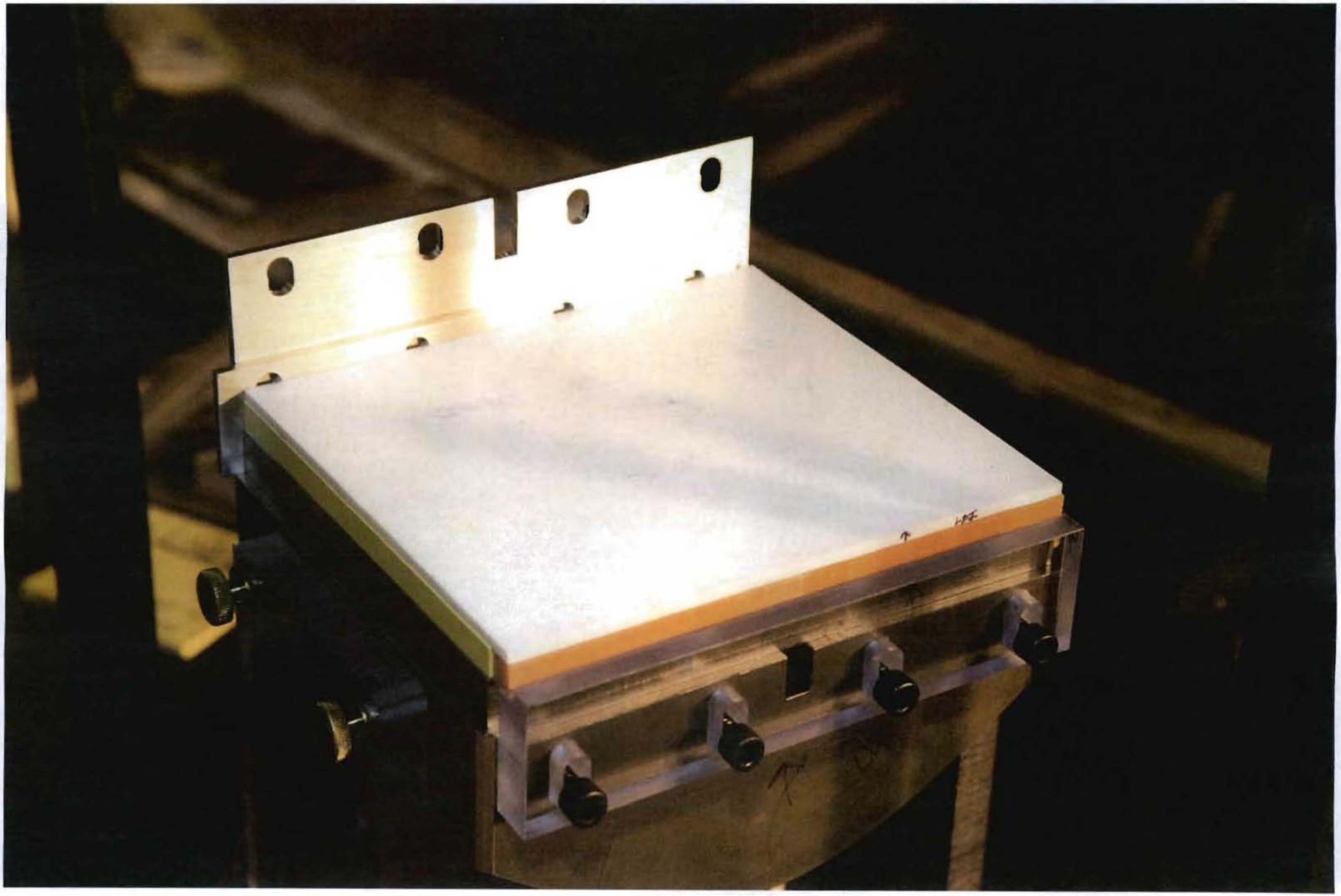
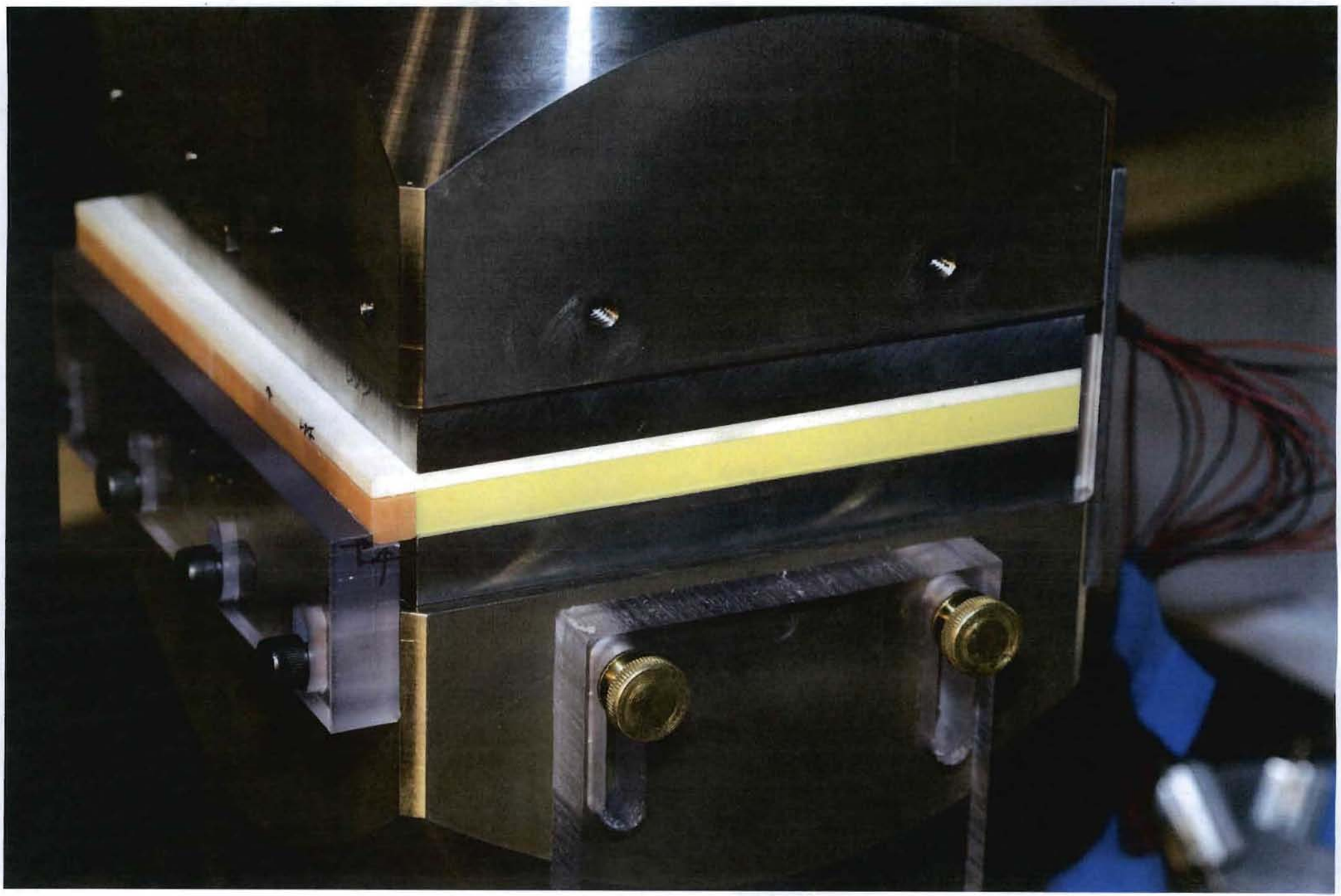
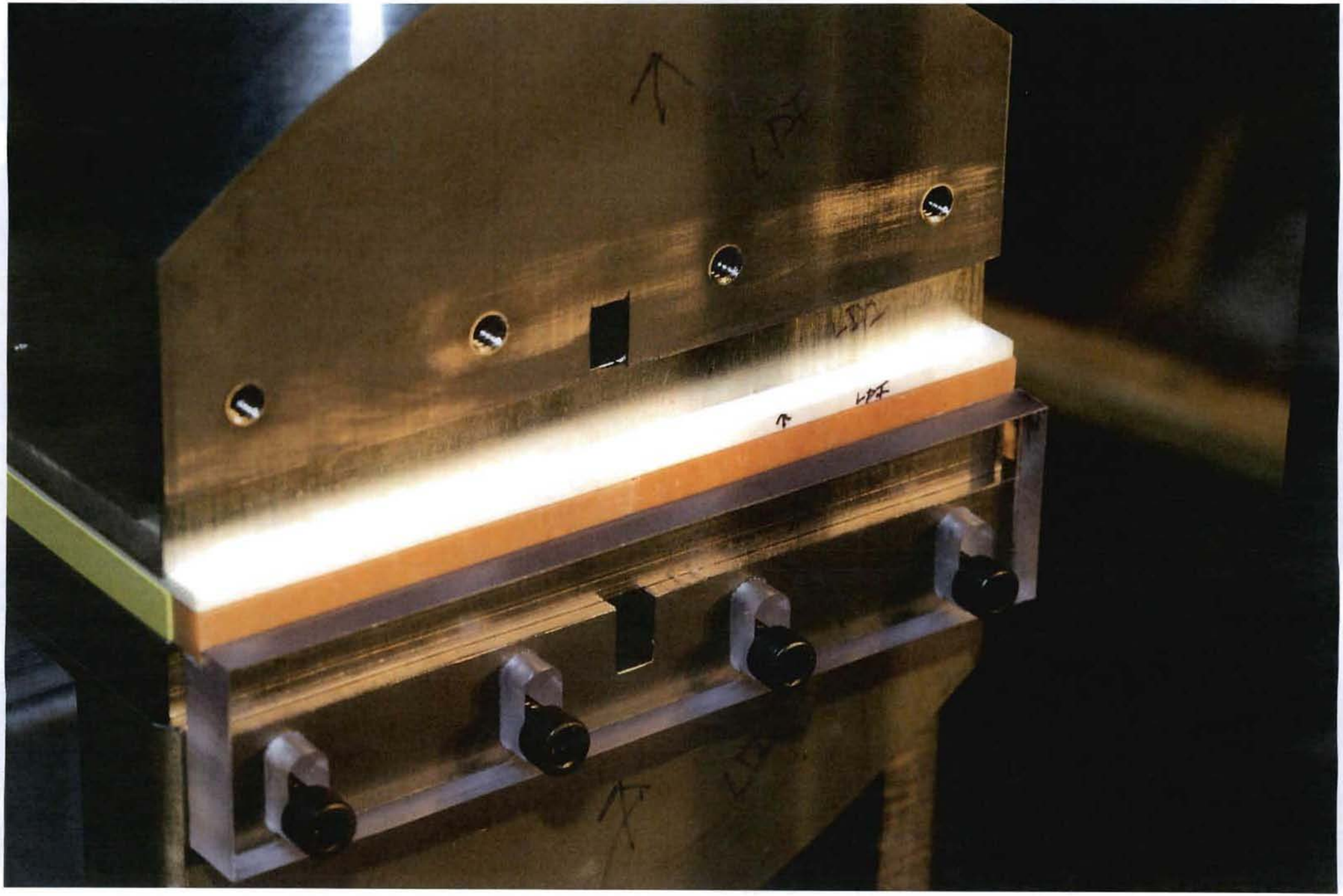
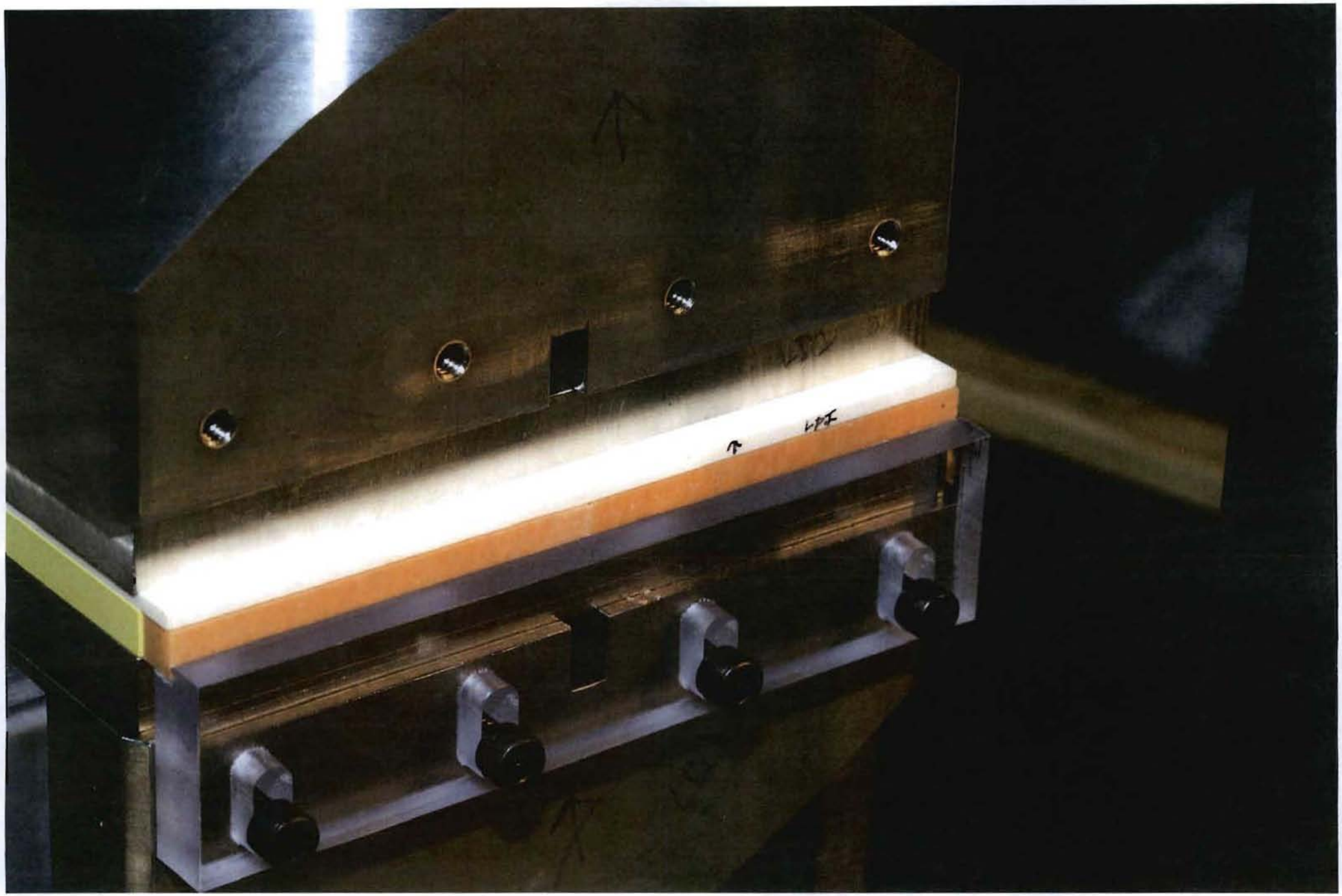
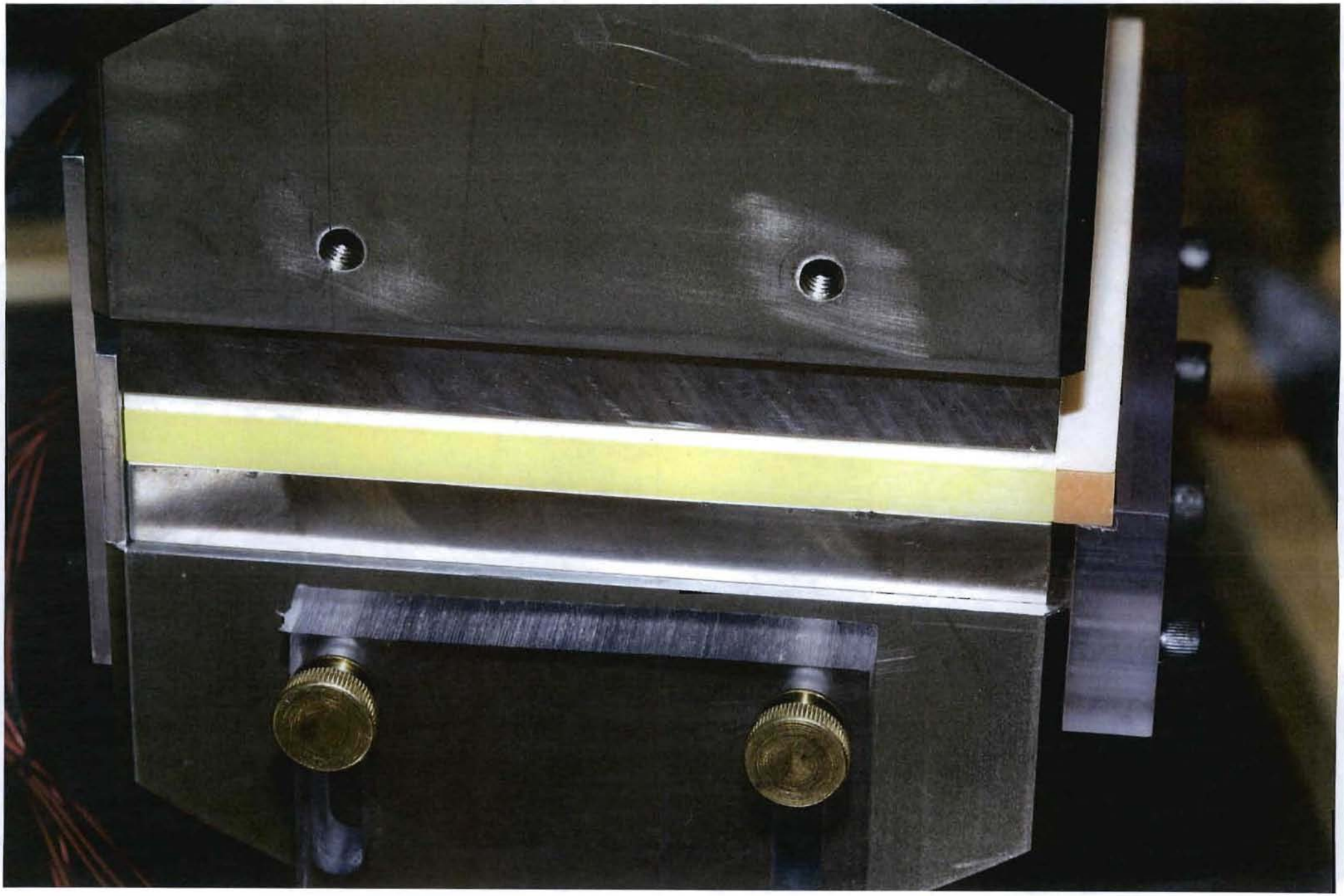


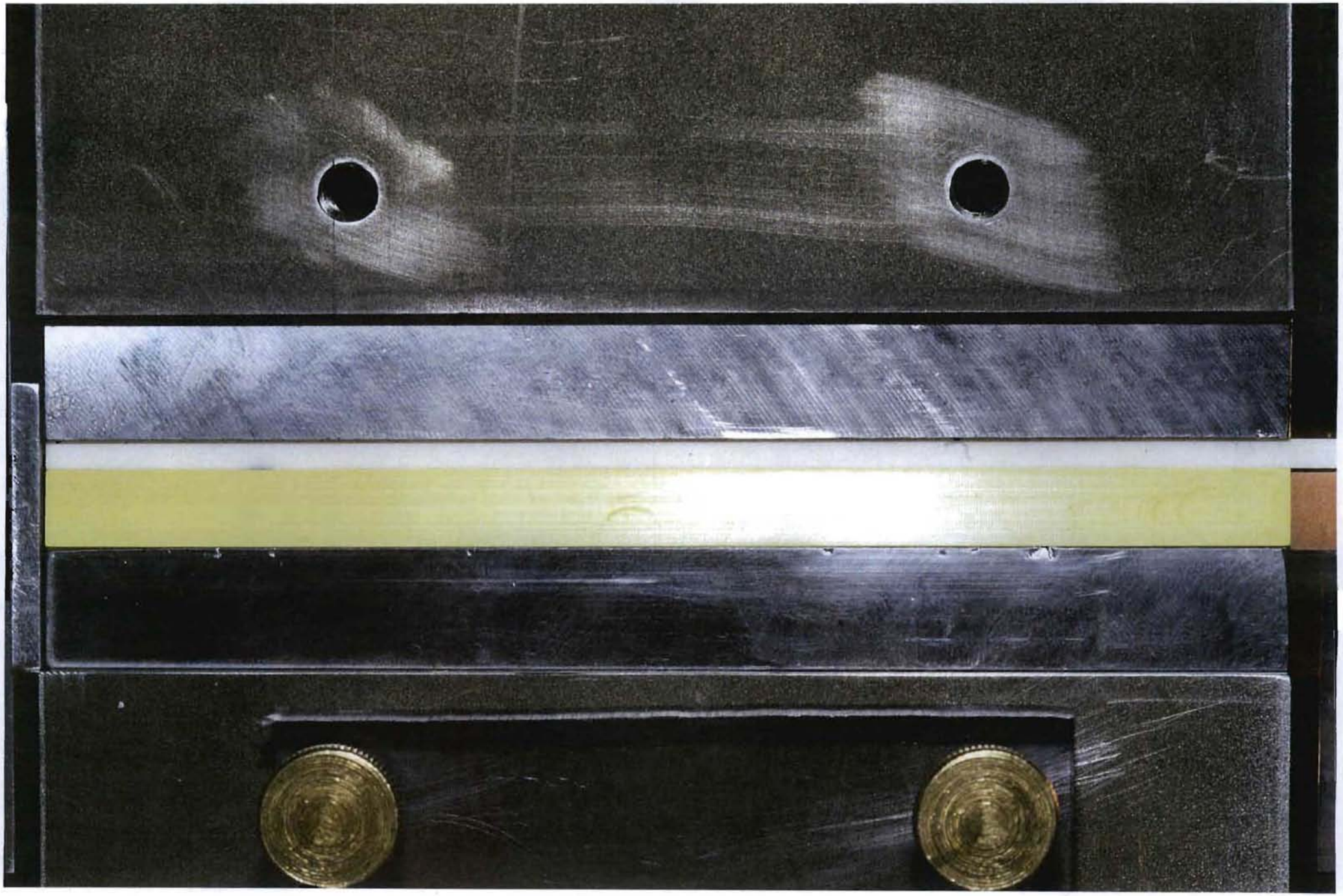


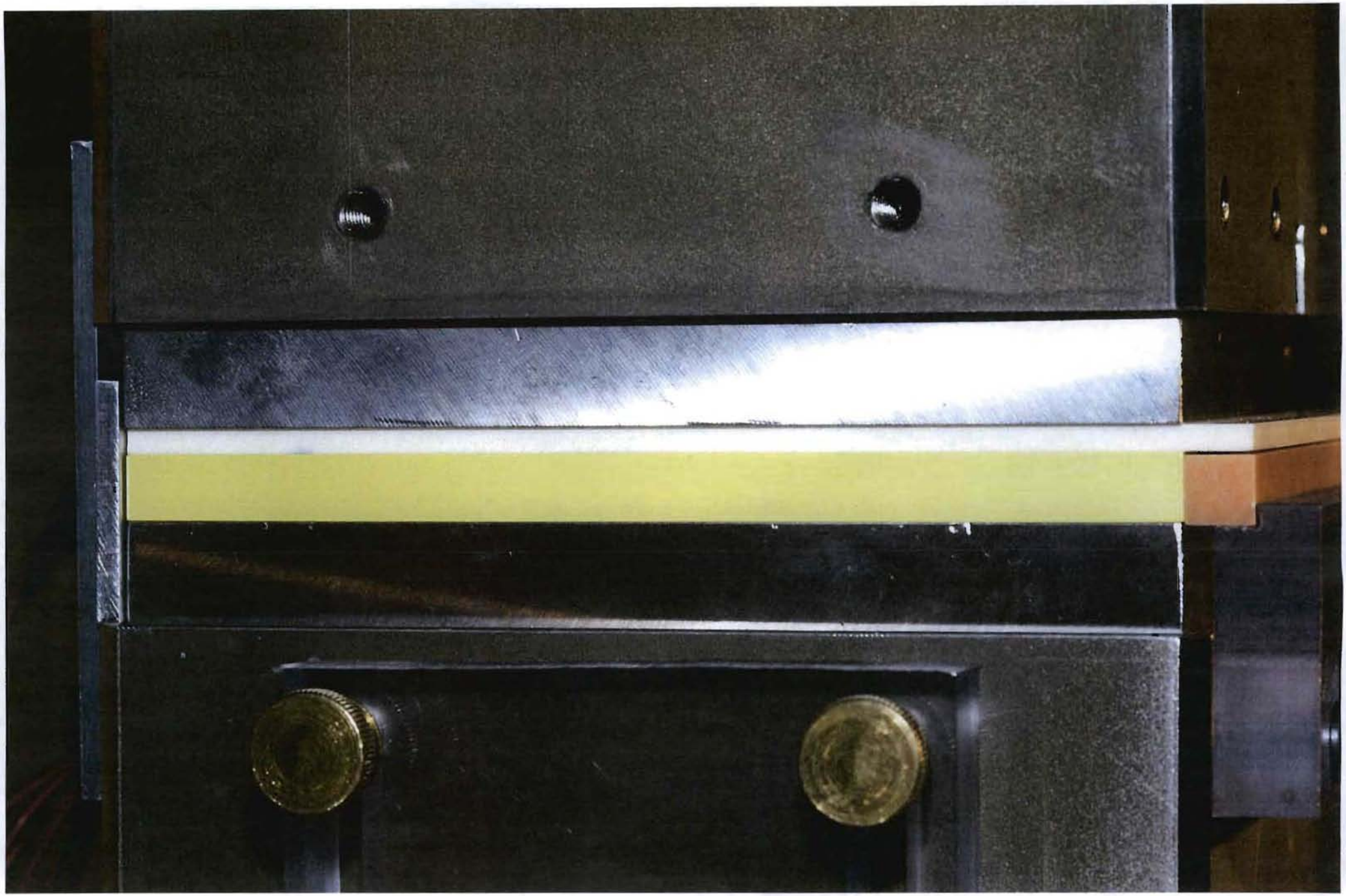


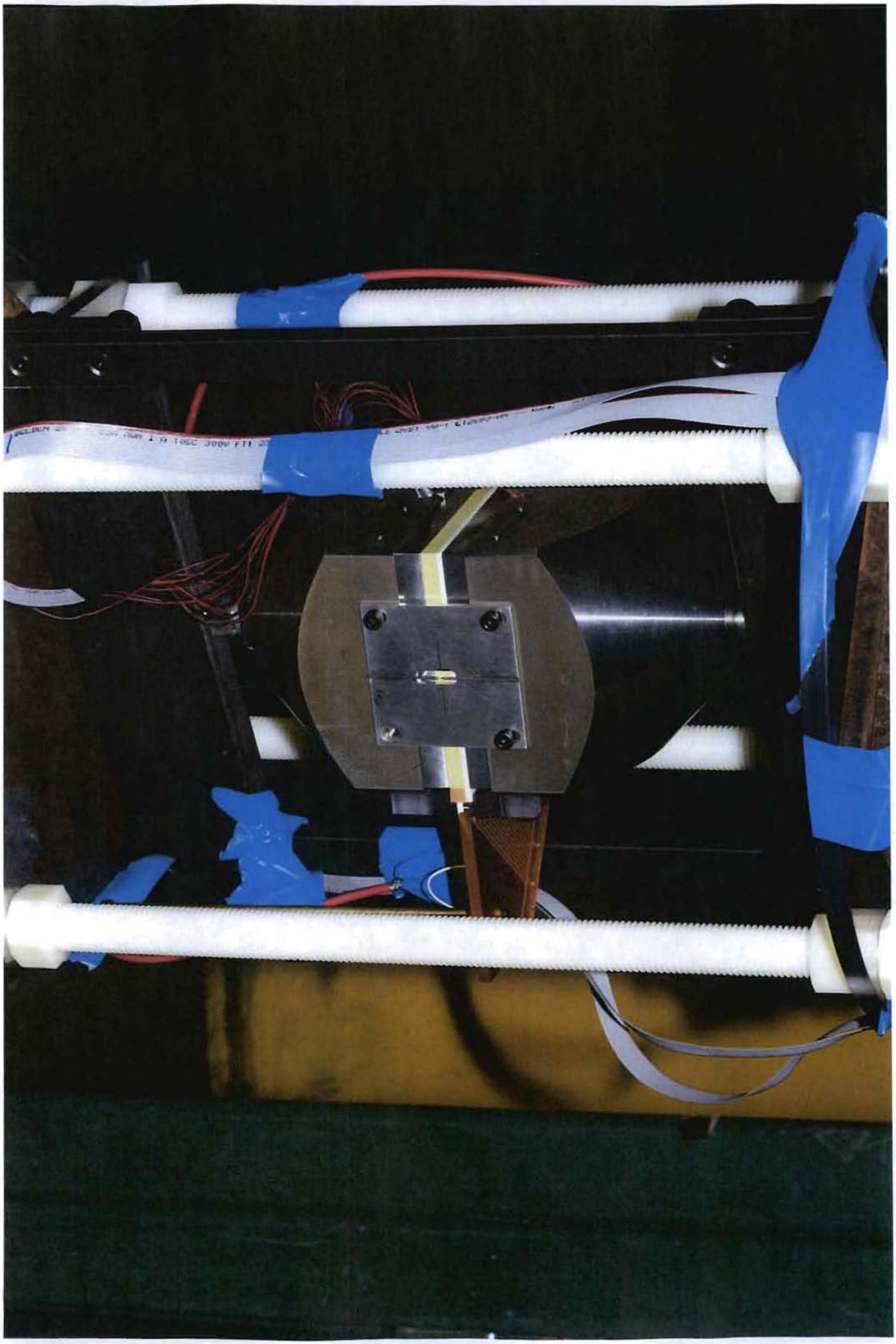


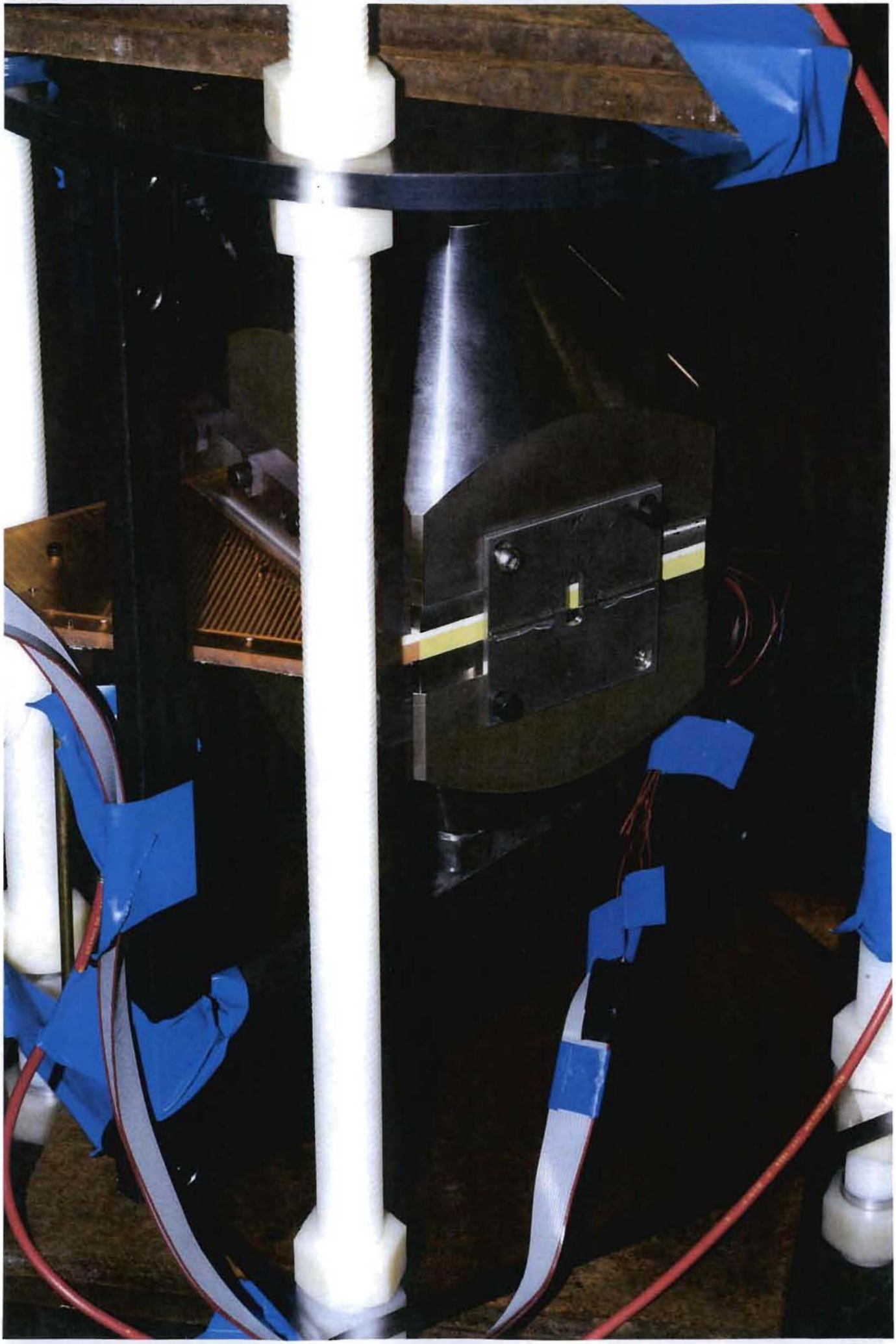


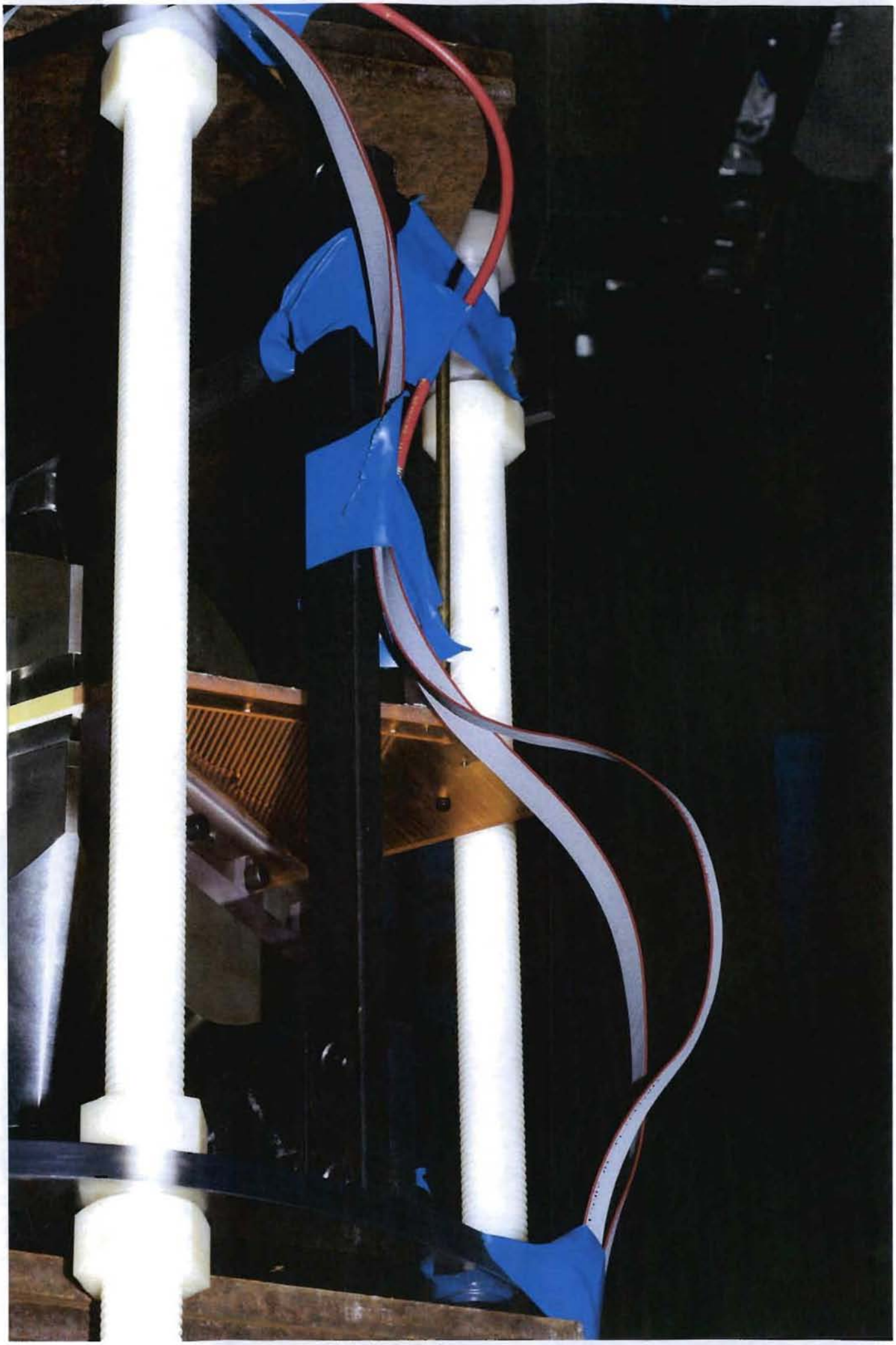


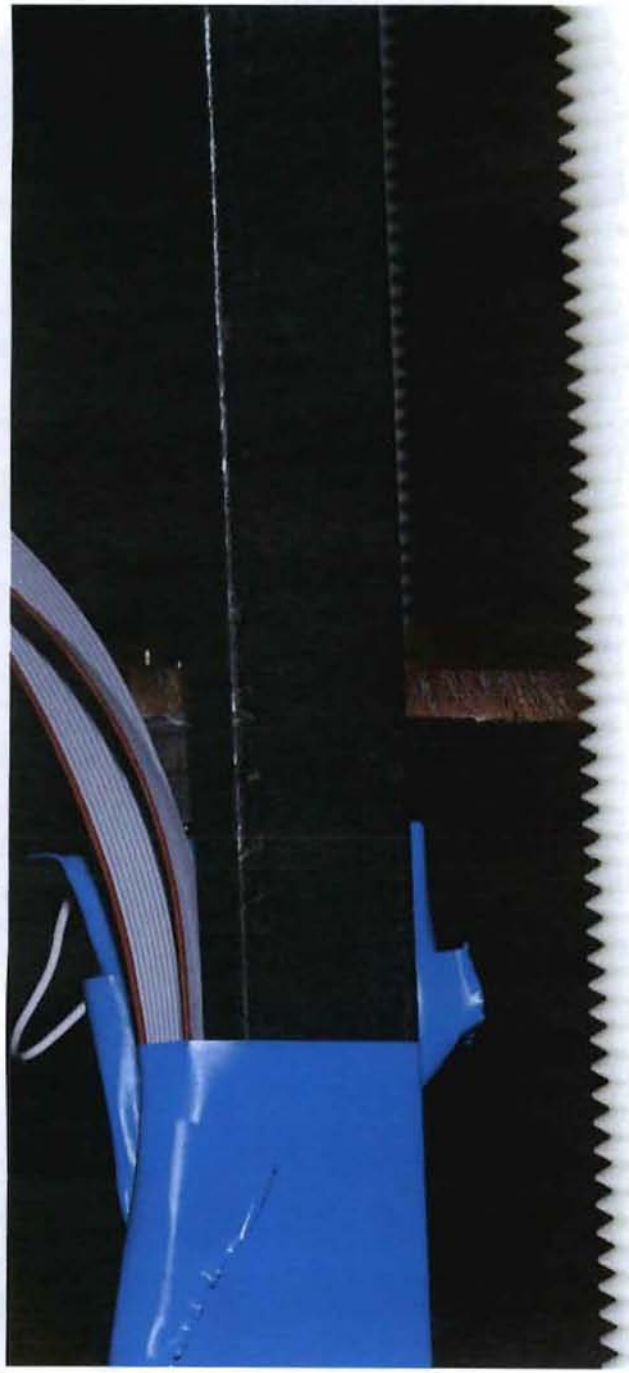


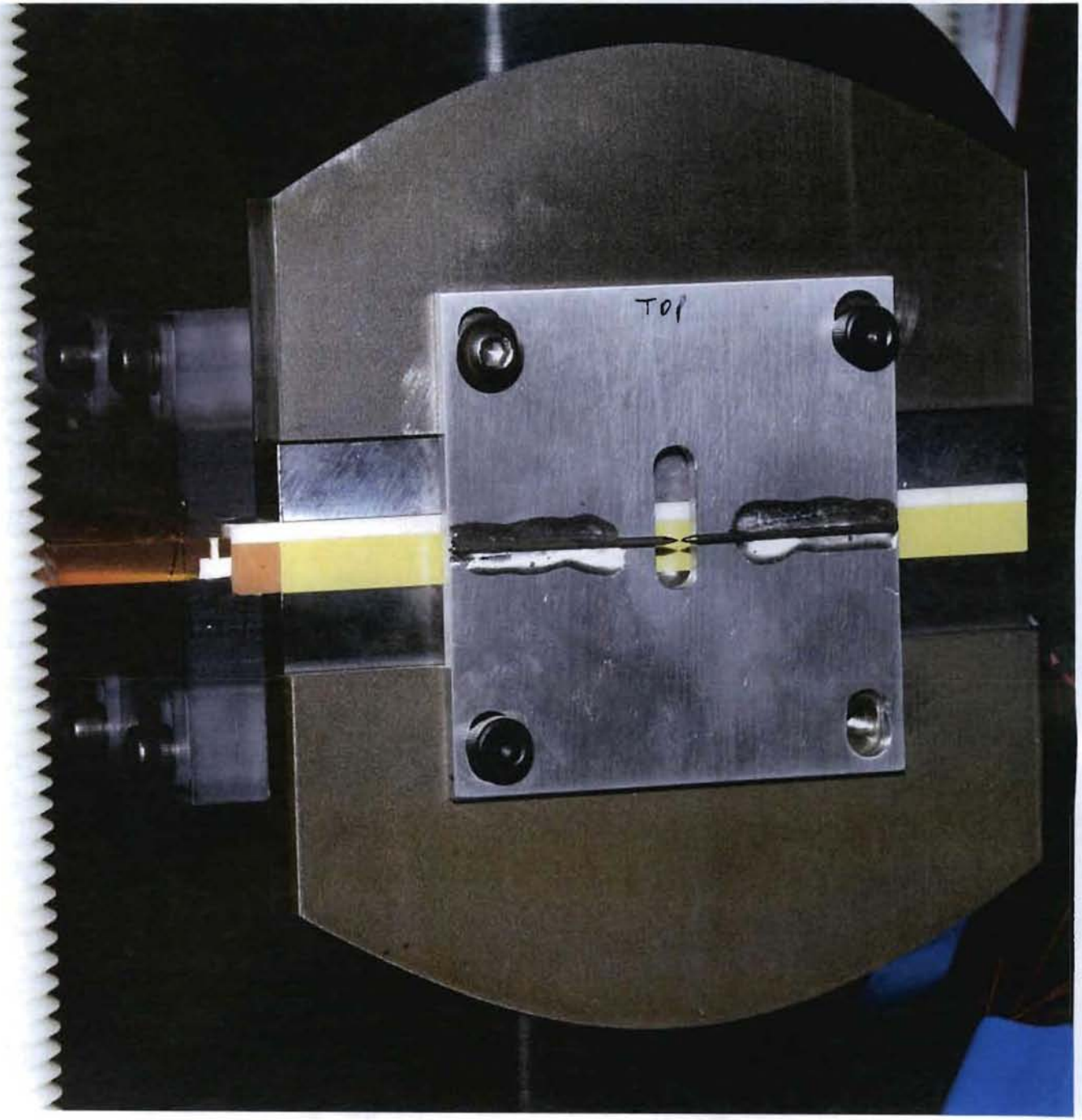


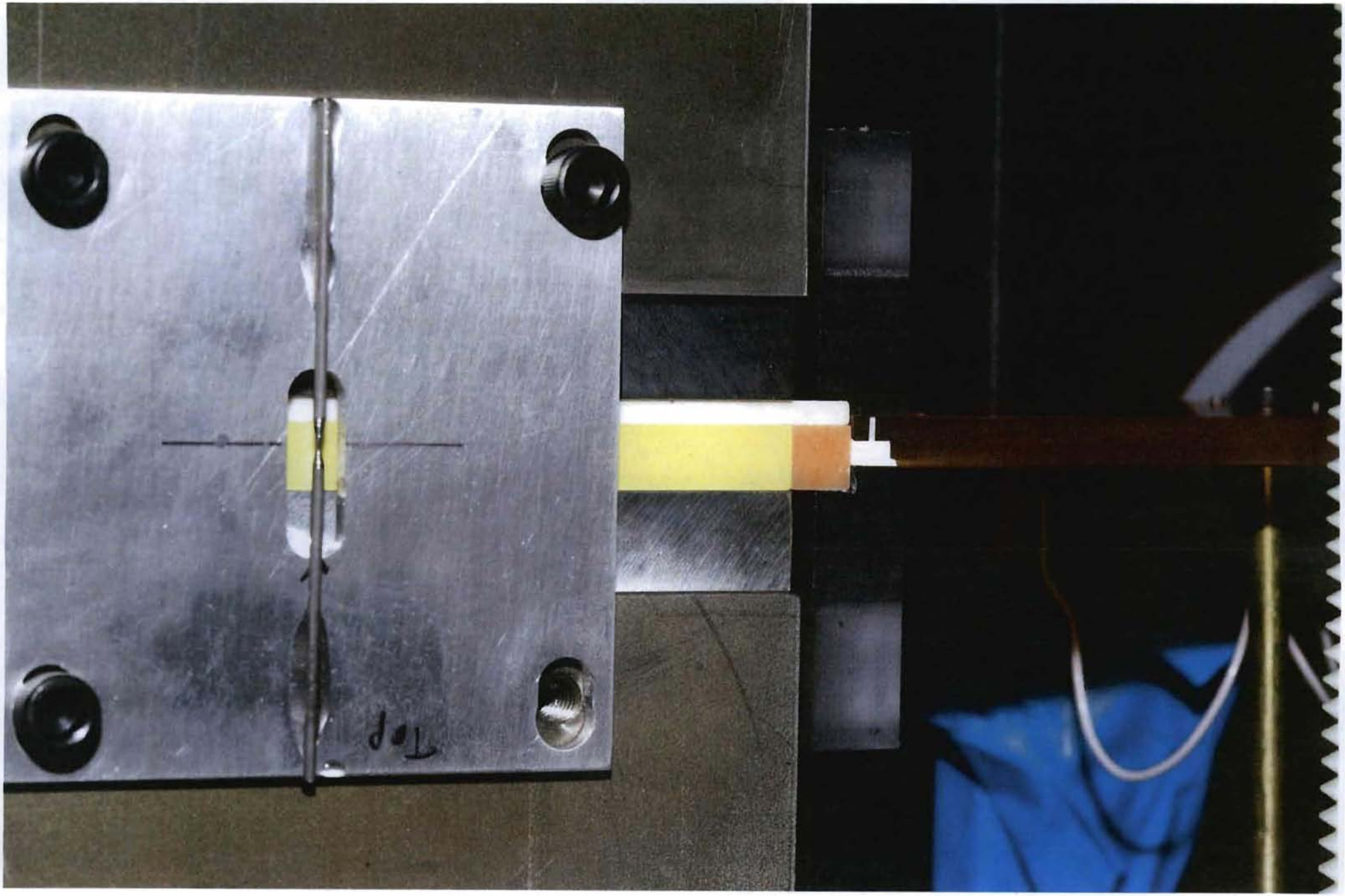









T01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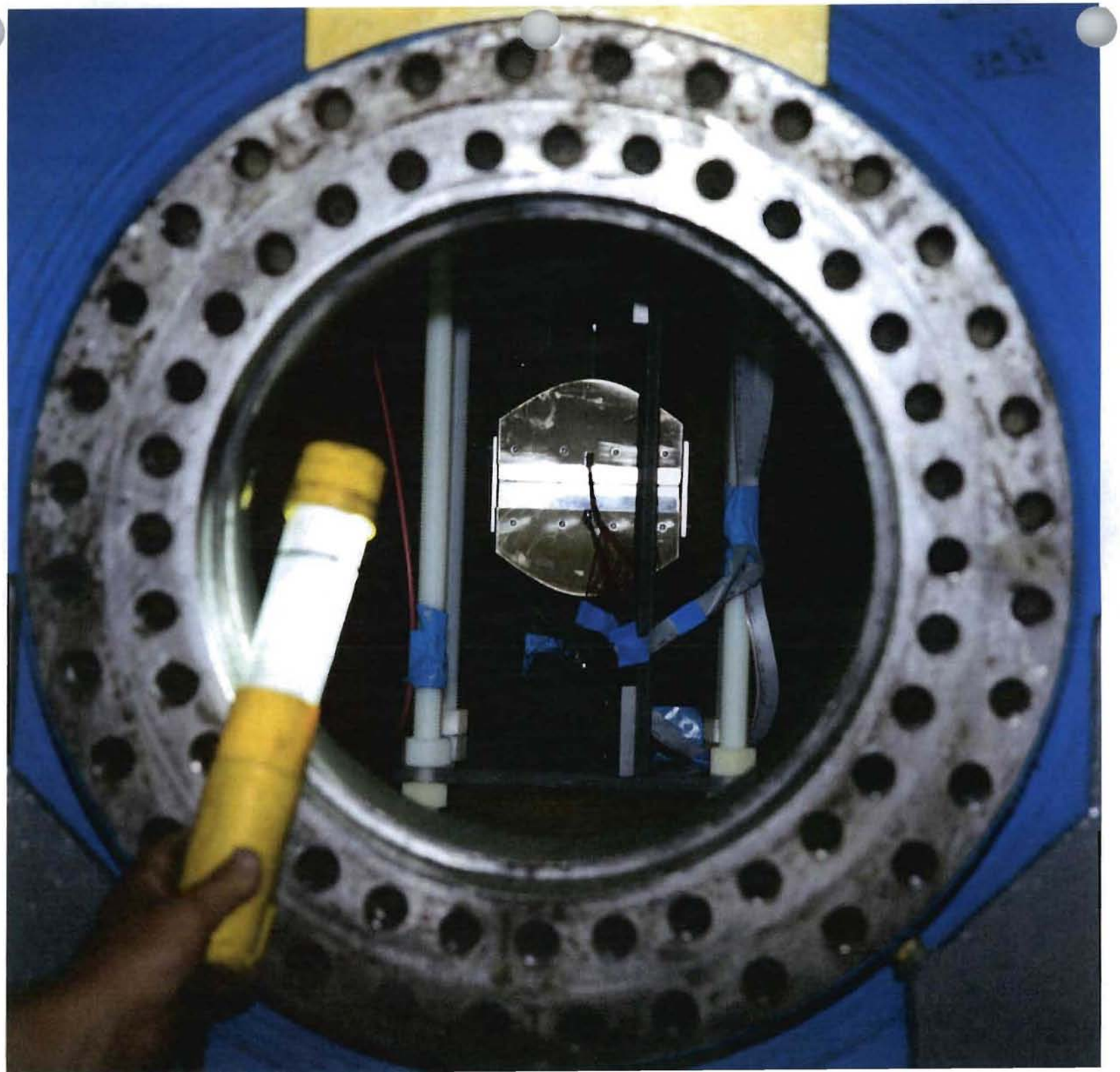


Proton Radiography
Science Based Stockpile Stewardship

42951 | 6/23/2009 7:51:39 AM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Activity Change

Activity Changed to PRAD0368 [479]

42952 | 6/23/2009 7:51:46 AM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: HV Off

Picture Type Change

Picture Type changed to HV Off [13]

42953 | 6/23/2009 8:10:49 AM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Beam Line Change

Beam Line Changed to 2009-DE9 Sandwich

Beam Line Title: 2009-DE9 Sandwich - 06/23/2009 - 6 Foot [113]

Comment: 2009-DE9 Sandwich

Mode: 4 Quad -I

Vessel: 6 Foot

Collimator IL0: 9.5 mr Taper

Collimator IL1: 10 mr Taper

Collimator IL2: N/A

Window IL0: 250 mill Al

Window Object Up: N/A

Window Object Down: N/A

Window Up IL1: 250 mill Al

Window Down IL1: 20 mil AL (NG)

Window IL2: 62.5 mil Al

Converter IL0: Beam Ion Chamber

Converter IL1: 1.9 mm LSO, 2x3

Converter IL2: 2.2 mm 9 element LSO mosaic

Location: LANSCE, Line C, Cave

Key: 113

Date Created: 6/23/2009

42954 | 6/23/2009 8:31:56 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: 31160 Type: HV Off

Independent Picture

06/23 08:31 *Picture* **31160**, HV Off, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C

42955 | 6/23/2009 8:32:47 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: 31161 Type: HV Off

Independent Picture

06/23 08:32 *Picture* **31161**, HV Off, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C

42956 | 6/23/2009 8:33:36 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36444 Picture: 31162 Type: HV Off

Start Run

06/23 08:33	*Start Run* **36444**	PRAD 368, DE-9 Sandwich
06/23 08:33	*Arm*	
06/23 08:33	*Info*	**Manual Trigger** from PCPRAD307
06/23 08:33	*Trigger*	
06/23 08:34	*Picture* **31162**	HV Off, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C, D
06/23 08:35	*End Run*	

42957 | 6/23/2009 8:35:47 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36445 Picture: 31163 Type: HV Off

Start Run

06/23 08:35	*Start Run* **36445**	PRAD 368, DE-9 Sandwich
06/23 08:35	*Arm*	
06/23 08:35	*Info*	**Manual Trigger** from PCPRAD307
06/23 08:35	*Trigger*	
06/23 08:36	*Picture* **31163**	HV Off, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C, D
06/23 08:37	*End Run*	

42958 | 6/23/2009 8:43:43 AM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Dark Field

Picture Type Change

Picture Type changed to Dark Field [1]

42959 | 6/23/2009 8:45:22 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36446 Picture: 31164 Type: Dark Field

Start Run

06/23 08:45	*Start Run* **36446**	PRAD 368, DE-9 Sandwich
06/23 08:45	*Arm*	
06/23 08:45	*Info*	**Manual Trigger** from PCPRAD307
06/23 08:45	*Trigger*	
06/23 08:46	*Picture* **31164**	Dark Field, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C, D
06/23 08:46	*End Run*	

42960 | 6/23/2009 8:47:19 AM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Focus

Picture Type Change

Picture Type changed to Focus [3]

42961 | 6/23/2009 9:00:23 AM | **ASaunders** | Edit PRAD0368 - Sandwich - DE9 Sandwich

```
set lens 2 to 1481
set lens 3 to 1458

these are calculated values for 61.6 MeV of energy loss, which corresponds to 6 inches of HE.

The object in the vessel is a 1.5 " square Al bar, 8 inches long across the field.
```

42962 | 6/23/2009 9:01:58 AM | **ASaunders** | Edit PRAD0368 - Sandwich - DE9 Sandwich

```
     delay width
lxp  185 120
lxt  0 50
h-gx  200  625
```

42963 | 6/23/2009 9:05:22 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36447 Picture: 31165 Type: Bad Picture

Start Run

06/23 09:05	*Start Run* **36447**	PRAD 368, DE-9 Sandwich
06/23 09:05	*Arm*	
06/23 09:05	*Trigger*	
06/23 09:05	Lens 1	1745
06/23 09:05	Lens 1	125.791
06/23 09:05	Lens 2	1492.83
06/23 09:05	Lens 2	1481
06/23 09:05	Lens 2	1476.683
06/23 09:05	Lens 3	1458
06/23 09:05	Lens 3	1482.73
06/23 09:05	Diffuser	1040
06/23 09:05	*Picture* **31165**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C, D
06/23 09:06	*End Run*	

42964 | 6/23/2009 9:08:44 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36448 Picture: 31166 Type: Focus

Start Run

06/23 09:08	*Start Run* **36448**	PRAD 368, DE-9 Sandwich
06/23 09:08	*Arm*	
06/23 09:09	*Trigger*	
06/23 09:09	Lens 1	1745
06/23 09:09	Lens 1	125.763
06/23 09:09	Lens 2	1492.936
06/23 09:09	Lens 2	1481
06/23 09:09	Lens 2	1476.918

06/23 09:09	Lens 3	1458
06/23 09:09	Lens 3	1482.589
06/23 09:09	Diffuser	1040
06/23 09:09	*Picture* **31166**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C, D
06/23 09:10	*End Run*	

42965 | 6/23/2009 9:16:42 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36449 Picture: 31167 Type: Focus

Start Run

06/23 09:16	*Start Run* **36449**	PRAD 368, DE-9 Sandwich
06/23 09:16	*Arm*	
06/23 09:16	*Trigger*	
06/23 09:16	Lens 1	1745
06/23 09:16	Lens 1	125.825
06/23 09:16	Lens 2	1571.672
06/23 09:16	Lens 2	1560
06/23 09:16	Lens 2	1555.314
06/23 09:16	Lens 3	1535
06/23 09:16	Lens 3	1559.339
06/23 09:16	Diffuser	1040
06/23 09:16	*Picture* **31167**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C, D
06/23 09:17	*End Run*	

42966 | 6/23/2009 9:41:52 AM | **ASaunders** | Edit PRAD0368 - Sandwich - DE9 Sandwich

camera E has minimal (but not 0) output levels. Investigation begins.

42967 | 6/23/2009 9:49:13 AM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Dark Field

Picture Type Change

Picture Type changed to Dark Field [1]

42968 | 6/23/2009 9:49:43 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36451 Picture: 31168 Type: Dark Field

Start Run

06/23 09:49	*Start Run* **36451**	PRAD 368, DE-9 Sandwich
06/23 09:49	*Arm*	
06/23 09:49	*Info*	**Manual Trigger** from PCPRAD307
06/23 09:49	*Trigger*	

06/23 09:49	*Picture* **31168**	Dark Field, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, E, F, A, B, C, D, Errors E .
06/23 09:49	***Error***	Error in AllCameras, Skip file transfer
06/23 09:51	*End Run*	

42969 | 6/23/2009 9:58:32 AM | **DAQ On-line** | Edit | PRAD0368 - Sandwich - DE9 Sandwich

Run: 36452 Picture: 0 Type: Dark Field

Start Run

06/23 09:58 *Start Run* **36452** PRAD 368, DE-9 Sandwich
06/23 09:58 *Arm*
06/23 09:58 *Info* **Manual Trigger** from PCPRAD307
06/23 09:58 *Trigger*
06/23 09:59 *End Run*

42970 | 6/23/2009 10:07:15 AM | **EIC** | Edit | PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Beam

Picture Type Change

Picture Type changed to Beam [2]

42971 | 6/23/2009 10:07:19 AM | **DAQ On-line** | Edit | PRAD0368 - Sandwich - DE9 Sandwich

Run: 36453 Picture: 31170 Type: Beam

Start Run

06/23 10:07	*Start Run* **36453**	PRAD 368, DE-9 Sandwich
06/23 10:07	*Arm*	
06/23 10:07	*Trigger*	
06/23 10:07	Diffuser	1040
06/23 10:07	MP Width	0
06/23 10:07	*Picture* **31170**	Beam, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 10:08	*End Run*	

42972 | 6/23/2009 10:08:42 AM | **EIC** | Edit | PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Focus

Picture Type Change

Picture Type changed to Focus [3]

42973 | 6/23/2009 10:08:47 AM | **ASaunders** | Edit | PRAD0368 - Sandwich - DE9 Sandwich

bad dei pulser killed camera E. Replaced pulser and now working.

42974 | 6/23/2009 10:09:10 AM | **DAQ On-line** | Edit | PRAD0368 - Sandwich - DE9 Sandwich

Run: 36454 Picture: 31171 Type: Focus

Start Run

06/23 10:09	*Start Run* **36454**	PRAD 368, DE-9 Sandwich

06/23 10:09	*Arm*	
06/23 10:09	*Trigger*	
06/23 10:09	Lens 1	1745
06/23 10:09	Lens 1	126.135
06/23 10:09	Lens 2	1492.72
06/23 10:09	Lens 2	1481
06/23 10:09	Lens 2	1476.386
06/23 10:09	Lens 3	1458
06/23 10:09	Lens 3	1482.691
06/23 10:09	Diffuser	1040
06/23 10:10	*Picture* **31171**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 10:10	*End Run*	

42975 | 6/23/2009 10:10:52 AM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36455 Picture: 31172 Type: Focus

Start Run

06/23 10:10	*Start Run* **36455**	PRAD 368, DE-9 Sandwich
06/23 10:11	*Arm*	
06/23 10:11	*Trigger*	
06/23 10:11	Lens 1	1745
06/23 10:11	Lens 1	126.131
06/23 10:11	Lens 2	1546.528
06/23 10:11	Lens 2	1535
06/23 10:11	Lens 2	1530.558
06/23 10:11	Lens 3	1510
06/23 10:11	Lens 3	1534.641
06/23 10:11	Diffuser	1040
06/23 10:11	*Picture* **31172**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 10:12	*End Run*	

42977 | 6/23/2009 3:24:54 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36456 Picture: 31173 Type: Focus

Start Run

06/23 15:24	*Start Run* **36456**	PRAD 368, DE-9 Sandwich
06/23 15:24	*Arm*	
06/23 15:25	*Trigger*	
06/23 15:25	Lens 1	1745

06/23 15:25	Lens 1	125.419
06/23 15:25	Lens 2	1492.748
06/23 15:25	Lens 2	1481
06/23 15:25	Lens 2	1476.714
06/23 15:25	Lens 3	1458
06/23 15:25	Lens 3	1482.33
06/23 15:25	Diffuser	1040
06/23 15:25	*Picture* **31173**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 15:26	*End Run*	

42978 | 6/23/2009 3:28:52 PM | **TNThompson** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Scope Monitor Crashes.
Scopes 1 & 8 (both in the cave) do not respond .

42979 | 6/23/2009 3:32:04 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36457 Picture: 31174 Type: Focus

Start Run

06/23 15:32	*Start Run* **36457**	PRAD 368, DE-9 Sandwich
06/23 15:32	*Arm*	
06/23 15:32	*Trigger*	
06/23 15:32	Lens 1	1745
06/23 15:32	Lens 1	125.382
06/23 15:32	Lens 2	1487.971
06/23 15:32	Lens 2	1476
06/23 15:32	Lens 2	1472.101
06/23 15:32	Lens 3	1458
06/23 15:32	Lens 3	1482.303
06/23 15:32	Diffuser	1040
06/23 15:32	*Picture* **31174**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 15:33	*End Run*	

42980 | 6/23/2009 3:36:12 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36458 Picture: 31175 Type: Focus

Start Run

06/23 15:36	*Start Run* **36458**	PRAD 368, DE-9 Sandwich
06/23 15:36	*Arm*	
06/23 15:36	*Trigger*	
06/23 15:36	Lens 1	1745

06/23 15:36	Lens 1	125.361
06/23 15:36	Lens 2	1483.258
06/23 15:36	Lens 2	1471
06/23 15:36	Lens 2	1468.015
06/23 15:36	Lens 3	1458
06/23 15:36	Lens 3	1482.279
06/23 15:36	Diffuser	1040
06/23 15:37	*Picture* **31175**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 15:37	*End Run*	

42981 | 6/23/2009 4:16:21 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36459 Picture: 31176 Type: Focus

Start Run

06/23 16:16	*Start Run* **36459**	PRAD 368, DE-9 Sandwich
06/23 16:16	*Arm*	
06/23 16:16	*Trigger*	
06/23 16:16	Lens 1	1745
06/23 16:16	Lens 1	125.362
06/23 16:16	Lens 2	1488.066
06/23 16:16	Lens 2	1476
06/23 16:16	Lens 2	1472.244
06/23 16:16	Lens 3	1453
06/23 16:16	Lens 3	1477.56
06/23 16:16	Diffuser	1040
06/23 16:16	*Picture* **31176**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 16:17	*End Run*	

42982 | 6/23/2009 4:41:48 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36460 Picture: 31177 Type: Focus

Start Run

06/23 16:41	*Start Run* **36460**	PRAD 368, DE-9 Sandwich
06/23 16:41	*Arm*	
06/23 16:42	*Trigger*	
06/23 16:42	Lens 1	1745
06/23 16:42	Lens 1	125.666
06/23 16:42	Lens 2	1487.768
06/23 16:42	Lens 2	1476

06/23 16:42	Lens 2	1471.953
06/23 16:42	Lens 3	1453
06/23 16:42	Lens 3	1477.098
06/23 16:42	Diffuser	1040
06/23 16:42	*Picture* **31177**	Focus, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 16:43	*End Run*	

42983 | 6/23/2009 5:07:59 PM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: PreShot

Picture Type Change

Picture Type changed to PreShot [6]

42984 | 6/23/2009 5:08:46 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36461 Picture: 31178 Type: PreShot

Start Run

06/23 17:08	*Start Run* **36461**	PRAD 368, DE-9 Sandwich
06/23 17:08	*Arm*	
06/23 17:09	*Trigger*	
06/23 17:09	MP Width	0
06/23 17:09	MP Countdown	99999
06/23 17:09	*Picture* **31178**	PreShot, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:10	*End Run*	

42985 | 6/23/2009 5:15:46 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36462 Picture: 31179 Type: PreShot

Start Run

06/23 17:15	*Start Run* **36462**	PRAD 368, DE-9 Sandwich
06/23 17:16	*Arm*	
06/23 17:16	*Trigger*	
06/23 17:16	MP Width	0
06/23 17:16	MP Countdown	99999
06/23 17:16	*Picture* **31179**	PreShot, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:17	*End Run*	

42986 | 6/23/2009 5:20:09 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36463 Picture: 31180 Type: PreShot

Start Run

06/23 17:20	*Start Run* **36463**	PRAD 368, DE-9 Sandwich

06/23 17:20	*Arm*	
06/23 17:20	*Trigger*	
06/23 17:20	MP Width	0
06/23 17:20	MP Countdown	99999
06/23 17:20	*Picture* **31180**	PreShot, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:21	*End Run*	

42987 | 6/23/2009 5:26:26 PM | **ASaunders** | Edit PRAD0368 - Sandwich - DE9 Sandwich

```
lxp 185 120
lxt  0 50
h-gx  200 625
```

42988 | 6/23/2009 5:32:22 PM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Timing Check

Picture Type Change

Picture Type changed to Timing Check [24]

42989 | 6/23/2009 5:33:15 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36464 Picture: 31181 Type: Timing Check

Start Run

06/23 17:33	*Start Run* **36464**	PRAD 368, DE-9 Sandwich
06/23 17:33	*Arm*	
06/23 17:33	*Trigger*	
06/23 17:33	*Picture* **31181**	Timing Check, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:34	*End Run*	

42990 | 6/23/2009 5:36:36 PM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: PreShot

Picture Type Change

Picture Type changed to PreShot [6]

42991 | 6/23/2009 5:37:15 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36465 Picture: 31182 Type: PreShot

Start Run

06/23 17:37	*Start Run* **36465**	PRAD 368, DE-9 Sandwich
06/23 17:37	*Arm*	
06/23 17:37	*Trigger*	
06/23 17:37	MP Width	0
06/23 17:37	MP Countdown	99999
06/23 17:37	*Picture* **31182**	PreShot, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E

06/23 17:38	*End Run*

42992 | 6/23/2009 5:38:49 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36466 Picture: 31183 Type: PreShot

Start Run

06/23 17:38	*Start Run* **36466**	PRAD 368, DE-9 Sandwich
06/23 17:38	*Arm*	
06/23 17:39	*Trigger*	
06/23 17:39	MP Width	0
06/23 17:39	MP Countdown	99999
06/23 17:39	*Picture* **31183**	PreShot, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:40	*End Run*	

42993 | 6/23/2009 5:40:26 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36467 Picture: 31184 Type: PreShot

Start Run

06/23 17:40	*Start Run* **36467**	PRAD 368, DE-9 Sandwich
06/23 17:40	*Arm*	
06/23 17:40	*Trigger*	
06/23 17:40	MP Width	0
06/23 17:40	MP Countdown	99999
06/23 17:40	*Picture* **31184**	PreShot, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:41	*End Run*	

42994 | 6/23/2009 5:42:16 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36468 Picture: 31185 Type: PreShot

Start Run

06/23 17:42	*Start Run* **36468**	PRAD 368, DE-9 Sandwich
06/23 17:42	*Arm*	
06/23 17:42	*Trigger*	
06/23 17:42	MP Width	0
06/23 17:42	MP Countdown	99999
06/23 17:42	*Picture* **31185**	PreShot, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:43	*End Run*	

42995 | 6/23/2009 5:43:49 PM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Dynamic

Picture Type Change

Picture Type changed to Dynamic [7]

42996 | 6/23/2009 5:45:39 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36469 Picture: 31186 Type: Dynamic

Start Run

06/23 17:45	*Start Run* **36469**	PRAD 368, DE-9 Sandwich
06/23 17:46	*Arm*	
06/23 17:46	*Trigger*	
06/23 17:46	Lens 1	1745
06/23 17:46	Lens 1	125.726
06/23 17:46	Lens 2	1488
06/23 17:46	Lens 2	1476
06/23 17:46	Lens 2	1472.546
06/23 17:46	Lens 3	1453
06/23 17:46	Lens 3	1477.447
06/23 17:46	Diffuser	1040
06/23 17:46	H-GX Gate Delay	200
06/23 17:46	H-GX Gate Length	625
06/23 17:46	MP Width	0
06/23 17:46	MP Countdown	99999
06/23 17:46	Beam Line Title	2009-DE9 Sandwich - 06/23/2009 - 6 Foot [113]
06/23 17:46	Comment	2009-DE9 Sandwich
06/23 17:46	Mode	4 Quad -I
06/23 17:46	Vessel	6 Foot
06/23 17:46	Collimator IL0	9.5 mr Taper
06/23 17:46	Collimator IL1	10 mr Taper
06/23 17:46	Collimator IL2	N/A
06/23 17:46	Window IL0	250 mill Al
06/23 17:46	Window Object Up	N/A
06/23 17:46	Window Object Down	N/A
06/23 17:46	Window Up IL1	250 mill Al
06/23 17:46	Window Down IL1	20 mil AL (NG)
06/23 17:46	Window IL2	62.5 mil Al
06/23 17:46	Converter IL0	Beam Ion Chamber
06/23 17:46	Converter IL1	1.9 mm LSO, 2x3
06/23 17:46	Converter IL2	2.2 mm 9 element LSO mosaic
06/23 17:46	Location	LANSCE, Line C, Cave

06/23 17:46	Key	113
06/23 17:46	Date Created	6/23/2009
06/23 17:46	*Picture* **31186**	Dynamic, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:47	*End Run*	

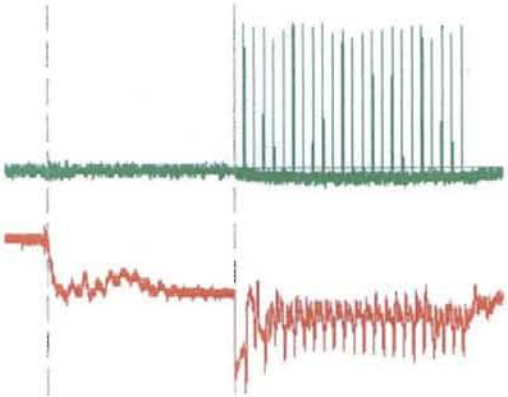
42997 | 6/23/2009 5:51:53 PM | **TNThompson** | Edit PRAD0368 - Sandwich - DE9 Sandwich

```
CVR to 1st Camera Timing:
Target:   19.000 uS
Actual:   18.890 uS

Markers: Scope 9, LeCroy LT584M

Time Markers
        1        2
1       0.0000E+00       -1.8890E-05
2       1.8890E-05       0.0000E+00

Value   2.3108E-04       2.4997E-04
```



File uploaded: ***P368.bmp*** of type ***image/bmp***

Click to open uploaded file

42998 | 6/23/2009 5:54:44 PM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Large Fiducial

Picture Type Change

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Picture Type changed to Large Fiducial [9]
```

42999 | 6/23/2009 5:56:15 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36470 Picture: 31187 Type: Large Fiducial

Start Run

06/23 17:56	*Start Run* **36470**	PRAD 368, DE-9 Sandwich
06/23 17:57	*Arm*	
06/23 17:57	*Trigger*	
06/23 17:57	Lens 1	1745
06/23 17:57	Lens 1	125.583
06/23 17:57	Lens 2	1571.607

06/23 17:57	Lens 2	1560
06/23 17:57	Lens 2	1555.068
06/23 17:57	Lens 3	1535
06/23 17:57	Lens 3	1559.358
06/23 17:57	Diffuser	1040
06/23 17:57	*Picture* **31187**	Large Fiducial, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 17:58	*End Run*	

43000 | 6/23/2009 6:06:48 PM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Dark Field

Picture Type Change

Picture Type changed to Dark Field [1]

43001 | 6/23/2009 6:07:49 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: 31188 Type: Dark Field

Independent Picture

06/23 18:07 *Picture* **31188**, Dark Field, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B,

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43002 | 6/23/2009 6:08:38 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: 31189 Type: Dark Field

Independent Picture

06/23 18:08 *Picture* **31189**, Dark Field, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B,

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43003 | 6/23/2009 6:10:05 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: 31190 Type: Dark Field

Independent Picture

06/23 18:10 *Picture* **31190**, Dark Field, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B,

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43004 | 6/23/2009 6:10:59 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: 31191 Type: Dark Field

Independent Picture

06/23 18:10 *Picture* **31191**, Dark Field, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B,

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43005 | 6/23/2009 6:11:21 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36471 Picture: 31192 Type: Dark Field

Start Run

06/23 18:11	*Start Run* **36471**	PRAD 368, DE-9 Sandwich
06/23 18:11	*Arm*	
06/23 18:11	*Info*	**Manual Trigger** from PCPRAD307
06/23 18:11	*Trigger*	
06/23 18:11	*Picture* **31192**	Dark Field, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E

06/23 18:12	*End Run*

43006 | 6/23/2009 6:13:12 PM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Beam

Picture Type Change

Picture Type changed to Beam [2]

43007 | 6/23/2009 6:13:17 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36472 Picture: 31193 Type: Beam

Start Run

06/23 18:13	*Start Run* **36472**	PRAD 368, DE-9 Sandwich
06/23 18:13	*Arm*	
06/23 18:13	*Trigger*	
06/23 18:13	Diffuser	1040
06/23 18:13	MP Width	0
06/23 18:13	*Picture* **31193**	Beam, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 18:14	*End Run*	

43008 | 6/23/2009 6:15:19 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36473 Picture: 31194 Type: Beam

Start Run

06/23 18:15	*Start Run* **36473**	PRAD 368, DE-9 Sandwich
06/23 18:15	*Arm*	
06/23 18:15	*Trigger*	
06/23 18:15	Diffuser	1040
06/23 18:15	MP Width	0
06/23 18:15	*Picture* **31194**	Beam, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 18:16	*End Run*	

43009 | 6/23/2009 6:16:52 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36474 Picture: 31195 Type: Beam

Start Run

06/23 18:16	*Start Run* **36474**	PRAD 368, DE-9 Sandwich
06/23 18:16	*Arm*	
06/23 18:17	*Trigger*	
06/23 18:17	Diffuser	1040
06/23 18:17	MP Width	0
06/23 18:17	*Picture* **31195**	Beam, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E

06/23 18:18	*End Run*

43010 | 6/23/2009 6:18:29 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36475 Picture: 31196 Type: Beam

Start Run

06/23 18:18	*Start Run* **36475**	PRAD 368, DE-9 Sandwich
06/23 18:18	*Arm*	
06/23 18:18	*Trigger*	
06/23 18:18	Diffuser	1040
06/23 18:18	MP Width	0
06/23 18:18	*Picture* **31196**	Beam, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 18:19	*End Run*	

43011 | 6/23/2009 6:20:02 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36476 Picture: 31197 Type: Beam

Start Run

06/23 18:20	*Start Run* **36476**	PRAD 368, DE-9 Sandwich
06/23 18:20	*Arm*	
06/23 18:20	*Trigger*	
06/23 18:20	Diffuser	1040
06/23 18:20	MP Width	0
06/23 18:20	*Picture* **31197**	Beam, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 18:21	*End Run*	

43012 | 6/23/2009 6:22:03 PM | **EIC** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: Picture: Type: Tungsten Window

Picture Type Change

Picture Type changed to Tungsten Window [28]

43013 | 6/23/2009 6:22:07 PM | **DAQ On-line** | Edit PRAD0368 - Sandwich - DE9 Sandwich

Run: 36477 Picture: 31198 Type: Pin Hole

Start Run

06/23 18:22	*Start Run* **36477**	PRAD 368, DE-9 Sandwich
06/23 18:22	*Arm*	
06/23 18:22	*Trigger*	
06/23 18:22	*Picture Change*	Pin Hole
06/23 18:22	*Picture* **31198**	Pin Hole, Cameras X, Y, Z, Q, R, S, T, U, V, N, O, P, H, I, J, K, L, M, G, F, A, B, C, D, E
06/23 18:23	*End Run*	

43014 | 6/23/2009 6:30:10 PM | **ASaunders** | Edit PRAD0368 - Sandwich - DE9 Sandwich

timing sheet for 368

prad368		cvr to db		db to foi			FOI Camera	DB to 1st camera (us)		CVR TO 1ST CAM F
HE double stuff sandwich							K	-3	19	300	22.00
	Camera	Daq Timing		seperation between pulses (ns)			CCPG pattern start			CCPG pattern stop	w
1	F1	0	0	300000	300060	60	19	-3.00			
2	B	1000	1000	301000	301060	60	20	-2.00			
3	G1	1000	0	301000	301060	60	20	-2.00			
4	H	2000	1000	302000	302060	60	21	-1.00			
5	F2	2000	0	302000	302060	60	21	-1.00			
6	K	3000	1000	303000	303060	60	22	0.00			
7	G2	3000	0	303000	303060	60	22	0.00			
8	N	4000	1000	304000	304060	60	23	1.00			
9	F3	4000	0	304000	304060	60	23	1.00			
10	Q	5000	1000	305000	305060	60	24	2.00			
11	G3	5000	0	305000	305060	60	24	2.00			
12	T	6000	1000	306000	306060	60	25	3.00			
13	F4	6000	0	306000	306060	60	25	3.00			
14	X	7000	1000	307000	307060	60	26	4.00			
15	G4	7000	0	307000	307060	60	26	4.00			
16	I	8000	1000	308000	308060	60	27	5.00			
17	F5	8000	0	308000	308060	60	27	5.00			
18	L	9000	1000	309000	309060	60	28	6.00			
19	G5	9000	0	309000	309060	60	28	6.00			
20	O	10000	1000	310000	310060	60	29	7.00			
21	F6	10000	0	310000	310060	60	29	7.00			
22	R	11000	1000	311000	311060	60	X=gone	30	8.00		
23	G6	11000	0	311000	311060	60	X=gone	30	8.00		
24	U	12000	1000	312000	312060	60	X=gone	31	9.00		
25	F7	12000	0	312000	312060	60	X=gone	31	9.00		
26	Y	13000	1000	313000	313060	60	X=gone	32	10.00		
27	G7	13000	0	313000	313060	60	X=gone	32	10.00		
28	J	14000	1000	314000	314060	60	X=gone	33	11.00		
29	F8	14000	0	314000	314060	60	X=gone	33	11.00		
30	M	15000	1000	315000	315060	60	X=gone	34	12.00		
31	G8	15000	0	315000	315060	60	X=gone	34	12.00		
32	P	16000	1000	316000	316060	60	X=gone	35	13.00		
33	F9	16000	0	316000	316060	60	X=gone	35	13.00		
34	S	17000	1000	317000	317060	60	X=gone	36	14.00		
35	G9	17000	0	317000	317060	60	X=gone	36	14.00		
36	V	18000	1000	318000	318060	60	X=gone	37	15.00		
37	Z	19000	1000	319000	319060	60	X=gone	38	16.00		
38	E	20000	1000	320000	320060	60	X=gone	39	17.00		
39	A	21000	1000	321000	321060	60	X=gone	40	18.00		
40	C	22000	1000	322000	322060	60	X=gone	41	19.00		
41	D	23000	1000	323000	323060	60	X=gone	42	20.00		

File uploaded: ***Prad368.xls*** of type ***application/vnd.ms-excel***

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Check checkboxes to select content filters ("" , * , ? chars allowed).

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prad368			cvr to db	db to foi	FOI Camera	DB to 1st camera (us)	CVR TO 1ST CAM	FC TIME REL TO	CVR to FOI
HE double stuff sandwich					K	-3	19	300	22.00
	Camera	Daq Timing	seperation between pulses (ns)	CCPG pattern start	CCPG pattern stop	width	X=gone	Rel To CVR	REL to FOI
1	F1	0	0	300000	300060	60		19	-3.00
2	B	1000	1000	301000	301060	60		20	-2.00
3	G1	1000	0	301000	301060	60		20	-2.00
4	H	2000	1000	302000	302060	60		21	-1.00
5	F2	2000	0	302000	302060	60		21	-1.00
6	K	3000	1000	303000	303060	60		22	0.00
7	G2	3000	0	303000	303060	60		22	0.00
8	N	4000	1000	304000	304060	60		23	1.00
9	F3	4000	0	304000	304060	60		23	1.00
10	Q	5000	1000	305000	305060	60		24	2.00
11	G3	5000	0	305000	305060	60		24	2.00
12	T	6000	1000	306000	306060	60		25	3.00
13	F4	6000	0	306000	306060	60		25	3.00
14	X	7000	1000	307000	307060	60		26	4.00
15	G4	7000	0	307000	307060	60		26	4.00
16	I	8000	1000	308000	308060	60		27	5.00
17	F5	8000	0	308000	308060	60		27	5.00
18	L	9000	1000	309000	309060	60		28	6.00
19	G5	9000	0	309000	309060	60		28	6.00
20	O	10000	1000	310000	310060	60		29	7.00
21	F6	10000	0	310000	310060	60		29	7.00
22	R	11000	1000	311000	311060	60	X=gone	30	8.00
23	G6	11000	0	311000	311060	60	X=gone	30	8.00
24	U	12000	1000	312000	312060	60	X=gone	31	9.00
25	F7	12000	0	312000	312060	60	X=gone	31	9.00
26	Y	13000	1000	313000	313060	60	X=gone	32	10.00
27	G7	13000	0	313000	313060	60	X=gone	32	10.00
28	J	14000	1000	314000	314060	60	X=gone	33	11.00
29	F8	14000	0	314000	314060	60	X=gone	33	11.00
30	M	15000	1000	315000	315060	60	X=gone	34	12.00
31	G8	15000	0	315000	315060	60	X=gone	34	12.00
32	P	16000	1000	316000	316060	60	X=gone	35	13.00
33	F9	16000	0	316000	316060	60	X=gone	35	13.00
34	S	17000	1000	317000	317060	60	X=gone	36	14.00
35	G9	17000	0	317000	317060	60	X=gone	36	14.00
36	V	18000	1000	318000	318060	60	X=gone	37	15.00
37	Z	19000	1000	319000	319060	60	X=gone	38	16.00
38	E	20000	1000	320000	320060	60	X=gone	39	17.00
39	A	21000	1000	321000	321060	60	X=gone	40	18.00
40	C	22000	1000	322000	322060	60	X=gone	41	19.00
41	D	23000	1000	323000	323060	60	X=gone	42	20.00

Count Down	
LR to First	19

Camera	Pulse No.
1	#N/A
2	#N/A
E	20000
H	2000
I	8000
J	14000
K	3000
L	9000
M	15000
N	4000
O	10000
P	16000
Q	5000
R	11000
S	17000
T	6000
U	12000
V	18000
X	7000
Y	13000
Z	19000
A	21000
B	1000
C	22000
D	23000
F1	0
F2	2000
F3	4000
F4	6000
F5	8000
F6	10000
F7	12000
F8	14000
F9	16000
G1	1000
G2	3000
G3	5000
G4	7000
G5	9000
G6	11000
G7	13000
G8	15000
G9	17000

B		0
F1		0
F2		0
F3		0
F4		0
F5		0
F6		0
G1		0
G2		0
G3		0
G4		0
G5		0
H		0
I		0
K		0
L		0
N		0
O		0
Q		0
T		0
X		0
A	X=gone	
C	X=gone	
D	X=gone	
E	X=gone	
F7	X=gone	
F8	X=gone	
F9	X=gone	
G6	X=gone	
G7	X=gone	
G8	X=gone	
G9	X=gone	
J	X=gone	
M	X=gone	
P	X=gone	
R	X=gone	
S	X=gone	
U	X=gone	
V	X=gone	
Y	X=gone	
Z	X=gone	

Summary of Run 36469, 5:47:16 PM, Tuesday, June 23, 2009

Batch Protons

	Group 1	
	N	Integral
Trigger 1	25	6.12437E+10
Run 36469	25	6.12437E+10
Batch started at 36469	25	6.12437E+10

Total Protons

RUN	Time	N	Group 1
36469	17:47 06/23/09	25	6.12437E+10

Protons per Peak

Run	Scope	Channel	# Peaks	Sum V-S	Sum P	Peak	Time	Peak V-S	Peak P	Rel Error
36469	9	2	25	2.40266E-06	6.12437E+10					
						1	9.99428E-09	1.89725E-07	4.83609E+09	1.33218E-02
						2	2.49988E-04	9.36086E-08	2.38608E+09	2.09660E-02
						3	2.50987E-04	9.72063E-08	2.47779E+09	1.96612E-02
						4	2.51986E-04	9.34131E-08	2.38110E+09	2.04595E-02
						5	2.52985E-04	9.23833E-08	2.35485E+09	2.12440E-02

						6	2.53982 E-04	8.27693 E-08	2.10979E+ 09	2.30905 E-02
						7	2.54981 E-04	8.77062 E-08	2.23563E+ 09	2.23769 E-02
						8	2.55981 E-04	9.61161 E-08	2.45000E+ 09	2.04190 E-02
						9	2.56979 E-04	9.46422 E-08	2.41243E+ 09	2.07370 E-02
						10	2.57978 E-04	9.19850 E-08	2.34470E+ 09	2.07772 E-02
						11	2.58977 E-04	9.56553 E-08	2.43825E+ 09	2.05174 E-02
						12	2.59975 E-04	9.10280 E-08	2.32030E+ 09	2.09956 E-02
						13	2.60974 E-04	9.07420 E-08	2.31301E+ 09	2.16283 E-02
						14	2.61973 E-04	8.74416 E-08	2.22889E+ 09	2.24446 E-02
						15	2.62972 E-04	9.25483 E-08	2.35905E+ 09	2.12062 E-02
						16	2.63970 E-04	8.99834 E-08	2.29368E+ 09	2.12393 E-02
						17	2.64969 E-04	9.39615 E-08	2.39508E+ 09	2.08872 E-02
						18	2.65967 E-04	9.39479 E-08	2.39473E+ 09	2.08902 E-02
						19	2.66967 E-04	9.24536 E-08	2.35664E+ 09	2.12279 E-02
						20	2.67966 E-04	9.40006 E-08	2.39607E+ 09	2.03317 E-02
						21	2.68964 E-04	9.26240 E-08	2.36099E+ 09	2.06338 E-02
						22	2.69963 E-04	8.96803 E-08	2.28595E+ 09	2.13111 E-02
						23	2.70962 E-04	9.71766 E-08	2.47703E+ 09	2.01962 E-02
						24	2.71960 E-04	9.21812 E-08	2.34970E+ 09	2.12906 E-02
						25	2.72959 E-04	8.96775 E-08	2.28588E+ 09	2.13118 E-02

DG535 Timing

Run	DG Tag	A Delay	B Delay	C Delay	D Delay
36469	8	2.571200000000E-02	3.000000000000E-04	5.000000000000E-03	0.500000000000
36469	9	5.100000000000E-03	1.000000000000E-04	5.150000000000E-03	5.000000000000E-08
36469	10	4.000000000000E-05	4.500000000000E-05	5.000000000000E-05	6.000000000000E-08
36469	11	1.995120000000E-04	5.000000000000E-05	0.00000000000	2.000000000000E-09
36469	13	2.500000000000E-02	5.000000000000E-07	0.00000000000	1.010000000000E-04
36469	14	5.000000000000E-12	1.300000000000E-05	5.000000000000E-12	5.000000000000E-12
36469	16	2.288700000000E-04	2.000000000000E-07	1.521500000000E-05	5.000000000000E-06
36469	23	9.100000000000E-06	3.000000000000E-04	6.750000000000E-07	1.000000000000E-06

Camera Walk/Timing File

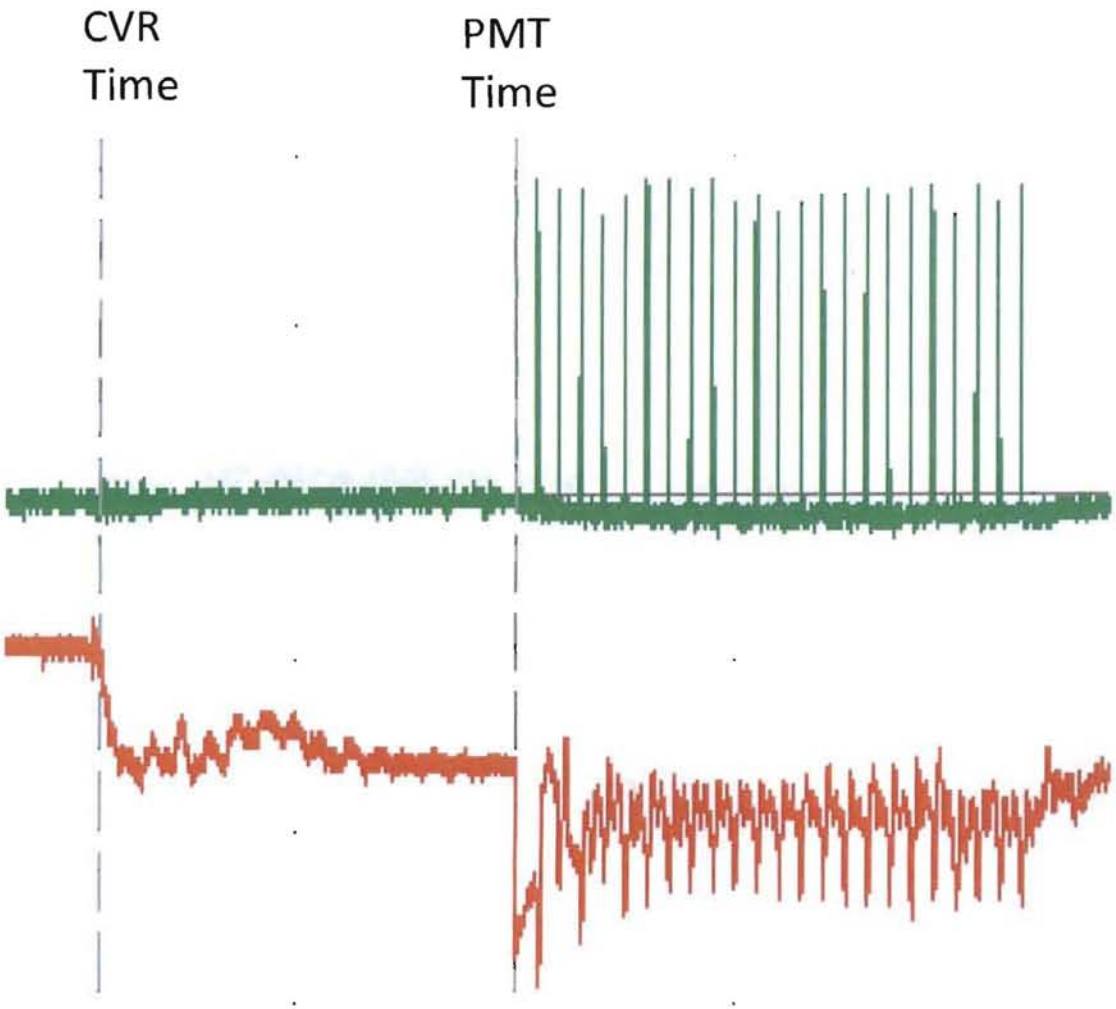
RUN	Time 1	Camera 1
36469	0.000	3.23439E-03,

Beam Line Status

Run	36469		
Time	6/23/2009 5:46:11 PM		
LCQM006V01	134579417	-73.7900009155273	OK
LCQM006L06	1	OFF	OK
LCQM007V01	134579417	71.8479995727539	OK
LCQM007L03	1	OFF	OK

LCQM008V01	134579417	-952.322998046875	OK
LCQM008L03	1	REV	OK
LCQL001P01	134579417	1745	OK
LCQL001V01	134579417	125.725997924805	OK
LCQL002I01	134579417	1488	OK
LCQL002P01	134579417	1476	OK
LCQL002V01	134579417	1472.54602050781	OK
LCQL003P01	134579417	1453	OK
LCQL003V01	134579417	1477.44702148438	OK
LCDF001E01	1	1040	OK
CCTM006D02	1	200	OK
CCTM006D03	1	625	OK
TBBC002D07	134579417	0	OK
TBBC002D06	134579417	99999	OK
TBMX001L01	134579417	NORM	OK
TBBC022D01	134579417	1500000	OK
TBBC022D02	134579417	1500000	OK
TBBC022D03	134579417	1500000	OK
TBBC022D04	134579417	1500000	OK
TBBC023D01	134579417	1500000	OK
TBBC023D02	134579417	1500000	OK
TBBC024D03	134579417	1500000	OK
TBBC023D04	134579417	1500000	OK
TBBC024D01	134579417	1500000	OK
TBBC024D02	134579417	1500000	OK
TBBC024D03	134579417	1500000	OK
TBBC024D04	134579417	1500000	OK
LCQM017I01	1	4	OK
LCQM020I01	1	62.5	OK

PRAD0368 Proton Timing Measurement



CVR to 1st Camera Timing:
Target: 19.000 uS
Actual: 18.890 uS

Protons in
Integrating Current Toroid (ICT)

Detonator Charge Pulse (CVR)
+ Protons in Phototube (PMT)

Operational Guide and Safety Control Check List

The following is to be used as an operational guide and as a safety checklist to allow for recording of implementation of controls.
This document is to be completed by the Experimenter In Charge or his designee. This document will be retained for 2 years after completed.

Shot Name: DE-9 Sandwich ; PRAD # 368 ; HX # LNSC-10557 ; Originator's # H3851
Dates of Shot: 6/23/2009 ; Experimenter in Charge (PRAD PIC): Alexander Saunders
HE PIC: Marr-Lyon ; Firing Leader: Lopez ; Secondary Operator: Bainbridge
Checklist & Safety Watch Campos ; Laser Diagnostics PIC N/A

Operational Guide	Safety Control Checklist	Initials	Date	Checked
Mark list for all N/A (Non/Applicable) items before EIC review. Classified shots; Call Richard Harford 5-0060 and Tim Olinger 5-6363 http://ptla.lanl.gov/cgi-bin/mailform/staff_form.htm	• EIC reviews & signs check list • PRAD safety/security review for this series within 2 weeks • Guards scheduled for night watching of classified shots	AS EC NA	6/23	✓ ✓ NA
Rope stays up until after shot has been completed.	• Rope off truck access entrance, at north end of counting house - Label rope with "No Parking Fire Lane" sign	EC		✓
RWP = Radiation Work Permit – NOT expired Uranium, Pu, and other unusual materials/conditions	• RWP for dynamics – date is current & posted on shield door • RWP for extras (U/Pu) - date is current & posted on shield dr	NA NA		NA NA
1) HE Category (Orange Octagon) 2) Experimenter In Charge permission required for entry	• Signs - Line C tunnel entrance station (PACS) • Signs - Line C shield door – small door	EC		✓ ✓
Lightning Detector – Display NM. Full Zoom out - verify speaker volume	• Lightning computer speaker volume turned up & verified • LANSCE electric field mill displayed and indicating • Lightning Strike program displayed and updating	Broken Use EC	access	Broken control ✓
	• CCR notified – EIC for the HE shot	EC		✓
Gun shots do not normally have a "confined space". NOT for DU/Pu!	• Confined Space Permit 09-1326 ; effective 6/23-26/09	EC		✓
Respirators are required by the IWD.	• HE workers available with current confined space training • Respirators with canisters available – expiration date verified • Level II Anti-C clothing available (U/Pu) • (U/Pu) RCT available with respirator and canisters in date	EC EC NA NA		✓ ✓ NA NA
Experiment Design - HE = High Explosive (Less than or equal to 10 pounds of HE or 300 grams of black powder)	• **Depleted Uranium** less than 100 pounds • HE load within Authorization Basis <10 lb HE <300gr powder	NA EC		NA ✓
	• HE on LANSCE Approved List	EC		✓
Some experiments do not use detonators, like electrically heated Cook-Off	• Detonators on approved list, if required.	EC		✓
Some Powder gun shots require conductive surfaces for handling powder	• Conductive surfaces available if required by shot sheet or PIC	NA		NA
EIRC = Explosives Instrumentation Review Committee Power Supply, CDU, DCU, fiber optics trigger, etc.	• Firing Circuit & firing circuit test equipment, if used, have been reviewed by the EIRC for this specific use.	EC		✓
	• Corresponding Proof/Overpressure Tests Completed	EC		✓
Shot sheet specifies the approved HE load for this shot in this vessel/gun	• Vessel Approving Authority - Approval Received	EC		✓
LANSCE = Los Alamos Neutron Science Facility	• Notification to LANSCE Experimental Area C Manager	EC		✓
Tested within past 30 days.	• Emergency Lighting in Line C dome	EC	6/17	✓
Portable gantry - Each structural member is attached by a removable pin. Not usually required for gun shots.	• Ask HX-3 if a Critical Lift Form will be needed later • A-frame crane – Official Daily Check – qualified operator	NA EC		NA ✓

Operational Guide	Safety Control Checklist	Initials	Date	Checked
Braided grounding strap connects ground block on dome wall south side east.	• Electrical bonding connection to dome wall ground plate • Vessel or gun target box • Crane • 6' vessel top door (sitting a top assembly stand) or gun barrel	EC EC EC EC		✓ ✓ ✓ ✓
Module 9 – select "Normal" & push reset. Place "S1 test" switch in "test" and run unit for 10 minutes. Place "test" switch back into "normal". Check automatic transfer valve is not pointing to empty bottle. If the stand-by tank is not open, the generator will fail when #1 empties.	• Backup generator enabled – Module 9 "Normal" and "Reset" • Backup generator tested (not usually required for gun shots) • Propane automatic selection valve – NOT RED • Both propane tank valves OPEN • Work-Stand light in dome hooked to generator and tested	EC EC EC EC EC	*	✓ ✓ ✓ ✓ ✓
CO = Carbon Monoxide – Zero ITX model after 15 minute warm-up. NOTE: Some CO monitors should not be ON when in their charger. NOTE: TV picture must be readable when dome lights are turned off. NOTE: The ITX models can be left on all day if no blower is installed.	• CO monitors – Two available and tested (includes zero reset) • Calibration memo current • One installed in dome with a TV picture in the counting house • Turn units off, including blowers, to preserve batteries	 EC		✓ ✓ ✓ ✓
Turn amplifier power on and select "phono" Amplifier can be turned off after test.	• Microphone is placed on vessel or gun catch tank and audio can be heard in counting house.	EC		✓
GFCI – Ground Fault Circuit Interrupter – Use circuit tester w/trip button Not usually required for gun shots. Power cords on floor can be electrical hazards during flooding caused by a cooling hose rupture. Check 208 V crane and laser cords also.	• GFCI receptacles for vessel tested within 30 days • Vessel drop light(s) hooked to GFCI • Vessel extension cord for impact wrench hooked to GFCI • No 120V or 208V power cord connections on floor	EC EC EC EC	6/17	✓ ✓ ✓ ✓
House air line drives a venturi pump in the vertical run of the PVC exhaust pipe to the LANSCE radioactive exhaust stack system	• Vacuum pump exhaust booster pump hooked up and working • Radiation Portal Monitor – Green status & bottles have gas	EC EC		✓ ✓
	• Laser setup check list started – if lasers will be used	NA		NA
Uranium and Plutonium – Vacuum system Pressure after the shot is supposed to be less than atmospheric. First filter layer is 2.0 microns. Second layer is 0.2 microns. Check valve prevents U dust going out into dome during venting. Venting must be done slowly so as to not ignite U dust. TV picture in counting house for vacuum gage.	• U/Pu – Calculated post shot pressure is below atmospheric • Filter pack between containment & vacuum sys – 0.2 micron • 2 psig check valve installed on vent valve • Flow restrictor installed in vent line • Remote reading of post shot pressure in counting house • Valves operate OK – containment isolation, vent, purge • Remote reading of primary container pressure in CCH	NA NA NA NA NA NA NA		NA NA NA NA NA NA NA
Uranium and Plutonium - Continuous Air Monitor	• CAM or Giraffe near vessel – Checked today by a RCT • Remote indication in counting house	NA NA		NA NA
Uranium and Plutonium – Contamination Control Areas	• Contamination area around vessel • Contamination area around HE assembly area • Contamination buffer area near portal monitor • Radioactive Materials Balance area (safe) posted correctly	NA NA NA NA		NA NA NA NA
Gas cooling/heating system could overpressure vacuum pumping system; so, a "conflat" blank is placed on a tee by the pressure gage. The LN2 dewar connections are easily confused – check the correctness.	• Gas filled, cooled, or heated shots • Zero pressure relief installed for upstream vacuum valve • LN2 dewar inlet & outlet connections double checked	 NA NA	 * *	 NA NA
Vacuum pump exhaust system to radioactive exhaust system – white PVC piping system – Big gray valves (usually without their red handles)	• Vacuum fore pump exhaust valve open – Upstream of vessel • Downstream of vessel • Second Lens system	 EC		✓ ✓ ✓
Both gage controllers in blue racks	• Vacuum gauge TV picture in CCH with separate illumination	EC		✓

Operational Guide	Safety Control Checklist	Initials	Date	Checked
Remove dust/gases falling out of front door	• Portable HEPA system rigged/tested under vessel front door	AS		✓
The type and thickness required is specified in the "Contained Shot Request Form" under "Shrapnel Protection". Windows must be checked for damage from previous shot every time, including checking the glass for cracks.	• Containment system beam windows • Glass thickness required = 0 inch; downStream 0 • Metal type = Al ; thickness = 1/4"; dwnStr = 1/4" • Upstream checked for damage after previous shot and installed • Downstream checked for damage and installed	 EC EC	 * *	 ✓ ✓
Key & reset at IL0; Power ON = green LEDs on controllers in blue racks	• Dalek - Key IN, Reset, and power ON	AS	*	✓
Beam Line vacuum pump-out valve – The containment system isolation valves to the pumping stations. Tested from CCH. CCH = Line C Counting House TV picture requires separate illumination to be seen when the dome lights are out.	• Containment isolation vacuum valve actuator operation • Upstream of vessel • Downstream of vessel • TV pictures can be viewed in CCH • Illuminators available (flashlight or equivalent) • Vacuum valves OPEN	 AS 	 * * *	 ✓ ✓ ✓ ✓ ✓
No bolts can be left out. Broken bolts must be reported to the HE PIC and EIC. Not required after the first shot in a series.	• Vessel/gun and containment pipes installed and checked for loose and missing bolts – every bolt installed and tight.	AS		✓
Door check for is for the doors installed at this time, like beam line doors.	• Vessel/gun installed doors checked for loose/missing bolts	AS		✓
	• Beam Line Setup entered into DAQ program	AS		✓
Exclusion Threshold Temperature is the temperature above which the HE might be unstable; so, people are excluded. LANSCE requires all Lock Out Tag Outs to be entered into their log. Thermocouple Meter or DVM with temperature scale	• Cook-Offs: • Shutter illumination available • TV picture of laser blocking shutter in counting house • Four lock boxes & padlocks available • Laser shutter tested – Fails safe (closed) upon loss of power • Heater cables locked by FL in CCH and FL has the key(s) • Heated shot - Portable thermocouple meter available and tested	 NA NA NA NA NA NA	 * 	 NA NA NA NA NA NA
	• Exclusion Threshold Temperature = _____ • Temperature readout working in counting house	NA NA	* *	NA NA
CDU = Capacitive Discharge Unit	• Firing Leader in direct charge of HV connection box key and charging key for CDU Power Supply • Cook-Off laser shutter power locked off and FL has the key • Secondary operator has trigger key	AS NA AS	* * *	✓ NA ✓
For ribbon cables, to support "slappers", this test is performed off site.	• High Pot testing of vessel feed-throughs completed	AS	*	✓
DCO – Detonator Checking Ohmmeter	• DCO available, if needed – Charged up or charging	A	*	✓
Signature in CCR (Central Control Room) for today's shot	• LANSCE Experimental Area C Manager Approval Received	AS		✓
Firing Site Access Control 7-6742	• Access Control - weather status – start a Weather Watch	AS		✓
	• HE starting transport to TA-53 at time = 1130	AS	*	✓
HE staff and P-25 have agreed that asking CCR to not open the line B tunnel door is sufficient control to prevent violation of the HE exclusion area. The EIC knows that the authorization basis requires firing leader approval before permitting line B entries. CCR line-by-line for Line B PACS = LBSS1L1 and/or 1L2 NTOF door – Exclusion Area – Red light ON and door Locked (pull on it)	• Notify CCR – "CCR, high explosives are being shipped to TA-53. Please do not allow entries into the line B and C tunnels without the permission of the Experimenter-In-Charge until after HE operations are completed." • Line B tunnel PACS secured • NTOF cave 202 key exclusion area secured	AS AS AS	*	✓ ✓ ✓
Orange Octagon with a "1" on it.	• Post large sign outside truck roll-up door – HE Category	AS	*	✓

Operational Guide	Safety Control Checklist	Initials	Date	Checked
Post 2 signs - HE Orange Octagon & EIC – **after** HE is on its way. HE octagon clips onto exclusion area box over top of keyed lock.	• EIC Sign for Line B tunnel - NTOF maze outside door • HE octagon – NTOF Exclusion area box	AS AS		✓ ✓
The experimenter in charge will notify CCR when the HE arrives on site.	• HE arrival time: 1200 • CCR Notified that the HE has arrived	AS	*	✓

******* **Move HE into Line C Dome** *********	**Move HE to Dome** * recheck all items for multiple shots		*	
Laminated Badge "I am guarding classified (SRD) High Explosives"	• Bomb Badge issued	NA		NA
LANL Meteorologist substitutes for broken lightning/field indications Moving the HE out of the delivery truck begins HE operations at TA-53	• Lightning/weather status - Access Control or Meteorologist • Notify Access Control that HE is being removed from truck	AS EC	* *	~~AS~~ ✓ ✓
A custom terminator is placed on the end of the cable.	• CDU output detonator cable is terminated – not open ended	EC	*	✓
	• Pathway for HE movement cleared of obstructions and HE area is free of combustibles	EC	*	✓
	• HE moved into Line C dome inside D.O.T. container	EC	*	✓
Door cannot be re-opened until after shot fired or returned to DOT container – AC20 page 83 Explosives Operations at LANSCE	• Area C shield door closed and air pads deflated before opening HE shipping container	EC	*	✓
	• Firing Leader holds keys: • Dome access keys (PACS) • VISAR control box • PDV Laser key • Cook OFF laser control key OR laser ignition fiber lock box	 EC NA NA NA	 * * * *	 ✓ NA NA NA

HCP = Hazard Control Plan IWD = Integrated Work Document EIC = Experimenter In Charge VISAR – Laser system Velocity Interferometer System for Any Reflective surface **Uranium**, Beryllium, Lead, etc. all require additional training and may require a special IWD PIC = Person in Charge – must be consulted about work which comes under their responsibility before the work starts, as per the IWD. Only one briefing per day is required if all the days shots are discussed at the first briefing and if there are no significant changes from shot to shot. HE heated above its Exclusion Threshold Temperature may go off without warning.	• Pre-Job Briefing by EIC • Has anyone NOT read and signed the PRAD security plan? • ---- Dynamic RWP? • ---- Area C hazard overview? • ---- Dynamic IWD? ----------→ • ---- Special IWD and/or training (U, Be, Ca, Pb, etc.) • Does anyone NOT have current TA-53 site specific training? • Experimenter In Charge is ----------→ • No dome PACS entries after HE load, without EIC approval • HE PIC is ... • Firing-Leader is ... • Secondary firing leader is ----------→ • Ignition sources prohibited in dome – no lighters, no matches • Absolutely no entries after HE exceeds exclusion temperature • Safety Watch is ----------→ • Forklift operations are halted in the dome and truck entrance • Laser Diagnostics PIC is ----------→ • VISAR/LASER system status is ... • Laser Keys – Clarify the times when FL needs to hold keys • MSDS sheets available via counting house computers -------→ • Flammable gases in detectors, cameras, and vessel? • Are there any other issues? • • • • •	------→ ------→ ------→ ------→	------→ ------→ ------→ ------→	___NA ___NA ___✓ ___✓ ___NA ___✓ ___✓ ___✓ ___✓ ___✓ ___✓ ___NA ___✓ ___✓ ___N/A ___NA ___NA ___✓ ___✓ ___✓

******* Load HE into Vessel **********	Loading HE * recheck all items for multiple shots		*	✓
	• Crane - Critical Lift form completed	NA	*	NA
	• Laser setup check list completed	NA		NA
U/Pu containment system not opened until after venturi pump disconnect. No air flow through containment system for U/Pu.	• U/Pu – Vacuum system venturi disconnected before opening • CAM & CAM exhaust pump turned on and verified by a RCT	NA NA	* *	NA NA
Cook-off laser ignition fiber locked after fiber is through the vessel door.	• Cook-off laser ignition fiber locked in box and FL has key	NA	*	NA
HE procedures limit the number of persons in the area to 5. Access Control or Meteorologist if local indications broken.	• Assign a door watch for HE exclusion area and to watch the lightning detector – reports to firing leader	EC	*	✓
No one is in the dome without the firing leader's approval.	• HE Exclusion Area established	EC	*	✓
Door watch asks each new person if they have ignition sources.	• HE team has NO ignition sources – no matches, no lighters	EC	*	✓
Team going in is in radio contact with a person outside.	• Radio Check – door watch to access control • Radio Check – entry team - door watch from inside shield door	EC EC	* *	✓ ✓
epending on the meter, the DCU check is done before or after the vessel is secured. The detonator cable is protected from sparks.	• Detonator Checking Ohmmeter – check completed • Shorting cap on detonator cable connector	EC EC	* *	✓ ✓
U/Pu - venturi pump air line was previously disconnected.	• U/Pu – Vacuum system venturi pump ReConnected	NA	*	NA
Blast containment system All bolts must be installed. No broken or missing bolts. All bolts must be re-checked for tightness after the system is under vacuum.	• Vacuum less than 25 torr and Vessel is secured (fully bolted steel doors) (25 torr = 25mm-Hg; = 25,000 microns) • Beam line bolts are all installed and tight (after vacuum) ★ • Vessel door bolts are all installed and tight (after vacuum) ★ • Gun breech – all holes plugged (pressure transducer)	EC EC EC NA	* * * *	✓ ✓ EC ✓ EC NA
Vessel and/or containment system leak too much for good pictures? 5 min DO NOT Exceed 25 Torr! HE exclusion area required for >25 torr!	• Leak check - Vessel pressure start .05 Finish .56 DO NOT Exceed 25 Torr! Time start ____ Finish ____	EC	*	✓
Gas cooled/heated shots only – "zero pressure relief valve"	• Pop-off disk clamp ring OFF prior to gas cooling/heating shot	NA	*	NA
U/Pu - The inner chamber is the "Thermos" or other containment vessel holding Pu, U, Be, etc. The "Vessel" is the containment vessel attached to the beam line (6' or 4' vessel).	• 15 minute vacuum check < 1 Torr change – close blast valves • Inner chamber pressure start ____ finish ____ • Vessel chamber pressure start ____ finish ____	NA NA NA	* * *	NA NA NA
Minimize radiation damage to CAM electronics during beam tuning.	• CAM **OFF**	NA	*	NA
Cook-offs - First testing of thermocouples and electric heaters. PACS must be secured for heater test. HX takes credit for PACS.	• Two thermocouples reading OK in counting house • Heater Cables still locked up in counting house • Laser blocking shutter CLOSED and laser ignition fiber locked • Cook Off heater test – Permission to hookup – HE PIC, EIC • HE exclusion area is established • Heater cables hooked up by FL in dome • Line C dome PACS secured • Permission to unlock & perform heater test – EIC, FL, HE PIC • Thermocouples tested by raising temperature 5 degrees • Heater cables locked by FL in CCH and FL has the key(s)	NA NA NA NA NA NA NA NA NA NA	* * * * * * * * * *	NA NA NA NA NA NA NA NA NA NA
IL = Image location Thin vacuum windows have protective covers to guard against blowouts when the beam line is under vacuum.	• Remove vacuum window covers • IL0 upstream • IL1 downstream • IL2 upstream and downstream	 LM	 * * *	 ✓ ✓ ✓

Go back inside vessel/target box with HE inside	Vessel Re-entry * recheck all items for multiple entries		*	
CDU may have been fired into a short to test timing signal synchronization	• Detonator high Voltage cables are **AGAIN** connected to grounding block on CDU power supply rack	_____	*	_____
	• Cook-off heaters locked off in CCH and the FL has the key(s)	___NA	*	___NA
	• EIC permission	_____	*	_____
	• Firing Leader & HE PIC permissions	_____	*	_____
	• Weather check with access control	_____	*	_____
	• HX-3 Radio checks with access control and entry team	_____	*	_____
	• FL has key(s) – CDU, laser(s), cook off keys (shutter&heaters)	_____	*	_____
	• Door & weather watch assigned	_____	*	_____
	• HE team has NO ignition sources.– no matches, no lighters	_____	*	_____
	• HE Exclusion Area established	_____	*	_____
Inside dome	• U/Pu – Vacuum system venturi disconnected before opening	___NA	*	___NA
	• CAM & CAM exhaust pump turned on and verified by a RCT	___NA	*	___NA
	• Cooling/heating system shut off – if required by firing leader	___NA	*	___NA
	• Laser blocking shutter CLOSED and laser ignition fiber locked	___NA	*	___NA
	• Detonator cables disconnected from CDU & shorted	_____	*	_____
Exiting dome	• U/Pu – Vacuum system venturi Re-connected	___NA	*	___NA
	• Vacuum less than 25 torr and Vessel is secured (fully bolted steel doors) (25 torr = 25mm-Hg; = 25,000 microns)	_____	*	_____
	• Vessel door bolts are all installed and tight (after vacuum)	_____		_____
	• Gun breech – all holes plugged (pressure transducer)	___NA	*	___NA
	• Detonator Checking Ohmmeter – check completed	_____	*	_____
	• Shorting cap on detonator cable connector	_____	*	_____
	• Leak check - Vessel pressure start _____ finish _____	_____	*	_____
	• U/Pu - CAM OFF	___NA	*	___NA
	• 15min double vessel check < 1 Torr change – close valves	___NA	*	___NA
	• Inner chamber pressure start _____ finish _____	___NA	*	___NA
	• Vessel chamber pressure start _____ finish _____	___NA	*	___NA
	• Cooling/heating system turn ON if required	___NA	*	___NA

FINAL ENTRY before FINAL SWEEP	Final Entry * recheck all items for multiple shots		*	
Verify Pins signal path has been checked	• Pins operation verified	CM [redacted]	*	✓ [redacted] *
CDU may have been fired into a short to test timing signal synchronization	• Detonator high Voltage cables are **AGAIN** connected to grounding block on CDU power supply rack	CM	*	✓
	• Cook-off laser shutter power locked off by FL and FL has key	NA	*	NA
Radio operator stays outside the shield door	• Weather check with access control	NA	*	NA
Needed for initial re-entry	• CO monitor located outside the dome (second unit)	CM	*	✓
	• Vacuum gage unit 1 on channel 6 • Vacuum gage unit 2 on channel 2	CM CM	* *	✓ ✓
Carbon Monoxide detector – Call the line C counting house to verify picture of Co monitor before exiting dome.	• CO monitor in Line C dome turned ON with picture in CCH • Illumination turned on for CO monitor • Illumination turned on for vacuum Gauge • Illumination turned on for vacuum Valve	 CM	* * * *	✓ ✓ ✓ ✓
Uranium and Plutonium U/Pu - Venturi pump air line was previously disconnected. CAM - Continuous Air Monitor	• U/Pu – Vacuum system venturi pump connected and working • CAM turned ON and working verified by a RCT • CAM exhaust pump turned ON	NA NA NA	* * *	NA NA NA
Usually for gun shots	• Turn on PIN power supply in Dome if required	[redacted]	*	[redacted] *
Post shot classified traces not visible to L-cleared RCT or operator	• Classified O-scopes are covered or displays disconnected	NA	*	NA
Amplifier power ON; select "phono".	• Microphone audio ON and in PHONO	CM	*	✓
Tap on vessel with metallic object.	• Microphone audio tested again	CM	*	✓
Note that the sign at the line B tunnel door is a long way away; so, this step is done in parallel with the final sweep with detonator hook-up. With UCN exclusion area, this is now the NTOF maze entrance door.	• Post sign "Special Re-Entry Procedure In Effect" • Line C key bank • Line B tunnel entrance door (NTOF maze door)	 CM CM	 * *	 ✓ ✓
FINAL SWEEP before Firing	**Final Sweep**		*	
	• EIC **AND** HE PIC give permission to hook-up shot for firing	AS	*	✓
	• Cook-off laser shutter power locked off by FL and FL has key • Heater cables locked by FL in CCH and FL has the key(s) • TV picture in counting house or control wires disconnected	NA NA NA	* * *	NA NA NA
HE operation - Team going in is in radio contact with a person outside. Lightning/ field level – local indication, Access Control, or Meteorologist	• Door/weather watch assigned • Weather/Lightning status OK	AS AS	* *	✓ ✓
The detonator conductivity is usually checked again before hookup	• DCO meter	AS	*	✓
Team going in is in radio contact with a person outside	• Radio Check – door watch to access control • Radio Check – entry team - door watch from inside shield door	NA AS	* *	NA ✓
Health Physics Technician, Central Control Room Operator, Firing Leader, and Firing Team Members as needed by the Firing Leader. The gun catch tank and target chamber may have vacuum valves. Gas cavity fill is different from gas target fill valve – different shot types.	• Detonator(s) connected to firing circuit or fiber to laser • DCO check completed • Gas cavity fill valve OPEN • Target/shot gas fill, cooling, or heating valves CLOSED • Gun catch tank/target vac. valves – Both closed, if applicable	CM CM NA NA NA	* * * * *	✓ ✓ NA NA NA
Lights are turned out for beam pictures. A containment system breach can release large quantities of CO.	• Lights OUT – dome • Notify CCR, " Line C Cave is ready for Firing. Special re-entry procedure is in effect due to possible carbon monoxide".	CM CM	* *	✓ ✓

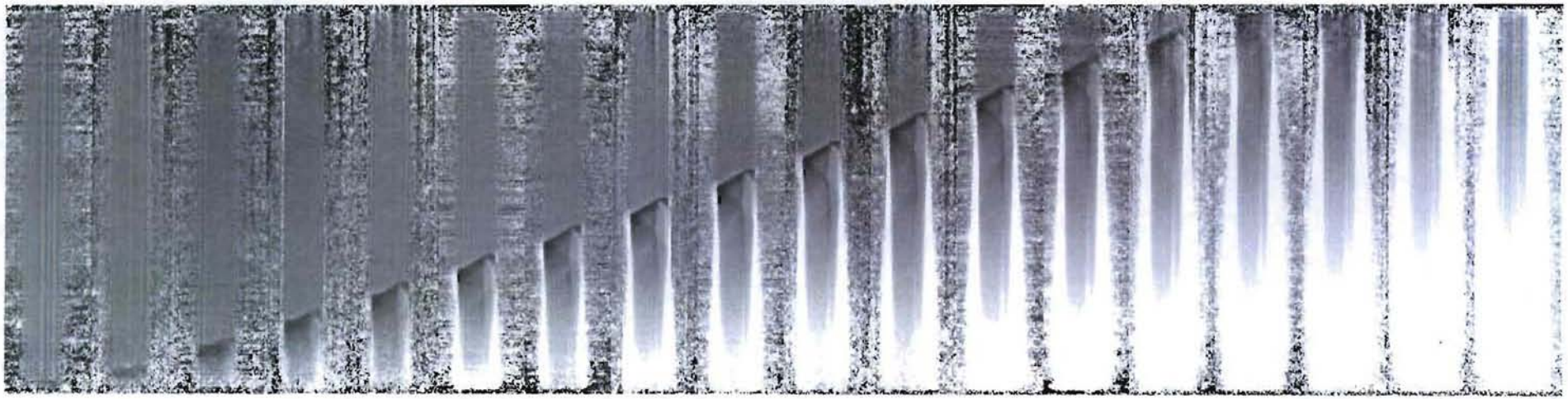
HE heated above its exclusion temperature may go off without warning.	• Cook offs - EIC and HE PIC and FL agree to start heating HE • Laser trigger OK • Laser blocking shutter enabled inside dome • Permission by EIC and FL to exceed exclusion temperature	NA NA NA NA	* * * *	NA NA NA NA
U/Pu - Room 53-3-S207, Motor Control Center T14G – HVA-1 and FE-1	• U/Pu - Lock fans OFF - Line C dome supply and exhaust fans	NA	*	NA
FIRING	**FIRING**		*	
Gun and vessel shots are fundamentally different when requesting beam	• LXP timing check – verify gate relationship to shot need	cpk	*	✓
DG-535 on top of firing rack. Same one used for firing detonators.	• Cook-off laser - gate generator in external trigger mode	NA	*	NA
Powder gun projectile detection pin(s) are jumpered for pre-shot testing.	• Gun shots – Disconnect short from Beam Request Pin	NA	*	NA
Lights may have been turned on to watch something.	• Lights OUT – dome – again check	cpk	*	✓
Some vessel shot have a gas cavity with two valves. The manual isolation valve is opened during final entry and the remotely operated valve is opened for the gas fill and then closed again before firing. Some vessel shots use timing pins powered from the counting house.	• Gas Fill valve OPEN • Gas fill pressure equalized • Gas fill valve CLOSED • PINS power supply ON, in counting house, if applicable	NA NA NA cpk	* * * *	NA NA NA ✓
	• VISAR ready, if applicable • PDV ready, if applicable	NA NA	* *	NA NA
Shift data taking mode from statics to dynamics. If in classified mode, camera computers are mode switched separately. If line X is lined up to the 1X or 2X beam stops, beam will not go to LC.	• DAQ in "Dynamic Mode" • Classified Camera computers in "Dynamic Mode" • CCR – "Is the line X beam lined up to send beam to line C?"	cpk NA cpk	* * *	✓ NA ✓
"Status" display from CCR is checked by EIC – right hand dash is green	• H- injector is ready and enabled to send beam – rt. green dash	cpk	*	✓
Usually for cook offs.	• Movie Mode – Cameras in Movie Mode • Stand alone mode • 999 Frames • Acquire mode	NA NA NA NA	* * * *	NA NA NA NA
The radiation safety system **MUST** be secured for HX to fire. Absolutely no talking by anyone, except as required by the EIC	• PACS secured • Announcement – "Attention! Final firing sequence Absolutely NO unnecessary TALKING!"	cpk cpk	* *	✓ ✓
Beam Line vacuum pump-out valves – Valves from pumping station to beam pipe.	• Close beam line vacuum pump-out valve remotely – upstream • Close beam line vacuum pump-out valve remotely downstream	cpk cpk	* *	✓ ✓
CDU – Capacitive Discharge Unit – This energy storage box, located next to the HE, fires the detonator. DG-535 MUST be in external trigger mode before shutter is opened.	• EIC gives permission to charge CDU OR open laser blocking shutter AFTER gate trigger = external • CDU charged or laser shutter open	cpk cpk	* *	✓ ✓
	• CCR – "Is beam available?" If yes, "CCR, standby for firing!"	cpk	*	
	• Cook offs – Start DAQ run WITHOUT arming cameras • Beam ON in continuous mode (like 2 or 3 Hz)	NA NA	* *	NA NA
	• EIC gives permission to Arm systems • Cameras ready • CDU trigger key enabled • PDV ready	cpk	* * *	✓ ✓ ✓ NA
	• EIC called for beam or triggered laser at 5:46 hours	cpk		✓

Post Shot	After Firing		*	
	• CDU discharged - high Voltage meter indicates zero	CPL	*	✓
Detonator high Voltage cables are **AGAIN** connected to grounding block on CDU power supply rack	• Detonator High Voltage cables connected to grounding block • Pin Power Supply OFF (in counting house)	CPL [illegible]	* *	✓ [illegible] *
	• CDU keys removed or cook-off laser blocking shutter closed	CPL	*	✓
Beam line upstream of containment system. Unit 1 channel 6.	• Post shot beam line pressure = 1.2 -3 torr	CPL	*	✓
TV picture of CO monitor	• Line C - CO before initial re-entry = 0 ppm CO	CPL	*	✓
Firing Leader determines the apparent shot status after evaluating the microphone audio, vacuum, and camera pictures.	• Apparent status • Successful • Partial (detonator fired) • Misfire (detonator did not fire)	 CPL 	*	✓
Write "N/A" if there is no misfire.	• Misfire/partial-fire procedures started if shot not successful	NA	*	NA
24/7 numbers = PTLA scheduling 7-4438, shift commander 5-1279	• Notify PTLA of need /no need for overnight guards	NA		NA
Photon Doppler Velocimeter – Laser system in counting house	• PDV laser, if used – shutdown and key REMOVED	NA	*	NA
Shut down = Laser Power supply turned OFF and key removed.	• VISAR shut down, if applicable, and key(s) removed	NA	*	NA
Firing Site Access Control 7-6742	• Access Control notified – Shot status • Cook off locks removed	NA NA	* *	NA NA
Line C dome radioactive exhaust must be ON before pumping. EIC console, Apps, right click, LXL, XAEF1L3 FLOW and 1L97 ON	• Area A radioactive exhaust stack fan is ON Do not rely upon Run Permit Ready - check line-by-line display	CPL	*	✓
Uranium and Plutonium	• Inner container pressure [illegible] Torr • Vessel pressure _____ Torr	NA NA	* *	NA NA
Read post shot pressure remotely. **NOTE: Three pump downs and two vents are a MUST for industrial health safety no matter how small the shot. After the first pump down to remove the HE products, two more air fills must be pumped out to ensure industrial safety.** **Uranium, Vanadium, etc.** need to cool before venting to reduce fire (**Uranium**) and/or slower oxidation (toxic **Vanadium** oxide).	• Upstream pressure 72 Close Upstream Pump Valve • Open Upstream blast valve - post shot pressure = _____ • Open Upstream pump valve to begin pumping • Open Downstream blast & pump valves to help pumping • Pump down (1) to less than 5,000 microns (**5 torr**) • Fiducial plate beam picture to verify collimators are clear • Flammable materials (like **U**) - 30 minutes before venting	CPL CPL CPL CPL CPL CPL NA	* * * * * * *	✓ ✓ ✓ ✓ ✓ ✓ NA
Normally, the first two vents are fast to blow out the collimators. For shots with potentially flammable post shot debris, like U, all venting is slow. **Venting is not required before an entry.**	• Vent 1 – Close Pump Valves & Open Atmosphere Vent valves • Pump down (2) to less than <5,000 microns (**5 torr**) --------→ • Vent 2 – Close Pump Valves & Open Atmosphere Vent valves • Pump down (3) to less than <5,000 microns (**5 torr**) • Vent 3 – Slow – Close both pump valves • Open slow vent valve	CPL CPL CPL CPL 	* * * * * *	✓ ✓ ✓ ✓
The initial entry team should always be minimized.	• EIC and firing leader both agree that Line C can be entered	CPL	*	✓
	• Notify CCR that the Line C dome CO is <25 ppm, before entry	CPL	*	✓
	• Portable CO monitor in the hands of the entry team	CPL	*	✓
Uranium and Plutonium	• Level II Anti-C on both the firing leader and RCT • Respirators for both • CAM reading OK	NA NA NA	* * *	NA NA NA

Until after the firing leader has checked for a breach, dome entries after a shot are a high explosives operation. Lightning/ field level – local indication, Access Control, or Meteorologist PPE includes tyvek suits, respirators, gloves, etc.	• Door/weather watch assigned for HE operations • Weather/Lightning status OK • Workers briefed on PPE requirements and waste segregation • Firing leader is controlling dome PACS keys • U/Pu – Reminder - disconnect venture pump before opening	cgh cgh NA cgh NA	* * * *	✓ ✓ NA ✓ NA
HE operation - Team going in is in radio contact with a person outside.	• Radio Check – door watch to access control • Radio Check – entry team - door watch from inside shield door	NA cgh	* *	NA ✓
Uranium and Plutonium	• Giraffe air monitor checked for contamination	NA	*	NA
	• Cook off laser key removed	NA	*	NA
	• Breach procedures implemented if a breach has occurred	NA	*	NA
The dome area is a HE exclusion area.	• Firing Leader releases Line C for additional access	cgh	*	✓
The EIC makes this decision after the firing leader agrees	• Notify CCR that special re-entry procedures NOT in effect • If HE is still present - Notify CCR "Line C continues to be an HE exclusion area due to unburned HE. Please do not permit entries into the line B tunnel without EIC approval."	cgh NA		✓ NA
Classified shots only	• Bomb Badge returned	NA	*	NA
	• Sign removed – Special Re-Entry Procedure - Line C key bank	cgh		✓
The dome area has been a HE exclusion area.	• Microphone – Turn OFF amplifier	cgh	*	✓
	• Gas cooling/heating system disconnected from vessel	NA	*	NA
Upstream vacuum station bypass ensures vessel fresh air via venture. **Uranium and Plutonium** – No air flow through vessel! Hazardous materials exclusion areas are normally 10' in front of the vessel and bags on the windows. Samples must be sent out for analysis.	• Remind vessel clean up crew to open vacuum bypass valve • Venturi pump air line disconnected • Establish exclusion areas prior to opening vessel and pipes • Samples taken from vessel for analysis of contamination	NA NA NA NA	* * * *	NA NA NA NA
	• CO Monitor in dome – Turn OFF	cgh		✓
Prior to removing vacuum windows	• Beam Window covers installed at • IL0 upstream • IL1 downstream (after camera station removed)	 _____ _____		 _____ _____
Plutonium – Put it back in the safe	• Container stored inside Radioactive Materials Balance Area	NA		NA

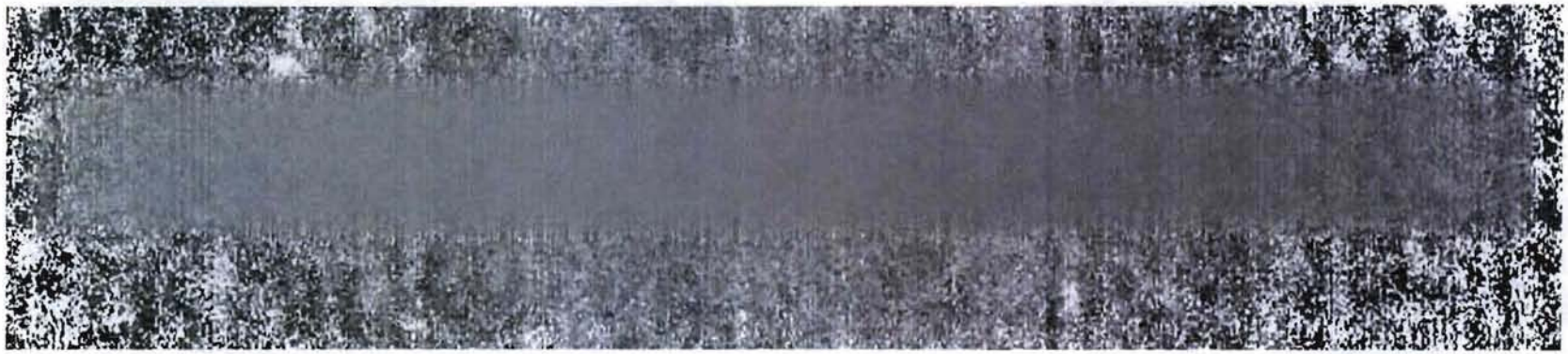
???? LAST SHOT of the day ????	• **LAST SHOT of the day?**			✓
	• TV Cameras and lights OFF • CO monitor & vacuum gauges at blue racks • Upstream valves • Downstream valves	____		____ ____ ____
	• VISAR status signs = Green	NA		NA
The one in the dome usually stays in the dome with its charger in the blue rack. The other one charges on the bench west of the VISAR room.	• CO monitors in chargers	____		____
The EIC and Firing Leader must both agree.	• Notify CCR that HE operations are completed for this day	CAP		✓
Locking out is preferable to log off.	• Lightning Detector Computers – Lock out	____		____
	• After HE operations are completed, remove signs • Large orange HE octagon – truck door • Small signs for HE and EIC • Line C Shield door • Line C access station (PACS) • Line B tunnel access (NTOF maze door) • Special Re-Entry - Line B tunnel access (NTOF maze door)	CAP		✓ ✓ ✓ ✓ ✓
Run out of propane - starter cranks until battery dies or starter fails	• Disable generator – Module 9 in "STOP"	____		____
Uranium and Plutonium	• CAM turned OFF • Dome Fans unlocked	NA NA		NA NA
	• Remove parking lot rope to truck access for "Fire Lane"	____		____
	• RWP – General RWP is current and posted	NA		NA
http://pwcnv02.lanl.gov/arakfram.htm?7:0 – Username/PW = APC/apc http://praddalek02/arakfram.htm?7:0 Dalek can also be turned off by cycling key switch in dome without Reset.	• HV to beam line data taking cameras – Turned Off • Dalek OFF – Look in the back of HS-R02 • No 120V or 208V power cord connections on floor	____ ____ ____		____ ____ ____
	• CCH doors locked	____		____
Install vacuum window covers IL = Image location Thin vacuum windows have protective covers to guard against blowouts. CanNOT be required if additional beam operations are scheduled.	• IL0 (upstream side) • IL1 (downstream side) • IL2 (both sides)	____		____ ____ ____
Master transfer key removed from transfer block and locked in PACS box	• Dome PACS keys locked in key bank	____		____

PRAD 0368 Composite
DE-9 Sandwich



Time

PRAD0368 02000 Camera H Ratio



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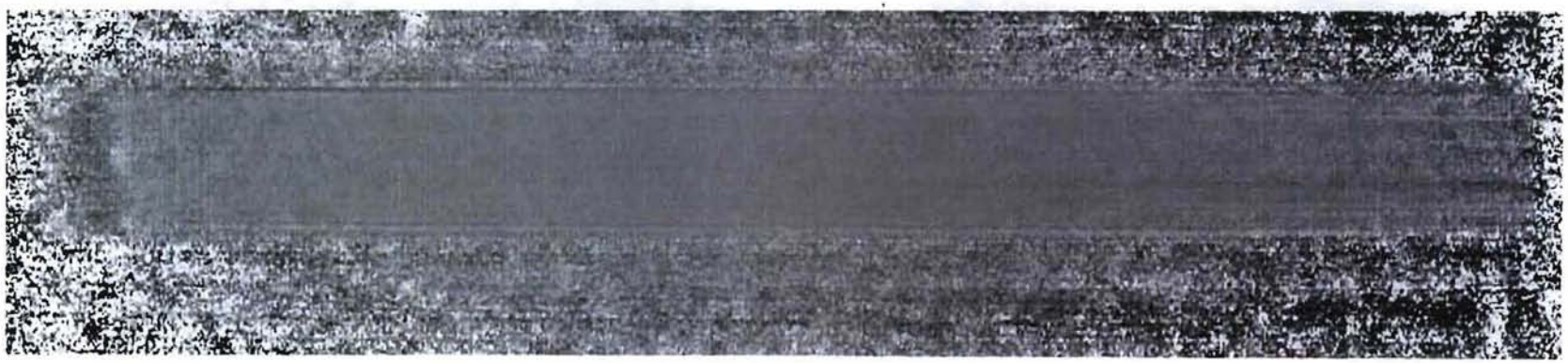

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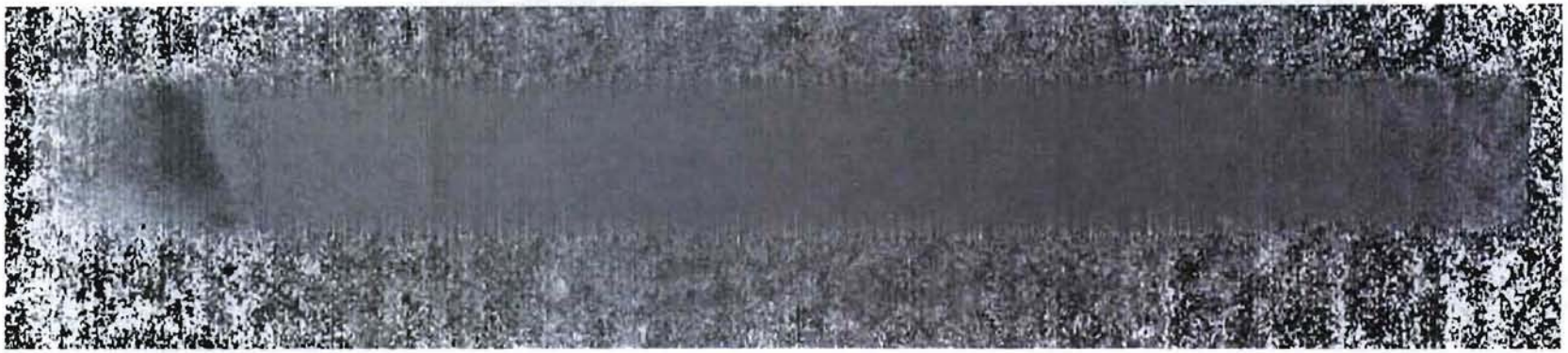

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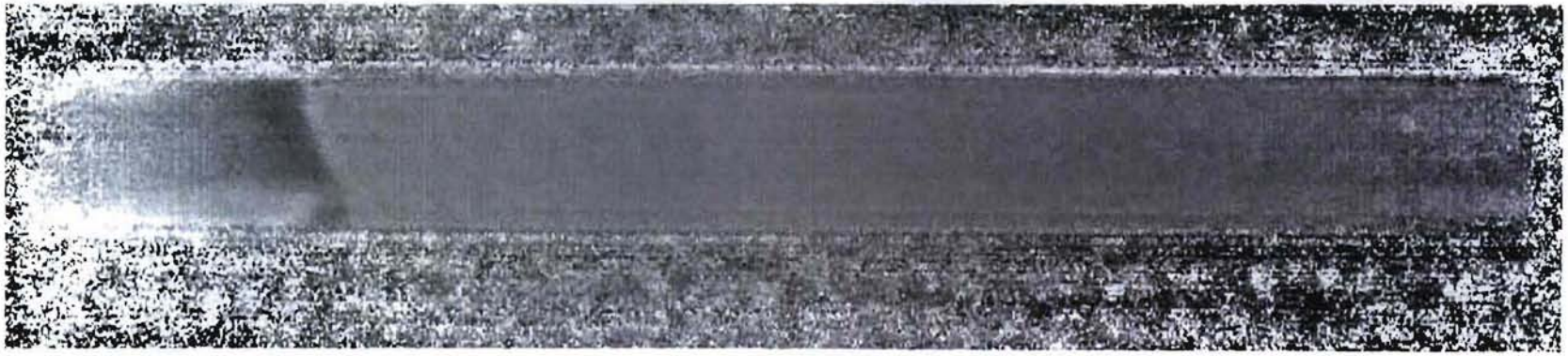

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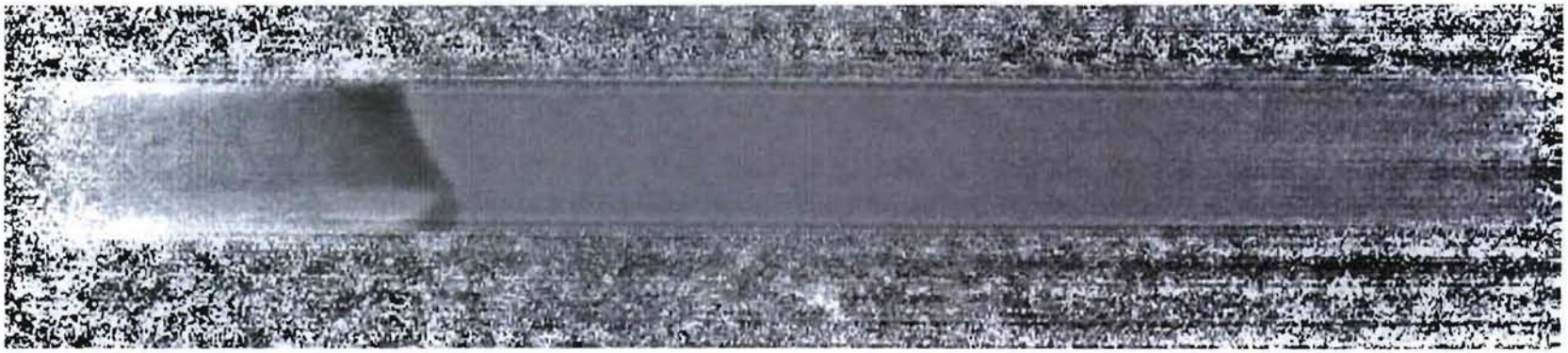

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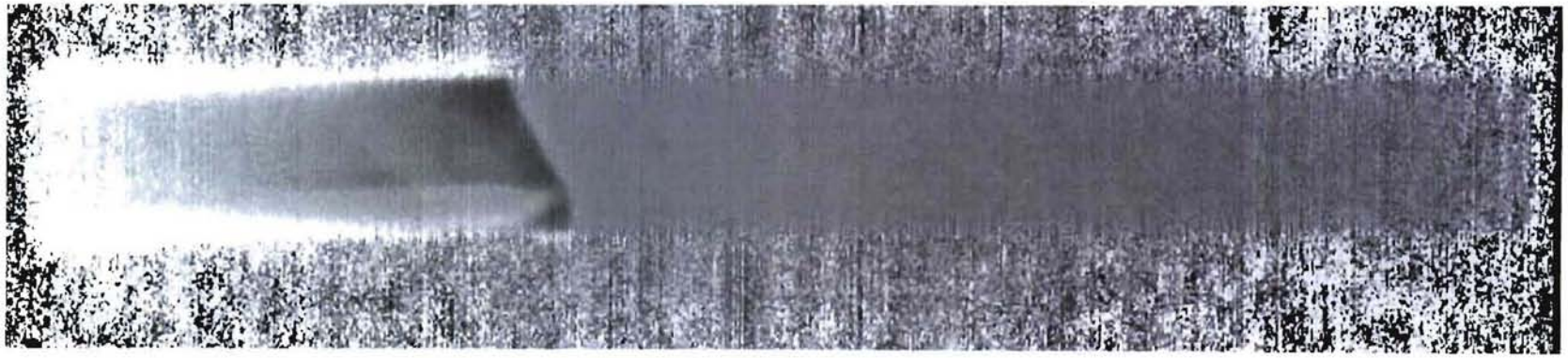

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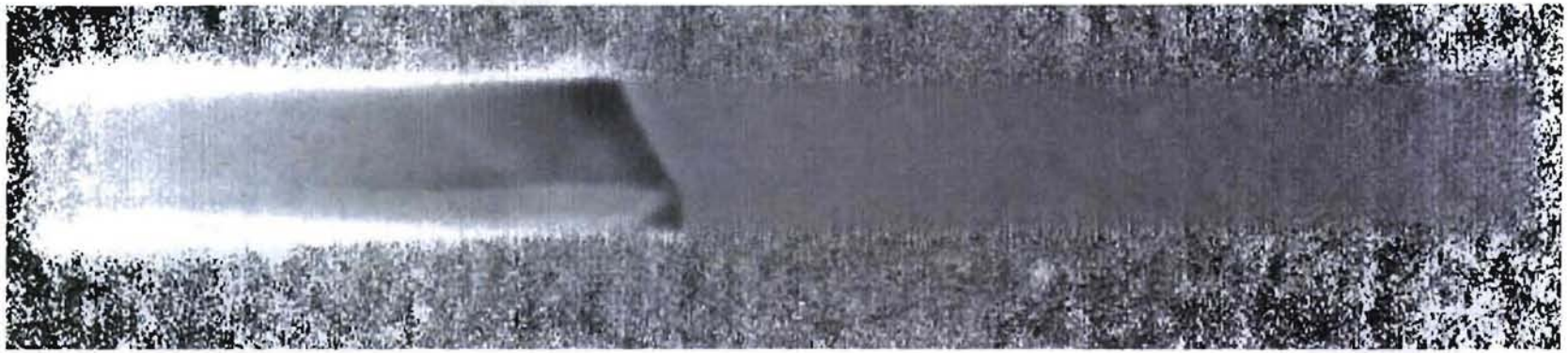

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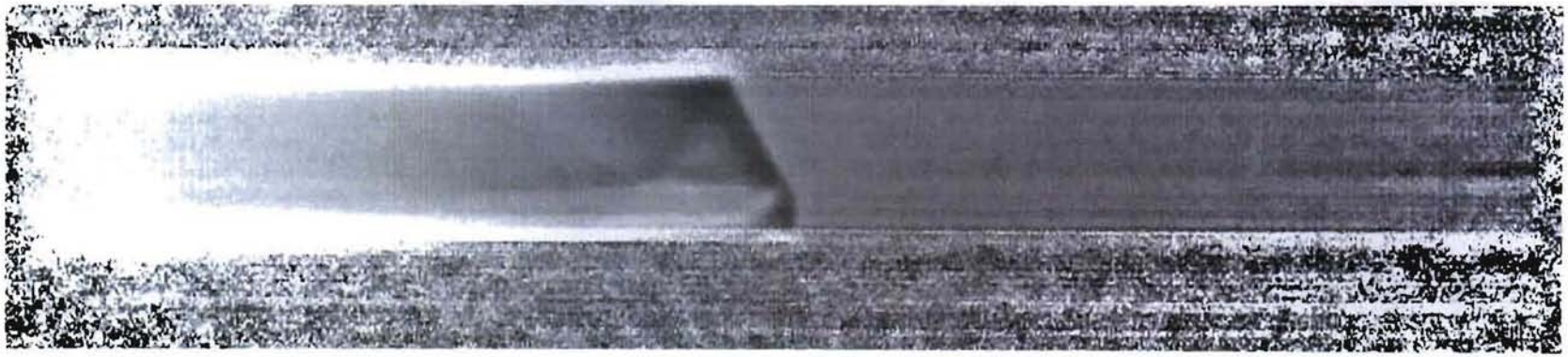

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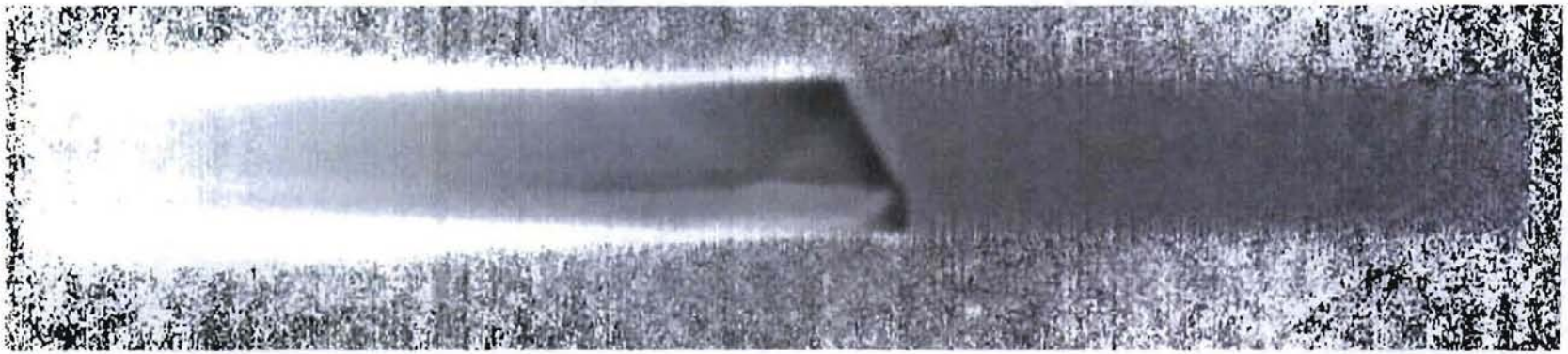

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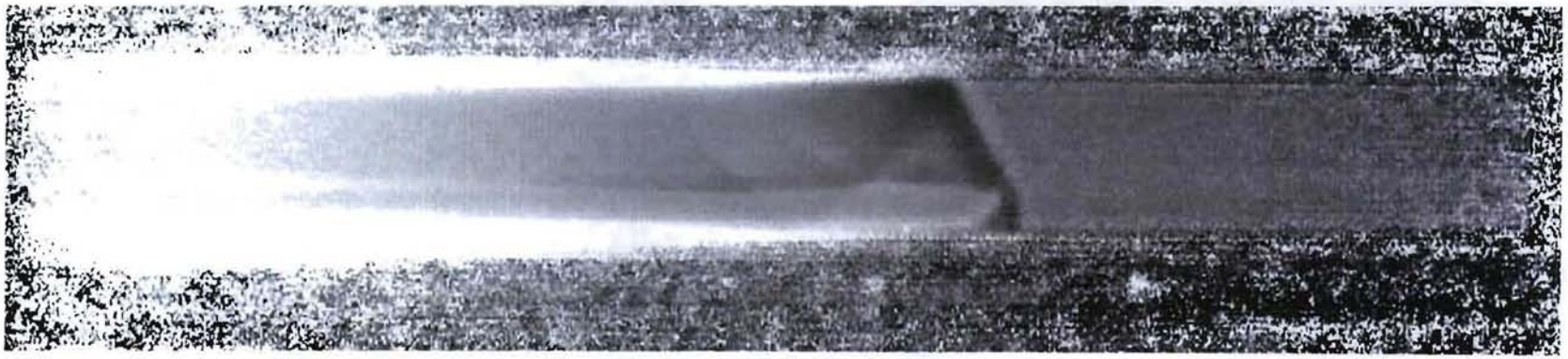

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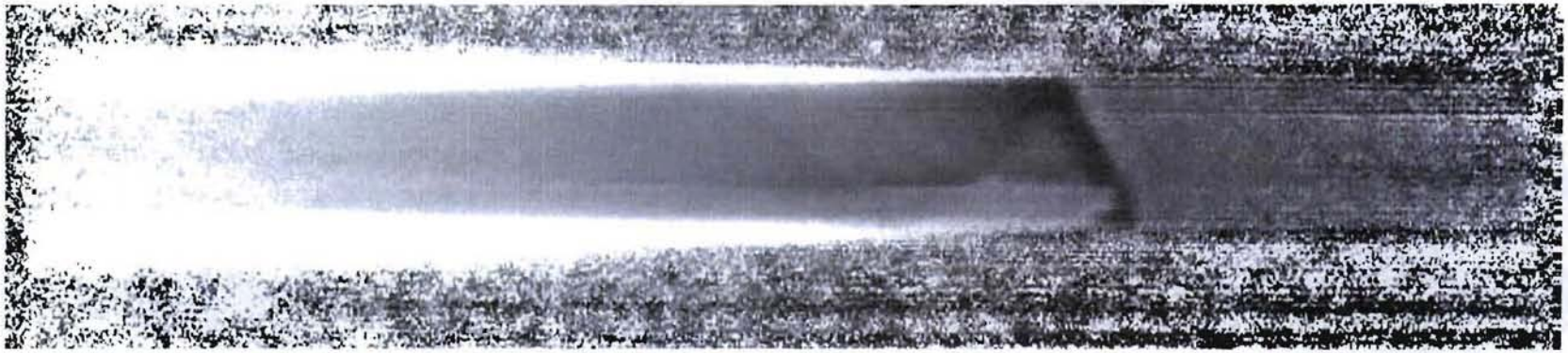

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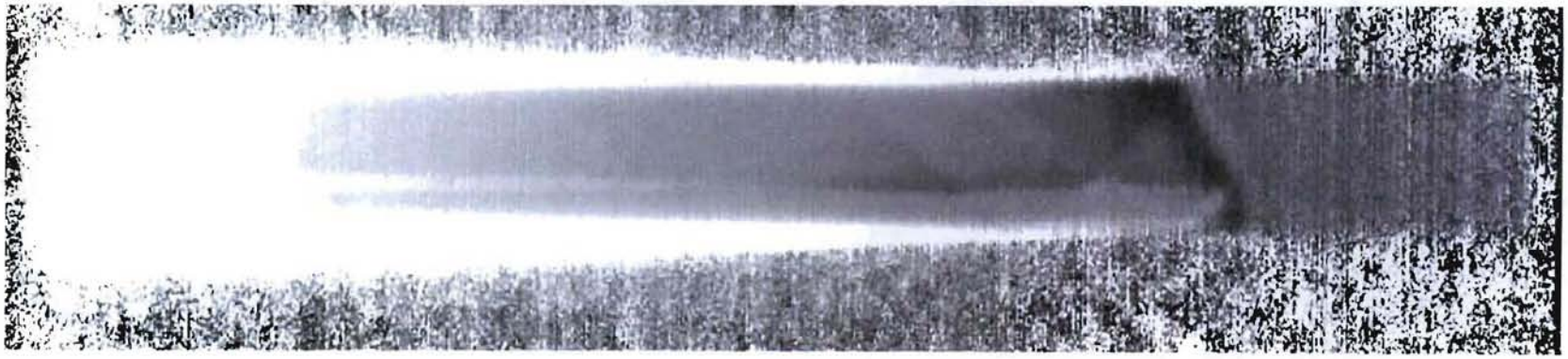

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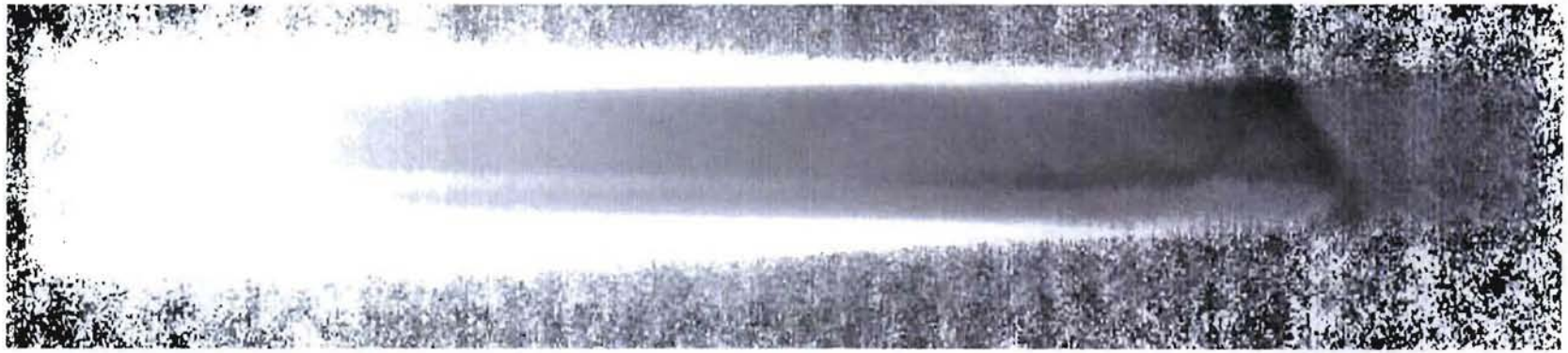

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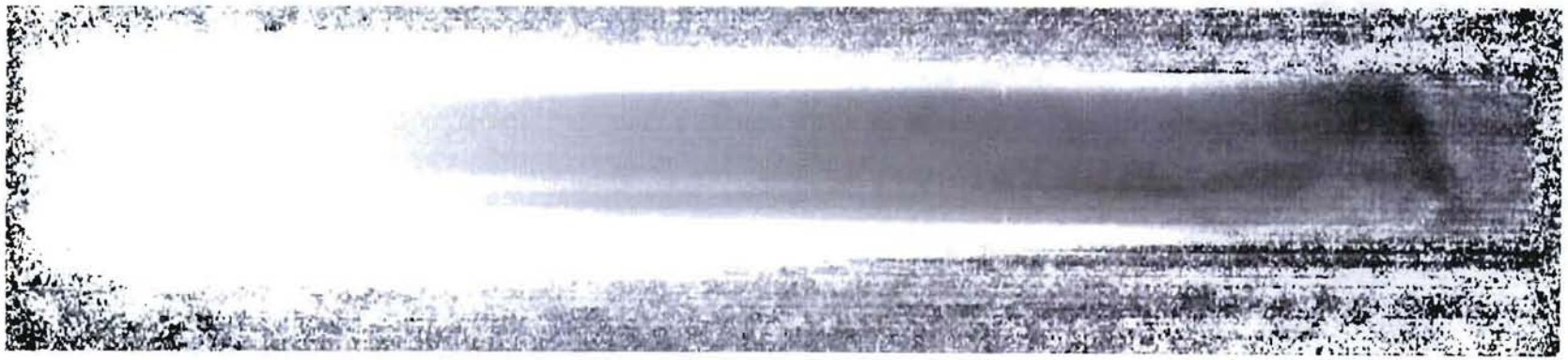

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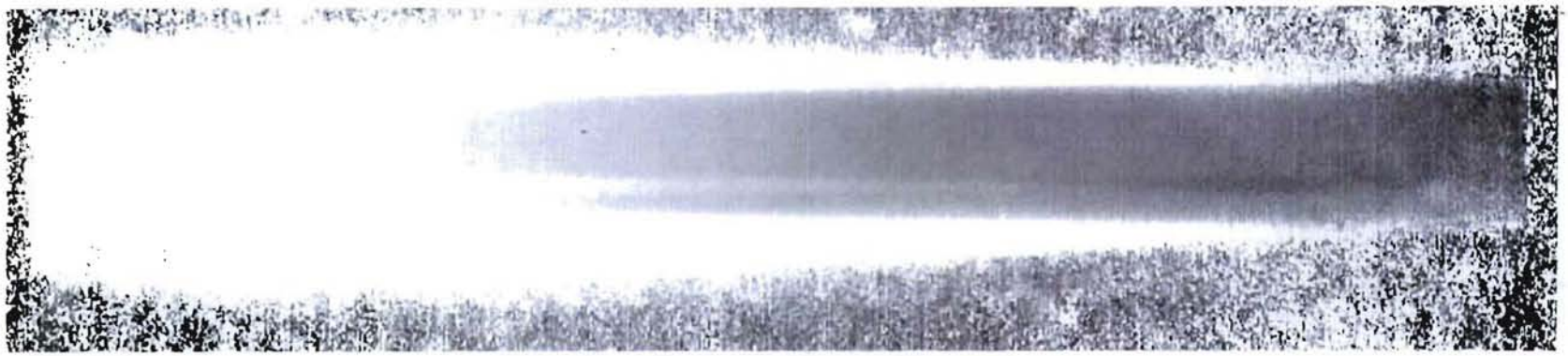

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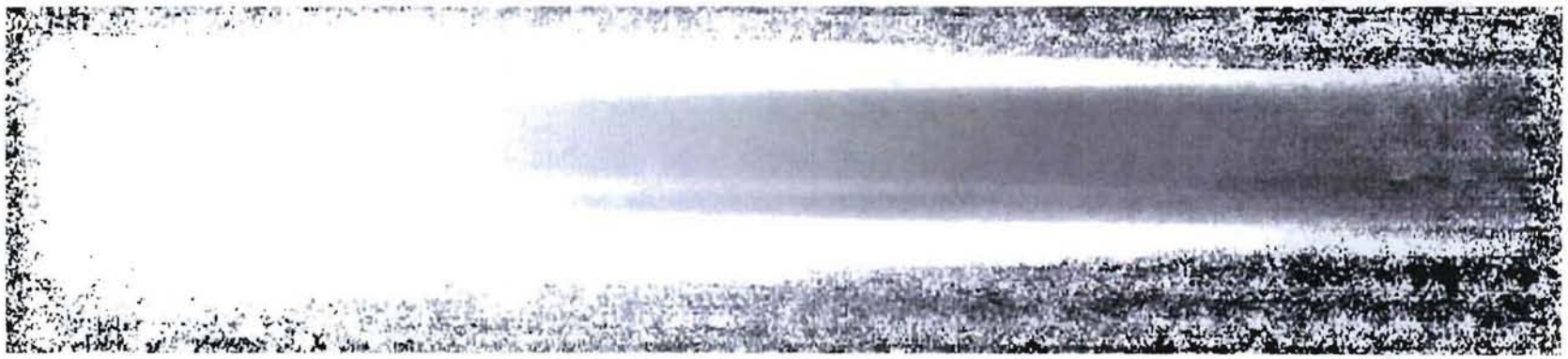

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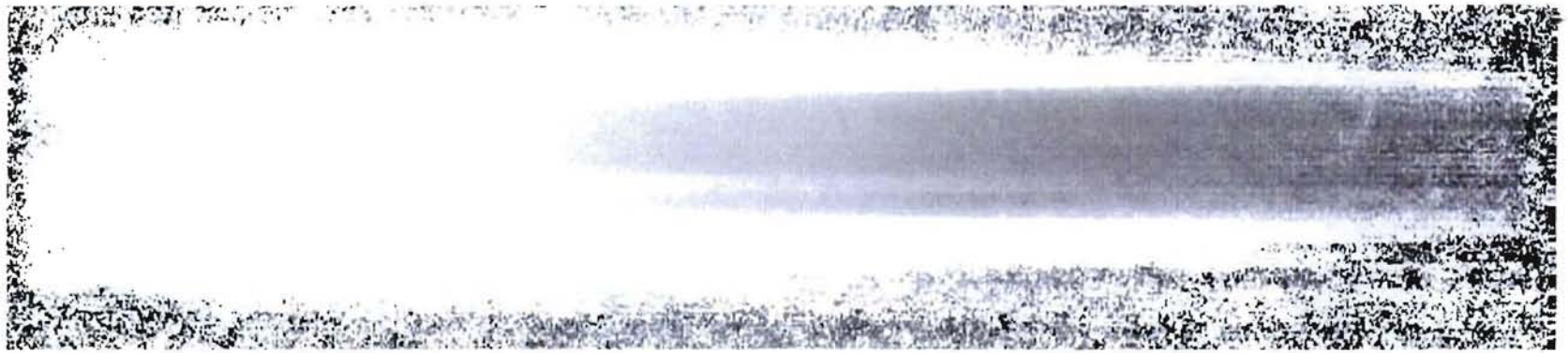
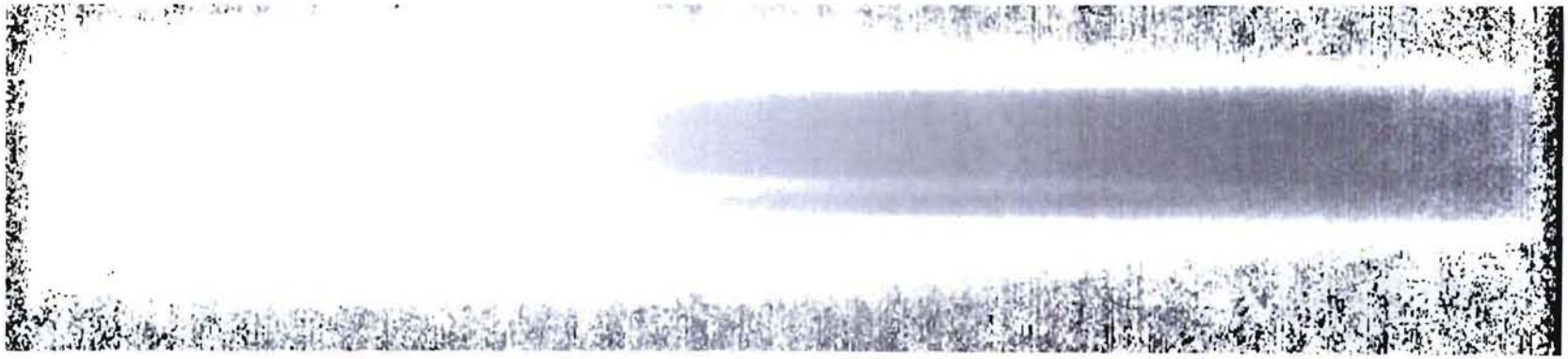
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