LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

UCRL-TR-203308

661L Pre Shot Report

Stephen T. Bosson

April 1, 2004

This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

B-DIVISION/SITE 300 EXPLOSIVES ACTIVITY PEER REVIEW

Shot Number: 661L

Ramrod: Bosson	**Bunker:** 801	**Estimated firing date:** April 27, 2004

Short description of any unusual circumstances and hazards:

Attention Ramrod/Experimenter!

For every explosives experiment to be conducted at the B-Division facilities at Site 300, you are to complete this portion and submit this form along with the following supporting documentation to Peer Reviewers for a safety assessment:

1) The completed Shot Material Database Input form (latest revision);
2) The Assembly Request (may be a copy of the original);
3) The completed pre-shot (except for those aspects ordinarily subject to late change). Muster/Fragment analyses, if required, are to be included with the pre-shot. Note that changes to the pre-shot that adversely affect safety will require another peer review.
4) A copy of each OSP and/or IWS that has been approved specifically for this experiment

Reviewers:

Signatures of ***at least*** two peer reviewers are required, with at least one of them from the list of B/S300-approved peer reviewers. The current list is maintained by the B-Division/Site 300 Facility Manager, with copies retained at each bunker.

As a Peer Reviewer, I have assessed the need for additional ES&H controls beyond those defined in the ES&H Manual (http://www-r.llnl.gov/es_and_h/esh-manual.html), the B Division/Site 300 FSP S300.1 (latest revision), and currently active OSPs/IWSs for activities performed at the proposed firing site. A new OSP/IWS will be required to conduct this experiment if the ES&H controls described in the accompanying pre-shot documentation are not considered adequate to meet the minimum requirements of the LLNL Health and Safety Manual , the B Division/Site 300 FSP S300.1 (latest revision), and/or currently active OSPs/IWSs for activities performed at the proposed firing site.

1) Based on my assessment, I have determined that additional safety controls **ARE / ARE NOT** (circle one) required for this experiment.

Peer Reviewer's signature: _____ **Date:** _____
(blue ink ONLY, please)

2) Based on my assessment, I have determined that additional safety controls **ARE / ARE NOT** (circle one) required for this experiment.

Peer Reviewer's signature: _____ **Date:** _____
(blue ink ONLY, please)

3) Based on my assessment, I have determined that additional safety controls **ARE / ARE NOT** (circle one) required for this experiment.

Peer Reviewer's signature: _____ **Date:** _____
(blue ink ONLY, please)

B Division Site 300 Shot Materials Database Input

A. For purposes of better Quality Assurance: > This form is to taken from the server for each use. > All entries by both RAMROD and BUNKER STAFF are to be made electronically > Signatures are to be in BLUE ink > Corrections to the hardcopy of this cmpleted form are to be made ONLY by single line-out (no whiteout), initialed and dataed.

B. List ONLY materials that will either be expended, scattered or will end up in the waste stream; do NOT list recoverable materials.

C. Bunker Supervisors MUST be notified well in advance of any experiment containing materials listed below that are preceded by double carats (^^).

D. If this complete form is Classified, submit it appropriatly as a classified Work paper.

E. If this completed form is UNCLASSIFIED, submit it with the Pre-Shot.

F. * means LX-10, 9404, Comp-B, propellant, ect.; ** means and/or compounds

	RAMROD Entries	BUNKER Entries
Account #	501582	
Bunker Shot #		-FY04-
Shot Name	661L	
Fire date		
Fire Time		
Program	Campaign 4.2	

Only HE columns shaded this way are to be entered into the database

	#	RAMROD Entries Name or type	RAMROD Entries Before Shot Estimate or design weight	BUNKER Entries Before Shot Actual measured weight	BUNKER Entries After Shot Picked up	BUNKER Entries After Shot Detonated or not retrieved
HE	1	LX-14	1,851.000 gm			
HE	2	PETN	0.064 gm			
HE	3	RDX	0.036 gm			
HE	4					
HE	5					
HE	6					
HE	7					
HE	8					
HE	9					
HE	10					
HE TOTALS >>>>>>>			**1,851.100 gm**			
HE TOTALS in lb. >>			**4.08 lb**			

Air Permit Calculations — **Place X in Green Box if Chamber Air SCRUBBER is to be used**

	Air Permit N-472-62-1 Limits for THIS Shot	Before Shot Estimate or design weight	Before Shot Actual measured weight	After Shot Picked up	After Shot Detonated or not retrieved
CO	0.3980 lb/lb HE	0.0955 lb/lb HE			
NOX	0.0265 lb/lb HE	0.0014 lb/lb HE			
SOX	0.0010 lb/lb HE				
NH_3	0.0218 lb/lb HE	0.0001 lb/lb HE			
H_2S	0.0155 lb/lb HE				
HCN	0.0210 lb/lb HE	0.0001 lb/lb HE			
HF	0.0010 lb/lb HE				
HCL	0.0210 lb/lb HE				

All PM10 emissions from chamber pass through HEPA filters and are below .00006 pound per pound of explosive.

= grams of Lead used in THIS shot per gm of explosive expended

			RAMROD entries		gm
1		Antimony**	gm	gm	
2	^^	Arsenic**	gm	gm	
3		Asbestos	gm	gm	
4	^^	***Barium*** **	gm	gm	

EXPERIMENT TYPE:

(Put "x" next to all that apply).

Conventional weapons	
Device hydro	
Diagnostic development	
Environmental	
HE development	
Proliferation/NEST	
SDI	
Structural studies	
Surety	
Other (define)	

Choose an HE Name or Type from the following list to type into the table:

ANFO
Black Powder
Comp-B
Comp-C3
Comp-C4
Detasheet
Dynamite, Ammonia
Dynamite, Gelatin
Dynamite, Straight
HMX
LX-04
LX-07
LX-10
LX-13
LX-14
LX-16
LX-17
PBX 9404
PBX 9407
PBX 9501
PBX 9502
PETN
RDX
RX-08
RX-35
Smokeless Powder
TATB
TNT
XTX-9003

DIAGNOSTICS:

(Put "x" next to all that apply).

Accelerometers	A
Audio	AU
Auxiliary Systems	AS
Digitizers	D
Effects	E

5	^^	Beryllium**	gm	gm	
6		***Cadmium***	gm	gm	
7		***Chromium***	gm	gm	
8		Cobalt**	gm	gm	
9	^^	Copper**	gm	gm	
10	^^	Corrosives (eg.,acids, bases)	ml	ml	
11		***Lead***	gm	gm	
12		***Mercury***	gm	gm	
13		Molybdenum**	gm	gm	
14		Nickel**	gm	gm	
15		PCBs (e.g., in capacitors)	ml	ml	
16	^^	Salt, fluoride	gm	gm	
17	^^	Salt, other lithium compnds	gm	gm	
18		***Selenium***	gm	gm	
19		***Silver***	gm	gm	
20		Solvents	ml	ml	
21		Thallium**	gm	gm	
22		Thorium**	gm	gm	
23		Tritium (micrograms)	ugm	ugm	
24		Uranium, depleted**	3954 gm	gm	
25		Vanadium**	gm	gm	
26		Zinc**	gm	gm	

	Pounds of gas produced in the chamber for THIS Shot	Before Shot Estimate or design weight	Before Shot Actual measured weight	After Shot Picked up	After Shot Detonated or not retrieved
CO		0.390 lb gas			
NOX		0.006 lb gas			
SOX					
NH_3		0.000 lb gas			
H_2S					
HCN		0.000 lb gas			
HF					
HCL					

Fabry Perot	I-#
Fiber optics	FO
Flashlamps	FL
Gamma Ray Camera	GR
Gauges	GU
Hycam	HC
IC Camera	IC
IR Temp	IR
Laser Fid	LF
Micro Radar	MR
MUMA	M
Optics	O
Pins	P
Pressure transducer	PT
Photonic velocimetry	PV
Pyrometers	PY
Ransco	RA
Recovery	R
Reflect Probe	RP#
Scopes	S
Strain gauge	SG
Thermocouple	T
Video	V
X-ray: LINAC	XL
X-ray: Orthogonal	XO
X-ray: Scandiflash	XS
X-ray:450: PI	XP
X-ray:FXR	XF
other (define)	

Comments (include description of unusual forms of materials):

This completed form must be reviewed and signed by the LLNL Waste Certification Officer, certifying that the container contents are as reported on this form.

Ramrod name (please print): **Ramrod signature (blue ink ONLY):**

Steve Bosson

Bunker rep name (please print): **Bunker Rep signature (blue ink ONLY):**

WASTE CERTIFICATION PROGRAM REPRESENTATION:

SIGNATURE: **DATE:**

SCHEDULING REQUEST

Shot Number: 661L

Ramrod: Bosson	Phone: 4-3096	Account Number: 501582

Firing Facility : 801		Start Date (estimated) : April 19, 2004			Reference Shot:661K
Estimated Time Required for Set Up: 1 week		Estimated Time Required for Clean Up: 1 week			
Principal Investigator: Greg Archbold		L- 016			Phone: 4-4495
Primary Engineer: Bryan Nathan		L- 125			Phone: 2-7506
Classification	Visual	☐ Proprietary	☐ SRD	☐ CRD	☒ UNC
	X-Ray View	☐ Proprietary	☐ SRD	☐ CRD	☒ UNC
	Digital Data	☐ Proprietary	☐ SRD	☐ CRD	☒ UNC
HE Weight <	4 lbs	Muster Type: N/A			Muster Radius: N/A
Toxic Materials	☒ U6Nb/D-38	☐ Be	☐ LiH	☐ Other	
Special OSPs required:					

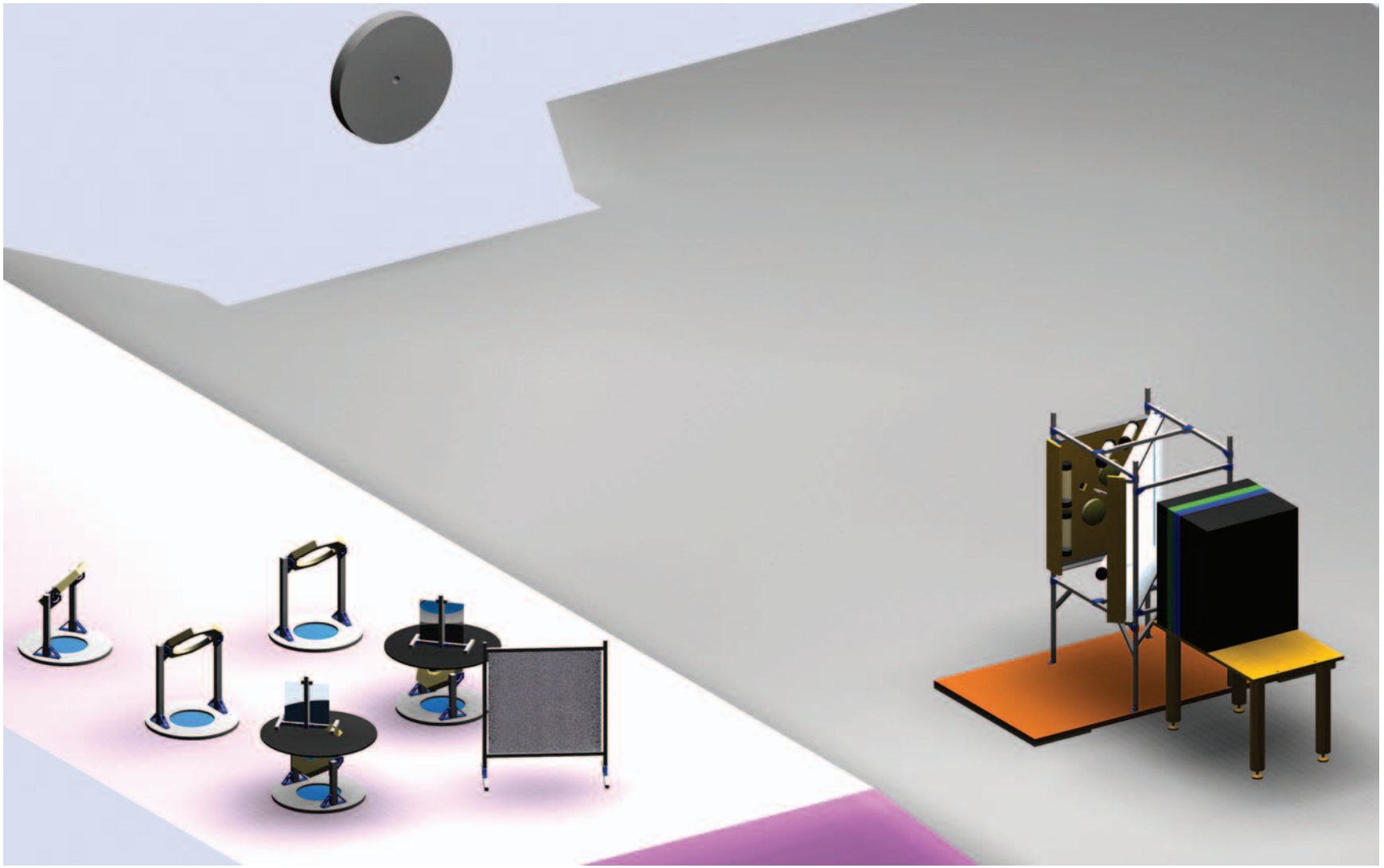
RESOURCE REQUIREMENTS

☐ **AS**	Auxiliary Systems						
☐ **C**	Candles (Argon)	Qty: 0 Small	Qty: 0 Large				
☐ **CT**	Cold Trap						
☒ **D**	Digitizers	Total Channels: 11+					
☒ **FL**	Flashlamps 8 each						
☐ **FS**	Remote Fireset	Type:	Voltage: V				
☐ **GR**	Gamma Ray Camera						
☐ **HC**	Hycam						
☐ **I-**	Fabry Perot Velocimetry	Probes:	Cameras:				
☐ **IC**	IC Camera						
☐ **IR**	IR Temperature Probe / Pyrometer						
☐ **LF**	LED / Laser FID						
☐ **M**	Vacuum/ MUMA System						
☒ **O**	Optics (Stand/ Model)	4/ 121-E	5/ 121-E	8/ 140	9/ 121-E	10/ 121-E	/
☐ **P**	Pins						
☐ **PT**	Pressure Transducer Preamplifier(s)	Qty:					
☒ **R**	Recovery Step wedges if possible						
☐ **RA**	Ransco , Shot Thermal Conditioning (includes temperature monitoring)	☐ Hot	☐ Cold				
☐ **SG**	Strain Gauge Preamplifier(s)	Qty:					
☐ **T**	Thermocouple Preamplifier(s)	Qty:					
☐ **TE**	Tent	Size:	☐ Black?				
☐ **V**	Video						
☒ **XF**	X-Ray, FXR						
☐ **XL**	X-Ray, LINAC						
☐ **XP**	X-Ray, 450 HP / PI						
☐ **XS**	X-Ray, 450 Scandiflash						
☐ **XO**	X-Ray, Orthogonal						
☒ **Other**	Use 501583 for clean up						

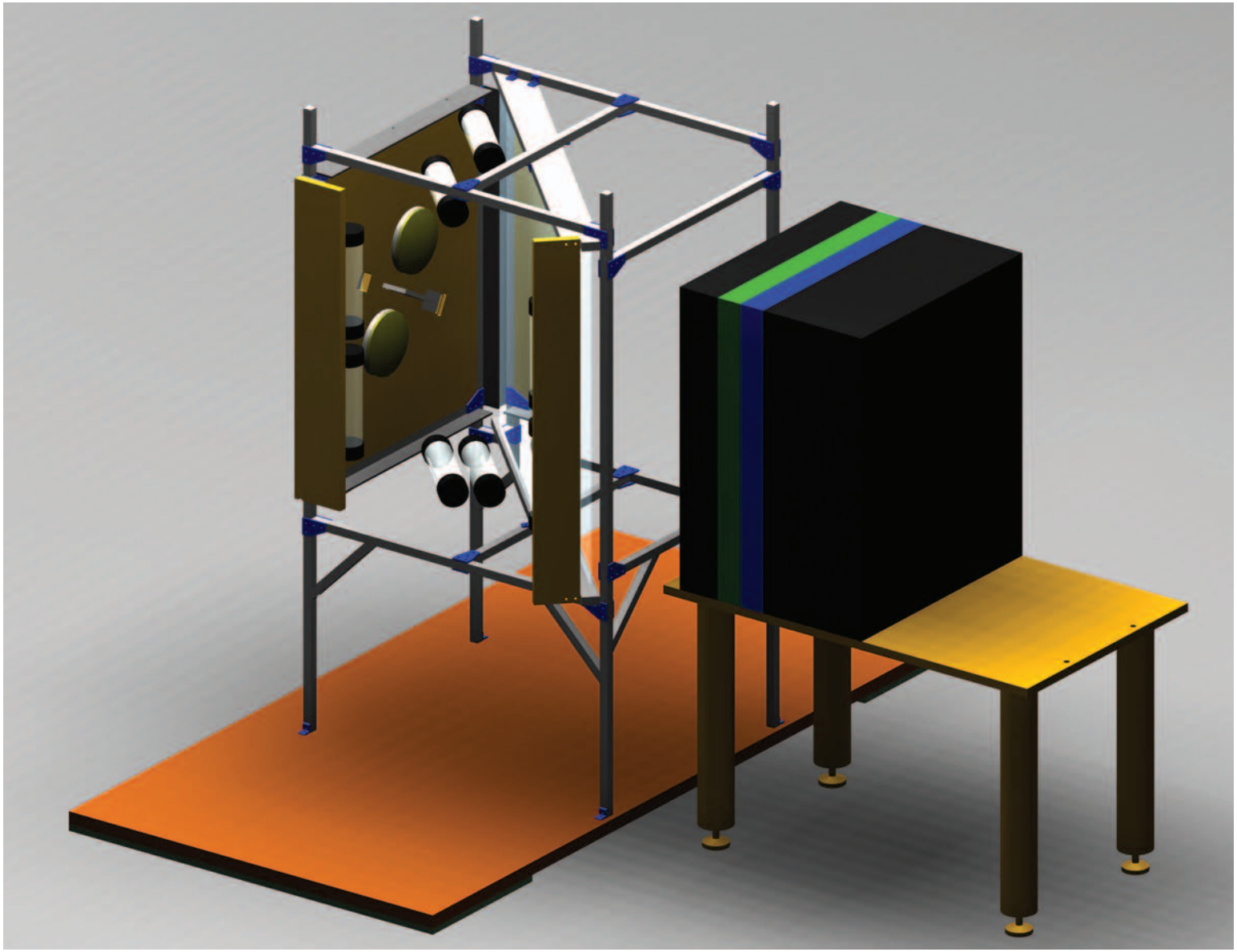
Date Fired : / /	Time Fired: : AM / PM	Temperature: ° F or C
Bunker Supervisor:		
Console Operator:		

Form Issue Date: 8/03. Discard Previous Versions

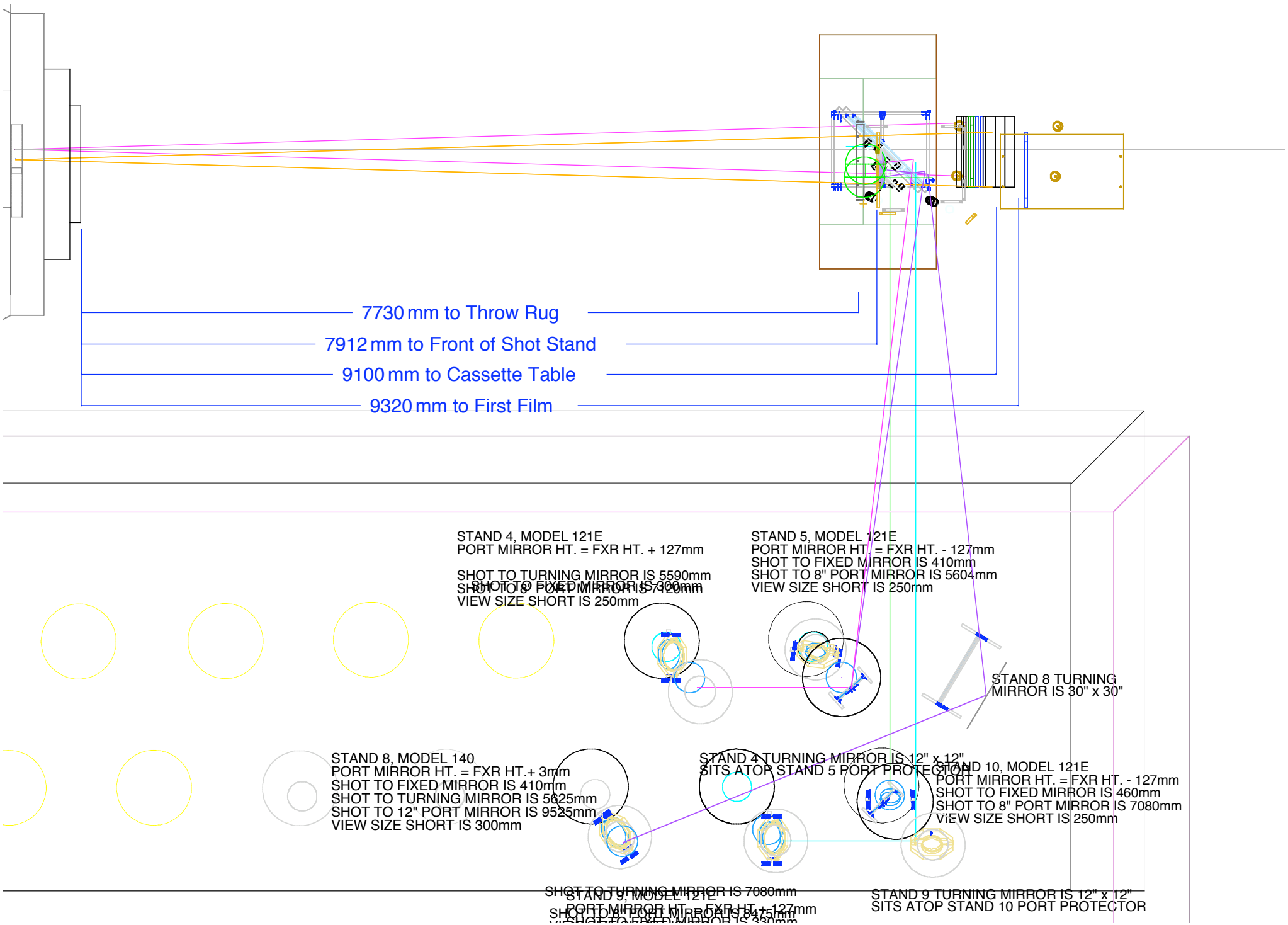
661L Chamber Layout



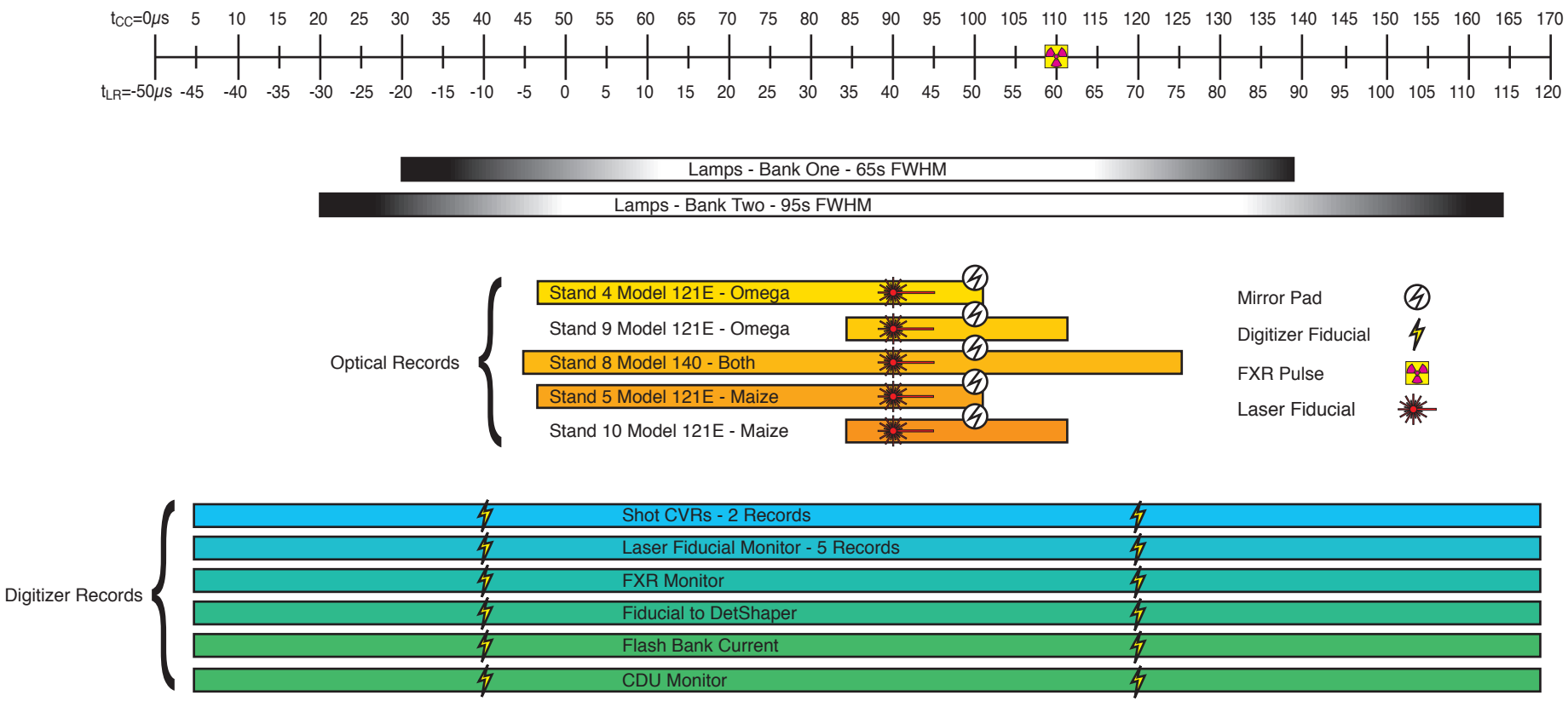
661L Chamber Layout - Closer



661L Chamber Layout



661L Timing Chart



TIMING DATA

Shot Number: 661L

Ramrod: Bosson | **Phone:** 4-3096

FIRST TIMING REFERENCE: Camera Coincidence __ | SECOND TIMING REFERENCE:

Delay Settings

		TEST COMPONENT	TIME μs	BEFORE or AFTER	CHOOSE TIMING REFERENCE	*DELAY SETTING*
Ch. 1	triggers	95μs FWHM Flash Bank	20	After	First Reference	
Ch. 2	triggers	65μs FWHM FlashBank	30	After	First Reference	
Ch. 3	fires	Maize aka Diabl o	50	After	First Reference	
Ch. 4	fires	Omega	50	After	First Reference	
Ch. 5	fires	All Mirror Pads	100	After	First Reference	
		Back out RP2 Function Times				
		for Shots				

Digitizer Settings

DIGITIZER CHANNEL	DIGITIZER FUNCTION	START AT	FROM REFERENCE	SAMPLE RATE (ns)	LENGTH (μs)	INCLUDE FIDS
	CDU Monitor	5μs	First	5	>165	yes
	Flash Bank Current	5μs	First	5	>165	yes
	Fid to Det Shaper	5μs	First	5	>165	yes
	CVR Mirror Pads	5μs	First	5	>165	yes
	FXR Monitor	5μs	First	5	>165	yes
	CVR Shots - 2 Records					

Fiducial Delay Settings

DELAY CHANNEL	FIDUCIALS	START AT	END AT	FROM REFERENCE	START FROM LOAD RING
	Digitizer Fiducial 1	40μs	40μs	First	-10μs
	Camera Fids, All Stands	90μs	95μs	First	40μs
	Digiter Fiducial 2	120μs	120μs	First	120μs

FXR / LINAC Delay (from Load Ring)

TIME FROM LOAD RING	*BUNKER SETTING*	*DISPLAY READOUT*	*DIGITIZER READOUT*
60μs			

Camera Delay Settings

STAND	MODEL NUMBER	SPEED/FRAME RATE	FRAME 3 TO REF.	*PHASE DELAY*
4	121-E	2k/2μs	52μs	
5	121-E	2k/2μs	52μs	
8	140	4.16k/1μs	N/A	
9	121-E	4k/1μs	87μs	
10	121-E	4k/1μs	87μs	

RADIOGRAPHY DATA

SHOT NUMBER 661L	RAMROD Bosson

☒ FXR (801)	☐ LINAC (851)	☐ Other	SHOT DATE (Estimated) April 27, 2004

BEAM COLLIMATION

☒	INTERNAL FXR COLLIMATION	Tungsten rings 10 (10 is normal)
☐	ADDITIONAL COLLIMATION	
	Material	
	Aperture	
	Aperture Exit to X-Ray Target	inches

SOURCE PROTECTION

☐					
☒	Be Plug	☒	Large (2")	☐	Small (1.25")
☒	Ceramic Cone	☐	Large	☒	Small
☐	Steel Plate	☐	20" x 20" x 2" with 5" exit hole		
		☐	Other		

FILM PROTECTION

HE (shot) 4.08 lbs HE (aux.) 0 lbs Total HE Weight 4.08 lbs

☐	Vermiculite Box	Size?		
☒	Blast Plate(s)	2"		
☒	Blast Window(s)	1" 3 each		Other
☒	1st Cassette	1" Front	1" Back ☒ Al	☐ Fe
☒	2nd Cassette	1" Front	1" Back ☐ Al	☐ Fe
☒	Coupler Back			
☒	Fe Kickers (sized for cassette) 2			

FILM PACK ☒ Flat Field ☒ Static (set up) ☒ Dynamic (shot) ☒ Double Exposure (set up plus shot)

Size 22 x 28 (29 x 35 cassette) Orientation Vertical

Film Specification AA, BMX, TMH, IX150

TABLE DISTANCES

Source to Object Distance is 8636mm

Object to First Film is 1338mm Magnification = 1.154

Object to Second Film is 1414mm Magnification = 1.1637

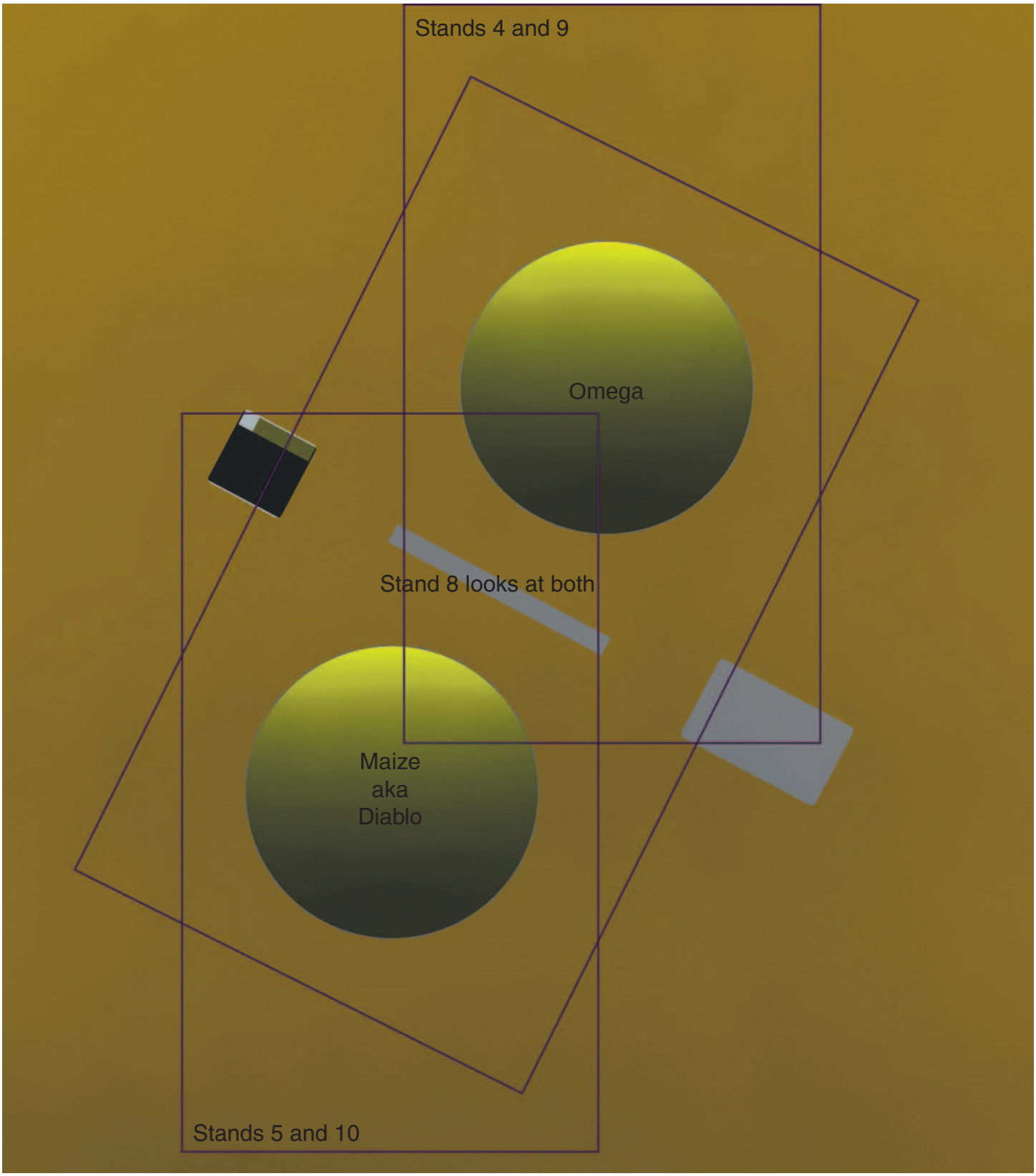
Beam Center to Film Center is 0 inches

ADDITIONAL COMMENTS

Two Days Before: If time permits, take several exposures of the 5004A test image.
Day before: morning - flat field, afternoon - static and first exposure of double.
Table distances above are not to be used for positioning, use chamber layout diagram to position shot.
Two pieces of IX150 will be used. One should be placed with its long side horizontal, at the top of the cassette, with its center line 68mm to the left of the cassette center line. The other should be placed with its long side horizontal, at the bottom of the cassette, with its center line 68mm to the right of the cassette center line.

FILM RECOVERY INFO spot size mm R@ 1 m = R @ shot

661L Camera Views



REQUIRED MATERIALS

Shot Number: 661L

Ramrod: Bosson **Phone:** 4-3096 **Account Number:** 501582

Table	Qty.
4' x 8' x 1.5" Steel	1
with pads under	

Port Glass	Qty.
8 " Ø	
10 " Ø	
12 " Ø	4

Port Mirrors	Qty.
8 " Ø	4
10 " Ø	
12 " Ø	1

Other Mirrors	Qty.
30" x 30"	1
12" x 12"	2
40" x 40"	1

Candle Supports	Qty.
Stand (width?)	
Stand (width?)	
Shelf (width?)	
Shelf (width?)	

Candles	Qty.

Flash Lamps	Qty.
GigaLumen	☒
Banks	2
Lamps	8

Tents	
	☐
	☐
	☐

Targets	Qty.

Target Holders	Qty.

CDU	
Protection	☐
Type	

Signal Cables	Qty.
For light	2
meters	

Detonator Cables	Qty.
31C/PT (60')	7
31C/31C (Length?)	

Miscellany	Qty.
Shot/mirror stand	1
80/20 stands	2
for turning mirrors	
Light meters	2
40" x 40" glass	3
Supplies for 8 lamps	

Form Issue Date: 6/2000 - Discard Previous Versions