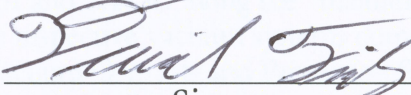
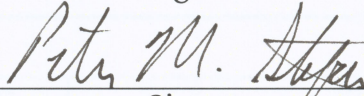
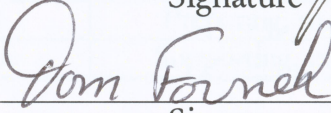
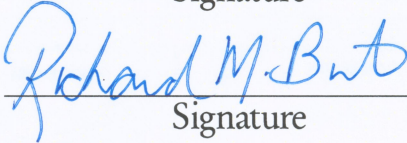

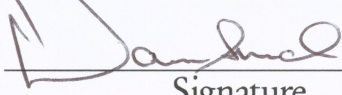



LCLS Interface Control Document #	1.1-521	LUSI-XTOD	Revision 0
<b>LUSI-XTOD Near Experimental Hall</b>			
David Fritz Author			4/25/08
	Signature		Date
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Tom Fornek LUSI Project Director			4/25/2008
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	Signature		Date

**Brief Summary:** This document defines the interfaces between the LUSI Project and LCLS XTOD in the Near Experimental Hall (NEH). Subsystems that connect-at or cross the boundaries are identified.

### Change History Log

Rev Number	Revision Date	Sections Affected	Description of Change
000	2008/4/24	All	Initial Version

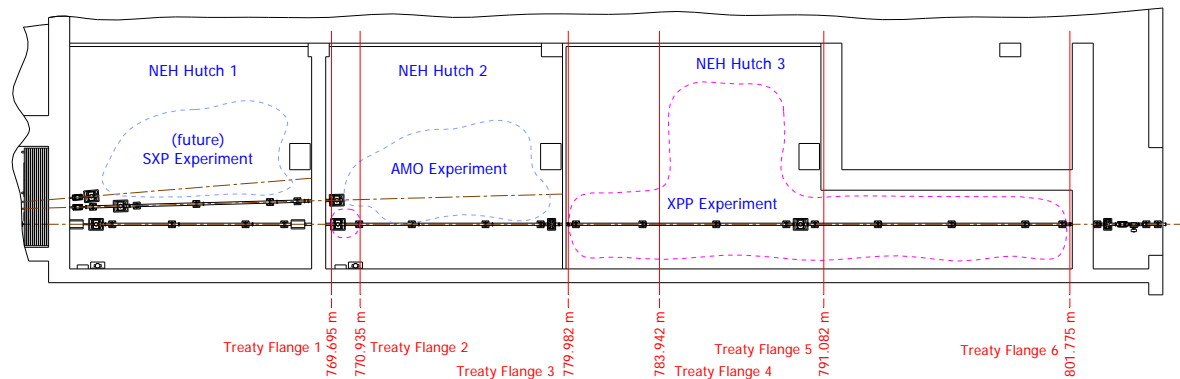
## EXECUTIVE SUMMARY

1.1 Scope: The NEH interfaces between the LUSI Project and LCLS XTOD. Responsibility alternates between LUSI and XTOD along the "mainline", hard x-ray branch beam line through the NEH. The respective vacuum systems communicate, and the LCLS x-ray beam is transported. Vacuum Controls and Protection System signals must work together.

### 1.2 Responsibilities

Group	WBS	Represented by:	Responsible for:
LUSI	-	<i>Tom Fornek</i>	Preparing, maintaining, and approving this ICD
XTOD	1.5	<i>Richard Bionta</i>	Supporting, maintaining, and approving this ICD

### 1.3 Interface Diagram



### 1.4 Interface Description

Heading	Check	Type	Location and Description
3.1	X	Mechanical	Avoid Interference of Respective Vacuum Components and Support Structures
3.2		Fluid	
3.3	X	Vacuum	Interconnected at Conflat-type Flanges
3.4		Thermal	
3.5		RF	
3.6		Electrical	
3.7		Power	
3.8	X	Signal	Vacuum Control, MPS/PPS
3.9	X	Radiation	X-Rays
3.10		Environmental	
3.11		Conventional Facilities	
3.12		Other	

## 2.0 Applicable Documents

ESD #1.1-302 *LCLS Mechanical Vacuum Specification*  
 PRD #1.5-002 *Physics Requirements for the XTOD Mechanical-Vacuum Systems*  
 ESD #1.5-118 *LCLS XTOD UHV Specifications*  
 ESD #1.1-328 *Vacuum Controls Requirements for XTOD and XES Systems*  
 ESD #1.5-129 *Vacuum Qualification of XTOD Instrumentation*

## 3.0 Interface Definition

Interfaces between the LUSI Project and LCLS XTOD occur at six Treaty Flanges within the Near Experimental Hall (NEH). At these interfaces, vacuum systems designed by the two responsible groups communicate, in order to transport the LCLS hard x-ray beam. To safely operate the resulting, joined vacuum system, Vacuum Controls and MPS/PPS signals must also function together. At the same time, physical components belonging to one group, e.g. component support stands and ion pumps, should accommodate the space requirements of the other group.

The locations of the Treaty Flanges are given in Table 1 below, and illustrated in Figure 1:

**Table 1: Treaty Flange Locations**

Label	Location	LCLS Z-Coordinate (m)	LUSI XPP Coordinate (m)
Treaty Flange 1	NEH 2	769.695	-10.287
Treaty Flange 2	NEH 2	770.935	-9.047
Treaty Flange 3	NEH 3	779.982	0.000
Treaty Flange 4	NEH 3	783.942	3.960
Treaty Flange 5	NEH 3	791.082	11.100
Treaty Flange 6	NEH 3	801.775	21.793

The z-coordinates represent the mating interface of  $\phi$ 6-inch Conflat-type flanges. The x and y coordinates for all flanges should be centered on the output beam of the XTOD Hard X-Ray Offset Mirror System (HOMS).

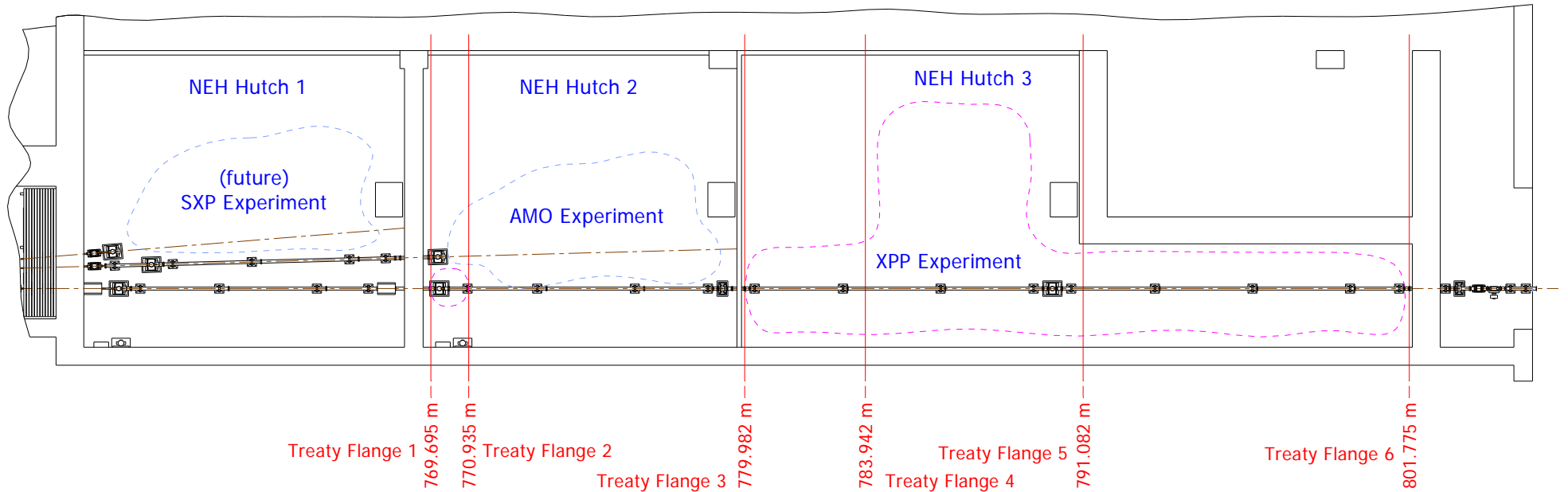


Figure 1: Plan view of the Near Experimental Hall (NEH) region, together with Treaty Flange locations. The illustrated XTOD transport hardware is not intended to represent how the Treaty Flanges will be accommodated. It is only pictorial, ~from Version 56 of the XTOD Configuration Drawing.

**3.1 Mechanical Requirements** –Interference between LUSI and XTOD vacuum system and support structure components should be avoided through mutual negotiation.

**3.2 Fluid Requirements** – None.

**3.3 Vacuum Requirements** – The LUSI Project agrees to adopt the specifications governing LCLS/XTOD vacuum systems, namely ESD #1.1-302 *LCLS Mechanical Vacuum Specification*, PRD #1.5-002 *Physics Requirements for the XTOD Mechanical-Vacuum Systems*, ESD #1.5-118 *LCLS XTOD UHV Specifications*, and ESD #1.5-129 *Vacuum Qualification of XTOD Instrumentation*.

Note that the above specifications do not prohibit designs using fully-vacuum-immersed elastomer seals, such as found on the gate seal of VAT Series 10 valves.

**3.4 Thermal Requirements** – None.

**3.5 RF Requirements** – None.

**3.6 Electrical Requirements** –None.

**3.7 Power Requirements** – None.

**3.8 Signal Requirements** –For the joined vacuum system, Vacuum Controls and MPS/PPS signals must function together. The LUSI Project agrees to adopt the specifications defined in ESD #1.1-328, *Vacuum Controls Requirements for XTOD and XES Systems*.

**3.9 Radiation Requirements** –The LCLS hard x-ray beam will be transported through the combined vacuum system, either to experiments performed in NEH Hutch 3, or/and experimental stations downstream.

**3.10 Environmental Requirements** – None.

**3.11 Conventional Facilities Requirements** –None.

**3.12 Other Requirements** –None.

**4.0 Verification** – Verification of all requirements is to be performed during system commissioning. Performance goals for each system to be tested are described in the respective Physics Requirements Documents.

**5.0 Notes** –None.