



# ENG-033 - CRR - CHIT RESOLUTION REPORT

## CHIT RESOLUTION REPORT FOR ODH MONITORING

*NSTXU\_1-8-1-1-3\_CRR\_100*

*Rev. 1*

Work Planning #:  
Effective Date: **03/09/2020**  
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# **Chit Resolution Report for Oxygen Deficiency Monitoring Systems**

**NSTXU\_1-8-1-1-3\_CRR\_100 R1**

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# Record of Changes

Rev.	Date	Description of Changes
0	January 24, 2020	Initial Release
1	March 6, 2020	Results from FDR

Review	Chit Number	Status
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR01	Closed
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR02	Closed
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR03	Closed
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR04	Closed
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR05	Closed
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR06	Closed
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR07	Closed
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR08	Closed
Vacuum & Fueling Systems DVVR	VFAPS02	Closed
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR10	Closed
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR11	Closed



Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR12	Closed
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR13	Closed
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR14	Closed
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR15	Closed
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR16	Closed
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR17	Closed
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR18	Closed

Review	ID	Chit
Test Cell Radiation & <b>Oxygen</b> Monitoring FDR	NTCO2MONFDR 01	NSTXU_1-8-1-1-3_CALC_100 has been signed, but needs to be uploaded to DMS.

Closed: The has been signed in PDF and was uploaded to DMS on 2/28/2020.

Review	ID	Chit
Test Cell Radiation & <b>Oxygen</b> Monitoring FDR	NTCO2MONFDR 02	NSTXU_1-8-1-1-3_DRP_100 Needs to be approved in DMS (pending approval)

Closed: The DRP has been loaded into the

Review	ID	Chit
Test Cell Radiation & <b>Oxygen</b> Monitoring FDR	NTCO2MONFDR 03	NSTXU_1-8-1-1-3_CRR_100 is pending review. However, there were a total of 18 chits at the PDR, none of which were rejected. Only 9 PDR chits are addressed in this CRR. The Chit Log also still shows the remaining 9 chits as OPEN. Please update this CRR to address & close ALL chits from PDR. The updated CRR needs to then be fully signed and filed in DMS
Test Cell Radiation & <b>Oxygen</b> Monitoring FDR	NTCO2MONFDR 05	NSTXU_1-8-1-1-3_CRR_100 must be fully signed and uploaded to DMS (it is pending review)

Closed: The CRR was signed in DMS on 2-10-2020. Upon inspection of the Chit log, it is correct there were a total of 18 chits. However, this was a combined Radiation and ODH PDR. The nine radiation chits were closed on 2/12/2019 in Chit resolution report NSTX-U-REC-098. The Chit log shows these chits as closed.

Review	ID	Chit
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Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR04	Consider evaluating personnel response and possible need for an additional monitor/PPE/egress route in areas where individuals can get trapped - ie: DARM .
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Closed: The updates to the design were considered and in areas where an individual can become trapped additional annunciators will be added. In addition, signs will be added to the facilities, e.g., DARM showing the most expeditious egress.

Review	ID	Chit
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR06	Recommend using 24 V Power Supplies that can be monitored by the PLC, and can be deployed N+1 such that the failure of one can be detected without back-feeding the other and masking the failure. Monitor the health of the UPS if possible.

Closed: The design has been updated to include redundant power supplies. The power supplies chosen are those being used by the personnel safety system.

Review	ID	Chit
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR07	Consider reviewing the system status contacts to ensure that the relay signal state results in a fail-safe configuration signal back to the PLC inputs (N/O or N/C).

Closed: The systems contacts have been reviewed. All relay contacts are fail-safe, whereby if there is a loss of power to the monitor there is an indication of an unsafe state.

Review	ID	Chit
Test Cell Radiation & <b>Oxygen Monitoring</b> FDR	NTCO2MONFDR08	Consider performing an noise level study on the audible alarm to determine the set volume level.

Closed: The sound level is well below the OSHA limit of 140 dBA for unprotected exposure.



REV 0 Chits -- previously signed follow

PDR

Review	ID	Chit
Test Cell Radiation & <b>Oxygen</b> <b>Monitoring</b> PDR	TCRADOMPDR10	Consider placement of O2 deficiency detector sampling heads after safety analysis.

Closed: A memo was developed that identifies the proper locations of the ODH monitoring system. This memo is used as a requirement that drove the design presented at the FDR. Memo OSS-191022-SPG-01

Review	ID	Chit
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR11	Add physical lock to device to prevent modification of approved configuration by unauthorized staff.

Closed: The ODH monitors and power supplies are protected from tamper via cages in the North Gallery as defined in the configuration managed safeguards. These safeguards are identified in drawing AE8350. In Addition the monitor case latches can and will be pad locked.

Review	ID	Chit



Oxygen  
Monitoring  
PDR

&

TCRADOMPDR12

Develop periodic maintenance procedure with triggers to service filters at appropriate interval. Does unit signal when filters changes are needed (reduced flow?)

Closed: The system auto calibrates and alarms if out of calibration. Standard maintenance processes and procedures that occur post-FDR will be used to maintain the systems. Specifically Preventive maintenance will be conducted to check and replace filters as defined by the manufacturer.

Review	ID	Chit
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR13	The electrical signals from the OD detector(outside test cell) into the test cell horns need 5 kV isolation. The proposed design features to satisfy this requirement should be described.

Closed: 5 kv isolation is not being provided. All annunciators are mounted to the test cell walls and do not contact any items that may be at NSTX-U potential.

Review	ID	Chit
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR14	Add visual indicator to accompany the siren when the O2 monitor has alarmed.

Closed: There are both audible and visual alarms on all 9 of the ODH monitoring annunciators.

Review	ID	Chit
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR15	Incorporate fixtures in your design to protect sampling heads from damage.

Closed: Specific fixtures are not being included in the design. Rather the heads are being placed in locations away from potential access and personnel traffic.



Review	ID	Chit
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR16	Calibration requires a certified O2 gas for 100% and 21%. The cal gas needs provision for controlled flow, and pressure. Not use of certified gas results in nuisance alarms.

Closed: The cal-gas solution is being bought from the manufacturer. This will be discussed at the FDR as part of the procurement discussion.

Review	ID	Chit
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR17	Add annunciation (light/sound) to South High Bay. Check/update requirements to include.

Closed: There is a O2 Detector Remote Annunciator in the South High Bay located at 105' elevation as defined in drawing AE9001.

Review	ID	Chit
Test Cell Radiation & Oxygen Monitoring PDR	TCRADOMPDR18	Need a method to alert the Control Room and possibly others (ESU?) if the oxygen monitoring system fails so that any necessary actions can be taken by the appropriate people.

Closed: The ODH signals are sent to the control room via the Torus System Vacuum and Gas PLC. This signal is documented in Drawing EA1500 Sheet 126. The status is displayed as part of the TVPS human machine interface (HMI).

## DVVR

Review	ID	Chit



DVVR	VFAPS02	The argon system and other gas systems would increase the probability of an oxygen deficiency condition in the cell. An ODH alarm system is an inexpensive improvement in personnel safety
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Closed: The ODH system was developed and the results of placing Oxygen deficiency monitoring and alarms systems were included and presented at the FDR. Drawing AE9001 provides the components locations and conduit plan.