USCMS HL-LHC ESH and QA REVIEW REPORT

REVIEW REPORT	Report No. 001

The Review Report Shall include at a minimum:

- The title of the item or system;
- A description of the item;
- Review Report Number;
- The type of review;
- The date of the review;
- The Charge to the Review Committee
- The names of the presenters;
- The names, institutions and department of the reviewers;
- The names of all the attendees (can attach sign-in sheet).

The report may contain:

- Findings/Observations – these are statements/items of general interest and require no response. (For example: There are 3 engineers and four designers working on this project)
- Comments – these items may require action by the design/engineering team, but a formal response is not required.
- Recommendations/List of Action Items – these are items that require formal action and closure in writing by the design team.

TYPE OF REVIEW: Internal Review of ESH and QA

Title of Review:	USCMS HL-LHC ESH and QA	
Presented By:	Mike Andrews	
Report Prepared By:	Mike Bonkalski, Betsy Dunn	Date: Nov. 29, 2018
Reviewers/Lab:	Mike Andrews (FNAL/LBNF), Mike Bonkalski (FNAL/ESHQ), Kevin Fahey (FNAL/LBNF), Betsy Dunn (ANL), Tom Barsz (ANL)	
Distribution:	Vivian O'Dell, Vaia Papadimitriou, T.J. Sarlina	
Attachments: Add links to location where pdf's are posted if wish to instead of attaching	☐ Review Slides ☐ Design Checklist ☐ Other ☐ Calculations ☐ Attendance ☐ Drawings	

Purpose of the Review:

The review will evaluate the ESH and QA aspects of the Project to assess readiness for the DOE mini CD-1 review. It also will evaluate the completion of recommendations associated with the previous DOE review completed in June 2018.

CHARGE ITEMS

Review Charge

1) Are the ESH and QA aspects of the project being properly addressed and is ESH and QA planning sufficient for this stage of the project?
    a. Yes. The project has a Quality Assurance Plan as required by DOE 413 QA Guide. The plan establishes QA roles and responsibilities, QA reviews and QA approvals, as well as QA requirements for individual subsectors and collaborative institutions. The QA Appendices were clearly-written, and the QA Activity Spreadsheet should be an effective method for ensuring that quality verifications are completed.

2) Are there ESH and QA resources assigned to the Project organization with defined roles and responsibilities?
    a. Yes, but as the Project proceeds the need for additional resources should be evaluated
3) Has the project established the flow-down of ESH and QA requirements to collaborating institutions?
    a. Yes
4) Is the documentation required by DOE O413.3b for CD-1 approval complete and in good order?
    a. Yes, but additional formatting of the content of the ISM Plan is necessary to clearly communicate expectations
5) Does the Preliminary Hazard Analysis Report (PHAR) address the known Project Hazards and present mitigation strategies?
    a. Yes, but should be evaluated by the current ESH Manager for completeness and accuracy
6) Has the Project satisfactorily responded to the ESH and QA recommendations from previous reviews?
    a. No, the Project still needs to address Recommendation #23. Also, some comments below are related to the ISM and QAP documents in Recommendation #22.

Introduction and outcome summary of the review:

Findings:

- The QA Plan is complete and the project team is working to complete the appendices for how the sub-projects will address the quality requirements.
- The ISM Plan and the PHAR have been developed.

- There are about 40 collaborating institutions on the project, covering both the DOE and NSF aspects of the work scope.

- Fermilab has a project electrical engineer, who is resourced at about 25%, to support the project; to date, there is no project mechanical engineer yet assigned, but the project team recognizes that it is likely that one will be needed as the project moves forward.

- The DOE scope of project responsibilities includes the new calorimeters, new tracker, trigger/HLT/DAQ, and MIP precision timing detector.

- Software QA plan of Fermi is flowed down to collaborators where they are creating firmwares

- Presently, CERN maintains a list of applicable codes and standards in their Document Center.

- The project team was recently updated to include an experienced professional ESH&Q Manager.

- The NEPA review was completed in Jan. 2018, and has been determined to be covered under a Categorical Exclusion.

- The project team stated there is minimal interaction between the component subsystems (i.e. calorimeter, tracker, endcap, trigger, MIP timing, etc), but there is interaction back to existing systems at CMS. CERN maintains a 3-D CAD drawing to ensure that all the various components fit together properly.

- Weekly project management meetings are held, which includes the project ESH&Q Manager. He is well-integrated into all levels of the project management team.

- Science requirements are documented in one spreadsheet and authored by the Project Scientist. The Science-Engineering and Engineering requirements are documented in another spreadsheet, per L2 sub-system.

- The NSF has adopted the HL-LHC CMS project's QA Plan.

- The project ESH&Q Manager is providing support to both DOE and NSF sites.

- There will be review and approval of QA/QC processes at institutions by the appropriate Level 2 Manager and the QA Coordinator, including site visits where necessary.

- There will be a designated QA contact at each institution, although it was noted that in general, these are not QA professionals.

- Use of a QA Field Audit Checklist will be implemented to ensure that institutions are adequately implementing the QA Plan.

- Subproject QA/QC activities are detailed in Subproject QA Activity Spreadsheets. These spreadsheets include WBS Number and Title, L2, L3, and/or L4 Managers, Institution, QA Coordinator, QA/QC Activity, Validation/Verification Activity, Inspection/Test Activities and Records. Project will be coordinating the spreadsheets for consistency.

- Findings from the field audit reports will be socialized in the weekly PM meetings and the weekly project office meetings.

Comments:

- The use of the QA Field Audit Checklist will be an effective method for implementing the project QA requirements at collaborating institutions. The project should consider adding checklist items related to preparation for shipping.

- The QA activity spreadsheets will be an effective method for implementing the project QA requirements; they clearly state what needs to be done, qualifications of personnel, etc. The plan to standardize the format of these QA Activity Spreadsheets should be completed.

- The terminology in the Site Field Audit Report should be updated to match Fermilab's issues management terminology (i.e. a "Finding" is actually a "non-conformance"). Also, consider how the report will be transmitted and communicated to the collaborating institutions.

- Consider whether the QA Activity Tracker spreadsheet could be brought to a level (i.e., QC Plan) to include a status column to capture when an item is complete. Presently, we understand that the status of activities are accounted for in the project schedule, but this may not be at a detail level.

- The number of site visits along with the creation and maintenance of QA documents may necessitate additional ESH&Q staffing resources. This will need to be continuously re-evaluated as the project progresses.

- Some sections in the QA spreadsheets are left blank. These areas are not fully developed yet and are thus, considered TBD, and should be notated as such.

- The ESH&Q presentations should include information relating to matrixed supplemental support from the ESH&Q section.

- Criteria for ESH production readiness visits was not defined as clearly as the QA requirements.

- Ensure that institutional ESH oversight is integrated into the HL-LHC CMS activities taking place at those respective institutions. The ESH&Q Manager should identify the ESH oversight for each institution.

- The ESH&Q Manager should consider including a slide addressing project Lessons Learned for the Directors and CD-1 reviews.

Recommendations:

- Develop a clear list of design codes and standards that are applicable to both the U.S. and CERN operations.

- The QAP needs to address the packaging and shipping requirements for components to be sent to CERN.

- The hazard analysis worksheets within the PHAR need to be reviewed by the ESH&Q Manager.

- The ISM Plan needs to be restructured to clarify collaborating institutions ESH requirements.

- Develop a set of ESH review criteria for institutional site visits.