



Closeout Presentation

Director's CD-3b Review of SLI-UUP

June 1-2, 2015

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Executive Summary

The focus of this Director's Review was to assess whether the SLI Utilities Upgrade Project (UUP) meets the DOE 413.3B requirements of Critical Decision CD-3b "Approve Start of Construction for Phase B", where Phase B is the final construction phase of the Project. As part of that assessment the Committee was requested to respond to 13 Charge Questions, which are included in this closeout. The committee has observed great progress in the areas of Technical, Schedule, Cost, ESH&Q, and Management since the last Director's CD-2/3a Review in October 2014.

Technical

The SLI-UUP scope of work consists of upgrades to the High Voltage Electrical (HV) and Industrial Chilled Water (ICW) systems. The design documents (drawings and specifications) are complete and have gone through independent design reviews. All recommendations from prior reviews and all comments from the independent design review of the ICW system have been addressed. The independent design review report for the HV system was not available to the committee at the time of this Review. The committee found that the overall design documents appear to be at the appropriate level for CD-3b, with the caveat that any comments included in the HV independent design review be assessed and addressed.

Cost / Schedule

The project has assembled a complete and thorough cost summary which will soon be validated when the bid results are received in early June. There appears to be adequate contingency at this stage of the project. In addition there is a detailed plan in place to utilize appropriate amounts of contingency at different times as the project progresses for added improvements to the project scope.

The project has prepared a complete and detailed schedule that captures the scope of work that will be completed in time to accomplish CD-4. The project has been implementing EVM and uploading data to PARS II.

ESH&Q

The Project has strengthened their team with adding Mike Andrews since the last Director's Review. The project team has properly addressed ESH&Q aspects for this stage of the project. The project has demonstrated strength in safely managing excavation and trenching work.

Management

SLI-UUP has a strong experienced management organization that is fully in place. The management team has set up regular meetings to create strong communication at all levels of the laboratory. The projects risk management approach is thorough capturing all expected risks that could be encountered during a civil construction project of this magnitude. The project has updated required project management documents addressing prior Committee comments. Some of these documents will need to be signed off prior to the DOE IPR. The EVMS process is in place and is in an early stage of maturity with only two months of reporting after receiving DOE CD-2 approval. Some additional experience and assistance is needed to tune the process.

The Review Committee had found only a few areas that require some additional work prior to the DOE CD-3b IPR in August of this year. With addressing the Committee's comments and recommendations the Project is ready to proceed to the DOE IPR.

1.0 Introduction

A Director's CD-3b Review of the Utilities Upgrade Project was held on June 1-2, 2015 at the Fermi National Accelerator Laboratory. The purpose of this review was to determine if the project meets the Critical Decision (CD) 3b (CD-3b, Approval to Start Construction Phase B) requirements as specified in DOE O 413.3B. To meet the design requirements for CD-3b the design must be at the level of final or near final design.

Additionally, the committee assessed the Project's progress on addressing the recommendations from the Director's and DOE CD-2/3a reviews

The assessment of the Review Committee is documented in the body of this closeout presentation, which consists of two major sections. The first section provides assessments of design and management. Each area within this first section is organized by Findings, Comments and Recommendations. Findings are statements of fact that summarize noteworthy information presented during the review. Comments are judgment statements about the facts presented during the review and are based on reviewers' experience and expertise. Comments are to be evaluated by the project team and actions taken as deemed appropriate. Recommendations are statements of actions that should be addressed by the project team. The second section of this presentation includes the committee's answers to the review charge questions.

The UUP Project is to develop a response to the review recommendations and present it to the Laboratory Management and regularly report on the progress during the Project's Project Management Group Meetings (PMGs) and at the Performance Oversight Group (POG). The recommendations will be tracked to closure in the iTrack system. Documented status of the project's resolution of the recommendations will need to be available for future reviews.

2.0 Assessment of Technical Design Review

2.1 High Voltage (HV)

Primary Writer: Jerry Leibfritz

Contributor: Jeff Sims, John Reid

Findings

- All designs for the project scope are complete. The Master Substation prefabricated control building and switchgear are under contract (CD-3a).
- All drawings are complete for the Threshold and Objective KPP's and are out for bid (CD-3b). Bids are due on 6/15/15.
- Objective KPP's are well defined, have been prioritized, and detailed construction drawings documenting the upgrades are complete.
 - Bid Options 1A-1F, the replacement of oil switches with new air switches and CHL.
 - Bid Option #2, replacing the 345 kv Oil Circuit Breaker with new SF6 Gas Circuit Breaker.
- The HV independent design review report (IDR) was received by the laboratory last week and was not available for review by this Committee.
- A switchover of the accelerator complex to the Kautz Road Substation was successfully executed and tested for several months.
- Value engineering exercises resulted in the relocation of the Master Substation Control building and the installation of a blast-wall between transformers.
- Arrangements to disconnect the Master Substation from the grid have been scheduled with Com-Ed for 9/8/15, and the project team is working with the Accelerator Operations Dept. to schedule the switchover of power from Master Substation to the Kautz Road Substation prior to this date.
- A Commissioning Agent has been retained.

Comments

- All recommendations from the previous CD-2/3a review have been addressed.
- Completion of the Objective KPP scope enhancement designs and inclusion as contract options is a best practice. Ensure the contract options have appropriately identified potential award timeframes, to avoid added negotiation in the future.
- The HV L2 Associate Project Manager should discuss the included safety considerations of the design, such as remote racking and exterior vented arc flash ducts, in his IPR presentation.

- Closely monitor progress of the ordered prefab building and civil construction site preparation to meet scheduled delivery of prefab building (Feb 15, 2016) to avoid delays & added costs.

Recommendations

1. Any recommendations from the Independent Design Review should be reviewed by a subset of this review committee and the UUP project management.

2.2 Industrial Cooling Water (ICW)

Primary Writer: Jerry Leibfritz

Contributor: Jeff Sims, John Reid

Findings

- All drawings are complete for the Threshold and Objective KPP's and are out for bid. Bids are due on 6/15/15.
- Objective KPP's are well defined, have been prioritized, and detailed construction drawings documenting the upgrades are complete.
- An independent design review of the project has been completed.
- Value engineering exercises resulted in the use of butterfly valves over gate valves which led to a significant cost savings.
- A traffic control plan has been developed to deal with the many logistic issues caused by ICW installation across roadways and parking areas.
- The duration of the ICW project is expected to be 18 months and is on the critical path for the overall project schedule

Comments

- All recommendations from previous reviews and all comments from the independent design review have been addressed.
- The design has matured since the CD-2/3a review, resulting in cost savings and design improvements, which provide greater flexibility and increased future capability of the system.
- Completion of the Objective KPP scope enhancement designs and inclusion as contract options is a best practice. Ensure the contract options have appropriately identified potential award timeframes, to avoid added negotiation in the future.
- The ICW L2 Associate Project Manager should include a description of the sequence of work and explain how they will maintain operation during construction, in his IPR presentation.
- The project is communicating with regulatory agencies regarding possible 401 and 404 permit applicability of stream and ditch crossings along road A1. The project has identified directional drilling as a possible alternative. The committee suggests clarifying the installation approach that reduces schedule risk related to permits, prior to the IPR.
- Consider phasing the ICW installation adjacent to the pi-poles to be during the 345kv de-energization, to simplify excavation equipment movement and reduce safety risk exposure.
- The project team currently estimates approximately 18 months for the ICW installation, which drives the project critical path. The project should be prepared to react to potentially

more aggressive construction schedules for the ICW work, if prospective GC's consider staffing the excavation work with more crews and equipment. Additional crews may also drive the need for additional field oversight.

Recommendations

2. If a 401 or 404 permit is required for portions of the open cut excavation along Road A1, consider revising the base scope to an alternate installation method in those areas that would not require a regional permit, prior to the IPR.

3.0 Cost, Schedule, ESH and Project Management

3.1 Cost

Primary Writer: Jeff Reiser

Contributor: Mike Gardner

Findings

- Total project cost is \$36M (PMB BCR005 of \$31.371M with contingency of \$4.628M)
Total project cost includes escalation, overheads, and contingency.
- Project has received all of its funding, critical decision approvals are required for the release of funds to the project.
- A scope enhancement plan has been developed indicating the use of un-encountered risk contingency and reduction in contingency need as construction progresses. The initial project baseline had \$5.272M in contingency of which \$2.276M is risk based expected value.
- Monte Carlo analysis was run on the risk register validating the risk uncertainty to an 80% confidence on all risks.
- There have been five baseline changes from the initial baseline up to this review with a sixth processed in May. The cumulative change is a reduction of \$941k from contingency.
- Project cumulative through April: BCWS=\$4.536M, BCWP=\$4.501M, ACWP=4.290M, CPI=1.05
- The A/E provided an estimate, an independent cost estimate was developed, and the two were reviewed and combined into a consolidated estimate.
- BOEs are developed and the direct costs seem to match the values in the P6 schedule
- The master substation control building prefabrication contract has been awarded as a part of the CD-3A.
- Bids for the high voltage construction and industrial chilled water construction are out and are expected to be received on June 15, well ahead of the CD-3B IPR.
- Existing contracts are cost loaded based upon the contract schedule of values.

Comments

- RAM values inconsistent with the BOE and schedule. Posted RAM was based on the initial baseline plus a correction for OPC. The project provided a revised RAM document consistent with BCR005.
- The project stated that they will be analyzing ETC. Currently the EAC=BAC, but will incorporate ETC as the construction phase starts.

- The consolidated estimates were developed using the more conservative data from the A/E estimate and the ICE estimate.
- Two months of VAR's have been prepared. Attention should be given to the quality of the variance analysis and recommended corrective action.
- The project did not have a log tracking the corrective action to the VARs, see Management section for recommendation.
- Project change log does not clearly define the added OPC in BCR005.
- Approximately \$9.3M of the \$29.6M BAC is EDIA. This yields a soft cost to hard cost ratio of 46% which is higher than the traditional 20% to 35%. The project team should be prepared to explain this at the IPR.
- Based on the project stage the contingency appears to be adequate.
- The project team has done a commendable job on the thorough development of the scope enhancement plan.

Recommendations

None

3.2 Schedule

Primary Writer: Jeff Reiser

Contributor: Mike Gardner

Findings

- A resource loaded schedule has been developed with 190 activities spanning from October 2013 to January 2019 (L1 Project Completion)
- The schedule has 300 logic relationships. Only one activity is without a predecessor and ten activities are without successors.
- M&S costs or budgeted hours are included on just over 50 activities.
- Schedule contingency is 18 months from L2 CD-4 to L1 Project Complete, risk based expected value is 12.24 months.
- Monte Carlo analysis was run on the risk register validating the risk uncertainty to an 80% confidence on all risks.
- Project cumulative through April: BCWS=\$4.536M, BCWP=\$4.501M, ACWP=4.290M, SPI=0.99
- The critical path has been defined to go through the ICW piping installation.
- The Electrical work has a four month cushion from the critical path.

Comments

- Construction activities are planning packages that will be converted to work packages with the award of the construction contracts.
- Some inconsistency exists between the baseline and the status schedule. Milestone descriptions in the status schedule have not been updated to the Fermilab standard.
- There are some activities with generic names that occur more than once in the schedule (Fermi policy). The description Planning Package still listed in the activity names for two activities that have been converted to work packages.
- Task types are not consistent with the PMTs, there are LOE activities that are task dependent in the schedule.
- Best practice scheduling is that only one activity without a predecessor and one activity without a successor.
- It was noted that there was a Lag document which was not available. Lags should be defined either in the note field or as a separate document.

Recommendations

3. Perform some general housekeeping schedule improvements discussed in the comments that should be made to the schedule.

3.3 ES&H

Primary Writer: John Benkert

Findings

- The Fermilab Integrated Safety Management (ISM) Program has obtained certification and is a registered Occupational Health & Safety Assessment Series 18001 Plan.
- The project team has extensive experience and the training required to support and safely oversee the planned excavation and trenching work associated with this project.

Comments

- With the High Voltage Project, for tasks involving lifting such as removal of the capacitor tree, demolition of the communications tower, and the placement of the control building, the hazard analysis plans need to consider the development of lift plans detailing the specific equipment used and the sequential steps employed to conduct each lift without incident.
- The review of the subcontractor submittals needs to assure that the recently revised OSHA 1926 regulations addressing confined space procedures have been incorporated.
- The Fermilab construction inspectors should be refreshed in their duties of the need to also view equipment installed to assure it meets the specification requested.
- Fermilab, in conjunction with the subcontractors, needs to develop a pedestrian, motor vehicle, and bicycle (including visitor ride-throughs) construction avoidance plan that can be updated as needed and publicized extensively within the Fermilab community.

Recommendations

None

3.4 Project Management

Primary Writer: Jason Budd

Contributor: Dean Hoffer

Findings

- The project has completed 2 monthly reporting cycles (March and April) since receiving DOE CD-2 approval in February 2015. This includes Earned Value Management reporting and inputting the data into PARS II. Two VARs have been processed. No Corrective Action Log was available.
- A detailed organization chart was presented. The appropriate personnel required to support the project were identified. No critical positions are TBD or unassigned (aside from the general contractor that will be assigned once ESAAB approval is given and the construction contract awarded).
- Contingency is tied to the retirement of risks. As risks are retired there is a clear plan for when to execute objective KPPs (e.g. scope enhancements.)
- ~\$2.3M of contingency required based on risk registry (known unknowns); total project contingency is ~\$5.3M to address known unknowns and unknown unknowns.
- Procurement approach is a Design-Bid-Build which will result in a fixed price contract; including fixed price/unit cost for the ICW backbone piping
- Project communications plans are in place. This includes regular project management meetings at the project, operations, science and laboratory management levels.
- Field changes are going to be tracked during the month and a BCR will be done monthly to capture all the changes during the time period that meet the requirements of the change control process.
- The project has updated multiple documents for CD-3b review to incorporate previous review recommendations

Comments

- Execution of objective KPPs (e.g. scope enhancements) will result in construction completion using some portion of the 18 months schedule float. Should monitor during the project the no/go dates of the remaining scope enhancements and eliminate those that cannot be completed without impacting the L1 CD-4 date.
- Using the term “scope enhancements” or “alternates” interchangeably may be confusing to some reviewers; it needs to be clear when presented these items are the approved objective KPPs identified within the PEP.
- The project should be commended for effectively implementing the base Earned Value Management processes at this early stage. However, further development of their processes is needed to be in full compliance with the Lab’s certified EVMS. Specifically, the project needs to ensure that VAR write-ups thoroughly evaluate/document the root cause of the

variance, and identifying corrective actions to prevent or at the least minimize reoccurrence. A best practice is for the project to create a Corrective Action Log and utilized it to track VAR corrective actions to closure.

Recommendations

4. The project needs to confirm which updated documents require approval signatures prior to the DOE CD-3b review.
5. In preparation for the DOE IPR review in August, the Office of Project Support Services should conduct an internal peer assessment on the UUP Project's implementation of Earned Value Management to confirm it is in compliance with the Lab's Certified System.

4. Charge Questions

Technical

4.1 Are final designs for all scope, including Phase-B, and the respective design review reports complete? Similarly, is the CD-3b scope towards achieving the Key Performance Parameters (KPPs) sufficiently defined and documented?

Yes, the final designs are complete for the ICW portion of the project and all recommendations from previous reviews and the independent design review have been addressed.

No, the HV design is complete, but the independent design review report for the HV upgrade was not available at the time of this review. Any recommendations from the independent design review should be assessed and addressed appropriately prior to the IPR.

Yes, the CD-3B scope towards achieving the KPP's is sufficiently defined and documented.

4.2 Is the final design sufficiently mature such that the Project can initiate procurements and start construction for Phase B scope? What outstanding design risks remain? For those elements of the design that are not yet finalized, has the Project shown that there are no major risks or issues that impede a clear path to a final design?

Yes - The final design is sufficiently mature to initiate Phase B procurements (pending the results of the HV independent design review). No risks were identified that would impede achieving final design.

Cost/Schedule/Funding

4.3 Does the resource-loaded schedule include the Project's full scope of work? Is the schedule realistic and achievable?

Yes, the base project scope is included in the resource loaded schedule and the project has a plan to incorporate work packages with the award of the construction contracts.

4.4 Are the cost and schedule estimates complete and credible? Do they include adequate scope, cost and schedule contingency? Is CD-4 achievable with the Project's risks and within the DOE approved Total Project Cost?

Yes, the project has conservative consolidated cost estimates based on the A/E estimate and an independent cost estimate. The Monte Carlo analysis validates the risk schedule and cost contingency.

4.5 Are the Phase B contract documents sufficient to support starting Phase B work? Are bids or quotes already in hand? If so, are the base bids or quotes within the cost estimates and consistent with the Project Execution Plan (PEP)?

Yes, the bid solicitation documents are sufficient to support starting Phase B work. No, the bid quotes have not been received and are due June 15, 2015. This will allow enough time to review them before the DOE review in August.

4.6 Is a contingency spend-down plan developed and executable by CD-4?

Yes

Are the proposed scope enhancements prioritized, within the objective KPPs, and consistent with the approved PEP?

Yes, the project has a plan which includes fourteen potential alternates. Six alternates have been designed and are being priced as part of the bid process. The project has a plan which includes trigger dates for starting four of the alternates if the time and funding is available.

Management

4.7 Has the Project implemented Risk Management by identifying risks, performing a risk assessment (qualitative and quantitative) and developing mitigation plans?

Yes

Are there any interdependencies with other projects or significant research operations?

Yes

If so, have they been identified and are there plans in place to mitigate risk for the CD-3B scope?

Yes, mitigation plans identify transferring risk to Laboratory. Operational plans include installation of new systems in parallel to existing systems and transferring over once commissioning is completed minimizing impact to scientific operations.

Does the risk register reflect both Phase B scope and the proposed scope enhancements?

Yes, Phase B scope and scope enhancements carry similar risks so are not called out separately. The retirement date of the risks is tied to if/when the scope enhancements are executed and completed.

4.8 Has the Project updated required project management documents per DOE Order 413.3B for CD-3B and per the Fermilab Project Management System? Are the Acquisition Strategy and Acquisition Plan updated and approved?

Yes, the Acquisition Strategy and other PM documents have been updated. The project should verify if these require updated signature approval.

4.9 Are the Project organization and staffing levels adequate to initiate Phase B construction and manage the work to achieve CD-4?

Yes

4.10 Are ESH&Q aspects being properly addressed at this stage?

Yes

Is the Hazard Analysis Report issued and are the permits in place to allow CD-3B scope to commence?

Yes, provided directional boring is used in place of open trenching at those wetlands locations requiring a permit, if a permit is deemed necessary.

4.11 Does the Project's Earned Value Management process for monthly progress reporting satisfy DOE and Laboratory requirements?

Yes, with some additional exercising of the process and support from a peer assessment. The project is in the early stages of reporting EVMS. With a few more monthly cycles and input from a peer assessment, the process will be robust enough to meet DOE and Laboratory requirements.

4.12 Has the Project appropriately addressed the recommendations from prior reviews?

Yes. All recommendations appear to have been satisfactorily addressed from prior reviews (Refer to UUP CD2/3a IPR Recommendation Tracking Table).

4.13 Is the UUP Project ready for a DOE CD-3B review in August?

Yes, pending the implementation of the recommendations and consideration of the comments.

4.0 Appendices

Charge

Agenda

Review Committee Contact List and Writing Assignments

Appendix A
Charge
Director's CD-3b Review of SLI-UUP
June 1-2, 2015

20-May-2015

To: Mike Lindgren, Chief Project Officer
From: Nigel Lockyer, Director
Subject: Director's CD-3B Review of SLI-UUP

Please organize and conduct a Director's Review to assess whether the Utilities Upgrade Project (UUP) meets the DOE 413.3B requirements of Critical Decision CD-3B "Approve Start of Construction for Phase B", where Phase B is the final construction phase of UUP. UUP received CD-2/3A Approval on February 18, 2015, which approved the performance baseline and the pre-procurement of the Master Substation Control Building. The project is preparing for a DOE CD-3B Review on August 11-12, 2015. The Director's CD-3B review should focus on the Phase B scope and proposed scope enhancements.

The review committee should respond to the following questions:

Technical

1. Are final designs for all scope, including Phase-B, and the respective design review reports complete? Similarly, is the CD-3B scope towards achieving the Key Performance Parameters (KPPs) sufficiently defined and documented?
2. Is the final design sufficiently mature such that the Project can initiate procurements and start construction for Phase B scope?

Cost/Schedule/Funding

3. Does the resource-loaded schedule include the Project's full scope of work? Is the schedule realistic and achievable?
4. Are the cost and schedule estimates complete and credible? Do they include adequate scope, cost and schedule contingency? Is CD-4 achievable with the Project's risks and within the DOE approved Total Project Cost?
5. Are the Phase B contract documents sufficient to support starting Phase B work? Are bids or quotes already in hand? If so, are the base bids or quotes within the cost estimates and consistent with the Project Execution Plan (PEP)?
6. Is a contingency spend-down plan developed and executable by CD-4? Are the proposed scope enhancements prioritized, within the objective KPPs, and consistent with the approved PEP?

Management

7. Has the Project implemented Risk Management by identifying risks, performing a risk assessment (qualitative and quantitative) and developing mitigation plans? Are there any interdependencies with other projects or significant research operations? If so, have they been identified and are there plans in place to mitigate risk for the CD-3B scope? Does the risk register reflect both Phase B scope and the proposed scope enhancements?
8. Has the Project updated required project management documents per DOE Order 413.3B for CD-3B and per the Fermilab Project Management System? Are the Acquisition Strategy and Acquisition Plan updated and approved?
9. Are the Project organization and staffing levels adequate to initiate Phase B construction and manage the work to achieve CD-4?

10. Are ESH&Q aspects being properly addressed at this stage? Is the Hazard Analysis Report issued and are the permits in place to allow CD-3B scope to commence?
11. Does the Project's Earned Value Management process for monthly progress reporting satisfy DOE and Laboratory requirements?
12. Has the Project appropriately addressed the recommendations from prior reviews?
13. Is the UUP Project ready for a DOE CD-3B review in August?

In responding to the questions above, the committee should present findings, comments, and recommendations at a closeout meeting with the UUP Project and Fermilab management. A written report is requested within two weeks after the completion of the review.

The committee is asked to present a draft of their report at the review closeout and to issue the final report within one week of the review's conclusion.



Nigel Lockyer
Director
Fermi National Accelerator Laboratory

cc:

T. Meyer
R. Ortgiesen
K. Collins
R. Alber
M. Kaducak

Appendix B
Agenda
 Director's CD-3b Review of SLI-UUP
 June 1-2, 2015

Monday, June 1, 2015

EXECUTIVE SESSION – One East (WH1E)

8:00 – 8:45 AM 45 Executive Session Dean Hoffer

OVERVIEW PLENARY SESSION – One West (WH1W)

8:45 – 9:00 AM 15 Welcome and Fermilab Context Kent Collins
 9:00 – 9:45 AM 45 Project Overview Russ Alber
 9:45 – 10:00 AM 15 Procurements Jim Hohbein
 10:00 – 10:15 AM 15 ES&H Mike Andrews

10:15 – 10:30 AM 15 BREAK – Outside One West (WH1W)

10:30 - 11:15 AM 45 WBS 2 High Voltage Randy Wielgos
 11:15 – 12:00 PM 45 WBS 3 Industrial Cooling Water Chuck Federowicz

12:00 – 1:00 PM 60 LUNCH – 2nd Floor Cross-Over

BREAKOUT SESSION DISCUSSIONS – Small Dining Room (WH1SW) and Confessional (WH5E)

1:00 – 1:45 PM 45 Management, Cost & Schedule Russ Alber
 1:45 – 2:30 PM 45 ESH & Construction Mike Andrews, Ron Foutch
 2:30 – 3:15 PM 45 WBS 2 High Voltage Randy Wielgos

3:15 – 3:30 PM 15 BREAK – Inside One East (WH1E)

3:30 – 4:15 PM 45 WBS 3 Industrial Cooling Water Chuck Federowicz
 4:15 – 5:30 PM 75 Executive Session – One East (WH1E)

Tuesday, June 2, 2015

8:00 – 8:45 AM 45 Answers to Day 1 Questions – One East (WH1E)

8:45 – 10:15 AM 90 Executive Session / Report Writing

10:15 – 10:30 AM 15 BREAK – One East (WH1E)

10:30 – 12:00 PM 90 Executive Session / Report Writing (Box Lunch provided to Reviewers)

12:00 – 1:00 PM 60 Closeout Presentation – Curia II (WH2W)

1:00 PM Adjourn

Appendix C
Review Committee Contact List and Writing Assignments

Director's CD-3b Review of SLI-UUP

June 1-2, 2015

Chairperson

Dean Hoffer, FNAL dhoffer@fnal.gov 630-840-8898

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