**Communications regarding UCAR RFP R15-19374 (NWSC-2)**

Revision History:

Revision #1: 10 April 2015 (Sections 1, 2 & 3)

Revision #2: 17 April 2015 (Section 4)

Revision #3: 24 April 2015 (Section 5)

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# Overview

This document contains UCAR communications, prospective Offeror questions, and UCAR responses related to the UCAR RFP R15-19374 (NWSC-2) subsequent to its release on Friday, April 3, 2015. This document will be revised and reposted to the NWSC-2 website (<https://www2.cisl.ucar.edu/NWSC-2>) as often as necessary. UCAR will inform registered Offerors of updates, but Offerors should also periodically check the website for new updates.

# Conventions

Each revision of this document is numbered sequentially and contains Offeror questions or requests for clarification and UCAR responses or communications with Offerors. Each question and its corresponding response is formatted as shown below, providing a unique question identifier and a brief description of the question, the date that UCAR received the question, and UCAR’s response to the question.

Example:

## Example brief description of question

dd Mon yyyy The text of Offeror’s question will appear here. It may be stated verbatim or modified slightly to remove suggestion of Offeror identity or irrelevant attributes of the question.

UCAR’s response to the question immediately follows.

# Q&A Revision #1, issued April 10, 2015

The following questions were received by UCAR between April 3, 2015, and April 9, 2015.

Offerors are reminded that items identified in Section 3 of the NWSC-2 Technical Specifications are target design specifications. Offerors should refer to the introductory paragraphs of Section 3 for how to address items not meeting those specifications.

## Open Ports/Leafs in Existing InfiniBand Switches

April 6, 2015 Can you provide details on open ports and unpopulated leafs on Yellowstone's Mellanox SX6536 switches and GLADE's Mellanox SX6512 switch?

The GLADE SX6512 switch contains 5 leafs and 7 open leaf slots.  Leafs 1, 2, 3 and 4 each have 4 unused ports and leaf 5 has 12 unused ports.

Yellowstone’s nine SX6536 switches each contain 29 leafs and 7 open leaf slots. All leaf ports are fully populated with the exception of leaf 29. The number of open ports available on leaf 29 of these switches is: Rack H70: 13, Rack H71: 15, Rack H72: 15, Rack H73: 11, Rack H74: 13, Rack H75: 13, Rack H76: 11, Rack H77: 13, Rack 78: 13.

Offerors are advised that this is the current status and not a commitment of what will be available in these switches when NWSC-2 is deployed.

## Software-only Proposals

April 9, 2015 Would UCAR entertain proposals solely for software products?

No, UCAR will not accept a proposal that bids only software. NWSC-2 is for the acquisition of HPC and PFS resources and a proposal that does not bid at least one of those resources will be considered unresponsive. UCAR may decide to purchase software outside of the NWSC-2 award.

## Plenum-rated Cables

April 9, 2015 Section 3.11.4 of the RFP’s technical specifications asks for all cables to be Plenum rated. Is this an absolute requirement?

Requirement 3.11.4 is intended to address cables that are not contained wholly within the HPC system or storage racks. All cables that run outside the systems (e.g., under the floor or in overhead trays) should be plenum rated.

# Q&A Revision #2, issued April 17, 2015

The following questions were received by UCAR between April 10, 2015, and 12:00 MDT April 16, 2015.

## Yellowstone Job Launch Times

April 10, 2015 Section 3.2.7.2 of the RFP’s technical specifications states “*The proposed job scheduler and resource management subsystem shall support an efficient mechanism to launch applications at sizes up to full scale. The Offeror shall describe the factors (such as executable size, number of jobs currently running or queued, and so on) that affect application launch time. The Offeror shall describe expected application launch times and how the factors noted increase or decrease the launch time.*” There is no description of the application launch performance of the current Yellowstone environment in tables 1, 2, or 3. Will UCAR provide this information?

No. UCAR does not plan to release this information.

## WRF Performance Reporting

April 10, 2015 There was a discussion in the community about 5 years ago that measuring WRF on a per-core basis can be misleading. At that time, there was an agreement to provide CONUS 2.5km benchmark results on socket counts in addition to core counts. Here are examples from 2010: <http://www2.mmm.ucar.edu/wrf/WG2/benchv3/2_5KM_Results_20100416core.htm> and <http://www2.mmm.ucar.edu/wrf/WG2/benchv3/2_5KM_Results_20100416sock.htm>. How should the WRF benchmarks be reported today? Provide results based on core count (even if they are misleading about actual performance) and/or provide results based on exact socket counts?

Offerors should submit the WRF benchmark results in accordance with the benchmark instructions (RFP Attachment 2 NWSC-2 Benchmark Instructions) and benchmark spreadsheet (RFP Attachment 3 NWSC-2 Benchmark Results Spreadsheet) available from the NWSC-2 procurement site. Per those instructions, cores should be fully-subscribed on participating nodes. The Offeror may optionally return results for additional configurations and is encouraged to do so if such results showcase an important performance aspect of the proposed system.

## Proposal Page Count

April 10, 2015 The NWSC-2 RFP, Section 2.4, states that the total page count for the combined Technical and Business/Price volumes of the Offeror’s response shall not exceed 400 printed pages. Section 2.4.1, #8 requires that if the Offeror takes exception to any of the terms and conditions of the sample Subcontract documents, they must be provided in the proposal as a change-tracked document. If an Offeror takes exception to these documents, potentially they could lose more than 40 pages of page count for this purpose, thus giving another Offeror that takes few (or no) exceptions to gain an advantage. Would UCAR consider excluding redlines (change-tracked edits) to the sample Subcontract from the 400-page page count?

UCAR prefers that proposals not exceed 400 pages, including redlines.

## Redlined Terms & Conditions: Pricing Tables

April 10, 2015 Section 2.4.1 of the NWSC-2 RFP requires that all pricing information be provided in an Excel spreadsheet. We note there are pricing tables contained in the sample Subcontract. Who is responsible to fill out the pricing tables in the sample Subcontract? Should they be included in any redlines (change-tracked edits) of the sample Subcontract?

The pricing tables in Article 5 and Article 7 of the sample subcontract will be constructed during subcontract negotiations. Offerors need not include pricing in the redlined Attachment 5 Sample Subcontract Terms & Conditions.

## Minimum Pricing

April 10, 2015 Section 2.4.1 of the RFP requires a statement that the prices quoted do not exceed the prices charged to all other customers, including the U.S. Government (e.g. GSA) for like or comparable quantities and conditions for sale. This type of language is extremely broad and is impossible to comply with. For a large company, there is no way to ascertain prices charged to other customers compared to prices proposed or charged to UCAR, either retroactively or prospectively. Since this is a competitive procurement, the bidding process itself should assure UCAR of the best prices possible; therefore, would UCAR consider deleting the requirement for this statement?

No. UCAR will not remove this statement. Offerors should make their best effort to provide the pricing information as requested.

## Multiple Awards

April 10, 2015 Section 3 of the RFP states that one or more awards will be made to the highest rated, most responsive, responsible Offerors whose proposal will be the most advantageous to UCAR. Does UCAR plan to split up the procurement such that different items may be awarded to different Offerors? Please clarify UCAR’s intent?

UCAR has no preconceived intent. This language is included to provide UCAR the flexibility to award HPC and PFS portions of the NWSC-2 systems separately should UCAR, upon review of proposals, consider that to be the most advantageous solution. Additionally, UCAR may elect to not exercise any of the Technical Options in Section 4 of the NWSC-2 Technical Specifications.

## Cable Trays

April 10, 2015 Section 3.11.4 of the RFP’s Technical Specifications states that all NWSC-2 system power cabling and water connections shall be below the access floor. All other cabling (e.g. system interconnect, administrative networking) should be above floor. The systems shall be provided with cable trays or cable containment integrated with and spanning between the system cabinetry for the system interconnect and networking cables. All cables shall be plenum rated. (1) Will NCAR provide ceiling-supported cable tray traversing the two data modules for the connection of storage cables from the solution system in Module A to the solution storage in the Storage Area in Module B or must the vendor provide and install that tray? (2) Is the storage solution vendor required to provide and install overhead cable tray for the new parallel file system cluster or will NCAR be providing them because of their use of the hot air containment?

(1) UCAR will provide overhead cable tray(s) to carry cables between the HPC system in Module A and all equipment placed in Module B. (2) UCAR will provide cable tray(s) and hot air containment, if necessary, for the NWSC-2 PFS solution.

## As-is and Optimized Benchmark Results

April 13, 2015 In section 4.5 of the NWSC-2 Benchmark Instructions (As-is and Optimized Benchmark Results) it appears that any set of “compiler flags and runtime environment settings” can be designed as a “base set” and used for the “as-is” run as long as the numerical validation criteria is met. This would imply that the “optimized” configuration would probably consist of source code changes only despite language referring to “compiler flags and run-time settings”. In other words, there would appear to be no reason not to use all available “compiler flags and runtime environment settings” for the “as-is” results. Can you confirm that this is correct?

This is a correct interpretation; as long as the set of compiler flags and runtime environment settings result in the benchmark passing numerical validation.

## MPAS-A Benchmark Instructions

April 13, 2015 Regarding the benchmark instructions available from <https://www2.cisl.ucar.edu/hpc_benchmarking> for MPAS-A, the verification requirement is to match “to 6 decimals”. Does this mean that you want a total of 6 decimal digits to match, 2 digits to the left of the decimal point and 4 digits to the right of the decimal point?

Yes.

## 24x7 Telephone Support

April 13, 2015 In reference to Technical Specification 3.12.6 Problem Reporting and Resolution Service: the Offeror shall provide 24x7 telephone and web-based problem reporting, ticketing, and resolution services. Please clarify what portion of the 24x7 telephone support is to be provided by live answer support personnel as opposed to electronic problem reporting, etc.

UCAR’s interest is for the Offeror to provide information on what services would be available for the proposed level of support. This should include whether and/or when the Offeror provides live escalation based upon problem criticality. In any event, support should be adequate for ensuring that the reliability and availability requirements are met as described in Section 3.7 of the NWSC-2 Technical Specifications.

## Maintenance and Support Options

April 13, 2015 In reference to Technical Specification 4.8.1 Maintenance and Support Options (specifically 4.8.1.2 and 4.8.1.3): for those maintenance and support options that include 9 hours by 5 days a week PPM, please clarify the required response time (e.g., 4 PPM hours or Next Business Day)?

UCAR presumes that a 9x5 PPM has a next business day response time. The Offeror’s proposal should state the proposed response times and if response time options are available, e.g. based upon problem criticality.

## NWSC AutoCAD

April 14, 2015 Can an AutoCAD Release 2014 file of the floor layout drawing of the Technical Specification’s Figure 3 be made available or sent to bidders? Can layers be included that show such details as existing overhead cable trays, and the height of those trays?

AutoCAD files of the NWSC facility will not made available on the publicly-accessible NWSC-2 RFP website. Offerors who require such files should request them from Alison Propes (apropes@ucar.edu). The existing cable trays have an ADC 4”x24” Fiber Tray suspended above a Chatsworth 24” Ladder. The ladder is used for copper cables. The ladder is 9’ 3” above the floor and base of the Fiber Tray is 9’ 10” above the floor. Offerors should note that these dimensions and layout should not be taken as a commitment for what may be deployed in Module A, which is the planned location for the NWSC-2 HPC system.

## 2x Yellowstone Sustained Equivalent Performance (YSEP)

April 15, 2015 The Technical Specification states “…The NWSC-2 system must meet or exceed the target minimum Yellowstone Equivalent Sustained Performance (YSEP) at acceptance. The target is a minimum of a 2x increase over the Yellowstone platform [2].” In the UCAR RFP, Section 1.1, Scope of the NWSC-2 Procurement, it states, “The system must provide a significant upgrade in computational capabilities, with a target increase of at least 2 times greater than the sustained performance of NCAR’s current Yellowstone system [1].” Per these statements, it is unclear whether meeting a 2x increase over the Yellowstone platform is mandatory and must meet or exceed the 2x requirement, or is a non-mandatory target requirement. Can UCAR provide clarification as whether meeting the target minimum YSEP of a 2x increase over the Yellowstone platform is a mandatory or target requirement?

All specifications in Section 3 are considered target requirements. Those that are quantitative, such as YSEP, are estimated based on the projected computational demands of UCAR’s scientific community in the NWSC-2 production timeframe. The extent to which Offeror proposals exceed, meet, or do not meet these specifications is therefore an important consideration in the proposal evaluation process.

## LTD Equipment

April 15, 2015 Section 2.20 of the RFP states “The LTD will be conducted by the Offeror … to the extent possible, on equipment and with products identical in configuration to the Offeror’s proposed NWSC-2 solution.” Given the delivery of the system is not until Fall of 2016, some of the major components (processor nodes, interconnect, high speed storage) will not be available for a summer 2015 Live Test Demonstration. Would UCAR clarify this requirement?

As noted in 2.20, “Should an LTD be conducted, the Offeror will be expected to develop, in consultation with UCAR, a schedule and itemized test plan which shall include a detailed description of the equipment and products that are to be used, portions of the NCAR benchmark applications, and other tests to be performed by the Offeror and UCAR.” It is understood that some of Offeror’s proposed solution may not be available in the summer of 2015, which is why UCAR states “… to the extent possible ….”

## 24x7, 4 Hour Response, Maintenance

April 15, 2015 Section 4.8.1.1 of the NWSC-2 Technical Specifications states “…24 hours by 7 days a week with a four hour response time to any request for service”. Would UCAR clarify that the 4-hour response time is referring to an actual Service Engineer that comes onsite in Cheyenne within 4 hours of the request? If this is not the case, please describe what would be acceptable.

UCAR does not have a specific requirement for onsite or remote response. It is expected that a specific response would be appropriate for the type of event, and thus Offerors should describe how these responses would be provided by their service organization.

## Next Business Day Response Time

April 15, 2015 Section 4.8.1.2 of the NWSC-2 Technical specifications states “The PPM shall be 8 hours by 5 days a week”. The requirement does not state when a Service Engineer is required to come onsite after a service request is initiated. Is a Service Engineer showing up onsite on the Next Business Day acceptable to fulfill this requirement? If not, please describe what would be acceptable.

Yes; please also see UCAR’s response to question 4.11, above.

## Test Phase Durations

April 15, 2015 UCAR states in the NWSC-2 Technical Specifications, Section 5.1, “NCAR and vendor staff shall perform pre-delivery testing at the factory on the hardware to be delivered …” AND in Section 5.2, “NCAR and vendor staff shall perform site installation and post-delivery testing on the fully delivered system …” AND in Section 5.3, “NCAR and vendor staff shall perform onsite acceptance testing on the fully installed system … ” The duration of Pre-Delivery Testing, Post-Delivery Testing, and Acceptance Testing vary widely in the HPC community. Would UCAR please estimate: (1) the duration of the Pre-Delivery tests, (2) the duration of the Post-Delivery, and (3) the duration of the Acceptance tests?

These durations will depend upon the awardee’s manufacturing, assembly and staging, and test capabilities, as well as whether the specific testing phase is initially successful or must be iterated to success. UCAR has provided an example of its expectations in the RFP’s Attachment 5F Sample Subcontract Schedule F (Acceptance Criteria and Testing). Proposals should provide guidance on how the Offeror would accommodate these test phases and expectations. Target durations for testing phases will be determined during subcontract negotiations.

## Delivery/Payment Dates

April 15, 2015 Section 2.21 of the RFP states ““…the installation of the initial equipment will complete in October 2016.” However, per the Sample Subcontract Terms and Conditions, Article 7, Payment, references the NWSC-2 Test system target installation in August 2016, the AMPS system in September 1, 2015 and the NWSC-2 Production HPC System in January 1, 2017. Delivery schedules for systems in two referenced sections conflict. Will UCAR provide clarification on targeted delivery dates of all systems? Will UCAR identify when the Project Manager is expected to be on-site to support the delivery and installation of the systems?

The sample subcontract documents released with the RFP are samples for Offeror review, thus dates contained in those documents are placeholders. Payment dates and delivery dates are different; payment takes place upon acceptance, which is based upon a system’s ability to pass its acceptance criteria.

UCAR expects that the NWSC-2 production systems will be accepted and placed into service in January 2017. Production system equipment delivery must be sufficiently early for the awardee(s) to install, configure and prepare the system for testing, and for the awardee(s) and NCAR to perform and successfully complete the post-delivery and acceptance testing.

The NWSC-2 Technical Specifications, Section 3.10.4, sets a target for delivery of the test systems relative to initial production equipment delivery. This is so that all parties involved (awardee(s), NWSC facility staff, CISL system administrators and operators, CISL user services staff, etc.) can gain experience with the test systems prior to production system installation activities.

The NWSC-2 Technical Specifications, Section 4.10.5, states that the AMPS systems delivery schedule will be set during subcontract negotiations.

Per Attachment 5G Sample Subcontract Schedule G (Project Management Requirements), “UCAR and the Subcontractor shall schedule and complete a workshop to mutually establish and agree upon project management goals, techniques, and processes. The initial workshop shall take place within 45 days after the Subcontract’s Effective Date. Additional project planning workshops shall take place as needed thereafter.” UCAR’s expectation is that the schedule for onsite availability of the Project Manager will be established at this initial workshop. Furthermore, as noted in Attachment 5G, the Project Manager will be on-site “…during the delivery, installation and acceptance test period of the System.” While this is a requirement for the primary HPC and PFS systems, it may also be necessary for other elements of the delivered solution.

# Q&A Revision #3, issued April 24, 2015

The following questions were received by UCAR between 12:00 MDT April 16, 2015, and 15:00 MDT April 22, 2015.

## Whose Certificate of Completion

April 17, 2015 Article 17 from the sample Subcontract requires that a “Certificate of Completion” be signed and submitted by the Subcontractor with each Deliverable. Will the form for this certificate be provided by UCAR or should the Subcontractor provide its own form?

Either UCAR or the Subcontractor can supply the form. This will be determined during subcontract negotiations.

## Project Management Plan

April 18, 2015 The RFP Section 2.4.1, bullet 6, states that the business/price volume of the proposal shall include “The Offeror’s proposed project management and execution plan” while Schedule G page G-1 indicates that the initial project plan is to be submitted within 60 days of the Subcontractor’s Effective Date. Please describe the content and level of detail expected for the plan to be provided for Bullet #6.

Section 2.4.1, bullet #6 refers to Schedule G. Page 1 of Schedule G provides a draft outline of the expected contents of the Project Management and Execution plan. The final outline and detail will be formulated at the Project Management workshop to be conducted 45 days after the subcontract’s Effective Date.

## Executive Summary of Technical Proposal

April 18, 2015 The RFP Section 2.4.2, bullet 1, states that the technical volume of the proposal shall include an executive summary. How should this summary differ from the “Executive Summary” specified for the Business/Price Volume (2.4.1 Bullet #1)?

The Technical and Business/Price volumes will undergo independent reviews, and thus must be self-contained to the extent required to support these reviews. UCAR will provide no additional clarification on the content of the Executive Summaries; the content of either is at the Offeror’s discretion.

## Live Test Demonstration Notification Lead Time

April 18, 2015 Regarding the RFP’s Section 2.20 Live Test Demonstration: approximately how much time will be provided between notification of the need for an LTD and the execution of the LTD?

See question and response 4.14, above.

## Live Test Demonstration Performance Tests

April 18, 2015 Regarding the RFP’s Section 2.20 Live Test Demonstration: the section states that the LTD system must be of “sufficient size to verify all specified and proposed functionality”. Does this mean no performance related verifications will be performed?

Performance verification is not intended to be part of the LTD. However, UCAR and the Offeror may, by mutual agreement, decide that performance of certain system characteristics will be measured during the LTD.

## Hot Aisle Containment

April 18, 2015 Regarding NWSC-2 Technical Specifications’ Figure 2, Mechanical Overview: The diagram shows a cold aisle containment system with hot aisle air being re-circulated for cooling. Do such containment areas need to be provided as part of the delivered solution?

The Mechanical Overview in Figure 2 shows a hot aisle containment system. This is used for the existing NWSC GPFS storage and other systems not utilizing liquid cooling. As noted in Figure 3 of the Technical Specifications, it is our intent to collocate the PFS in the same general area of Module B as the existing storage system. To the extent that the new storage system requires or can utilize a containment system, it will be provided by UCAR. Please also see question and response 4.7, above.

## HOMME/HOMME\_Comm Timers

April 18, 2015 Regarding the NWSC-2 Benchmark Instructions: we have observed that the reported wallmax times for “prim\_run” in the file “HommeTime\_stats” is significantly higher than the wall clock times for the run (more than 100 sec). We replaced the GPTL timers with MPI\_WTIME, and the variation between the times reported is insignificant (less than 0.02 sec). We feel that the GPTL timers do not report the wall times correctly. Has NCAR seen such discrepancies? Is there an option to correct the time reported by GPTL? Would timing information using MPI\_WTIME be acceptable?

The GPTL timing library is widely used for generating timing statistics within CESM and its component models, and is tested on many machines both internal and external to NCAR. We have not observed the described discrepancy. It may indicate a problem with the build on the Offeror’s system. The Offeror should return the timing information as requested and may optionally return additional results using MPI\_WTime timers.

## Projection of Benchmark Results

April 18, 2015 Regarding the NWSC-2 Benchmark Results Spreadsheet: the benchmarks HPCG, STREAM, SHOC, OSU-MPI, IOR, pyReshaper and mdtest are not a part of the NCAR benchmark worksheet but are specified in Attachment 2. Is it correct to assume that there is no need to perform projections on them from the tested to the proposed system? Are vendors allowed to present worksheets of the above tests on the tested architectures only?

The Offeror should return results of the HPCG, STREAM, SHOC, OSU-MPI, IOR, pyReshaper and mdtest benchmarks from the benchmark system(s). Offerors are encouraged, but are not required, to return projected results for these benchmarks for the proposed system(s). In general, as noted in 4.2 above, Offeror may optionally return results for additional configurations and is encouraged to do so if such results showcase an important performance aspect of the proposed system.

## System Availability Definition

April 18, 2015 Regarding the definition of System Availability in the Sample Subcontract Terms and Conditions: does N (“number of nodes in the system”) represent all system nodes or just compute nodes?

UCAR intends that System Availability refers to all nodes in a system, which includes compute nodes as well as any other node types, including those that may be purchased through exercised Technical Options.

## Schedule E Effective Date

April 18, 2015 Regarding Attachment 5E Sample Subcontract Schedule E (Deliverable Requirements): does “Effective Date” mean the date the final contract is signed by all parties?

Yes. Please see the first page of Attachment 5 NWSC-2 Sample Subcontract Terms and Conditions.

## Schedule E Test System Delivery

April 18, 2015 Regarding Attachment 5E Sample Subcontract Schedule E (Deliverable Requirements): the “Due Date” for the NWSC-2 Test System is specified as “At least 60 days before initial production equipment delivery.” However, Section 2.21 "Schedule" of UCAR RFP R15-19374 (NWSC-2), lists the delivery date as "IPEDD minus 30-60 days". What is the minimum number of days prior to IPEDD must the Test System be delivered by?

Please see question and response 4.18, above.

## Schedule E AMPS System Delivery

April 18, 2015 Regarding Attachment 5E Sample Subcontract Schedule E (Deliverable Requirements): the “Due Date” for the AMPS System is specified as “At least 30 days before initial production equipment delivery.” However, Section 2.21 "Schedule" of UCAR RFP R15-19374 (NWSC-2) pg. 13, lists the delivery date as "To be negotiated". Which delivery date description should be used?

Please see question and response 4.18, above.

## Acceptance: Factory Trial 72 Hour Test Criteria

April 18, 2015 The Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 2.2, states that the “72 Hour Test” has the following pass criteria: “High availability of the production system for a 72 hour test period under constant throughput load.” What is the definition of / requirement for achieving the “High Availability” specified as the “Pass Criteria” for the 72 Hour Test?

UCAR intends that the 72-hour test should pass the 98%, and 99%, availability for the HPC and PFS, respectively. Since this is part of a Sample Subcontract, the Offeror may propose an alternate definition.

## Acceptance: System Test Shutdown and Cold Boots

April 18, 2015 The Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 3.2.2, states “Two successful HPC system shutdowns and cold boots to production state…” are specified. Would these need to be two consecutive successful shutdown/restarts or just two during the test period (e.g. with possibly an unsuccessful one in between)?

These should be two consecutive successful shutdown/restarts.

## Acceptance: System Test Production State

April 18, 2015 The Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 3.2.2, states “Production State” is defined as “98% of the HPC resource is available”. What constitutes the “HPC resource” (e.g. 98% of the compute nodes must be available for production work)?

Availability is defined in Attachment 5 Sample Subcontract Terms & Conditions. In this particular context, it is 98% of all nodes of the HPC system. See also question and response 5.9, above.

## Acceptance: System Resilience Test Metrics

April 18, 2015 Regarding the Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 3.2.3, System Resilience Test: with regard to the specified “metrics for resilience operations” can more details be provided now with regard to the time related requirements (e.g. “time to complete the initial recovery”, “time required to restore”) or would these be negotiated after award?

The metrics are described in the subsequent test descriptions for the HPC and PFS systems. It is expected that the additional details of the acceptance testing will be negotiated as part of subcontract negotiations.

## Acceptance: Availability Test Sliding Window

April 18, 2015 Regarding the Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 3.2.5, Availability Test: please explain how the “sliding window” would work as in “Availability Test shall be 30 contiguous days in a sliding window within the Acceptance Test Period.”

The Availability Test is used to ensure that a system can meet the required reliability under a realistic application workload. The 30-day Availability Test sliding window begins at the start of the Availability testing and is reset if, at any time, the availability drops sufficiently below that required (for the HPC system 98%; for the PFS system 99%) to be irrecoverable in the remainder of the 30-day window. For example, using the definition of System Availability provided in Attachment 5 Sample Subcontract Terms and Conditions, a 5000-node HPC system can have up to 72,000 node-hours of downtime in a 30 day window and still achieve 98% System Availability. In practice, if such an HPC system were undergoing an Availability Test and accumulated greater than 72,000 node-hours of downtime, its 30-day Availability Test would be terminated and subsequently restarted from scratch at a time mutually agreeable to UCAR and the Subcontractor. Similarly, if a one-filesystem PFS undergoing an Availability Test accumulated greater than 7.2 filesystem-hours of downtime, its 30-day Availability Test would be terminated and restarted from scratch.

## Acceptance: Availability Test Metric Thresholds

April 18, 2015 Regarding the Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 3.2.5, Availability Test: what occurs if the HPC or PFS drop below the specified availability percents (e.g. the full 30 day test period is restarted, etc.)?

The full 30-day test period is restarted. See question and response 5.17, above.

## Acceptance: Availability Test Significant Problem

April 18, 2015 Regarding the Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 3.2.5, Availability Test: please provide the definition of “significant problem” as used in “No significant problems shall be open during the last 7 days.”

Significant problems are those, either hardware or software, that have the potential to push the conclusion of the Availability Test beyond the 7 remaining days. In other words, at the conclusion of day 23, any problem that could cause the Availability Test not to conclude 7 days later would be considered significant. This could also include serious unresolved problems or new ones which crop up during the last week, such as inconsistent benchmark numerical results or unexplained performance outliers. The intent is that any such problems would have surfaced during the first 23 days and the system should complete the final week of its Availability Test in a stable and healthy state and thus be ready for user production.

## Acceptance: Availability Test Significant Hardware Repairs

April 18, 2015 Regarding the Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 3.2.5, Availability Test: please provide the definition of “significant hardware repairs” as used in “… if any system software upgrade or significant hardware repairs are applied, the Subcontractor shall be required to….”

Significant hardware repairs are any that have the potential to cause Availability to drop below 98% for the HPC system or 99% for the PFS system. This would include, for example: the loss of a core switch that takes a large numbers of nodes out of production; widespread and/or frequent node or leaf switch failures; loss of storage controllers; communications fabric, administrative network, or disk controller instability. Significant hardware failures do not include things such as, for example, isolated node failures, failure of a single drive, failure of redundant components, etc.

## Acceptance: Failures and Downtime

April 18, 2015 Regarding the Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 4: what are the definitions of “disrupt” and “significant” as in “Other failures in the Subcontractor supplied products and services that disrupt work on a significant portion of the nodes shall constitute a system wide outage?

Disruptive work is that which renders nodes or file system services unusable for planned testing activities. This could include things such as: delays in Offeror-provided repairs due to the [un]availability of Offeror personnel, delays due to supplier parts [un]availability, or subcontractor maintenance activities having collateral effects. See the responses in 5.19 and 5.20 for what could constitute a significant portion of the system.

## Acceptance: Software Downtime

April 18, 2015 Regarding the Sample Subcontract Schedule F (Acceptance Criteria and Testing), Section 4: the System Availability algorithm is based on the number of node hours. Can you explain how “software downtime” would be factored in to this algorithm for the calculation of overall System Availability?

Attachment 5 Sample Subcontract Terms and Conditions defines downtime as “Any period of time during which a node or component of the system cannot be used operationally. In calculating System Availability, only downtime due to the failure of Offeror-supplied hardware or software applies”. Thus software downtime accumulates when a portion of the system cannot run its planned workload due to a software problem, and is factored into System Availability in the same manner as hardware downtime. Software problems which could induce downtime include, for example: a bug or other instability in the routing software, MPI stack, job launcher, or file system, any of which renders the system, or a portion thereof, unable to successfully carry out planned user or testing activities.

## Project Plan “Days”

April 18, 2015 Regarding the Sample Subcontract Schedule G (Project Management Requirements): are the “days” specified (e.g. “within 45 days”, “within 60 days”) business or calendar days?

These are calendar days.

## Project Plan’s System Stability Planning & Software Plan

April 18, 2015 Regarding the Sample Subcontract Schedule G (Project Management Requirements): with regard towhat is specified as required for the “Project Plan,”can you please explain the type of information needed for the following (e.g. are these just implementation/verification and burn-in type project plan type activities or something more)?

* System Stability Planning
* Software Plan

The project plan should detail the Offeror’s comprehensive approach to fulfilling all requirements of the Subcontract, for the life of the Subcontract. This includes all activities associated with but not limited to delivery, acceptance, maintenance, support, upgrades, and the meeting of system lifetime reliability criteria, as well as any corporate or subcontract-specific planning that plays into overall system stability or reliability, including software and its testing, support, update and release plans. Depending on the Offeror’s proposed solution and the negotiated subcontract, this may also include details on delivery and support of Technical Options.

## Subcontractor Contacts Names & Contact Info

April 18, 2015 Regarding the Sample Subcontract Schedule G (Project Management Requirements): It’s indicated that the names and contact information for the specified Subcontract Management Contacts should be provided in Schedule C. As vendor selection isn’t until early 2H/15 and implementation not until 2H/16 it would be difficult at this time to “assign” specific people now as there’s always the chance they may be assigned to other projects or move to different positions in the interim. Could identifying specific people be deferred at least until after award, or should people be identified in the RFP response with the understanding that some personnel may change over time?

The Offeror should provide names where they are available, and note where they are yet to be determined, by TBD. As with all Sample Subcontract documents, these will be finalized during subcontract negotiations.

## WRF Benchmark Output Files

April 20, 2015 Section 5.18 of the NWSC-2 Benchmark Instructions states “*The WRF (V3) benchmark should be run using 576, 1152, 2304, 4608, 6912, and 9216 cores. For each run of the benchmark, the standard error and standard output should be saved and returned along with the files* ***rsl.out.0000****,* ***rsl.err.0000****, and* ***wrfout\_d01\_2005-06-04\_09\_00\_00****.*”

However the README for WRF states: “*To check for validity use the* ***diffwrf*** *tool to compare the* ***wrfout\_d01\_2005-06-04\_09\_00\_00*** *file to the reference version,* ***wrfout\_d01\_2005-06-04\_09\_00\_00.ref****, included with distribution. The diffwrf tool is located in the* ***WRFV3\_BENCH/external/io\_netcdf/*** *directory and takes the names of the two files to compare as arguments. Also included is a sample of diffwrf output comparing two valid WRF runs,* ***diffwrf\_2.5kconus.ref.out****. The diffwrf output comparing your run to the reference run should agree to a similar number of digits as the sample output. If one or two fields agree to one fewer decimal than in the sample, it’s ok, but major differences indicate a problem.*”

Since the output file **wrfout\_d01\_2005-06-04\_09\_00\_00** is approximately 4.5 GB, would NCAR accept output from diffwrf rather than the wrfout file itself?

The Offeror may return the **diffwrf** output in lieu of the **wrfout\_d01\_2005-06-04\_09\_00\_00** files, but if they do so, they should retain the **wrfout\_d01\_2005-06-04\_09\_00\_00** files in case UCAR needs to request those for further verification..

## LES Benchmark Starting mpi\_wtime() Timer

April 20, 2015 The time reported for LES as "time-io" includes a call to the subroutine get\_units(), which opens a file for each MPI rank. As a result, the reported time-io is sensitive to the file-creation time. In order to get a timing value that reflects computation time, it would be preferable to exclude the call to get\_units(). This could be done most simply by moving the starting timer:
 ts\_mpi = mpi\_wtime()
after the call to get\_units() in les.F.

Is it acceptable to move the starting timer?

UCAR’s testing shows the timing difference between starting the timer in these two source code locations to be less than 0.1% on the Yellowstone system. Offerors should return “as-is” timings as requested in the benchmark instructions utilizing the released **les.F** source. Offerors may optionally return additional timings with the following change made to the **les.F** source:

# diff -e les.F.orig les.F

409a

 ts\_mpi = mpi\_wtime()

.

400d

## MPAS-A Hangs with Ranks 2304 and Higher

April 20, 2015 The execution of MPAS-A (15km and 30 km) with ranks 2304 and higher hangs. After performing some profiling on MPAS-A, we have identified that the execution stalls in ncmpiio open function in atmosphere model. How can vendors resolve this problem? If possible, could UCAR provide vendors your build configurations used to build both necessary libraries and MPAS itself?

UCAR has successfully run MPAS-A at all requested ranks and has not encountered this problem in the testing it has done. UCAR can only speculate on the root cause and encourages the Offeror to investigate possible scaling issues with its MPI-IO implementation, or build issues with supporting IO libraries. Below is a description of build options for IO libraries used to successfully run the benchmark on Yellowstone.

NetCDF 4.3.0:

export CC=icc

export FC=ifort

export CXX=icpc

HDF5\_ROOT=/glade/apps/opt/hdf5/1.8.12/intel/12.1.5

PREFIX=/glade/apps/opt/netcdf/4.3.0/intel/12.1.5

export CPPFLAGS="-I${HDF5\_ROOT}/include"

export LDFLAGS="-L${HDF5\_ROOT}/lib -Wl,-rpath,${HDF5\_ROOT}/lib"

export LIBS="-lsz"

./configure --prefix=$PREFIX --enable-netcdf4 --enable-shared --disable-dap --enable-mmap --enable-diskless

make

PNetCDF 1.4.1:

PREFIX=/glade/apps/opt/pnetcdf/1.4.1/intel/12.1.5

MPICC=mpicc

MPICXX=mpicxx

MPIF77=mpif77

MPIF90=mpif90

CC=icc

CXX=icpc

FC=ifort

F77=ifort

export MPICC MPICXX MPIF77 MPIF90 CC CXX FC F77

./configure --prefix=${PREFIX} --disable-mpi-io-test --enable-subfiling --disable-file-sync

make

PIO 1.7.1:

module load intel/15.0.0

module load netcdf/4.3.0

./configure --enable-netcdf4 --prefix=/glade/p/work/rory/pio/1.7.1/intel/15.0.0

make

For PIO, note that those module loads will include the correct -L and -l flags for NetCDF and PNetCDF automatically via wrapper scripts.

## Schedule G Effective Date

April 20, 2015 Schedule G has multiple references to the Subcontract’s Effective Date. Can UCAR confirm when the Subcontract Effective Date actually starts in relation to Contract Award?

Please see question and response 5.10, above.

## Running Benchmarks as Requested / IOR Iteration Count

April 21, 2015 For IOR runs 1, 2, and 3 the provided scripts have 8 iterations defined which means 8 write tests and 8 read tests for the four test case, i.e. POSIX FFP, SSF and MPIIO FFP, SSF. Using 8 iterations equals a total of 64 tests for run3 or more for the scaling tests in run1 and run2. Is the IOR number of iterations per test case a suggestion or a requirement? Can we reduce the number of iterations to a value of 4 instead of 8?

As with all NWSC-2 benchmarks, UCAR requests that the Offeror runs the benchmark as requested and released. An Offeror who is unable to run any of the benchmarks as requested should include, in the technical volume of their proposal, a description of each missing or abbreviated benchmark and an explanation or rationale for the missing results.

## Early Access System(s)

April 21, 2015 Regarding Section 4.5, Early Access System, of the NWSC-2 Technical Specifications: It is unclear to the number of system[s] that are being requested and the time frame of the delivery. The requirement states that they “will be (delivered or made available) six months before delivery of any hardware or software that is planned for production.” Does this mean before IPEDD (spring 2016)? Or, is this option a post-production requirement for technology refresh? Can UCAR clarify the option for an Early Access System[s]?

The purpose of an Early Access System (EAS) is for UCAR to gain familiarity with the system and its technology, software, behavior, performance, etc. well before delivery of contractually-obligated production equipment. Its utility and value to UCAR will depend upon how different the proposed system(s) are from NCAR’s existing Yellowstone environment. An EAS may involve delivery of equipment to NCAR or allowing NCAR staff access to the EAS at the Offeror’s facility. An EAS may also be one equipped with certain options (e.g. containing many-core nodes or innovative storage or memory technologies). Thus, in general, the delivery, or availability, of an EAS would be before IPEDD; but it could, for example in the case of an exercised option to be delivered after IPEDD, be at a date later than IPEDD yet before the delivery of the equipment associated with that exercised option.

## NWSC Computer Room Dew Point

April 22, 2015 What is the dew point range throughout the year for the computer room?

NWSC is designed for ambient conditions of 72F and 35% relative humidity, thus computer room dew point temperature is maintained at approximately 42F.

## NWSC Water Supply Temperature

April 22, 2015 Please confirm the inlet water temperature to the computer equipment as we are assuming 65F. What is the range of temperature for the inlet water temperature?

NWSC supply water temperature is nominally 65F; ±2F.

## Supply and Return Hose Insulation

April 22, 2015 Does UCAR expect the water supply and return hoses between the customer underfloor water fittings to be insulated or not?

The supply and return hoses do not need to be insulated if the Offeror is using NWSC supply water temperatures. If the Offeror is using another liquid or refrigerant whose temperature is low enough to risk condensation, then those cold-temperature components must be insulated.

## PFS Bandwidth to NWSC Systems

April 22, 2015 Table 1 and Section 3.5.3 of the NWSC-2 Technical Specifications specify 100 GB/s of aggregate external bandwidth between the PFS and other NWSC systems. What is the expected connection to these "other" NWSC systems? Is this bandwidth exclusive of any network protocol required for these connections?

UCAR expects the Offeror to provide their suggested solution for this. From the diagram of the current environment (Figure 1 of the NWSC-2 Technical Specifications) and the ***GLADE Overview*** available from the NWSC-2 website, the Offeror can assume there are options to connect into the current InfiniBand fabric in some manner and/or provide an Ethernet based solution. The bandwidth should be measurable in a production environment, thus if there is overhead from the network protocol, that overhead is in addition to the 100GB/s.

## Personnel Resumes

April 22, 2015 Section 2.4.1 of the RFP, bullet 7, requests resumes. Are you requesting full resumes or more of a summary (e.g. Name of people, title, years of experience in HPC systems, skills and relevant experience)?

Contents of the resumes are at the Offeror’s discretion.

## Installation of Initial Equipment Complete

April 22, 2015 Regarding the table in Section 2.21 of the RFP: Can you define the meaning of “Installation of initial equipment complete”? For example, is this hardware power on or is this the full system where all hardware and software is installed and configured and jobs are running?

The dates in the table are approximate and UCAR intends this milestone to be the point at which the equipment is installed and ready for power-on. As requested in the technical specifications, Offerors should provide their own projected delivery and installation timetable that allows sufficient time for acceptance testing and successful completion by January 2017. Also see question and response 4.18, above.

## Large Job Characteristics

April 22, 2015 Regarding the NWSC-2 Technical Specifications, Section 3.1 Scalability: can NCAR break down what sorts of jobs are currently run with 512 or more nodes? If they are small subset of the applications, do they tend to be grid point communications or spectral?

UCAR has provided Offerors with the Yellowstone Workload Study (available from the NWSC-2 website) and the NCAR Benchmarks, which are representative of current and anticipated NWSC-2 workload. UCAR will provide no further details.

## Large Job Scheduling

April 22, 2015 Regarding the NWSC-2 Technical Specifications, Section 3.1 Scalability: Do large jobs (>512 nodes) currently tend to be scheduled for immediate or near term execution, or are they scheduled with more advanced reservations to wait for optimal resource alignment? If they can be scheduled out in time, does NCAR have an expectation based on current scheduler performance?

Large jobs are run in NCAR’s current production environment both on-demand and in advanced reservations. This is also anticipated to be the case in the NWSC-2 environment. UCAR will provide no further guidance.

## NWSC Chiller Capacity Augmentation

April 22, 2015 Does NCAR plan to add chiller capacity to support the proposed NWSC-2 cluster?

UCAR plans to augment chiller capacity based on the specifics of the proposed solution.

## Water Circuits and Connections

April 22, 2015 Does the new data center area have water circuits already installed under the floor? If so, is there a preferred connection type for the facility-to-rack connection?

Water circuits are not yet installed in Module A, where the NWSC-2 HPC system will be housed, but will be in place before the date scheduled for NWSC-2 system delivery. UCAR prefers that the Offeror provides quick disconnects, unless the pressure drop is significant. Offerors should provide details of the proposed connection type and any options.

## Module A Fan Wall

April 22, 2015 For Module A (NWSC-2) cooling, will the same fan wall design used for NWSC-1 be installed?

UCAR plans to augment capacity to meet the requirements of NWSC-2 cooling. This may or may not be the same fan wall design and is dependent on the NWSC-2 solution requirements.

## Integrated Cable Trays

April 22, 2015 Is it a requirement for the cable tray pathways to be mounted to the rack cabinets or could they be suspended from the ceiling?

UCAR expects that the Offeror’s solution will provide integrated cable trays for system interconnect and administrative network cabling. UCAR will provide ceiling mounted cable trays/ladders to accommodate cables running between the HPC system in Module A and the PFS and other systems in Module B. Also see question and response 4.7, above.

## Cable Trays (2)

April 22, 2015 UCAR’s response to question 4.7 stated that “UCAR will provide cable tray(s) and hot aisle containment, if necessary, for the NWSC-2 PFS solution.” Does this mean UCAR will provide those components for the PFS even for vendors offering a complete (storage + compute) solution or would those vendors be responsible to provide containment and/or cable tray equipment for all racks?

Whether UCAR awards the NWSC-2 HPC and PFS systems to a single vendor or not, UCAR expects the Offeror’s HPC system (to be placed in Module A) to have integrated cable trays. UCAR will provide cable raceways to, and containment for, the PFS system (to be placed in Module B). If UCAR’s assumption that the HPC and PFS systems are separable does not conform to the Offeror’s proposed solution, the Offeror should provide integrated cable trays for their complete solution.

## Operational Use

April 22, 2015 Regarding the Sample Subcontract Terms and Conditions definition of downtime: some types of faults still allow a component to remain “functional” (e.g. a node’s loss of out of band management capability) at close to the pre-failure state level of capability and performance that may not impact running jobs. What is the definition of “cannot be used operationally”?

Operational use is successfully running the expected workload: during testing this is the benchmarks and other tests, during production this is the user workload. This testing and user workload consists of both batch and interactive use. If a component used normally to run the expected workload cannot be used to do so successfully, it cannot be used operationally.

## Initial Risk Management Plan Timing

April 22, 2015 Regarding the table in Attachment 5E (Deliverable Requirements): assuming that the Subcontract’s effective date is the date of contract award, it appears that the risk management plan, risk register, and risk assessment report is due prior to the project plan and project workshop. What is the expectations and rationale for having that due before the project planning workshop?

UCAR believes that the Offeror’s identification of risks, including their likelihood and impact, is a critical component to overall project planning, and discussion of such risks will be a key element of the project planning workshop. Thus, the initial risk register, management plan and assessment report are expected prior to the project planning workshop.

## Missed Performance

April 22, 2015 Regarding Attachment 5F’s Performance Test: what will occur if one or more of the specified benchmarks do not meet or exceed the performance commitments and the Subcontractor’s provisioning of additional hardware/software to address the situation is determined to be ineffectual or impractical (e.g. penalties)?

UCAR will address this during subcontract negotiations.

## IOR Iteration Count

April 22, 2015 The IOR original scripts will do 8 iterations ("-i 8") for each test. This would take a lot of time and doesn't seem to be necessary. Can we reduce it to 2 or even 1?

Please see question and response 5.30, above.

## IOR Transfer Size

April 22, 2015 For IOR, the transfer size was set as 4M. Can it be changed to other values such as 16M to make better use of the file system?

Offerors should return results as requested and released. Offerors may return additional results by setting the transfer size to match the block size of the file system being bid.

## IOR and mdtest Runs #2, #3

April 22, 2015 If run2 already contains the same workload as run3, do we still need to run the run3 job? This question is for both IOR and MDTEST?

If the Offeror prefers, run 2 can be set up to run everything but the full system size. Run 3 is a single run at the full system size. UCAR requests that the Offeror run and return run2 and run3 results as a separate output files to facilitate its analysis.

## Question Deadline Extension

April 22, 2015 As we will be conducting more benchmarking activity, is it possible to extend the date for questions for items related to the benchmarks?

No.