

UNCONTROLLED UNCLASSIFIED INFORMATION





Construction Specifications

Division 01 - General Requirements

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SECTION 01 25 00 SUBSTITUTION PROCEDURES

PART 1 GENERAL

2.1 SECTION INCLUDES

- 2.1.1 Submittal procedures for proposed substitutions
- 2.1.2 Documentation procedures
- 2.1.3 Subcontractor certifications

2.2 SUBMITTAL PROCEDURES

2.2.1 Substitutes for Specified Items: Wherever catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with a designated material, product, thing, or service mentioned in these specifications, they are used to establish the standards of quality, utility, and appearance required. LLNS generally discourages substitutions unless the specified product is unavailable or there is benefit to LLNS. LLNS may approve substitutions that are equal in quality, utility, and appearance to those specified, unless the specification indicates "no substitutions." Substitutions are subject to the following provisions:

- (a) LLNS will only consider substitution requests submitted after the bid date when circumstances do not allow products or methods to be met as defined in the subcontract documents. LLNS will not consider substitution requests under one or more of the following circumstances:
 - (1) Requests by manufacturers.
 - (2) Substitutions that are indicated or implied on shop drawings or product data submittals without having received prior approval.
 - (3) Requests without a separate written request.
- (b) Submit substitution requests in writing, using the LLNL construction management software, to the LLNS subcontract technical representative (STR) and contract analyst for LLNS approval. If a substitution application or form does not exist in the software tool, submit requests using LLNS-furnished form PMO.DT-FM-42, *Substitution Requests*. List and describe each proposed substitute item or material with sufficient data to support that the substitution is equal or better and meets the requirements of the Subcontract.

Note: Do not use Procore for requests if the request includes sensitive information with markings, such as Controlled Unclassified Information (CUI) or Official Use Only. Prior to using Procore, users must take the LLNS Project Management Office (PMO) cloud-based services training, which explains the constraints in detail. Kahua can be used for marked sensitive information.

- (c) LLNS will approve or reject, in writing, proposed substitutions. LLNS requires at least 5 business days to respond depending upon the size of the project. LLNS approval does not relieve the Subcontractor from complying with the requirements of the drawings and specifications. The Subcontractor is responsible, at its own expense, for changes resulting from proposed substitutions that affect other parts of its own work or the work of others.

- (d) If the use of substitute products or materials involves redesign of other parts of the work, LLNS will charge Subcontractor for the cost of redesign. If this substitution affects the work of others on the project, LLNS will charge the Subcontractor for the cost of the associated additional work of others.
- (e) Submitting a substitution request does not relieve the Subcontractor from schedule commitments. It is the Subcontractor's responsibility to promptly recognize if materials are not readily available.
- (f) The STR may reject incomplete substitution requests.

2.3 DOCUMENTATION PROCEDURES

2.3.1 Limit each request to a single proposed substitution item.

2.3.2 Provide an itemized comparison of proposed substitution to the item specified. Tabulate the differences, where appropriate, in materials, physical characteristics, finish, in-service performance, durability, visual effect, sustainable design features, estimated life, estimated maintenance, availability of spare parts and repair services, energy consumption, salvageability, and manufacturer's warranties. Include the following:

- (a) Identification of the specification section or detail reference where the proposed substitution applies.
- (b) Identification of materials, products, or supplies, including manufacturer's name, catalog name and number, and the manufacturer's address and telephone number.
- (c) Installation characteristics, installation drawings and manufacturer's literature, including product description, performance and test data, and reference standards if pertinent.
- (d) Effect of change on project schedule; demonstrate that redesign due to substitution will not adversely impact project schedule.
- (e) Accurate cost data for the proposed substitution in comparison with the product specified. Provide an itemized list with cost comparisons including labor and materials.
- (f) Equitable adjustment and credit that the Subcontractor proposes to offer LLNS, including accounting of costs incurred by LLNS due to redesign or evaluation services, increased cost of other LLNS construction, and similar considerations.
- (g) Description of how this substitution impacts other related systems and the work of others.

2.3.3 When applicable or requested by LLNS, provide off-the-shelf samples of the specified item and the proposed substitution.

- (a) Do not use previous approval by LLNS as a basis for submitting a *request for substitution*. Do not assume that LLNS will accept a *request for substitution* just because we accepted it on another project.

2.4 SUBCONTRACTOR CERTIFICATIONS

2.4.1 Investigate the proposed item and certify that the quality, utility, and appearance are equivalent or superior to that shown or specified. Update supporting information for the proposed item as new or different data becomes available.

2.4.2 Certify that the same warranty applies for the substitution as for the product specified.

2.4.3 Accept responsibility for installation of the accepted substitution into the work. Make changes, subject to LLNS approval, as required to complete the work.

2.4.4 Certify waiver of claims for additional costs or time related to the substitution.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 25 00

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SECTION 01 26 13 REQUESTS FOR INFORMATION

PART 1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Submittal procedures for requests for information (RFI)

1.2 DEFINITIONS

1.2.1 **request for information.** A document submitted by the Subcontractor requesting clarification of a portion of the subcontract documents. Referred to as an **RFI**.

1.3 SUBCONTRACTOR'S REQUESTS FOR INFORMATION

1.3.1 Request an interpretation from LLNS if any of the following apply:

- (a) Subcontractor is unable to determine from the subcontract documents the exact material, process, or system to be installed.
- (b) Elements of construction are required to occupy the same space (interference).
- (c) An item of work is described differently in more than one place in the Subcontract Documents.
- (d) Subcontractor and STR agree to capture and share specific decisions (e.g., waive a requirement).

1.3.2 Before submitting an RFI, verify the information is not already included in the subcontract documents. LLNS will coordinate with the subcontractor to close RFIs that request information that is clearly indicated in the subcontract documents.

1.3.3 Comply with procedures specified in this section to make requests for interpretation.

1.3.4 Prepare and submit RFIs on the form provided in the LLNL construction management software application unless otherwise directed by the STR. Completely fill in the RFI form. By submitting the RFI, the Subcontractor attests that the Subcontractor made a good faith effort to determine the requested information from the Subcontract Documents.

Note: Do not use Procore for requests if the request (including attachments) includes sensitive information with markings, such as Controlled Unclassified Information (CUI) or Official Use Only. Prior to using Procore, users must take the LLNS Project Management Office (PMO) cloud-based services training, which explains the constraints in detail. Kahua can be used for marked sensitive information.

1.3.5 Review and attach RFIs from lower-tier subcontractors and suppliers to a new RFI prepared and submitted as described above for Subcontractor-initiated RFIs.

- (a) Review lower-tier subcontractor and supplier-initiated RFIs and take action to resolve issues of coordination, sequencing, and layout of the work.
- (b) Subcontractor is responsible for delays resulting from the necessity to resubmit an RFI due to insufficient or incorrect information presented in the RFI.

1.3.6 Do not use RFIs for the following purposes.

- (a) To request clarification of issues related to means, methods, techniques, and sequences of construction or for establishing trade jurisdictions and scopes of lower-tier subcontracts. Such issues, unless stated otherwise in the subcontract documents, are solely the Subcontractor's responsibility.
 - (1) If an RFI impacts the sequence of construction, then note the impact on that RFI for consideration by LLNS. Provide complete information required for LLNS to analyze and understand the circumstances causing the impact.
 - (b) To request approval of submittals (use procedures specified in section 01 33 00 - Submittal Procedures)
 - (c) To request approval of substitutions (use procedures specified in section 01 25 00 - Substitution Procedures)
 - (d) To request subcontract changes such as cost, schedule, design, or work performance. (Use change order procedures in the subcontract documents. Indicate that there is a cost impact, but do not put costs in an RFI).
- 1.3.7 Review Time: LLNS will generally respond to RFIs within 14 calendar days of receipt, excluding holidays. For the purpose of establishing the start of the response period, LLNS will consider RFIs received after 12:00 pm as having been received on the following regular workday.
- (a) Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- 1.3.8 Responses: RFI responses do not constitute a directive or authorization to perform extra work or cause delay. If the Subcontractor believes that a clarification (official response) by LLNS or the design professional will likely lead to a change in the Subcontract sum or period of performance, promptly, and not more than 7 calendar days following the official response, notify LLNS to this effect in writing and follow up with a written change order request in accordance with the Subcontract General Provisions and Change Order Procedures.

PART 2 PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION 01 26 13

SECTION 01 30 00 ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Arrangement of documents.
- 1.1.2 Wireless devices in "limited" security areas.
- 1.1.3 Site staffing and work hours.
- 1.1.4 Badges and identification verification.
- 1.1.5 Security escorts.
- 1.1.6 Accuracy of data.
- 1.1.7 Survey data.
- 1.1.8 Salvable and excess materials.
- 1.1.9 Emergency repairs.
- 1.1.10 LLNS partial occupancy or use.
- 1.1.11 Basis for acceptance.

1.2 ARRANGEMENT OF DOCUMENTS

- 1.2.1 The drawings and specifications may not specifically show or mention every item necessarily required. Provide complete and operable systems and equipment separately unless expressly stated otherwise.
- 1.2.2 These subcontract documents introduce titles and headings to divisions, sections, and paragraphs for convenience. Do not assume that they are a correct or complete segregation of the several units of materials and labor.
- 1.2.3 The terms of the Subcontract, General Provisions, and Project Requirements Document apply to each section of these specifications as fully as if repeated within that division. The Subcontract documents are complimentary and what is required by one is as binding as if required by all; performance by the Subcontractor is required only to the extent consistent with the Subcontract Documents and reasonably inferable from them as being necessary to produce the indicated results.
- 1.2.4 Items listed within each division (or section) of the specifications are not necessarily all-inclusive. The Subcontractor is responsible for performance and completion of the work in accordance with the scope of work detailed in Project Requirements Document and the subcontract documents.
- 1.2.5 Portions of these specifications are of the abbreviated, simplified type and may include incomplete sentences. Omissions of words or phrases such as "the Subcontractor must," "in conformity with," "must be," "as noted on the drawings," "in accordance with details," "a," "the" and "all" are intentional. Omitted words or phrases are supplied by inference in the same manner as they are when a "note" occurs on the drawings.

1.3 WIRELESS DEVICES IN "LIMITED" SECURITY AREAS

1.3.1 Non-government mobile/wireless devices are not allowed in "Limited" security areas (limited areas) (refer to *Security and Site Access Provisions* for definitions) inside buildings.

- (a) A mobile device is a portable computing device that:
 - (1) can easily be carried by a single individual;
 - (2) is designed to operate without a physical connection (e.g., wirelessly transmit or receive information);
 - (3) possesses local, non-removable data storage; and
 - (4) is powered on for extended periods of time with a self-contained power source.
- (b) Mobile devices also include voice communication capabilities, onboard sensors that allow the device to capture (photograph, video, record or determine location) information and/or built-in features for syncing data. Examples of mobile devices include but are not limited to cell phones, tablets, smart watches, fitness trackers and E-readers.

1.3.2 Submit requests for mobile hot spots and cradle points to the LLNS subcontract technical representative (STR). Allow 14 calendar days for approval.

1.3.3 Tools and equipment with global positioning systems (GPS) and devices with Bluetooth or wi-fi capabilities are prohibited anywhere in limited areas, both inside and outside of buildings.

1.4 SITE STAFFING AND WORK HOURS

1.4.1 Site Staffing: As a minimum, provide the following staff positions:

- (a) Construction Superintendent – Unless specified otherwise in the Project Requirements Document, LLNS requires the presence of the Subcontractor's construction superintendent at the jobsite, including overtime hours and shift work hours, at all times when the Subcontractor or lower-tier subcontractors perform work.
 - (1) The construction superintendent is responsible for ensuring work is performed in accordance with contractual requirements and effectively directing and coordinating trades to ensure safe and efficient progress of the work.
 - (2) The superintendent may not perform work.
 - (3) If the Subcontractor's superintendent leaves the jobsite while the Subcontractor or lower-tier subcontractor performs work, LLNS will stop work. The Subcontractor is solely responsible for costs incurred due to the work stoppage.
 - (4) LLNS requires that the construction superintendent be knowledgeable of the project's hazards and have full authority to act on behalf of the Subcontractor.
 - (5) The superintendent may temporarily delegate their duties and responsibilities to a competent subordinate, with 30-hour OSHA training, during a planned absence from the job site. Promptly notify the STR at the time of delegation.
 - (6) LLNS requires that the construction superintendent make frequent and regular inspections of the construction jobsite to identify and correct instances of noncompliance with project safety and health requirements.

- (7) During the periodic absences of the safety officer, the construction superintendent may serve as the safety officer.
- (b) Project Manager and Quality Control Manager – The project manager and the quality control manager can be corporate resources that oversee work on this project on a part-time basis and can delegate full-time responsibility to other individuals unless stated otherwise in the Project Requirements Document.
- (c) Safety Officer – The safety officer can be a corporate resource that oversees the work of this project, or the construction superintendent can assume this role, unless stated otherwise in the Project Requirements Document. The safety officer may not perform work. See section 01 35 23 - General Safety Provisions article "Subcontractor Safety Program" for further requirements.

1.4.2 Work Hours

- (a) Site 200: Standard work hours at site 200 are Monday through Friday from 7:00 am to 6:00 pm, except LLNL holidays.
- (b) Site 300: Standard work hours at site 300 are Monday through Thursday from 7:00 am to 5:30 pm, except LLNL holidays.
- (c) LLNS is open to earlier start times during summer months due to summer temperatures.
- (d) Submit requests for nonstandard work hours to the STR at least three business days in advance.

1.5 BADGES AND IDENTIFICATION VERIFICATION

- 1.5.1 Only United States citizens with no outstanding warrants, including unpaid child support and traffic violations, may access LLNL.
 - (a) United States citizens are defined as persons born or naturalized in the United States. Permanent residency or Green Card holders are not United States citizens.
- 1.5.2 Badges must be requested 72 hours in advance. Obtain and return the completed badge request form via email to the STR and pmo-cma-team@listserv.llnl.gov. Complete the form with each employee's and lower-tiered employee's full name, date of birth, social security number, and company name.
- 1.5.3 Further details for badging, access, and identification verification are in the *Security and Site Access Provisions* found under the "Special Provisions" link on the LLNL Supply Chain Management's [website](https://supplychain.llnl.gov/supplier-information/special-provisions) (<https://supplychain.llnl.gov/supplier-information/special-provisions>).

1.6 SECURITY ESCORTS

- 1.6.1 If escorts are required by the Subcontract, the following applies:
 - (a) Responsibilities of Escorted Personnel
 - (1) Escort Ratio: 1 escort to 5 uncleared subcontractors' ratio unless a security plan has been approved. If personnel do not have a security clearance and perform work in a limited area that requires clearance, then they must remain within line of sight of the escort. If opaque barriers, fences, impervious barriers or other divisions are present in a work area, then the ratio will remain at 1 to 5. If no clear line of sight is achievable, then additional escort resources are required in such instances.
 - (2) Sign in/out of the project security logbook.

- (3) Those who fail to follow security protocols are subject to immediate removal from the LLNL site and revocation of their site access.
 - (4) Individuals being escorted must maintain a professional relationship with Protective Force Officers and security escorts.
 - (5) Coordinate the route of travel into and out of the limited area with the STR.
- (b) Notification: Request additions to or a reduction in escort support three business days in advance. Notifications received less than three business days in advance could potentially result in no additional resources and may delay work; the Subcontractor is solely responsible for costs incurred due to such delays.
- (c) Hours and Overtime
- (1) Standard security escort hours: Monday through Thursday 7 am to 3:30 pm (site 200 and 300), and Friday 7 am to 3:30 pm (site 200 only)
 - (2) Unless specified otherwise in the Subcontract, coordinate requests for working outside standard hours with the STR. Requests received less than three business days in advance may not be approved.
- (d) Subcontractor Vehicles
- (1) Attach clearly visible contractors placard showing the contractors business name and license number on vehicles entering limited areas. Those without placards will not be allowed into limited areas. Non-delivery, personal vehicles, and other non-essential vehicles must remain outside of the limited areas. Subcontractors can use security access portals and or carpool to enter limited areas.
 - (2) Request escorts if making deliveries into the limited areas. Coordinate deliveries with the STR to ensure adequate escort remains at the project when a delivery is entering the limited areas.
 - (3) Turn on vehicle emergency flashers when entering the limited areas under security escort. Security escorts will follow deliveries to the project location. The 1 to 5 ratio remains in effect when escorting vehicles.
 - (4) Obey signs and postings. Park only in designated parking stalls unless otherwise directed or approved by the STR. Do not park in stalls labeled/marked as "government vehicle only." Do not park in landscaping areas without prior authorization. Do not block emergency access lanes, driveways, or pedestrian sidewalks. Vehicles parked in red zones, government vehicles stalls, landscaping areas (without authorization) or in violation of California traffic laws are subject to penalty.

1.7 ACCURACY OF DATA

- 1.7.1 The data in the Project Requirements Document, these specifications, and on drawings are as accurate as could be secured, but LLNS cannot guarantee their complete accuracy. The data are for the assistance and guidance of the Subcontractor. The work governs the exact locations, distances, levels, and like items.
- 1.7.2 Before starting the work, check lines, levels, and dimensions shown on the drawings against field conditions. Report discrepancies to the STR immediately. In the event of discrepancies, do not proceed with the work until the STR gives direction.

- 1.7.3 Investigate the structural and finish conditions affecting the work and arrange work accordingly. Provide fittings, equipment, accessories, and like items to accommodate such conditions.

1.8 SURVEY DATA

- 1.8.1 Where applicable, LLNS has provided horizontal (California State Plane Coordinate System, Zone 3 (US Survey Feet)) and vertical (LLNL vertical datum network) survey control points on the drawings. Provide construction staking as required for construction and inspection by or under the direction of a California Licensed Land Surveyor.

1.9 SALVABLE AND EXCESS MATERIALS

- 1.9.1 Do not use salvable material dismantled from existing work in new construction unless specifically indicated in the drawings, specifications, or Project Requirements Document.
- 1.9.2 The Subcontractor is responsible for the condition of dismantled materials until re-installation by the Subcontractor, and LLNS reviews and accepts the final installation.
- 1.9.3 The Subcontractor is responsible for the condition of salvaged materials that are to remain the property of LLNS until accepted by LLNS.
- 1.9.4 Immediately remove other materials dismantled from existing work and released through LLNS to the Subcontractor as Subcontractor's property.

1.10 EMERGENCY REPAIRS

- 1.10.1 LLNS reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Subcontractor's guarantee or relieving the Subcontractor of its responsibilities.

1.11 LLNS PARTIAL OCCUPANCY OR USE (BENEFICIAL OCCUPANCY)

- 1.11.1 LLNS reserves the right to occupy completed or partially completed portions of the work provided LLNS and the Subcontractor have accepted the responsibilities assigned to each of them for the following, in writing:
- (a) Payments; retainage (if any); security; maintenance; utilities; damage to the work; and insurance.
 - (b) The period for correction of the work and commencement of warranties required by the subcontract documents for such portions of the work partially used or occupied by LLNS.
- 1.11.2 If the Subcontractor and LLNS are unable to agree upon the matters above, LLNS may nevertheless use or occupy completed or partially completed portion(s) of the work. Immediately prior to such partial occupancy or use of the work LLNS and the Subcontractor will jointly inspect the portion(s) of the work that LLNS intends to occupy or to determine and record the condition of the work.

1.12 BASIS FOR ACCEPTANCE

- 1.12.1 The basis for inspection/acceptance is compliance with the requirements set forth in the Subcontract and terms and conditions of the Subcontract. LLNS will reject non-conforming products or services. The Subcontractor must correct deficiencies within 14 calendar days of the rejection notice in accordance with the applicable clauses. If the Subcontractor cannot correct deficiencies within 14 calendar days, immediately notify the STR of the reason for the delay and provide a proposed corrective action plan within the 14 calendar days.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION 01 30 00

SECTION 01 31 19 COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Coordination and project conditions
- 1.1.2 Preconstruction meeting
- 1.1.3 Construction coordination meetings
- 1.1.4 Periodic schedule update meetings
- 1.1.5 Close-out meeting
- 1.1.6 Pre-installation meetings

1.2 COORDINATION AND PROJECT CONDITIONS

- 1.2.1 Coordinate and schedule the work of tiered subcontractors and provide information required by them for proper scheduling and execution of the work. In the same manner, coordinate work with LLNS and other subcontractor(s) operating in the area or as directed by the STR, including reasonable adjustments of schedule to allow other subcontractor(s) or LLNS to do their work.
- 1.2.2 Verify that utility requirements and characteristics of operating equipment are compatible with building utilities supplied and installed by others. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- 1.2.3 Coordinate installations.
- 1.2.4 Coordinate scheduled work with other subcontractors on jobsite.

1.3 PRECONSTRUCTION MEETING

- 1.3.1 The LLNS contract analyst will schedule a meeting after notice of award and prior to notice to proceed.
- 1.3.2 Attendance is required by the Subcontractor and tiered subcontractors.
- 1.3.3 Agenda
 - (a) Safety submittals, LLNS work planning and control document review, and flow-down of safety expectations and training requirements
 - (b) Cybersecurity requirements and use of subcontractor's management software. Use of Subcontractor's cloud services is not allowed unless approved by LLNS in writing.
 - (c) Security and housekeeping procedures
 - (d) Submission of proposed preliminary project schedule
 - (e) Designation of personnel representing the subcontract parties
 - (f) Use of premises by LLNS and Subcontractor
 - (g) LLNS' requirements and partial occupancy
 - (h) Temporary facilities and controls provided by LLNS

- (i) Discussion of procedures and processing of field decisions, safety, submittals, substitutions, applications for payments, proposal request, change orders, requests for information, and project closeout procedures
 - (j) Discussion of documents that must be maintained at the site (copy of the drawings, specifications, addenda, change orders, field orders, approved shop drawings, architect's supplementary instructions, requests for information and other Subcontract-related documents and modifications, including securing information during off-hours.
 - (k) Scheduling, sequence of construction, and scheduling of inspection and testing
 - (l) Surveying
 - (m) Procedures for maintaining project record documents (e.g. red-lined drawings)
 - (n) Requirements for start-up of equipment and transfer to operations
- 1.3.4 The STR will record minutes and distribute copies as soon as practical after the meeting to each participant and those affected by decisions made.

1.4 CONSTRUCTION COORDINATION MEETINGS

- 1.4.1 In coordination with the STR, arrange and conduct, at least weekly (unless otherwise agreed to by the STR), coordination meetings with the purpose of discussing progress of the work, jobsite safety, coordination issues between lower-tier subcontractors, and other pertinent project concerns. The Subcontractor's project manager, site superintendent, and safety officer must attend the meetings. Lower-tiered subcontractors and engineer-of-record (for design-build projects), as directed by the STR, must also attend the meetings. Other attendees may include LLNS personnel affected by the work.
- 1.4.2 Arrange meetings, prepare agenda with copies for participants, and preside at meetings. Distribute meeting agenda 48 hours in advance along with 3-week look-ahead.
- 1.4.3 Include, as a minimum, the following coordination meeting agenda topics:
- (a) Project safety and security
 - (b) Review minutes of previous meetings
 - (c) Review of work progress via three-week look-ahead
 - (d) Field observations, non-conforming work, and decisions
 - (e) Identification of problems that impede planned progress
 - (f) Review of submittal schedule and status of submittals
 - (g) Identification of long-lead materials, products, and equipment and the impact of the lead time to the critical path
 - (h) Review Subcontractor's request-for-information (RFI) log and compare to LLNS log
 - (i) Review of outstanding RFIs and requests for substitutions. Incomplete requests may be rejected by the STR.
 - (j) Review of record drawings and specifications (red-line drawings)
 - (k) Review of off-site fabrication and delivery schedules
 - (l) Maintenance of project schedule

- (m) Corrective measures to regain projected schedules
- (n) Planned progress during succeeding work period
- (o) Coordination of projected progress
- (p) Maintenance of quality and work standards
- (q) Effect of proposed changes on project schedule and coordination
- (r) Other business relating to work
- (s) Status of change orders

1.4.4 Prepare minutes of the meetings and distribute copies within 48 hours after meeting to each participant and those affected by decisions made.

1.5 PERIODIC SCHEDULE UPDATE MEETINGS

1.5.1 Conduct monthly (unless directed otherwise in the Project Requirements Document) schedule update meetings for the purposes of reviewing the Subcontractor's proposed out of sequence corrections, determining causes for delay, correcting logic, and maintaining schedule accuracy. See section 01 32 13.10 - Project Schedule article "Periodic Schedule Update Meetings" for further requirements

1.6 CLOSE-OUT MEETING

1.6.1 At least 60 days from the scheduled beneficial occupancy date or at 80% construction completion, schedule and meet with LLNS to identify actions necessary for completing the work (punch list) and have a plan for accomplishing these actions in a timely matter. See section 01 70 00 - Execution and Close-Out Procedures.

1.7 PRE-INSTALLATION MEETINGS

- 1.7.1 When required in individual specification sections or the Project Requirements Document, or as determined by the STR, coordinate with the STR and convene a pre-installation meeting at the site prior to commencing work of the specified section. Notify the STR of the meetings at least 1 week in advance.
- 1.7.2 Require the attendance of parties directly affecting, or affected by, work of the specific section.
- 1.7.3 Prepare the agenda and preside at meetings to review, as a minimum, the following:
- (a) Conditions of proposed installation, preparation, and installation procedures
 - (b) Coordination with related work of other Subcontractors on site
- 1.7.4 Record minutes and distribute copies, for review and comment, to each participant and those affected by the decisions within 3 business days of the meeting. Resolve comments and distribute final minutes within 1 week of the meeting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 31 19

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SECTION 01 32 13.10 PROJECT SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Schedule development requirements
- 1.1.2 Scheduling software requirements

1.2 REFERENCES

- 1.2.1 15 CFR 700 - Defense Priorities and Allocations System; current edition.

1.3 DEFINITIONS

Activity. A portion or element of work, action, or reaction that is precisely described, readily identifiable, and is a function of a logical sequential process.

Defense Priority Allocation System (DPAS). In accordance with the Defense Production Act, LLNS assigns DPAS ratings (e.g., DX-E1 or DO-E2) to certain subcontracts or items when they have been determined to be required for national defense use under DPAS regulation (15 CFR 700). Subcontractor is required to expedite these items and provide detailed schedule information.

free float. The amount of time an activity can be delayed without delaying the early start of activities following it (i.e., without taking away the float of later activities).

independent float. Float that belongs to one activity alone. It is not shared with other activities, earlier or later (i.e. it has no effect on other activities).

long lead materials. Items that are not readily available off the shelf.

level 3 schedule. A level 3 schedule (or level 3 control schedule), as defined by AACE International, is the control level generally prepared to communicate the execution of the deliverables for each of the subcontracting parties. The schedule reflects key interfaces and shows enough detail to map the critical activities.

milestones. A significant point or event in the project.

negative total float. The amount of time by which the early date (start or finish) of an activity exceeds its late date.

total float. The amount of time an activity can be delayed without delaying the project end date or an intermediary milestone.

weather:

adverse weather. Normal weather events that negatively affect the productivity of workers and/or that may affect a project's critical path or consume float. Adverse weather represents conditions that should be expected during project execution that may impact work progress.

adverse/delayed impact by weather. Demonstrated evidence the actual adverse weather delay days prevented work on critical path activities for 50 percent or more of the Subcontractor's scheduled workday.

normal weather. Weather that is expected for a period of time based upon the historical weather conditions for the locale. Normal weather includes weather that is and is not adverse as would be expected for a particular location.

measured and validated. Weather data collected by LLNS at a defined collection point and provided to the Subcontractor.

severe weather. A weather event, which is in itself severe and can be of a violent nature.

weather event. A storm or significant weather condition that stops or appreciably hinders work until it has passed or the effects of the weather condition have dissipated. This may include rain, rising water, snow, ice, extreme cold, high winds, extreme heat and/or high humidity, or weather related occurrence. The weather event may not be localized at the site as in the case of flood water from an upstream rain event.

1.4 CALENDAR DAYS

1.4.1 Use calendar days in the schedules. Include non-working days and LLNS-recognized holidays.

1.5 CONSTRUCTION-ONLY SUBCONTRACTS

1.5.1 If the subcontract is for construction only, ignore directions pertaining to design.

1.6 SUBMITTALS

1.6.1 Submit schedules in accordance with section 01 33 00 - Submittal Procedures and the requirements of this section. LLNS will return comments as stated in section 01 33 00.

1.7 QUALITY ASSURANCE

1.7.1 Designate an authorized experienced scheduler representative to be responsible for preparing the schedule, updating the schedule (activity status), and preparing reports. LLNS will validate the Subcontractor's project schedule against the criteria in this specification.

PART 2 PRODUCTS

2.1 SOFTWARE

2.1.1 Develop schedules in Microsoft Project (use a version that is fully compatible with [Microsoft Project Online Desktop Client](#)). Obtain approval from the LLNS subcontract technical representative (STR) prior to using alternative scheduling software. If proposing alternate software, provide supporting documentation to show full compatibility with Microsoft Project Online Desktop Client. LLNS, at the discretion of the STR, may request a demonstration to verify compatibility.

2.1.2 Use the following settings:

- (a) Options > Schedule > Calculation Options
 - (1) Check the box for 'Actual costs are always calculated by Project'
- (b) Options > Schedule > Calendar Options
 - (1) Fiscal year starts in October
- (c) Options > Advanced > Earned Value Options
 - (1) Set Default task Earned Value Method to 'Physical % Complete'
- (d) Using 'Rollup' column, set all activities to 'Yes'
- (e) All tasks must be set to Auto Scheduled

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- 3.1.1 Develop schedule, as a minimum, to an AACE International level 3 control schedule for status and reporting. Show the sequence in which the Subcontractor proposes to perform the work and dates on which the Subcontractor contemplates starting and completing the schedule activities. Schedule the entire project, including the design (if applicable) and construction (including commissioning) sequences. Scheduling of design and construction is the responsibility of the Subcontractor. Subcontractor management personnel must actively participate in the schedule development. Designers and lower-tier subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate project schedule. Provide a schedule that is forward planning as well as a project monitoring tool.
- (a) Subcontractor's Project Schedule: Use the Subcontractor's project schedule to measure the progress of the work and to aid in evaluating time extensions. Make the schedule cost-loaded and CSI MasterFormat activity-coded (use the latest edition of MasterFormat). Cost-load as a single project resource, at \$1/unit and as an activity resource assignment. Make the cost-load level of detail consistent with the schedule of values, do not make cost-loading more detailed unless directed in the Project Requirements Document. The Subcontractor's project schedule is the basis for progress payment evaluation. If the Subcontractor fails to submit the schedule within the time prescribed, LLNS may withhold approval of progress payments until the Subcontractor submits the required schedule.
- (b) Schedule Status: Provide a schedule status on at least a monthly basis. If, in the opinion of LLNS, the progress of the work falls behind the Subcontractor's project schedule, take steps necessary to improve progress, including steps that may be required by LLNS, without additional impacts in this circumstance, LLNS may require the Subcontractor to increase the number of shifts, overtime operations, and days of work. LLNS may also require the Subcontractor to submit a supplementary schedule or schedules, updated weekly, as LLNS deems necessary to demonstrate how the scheduled rate of progress will be regained. (See article 3.05 Submission Requirements.)
- 3.1.2 Additional Schedule Content for Defense Priority Allocation System (DPAS) Rated Orders
- (a) In the event LLNS has designated certain long lead items as critical and DPAS rated under this Subcontract, the Subcontractor is responsible for rating the associated purchase orders, for updating status, and for expediting delivery of these items to ensure there is no impact to the critical path. The Subcontractor's schedule submittals must include at least the following milestones for the DPAS rated items: material submittals, order placement, design, material/subcomponent receipt, fabrication, inspection, shipment release, and delivery.

3.2 CONSIDERATIONS FOR PAYMENT

- 3.2.1 Cost-load the schedule commensurate with the subcontract schedule-of-values.
- 3.2.2 Use CSI MasterFormat at level 3, minimum (e.g., 03 15 19 - Cast-in Concrete Anchors), for the schedule of values (refer to Subcontract for further schedule of values requirements)

3.2.3 Produce schedules compliant with division 01 requirements and incorporate LLNS comments. If the Subcontractor believes a LLNS comment to the Subcontract schedule constitutes a change rather than a value added correction or administrative revision, then the Subcontractor should notify the contract analyst of the impact prior to proceeding.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

3.3.1 Critical Path Method: Use the critical path method (CPM) of network calculations to generate the project schedule. Prepare the project schedule in the precedence diagram method (PDM).

3.3.2 Level of Detail: LLNS will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

(a) Activity Durations:

- (1) Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods.
- (2) Ensure that there are no non-procurement and non-level-of-effort activities that have original durations (OD) greater than 30 calendar days.
- (3) Limit activity duration, except procurement and level-of-effort to no more than 45 calendar days.

(b) Design (if design-build project) and Permit Activities: Include design and Subcontractor permit and authorization activities with the necessary meetings and follow-up actions and design package submission dates. Include the design schedule in the project schedule; show the sequence of events involved in carrying out the project design tasks within the specific subcontract period. Identify major design tasks, including those that control the flow of work. Include LLNS review and comment incorporation periods associated with each item.

(c) Procurement Activities: Include activities associated with the submittal; LLNS review cycle; acceptance; procurement; fabrication and delivery of long lead materials, equipment, fabricated assemblies; and items on the critical path. A typical procurement sequence includes the following string of activities: submit, accept, procure, fabricate, and deliver.

(d) Major Tasks: Include, at least the following list of tasks if part of the project scope. Allow 14 calendar days for LLNS review and comment:

- (1) Long lead material deliveries.
- (2) Deliverables as listed in other specification sections.
- (3) Escort support as needed.
- (4) Submission and acceptance of installed equipment lists.
- (5) Submission and acceptance of testing and air balance (TAB).
- (6) Submission of TAB specialist design review report.
- (7) Construction activities.
- (8) Interfaces with other LLNS operations.

- (9) Planned utility or building service interruptions. If an outage will interfere with LLNS' operations in the affected area, then describe the duration of the interference and the nature of the impact for the STR approval. Identify the affected buildings and duration of the planned outage. Note that outages may require considerable lead time to arrange; therefore, schedule them as far in advance as possible to avoid delays.
 - (10) Submission and acceptance of testing and balancing of HVAC plus commissioning plans and data
 - (11) Air and water balancing report.
 - (12) Commissioning.
 - (13) Controls testing plan submission.
 - (14) Controls testing.
 - (15) Performance verification testing.
 - (16) Other systems testing.
 - (17) Commissioning (including intermediate systems commissioning).
 - (18) Inspections as defined in section 01 70 00 - Execution and Close-Out Procedures.
 - (19) Correction of punch-list items.
 - (20) Close-out.
- (e) LLNS Activities: Show LLNS and other agency activities that could impact progress. These activities include, but are not limited to, acceptances, design reviews, environmental permit approvals by State regulators, permits supplied by LLNS (see section 01 41 26 - Permit Requirements), inspections, utility tie-in, Government-furnished equipment (GFE) and notice to proceed (NTP) for phasing requirements.
- (f) Activity Responsibility Coding (RESP): Assign responsibility code for activities to the Subcontractor, lower-tier-subcontractors, LLNS, or whoever is responsible for performing the activity. Activities coded with a LLNS code include, but are not limited to, LLNS design reviews, LLNS acceptances, environmental permit approvals by State regulators, GFE and notice-to-proceed (NTP) for phasing requirements. Code activities not coded with a LLNS responsibility code to the Subcontractor or lower-tier-subcontractor responsible to perform the work. Activities with more than one responsibility code are not allowed. Examples of acceptable activity code values are DOR (for the designer-of-record, ELEC (for the electrical lower-tier-subcontractor), MECH (for the mechanical lower-tier-subcontractor, and LLNS). Unacceptable code values are abbreviations of the names of lower-tier-subcontractors.
- (g) Subcontract Changes Coding (MODF): Assign activity code to activity or sequence of activities added to the schedule because of a subcontract modification or change order, when approved by LLNS, with a subcontract changes code. Key code values to the affected activities. Activity or sequence of activities added to the schedule because of alleged constructive changes made by LLNS may be added to a copy of the current schedule, subject to the acceptance of LLNS. Assign activity codes for these activities with a subcontract changes code. Key the code values to the Subcontractor's numbering system. More than one subcontract changes code per activity is not allowed.

- (h) Subcontract Work Breakdown Structure Coding (SWBS): Key code schedule activities to the provided SWBS element as well as to the applicable CSI element. Break down the authorized project scope using progressive elaboration to a greater level of definition -- from scope statement and work breakdown structure to logical or related sub element groupings down to specific scheduled activities -- to facilitate sufficient planning and invoicing granularity. Subcontractor may add additional lower levels of detail than the SWBS to better organize their work.
- (i) Phase of Work Coding (PHAS): Assign phase of work code to activities based upon the phase of work in which the activity occurs. Code activities to either a design phase or a construction phase. Code fast-track design and construction phases proposed by the Subcontractor to allow filtering and organizing the schedule by fast-track design and construction packages. If the subcontract specifies construction phasing with separately defined performance periods, identify a construction phase code to enable filtering and organizing of the schedule accordingly. Identify each activity with a single project phase and have only one phase of work code.
- (j) Category of Work Coding (CATW): Assign category of work code to activities based upon the category of work to which the activity belongs. Category of work code must include, but is not limited to design, design submittal, design reviews, review conferences, permits, construction submittals, construction submittal acceptances, acceptance, procurement, fabrication, delivery, weather sensitive installation, non-weather sensitive installation, start-up, test and turnover. Assign a category of work code to each activity.
- (k) Scheduled Project Completion and Activity Calendars: The schedule interval extends from award date to the required subcontract completion date. The subcontract completion activity ("End Project") is based on the required subcontract duration in the accepted subcontract proposal, as adjusted for approved subcontract time extensions. The first scheduled work period is the day after the award is acknowledged by the Subcontractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7-day calendar when the subcontract assigns calendar day durations for the activity such as a LLNS acceptance activity. If the Subcontractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and LLNS holidays. Assign the category of work code "weather sensitive installation" to those activities that are weather sensitive. LLNS will interpret work periods not identified as non-work periods on each calendar to mean the Subcontractor intends to perform work during those periods.
 - (1) Project Start Date: Start the schedule no earlier than the date on which the subcontract was executed. Include as the first activity in the project schedule an activity called "Start Project" (or award). Apply the "ES" (early start) constraint date of zero-day duration to the "Start Project" equal to the date that the NTP was executed.
 - (2) Schedule Constraints and Open-Ended Logic: Constrain completion of the last activity in the schedule by the subcontract completion date. Ensure that when the calculated early finish date of the last activity is later than the subcontract completion date the result of the schedule calculations is negative float.

- (A) Include as the last activity in the project schedule an activity called "End Project". Ensure that the "End Project" activity has a late finish ("LF") constraint date equal to the subcontract completion date for the project, and with a zero-day duration or by using the "project must finish by" date in the scheduling software.
 - (B) No constrained dates other than those specified in the subcontract are allowed.
 - (C) The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.
 - (D) Only two open-ended activities are allowed: "Start Project" (or award) with no predecessor logic and "End Project" with no successor logic. Activities must have a predecessor and a successor with no dangling activities.
- (I) Interim Completion Dates: Constrain contractually specified interim completion dates, using soft constraints, to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.
- (1) Out-of-Sequence Progress: Activities that have progressed before preceding logic has been satisfied (out-of-sequence progress) is not allowed. Propose logic corrections to eliminate out-of-sequence progress. Use retained logic, not progress override, to correct out-of-sequence logic prior to submitting status.
 - (2) Negative Lags and Start to Finish Relationships: Negative value lag durations contained in the project schedule are not allowed. Do not use start-to-finish (SF) relationships.
 - (3) Calculation Mode: Retain the logic between predecessors and successors schedule calculations even when the successor activity starts, and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started, and the predecessor logic is not satisfied ("progress override") is not allowed.
 - (4) Milestones: The schedule must include milestone activities for each significant project event. At a minimum, the following design milestones are required: schematic design phase complete, design development phase complete, and construction documents phase complete. Minimum construction milestones are: notice-to-proceed, permits acquired, long-lead items acquired, foundation/substructure construction complete, 50 percent construction complete, 100 percent construction complete, commissioning complete, and beneficial occupancy.
 - (5) Total Float: Total float must be less than 2 reporting periods.
 - (6) Weather
 - (A) Include time for anticipated delays attributable to weather based upon average climatic range provided by the National Weather Service or another approved source.
 - (B) Include as a weather delay buffer at the end of construction, but prior to subcontract construction completion milestone. Unanticipated delays may be due to unusually severe weather with adverse/delay impact. This delay must be documented in daily reports (see section 01 33 00 - Submittal Procedures for daily report details) and substantiated with measured and validated data.

3.4 PROJECT SCHEDULE SUBMISSIONS

3.4.1 Provide the submissions as described below. The data, Gantt charts, reports, and network diagrams required for each submission are described in the article "Submission Requirements."

3.4.2 Initial Project Schedule Submission

- (a) Submit the initial project schedule for acceptance within 14 calendar days of Subcontract award.
- (b) Demonstrate a sequence of activities that represent work through the entire subcontract performance period.
- (c) [This paragraph applicable to design-build projects only.] Include in the design-build schedule detailed design and permitting activities, including, but not limited to, identification of individual design packages; design submission, reviews and conferences; subcontractor permit and authorization submissions and required LLNS actions; and long lead item acquisition prior to design completion. Also cover in the preliminary design-build schedule the entire construction effort with as much detail as is known at the time; however, as a minimum, include construction start, 50 percent construction complete, and 100 percent complete milestones and detailed construction activities through the dry-in milestone, including activity coding and cost loading.
- (d) Reconcile cost-loaded activities with the subcontract schedule-of-values. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by LLNS acceptance of associated designs.
- (e) When the design is complete, update the construction schedule and resubmit.

3.4.3 Design Package Schedule Submission: With each design package submitted to LLNS, submit a fragment schedule extracted from the then current Preliminary, Initial or Updated schedule that covers the activities associated with that Design Package including construction, procurement and permitting activities.

3.4.4 Periodic Schedule Updates: Based on the result of the meeting, specified in periodic schedule update meetings, submit periodic schedule updates, along with invoice and accruals. These submissions will enable LLNS to assess Subcontractor's progress. Update the schedule to include detailed, lower WBS level construction activities as the design progresses, but not later than the submission of the final, unreviewed design submission for each separate design package. LLNS may require submission of detailed schedule activities for distinct construction that is started prior to submission of a final design submission, if such activity is authorized.

3.5 SUBMISSION REQUIREMENTS

3.5.1 Submit the following items for the initial schedule and every periodic schedule update throughout the life of the project:

- (a) Data: Provide baseline and current working status file data containing the project schedule in the backup format. Include previous update backup files. Label each submittal indicating the type of schedule (e.g. initial or update), full subcontract number, data date, and file name. Provide each schedule with a unique file name. Submit as required in section 01 33 00 - Submittal Procedures.
- (b) Approved Changes Verification: Include only those project schedule changes in the schedule submission that have been previously approved by LLNS. Specifically reference in the narrative report on an activity-by-activity basis, changes made since the previous period and relate each change to documented, approved schedule changes.

3.6 PERIODIC SCHEDULE UPDATE MEETINGS

- 3.6.1 Conduct monthly (unless directed otherwise in the Project Requirements Document) schedule update meetings for the purposes of reviewing the Subcontractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy. The Subcontractor's project manager and authorized scheduler must attend the meeting.
 - (a) Meetings must occur by the fifth working day of the calendar month and after the Subcontractor has updated the schedule with LLNS concurrence reflecting actual start dates, actual finish dates, remaining durations, and percent complete for each activity with updated status.
 - (b) Bring a laptop computer with the scheduling software loaded for the meeting to allow meeting participants to view the proposed schedule update during the meeting. The meeting and resultant acceptable schedule update must be a condition precedent to a formal submission of the update as described in "Submission Requirements" article and to the submission of an invoice for payment. The meeting will be a working interactive exchange that will allow LLNS and the Subcontractor the opportunity to review the updated schedule on a real time and interactive basis.
 - (c) Organize, sort, filter and schedule the update as requested by LLNS.
 - (d) Submit a rough draft of the proposed activity logic corrections to the STR 48 hours in advance of the meeting.
- 3.6.2 Update Submission Following Progress Meeting: Submit a complete update of the project schedule containing accepted progress, revisions, and adjustments, pursuant to "Submission Requirements" article not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.
- 3.6.3 Status of Activities: Update information, including actual start dates (AS), actual finish dates (AF), remaining durations (RD), and percent complete are subject to the acceptance of LLNS prior to the meeting. As a minimum, address the following items on an activity-by-activity basis during each progress meeting.
 - (a) Start and Finish Dates: Accurately show the status of the AS and AF dates for each activity currently in-progress or completed since the last update. Only assign AS dates when actual progress occurs on an activity.

- (b) Remaining Duration: Update the estimated RD for incomplete activities independent of percent complete. Remaining durations may exceed the activity OD or may exceed the activity's prior update RD if the STR considers the current OD or RD to be understated based on current progress, insufficient work crews manning the job, unrealistic OD, or deficiencies that must be corrected that restrain successor activities.
- (c) Percent Complete: Use physical percent complete. Update the percent complete for each activity started, based on the realistic objective measurable assessment of earned value. Activities that are complete except for remaining minor punch list work and that do not restrain the initiation of successor activities may be declared 100 percent complete. To allow for proper schedule management, cost-load correcting the punch list from LLNS pre-final inspection activities not less than 1 percent of the total Subcontract value, which activities may be declared 100 percent complete upon completion and correction of punch list work identified during LLNS pre-final inspections.

3.7 WEEKLY COORDINATION MEETINGS

- 3.7.1 LLNS and the Subcontractor must meet weekly between the meetings described in paragraph "Periodic Schedule Update Meetings" in section 01 31 19 - Coordination and Meetings for jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and approved schedule update must be used for the purposes of this meeting and for the production and review of reports.
- 3.7.2 Provide a Gantt chart produced by the scheduling software, organized by total float and sorted by early start date, and a three week "look-ahead" schedule by filtering schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by work area code and sorted by early start date. Also show the status of the prior week tasks – one-week look-back. The 3-week look-ahead schedule must always show the following activities:
 - (a) Security escorts.
 - (b) Lock-out / tag-out (LOTO).
 - (c) Building Department inspections.
 - (d) High-hazard activities, such as hoisting and rigging, hazardous material abatement pre- and post-inspection, confined space entry, hazardous waste disposal.
 - (e) Other activities requested by the STR.
 - (f) LLNS and the Subcontractor must jointly review the schedules. If it appears that activities on the longest path(s), which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily, and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes, but is not limited to, the following: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if activities coded as LLNS responsibility require LLNS corrective action.

3.8 DIRECTED CHANGES

- 3.8.1 If issued a directed change order (DCO) for work prior to settlement of price, time, or both, submit proposed schedule revisions to LLNS within two weeks of the DCO being issued. LLNS will accept proposed revisions to the schedule prior to inclusion of those changes within the project schedule. The Subcontractor must include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated.
- 3.8.2 If the Subcontractor has objections to the revisions furnished by LLNS, advise LLNS within two weeks of receipt of the revisions. Regardless of the objections, the Subcontractor must continue to update the schedule with LLNS's revisions until an agreement in the revisions is reached.
- 3.8.3 If the Subcontractor fails to submit alternative revisions within two weeks of receipt of LLNS's proposed revisions, the Subcontractor will be deemed to have concurred with LLNS's proposed revisions. The proposed revisions may be the basis for an equitable adjustment for performance of the work.

3.9 OWNERSHIP OF FLOAT

- 3.9.1 Float is not for the exclusive use of either LLNS or the Subcontractor; it is jointly owned by both and is a resource available to and shared by both parties as needed to meet subcontract milestones and the Subcontract completion date. The use of resource leveling, or other techniques used for artificially adjusting activity durations to consume float and influence critical path is prohibited. Do not sequester shared float through strategies such as extending activity duration estimates to consume available float, using preferential logic, or using extensive crew/resource sequencing, constraints, unnecessary milestones, leads or lags on logic ties, and hammock type activities.

END OF SECTION 01 32 13.10

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SECTION 01 32 13.11 PROJECT SCHEDULE FOR MAJOR PROJECTS

PART 1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Schedule development requirements for design-build and construction-only major projects, including engineering, construction, and commissioning elements. This section includes developing and submitting the project critical path method (CPM) schedules, updates, supplementary schedules, recovery plan schedules, changes, validation, schedule-of-values, and invoicing schedules.

1.1.2 Scheduling software requirements

1.2 REFERENCES

1.2.1 15 CFR 700 - Defense Priorities and Allocations System; current edition.

1.3 DEFINITIONS

activity. A portion or element of work, action, or reaction that is precisely described, readily identifiable, and is a function of a logical sequential process.

baseline schedule. The approved plan against which the project's actual performance, with respect to accomplishing the work scope contained within each detail activity, is measured. Once the integrated project schedule (IPS) is approved by LLNS, it will be considered "baselined." At this time, the dates, resource costs, activity codes, work breakdown structure, and activity descriptions are fixed unless changes are executed through a documented and approved change control process.

construction schedule. Same as IPS schedule.

critical activities. Activities on the longest path. Longest path and near-critical activities must not make up more than 20 percent of all activities within the baseline schedule.

critical path. The longest continuous chain of activities (may be more than one path) that establishes the minimum overall project duration. Critical path activities are the project tasks that must start and finish on time to ensure that the project ends on schedule. A delay in a critical path activity will delay completion of the project unless the project plan can be adjusted so that successor tasks can finish more quickly than planned.

Defense Priority Allocation System (DPAS). In accordance with the Defense Production Act, LLNS assigns DPAS ratings (e.g., DX-E1 or DO-E2) to certain subcontracts or items when they have been determined to be required for national defense use under DPAS regulation (15 CFR 700). Subcontractor is required to expedite these items and provide detailed schedule information.

element of cost. A basic unit of planning in earned value, such as labor, travel, material, lower-tier subcontracts, and other direct costs.

free float. Maximum amount by which an activity can be delayed beyond its early dates without delaying a successor activity beyond its early dates.

IPS schedule. The schedule developed by the Subcontractor and approved by LLNS that will be used for managing and monitoring the progress of the subcontract. This is a plan that defines when Work is to be done to accomplish program objectives on time.

IPS level 3 schedule. A level 3 schedule (or level 3 control schedule), as defined by AACE International, is the control level generally prepared to communicate the execution of the deliverables for each of the subcontracting parties. The schedule reflects key interfaces and shows enough detail to map the critical activities.

long lead materials. Items that are not readily available off-the-shelf.

longest path (LP). The longest continuous path of activities through a project, which controls project early completion. It is possible for otherwise defined critical path activities to not be on the longest path and longest path activities to not show calculated critical float. The longest path analysis is unaffected by activity calendars. The longest path is determined by the string of activities, relationships, and lags, that push the project to its latest, early finish date.

MasterFormat. A publication of Construction Specifications Institute (CSI) and Construction Specifications Canada (CSC) comprising a master list of numbers and titles classified by work results. It is primarily used to organize project manuals and detailed cost information, other written information for commercial and institutional building projects, and to relate drawing notations to specifications.

milestones. A significant point or event in the project.

near critical. Paths having total float of up to 14 calendar days (10 work days) or more than the greatest float value found on the longest path

near critical path float (secondary float). An activity or set of activities that are almost critical or are at risk of becoming critical if delayed past their expected completion times. Inclusion in this list may be made by using total float, longest path value, or multiple critical paths. Typically, the value associated with these near-critical path activities are approximately one-half of the reporting period's duration or less.

negative float. (1) The amount of time by which the early date of an activity exceeds its late date. It is how far behind an activity is from its planned early start/finish date. (2) Time by which the duration of an activity or path must be reduced in order to permit a limiting imposed date to be achieved. Negative float is not allowed.

network float. The total float values that exist on the various chains of activities within the CPM network. Distinguished from project float.

percentage complete. The physical percentage of completion; not the resource or duration percentage complete.

precedence method. Scheduling system where relationships between activities are expressed from start or finish of an activity to start or finish of the succeeding activity, with minimal use of lead or lag time.

project total float. The length of time between the Subcontractor's projected completion milestone and the subcontract completion date milestone.

remaining duration. Equal to the factor of the remaining percentage of completion times the original as-planned duration, or as approved by LLNS.

remaining float (RF). The difference between the early finish and the late finish.

weather:

adverse weather. Normal weather events that negatively affect the productivity of workers and/or that may affect a project's critical path or consume float. Adverse weather represents conditions that should be expected during project execution that may impact work progress.

adverse/delayed impact by weather. Demonstrated evidence the actual adverse weather delay days prevented work on critical path activities for 50 percent or more of the Subcontractor's scheduled workday.

normal weather. Weather that is expected for a period of time based upon the historical weather conditions for the locale. Normal weather includes weather that is and is not adverse as would be expected for a particular location.

measured and validated. Weather data collected by LLNS at a defined collection point and provided to the Subcontractor.

severe weather. A weather event, which is in itself severe and can be of violent nature.

weather event. A storm or significant weather condition that stops or appreciably hinders work until it has passed or the effects of the weather condition have dissipated. This may include rain, rising water, snow, ice, extreme cold, high winds, extreme heat and/or high humidity, or weather related occurrence. The weather event may not be localized at the site as in the case of flood water from an upstream rain event.

supplemental schedules. Those schedules that are not part of the baseline schedule hierarchy (working and baseline). They are often used for day-to-day operational planning and management and may supplement the baseline and working schedules, but they are not under configuration (change) control. This category includes "what-if" schedules generated to evaluate potential alternate management options.

time impact analysis (TIA). The TIA is a forward-looking, prospective schedule analysis technique that adds a modeled event or events to an non-impacted schedule to determine the potential impact of that event(s) to the longest path and therefore project completion. The prospective TIA procedure is performed while a project is on-going, and thus has a forward-looking or a prospective analysis perspective in near-real time context. This TIA practice concerns itself only with time aspects.

total float (TF). Total float represents the total potential slack time available to an activity until it becomes critical path. It is calculated assuming prior activities are finished as early as possible and following activities are started as late as possible. Total float is shared with other activities along a path and its availability is subject to its use by those other activities. Total float is measured as the difference between the early and late start dates (LS minus ES) or the early and late finish dates (LF minus EF). It is the maximum number of work periods by which an activity can be delayed without delaying project completion or violating a target (milestone) finish date. Float can be measured in hours, days, weeks, or months depending on the project's planning unit, and can have negative, zero, or positive values.

working schedule. Once the baseline CPM schedule has been established, it will be necessary to update actual progress on a predetermined basis and compare it to the baseline CPM schedule. The working schedule is used for that purpose. The updated activities, when compared with the baseline dates, provide an indication of the schedule performance for the overall project.

NOTE: The working schedule and baseline schedule are not the same file within the scheduling software. They may be attached, but at no time should the baseline schedule contain status. Working schedules are also called "current" or "forecast" schedules.

zero float. A condition where there is no excess time between activities or along a path of activities. An activity with zero float is considered a critical activity. An activity has zero float when the early and late start/finish dates equal each other. Activities with zero float are on the critical path(s) of the project.

1.4 CONSTRUCTION-ONLY SUBCONTRACTS

1.4.1 If the subcontract is for construction only, ignore directions pertaining to design.

1.5 SCHEDULER QUALIFICATIONS

1.5.1 Retain a project scheduler to perform the scheduling, invoicing, and managing of the project controls requirements. The scheduler must be proficient in Primavera P6 and scheduling methodologies, and must have performed the scheduling duties on several construction projects of similar size and complexity for the duration of this project.

1.5.2 The project scheduler must participate in the monthly meeting at the job site in-person, or via phone, as required by the LLNS subcontract technical representative (STR). The project scheduler is considered a member of the Subcontractor's key personnel.

1.6 SUMMARY

1.6.1 Prepare and maintain a detailed cost loaded baseline schedule using critical path method (CPM).

1.6.2 Submit planned value (PV) and performance (physical percent complete) data based on the approved baseline schedule and progress to date.

1.6.3 Prepare and maintain a detailed cost loaded baseline schedule using CPM.

1.6.4 Use this baseline (target) schedule to plan, organize and execute the entire scope of work.

1.6.5 Develop, maintain, and submit a monthly cost-loaded forecast schedule to use to record actual performance, report status, and report the critical path to contract completion.

1.6.6 Prepare to discuss the schedule development, the progress, and the logic in detail.

1.7 SCHEDULE OF VALUES

1.7.1 Ensure that the cost loaded schedule aligns with the schedule-of-values (SOV).

1.7.2 Code activities in the schedule, that have been loaded with a budgeted cost, to the appropriate pay item in the SOV, in agreement with the subcontract terms. Use these cost-loaded activities for monthly payment applications.

1.7.3 Export the SOV data to an Excel spreadsheet. Ensure that the data vertically aligns with the LLNS supplied work breakdown schedule (WBS). Use this spreadsheet when applying for payment.

1.8 SUBMITTALS

1.8.1 Submit electronic copies (*.XER) of the schedule and SOV to LLNS as required in this specification.

1.8.2 Submit the current forecast schedule monthly per the LLNS business rhythm calendar.

1.8.3 Submit a revised baseline schedule only when there is a LLNS approved change in the baseline scope or work, subcontract cost, or schedule that has been enacted via Subcontract revision (imposed finish date, original duration and, or logic) or upon LLNS request.

1.8.4 Submit the following:

- (a) As applicable: baseline schedule and revised baseline narrative
- (b) Monthly: forecast schedule
- (c) Monthly: project narrative progress report
- (d) Monthly: invoice and SOV
- (e) Weekly: four-week rolling schedule
- (f) Daily: daily force and activity report

1.8.5 Required Schedule Submittal Formats

- (a) Submit the baseline, forecast, and four-week rolling schedule in the electronic native P6 file (*.XER) and in PDF format.
- (b) Format
 - (1) .pdf to landscape on 11-inch by 17-inch sheets
 - (2) font size minimum 10 pt.
 - (3) P6 file layouts clearly defined or labeled

1.8.6 Content Format

- (a) Format the schedules as follows:
 - (1) Provide the following in the title block of each schedule submission:

project start date	project finish date
data date	run date
file name	Subcontractor name
project title	brief title describing the schedule (e.g., "4 week rolling")
page# of#	

- (2) Provide the following columns in each schedule (baseline, forecast and 4-week rolling) at a minimum, (in order from left to right):
 - (A) Activity ID
 - (B) Activity Description
 - (C) SOV Cost
 - (D) Original Duration (OD)
 - (E) Remaining Duration (RD)
 - (F) Actual Duration (AD)
 - (G) Activity Percent Complete
 - (H) Early Start (ES)
 - (I) Early Finish (EF)
 - (J) Late Start (LS)
 - (K) Late Finish (LF)

- (L) Start
- (M) Finish
- (N) Total Float (TF)
- (O) Variance to Target 1 EF (Target 1 = baseline schedule)
- (3) Make the activity bars visible on the balance of the paper schedule.
- (4) Show total float and free-float times. Float is not for the exclusive benefit of either LLNS or the Subcontractor.
- (5) Show the following information for each activity:
 - (A) Identification by node number
 - (B) A unique description of each activity, including shop drawings submittal and approval; and ordering and delivery of major materials and equipment that are part of the work.
 - (C) Define the activity (scope) using action (verb) and its output (deliverable, noun) whenever possible in the activity name (The description for site activities should be in enough detail to identify the activities by location and, or elevation.)
 - (D) Maintain estimated durations for each activity between 1 day and 2 fiscal calendar months (shop drawing approvals; and material and equipment deliveries may exceed 2 fiscal calendar months).
 - (E) The sequence, restraints and interfaces between and among Subcontractor's activities, as well as the sequence, restraints and interfaces between Subcontractor's activities and the activities of separate Subcontractor or known lower-tier subcontractor or by LLNS.
 - (F) The dollar value loading, loaded as a non-labor resource titled "S/C Cost," (Subcontractor) on each activity. Do not use P6 Expenses. The sum of all activity dollar values must equal the total amount of the Subcontract SOV.
 - (G) Provide the following columns on the four-week rolling schedule at a minimum:

Activity ID	Activity Description
Remaining Duration (RD)	Percent Complete
Baseline Start (ES)	Baseline Finish (EF)
Start	Finish
Total Float (TF)	Variance to Baseline

- (H) Include in the activity notepad associated LLNS required items such as requests-for-information, key submittals or other items that may prevent successful execution of the work per the planned schedule. Include comments in the schedule (and in monthly narrative report) items that are behind schedule.
- (b) Monthly Project Narrative Minimum Content
- (1) Accomplishments
 - (2) Issues impacting construction

- (3) Changes to the forecast, dates, key milestones, logic, updates
 - (4) Explanation of variance from prior month
 - (5) Implementation of contract change orders
 - (6) Discussion on critical path, near critical path(s), and comparison to prior submittal
 - (7) Risks, threats, and opportunities
 - (8) LLNS required items in the next month, including government furnished equipment
 - (9) Recovery plan and corrective actions
- (c) Schedule-of-Values (SOV)
- (1) Submit the SOV in a Microsoft Excel spreadsheet.
 - (2) Show cost and performance for the current period and cumulative to date.
 - (3) Include error checking or conditional formatting to detect cumulative performance cost to date exceeding the schedule of value amount for each line item and reconcile to cost loaded P6 activities.

1.8.7 Submission Timeline

- (a) Submit within 10 calendar days following subcontract award, a partial schedule consisting of a precedence network diagram using the critical path method to show each individual essential activity in sequence for the first 60 calendar days of work.
- (1) Show durations and dependencies including off-jobsite activities such as design, fabrication of equipment, procurement, delivery of materials, and items furnished by LLNS.
- (b) Submit, for approval, within 30 calendar days following subcontract award and before the first progress payment is made, a complete baseline schedule. This baseline schedule must not contain project status.
- (1) Include a precedence network diagram using the critical path method to show each individual essential activity in sequence. The longest path (usually the path with the least total float) determines the critical path.
 - (2) Show durations and dependencies including off-jobsite activities such as design, fabrication of equipment, procurement, delivery of materials, submittal dates, and items furnished by LLNS.
 - (3) Reconcile cost loading to subcontract value.
 - (4) Hold baseline schedule under configuration control to prevent unauthorized changes.

PART 2 PRODUCTS

2.1 SOFTWARE

2.1.1 Develop schedules in Primavera P6, version 18.8 or another version compatible with and approved by LLNS.

2.2 SOFTWARE SETTINGS

2.2.1 Provide a schedule that encompasses the following settings and codes.

2.2.2 Prepare the schedule in accordance with the following P6 settings and parameters. Deviation from these P6 software settings and parameters, without written consent of the STR, may be cause for rejection of schedule submission.

2.2.3 Schedule Software Settings and Restrictions

- (a) Activity Date and Time Constraints: No constraint dates other than award and the contract complete milestone are allowed.
- (b) Handle schedule calculations and out-of-sequence progress (if applicable) only through retained logic.
- (c) Identify and correct out of sequence logic and negative float prior to submitting the schedule.
- (d) Minimize redundant logic ties. Predecessor ties not to exceed 15 logic ties.
- (e) Demonstrate all levels of schedules including supplementary schedules, monthly at a minimum, horizontal and vertical traceability.
- (f) Do not use resource leveling, constraints, or other techniques for the purpose of artificially adjusting activity durations to consume total or free float or otherwise influence critical path.

2.2.4 Software Settings

- (a) Never use progress override.
- (b) Show activity durations and float values in calendar days.
- (c) Show activity progress using remaining duration.
- (d) Set default activity type to "task dependent."
- (e) Use expected finish for the ongoing activities.
- (f) General: Define or establish calendars and activity codes ONLY at the "Project" level, not the "Global" level. Utilize and comply with the provided LLNS monthly business calendar with fiscal month end dates and holidays.
- (g) Set the following parameters in the P6 Web Application to the following standard:
 - (1) Set time periods for P6 to 8.0 hours/day, 40.0 hours/week, 173.3 hours/month and 2080.0 hours/year.
 - (2) Use the provided calendar to specify the number of work hours for each time period; check the box for LLNS assigned calendar.
 - (3) Check the box "Budgeted Values with Current Dates" for earned value calculation.
- (h) Project Level: Dates Tab
 - (1) Set "Must Finish By" date to "Subcontract Completion Date" and set "Must Finish By" time to 05:00 pm.
- (i) Project Level: Defaults Tab
 - (1) Duration Type: Set to "Fixed Duration & Units."
 - (2) Percent Complete Type: Set to "Physical."
 - (3) Activity Type: Set to "Task Dependent."

- (4) Calendar: Select the provided LLNS calendar for activities. Calendar must reflect Saturday, Sunday and LLNS federal holidays as non-workdays and other LLNS non-workdays. Alternative calendars may be used with prior STR approval.
- (j) Project Level: Calculations Tab
 - (1) Uncheck "Activity Percent Complete Based on Activity Steps"
 - (2) Check "Reset Remaining Duration and Units to Original"
 - (3) Check "Actual to Remaining"
 - (4) Uncheck "Recalculate Actual Units and Cost When Duration Percent Complete Changes"
 - (5) Check "Link Actual to Date and Actual This Period Units and Cost"
 - (6) Set "Default Price / Unit for Activities Without Resources or Role Price / Units (Non labor) Price/Unit" to \$1
 - (7) Uncheck "Update Units When Costs Change on Resource Assignments"
- (k) Project Level: Settings Tab
 - (1) Define Critical Activities: Check "Total Float Less Than or Equal To" and add 0 days.
- (l) Work Breakdown Structure Level: Earned Value Tab
 - (1) Technique for Computing Performance Percent Complete: Select "Activity Percent Complete"
 - (2) Technique for Computing Estimate to Complete (ETC): Select "PF = 1"

2.3 MINIMUM SOFTWARE CODING

2.3.1 Use only P6 project level codes for the P6 codes, do not use P6 global codes.

2.3.2 Work Breakdown Structure and Activity Code

- (a) LLNS will provide the project level work breakdown structure (WBS) for the Subcontractor to add further detail, WBS levels, and organize the project scope.

2.3.3 Change Order Code.

- (a) Code the new or affected schedule activities with the applicable subcontract modification identification for each subcontract modification change order.

2.3.4 Assigned Calendars

- (a) Use the provided LLNS P6 calendar for activities, and reflect LLNS month end dates, required holidays and anticipated non-work days. Add the LLNS operations to the CPM scheduled activities. This calendar is a five-day, one shift, work including established holidays and non-workdays. Work scheduled on a different calendar must be pre-approved by LLNS.

2.3.5 Abbreviations, Acronyms, other Subcontractor Codes Defined

- (a) Clearly describe abbreviations, acronyms, and other codes used in P6 and other documentation, in a legend or table attached to each of the CPM schedule and other submittals.

2.4 DELETION OF ACTIVITIES

2.4.1 During schedule changes, do not renumber, delete, re-purpose, or rename an activity once it exists on the schedule to change the scope of the activity and do not remove it from the schedule logic.

- 2.4.2 When an activity is no longer applicable, but not started, maintain within the logic stream for historical record, change the activity to a milestone and clearly label "No Longer Required" after the activity description.
- 2.4.3 When a started activity is no longer applicable, cut at termination date, set budget equal to performance and leave in logic path. Redistribute remaining budget associated with discontinued or non-applicable activity through a deductive change order or another approved activity.
- 2.4.4 Document change in the activity/milestone's "notebook," including a date and explanation for the change, and who changed it or approved it. When authorized via change request, document changes in the activity's "notebook."
- 2.4.5 Never re-use the activity identification number for a "no longer required" activity.

2.5 RETROACTIVE CHANGES

- 2.5.1 Retroactive changes are not permitted in the baseline or the forecast schedules; authorized changes are to occur in the future period.
- 2.5.2 Future planned work can be started earlier than indicated in the baseline schedule.

PART 3 EXECUTION

3.1 SCHEDULE DEVELOPMENT

- 3.1.1 Schedule Criteria: Identify and show activities required to complete the project in a timely manner and their dependency relationships. Show all schedule activities, such as key milestones, design, procurement, quality control, review cycles, construction, fabrication, installation, demolition, long lead or government furnished equipment, safety documents, commissioning, restoration, acceptance testing, training related activities, submittals and submittal stakeholder response cycle time. Submit schedule submittals with a well-defined, unconstrained, and continuous critical path from the Data Date to the final milestone "Subcontract Complete."
- 3.1.2 Use the LLNS provided [via P6] approved schedule template. Use this template to build the baseline and subsequent status schedules. The template contains the summary WBS, the activity codes definition (sort fields), the LLNS calendar, and the resource table. Maintain the integrity of the structure provided by LLNS.
 - (a) The Subcontractor may add to, but must not modify or delete the existing structure, fields, or tables.
- 3.1.3 Schedule the work activities to early start and early finish dates.
- 3.1.4 Determine the sequence and duration of the detailed construction activities.
 - (a) Approval of the Subcontractor's baseline schedule by LLNS in no way constitutes or should be construed as an admission or representation by LLNS that the baseline schedule, as approved, is feasible or practical. The Subcontractor assumes the risk of the practicality and feasibility of the baseline schedule.
- 3.1.5 Submit a complementary and detailed narrative description of its plan for performing the work. Summarize equipment and personnel requirements by craft to complete a cost loaded schedule.
- 3.1.6 Maintain the approved baseline schedule.

- 3.1.7 Submit a recovery plan if the work is 14 calendar days behind schedule. Ensure that the recovery plan for getting the work back on schedule has no additional impacts to LLNS. The plan is subject to review and approval by LLNS.
- 3.1.8 Promptly inform LLNS of proposed scope changes in the baseline schedule and narrative and furnish LLNS with a revised baseline schedule, justification, and narrative within 10 calendar days after approval by LLNS of such change. Keep the baseline schedule and narrative up-to-date and revise as subcontract modifications are issued.
- 3.1.9 Ensure that the revised baseline schedule and narrative shows sufficient detail, as determined by LLNS, to meet the requirements for completing any separable part of and all of the work. Do not modify milestone schedule dates with baseline revisions except to reflect subcontract change orders or modifications. Refer to the article "Baseline Schedule Freeze Period" for time constraints on baseline changes.
- 3.1.10 Rework: The following requirements apply to work activities that were previously completed or partially completed, and if rework will be performed in more than one reporting period:
- (a) Do not modify the baseline schedule due to rework.
 - (b) Updates are permitted in the current forecast schedule only.
 - (c) Do not revise previously completed activities.
 - (d) Reflect rework in new activities, per instructions for any other activities.
 - (e) Insert new activities, identified as "rework" activities in the title, into the schedule to reflect the scope of the rework and linked to ensure correct sequence of the work.
 - (f) Do not cost load rework activities.
- 3.1.11 Report project status in the monthly project narrative progress report.
- 3.1.12 Milestones
- (a) Initiate the baseline and forecast schedule with a milestone identified as "subcontract award" and terminate with a milestone identified as "subcontract complete". These specific milestones must be constrained.
 - (b) Include subcontract milestones.
 - (c) Include the major and intermediate milestones necessary to track important events in each WBS and schedule.
 - (d) Include milestones for 50 percent construction complete and 100 percent construction complete.
 - (e) Include a completion milestone for each major system at the level 3 WBS.
 - (f) Do not resource or cost load milestones.
- 3.1.13 Activity Requirements:
- (a) Breakout activities by lower-tiered subcontractor. Do not assign activities to more than one lower-tier subcontractor.
 - (b) Meet the following activity criteria:
 - (1) Unique identification number per activity.

- (2) Unique description, including shop drawings submittal; and approval, ordering and delivery of major materials and equipment to be incorporated into the work. Include activities with enough duration to accommodate LLNS review cycles. (The description for site activities should be in enough detail to identify the activities by location and, or elevation.)
- (3) Maintain estimated durations for each activity between 1 day and 2 fiscal calendar months (shop drawing approvals; and material and equipment deliveries may exceed 2 fiscal calendar months).
- (4) Do not tie discrete activities to level of effort activity scope, either in predecessor or successor logic, and never influence the critical path or influence driving paths. Do not mix level of effort and discrete scope effort in the same work package.
- (5) The sequence, restraints, and interfaces between and among Subcontractor's activities, as well as the sequence, restraints and interfaces between Subcontractor's activities and the activities of any separate Subcontractor or known lower-tier-subcontractor or by LLNS.
- (6) The dollar value loading each activity. The sum of activity dollar values equals the total amount of the Subcontract in both the baseline and the forecast status files.
- (7) Assign a WBS number to each activity that correlates its scope with the summary WBS in the project schedule provided in the schedule template. Add additional level(s) of detail to this WBS to manage the work.
- (8) Code each activity using the LLNS codes identified in this specification as well as in the provided template. Code activities that are added via change order with the Subcontract revision number in the "change order" code.
- (9) Activities with more than 0 percent complete must have an "actual start" date. Activities that are 100 percent complete must have an "actual finish" date.
- (10) Each activity must have TF measured against the Subcontract completion date as agreed to by the STR through an unobstructed logic string (no constraint dates other than award and the subcontract complete milestone).
- (11) Total float cannot exceed 44 days for a P6 activity.
- (12) Ensure that each cost-loaded activity greater than 60 calendar days has a quantity breakdown and unit of measure such that accurate progress can be recognized on activities that span multiple billing cycles.
- (13) Except for the two key milestones "subcontract award" and "subcontract complete," activities and milestones must have a minimum of one predecessor and one successor within the schedule logic.
- (14) Additionally, a start-to-start (SS) relationship cannot be the only successor tie for a single activity; there must be at least a finish-to-finish (FF) relationship as well.
- (15) If unavoidable, finish-to-finish lags must not be longer than the successor's original duration or 22 days, whichever is less.
- (16) Do not use lead, also called negative lag.
- (17) Do not use start-to-finish (SF) relationships.

- (18) Use greater than 85 percent finish-to-start logic.
- (19) Avoid redundant logic ties on activities and milestones.
- (20) Critical path activities must be less than 40 percent of total number of activities.
- (21) Do not use hard constraints, other than the contract award and completion milestones.
- (22) Activity durations: Whole day units based on the "LLNL Standard Work Hour Calendar."
Do not exceed two LLNL fiscal calendar months, unless otherwise agreed to by the STR except for the following:
 - (A) Non-resource loaded activities for fabrication, manufacture and delivery of equipment or materials.
 - (B) LLNS activities (e.g., inspections, reviews, approvals, LLNS-furnished equipment, or materials).
- (23) Cost-load (dollars) each activity (except for milestones and schedule visibility tasks (SVT)) to represent its value and correlate with the SOV.
 - (A) Note: SVTs are schedule tasks performed by others that are integral to the completion of the project and have zero budgets

3.1.14 Additional Schedule Content for Defense Priority Allocation System (DPAS) Rated Orders

- (a) In the event LLNS has designated certain long lead items as critical and DPAS rated under this Subcontract, the Subcontractor is responsible for rating the associated purchase orders, for updating status, and for expediting delivery of these items to ensure there is no impact to the critical path. The Subcontractor's schedule submittals must include at least the following milestones for the DPAS rated items: material submittals, order placement, design, material/subcomponent receipt, fabrication, inspection, shipment release, and delivery.

3.2 BASELINE SCHEDULE

- 3.2.1 No status in the baseline schedule.
- 3.2.2 Make changes to the baseline schedule via approved LLNL subcontract change order process.
- 3.2.3 Match the cost-loaded baseline schedule budgeted cost to the base value of the Subcontract plus approved change orders.
- 3.2.4 Weather
 - (a) Include time for anticipated delays attributable to adverse weather as a buffer at the end of construction, but prior to subcontract construction completion.
 - (b) See subcontract General Provisions clause entitled "Supplemental Construction Terms and Conditions" for reporting requirements and criteria that justifies weather delays. Only claim delays that exceed anticipated weather delays and available float and comply with the Subcontract article.
 - (1) Unanticipated delays may be due to unusually severe weather with adverse/delay impact. This delay must be documented in daily reports (see section 01 33 00 - Submittal Procedures for daily report details) and substantiated with measured and validated data.
 - (c) Monthly Anticipated Adverse Weather Delays. Assign a weather code to activities that could be impacted by adverse weather.

- 3.2.5 Match the total value of the activities to the value of the pay items.
- 3.2.6 Use the baseline schedule as the basis for and reconcile to the SOV.
- 3.2.7 The data date in the baseline must be prior to the award date milestone and remain stationary.

3.3 PERIODIC SCHEDULE UPDATE MEETINGS

- 3.3.1 Conduct monthly (unless directed otherwise in the PRD) schedule update meetings for the purposes of reviewing the forecast schedule and the Subcontractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy.
- 3.3.2 Meetings must occur by the fifth working day of the calendar month and after the Subcontractor has updated the schedule with LLNS concurrence respecting actual start dates, actual finish dates, remaining durations and percent complete for each activity it intends to status.
- 3.3.3 Bring a laptop computer with the scheduling software loaded for the meeting which allows meeting participants to view the proposed schedule update during the meeting.
- 3.3.4 The meeting and resultant acceptable schedule update must be a condition precedent to a formal submission of the update.
- 3.3.5 Unless otherwise indicated by LLNL, the data date for the submitted forecast schedule must correspond to the first day of the following fiscal month per LLNL financial calendar. LLNS will provide a financial calendar annually.
- 3.3.6 The forecast schedule budgeted cost must always match the base value of the Subcontract value plus approved change orders.
- 3.3.7 The updates must be accompanied by the following information as required:
 - (a) When the forecast schedule impacts the "Subcontract Complete" milestone date by more than 7 calendar days and less than 14 calendar days, the written narrative must explain the reasons for the impact. The narrative must:
 - (1) explain in clear terms what activities are causing the impact.
 - (2) address relevant corrective action to regain schedule; and
 - (3) provide an evaluation as to whether the trend will improve or will continue to impact the end date.
 - (b) Develop a detailed recovery schedule based on a copy of the last status file (*.XER format). Submit narrative recovery plan within 7 calendar days of identification of a delay to the "Subcontract Complete" milestone date where the impact is 14 or more calendar days.
 - (1) On corrective action recovery schedule provide equipment, material, man-hour information, and crew size to justify duration changes. Identify existing information and planned information so that LLNS can easily identify and evaluate the changes.
 - (2) Identify required changes to the logic and furnish justification for the proposed changes.
 - (3) Provide details in the narrative describing actions to implement the recovery that are quantifiable Include the following items:
 - (A) Describe what the proposed changes will accomplish and their effect on the critical path.
 - (B) Identify the lower-tier subcontractors involved with the recovery plan.

- (C) For each activity that specifies overtime as a recovery plan, identify the amount of overtime required.
 - (D) Identify additional resources, changes in working time, workdays, shifts, and similar factors that are required for schedule recovery.
- (4) Review the recovery schedule and plan with LLNS to determine the effectiveness of the recovery schedule and to determine whether the Subcontractor has regained compliance with the Schedule. At the direction of LLNS, one of the following will occur:
- (A) If still behind schedule, prepare, in conjunction with LLNS, another recovery schedule at the Subcontractor's expense, to take effect during the immediate subsequent pay period.
 - (B) If the Subcontractor has sufficiently regained the time lost, then resume compliance with the original schedule.
- 3.3.8 Include the following data in the monthly schedule update (Schedule Status against approved Baseline):
- (a) Actual start and finish dates.
 - (b) Activity percent complete.
 - (c) Remaining duration for started activities.
 - (d) Forecast expected finish dates for activities that have started.
 - (e) Forecasted start dates that were scheduled to start but have not yet started as planned per the baseline (including their durations).
 - (f) Planned value through the data date.
 - (g) No status after the data date.
- 3.3.9 The week following submission of the monthly forecast schedule, host a 90-day look-ahead meeting to review the forecast schedule, see submittal layout requirements above. Include lower-tier subcontractors who are performing the work in the 90-day window.
- (a) Furnish color 11-inch by 17-inch copies of the schedules to meeting attendees.
 - (b) Lead a discussion about the schedule forecast, including the following topics:
 - (1) Status of submittals, RFIs, and change orders.
 - (2) Status of other required documents (e.g., lift plans, traffic plans, and utility outages)
 - (3) Status of fabrication, equipment, and materials
 - (4) Upcoming inspections
 - (5) LLNL support (e.g., potholing and equipment delivery)
 - (c) Discuss specific schedule activity concerns, LLNS interfaces, utility outages, delays and improvements that represent the general progress of the activities.

3.4 FOUR-WEEK ROLLING SCHEDULE

- 3.4.1 Prepare and submit a four-week rolling schedule as a weekly work plan. Indicate progress achieved versus planned for the previous week and planned progress for the next three weeks. Indicate scheduled activities, procurement deliverables, equipment, and specific items required from LLNS to achieve the planned performance. Submit the rolling schedule, in the format described in article "Submittals," by noon on the last workday of each week. This plan must also be vertical and horizontally traceable to the monthly P6 submittal.
- 3.4.2 The four-week rolling schedule will be reviewed at the weekly progress review meeting. Lead the discussion and present the progress to LLNS, including the following topics:
- (a) The number of personnel on site, planned progress, and actual progress for the previous week.
 - (b) Forecast progress for the next week and anticipated number of personnel and equipment, including security escorts.
 - (c) Anticipated utility outage requirements (e.g., lock-out/tag-out (LOTO)).
 - (d) Required LLNL operations interface needs (e.g., building department inspections, high-hazard activities, and hazardous waste disposal).
- 3.4.3 LLNS may require attendance by the lower-tier subcontractors performing scheduled activities.

3.5 UTILITY OUTAGES AND CLOSURES

- 3.5.1 To minimize disruption to other critical LLNL work, anticipate planned utility or building service interruptions in advance and indicate on the schedule for coordination. If an outage will interfere with LLNS' operations in the affected area, describe the duration of the interference and the nature of the impact for the STR's approval.
- 3.5.2 For scheduled outages, submit a request to the STR for approval in advance (see section 01 41 26 - Permit Requirements for details and advance notification requirements). Identify the affected buildings and duration of the planned outage, including the approval time. Note: Outages may require considerable lead time to arrange; therefore, schedule them as far in advance as possible to avoid delays.
- 3.5.3 The STR will coordinate with affected tenants, customers, and LLNL services as applicable.
- 3.5.4 If the discontinued service is due to an emergency breakdown, promptly notify the STR; the STR will notify the affected tenants, customers, and LLNL services.

3.6 SCHEDULE EVALUATION

- 3.6.1 Performance is based on the percent complete of work accomplished through the data date.
- 3.6.2 LLNS will review each schedule submission and evaluate the Subcontractor's project status based on monthly performance obtained from the PV, physical percent complete, and TF. LLNS determines a project to be "on schedule" when the Subcontractor meets the following two conditions:
- (a) The schedule performance equals the PV.
 - (b) The critical path TF to the contract completion date equals zero.
- 3.6.3 LLNS will utilize schedule health metrics to evaluate schedule submittals. Evaluation will include analysis to ensure no retroactive or unauthorized changes have occurred.

3.6.4 The Subcontractor and LLNS must consent to agree on unit quantities of work completed equating to a percentage of payment for each activity progressed during the update period consistent with the schedule of values.

3.7 BASELINE SCHEDULE CHANGE

3.7.1 Baseline Change Requests

- (a) Major restructuring, original duration changes, re-logic or splitting of activities into additional area detail at any point in the progress of the project must be accompanied by a written request. Include the following information:
 - (1) Description of change
 - (2) Reason for change
 - (3) Cost and schedule impacts
 - (4) Scope impacts
- (b) LLNS will review change requests. If LLNS approves a baseline schedule change, LLNS will issue a Subcontract modification.

3.8 DIRECTED CHANGE ORDERS

3.8.1 If issued a directed change order (DCO) for work prior to settlement of price or time, submit proposed schedule revisions to LLNS within two weeks of the DCO issue date. Create at least one new cost-loaded schedule activity for each approved DCO.

- (a) Create new resource activities for each lower-tier subcontractor's scope that is affected by the change order. These activities must accurately represent the approved cost and scope.
- (b) Add the activities in the schedule sequence at the logical point the work should be performed. Identify added change order activities with the change order number followed by the description.
- (c) Adding change order activities to the end of the base activity the new scope is derived from does not constitute thoughtful planning and may not be accepted by LLNS (the new scope may be required to complete before the base scope can continue or it may be required to be performed in parallel with the base scope). Perform this analysis prior to placing the activities into the logic.

3.8.2 Submit a written time impact analysis for each time extension request or change that may affect the "Subcontract Complete" milestone date. Illustrate the influence of each change or delay on the current subcontract schedule completion date. Also provide a fragmented schedule network using the Baseline Schedule. Evaluate the fragmented schedule network in the baseline schedule without considering the forecast schedule. Submit this narrative with each change order submitted that affects the project schedule.

3.8.3 Incorporate directed subcontract baseline changes within the subsequent reporting period.

3.9 PAYMENT PROCESS AND INVOICE VERIFICATION

3.9.1 Invoices must report costs at the pay item level consistent with the project WBS and approved SOV.

3.9.2 The week prior to the close of the LLNS financial period, evaluate the physical progress of each activity performed during that period. Record progress as physical "percent complete" (% complete) in the schedule and in SOV at the activity level.

3.9.3 The performance (based on physical percent complete) dollar amount in the month end forecast schedule must match the dollar amount submitted in the application for payment for that period. If the STR and Subcontractor disagree on the percent completed, the STR will make the final determination. Thereafter, submit the application for payment for the agreed upon progress to LLNS, adjust the performance (physical percent complete) status in the schedule accordingly, and resubmit the month end status file.

3.10 TIME OF COMPLETION

3.10.1 If the Subcontractor intends to complete the work earlier than the subcontract completion date, LLNS is not liable to the Subcontractor for additional costs or other damages should the Subcontractor be unable to complete the work before the early milestone completion dates or before the Subcontract completion date. Acceptance by LLNS of a Schedule that indicates completion prior to Subcontract completion date is for the convenience of the Subcontractor and does not change the Subcontract requirements, including but not limited to the Subcontract completion date. Subcontract requirements must be consistent with and applicable only to the completion of the work in accordance with the subcontract completion date required by the Subcontract unless LLNS and Subcontractor otherwise agree by issuance of the appropriate Subcontract change order.

3.10.2 Do not show a completion date later than the Subcontract completion date, unless LLNS approves time extensions.

END OF SECTION 01 32 13.11

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Submittal procedures
- 1.1.2 Samples
- 1.1.3 Daily reports
- 1.1.4 Test reports and design data
- 1.1.5 Certificates
- 1.1.6 Manufacturer field reports
- 1.1.7 Erection drawings
- 1.1.8 Submittal register
- 1.1.9 Administrative submittals

1.2 SUBMITTAL PROCEDURES

- 1.2.1 General Procedures
 - (a) Furnish submittals electronically via LLNS construction management software unless otherwise directed by the LLNS subcontract technical representative (STR).
 - (b) Submit safety documents, drawings, product data (including material specifications and data sheets), manufacturer's instructions, maintenance manuals, and other submittals specified. If LLNS determines the Subcontractor's submittal is incomplete or unacceptable, the STR will return it to the Subcontractor.
 - (c) Submit a submittal schedule and procedure for LLNS review and approval or rejection and resubmittal. Identify critical submittals; design drawings and specifications (if required in the Project Requirements Document or if it is a design-build subcontract); and shop drawings on the schedule. Allow 14 calendar days for LLNS submittal review on the submittal schedule. LLNS will not allow delays in the job progress because of Subcontractor failure to make required submittals per the approved project schedule and submittal register (see article "Submittal Register"). Advise the contract analyst and the STR of potential submittal delays and provide a recovery schedule (refer to section 01 32 13.11 - Project Schedule for Major Projects or 01 32 13.10 - Project Schedule).
 - (d) Do not begin work related to or impacted by a submittal until LLNS has approved that submittal, or the STR has provided written direction to proceed.
 - (e) Submit drawings and data, whether prepared by the Subcontractor or its suppliers, as the instruments of the Subcontractor. By providing submittals the Subcontractor represents to LLNS that it has (1) reviewed and approved them, (2) determined and verified materials, field measurements and related field construction criteria, or will do so, and (3) checked and coordinated the information within the submittals with the requirements of the Work and of the design and build documents.

- (f) In each submittal, include literature and identify for each separable and separate piece of material or equipment the job title, subcontract number, specification section number, the specific applicable paragraph of the specifications, and the applicable section of the submittal. Consecutively number each different submittal.
- (g) Provide space on shop drawings and submittals for Subcontractor and LLNS review stamps.
- (h) Apply the Subcontractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and subcontract documents.
- (i) Submittal Review
 - (1) Review and acceptance or approval of items submitted by the Subcontractor does not constitute acceptance of means, methods, materials, process, or components that do not comply with the requirements of the specifications, drawings, or other subcontract documents.
 - (2) LLNS will review drawings and data for conformance with the design intent. LLNS approval of the drawings or data does not relieve the Subcontractor from any dimensional or quantity errors, or other errors that develop later. Approval of the submittal documents does not relieve the Subcontractor from responsibility for substituting requirements in the subcontract drawings and specifications; unless the Subcontractor provided written notification to LLNS (as required in Section 01 25 00 - Substitution Procedures) of the proposed substitution and has received written approval from LLNS for the substitution.
 - (3) LLNS will indicate review comments and the Subcontractor's required action on the submittals directly or on the transmittal letter. LLNS typically categorizes review comments as follows:
 - (A) Submittals marked as "NO EXCEPTION TAKEN" appear to be satisfactory as-is and do not require correction.
 - (B) Submittals marked as "FURNISH AS NOTED" appear to be satisfactory with the noted corrections, and do not require further LLNS review prior to construction. Provide revised drawings reflecting the corrections.
 - (C) Submittals marked as "REVISE AS NOTED & RESUBMIT" require corrected resubmittals for one or more of the following reasons. Provide a revised submittal for LLNS approval prior to commencement of related work.
 - (1) Drawings and data require corrections, as noted, prior to final review.
 - (2) Drawings and data are incomplete and require additional detailed information prior to final review.
 - (3) Drawings and data do not meet the requirement of subcontract documents.
 - (D) Submittals marked as "REJECTED, RESUBMIT" do not comply with the subcontract documents, or they propose an "or equal" substitution without following the proper procedures or documentation. Provide a superseding submittal for LLNS approval prior to commencement of related work.

- (j) Return of Submittals
 - (1) The STR will return marked submittals to the Subcontractor as stated in the subcontract. Note that timely reviews are dependent upon complete submittals in accordance with these instructions.
 - (2) LLNS will return one hard copy or an electronic copy of the drawings and data to the Subcontractor with appropriate stamps and notations. When indicated, make the noted changes and corrections. Promptly resubmit the electronic copy.
- (k) Subcontractor Resubmittal: Identify changes made since previous submission.

1.2.2 Shop Drawings

- (a) Submit shop drawings as required by the various sections of the specifications for LLNS review.
- (b) Request drawing numbers from the STR and apply to the shop drawings.
- (c) Provide detailed shop drawings in plan view, with cross-sections as necessary to provide clarity, indicating proposed installation plans. On the drawings, depict actual elevations and linear dimensions, routing changes, transitions, and major offsets deemed necessary to accomplish the installation. Submit the shop drawings to the STR for review and comment prior to starting installation.
- (d) Submit shop drawings for proposed rearrangements of equipment and materials, and for substitutions in equipment and materials, that differ from those detailed on the subcontract drawings in accordance with 01 25 00 - Substitution Procedures. Submit uniform shop drawings that conform to the subcontract drawings in quality, size, and detail. Promptly bring unavoidable conflicts encountered during the preparation or review of the shop drawings, or during construction, to the attention of the STR, in writing, for resolution.
- (e) Where the subcontract drawings are diagrammatic and show only the general arrangement of the systems, ensure materials and equipment are installed correctly and adjust as necessary or required to resolve space problems and preserve service clearance. In the event a major rerouting of a system appears necessary, prepare shop drawings of the proposed rearrangement and submit the drawings for approval to the STR.
- (f) Subcontract drawings may not show necessary offsets, adjustments, and transitions required for the complete installation because of the diagrammatic nature and small scale.

1.2.3 Product Data

- (a) Submit product data as required by various articles of this section, or as LLNS otherwise requests, for review in accordance with the instructions in the specifications.
- (b) Annotate product data submittals to clearly indicate make, model, and identification numbers of submitted items.

1.2.4 Calculations

- (a) Use standard, recognized computation techniques; shortcut methods and rules of thumb are not acceptable. Present computations in well-indexed document form with assumptions stated and references made to supporting documents and text. Include test data, where appropriate, as part of the supporting documentation.

- (b) Submit final calculations. Architects and engineers-of record are required to have a current license in the State of California, and are required to seal, sign, and date final calculations in accordance with the California Business and Professions Code, sections 5535 through 5538, and sections 6730 through 6749.
- (c) In addition to the architect or engineer-of-record, an independent engineer or architect of the same discipline (can be from the same firm) is required to check and sign the calculations.

1.2.5 Manufacturer's Written Instructions

- (a) Submit an electronic copy of manufacturer's written instructions for installing materials or equipment in the submittal register. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.3 SAMPLES

- 1.3.1 Samples for Review. Submit samples to the STR to review for the limited purpose of checking conformance with information given and the design concept expressed in the subcontract documents.
- 1.3.2 Samples for Information. Submit samples to the STR for information only.
- 1.3.3 Samples for Selection
 - (a) Submit samples to the STR for aesthetic, color, or finish selection by LLNS.
 - (b) Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for LLNS selection, and verification of quality and utility.
 - (c) After review, produce duplicates of LLNS' selections and distribute in accordance with subpart 1.01.
- 1.3.4 Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- 1.3.5 Include identification and full project information on each sample.
- 1.3.6 Submit the number of samples specified in individual specification sections or the Project Requirements Document; LLNS will retain one sample.
- 1.3.7 Use reviewed samples in the work if allowed by the individual specification sections.
- 1.3.8 Do not use samples for testing purposes unless specifically stated in the specifications.

1.4 DAILY REPORTS

- 1.4.1 Submit one copy of daily construction reports to the STR at the end of each business day.
- 1.4.2 Report the following: current activities, work areas, crew sizes by craft, weather conditions, tests, inspections, major equipment and material deliveries, a summary of quality problems, non-conformances, and non-conformance resolutions when applicable.
- 1.4.3 Submit copies of pre-task safety planning reports daily.

1.5 TEST REPORTS AND DESIGN DATA

- 1.5.1 Submit test reports and design data for LLNS review, and for assessing conformance of tested items/components with the design concept expressed in the subcontract documents.

1.6 DESIGN-BUILD PROJECT SUBMITTALS

1.6.1 General

- (a) Provide construction documents consisting of drawings and specifications that set forth, in detail, the quality levels of materials and systems and other requirements for the construction of the project. The construction documents must not deviate from the design criteria established in the Project Requirements Document without following the change request process in the subcontract documents. Failure of LLNS to discover deviations from the design criteria does not relieve the Subcontractor of the obligation to perform the work in accordance with the design criteria.
- (b) The construction documents, prepared and submitted in accordance with the requirements are deemed "Subcontract Documents."
- (c) Provide design services or certifications including drawings, calculations, specifications, certifications, and other submittals signed and sealed by the State of California licensed design professional.
- (d) Submit specifications in Microsoft Word as well as the pdf certified version.

1.6.2 Design Drawings

- (a) Submit design drawings as required by the Project Requirements Document, for review in accordance with this submittal's specification. Do not submit drawings via the LLNS construction management software; LLNS will provide a file sharing folder to submit electronic copies of drawings.
- (b) In the drawing package, include enough drawings to provide a full and complete construction package.
- (c) Drawing Format and Preparation Requirements
 - (1) Conform to and comply with the U.S. National CAD Standard (NCS) available through the National Institute of Building Science (NIBS). For purposes of these specifications, the term "consultant" used in the referenced standards means the Subcontractor or the applicable engineering discipline, as appropriate.
 - (2) See drafting and drawing requirements in the LLNS Facilities Drafting Standard PMO.DT-ST-0002 attached to the Project Requirements Document.

1.6.3 Specifications

- (a) Conform technical specifications to CSI MasterFormat®, SectionFormat™, and PageFormat™
- (b) Use LLNL Facilities Master Specifications if required in the Project Requirements Document.
- (c) In the construction specifications, refer to the subcontract parties as "Subcontractor" or "lower-tier subcontractor," and use "LLNS" in place of "Contractor" and "owner." Do not use the terms "contract," "contractor," or "owner."

1.7 CERTIFICATES

- 1.7.1 When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Subcontractor to STR, in quantities specified for product data for review. Certificates may be recent or previous test results on material or product, but LLNS approval is required.

1.7.2 Indicate that material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.8 MANUFACTURER'S FIELD REPORTS

1.8.1 Submit reports to the STR within 14 calendar days after observation or prior to request for final inspection, whichever is sooner, to assess conformance with information given and the design concept expressed in the subcontract documents.

1.9 ERECTION DRAWINGS

1.9.1 Submit drawings to the STR to assess conformance with information given and the design concept expressed in the subcontract documents.

1.9.2 LLNS may reject data indicating inappropriate or unacceptable work.

1.10 SUBMITTAL REGISTER

1.10.1 Within 14 calendar days of receiving notice to proceed, submit a comprehensive submittal register. Do not construe this register as limiting the type and number of Subcontractor submittals that may be required or advisable to facilitate the correct execution of the work. Other specification sections may require additional submittals. Additional submittals include mockups, installer qualifications, calculations, certifications, and other submittals not specifically categorized. At a minimum, include the following information in the submittal register:

- (a) Subcontract number.
- (b) Project name.
- (c) Item number.
- (d) Specification section or detail reference.
- (e) Submittal number.
- (f) Submittal description.
- (g) Specification paragraph number.
- (h) Date required to submit.
- (i) Date actually submitted.

1.11 ADMINISTRATIVE SUBMITTALS

1.11.1 Submit a list of lower-tier subcontractors in accordance with subcontract requirements. Include subcontractors' telephone numbers and addresses.

1.11.2 Various sections within the general requirements of the division 01 specifications list submittal requirements of administrative nature. Unless specifically indicated otherwise, submit these using the same process as specified for other submittals in this section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 ADMINISTRATIVE SUBMITTALS

3.1.1 After project execution and pending notice-to-proceed with the construction work, develop and submit the applicable administrative submittals as follows:

Submittal	Sections for More Details
Submittal register	Section 01 33 00 - Submittal Procedures
Schedule	Refer to PRD for the applicable section: Section 01 32 13.10 - Project Schedule; or Section 01 32 13.11 - Project Schedule for Major Projects
Proof of off-site agencies having jurisdiction over work notifications	Section 01 35 20 - Permitting, article 1.04 "Off-Site Agency Notifications"
Quality plan	Section 01 40 00 - Quality Requirements
Approved corporate safety plan	Section 01 35 23 - General Safety Provisions
Approved job hazard analysis	Section 01 35 23 - General Safety Provisions
Solid waste management plan and log	Section 01 35 43 - Environmental Protection, attachment 01 35 43-2

- 3.1.2 Upon receipt of written notice to proceed with construction phase work, perform the work of the construction documents and the services in this section. Do not deviate from the Project Requirements Document or the LLNS-approved construction documents, including the drawings, specifications, and other approved submittals without following the change request process in the subcontract documents.

END OF SECTION 01 33 00

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SECTION 01 35 23 GENERAL SAFETY PROVISIONS

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Section Includes

- (a) Program policy.
- (b) Employee concerns program; differing professional opinions.
- (c) Subcontractor safety program.
- (d) ES&H submittals.
- (e) Subcontractor training program.
- (f) Subcontractor safety meetings.
- (g) Emergencies.
- (h) ES&H Requirements for Site 300 access.
- (i) Safe Plan of Action (SPA).
- (j) Protection of persons and property; PPE; scaffolding and ladder safety; fall protection; hoisting and rigging activities; material handling; aerial lifts, and confined spaces.
- (k) Lock-out/tag-out (LOTO).
- (l) Welding, burning, or fire producing activities.
- (m) Laser safety.
- (n) Hot or cold environments.
- (o) Hearing conservation.
- (p) Exposure protection for silica dust, chemical substances, and other physical agents.
- (q) HEPA filter certification.
- (r) Electrical safety.
- (s) Locating buried and hidden utilities; excavation and trenching; demolishing utilities.
- (t) Pressure safety.
- (u) Temporary traffic control.

1.1.2 Related Requirements

- (a) Section 01 35 23.13 - Asbestos Safety - Class I and II
- (b) Section 01 35 23.19 - Asbestos Safety - Class III and Unclassified
- (c) Section 01 35 23.21 - Lead Work Exposure Protection
- (d) Section 01 35 23.23 - Radiological Safety Requirements
- (e) Section 01 35 23.25 - Beryllium Exposure Prevention
- (f) Section 01 35 43 - Environmental Protection for packaging and transportation of hazardous and non-hazardous material operations.

- (g) Section 01 41 00 - Regulatory Requirements

1.2 REFERENCES

1.2.1 Acronyms and Abbreviations:

- (a) **ES&H.** environment, safety, and health
- (b) **LOTO.** lock-out / tag-out

1.2.2 Definitions:

- (a) **competent person.** A person capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. [29 CFR 1926.32(f)]
- (b) **documented attachment point.** An attachment point that is clearly identified by the manufacturer, vendor, or engineer as a lifting point.
- (c) **safety.** For the purposes of these specifications, the term "safety" encompasses the environment, safety, and health, including pollution prevention and waste minimization.
- (d) **securement.** Load placement (e.g., securing with cargo straps in a transport vehicle, installing anchor bolts for a column, or fastening to another component prior to rigging removal).
- (e) **undocumented attachment point.** An attachment point that is not identified as a lifting point by the manufacturer, vendor, or engineer in writing.

1.2.3 Reference Standards

- (a) 10 CFR 851 - Worker Safety and Health Program; current edition.
- (b) 29 CFR 1910.95 - Occupational noise exposure; current edition.
- (c) 29 CFR 1910.101 - Compressed gases (general requirements); current edition.
- (d) 29 CFR 1910.134 - Respiratory protection; Current Edition.
- (e) 29 CFR 1910.147 - The control of hazardous energy (lockout/tagout); current edition.
- (f) 29 CFR 1910.333 - Selection and use of work practices; current edition.
- (g) 29 CFR 1926 - Safety and Health Regulations for Construction; current edition.
- (h) 29 CFR 1926.50 - Medical Services and First Aid; current edition.
- (i) 29 CFR 1926.52 - Occupational Noise Exposure; current edition.
- (j) 29 CFR 1926.417 - Lockout and Tagging of Circuits; current edition.
- (k) 29 CFR 1926.502 - Fall protection systems criteria and practices; Current Edition.
- (l) 29 CFR 1926.1153 - Respirable crystalline silica; current edition.
- (m) 29 CFR 1926.1431 - Hoisting Personnel; current edition.
- (n) ACGIH TLV/BEI - TLVs and BEIs: Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices; 2016.
- (o) ANSI Z49.1 - Safety In Welding, Cutting, And Allied Processes; 2012.
- (p) ANSI Z136.1 - American National Standard For Safe Use Of Lasers; 2014.

- (q) ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment; 2014.
- (r) ANSI/ASSE Z88.2 - Practices for Respiratory Protection; 2015.
- (s) ANSI/ISEA 107 - American National Standard For High-Visibility Safety Apparel; 2020.
- (t) ANSI/ISEA Z87.1 - American National Standard For Occupational And Educational Personal Eye And Face Protection Devices; 2020.
- (u) ANSI/ISEA Z89.1 - American National Standard For Industrial Head Protection; 2014 (R2019).
- (v) ASME B30.23 - Personnel Lifting Systems; current edition.
- (w) ASTM F2413 - Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear; 2018.
- (x) California Code §4216.2 - Regional Notification Center System; current edition.
- (y) Caltrans MUTCD - Caltrans Manual on Uniform Traffic Control Devices; 2014.
- (z) DOE O 442.1B - Department of Energy Employee Concerns Program; 2019.
- (aa) DOE O 442.2 - Differing Professional Opinions for Technical Issues Involving Environmental, Safety, and Health Technical Concerns; Chg 1, 2016.
- (bb) NFPA 70E - Standard for Electrical Safety in the Workplace; 2021.

1.3 PROGRAM POLICY

- 1.3.1 Work by the Subcontractor and its lower-tier subcontractors at LLNL is subject to the specified requirements and cited regulations. If there is a conflict between requirements, apply the most stringent requirement unless otherwise directed by LLNS.
- 1.3.2 Assist LLNS and the Department of Energy (DOE) National Nuclear Security Administration (NNSA) in complying with applicable environment, safety, and health (ES&H) regulations. Do not construe anything in this part as relieving a subcontractor from complying with additional specific safety and health requirements that it determines to be necessary to protect the safety and health of workers.
- 1.3.3 Integrate ES&H into work planning and execution (derived from LLNS Contract No. DE-AC52-07NA27344, modification No. 793, section I-091 DEAR 970.5223).
 - (a) Perform work safely, in a manner that ensures adequate protection for employees, the public, and the environment. The Subcontractor is accountable for the safe performance of work and for exercising a degree of care commensurate with the work and the associated hazards. Ensure that management of ES&H functions and activities becomes an integral, but visible, part of the subcontractor's work planning and execution process. Ensure the following:
 - (1) Line management is responsible for the protection of employees, the public, and the environment. Line management includes those subcontractor employees managing or supervising employees performing work.
 - (2) Clear and unambiguous lines of authority and responsibility for ensuring ES&H are established and maintained at all organizational levels.

- (3) Personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities. Remove employees from work under the Subcontract if they are determined to be careless, incompetent, unfit for duty, or otherwise objectionable to the Subcontractor or LLNS.
 - (4) Resources are effectively allocated to address ES&H, programmatic, and operational considerations. Protecting employees, the public, and the environment is a priority whenever activities are planned and performed.
 - (5) Before work is performed, evaluate the associated hazards and establish an agreed-upon set of ES&H standards and requirements, which, if properly implemented, provide adequate assurance that employees, the public, and the environment are protected from adverse consequences.
 - (6) Implement administrative and engineering controls to prevent and mitigate hazards that are tailored to the work being performed. Place emphasis on designing the work and/or controls to reduce or eliminate the hazards and to prevent accidents and unplanned releases and exposures. Select hazard controls based on the following hierarchy:
 - (A) Elimination or substitution of the hazards where feasible and appropriate.
 - (B) Engineering controls where feasible and appropriate.
 - (C) Work practices and administrative controls that limit worker exposures.
 - (D) Personal protective equipment.
 - (7) The conditions and requirements are satisfied so operations may be initiated and conducted as established and agreed-upon by LLNS and the Subcontractor. These agreed-upon conditions and requirements are requirements of the contract and binding upon the Subcontractor. Tailor the extent of documentation and level of authority of the agreement to the complexity and hazards associated with the work and as required by the Subcontract.
- (b) Manage and perform work in accordance with conditions in this specification and follow these overarching attributes:
- (1) Define the scope of work.
 - (2) Identify and analyze hazards associated with the work.
 - (3) Develop and implement hazard controls.
 - (4) Perform work within controls.
 - (5) Provide feedback on adequacy of controls and continue to improve safety management.
- (c) Provide feedback to the LLNS subcontract technical representative (STR), when requested and without limitation. This feedback may include a self-assessment of the Subcontractor's performance relative to the ES&H requirements of this subcontract.
- (d) Comply with and assist LLNS in complying with ES&H requirements of applicable laws and regulations identified in this Subcontract. Cooperate with federal and non-federal agencies having jurisdiction over ES&H matters under this subcontract in coordination with LLNS.

- (e) Promptly evaluate and resolve noncompliance occurrences with applicable ES&H requirements. If the Subcontractor fails to provide resolution or if, at any time, the Subcontractor's acts or failure to act causes substantial harm or an imminent danger to the environment or health and safety of employees or the public, LLNS may issue an order stopping work in whole or in part. Stop work order issued by LLNS under this clause are without prejudice to other legal or contractual rights of the Government. If LLNS issues a stop work order, an order authorizing the resumption of the work may be issued at the discretion of LLNS. The subcontractor is not entitled to an extension of time or additional fee or damaged by reason of, or in connection with, work stoppage ordered in accordance with this subcontract.
 - (1) If LLNS directs the Subcontractor to execute either a corrective action plan or compensatory measures due to safety incidents at LLNL for other projects, the Subcontractor must implement these plans and measures on-site for like work under other subcontracts regardless of whether they are serving as a LLNS subcontractor or a lower-tier subcontractor to the LLNS subcontractor.
- (f) Regardless of the performer of the work, the subcontractor is responsible for compliance with the ES&H requirements applicable to this Subcontract. The Subcontractor is responsible for flowing down the ES&H requirements applicable to this contract to lower-tier subcontracts to the extent necessary to ensure the subcontractor's compliance with the requirements.
- (g) Include a clause substantially the same as what is stated in this section in lower-tiered subcontracts involving complex or hazardous work. Provide for the right to stop work under the conditions described in this section. Depending on the complexity and hazards associated with the work, the subcontractor may choose not to require lower-tier subcontractor to submit a corporate safety plan, or similar, for the subcontractor's review and approval.

1.4 EMPLOYEE CONCERNS PROGRAM, DIFFERING PROFESSIONAL OPINIONS

- 1.4.1 Comply with Department of Energy (DOE) DOE O 442.1B, *Department of Energy Employee Concerns Program* and DOE O 442.2, *Differing Professional Opinions for Technical Issues Involving Environmental Safety and Health*. The following paragraphs outline the implementation of these programs by LLNS.
- 1.4.2 The differing professional opinions (DPO) process encourages and facilitates dialogue and resolution on DPOs from Subcontractor employees regarding ES&H technical issues. The intent of this process is not to circumvent other avenues for resolving technical disagreements, but rather to supplement existing processes for assessing and addressing technical issues related to ES&H. This process may require LLNS to stop or curtail work operations to place the facility or activity in a safe condition until the DPO issue has been resolved.
- 1.4.3 Subcontractor employees with knowledge of an ES&H related technical issue or activity at LLNL that they believe is not being properly addressed should raise the issue in accordance with the following instructions to ensure it is properly considered in a timely manner. The National Nuclear Security Administration (NNSA), the DOE agency that oversees LLNL operations, uses the term "submitters" to refer to Subcontractor employees who submit DPOs. As a submitter, comply with the following:

- (a) First, seek resolution through readily available processes, such as discussions with first-line supervisors, or the review and comment processes.
- (b) If not resolved through a readily available process, submit DPO issues in writing to the attention of the LLNS contract analyst, or directly to the NNSA Laboratory Field Office (LFO). The following information is required:
 - (1) Summary of position, including proposed or established practice.
 - (2) Recommended action.
 - (3) Assessment of consequences and technical basis for concern.
 - (4) Recommended technical experts.
 - (5) Relevant documentation for review.
 - (6) Explain attempts to resolve issue prior to submitting a DPO.
 - (7) Identify the NNSA facility and activity.

- (c) Submit written DPO issues to the following address:

DPO Manager, NNSA/LFO Chief of Staff
NNSA – Livermore Field Office, L-293
7000 East Avenue / P.O. Box 808
Livermore, CA 94550 / 94551

- (d) If requested, meet with ad hoc panels and managers, and provide known information to support a thorough review of the concern.

1.4.4 Inform employees of their right and ability to report concerns on technical issues relating to ES&H through the DPO process.

1.4.5 Extend the requirements of this subpart to lower-tier subcontractors to ensure the lower-tier subcontractor's compliance with the requirements and the safe performance of work.

1.5 SUBCONTRACTOR SAFETY PROGRAM

1.5.1 The Subcontractor is solely responsible for initiating, maintaining, and supervising safety provisions, precautions, and programs during the performance of the Subcontract.

1.5.2 Management Responsibilities and Worker Rights

- (a) Assign worker safety and health responsibilities, evaluate personnel performance, and hold personnel accountable for worker safety and health performance.
- (b) Use qualified worker safety and health professionals (e.g., certified industrial hygienist or certified safety professional) as required by these specifications.
- (c) Provide workers with access to information relevant to the worker safety and health, including:
 - (1) The Subcontractor's corporate safety plan, job hazard analysis (JHA), and other relevant health and safety information applicable to the work.
 - (2) Applicable injury/illness information from OSHA No. 300 and 300A forms (or California State equivalents), subject to Freedom of Information Act restrictions.
 - (3) LLNS provided health and safety information and publications.

- (4) LLNS provided 10 CFR 851 worker's rights poster, to be posted at the jobsite.
- (d) Provide measures for workers to report, without reprisal, job-related fatalities, injuries, illnesses, incidents, and hazards and make suggestions for mitigating hazards. Promptly respond to such reports and suggestions.
- (e) Inform workers of their rights, which include the following:
 - (1) Access to the health and safety information.
 - (2) Notification of exposure monitoring results.
 - (3) Right to observe monitoring and receive the results of their own exposure monitoring.
 - (4) Express concerns related to worker safety and health.
 - (5) The right to stop work or decline to perform an assigned task based on a reasonable belief that the task poses an imminent risk of death, serious physical harm, or other serious hazard in circumstances where there is insufficient time to use normal hazard reporting procedures.
- (f) During periods of active construction, the Subcontractor must have a safety officer in accordance with section 01 30 00 - Administrative Requirements and the Project Requirements Document.

1.5.3 Hazard Assessment and Prevention

- (a) Address hazards identified in the Subcontractor Area Hazards Control List (SAHCL), the Subcontractor's corporate safety plan, and the JHA.
- (b) The Subcontractor's workers, including lower-tier subcontractors, are required to acknowledge being informed of the hazards and protective measures associated with assigned work activities. After the safety orientation submit an attendance roster with employee signatures verifying that each employee understands the safety plan and ensure that the attendance roster is always available at the jobsite.
- (c) Instruct workers to report hazards not previously identified or evaluated to the Subcontractor's designated representative. If immediate corrective action is not possible or the hazard falls outside of project scope, immediately notify affected workers, post appropriate warning signs, implement needed interim control measures, and notify LLNS of the action taken. Stop work in the affected area until appropriate protective measures are established.
- (d) Establish and document procedures for routinely assessing workplace hazards produced from chemical, biological, and safety hazards at the jobsite.
- (e) Implement a hazard prevention and abatement process to ensure prompt abatement of identified and potential hazards at the jobsite.

1.6 RECORD KEEPING AND REPORTING

- 1.6.1 Reporting requirements specified in this section are in addition to and do not replace the Subcontractor's obligations for injury and illness reporting or recordkeeping per OSHA requirements.

- 1.6.2 Report OSHA recordable fatalities, injuries and illnesses involving the Subcontractor and lower-tier subcontractor personnel and property damage to the STR immediately (**within one hour of incident**). Also, conduct an incident investigation and submit a complete written report on DOE Form 5484.3 to the STR within one calendar day of the incident. LLNS may perform its own investigation (see Injury and Illness Reporting Provisions for details). If an injury is involved, provide a daily verbal and written update to the LLNSSTR until the claimant is released to full duty and/or claim has been resolved. Retain and maintain work activity records in accordance with applicable state and federal requirements.
- 1.6.3 Follow the injury and illness reporting requirements found in the following applicable provision document (available at supplychain.llnl.gov):
- (a) Injury and Illness Reporting Provision, or
 - (b) *Injury and Illness Reporting with Quarterly Updates Provisions*
- 1.6.4 Provide personal/area sampling results and reports to the STR as soon as they become available.
- 1.6.5 Retain the following records; LLNS may request these for review:
- (a) Periodic inspections and personal/area sampling results, including person(s) conducting the inspection, the unsafe conditions and work practices identified, and actions taken to correct the unsafe conditions or work practices.
 - (b) Documentation of ES&H training for each employee, including employee name or other identifier, training dates, type(s) of training, and training providers.
 - (c) Documentation of readiness to work, such as training records for crane operators or designated competent persons, medical qualifications, or certification of HEPA filter systems.
 - (d) Supplemental documentation as required by these specifications or the JHA, such as lift plans, lockout/tagout (LOTO) plans, excavation plans, and fall-protection.
 - (e) Personal/area sampling results and reports.

1.7 SUBMITTALS

- 1.7.1 See section 01 33 00 - Submittal Procedures for submittal procedures.
- 1.7.2 LLNS will make the final determination on the acceptability of submittals. LLNS approval of submittals does not relieve the Subcontractor from responsibility for errors or omissions in such submittals or from responsibility for complying with the requirements of this subcontract, applicable laws, or regulations. The Subcontractor is not entitled to a cost or schedule adjustment due to failure to submit acceptable submittals or submittals that were later found to be inadequate and require correction and re-approval.
- 1.7.3 Keep one copy of approved submittals for LLNS use at the jobsite in hard copy or electronic format.
- 1.7.4 Job Hazard Analysis (JHA): Use the LLNS-provided JHA template. Begin JHA development with a clearly defined scope of work that is broken down into a series of tasks. Describe each task, the hazards associated with each task, and the controls used to mitigate those hazards by following the hierarchy of controls:
- (a) Elimination or substitution of the hazards where feasible and appropriate.
 - (b) Engineering controls where feasible and appropriate.

- (c) Work practices and administrative controls that limit worker exposures.
 - (d) Personal protective equipment.
- 1.7.5 Corporate Safety Plan/Program: Document the Subcontractor's general approach to ES&H, in writing, including specific program information as identified in this specification section. The corporate safety plan must include the items listed below prepended with (+); include the other items listed if applicable to the work:
- (a) (+) Names and contact information for the person(s) with authority and responsibility for implementing the plan at LLNL.
 - (b) (+) Roles and responsibilities.
 - (c) (+) Description of the system used for ensuring employees comply with safe and healthy work practices (e.g., employee recognition, training, disciplinary actions).
 - (d) (+) Description of the system for communicating with employees on matters relating to ES&H, including provisions designed to encourage employees to inform management of hazards at the work site without fear of reprisal (e.g., reporting procedures, meetings, training, postings, anonymous notifications, corrective action tracking and close-out).
 - (e) (+) Procedures used to identify and evaluate workplace hazards, including scheduled periodic inspections to identify unsafe conditions and work practices (e.g., JHA, inspections, permit compliance, personal or area sampling).
 - (f) Procedure for compliance with requirements for scaffolding erection, use, and disassembly if scaffolding will be used on the project.
 - (g) Electrical safety program, including details on practices and procedures.
 - (h) Fall protection program.
 - (i) Aerial lift safety and inspection program.
 - (j) Lock-out tag-out (LOTO) program.
 - (k) Laser safety program for work requiring class 3B or greater lasers.
 - (l) Trenching and excavation program.
 - (m) Procedures that describe what to do if new hazards are identified during work that were previously not assessed.
 - (n) Requirement to provide LLNS with personnel and area sampling reports as soon as the data is available.
 - (o) (+) Procedure for reporting and investigating occupational injury or occupational illness that complies with applicable regulations and the specified requirements. As part of this procedure, outline method for directing non-life-threatening injuries to an occupational medical provider prior to consideration of an entity such as urgent care or a hospital.
 - (p) (+) Methods or procedures for correcting unsafe or unhealthy conditions, work practices, and work procedures in a timely manner based on the severity of the hazard.
 - (q) (+) Description of how required training is delivered and maintained and complies with the specified requirements.

- (r) (+) Specific emergency response information describing methods of compliance with this specification, including identification and contact information for the chosen local medical provider.
 - (s) (+) Implementation of comprehensive occupational medicine program for workers stationed at an LLNL jobsite for more than 30 days per year or who are enrolled in a medical monitoring program required by regulations.
- 1.7.6 Names of designated competent persons and the verification of their training and experience.
- 1.7.7 ES&H training records and certificates for each employee that will perform work requiring such training.
- 1.7.8 Supplemental documentation, as requested by LLNS, such as detailed fall-protection plans, LOTO plans, and excavation plans.
- 1.7.9 Scaffolding:
- (a) If engineering is not required by 29 CFR 1926, provide manufacturer's specification for the specific scaffolding system proposed.
 - (b) If engineering is required by 29 CFR 1926, provide engineered scaffold plans stamped by a California licensed professional engineer.
- 1.7.10 Lift plan (if hoisting and rigging activities are necessary for the work). Lift plans must be specific to the configuration of the intended lift.
- (a) Designate personnel roles.
 - (b) Break the lifting activities down to the task level (e.g., staging, rigging, pre-lift, lift, and securement), using drawings and/or text.
 - (c) Characterize the load – weight, dimensions, center of gravity, rigidity, stability, and rigging attachment points.
 - (1) Provide a diagram from the manufacturer, vendor, or engineer showing every lift point.
 - (2) Verify undocumented attachment points (i.e., attachment points not identified by the manufacturer, vendor, or engineer) by calculation to demonstrate adequacy.
 - (d) If some parameters cannot be determined ahead of time, submit plans for field determinations, including trial lifts.
 - (e) Define the work area, such as boundaries and access control, travel path of the load, start, staging, and finish points.
 - (f) Equipment, facilities, or structures that pose obstructions or impediments to moving/manipulating the load.
 - (g) Imposed loads on structures, utilities (above/below grade).
 - (h) Weather considerations.
 - (i) Identify the lifting and rigging equipment: type (use the categories defined), capacities (load charts), physical size (length, width, height, physical compatibility), and rigging equipment (slings, rigging hardware, below-the-hook lifting devices).
 - (j) Describe securement of the load.
 - (k) Provide load path calculations (identify the forces that are affecting the rigging equipment).

- (l) Provide mathematical calculations to demonstrate the load/object moves only due to forces and moments appropriately applied to start and stop desired motion.
- (m) Demonstrate that equipment and components are within design constraints, and peripheral issues (ground bearing issues, crane mat calculations, and prohibited zones for power lines) are properly addressed.
- (n) Personnel qualifications for crane operators, riggers, and signal persons.
- (o) Age verification, for persons involved with cranes, hoisting, or rigging.
- (p) Crane certifications and inspection records.
- (q) ASME certifications and inspection records for the equipment used for hoisting and rigging.
- (r) ASME proof load test documentation for slings, below-the-hook lifting devices, and rigging hardware used for critical lifts.

1.7.11 Material handling plan. At a minimum, the material handling plan must include the following:

- (a) Details of the load, including depictions showing manufacturer pick points (if applicable to the item type).
- (b) Proposed lifting equipment, including detail on attachments and accessories, such as fork attachments and cut sheets for slings/chain falls.
- (c) Lifting crew and their roles, responsibilities, qualifications, and competencies.
- (d) Lifting methods, including possible variations in the plan as materials may vary in dimensions and weights.
- (e) Requirements to erect and dismantle lifting equipment (if any).
- (f) Sketch of the lifting zone showing positions of lifting equipment, crew, and load.

1.7.12 LOTO procedure and plan (required 14 days in advance of LOTO request). The STR will provide a LOTO plan worksheet.

1.7.13 Maintenance of Traffic (MOT) plan (required when work will affect the safety of motorist, bicycle, or pedestrian traffic.)

1.8 SUBCONTRACTOR TRAINING PROGRAM

1.8.1 Employee Orientation Training: Provide orientation training for every employee (including lower-tier subcontractors) working on the jobsite covering the various safety policies, safety manuals, first aid availability, accident reporting procedures, emergency procedures (notification procedures, evacuation routes, mustering points, and accountability), safety meeting participation, personal protective equipment (PPE), enforcement procedures, and applicable LLNS-specific requirements.

1.8.2 Supervisor/Employee Safety Training: Provide training to supervisors covering record keeping, incident reporting and investigation, OSHA inspections, health and safety documentation requirements (e.g., OSHA 30-hour course for construction). In addition, provide training to employees (and lower-tier subcontractors) on construction hazards and protective measures (e.g., OSHA 10-hour course).

1.8.3 Competent and Qualified Person Training: Operations requiring a competent or qualified person in accordance with OSHA requirements, such as trenching, excavation and shoring, fall protection, scaffolds, confined space entry, silica, and rigging.

1.9 SUBCONTRACTOR SAFETY MEETINGS

- 1.9.1 Safety Orientation: Prior to the start of work, attend a LLNS-hosted construction safety orientation.
- 1.9.2 Weekly Safety Meetings: Conduct weekly meetings with on-site Subcontractor and lower-tier subcontractor personnel. Prepare documentation detailing the subject discussed with signatures of participants for each meeting and make available to LLNS when requested.
- 1.9.3 Daily Safe Plan of Action (SPA) Meetings: Conduct daily SPA meetings with the work crew and each lower-tier subcontractor at the jobsite before the start of work. If performing work within the National Ignition Facility (NIF) complex, the Subcontractor should use NIF's SPA as provided by the STR. Inform the STR of the time and location of daily SPA meetings. The STR will attend SPA meetings at their discretion.

1.10 EMERGENCIES

- 1.10.1 In an emergency affecting the safety of persons or property, immediately call the LLNL Emergency Dispatch Center by dialing 911 from an LLNL system phone or 1-925-447-6880 from a non-LLNL phone or cellular phone. Take action to prevent or minimize damage, injury, or loss without risking personal safety. Preserve the integrity of the scene for investigation.
- 1.10.2 Notify the STR of the occurrence of such an emergency or off normal event and actions taken within 1 hour. If the STR is not available, contact the LLNS contract analyst in Supply Chain Management (SCM). This notice may be oral but must be followed by a written confirmation.

1.11 ES&H REQUIREMENTS SITE 300 ACCESS

- 1.11.1 Subcontractor employees seeking access to the jobsite for the first time must complete the following training:
 - (a) Site 300 Safety Orientation (LLNL course ID DT0095-W).
 - (b) Valley Fever Awareness (LLNL course ID HS0096-W).
- 1.11.2 LLNS may require additional ES&H-related training and documentation depending upon the location of the work site.

1.12 QUALITY ASSURANCE

- 1.12.1 Certify HEPA-filtered equipment (e.g., vacuum cleaners, portable exhaust ventilation units, negative-pressure machines) used for asbestos, lead, silica, or other hazardous materials every 12 months. Document the certification and keep hard copy or electronic copy at the job site for LLNS review. Allow LLNS access to verify the certification and check performance of HEPA-filtered equipment at any time after it arrives at the LLNL project site.
- 1.12.2 Hoisting and Rigging Personnel Training and Qualification
 - (a) Provide personnel who rig loads, provide crane signal duties, and/or operate cranes or hoists that have experience and training on selection, inspection, hazards, operation, and use of hoisting and rigging equipment.
 - (b) Personnel must also have the following qualifications:
 - (1) Be 18 years of age or older.
 - (2) Operator certification by the National Commission for Certification of Crane Operators (NCCCO) or other organization recognized by the U.S. Department of Labor.

- (3) Rigger/Signalman certification by the National Commission for Certification of Crane Operators (NCCCO) or other organization recognized by the U.S. Department of Labor

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SAFE PLAN OF ACTION (SPA)

- 3.1.1 The SPA is a task- and time-driven process designed to ensure that every task receives proper safety planning prior to starting work. It supplements other processes in place to help foster safe, timely, and quality work at the jobsite. The SPA is part of the daily work authorization for all work activities.
- 3.1.2 Develop the SPA as a collaborative effort between the work crew and superintendent develop before beginning a task. The intent is to systematically plan specific tasks in a safe and effective manner. The SPA does not replace procedures set forth in Subcontractor's site safety program; it reinforces aspects of safety pertaining to specific day's work.
- 3.1.3 Responsibilities: Implementation of the SPA process is the responsibility of Subcontractor's management, field teams, and LLNS' project team. The Subcontractor may delegate authority to perform identified tasks to other qualified personnel, but responsibility remains with those named above.
 - (a) Subcontractor Management Team (Project Manager and Superintendent)
 - (1) Ensure adequate training in the SPA process for personnel working at the construction site.
 - (2) Monitor content of completed SPA forms for quality and completeness.
 - (3) Report SPA worksheet content to LLNS monthly.
 - (b) Subcontractor Superintendent
 - (1) Become knowledgeable of the JHA, SPA process, and work crew(s) activities. Become knowledgeable of the SPA process, JHA, and approved supplemental safety plans and work crew(s) activities.
 - (2) Provide on-the-job training for work crew.
 - (3) Conducting meetings at the start of each new task or shift to lead the work crew through the job-planning process and development of the SPA worksheet.
 - (4) Document the SPA using the LLNS-furnished worksheet.
 - (c) Subcontractor Work Crew
 - (1) Become knowledgeable of the SPA process.
 - (2) Complete necessary training in the SPA process.
 - (3) Participate in preparation of the worksheet at the start of each new task or shift.
 - (4) Conduct work activities in accordance with the approved JHA, supplemental safety plans, and daily SPA.
 - (5) Stop work when scope exceeds the SPA.
 - (6) Stop or pause work if tasks may exceed the approved scope.

- (d) STR
 - (1) Ensure Subcontractor receives SPA process training.
 - (2) Ensure Subcontractor implements the SPA process.
 - (3) Ensure coordination of safety hold points.
 - (4) Ensure periodic review of completed SPA forms and provide feedback to the Subcontractor

3.1.4 SPA Process: The SPA process is defined by the following action steps:

- (a) Identify Work Area and Task: The JHA covers the scope of work; the SPA covers specific tasks performed during a shift in a particular work area using the JHA as a reference. Note: A clear understanding of what the job entails from beginning to end is essential for an accurate and complete SPA.
- (b) Develop Safe Plan of Action: Develop the SPA with input from the work crew assigned to the work during the daily pre-job briefing. The superintendent must provide guidance, lead the work crew as they plan their work for the shift, and solicit their participation in identifying hazards and hazard control measures, such as personnel protective equipment (PPE), required training, permits, procedures, co-occupancy, area hazards, and like items.
- (c) Document the SPA: Document SPAs using the attached form, *Safe Plan of Action Worksheet*. Each member of Subcontractor's field team is required to legibly print their name and badge number on the completed worksheet. Signatures indicate the individuals have participated in development of the worksheet, understand the hazards, and agree to follow the completed worksheet. Visitors must review and sign the SPA before entering the work area. If visitors are entering work area prior to normal operating hours, permission is required for entry by the STR and superintendent or their designated representative.
- (d) Conduct SPA Meetings: Conduct a daily pre-job SPA meeting and discuss tasks for that day. This is a brief (generally not more than 10 minutes) safety meeting. When continuing a task from a previous day, include a review of the current SPA and consider new hazards or conditions that could exist. The SPA meeting may be combined with a "toolbox" meeting or "morning safety" meeting; however, the meeting is required to include a review every SPA currently in effect, or development of a new worksheet and sign-off by each worker and the superintendent.
- (e) Post Completed SPA Worksheets: Post the completed worksheet immediately adjacent to the work area so anyone may review the form throughout the work shift. In case of an incident, immediately evaluate the SPA for work conditions and procedures. Keep SPA worksheets outside of the work area to allow others to review and sign prior to entering the work area.
- (f) Retain Completed SPA Worksheets: Retain hard copies of SPA worksheets and furnish signed and dated copies of the worksheets to the STR upon completion of the form, and again at completion of the tasks described in the worksheet. The construction manager will also retain a copy of SPA records.
- (g) Review the SPA Process: Verify the content and quality of the SPA worksheets completed by personnel and lower-tier subcontractors. The STR will use appropriate sampling techniques to monitor the quality of completed worksheets.

3.2 PROTECTION OF PERSONS AND PROPERTY

- 3.2.1 Erect and maintain, as required by these specifications and Subcontract documents, existing site conditions, and performance of the subcontract, safeguards for safety and protection of persons and property, including, but not limited to: traffic control, lighting, shade, potable water, and access control to the work site using signage and/or barriers.
- 3.2.2 Notify the STR of conditions that could affect LLNS or other Subcontractor activities at the project site, adjacent sites, or to utilities.

3.3 PERSONAL PROTECTIVE EQUIPMENT

- 3.3.1 Select and use PPE required by 10 CFR 851, 29 CFR 1910.134, and 29 CFR 1926 subpart E.
- 3.3.2 Ensure that Subcontractor employees, lower-tiered subcontractors, and construction vendors have, inspect, and use required PPE. Minimum construction site PPE includes the following:
 - (a) ANSI/ISEA Z89.1 approved hard hats.
 - (b) ANSI/ISEA Z87.1 approved safety glasses with side shields.
 - (c) Shirts with a minimum of 4-inch sleeves and long pants.
 - (d) ANSI/ISEA 107 approved class II high visibility safety vest.
 - (e) ASTM F2413-approved safety toe work boots.
 - (f) Additional PPE as identified and required by the project JHA (e.g., respiratory protection, hearing protections, gloves).
 - (g) Respirators selected and managed in accordance with ANSI/ASSE Z88.2.
- 3.3.3 Submit a JHA with task-specific hazards and controls for LLNS approval if PPE is required to be worn during work.

3.4 SCAFFOLDING AND LADDER SAFETY

- 3.4.1 Erect, use, and disassemble scaffolding in accordance with 29 CFR 1926, subpart L, "Scaffolds." Train scaffolding users and competent persons in accordance with 29 CFR 1926.454(a).
- 3.4.2 Do not use ladders or scaffolding at LLNL until LLNS reviews and approves the following Subcontractor submittals:
 - (a) Corporate safety plan with scaffolding procedures.
 - (b) JHA with task-specific hazards and controls.
 - (c) Competent person training records.
- 3.4.3 Select and use ladders in accordance with 29 CFR 1926, subpart X, "Stairways and Ladders."
- 3.4.4 Inspect ladders (by the worker) prior to use.

3.5 FALL PROTECTION

- 3.5.1 Provide fall protection at the work site in accordance with 29 CFR 1926, subpart M - Fall Protection.
- 3.5.2 Do not begin work requiring fall protection until LLNS reviews and approves the following Subcontractor submittals:
 - (a) Corporate safety plan with documented fall protection program
 - (b) JHA with task-specific hazards and controls

(c) Competent person training records

3.5.3 For warning line systems in compliance with 29 CFR 1926.502(f), include additional warning lines or demarcation at lower levels when needed to ensure that they are visible at the employee's working level.

3.5.4 If required by LLNS, submit a detailed description of the methodology for identifying anchor points, calculating clearance requirements, and rescue procedures.

3.6 HOISTING AND RIGGING

3.6.1 Do not begin work involving hoisting and rigging operations or equipment until LLNS reviews and approves the following Subcontractor submittals to verify operations and equipment comply with requirements:

(a) Lift plan (not required for ordinary lifts less than 2,000 lb.) at least 14 calendar days prior to the planned lift(s). Multiple lifts occurring at the same construction location may be included in a single lift plan). Note: Deviations from the approved lift plan require approval by the STR prior to start.

(b) JHA with task-specific hazards and controls.

(c) Scaled drawings for special-ordinary and critical lifts.

(d) Current crane certifications and inspection records.

(e) ASME certifications and inspection records for the equipment used.

(f) ASME proof load test documentation for slings, below-the-hook lifting devices and rigging hardware used for critical lifts.

(g) Certification/qualification records for crane operators, riggers, and signal persons. Records may be submitted with the lift plan or upon arrival of the personnel at LLNL.

3.6.2 Conduct hoisting and rigging activities in accordance with 29 CFR 1926 - Safety and Health Regulations for Construction, subpart CC, "Cranes and Derricks in Construction," and subpart R, "Steel Erection."

3.6.3 Plan and execute lifts of personnel, such as using a hoisting device or basket, in accordance with 29 CFR 1926.1431 and ASME B30.23.

3.6.4 Hoisting and rigging activities include use of the following equipment or devices:

(a) Mobile cranes.

(b) Facility cranes.

(c) Forklifts with lifting attachments.

(d) Chain falls.

(e) Come-a-longs.

(f) Gantries.

(g) Industrial grade or rated jacks, rollers, dollies, skates/skids, self-propelled modular transporters, pushers/pullers.

(h) Rigging equipment, such as slings, rigging hardware, and below-the-hook lifting devices.

3.6.5 Equipment Inspection and Maintenance

- (a) Tag rigging equipment with capacity.
 - (b) Provide documentation upon request demonstrating that the equipment passed an annual inspection within 1 year from date of intended use and passed a pre-operational inspection prior to use. Store rigging properly (e.g., on racks or in protected areas).
 - (c) Inspect rigging in compliance with 29 CFR 1926, subpart CC, "Cranes and Derricks in Construction."
 - (d) Ensure slings, below-the-hook lifting devices, and rigging hardware have a unique identifier permanently affixed corresponding to the proof test documentation.
 - (e) Maintain inspection records at the project site and make them available upon request for verification of inspections.
- 3.6.6 Protect synthetic slings that are in contact with edges, corners, or protrusions from cutting damage with sufficient cut protection. The load rating must be determined by the cut protection product manufacturer or a qualified person.
- 3.6.7 Lift Classification: During the bid walk, LLNS will classify lifts into one of the following categories: ordinary, special-ordinary, or critical. Provide input to LLNS during the bid walk as appropriate to determine the lift categories.
- (a) Ordinary Lift: Lifts that are not classified as special-ordinary or critical.
 - (b) Special-Ordinary Lift: Lifts that involve one or more of the following conditions. LLNS may choose to classify a lift as special-ordinary for reasons other than those noted above.
 - (1) The load will be rotated or manipulated on or about its non-vertical axis.
 - (2) The load will be transferred (i.e., in mid-air from one crane to another).
 - (3) Any load where the center of gravity might move during the lift, such as a tank filled with liquid.
 - (4) Use of multiple lifting devices, such as use of more than one lifting equipment (i.e., cranes, hoists, forklifts, jacks, etc.) in sharing the load.
 - (c) Critical Lift: Lifts that involve one or more of the following conditions:
 - (1) Loss of control of the load would likely result in the declaration of an emergency.
 - (2) The load is unique and vital to a system, facility, or project operation, and would be irreplaceable or not repairable if damaged.
 - (3) If the load were to become damaged, the cost to replace or repair the load, or the delay in operations would have a negative impact on facility, organizational, or DOE budgets that would affect program commitments.
 - (4) If mishandling or dropping of the load would cause one or more of the above consequences to nearby installations and facilities.
 - (5) For steel erection, the lift exceeds 75 percent of the rated capacity of the crane or derrick, or if the lift requires the use of more than one mobile crane or derrick (refer to 29 CFR 1926.751, Definitions).
 - (6) Lift activities where the crane boom extension can reach a nuclear facility, regardless of radial direction or boom elevation.

- (d) Personnel Lift: A personnel lift is one in which personnel are lifted using a hoisting device when lower-risk means are not available. This category of lift is not allowed under normal circumstances. In the event this option demonstrates significantly lower risk than other conventional means, it may be deemed acceptable upon approval of the STR and with technical review by a qualified LLNL person. Personnel lift planning must comply with ASME B30.23.
- (e) The table below lists the requirements and documentation for the different categories of lifts:

Requirement	Lift Type			
	Ordinary (< 2,000 lb.)	Ordinary (> 2,000 lb.)	Special- Ordinary	Critical
Documented Lift Plan	Not required	Required	Required	Required
Designation of Personnel Roles	Appoint a designated leader (DL); LLNS concurrence. Designate in lift plan, present at work site for entire lifting operation, may delegate or transfer. Communicate DL changes verbally.			Appoint a person In charge (PIC); LLNS concurrence. Designate in lift plan, present at work site for entire lifting operation, and cannot be delegated or transferred.
Inspections/ Verifications	Hoisting and rigging equipment meet ASME B30 requirements. Provide current certifications and inspection records. LLNS-qualified personnel verification and approval of equipment upon arrival at LLNL. Request that the LLNS STR arrange verification of setup and equipment prior to each set of lifts following repositioning.			Proof-load test rigging equipment (slings, below-the-hook lifting devices, and rigging hardware) in accordance with applicable ASME standard. LLNS-qualified personnel verification and approval of equipment upon arrival at LLNL. Request that the STR arrange verification of setup and equipment prior to each set of lifts following repositioning.
Drawings	--	--	Scaled drawings required	
Documented Pre-Lift Meeting	--	--	Required	Required. Document in the lift plan.
Practice Lift	--	--	--	Required as indicated by LLNS
Documented Post-Lift De-Brief	--	Required	Required	Required

3.7 MATERIAL HANDLING

3.7.1 Do not move the following items or equipment using forklift attachments, chain falls, come-along, specialized dollies, gantry cranes, or other material handling equipment until LLNS reviews and approves the Subcontractor's material handling plan and JHA with task-specific hazards and controls:

- (a) Large items
- (b) Irregularly shaped or configured items, such as those with center of gravity or balance concerns
- (c) Equipment with tight installation tolerances

3.7.2 Handle materials in accordance with 29 CFR 1926, subpart H, "Materials Handling, Storage, Use, and Disposal."

3.8 AERIAL LIFTS

3.8.1 Do not operate aerial lifts until LLNS reviews and approves the corporate safety plan, operator training records, inspection records, and the JHA with task-specific hazards and controls.

3.8.2 Operate aerial lifts in accordance with 29 CFR 1926, subpart L, "Scaffolds."

3.8.3 Use fall restraints with a body harness attached to an anchor point on the basket. This applies to operators and passengers.

3.8.4 Obtain prior approval from LLNS if it is necessary to exit lifts or platforms from a height.

3.8.5 Make operator training records and inspection records available for review at the jobsite.

3.9 ROOF ACCESS

3.9.1 Do not access roofs without authorization from the STR and a roof access permit (where required).

3.9.2 LLNS facility management controls access to building roofs. If roof access is necessary, do the following:

- (a) Coordinate with the STR to obtain permission from the facility manager and, if required, obtain a roof access permit.
- (b) Provide JHA with task-specific hazards and controls.

3.9.3 If a roof access permit is required, follow the requirements listed on the permit.

3.10 CONFINED SPACES

3.10.1 Do not enter confined spaces until LLNS reviews and approves the corporate safety plan with the confined space entry program, worker training records, and the JHA with task-specific hazards and controls.

3.10.2 Conduct entries of permit-required confined spaces in accordance with 29 CFR 1926, subpart AA, "Confined Spaces in Construction."

- (a) If the Subcontractor is the sole entrant, perform the entry under the Subcontractor's confined space program using the Subcontractor's entry permit.
- (b) If the entry is performed jointly by LLNS and the Subcontractor, perform the entry under LLNS requirements using a LLNS entry permit.
- (c) Conduct a joint pre-activity walkthrough to review confined space hazards and controls.

3.11 LOCK-OUT/TAG-OUT (LOTO)

3.11.1 Do not begin work on or perform LOTO on energized systems or equipment until LLNS reviews and approves the following documents:

- (a) Corporate safety plan with the documented LOTO program
- (b) Training records for LOTO-authorized workers
- (c) Documented LOTO procedure (required 14 days in advance of needing LOTO)

3.11.2 LOTO is applicable if working on or near equipment or systems with energy sources as defined in 29 CFR 1910.147, 29 CFR 1910.333, 29 CFR 1926.417, or NFPA 70E.

3.11.3 LLNS will assume primary LOTO responsibility for the Subcontractor. Contact the STR to establish LOTO, perform zero-energy verification (ZEV), and apply the first lock.

- (a) LLNS personnel will establish LOTO on equipment and systems and perform the ZEV to place it in a safe work condition.
- (b) Subcontractor personnel designated as LOTO-authorized workers must join a group LOTO with their own, individually keyed, lock and associated tab after LLNS applies the first lock.
- (c) At the Subcontractor's discretion, Subcontractor personnel can perform a secondary ZEV after the initial LLNS ZEV, after applying their lock(s), and before beginning work. NOTE: An NFPA 70E qualified electrical worker is required if Subcontractor elects to perform a secondary ZEV and any test before touch checks on electrical equipment that has been LOTO by LLNS). This secondary verification must be done using a CAT III or higher measurement device with appropriately rated leads to test each phase conductor or circuit part before beginning work. LOTO authorized workers joining a group LOTO are not required to observe zero energy verification but can request it.
- (d) LLNS will be the last to remove their lock in the sequence to re-energize the equipment or system.

3.12 ELECTRICAL SAFETY

3.12.1 Comply with NFPA 70E and 29 CFR 1926, subparts K and V requirements for qualified electrical workers.

- (a) If exposed energized parts are encountered where none were expected, particularly during testing of locked- and tagged-out circuits, stop work immediately and contact the STR for guidance before proceeding.
- (b) If performing work near exposed, energized equipment, then comply with the following:
 - (1) Address the work in the safety plan.
 - (2) Ensure qualified personnel perform the work.
 - (3) Provide safety equipment as specified in NFPA 70E and 29 CFR 1926, subparts K and V.
 - (4) Notify STR 14 days prior to performing the work. The STR may provide specific guidance for performing such work.

3.12.2 Lock and tag electrical circuits planned for work in accordance with **LOCKOUT/TAGOUT (LOTO)** article.

3.12.3 Work may be required near exposed, energized equipment. Address this work in the safety plan, provide qualified personnel to perform such work, and provide necessary safety equipment as specified in NFPA 70E and 29 CFR 1926, subparts K and V. Notify the STR 14 days in advance of performing the work. The STR may provide guidance for performing such work.

3.13 WELDING, BURNING, FIRE, AND SPARK-PRODUCING ACTIVITIES

3.13.1 Perform welding in accordance with OSHA 29 CFR 1926, subpart J and ANSI Z49.1, "Safety in Welding, Cutting, and Allied Processes," sections 4.3 and E4.3.

(a) Do not bring on-site or use thoriated tungsten electrodes; thoriated tungsten is prohibited at LLNL.

(b) Submit welding program as part of the corporate safety plan.

3.13.2 LLNS requires hot-work permits for welding, soldering, and other operations with fire potential.

(a) The STR will obtain permits from the LLNL Fire Department for activities including cutting and welding, heat treating, grinding, powder-driven fasteners, hot riveting, torching, soldering, using tar pots or tar kettles, and other heat-producing, or spark-producing, tasks that could result in a fire.

(b) Follow controls as prescribed on the permit and post permits in the work area until the work is completed.

3.14 LASER SAFETY

3.14.1 Conduct work with lasers in accordance with ANSI Z136.1, "Safe Use of Lasers."

3.14.2 If the work requires the use of a class 3B laser or greater, do not begin work until LLNS approves the JHA with task-specific hazards and the corporate safety plan with the documented laser safety program.

3.15 HOT OR COLD ENVIRONMENTS

3.15.1 Protect workers from temperature stress in accordance with the ACGIH TLV/BEI.

3.15.2 If workers are at risk of developing heat or cold-related illness, do not begin work until LLNS approves the JHA with task-specific hazards and controls.

3.16 HEARING CONSERVATION PROGRAM

3.16.1 Do not begin work that may expose workers to noise exceeding the defined limits until LLNS approves the JHA with task-specific hazards and controls.

3.16.2 Implement the requirements of 29 CFR 1926.52 and ACGIH TLV/BEI to protect workers from noise exposure and reduce noise to less than 85 dBA based on a 8-hour time-weighted average (TWA) or, if impact/impulse noise, less than 140 dBC.

(a) Use engineering and administrative controls, if feasible, to protect employees from noise exposure greater than the indicated limits.

(b) Provide hearing protective devices with the appropriate noise reduction rating (NRR) to reduce sound levels below the indicated limited when engineering and administrative controls are not feasible or are insufficient.

3.16.3 Enroll workers exposed to noise levels of 85 dBA or greater, based on an 8-hour time-weighted average (TWA), in a hearing conservation program (HCP) in accordance with 29 CFR 1910.95.

3.17 EXPOSURE PROTECTION FOR SILICA DUST

- 3.17.1 Protect workers from exposure to crystalline silica dust in accordance with 29 CFR 1926.1153 and ACGIH TLV/BEI when performing dust-generating work such as jack hammering, core-drilling, or saw-cutting concrete, removing or sawing tile or stone, and sandblasting.
- 3.17.2 Follow the LLNL-modified version of 29 CFR 1926.1153(c)(1) table 1 (see attachment 01 35 23-3), "Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica."
- 3.17.3 Use HEPA vacuums certified in accordance with **HEPA FILTER CERTIFICATION** article to clean up wet or dry silica dust or slurry generated during concrete or asphalt disturbance and for worker protection.
- 3.17.4 Do not start silica dust-generating work until LLNS approves the JHA task-specific hazards and controls.

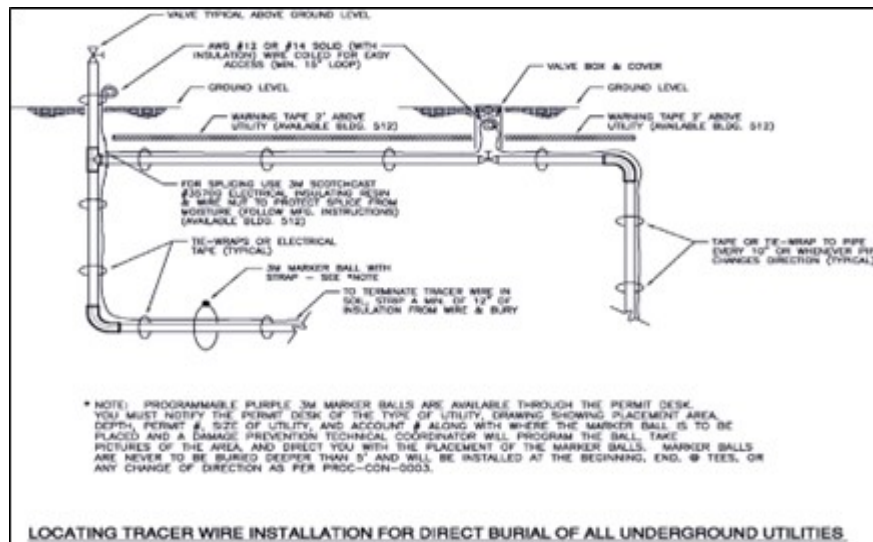
3.18 EXPOSURE PROTECTION FOR CHEMICAL SUBSTANCES AND PHYSICAL AGENTS OTHER THAN ASBESTOS, BERYLLIUM, LEAD, OR SILICA

- 3.18.1 Do not start work activities involving potential exposure to chemical substances and physical agents until LLNS approves the JHA with task-specific hazards and controls.
- 3.18.2 Implement the requirements of ANSI Z358.1 if the eyes or body of workers potentially exposed to injurious corrosive materials. At a minimum, performance requirements of this emergency equipment must meet 29 CFR 1926.50(g).
 - (a) Submit requests for exemptions to implementation of specific ANSI Z358.1 to the STR.
- 3.18.3 Comply with the applicable codes, standards, and regulatory requirements included in section 01 41 00 - Regulatory Requirements to reduce worker exposure to chemical and physical agents below the required limits.
- 3.18.4 Provide documentation to justify and prove that worker exposures are being maintained below applicable limits. This can be accomplished by the following:
 - (a) Monitor activities, including the collection of personal and area samples.
 - (b) Collect other objective data and provide an explanation of its applicability to the specific tasks being performed under this Subcontract.
 - (c) Maintain documentation for LLNS review at the worksite either in hard copy or electronic format.
 - (d) If LLNS determines worksite documentation is insufficient, LLNS will pause or stop work until issues are resolved.
- 3.18.5 Allow LLNS access to the worksite for collection of personal or area monitoring data to verify exposures.

3.19 LOCATING BURIED AND HIDDEN UTILITIES

- 3.19.1 Before performing soil, concrete, or non-concrete wall, ceiling, or floor penetrations, notify the STR to determine if scanning is required and to secure dig and penetration permits and determine if they are required. Provide notification at least 14 days in advance of anticipated penetration work.
- 3.19.2 Procedure:

- (a) Permits are required for soil penetration regardless of depth. Permits may be required for other types of penetrations.
- (b) LLNS will perform locating surveys and will furnish available documentation for the area of proposed excavation or drilling, including drawings, survey data, and locating reports.
- (c) Clearly mark excavation areas with white paint in accordance with California Code §4216.2. Confirm that these marks remain intact and clearly visible throughout the entire survey and excavation process.
- (d) Mark new conduit routes and planned wall penetrations deeper than ¼ inch.
- (e) Request the STR review and approval of routing and penetration locations prior to continuing the work.
- (f) Excavations
 - (1) Perform excavation in accordance with **EXCAVATIONS AND TRENCHING** article.
 - (2) When the excavation crosses or is within a 30-inch radius of a known or located utility, excavate by hand or air knife until reaching the required depth or the utility is located.
 - (3) When the excavation parallels the located utility, test the proposed route of excavation by potholing every 25 feet prior to starting the excavation.
 - (4) Excavate potholes by hand until reaching the required depth or the utility is located. If the surveyed depth of the located utility is not uniform, decrease the pothole interval distance to 12.5 feet. If the potholing operation locates a utility where none was expected, stop the operation and immediately notify LLNS.
 - (5) Place direct burial warning tape and markers along the entire length of and about 2 feet above uncovered subsurface infrastructures during backfilling.
 - (6) Include information on tape and coding in the survey.
 - (7) On nonmetallic utilities, install tracer wire in accordance with the figure below.



- (8) If existing nonmetallic utilities are uncovered during excavation, place programmable electronic marker prior to backfilling trench. LLNS will provide programmable electronic balls.
- (9) If excavation uncovers an unidentified utility, stop excavation in this area and immediately notify the STR.

3.19.3 LLNS requires extensive planning and careful execution of penetration through concrete or non-concrete walls, floors, or ceilings, both interior and exterior.

- (a) Required PPE: Use safety glasses with side shields and electrical hazard (EH)-rated safety shoes, or dielectric boots. In addition, use class 0 electrical gloves for penetrations where electrical over 50 V is known, or suspected and cannot be located.
- (b) Penetrations Greater than ¼ inch into Wall Cavities or Wood and Metal Framing:
 - (1) Use Proper Analysis Tools: Use non-conductive power or manual tools. Use standard scanners for wood with a detector for metal/wire location.
 - (2) Plan the Penetration: Check with the STR for known hazards; LOTO of the energy source is required where the penetration is within 6 inches of concealed electrical sources above 50 V and mechanical energy sources. Layout and plan the penetration beforehand and identify hazards on both sides of the wall.
 - (3) Mark new conduit routes and wall penetrations. As required, request the STR review and approve the routing and penetration locations prior to continuing the work.
 - (4) Identify Exterior Hazards: Surfacing material hazards such as asbestos, beryllium, lead, or other hazardous materials require additional permits, training, and PPE. Stop work and notify the STR if suspect hazardous materials are encountered.
 - (5) Identify Interior Hazards: Identify wall interior hazards such as electrical, EMT, and other ferrous or non-ferrous utilities by scanning, scoping, or cutting a view hole into the surface.
 - (A) Hand-scan the area to determine locations of studs, metal objects, electrical conduits, mechanical pipes, and other obstructions.
 - (B) Hand-scan the area with a voltage sensitive detector for electrical circuits not in a metal conduit, such as "Romex" type wiring.
 - (C) Using non-conductive tools, poke a hole for a bore scope, or cut a view hole, at a depth equal to, but not greater than the thickness of the surface material layers.
 - (D) View inside structure with a flashlight or borescope for utilities.
 - (6) Relocate penetrations to avoid identified hazards.

3.20 EXCAVATION AND TRENCHING

3.20.1 Perform excavation under the supervision of a competent person as defined by 29 CFR 1926, subpart P, sections 650, 651, and 652.

3.20.2 Before beginning excavations 5 feet or more in depth, submit in the corporate safety plan the trenching and excavation program, and in the JHA or a separate document submit a detailed plan showing the design of shoring, bracing, sloping, or other provisions to protect workers from the hazard of caving ground during the excavation.

3.20.3 Special Trench Barricades

- (a) In areas of high population density and high pedestrian traffic, provide special open-trench barricades and protection.
- (b) For open trenches adjacent to occupied buildings, crossing pedestrians, crosswalks and paths, at street intersections, and crossing or adjacent to sidewalks and driveways, the following forms of open-trench protection are required:
- (c) Provide type II barricades, as defined in Caltrans MUTCD, positioned on each side of the trench and at a maximum of 10-foot intervals. Alternate spacing on each side of the trench to show that a frontal view depicts barricades at 5-foot intervals.
- (d) Position each barricade at least 2 feet away, whenever possible, from the open trench or excavation.
- (e) Provide barricades with a yellow flasher at least 8 inches in diameter. (Note: Temporary barricades used during daylight operations do not require flashers.) Direct street-side flashers parallel with the street, and face curb-side flashers and flashers along pedestrian routes in the direction of pedestrian traffic.
- (f) When not using continuous solid barricades, attach interconnecting ropes or tape to barricades. When rope is used, attach streamers at 2- to 3-foot intervals.
- (g) Provide walkways and bridges with standard guard rails at pedestrian crossing points, except when trench width is 2 feet or less, in which case use a type II barricade straddling the trench on either side of the walkway.
- (h) Where vehicle traffic crosses trenching operations, provide metal plate coverings to support motor vehicles. Determining the adequacy of the metal plate to support traffic loads is the responsibility of the Subcontractor.

3.21 DEMOLISHING UTILITIES

3.21.1 Paint or label existing utilities structures, subsystems, and components (SSC) planned for demolition.

- (a) Identify systems to be removed with a green indicator, such as a green ribbon or green paint.
- (b) Identify systems to remain with red indicator, such as red ribbon or red paint.
- (c) Notify STR and request concurrence.

3.21.2 After the STR concurs with the SSC selection, do the following:

- (a) Confirm with the STR that the marked utilities are de-energized.
- (b) Coordinate with the STR for LOTO of adjacent utilities.
- (c) Do not proceed with demolition until the STR lifts the hold point.
- (d) Isolate and physically separate per **LOCK-OUT/TAG-OUT (LOTO)** article.
- (e) Annotate the status as de-energized using black paint in the presence of the LLNS representative.
- (f) Protect adjacent utilities from damage during demolition activities.

3.22 PRESSURE SAFETY

3.22.1 Comply with requirements of 10 CFR 851, appendix A, article 4.

3.22.2 Comply with requirements 29 CFR 1910.101 for compressed gasses.

3.23 TEMPORARY TRAFFIC CONTROL

3.23.1 Provide temporary traffic control in compliance with the Caltrans MUTCD.

3.24 ATTACHMENTS

Attachment 001 35 23-1 (4 pages): Safe Plan of Action Instructions and Worksheet

Attachment 01 35 23-2 (8 pages): Lock-Out / Tag-Out Plan (FRM-2409)

Attachment 01 35 23-3 (8 pages): Subcontractor Silica Dataset and Modified Table 1

END OF SECTION 01 35 23

SAFE PLAN OF ACTION (SPA) WORKSHEET INSTRUCTIONS

Complete the **LLNL Subcontractor Safe Plan of Action (SPA) Worksheet** daily for each project. Post the SPA worksheet instructions at each jobsite for reference. Note: Multi-craft jobs require each discipline to complete a separate form for their task. If necessary, attach additional pages with tasks and page numbers at the bottom (e.g., page 1 of 2.)

1. Fill in the work control document (WCD) number, work permit number (if applicable) and PO, PW, or work order number.
2. Indicate if there is a lower-tier subcontractor on the job, which craft is performing the work and LLNS responsible individual with their phone number.
3. Provide today's date, location of task, shift being worked, and equipment numbers, if applicable.
4. List major work steps of this task, the potential hazards, controls/safety plan and equipment and/or tools required.
5. Using the back side of this form as a guide, walk-through the work area and list potential hazards involved with each work step.
6. Indicate hold-point inspections required in the "work area coordination & safety questions" (under the "Safety Hold Point Inspection" section) for any of the following activities:
 - a. LOTO
 - b. Rigging/hoisting
 - c. Confined space entry
 - d. Fall protection
 - e. Asbestos abatement
 - f. Lead abatement
 - g. Hazardous material removal
7. Ask the worker readiness questions that are designed to determine if the work crew is ready and able to work safely. If there are specific issues with a worker, it is encouraged that they speak to the foreman or superintendent privately. These questions are not intended to infringe on a worker's personal health issues but are a tool for the foreman or superintendent to have a productive dialog with the workers. See below for sample questions. After the foreman or superintendent has asked the questions, document responses by checking the boxes.

Worker Readiness Sample Questions


<input type="checkbox"/> Is the work ready?	<input type="checkbox"/> Are there any new, unique, or significant hazards in today's work?
	<input type="checkbox"/> Are the controls in place and functioning?
	<input type="checkbox"/> Any interfaces with other work groups?
<input type="checkbox"/> Is the work area ready?	<input type="checkbox"/> Is the work released for the day?
	<input type="checkbox"/> Other work in the area?
	<input type="checkbox"/> Are there any new area hazards that have not been previously identified?
<input type="checkbox"/> Are all the workers ready?	<input type="checkbox"/> Do we all understand today's tasks and who is doing what?
	<input type="checkbox"/> Do you have any medical conditions that impact your ability to work safely?

8. Have each worker review the work area, assist with completing this form as applicable, and legibly print his/her name and employee/badge number.
9. The STR may attend SPA meetings.
10. Ensure all copies of SPA(s) are submitted to the STR for retention in the project file as prescribed by the Laboratory's retention schedule.

Safe Plan of Action (SPA) Worksheet

Project	Subcontractor	WCD #	Permit #
Task Location	Lower-tier Subcontractor	Craft	Work Permit Type
Date	Shift	LLNS RI Name / Phone #	

Major Work Steps of Task	Potential Hazards	PAT#	Controls/Safety Plan	Equipment/Tools Required

Task-Specific Required Inspections	Inspected By/Name:	Work Area Coordination & Safety Questions
Daily lift		Coordination needed with adjacent and/or co-occupancy in work area? ___ Y ___ N
Harness		Any scheduled hold-point and/or safety hold-point inspections? (below) ___ Y ___ N
Fire extinguisher current		Is the work to be performed and work area ready? ___ Y ___ N
Cords properly inspected by each user		Does everyone understand the task to be performed? ___ Y ___ N
All existing systems enabled	Documented Below by Signature	Safety Hold Point Inspections (if applicable): 
Hoisting and rigging		
Excavation		
Scaffold		
PITs inspected		

Pre-job briefing has been completed and each employee is taking the responsibility to ensure that all required training for this work activity is current and that they are competent and qualified on all required tools/equipment. Each employee must **LEGIBLY PRINT their name and badge number.**


Use the multi-employer sign-in sheet for additional signatures to confirm all workers have read and agreed to this SPA.

Subcontractor Foreman/Superintendent: _____

NOTE: You must pause work if conditions change, the job scope changes, or a deficiency in the plan is noted. If any injuries or incidents occur, respond as appropriate, then immediately contact the LLNS Responsible Individual. **ALL WORKERS HAVE THE RIGHT TO STOP WORK.**

Safe Plan of Action – Preparation Checklist

<p>Overhead Hazards</p> <ul style="list-style-type: none"> <input type="checkbox"/> Power de-energize required? <input type="checkbox"/> Power lines <input type="checkbox"/> Clearance distance <input type="checkbox"/> Sprinkler lines 	<p>PPE</p> <ul style="list-style-type: none"> <input type="checkbox"/> Hard hat <input type="checkbox"/> Eye protection <input type="checkbox"/> Face shield gloves <input type="checkbox"/> Work boots <input type="checkbox"/> Arm sleeves <input type="checkbox"/> Welding hood <input type="checkbox"/> Dust mask (NIOSH approved) <input type="checkbox"/> Respirator - trained <input type="checkbox"/> FR clothing <input type="checkbox"/> Other: <input type="checkbox"/> Other: 	<p>Electrical Hazard</p> <ul style="list-style-type: none"> <input type="checkbox"/> Contact Energy Owner <input type="checkbox"/> Test before you touch <input type="checkbox"/> Properly rated, calibrated meter <input type="checkbox"/> NFPA 70E 	<p>Lifting Equipment (Crane)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Signalman assigned <input type="checkbox"/> Tag line <input type="checkbox"/> Inspection <input type="checkbox"/> Proper rigging, rigging plan 	<p>Working with Chemicals</p> <ul style="list-style-type: none"> <input type="checkbox"/> Direct Contact <input type="checkbox"/> SDS <input type="checkbox"/> Proper containers and labeling
<p>Elevated Work</p> <ul style="list-style-type: none"> <input type="checkbox"/> Tether tools and material <input type="checkbox"/> Canvas bag <input type="checkbox"/> Fire blanket <input type="checkbox"/> Empty pockets 	<p>Fall Protection</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inspection & proper fit <input type="checkbox"/> At least 2 people present <input type="checkbox"/> Fall Rescue plan <input type="checkbox"/> Anchorage Point Available <input type="checkbox"/> Horizontal Lifeline system <input type="checkbox"/> Retractable device 	<p>Fire Hazard</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cut, weld, burn, grind, solder <input type="checkbox"/> Hot work permit: <input type="checkbox"/> Fire extinguisher? <input type="checkbox"/> Fire watch? <input type="checkbox"/> Area clear of flammables? 	<p>Excavations</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inspected by: <input type="checkbox"/> Shoring <input type="checkbox"/> Benching <input type="checkbox"/> Permit current? <input type="checkbox"/> Air monitoring 	<p>Worker Readiness Questions</p> <ul style="list-style-type: none"> <input type="checkbox"/> Are all Workers ready? <input type="checkbox"/> Is anyone feeling stressed or distracted? <input type="checkbox"/> Does everyone feel they can proceed with the work safety?
<p>Lifts and Scaffold</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inspection and documentation <input type="checkbox"/> 100% tie-off <input type="checkbox"/> Anchorage points <input type="checkbox"/> Tags in place 	<p>Body Mechanics</p> <ul style="list-style-type: none"> <input type="checkbox"/> Stretch <input type="checkbox"/> Proper lifting techniques <input type="checkbox"/> Manual lifting, need help <input type="checkbox"/> Slips / trips / falls <input type="checkbox"/> Inspect access / egress <input type="checkbox"/> Awkward body position 	<p>Approved Safety Documentation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Corporate Safety Plan <input type="checkbox"/> JHA <input type="checkbox"/> Approval from STR to begin work <input type="checkbox"/> Other safety plan(s)? 	<p>Ladder</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inspection <input type="checkbox"/> Proper use – 3 pts. contact, belt buckle rule <input type="checkbox"/> Tie-off point <input type="checkbox"/> Appropriate Storage - laying down 	<p>Hold Points</p> <ul style="list-style-type: none"> <input type="checkbox"/> LOTO <input type="checkbox"/> Hazardous material removal <input type="checkbox"/> Fall protection <input type="checkbox"/> Confined space <input type="checkbox"/> Hoisting/rigging/material handling <input type="checkbox"/> Lead/asbestos abatement <input type="checkbox"/> Other:
<p>Hand & Power Tools</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inspect cord(s) <input type="checkbox"/> GFCI <input type="checkbox"/> Review operators manual <input type="checkbox"/> Guarding in place <input type="checkbox"/> UL label or AHJ inspection <input type="checkbox"/> Unplug after use <input type="checkbox"/> Proper clean-up and disposal 	<p>Environment</p> <ul style="list-style-type: none"> <input type="checkbox"/> Hydrated Shelter available <input type="checkbox"/> Appropriate clothing <input type="checkbox"/> Hearing protection ≥ 85 dbA <input type="checkbox"/> Double required? <input type="checkbox"/> Co-occupancy 	<p>Material Handling</p> <ul style="list-style-type: none"> <input type="checkbox"/> Items secure to cart /truck (tie down) <input type="checkbox"/> Chock if necessary / parking brake <input type="checkbox"/> Stairs or elevator <input type="checkbox"/> Formal plan for high-risk activities approved? 	<p>Material Handling</p> <ul style="list-style-type: none"> <input type="checkbox"/> LOTO <input type="checkbox"/> Hazardous material removal <input type="checkbox"/> Fall protection <input type="checkbox"/> Confined space <input type="checkbox"/> Hoisting/rigging/material handling <input type="checkbox"/> Lead/asbestos abatement <input type="checkbox"/> Other: 	<p>Material Handling</p> <ul style="list-style-type: none"> <input type="checkbox"/> LOTO <input type="checkbox"/> Hazardous material removal <input type="checkbox"/> Fall protection <input type="checkbox"/> Confined space <input type="checkbox"/> Hoisting/rigging/material handling <input type="checkbox"/> Lead/asbestos abatement <input type="checkbox"/> Other:

	Institutional Form		FRM-2409	Rev. 02
	Lockout Tagout Plan			
	Functional Area	Safety Engineering	Effective Date:	03/01/23

1.0 References


Identifier	Title
PRO-2402	Performing LOTO

2.0 Change History

Date	Revision	Change Type	Revision Description
See Watermark	02	Minor	Corrected form formatting. Moved special instructions section to the Isolation Order List. Minimized space taken by example content to allow more space for job-specific content.
08/01/2023	01	Major	Restructured form for applicability throughout LLNL based on input and contributions from the LOTO Task Force.
09/07/2022	00	New	Initial Issue.

3.0 Contact Information

Name	Phone	Email
Mark McCain	(925) 423-3221	mccain2@llnl.gov

Lockout Tagout (LOTO) Plan		Plan#:	Date:	Rev:
	Work Document / Work Order:		Equipment / System:	
	Facility / Building:		Location:	
	Job Scope / Description:			

LOTO Type: SIMPLE COMPLEX

Hazardous Energy Sources (Types and Magnitudes)				
<input type="checkbox"/> CHEMICAL		<input type="checkbox"/> HYDRAULIC		Number of REQUIRED LOTO Points
<input type="checkbox"/> ELECTRICAL		<input type="checkbox"/> PNEUMATIC		
<input type="checkbox"/> GRAVITY		<input type="checkbox"/> THERMAL		
<input type="checkbox"/> MECHANICAL MOTION:				
<input type="checkbox"/> OTHER:				
Hazardous Energy Notes/Equipment/Prerequisites:				

	Print	Sign	Title / Company	Date
*Prepared by:				
*Approved by:				

**Preparer & Approver shall be knowledgeable of the scope of work and how to safely isolate the hazards described in this LOTO Plan.*

Approver shall be AI, RI, or designee. Preparer and Approver **shall not be the same person.*

Name	Role (Applied or Removed LOTO)	Signature	Date
	Energy Owner-Applied LOTO		
	Energy Owner-Removed LOTO		

DO NOT PROCEED WITHOUT AN APPROVED LOTO PLAN

****If at any point during the LOTO process the plan changes, PAUSE WORK. The LOTO Plan must be revised and approved by all parties involved****

Isolation Order List / Method of Procedure:

LOTO APPLICATION PROCESS								
1. Prepare and Notify		2. Shutdown Equipment		3. Isolate the Energy		4. Apply LOTO Devices	5. Control Stored Energy	6. Verify and Test
Special Instructions:								
Task #	Instructions / Activities	LOTO Isolation Point Location (Building/Room)	LOTO Isolation Point Identification	LOTO Isolation Point Position (Open/Closed)	Performer Initials/Date/Time	Verifier Initials	Notes/Comments	
1.								
2.								
3.								
4.								
5.								
6.	*****HOLD TO PERFORM WORK*****	*****	*****	*****	*****	*****	*****	

LOTO REMOVAL PROCESS							
VERIFY nonessential items are removed and affected personnel are notified and located safely away from the equipment. ENSURE equipment is operationally intact and controls are in a neutral position. REMOVE locks and tags. NOTIFY equipment owner.							
Special Instructions:							
Task #	Instructions / Activities	LOTO Isolation Point Location (Building/Room)	LOTO Isolation Point Identification	LOTO Isolation Point Position (Open/Closed)	Performer Initials/Date/Time	Verifier Initials	Notes/Comments
7.							
8.							
9.							
10.							
11.							

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Work Document / Work Order #:					LOTO Plan (if applicable):								
Job Scope / Description:													
Name	Contact Phone #	Lock #	Date	Time On	Time Off	Time On	Time Off	Time On	Time Off	Time On	Time Off	Time On	Time Off

Attach Log Sheets to the Associated LOTO Plan Log Page _____ of _____

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1. Fill in the header:
 - a. Enter the LOTO plan number, if applicable, otherwise mark "N/A".
 - b. Date (the date of the original request or the date the plan is filled out).
 - c. Revision number for this plan, start with "0". Track all subsequent changes/modifications in sequential order (i.e., Rev 1, 2, 3, etc.).
 - d. Reference **ALL** applicable work document numbers (e.g., work control document, work order).
 - e. Equipment and/or system information (this can also include asset numbers out of the master equipment list or identifications out of different databases/programs such as enterprise asset management).
 - f. Facility and/or building.
 - g. List all room location(s) specifically where equipment is affected by application of LOTO or LOTO devices.
 - h. Include job scope and/or description of work being performed.

*****It is LLNL policy for Complex LOTO, that a written plan specific to the equipment being worked on, and appropriate authorization is required. PRO-2402 Section 5.2.3.2**

2. Check the box for whether this LOTO is simple or complex. Guidance is provided in the note box below, reference *PRO-2402 Section 5.2.3 "Documenting LOTO"* for additional information. Contact the hazardous energy control SME, if needed.

NOTE: Simple LOTO must meet ALL the following criteria:

- The machine or equipment has a single energy source which can be readily identified and isolated.
- A single energy isolating device will completely deenergize and deactivate the machine or equipment.
- The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutting down, which could endanger workers.
- Work is conducted in one work location.
- The work does not require a transfer of ownership between shifts.

3. Check all boxes with applicable hazardous energy source(s). Next to associated hazardous energy source(s); enter type(s) and magnitude(s) in measurable units (e.g., volts alternating current (AC), pounds per square inch gauge (psig), bar, degrees Celsius).
4. Enter the total number of LOTO isolation points required to control hazardous energy. See Isolation Order List/ Method of Procedures **LOTO APPLICATION** table to determine all the identified isolation points.
5. Include hazardous energy notes/Equipment/Prerequisites: Examples include specific PPE, tools, or energy isolation devices required (e.g., arc flash suit, rated gloves), approach boundaries for electrical, exclusion zones for pressure).
 - a. List any details as needed to provide clarity and completeness for the benefit of the workers.
 - b. Additional permits/processes or reference documents required (e.g., Low Voltage Outage, internal procedures, equipment manuals).

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- c. Safety barricades for LOTO work areas.
 - d. Details regarding shift change.
6. Preparer – The person that completed the LOTO plan. Enter name, signature, title/company, and date.

NOTE: The LOTO plan Preparer and Approver must have the technical knowledge to understand if the plan is correct.

NOTE: The LOTO Plan Preparer and Approver SHALL NOT be the same person.

7. Approver – The Authorizing Individual, Responsible Individual or designee that is sanctioned to approve and release LOTO work. Enter name, signature, title/company, and date.
- a. More lines can be added to this section for additional validations, reviews, and approval authorities, as needed.
8. Energy Owner – The Energy Owner who Performed/Applied the LOTO. Name/Signature/Date.
9. Energy Owner – The Energy Owner who Removes the LOTO. Name/Signature/Date.
- a. Both signatures may be the same LOTO Authorized Worker. If the role is transferred, they may be two different LOTO Authorized Workers.

NOTE: The 6 Steps of LOTO shall be performed for ALL LOTOs.

The LOTO application-Special Instructions section can be expanded with additional details, as needed.

10. **LOTO APPLICATION PROCESS** table: Tasks are entered in the sequence order required to safely establish the LOTO.
- a. Special Instructions – any written information that supports the Applied LOTO tasks/instructions on the list.
 - b. Instructions / activities - add specific detailed information for each task. This section can include additional elements such as photos, drawings, schematics, etc., that is beneficial to ensuring the workers are clear on what actions are needed and are provided sufficient instruction for clarity.

Examples:

- Make calls to responsible persons, facility manager.
 - Get clearance to de-energize.
 - Shutdown equipment.
 - Open circuit by opening breaker (i.e. Panel 931A-B3 ckt 17).
 - Perform LIVE-DEAD-LIVE check on voltage meter.
 - Perform zero energy verification.
 - List independent verification task/instruction
- c. The location of the LOTO isolation point, building and room number (e.g., R999 South end of hallway).
 - d. LOTO isolation point identification, typical examples are circuit breaker(s), valve(s), flow switch(es), etc., required to perform the energy isolation (e.g., FS-101, Panel 723A-B1 ckt 15).
 - e. LOTO isolation point position (e.g., open, closed).

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- f. Performer enters initials after each task is complete along with date and time.
- g. **If** verification is required (Independent or secondary), then have verifier initial after each task as the verification is complete along with date and time.
- h. Enter notes or comments as required (e.g., use specific isolation devices, use specific meter for zero energy verification, list isolation lock #).

NOTE: The example Energy Owner checks for both LOTO Application and Removal are included as guidance but are not intended to be a complete nor exhaustive set of verifications that the energy owner can follow without also evaluating the specific circumstances and requirements for each LOTO being performed.

The institutional LOTO policies supersede any guidance in this form instruction when conflict arises. In any cases where uncertainty exists, contact the hazardous energy control SME for assistance.

Example Energy Owner Checks for LOTO Application:

- Did you communicate to all affected personnel the equipment that will be Locked Out and purpose/scope?
- Have you located and identified all power sources, including stored energy and documented this in the LOTO Plan?
- Did you isolate all power sources (e.g., electricity, pressure, moving parts, suspended parts)?
- Have you locked out all power sources with approved locks and fill in the LOTO tag?
- Have you reviewed and confirmed all energy sources and documented them on the Equipment Log Sheet?
- Was a Pre-Job conducted and were hazards reviewed by applicable personnel?

NOTE: If required, an example of a Group LOTO Log Sheet is provided with this LOTO Plan Form. Other approved Group LOTO Log sheets may be used.

11. If applicable, print the group LOTO log sheet and have all LOTO authorized workers that are part of the LOTO sign on and off with their lock numbers, as needed. Additional log sheets can be printed. When the LOTO is complete, number the log sheet pages 1 through the total number of pages and attach to completed LOTO Plan.
12. **LOTO REMOVAL PROCESS** table. Tasks are entered in the sequence order required to safely remove the LOTO.
 - a. Special Instructions – any written information that supports the Removal LOTO tasks/instructions on the list.
 - b. LOTO removal instructions / activities - add specific detailed information for each task. Exactly as with the application instructions, this section can include additional elements such as photos, drawings, schematics, etc.

Examples:

- Make calls to responsible persons, facility manager.
- If required, ensure equipment has been inspected.

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- Get clearance prior to energizing equipment/system.
 - Energize equipment.
 - Close circuit by switching breaker (i.e., Panel 931A-B3 ckt 17).
 - Open valve (i.e., V-981 supply valve, 133RCHC02-1 supply valve).
- c. The location of the LOTO isolation point, building and room number.
- d. LOTO isolation point identification (e.g., V-981, 133RCH02-1 CTWS 2).
- e. LOTO isolation point position (e.g., open, closed).
- f. Performer enters initials after each task is complete along with date and time.
- g. If independent verification is required, have an independent verifier initial after each task as the verification is complete along with date and time.
- h. Enter notes or comments as required.

Example Energy Owner Checks for LOTO Removal:

- Did you verify all work is completed and guards are in place or install suitable barricades and/or attendants as required?
- Have you notified affected personnel and verified that it is safe to start or re-energize equipment?
- Did you walk down the system and remove all energy isolation devices?

NOTE: All personal locks can only be removed by the person that placed the lock on the energy isolation device, no other persons shall have a key or remove another worker's lock (1 Lock=1 Key).

LLNL-MI-816293

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Tasks	# Samples	Monitoring Duration [range, minutes]	Total Respirable Dust (mg/m ³ 8-hr TWA) [Conc reported by lab]	Total Respirable Silica Dust (mg/m ³ 8-hr TWA)	% of TLV Respirable	Required?	Type?
Roofing Removal: manual shoveling and handheld power brooming	4	413 - 126	<0.047	<0.008	20	None	
Walk-behind saws, outdoor application	11	100 to 244	<0.025 to 0.244	<0.0025 to 0.013	10 to 52	None	
Handheld power saws, outdoor application	1	240	0.028	0.0135	54	None	
Concrete drilling	7	37 to 278	<0.025 to 0.281	<0.0042 to <0.012	17 to 48	None	
Coring	4	90 to 323	0.1	<0.0042 to 0.0112	17 to 45	None	
Coring - 24" diameter	2	345	0.13 to 0.37	0.0337 to 0.086	135 to 344	Y	APR-10
Jackhammers and handheld powered chipping tools, outdoors	3	150 to 245	0.2	0.0097 to 0.156	39 to 524	Y	APR-25
Handheld chipping, outdoors	1	240	NP	<0.0042	17	None	
Concrete mixing	1	242	NP	<0.0042	17	None	
Grinding	1	102	0.128	0.023	92	Y	APR-10
Sack and patch	1	90	0.244	<0.012	48	None	

Subcontractor_Silica_Dataset_and_Modified_Table1

LLNL-MI-816293

Tasks	# Samples	Monitoring Duration [range, minutes]	Total Respirable Dust (mg/m ³ 8-hr TWA) [Conc reported by lab]	Total Respirable Silica Dust (mg/m ³ 8-hr TWA)	% of TLV Respirable	Required?	Type?
Backhoe loading of concrete/asphalt	2	168	<0.2	<0.008	32	None	
Potholing	1	90	1.8	0.01	40	None	
Wall mounted wet saw	1	244	0.044	0.0036	14	None	
Drywall Demolition	2	57 to 70	0.0875 to 4.4	<0.0088 to <0.013	35 to 52	None	
Drywall Installation	3	66 to 250	0.1 to 0.245	<0.0012 to <0.0089	5 to 35	None	
Powder or gas actuated tools	4	110 to 345	<0.044 to 0.051	<0.0086 to <0.0087	34 to 35	None	
Concrete Brushing	1	92	0.026	<0.0027	11	None	
Sanding dry wall and joint compound	17	203 to 325	ND - 0.016	<0.0026	10	None	
Drywall - Rip/Rasp	2	71 to 94	0.09 to 0.1	<0.0012	5	None	
Walk-behind milling machine and floor grinder [beadblasting]	1	249	<0.051	0.006	24	None	

Subcontractor_Silica_Dataset_and_Modified_Table1

1926.1153 Respirable crystalline silica.

(c) specified exposure control methods (1) For each employee assigned in a task identified on the Modified Table 1, the employer shall fully and properly implement for engineering controls, work practices, and respiratory protection specified for the task on the Modified Table 1, unless the employer assesses and limits the exposure of the employee to respirable silica in accordance with 1926.1153(d) Alternative exposure control methods.

Information in **red text** represents additions or amendments to 1926.1153(c)(1) Table 1 to clarify the equipment/task description and control requirements. For respiratory protection requirements, information contained in **[brackets]** represents the original respiratory protection requirement specified in Table 1 which has been modified based upon internal or industry wide exposure assessment datasets.

Modified Table 1: Specific Exposure Control Methods when Working with Materials Containing Crystalline Silica

<i>Equipment/task</i>	<i>Engineering and work practice control methods</i>	<i>Required respiratory protection and minimum assigned protection factor (APF)</i>	
		<i>≤ 4 hours/shift</i>	<i>> 4 hours/shift</i>
(i) Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None.
(ii) Handheld power saws (any blade diameter) e.g. saw cutting	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions:		
	When used outdoors When used indoors or in an enclosed area	None APF 10	APF 10. APF 10.
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less) Includes drywall (aka gypsum board, wallboard) installation, sanding drywall, rasp/rip, and demolition [PMO017, PMO020]	For tasks performed outdoors only: Use saw equipped with commercially available dust collection system Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency	None	None.
	Demolition activities, e.g. sledge hammer or saws without dust collector	APF-10 [None]	APF-10 [None]
(iv) Walk-behind saws (aka saw cutting or concrete saws) [PMO009]	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions:		

	-When used outdoors	APF-10 [None]	APF-10 [None]
	-When used indoors or in an enclosed area	APF 10	APF 10.
(v) Drivable saws [PMO005]	For tasks performed outdoors only: Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None.
(vi) Rig-mounted core saws or drills (including impact and rotary hammer drills) [PMO011 and PMO012]	Use tool equipped with integrated water delivery system that supplies water to cutting surface Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions core-drilling, less than or equal to 8-inch diameter core-drilling, greater than 8-inch diameter	None APF 10 [None]	None. APF 10 [None]
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills) [PMO011 and PMO012]	Use drill equipped with commercially available shroud or cowling with dust collection system Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism Use a HEPA-filtered vacuum when cleaning holes seismic securing or core hole saw; up to 3"-hole diameter.	None	None.
(viii) Dowel drilling rigs for concrete	For tasks performed outdoors only: Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism Use a HEPA-filtered vacuum when cleaning holes	APF 10	APF 10.
(ix) Vehicle- mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector OR Operate from within an enclosed cab and use water for dust suppression on drill bit	None None	None. None.
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact:		

[PMO009]	<p>-When used outdoors</p> <p>-When used indoors or in an enclosed area</p>	<p>APF 25 [None] APF 25 [APF 10]</p>	<p>APF 25 [APF 10]. APF 25 [APF 10].</p>
	<p>OR</p> <p>Use tool equipped with commercially available shroud and dust collection system</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions</p> <p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism:</p>		
	<p>-When used outdoors</p> <p>-When used indoors or in an enclosed area</p>	<p>APF 10 [None] APF 10</p>	<p>APF 10. APF 10.</p>
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	<p>Use grinder equipped with commercially available shroud and dust collection system</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism</p>	APF 10	APF 25.
(xii) Handheld grinders for uses other than mortar removal, e.g. handheld surface grinders, planer, scarifier or scabbling/scappling	<p>For tasks performed outdoors only: Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions</p> <p>OR</p> <p>Use grinder equipped with commercially available shroud and dust collection system</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism:</p>	<p>APF 10 [None]</p>	<p>APF 10 [None]</p>
	<p>-When used outdoors</p> <p>-When used indoors or in an enclosed area</p>	<p>APF 10 [None] APF 10 [None]</p>	<p>APF 10 [None] APF 10. APF 10.</p>

(xiii) Walk-behind milling machines and floor grinders (aka surface grinders, planer, scarifier or scabbling/scappling)	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None.
	OR Use machine equipped with dust collection system recommended by the manufacturer Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes	None	None.
(xiv) Small drivable milling machines (less than half-lane) [PMO005]	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant Operate and maintain machine to minimize dust emissions	None	None.
(xv) Large drivable milling machines (half-lane and larger) [PMO005]	For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust Operate and maintain machine to minimize dust emissions	None	None.
	For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust Operate and maintain machine to minimize dust emissions	None	None.
	OR Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant Operate and maintain machine to minimize dust emissions	None	None.

(xvi) Crushing machines [PMO005]	Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points) Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station	None	None.
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions	None	None.
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: Demolishing, abrading, or fracturing silica-containing materials Includes manual removal of gravel or soil [PMO005]	Apply water and/or dust suppressants as necessary to minimize dust emissions	None	None.
	OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab	None	None.
(xviii) Concrete Mortar Mixing [PMO005]	Ready mix trucks, silo and silo mixers, pull behind or skid mounted or drum type mixers OR Hand mixing concrete bags	None	None.
		None	None.

(xx) Soil potholing; includes hydro evacuation [PMO005]	Use machine equipped with dust collection system recommended by the manufacturer	None	None
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
	OR		
	Use equipment designed to deliver water for dust suppression and other points where dust is generated	None	None
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
(xxi) Power brooming [PMO005]	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None
(xxii) Powder or gas actuated tools [PMO033]	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None

Table I: Assigned Protection Factors⁵

Type of Respirator ^{1,2}	Quarter mask	Half mask	Full facepiece	Helmet/Hood	Loose-fitting facepiece
1. Air-Purifying Respirator	5	10 ³	50	—	—
2. Powered Air-Purifying Respirator (PAPR)	—	50	1,000	25/1,000 ⁴	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode	—	10	50	—	—
• Continuous flow mode	—	50	1,000	25/1,000 ⁴	25
• Pressure-demand or other positive-pressure mode	—	50	1,000	—	—
4. Self-Contained Breathing Apparatus (SCBA)					
• Demand mode	—	10	50	50	—
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	—	—	10,000	10,000	—

Notes:

¹ Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

² The assigned protection factors in Table I are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

³ This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

⁴ The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

⁵ These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134(d)(2)(ii).

SECTION 01 35 23.13 ASBESTOS SAFETY - CLASS I AND II

PART 1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Asbestos controls for class I and class II asbestos containing material (ACM) abatement and removal.

1.2 RELATED REQUIREMENTS

1.2.1 Section 01 35 23 - General Safety Provisions: HEPA filter requirements

1.2.2 Section 01 35 23.19 - Asbestos Safety: Class III, IV, and Unclassified

1.3 DEFINITIONS

1.3.1 class I: Activities involving the removal of thermal system insulation (TSI) and surfacing ACM and presumed asbestos containing materials (PACM).

1.3.2 class II: Activities involving the removal of ACM that is not TSI or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

1.3.3 competent person: (as defined by 29 CFR 1926.1101 (b)) means, in addition to the definition in 29 CFR 1926.32 (f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32 (f); in addition, for Class I and Class II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor, or its equivalent.

1.3.4 project designer: (as defined by 29 CFR 1926.1101 (b)) means a person who has successfully completed the training requirements for an abatement project designer.

1.4 REFERENCE STANDARDS

1.4.1 22 CCR §66262.32 - California Code of Regulations, Title 22. Social Security, Division 4.5. Environmental Health Standards for the Management of Hazardous Waste, Chapter 12. Standards Applicable to Generators of Hazardous Waste, Article 3. Pre-Transport Requirements, § 66262.32 Labeling; current edition.

1.4.2 29 CFR 1910.134 - Respiratory protection; Current Edition.

1.4.3 29 CFR 1910.141 - Sanitation; current edition.

1.4.4 29 CFR 1926 - Safety and Health Regulations for Construction; current edition.

1.4.5 29 CFR 1926.32 - Definitions; current edition.

1.4.6 29 CFR 1926.1101 - Asbestos; Current Edition.

1.4.7 40 CFR 763 - Asbestos; current edition.

1.4.8 BAAQMD regulation 11, rule 2 - Bay Area Air Quality Management District (BAAQMD), Regulation 11 - Hazardous Pollutants, Rule 2 - Asbestos Demolition, Renovation, and Manufacturing; current edition.

1.4.9 NMAM - NIOSH Manual of Analytical Methods; 5th edition.

1.4.10 SJVAPCD regulation IV, rule 4002 - National Emission Standards for Hazardous Air Pollutants; current edition.

1.5 SUBMITTALS

1.5.1 See section 01 33 00 - Submittal Procedures for submittal procedures.

1.5.2 Asbestos Abatement Plan: Submit an "Asbestos Abatement Plan" to the Subcontract Technical Representative (STR) for approval prior to starting work on-site. In the plan, detail the proposed work methods, procedures, and equipment intended to prevent asbestos exposure to LLNS and Subcontractor employees.

- (a) Ensure LLNS facilities are not contaminated and protect the environment.
- (b) Include the engineering, administrative, and personal-protective controls that provide compliance with the applicable provisions of these specifications, and applicable regulations and laws.
- (c) Address the following specific items in the asbestos abatement work plan:
 - (1) Isolation Controls: Describe the equipment, supplies, and techniques used to isolate a regulated containment area. Describe the engineering controls employed.
 - (2) Air-Sampling Plan: Include the personal air-sampling plan described in these specifications.
 - (3) Negative-Pressure System: Describe the selection, testing, staging, use, and monitoring methods for equipment to provide a negative pressure in the asbestos-removal area. Provide diagram of abatement area including negative pressure machine(s) and decontamination chambers.
 - (4) Waste Handling for Nonfriable ACM: Describe the containment, storage, transportation, and disposal methods for nonfriable asbestos-containing waste and asbestos items.
 - (5) Waste Handling Friable ACM: Describe the containment and turn-over methods for friable ACM turned over to LLNS for disposal.

1.5.3 Pre-Start Submittals: Provide the following applicable items to the STR prior to the start of asbestos-handling work:

- (a) Evidence of employee training meeting the 40 CFR 763, and 29 CFR 1926 (Fed/OSHA), requirements for employees performing asbestos work.
- (b) Records of respirator fit testing and training applicable to the minimum respirator requirements of 29 CFR 1926.1101.
- (c) Competent Person training records meeting 29 CFR 1926.1101 requirements.
- (d) Evidence of medical surveillance program administration for employees using respirator or otherwise and/or where medical surveillance is required by 29 CFR 1926.1101.
- (e) Subcontractor's respiratory protection program policy that is compliant with 29 CFR 1910.134.
- (f) Negative Exposure Assessment (NEA) reports if NEA will be used to justify controls to the extent allowed in 29 CFR 1926.1101.
- (g) Records of HEPA-filtered equipment certification (see "HEPA Filter Certification" in section 01 35 23 - General Safety Provisions).

- (h) Asbestos-abatement work procedure and safety plan, as required in this document.
- (i) Evidence of a valid BAAQMD regulation 11, rule 2 Acknowledgement of Demolition/Notification and Payment Fees or SJVAPCD regulation IV, rule 4002 Demolition/Renovation Permit Release for the specific project:
 - (1) For Livermore Site: Friable ACM removal greater than 100 linear feet, 100 square feet, or 35 cubic feet, submit a separate BAAQMD asbestos notification specific for the project. If a structural element is involved submit a demolition notification.
 - (2) For Site300: Friable ACM removal greater than 160 linear feet, 260 square feet, or 35 cubic feet, submit a SJVAPCD asbestos notification for the project. If a structural element is involved, submit a demolition notification.
- (j) Name and address of site where nonfriable asbestos waste will be disposed.
- (k) Copy of asbestos-related insurance coverage.
- (l) A personal air-sampling plan for implementation during the asbestos-handling work that is compliant with 29 CFR 1926.1101. Include the following minimum elements in the plan:
 - (1) Where using respirators other than type "C" air-supplying, provide representative employee monitoring in a manner adequate to calculate an 8-hour time-weighted average and an excursion exposure on each shift during which workers handled asbestos materials.
 - (2) Where using type "C" respirators, provide initial representative samples and subsequent weekly samples.
 - (3) A laboratory certified by the American Industrial Hygiene Association (AIHA) in the analysis of air samples by NMAM method 7400 (Asbestos and Other Fibers by PCM) or the Fed/OSHA reference method must perform the sample analysis in accordance with these methods.
- (m) Descriptive literature on specified equipment and material, as listed below:
 - (1) Negative-pressure machines
 - (2) Water-filtration system and filters
 - (3) Wetting materials, encapsulants, spray glues, and other chemicals
 - (4) Fire-resistant plastic or other materials used in construction of isolated area
 - (5) Respirators
 - (6) Negative-pressure monitor
 - (7) Air-sampling pump
 - (8) Fire extinguishers brought on-site
 - (9) Ground fault circuit interrupters (GFCI)
 - (10) Floor buffer machines and associated pads
 - (11) Alternative removal devices, such as water jet sprayers and infrared heating machines
 - (12) Temporary water-resistant lighting

1.5.4 Daily Submittals: Submit the following items to the STR within one working day following the day on which the results are available.

- (a) Submit results of personal air monitoring (8-hour time-weighted average and excursion results, including analytical laboratory reports) to LLNS within one working day following the day on which the results are available.
- (b) Copies of print-out from negative-pressure monitors.

1.5.5 Final Submittals: Following completing asbestos-handling work, submit copies of access logs for the regulated area and completed shipping documents. This includes a list of what asbestos-containing materials were removed and from exact locations.

1.6 QUALITY ASSURANCE

1.6.1 Abatement plans with alternate control methods for class I work must be written by a certified industrial hygienist or licensed professional engineer who is trained to the level of project designer as defined by 29 CFR 1926.1101(b).

PART 2 PRODUCTS

2.1 GENERAL

2.1.1 Provide material, equipment, tools, and devices required to complete the asbestos safety work in accordance with 29 CFR 1926.1101 and as follows:

- (a) Polyethylene sheeting: Fire retardant with a minimum thickness of 6-mil where the largest size possible is provided to minimize seams.
- (b) Asbestos waste bags and glove bags: 6-mil thick.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 **Personal-Protective Equipment (PPE).** Use PPE to minimize Subcontractor employee exposure to asbestos as described in 29 CFR 1926.1101 and below:

- (a) Use respiratory protection in accordance with 29 CFR 1926.1101. Class I asbestos work requires tight-fitting, powered air-purifying respirator (PAPR) or full face piece, supplied-air respirator operated in the pressure-demand mode and equipped with either HEPA egress cartridges or an auxiliary positive-pressure, self-contained breathing apparatus (SCBA) whenever a negative exposure assessment is not available.
- (b) Protective Clothing
 - (1) Wear disposable-type full-body protective clothing, including foot, hand, and head covering, as required by Fed/OSHA when working in a regulated, containment area.
 - (2) Make disposable protective coveralls, shoe covers, and gloves available for use to qualified LLNS inspectors.
 - (3) Stage this gear at the entrance to each isolated area or at the perimeter of each asbestos-work area.
 - (4) Provide at least four sets of disposable gear each day for each work area after starting the asbestos-removal work and until the area successfully passes the final clearance sample.

3.1.2 Other Protective Gear: Provide other necessary protective gear, including boots, goggles, and hardhats, and enforce the use of the provided gear.

3.2 ENGINEERING CONTROLS AND GENERAL WORK PROCEDURES

3.2.1 Perform asbestos work in accordance with controls outlined in 29 CFR 1926.1101 for class I or II work.

3.2.2 Unless specifically exempted by LLNS, use wet methods.

3.2.3 Post "DANGER, Asbestos Work Area" signs at entrances to regulated work areas in accordance to 29 CFR 1926.1101.

3.2.4 Establish a regulated area that will keep unprotected personnel out and prevent the spread of asbestos beyond the boundaries of the area.

3.2.5 For work inside buildings, erect critical barriers over ventilation system vents, doors, open areas, and other penetrations. If necessary, configure the ventilation system to place the work area under negative pressure relative to the surrounding areas.

3.2.6 Test and certify HEPA filtered equipment in accordance with "HEPA Filter Certification" in section 01 35 23 - General Safety Provisions.

3.2.7 Do not eat, drink, use tobacco products, or apply cosmetics in the designated regulated area.

3.3 GLOVE BAGS

3.3.1 Shut-off and tag-out ventilation units that service the area where the asbestos-containing material is being removed.

3.4 ASBESTOS REMOVAL USING NEGATIVE-PRESSURE ENCLOSURES (NPE)

3.4.1 Except in circumstances where LLNS permits other procedures, handle asbestos within an NPE area, as defined in 29 CFR 1926.1101. Characteristics of an NPE include isolating the work area from surrounding areas (typically using disposable plastic sheeting), establishing negative pressure within the isolated area, and constructing and using a three or more chambered decontamination chamber assembly.

3.4.2 Where the NPE area approach is used, the minimum characteristics of that work must include the following items, in addition to other applicable requirements presented in this section and in applicable regulations and laws.

(a) Isolation

- (1) Shut off and tagout ventilation units that service the ACM contaminated area. Protect the surrounding areas of the building or the general environment by constructing an NPE. Construct this enclosure from materials that meet the fire-resistance requirements.
- (2) Critical barriers: Initial covers installed over ventilation duct openings, windows, doors, and other transitions from the work area to adjacent non-isolated areas, including doorways on the decontamination chambers.
- (3) Provide transparent viewing ports at appropriate locations in critical barriers for LLNS or local air quality district (BAAQMD, SJVAPCD) representatives to observe the work areas from outside the barrier.

- (4) Make barriers isolating the work area from the surrounding areas complete and as airtight as possible, with the exception of the intended makeup air routes of the personal decontamination chambers, and, if applicable, the waste pass-out chambers. Seal other gaps and openings.
 - (5) Design the above listed isolation controls such that they remain intact and airtight throughout the expected duration of the work in the isolated area.
- (b) Decontamination Chambers: Establish decontamination chambers and connect to the regulated area for employee decontamination to meet the requirements of 29 CFR 1926.1101 and as specified below:
- (1) Employees must enter and exit the regulated area through the decontamination area.
 - (2) If needed, provide shower facilities to comply with 29 CFR 1910.141(d)(3), unless it is proven to not be feasible.
 - (A) The showers must be adjacent to both the equipment room and clean room unless it is demonstrated that this location is not feasible.
 - (B) If not feasible or where work is performed outdoors, remove asbestos contamination in accordance to 29 CFR 1926.1101(j)(1).
- (c) Negative-Pressure Requirements: In addition to the general requirements for establishing negative pressure within the isolated area, as described above, the following minimum requirements apply:
- (1) Maintain a minimum of four theoretical air changes per hour in the isolated area.
 - (2) Maintain a pressure differential inside the isolated area of negative 0.02 inch water gauge (wg) or greater at all times after starting asbestos work until clearance sampling indicates that the area meets the final clearance criterion.
 - (A) Provide recording, continuous-reading negative-pressure monitor (i.e., manometer).
 - (B) Calibrate this monitor prior to the start of the asbestos-abatement work, and at least once every two weeks thereafter.
 - (C) Affix a calibration sticker to each monitor, with the date of calibration and the name of the person and organization performing the calibration.
 - (D) Set the monitor to alarm, with an audible signal that is clearly audible within the asbestos work area, when the pressure differential drops below -0.02-inch wg.
 - (3) Locate the negative-pressure exhaust system, to the extent feasible, at the opposite side of the containment to the personal decontamination chambers and waste pass-out (where applicable).
 - (4) For asbestos-handling work where only one negative-pressure machine exhausts the isolated area, stage a second negative-pressure machine at the work site for use in the event of failure of the primary unit. This second unit must meet the same testing requirements as the primary unit prior to use. This unit must have a flow capacity equal to or greater than the flow capacity of the primary unit.

3.5 ASBESTOS ROOFING REMOVAL

- 3.5.1 Perform asbestos work in accordance with controls outlines in 29 CFR 1926.1101, section 1529 for class II work.
- (a) Shut off and tagout all ventilation units that service the area where the ACM is being removed.
 - (b) Lower ACM that is not intact to the ground as soon as it is practicable, but no later than the end of the work shift. Either keep material remaining on roof wet, place in an impermeable waste bag, or wrapped in plastic sheeting.

3.6 AIR SAMPLING

- 3.6.1 Conduct employee sampling in accordance with Fed/OSHA requirements pertaining to air sampling.
- 3.6.2 Stop work and immediately contact the STR if evidence suggests or confirms potential exposure exceeding the limits.

3.7 RESPONSE TO FAILURE OF CONTROL PROCEDURES

- 3.7.1 Elevated Perimeter Samples
- (a) If a perimeter sample initially obtained by LLNS and analyzed by phase contrast microscopy (PCM) is found to exceed 0.01 fibers per cubic centimeter (f/cc) or the pre-established baseline level, immediately stop asbestos- removal work. If the Subcontractor obtained the sample, immediately inform LLNS of the elevated sample result.
 - (b) LLNS may convene a meeting within 24 hours to determine the cause of the elevated fiber levels. If LLNS determines that the elevated fiber level most likely resulted from failure in the Subcontractor's control procedures, LLNS may have the subject perimeter samples re-analyzed by TEM (NMAM method 7402) to verify that the fibers detected are asbestos.
 - (c) If analysis indicates the presence of asbestos in concentrations greater than 0.01 f/cc (or 70 s/mm²), do the following:
 - (1) Make corrections or improvements to work procedures to reduce leakage of fibers from work area.
 - (2) Erect critical barriers surrounding area where elevated asbestos level was detected.
 - (3) Decontaminate surrounding areas, as stipulated by LLNS.
 - (4) Continue decontamination until sampling by LLNS, taken using appropriate procedures and analyzed by TEM or PCM, indicate an airborne asbestos level of less than 70s/mm² or 0.01 f/cc.
- 3.7.2 Observed Deficiency in Engineering Controls
- (a) Immediately correct observed deficiencies in the engineering controls, such as failure of plastic barriers or covering, loss of required negative pressure, clogging of shower drain, and loss of exhaust airflow.
 - (b) If you cannot correct the problem immediately, stop asbestos work pending correction of the deficiency.
- 3.7.3 Observed Deficiency in Work Practices: Promptly correct identified deficiencies in work practices, use of equipment, and personal-protective controls.

3.8 WASTE HANDLING

- 3.8.1 Dispose of ACM and items contaminated with asbestos, other than those items decontaminated or sealed and removed from LLNS property in a sealed condition, as asbestos-containing waste.
- 3.8.2 Handle, contain, label, store, transport, and dispose of asbestos-containing waste in accordance with 29 CFR 1926.1101, other applicable laws, codes, and regulations.
- 3.8.3 Mark vehicles used to transport asbestos-containing waste material as specified below during loading and unloading of waste.
- 3.8.4 Seal friable waste in airtight containers. Seal the waste in one 6-millimeter gauge or thicker plastic bag and subsequently seal in a second similar bag or metal or plastic drum. Place liquids contaminated with asbestos (e.g., unfiltered shower water) in metal or plastic drums.
- 3.8.5 Ensure proper labeling of secondary bags or drums. Display each container of 110 gallons or less with the following words and information in accordance with the requirements of 22 CCR §66262.32:

HAZARDOUS WASTE-State and Federal Law Prohibit Improper Disposal.

If found, contact the nearest police or public safety authority, the U.S. Environmental Protection Agency, or the California Department of Toxic Substances Control.

Generator's Name and Address_____.

Generator's EPA Identification Number_____.

Manifest Tracking Number_____.

- 3.8.6 Turn over friable ACM to LLNS. LLNS will manage and dispose of hazardous (friable asbestos-contaminated) waste.
- 3.8.7 Transport nonfriable, nonhazardous ACM to the Waste Management Altamont Landfill or Republic Services Vasco Road Landfill and dispose of in accordance with applicable laws and regulations. For alternate disposal sites, submit the proposed site information and description and quantity of materials to be disposed to LLNS for evaluation on a case-by-case basis.

3.9 INSPECTIONS AND AIR SAMPLING CONDUCTED BY LLNS

- 3.9.1 LLNS will conduct a variety of inspections of the work site to ensure compliance with the provisions of this section and applicable laws and regulations. Some of these inspections require notifying LLNS, see below. Inspections may include, but are not limited to, the following:
- (a) Inspection of the engineering controls used by the Subcontractor, including isolation controls, negative-pressure machines, decontamination facilities, water-filtration systems, and vacuum cleaners. This may include an initial inspection of the isolated area controls after installation, but before the asbestos-removal work begins. Schedule this set-up inspection with the STR at least 24 hours in advance of starting asbestos-handling work.
 - (b) Inspection of the PPE used by the Subcontractor, including the use of respirators and protective clothing.
 - (c) Inspection of the work practices, training and medical surveillance records used by the Subcontractor, including asbestos wetting and removal procedures, and decontamination procedures.

- (d) LLNS will conduct a pre-clearance visual inspection in the work area after asbestos removal, but prior to application of encapsulant or lock-down agent. If removing asbestos using the isolated/regulated area procedure, conduct the final visual inspection after the removal of the inner layer of plastic sheeting on the floor, walls, and other internal surfaces, where applicable. To successfully pass the visual inspection, no visible residue of the material can remain. Schedule this inspection with the STR at least 24 hours in advance.
- (e) LLNS may conduct perimeter sampling to verify the adequacy of Subcontractor's work procedures. LLNS will take these samples outside regulated areas or restricted perimeters established by the work, and at the exhaust of the negative-pressure machine(s) or in the clean room, where applicable. LLNS will analyze perimeter in accordance with NMAM method 7400. The allowable maximum limit for air samples is 0.01 f/cc (fibers per cubic centimeter) of air, or a baseline fiber level established by LLNS, whichever is higher. This is the "perimeter limit." LLNS will establish a baseline in the work area if LLNS deems necessary, or at the request of the Subcontractor. For work in a regulated area, LLNS can usually establish a baseline level only after the Subcontractor has erected isolation controls.
- (f) LLNS will conduct clearance sampling for asbestos-removal work conducted within a regulated area. LLNS will conduct this clearance sampling after successful completion of the visual inspection, as described above, and after the application of the encapsulant or lock-down agent, as applicable. LLNS will not conduct the final sampling until the encapsulant, or lock-down agent is dry, or 24 hours after application of same, as determined by LLNS, whichever is less. LLNS will take the clearance aggressive-type sample only after the Subcontractor removes temporary floor covering (plastic) and wall covering, except for critical barriers and decontamination facilities.
- (g) Consult with the STR who will determine the number of clearance samples, and their analysis, after discussion with the Subcontractor.

3.10 CLEARANCE CRITERIA

3.10.1 LLNS will consider the workspace cleared of asbestos when the following criteria are met:

- (a) The Subcontractor removes asbestos, other materials, and items as intended, including dust, debris, or residue and LLNS determines by visual inspection that the work is complete.
- (b) Subcontractor has encapsulated (locked down) surfaces from which the Subcontractor removed ACM.
- (c) The results of the final clearance samples do not exceed the values specified below:
 - (1) Phase Contrast Microscopy (PCM): Where the sample analysis is by PCM, the acceptable clearance level is 0.01 f/cc or less. Each sample from each area must be less than this value to achieve the clearance level. PCM results will be available one working day after the completion of sampling.
 - (2) Transmission Electron Microscopy (TEM): Where the sample analysis is by TEM, the acceptable clearance level is 70 s/mm² or less for each sample in each asbestos-removal area. TEM sample results will be available one working day after they are taken.
- (d) Subcontractor removes equipment and supplies used during the asbestos-removal work (e.g., plastic is removed and negative-pressure machine).

- (e) Subcontractor provides LLNS with the submittals required before, during, and after completing the work.

END OF SECTION 01 35 23.13

SECTION 01 35 23.19 ASBESTOS SAFETY - CLASS III AND UNCLASSIFIED

PART 1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Asbestos controls for class III and unclassified asbestos containing material (ACM) that may be incidentally disturbed during maintenance and repair operations.

1.2 RELATED REQUIREMENTS

1.2.1 Section 01 35 23 - General Safety Provisions: HEPA filter requirements

1.2.2 Section 01 35 23.13 - Asbestos Safety - Class I and II: controls for asbestos abatement and removal

1.3 DEFINITIONS

1.3.1 **class III.** Repair and maintenance operations, where ACM, including TSI and surfacing ACM and PACM, is likely to be disturbed. All waste must fit inside a 60-inch by 60-inch bag.

1.3.2 **competent person.** (as defined by 29 CFR 1926.1101 (b)) means, in addition to the definition in 29 CFR 1926.32 (f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32 (f).

1.3.3 **supervisor:** (see competent person)

1.3.4 **unclassified.** Activities involving the removing of ACMs that contain less than 1% asbestos by layer.

1.4 REFERENCE STANDARDS

1.4.1 29 CFR 1910.134 - Respiratory protection; Current Edition.

1.4.2 29 CFR 1926 - Safety and Health Regulations for Construction; current edition.

1.4.3 29 CFR 1926.32 - Definitions; current edition.

1.4.4 29 CFR 1926.1101 - Asbestos; Current Edition.

1.4.5 40 CFR 763 - Asbestos; current edition.

1.4.6 BAAQMD regulation 11, rule 2 - Bay Area Air Quality Management District (BAAQMD), Regulation 11 - Hazardous Pollutants, Rule 2 - Asbestos Demolition, Renovation, and Manufacturing; current edition.

1.4.7 NMAM - NIOSH Manual of Analytical Methods; 5th edition.

1.4.8 SJVUAPCD, regulation IV, rule 4002 - San Joaquin Valley Air Pollution Control District (SJVUAPCD), Regulation IV - Prohibitions, Rule 4002 - National Emission Standards for Hazardous Air Pollutants; current edition.

1.5 SUBMITTALS

1.5.1 See section 01 33 00 - Submittal Procedures for submittal procedures.

- 1.5.2 Asbestos Work Plan: Submit an asbestos work plan (a JHA may be submitted in lieu of the work plan) to LLNS for approval prior to starting work on site. In the plan or JHA, detail the proposed work methods, procedures, and equipment intended to prevent asbestos exposure to LLNS and Subcontractor employees, ensure LLNS facilities are not contaminated, and protect the environment. Include the engineering, administrative, and personal-protective controls that provide compliance with the applicable provisions of these specifications and applicable regulations and laws.
- 1.5.3 Pre-start Submittals: Provide the following applicable items to the STR prior to the start of asbestos-handling work:
- (a) Employee training records meeting demonstrating compliance with 40 CFR 763 (also know as Asbestos Hazard Emergency Response Act or AHERA) and 29 CFR 1926.1101.
 - (b) Records of respirator fit testing and training applicable to the minimum respirator requirements of 29 CFR 1926.1101.
 - (c) Competent Person training records meeting 29 CFR 1926.1101 requirements.
 - (d) Evidence of medical surveillance program administration for employees using respirator or otherwise and/or where medical surveillance is required by 29 CFR 1926.1101.
 - (e) Subcontractor's respiratory protection program policy that is compliant with 29 CFR 1910.134.
 - (f) Negative Exposure Assessment (NEA) reports if NEA will be used to justify controls to the extent allowed in 29 CFR 1926.1101.
 - (g) Records of HEPA-filtered equipment certification (see "HEPA Filter Certification" in section 01 35 23 - General Safety Provisions).
 - (h) Evidence of a valid BAAQMD regulation 11, rule 2 Acknowledgement of Demolition/Notification and Payment Fees or SJVUAPCD, regulation IV, rule 4002 Demolition/Renovation Permit Release for the specific project:
 - (1) For Livermore Site: Friable ACM removal greater than 100 linear feet, 100 square feet, or 35 cubic feet, submit a separate BAAQMD asbestos notification specific for the project. If a structural element is involved submit a Demolition Notification.
 - (2) For Site300: Friable ACM removal greater than 160 linear feet, 260 square feet, or 35 cubic feet, submit a SJVAPCD asbestos notification for the project. If a structural element is involved, submit a Demolition Notification.
 - (i) Name and address of site where nonfriable asbestos waste will be disposed.
 - (j) Copy of asbestos-related insurance coverage.
 - (k) A personal air-sampling plan for implementation during the asbestos-handling work that is compliant with 29 CFR 1926.1101. Include the following minimum elements in the plan:
 - (1) Where using respirators other than type "C" air-supplying, provide representative employee monitoring in a manner adequate to calculate an 8-hour time-weighted average and an excursion exposure on each shift during which workers handled asbestos materials. Where using type "C" respirators, provide initial representative samples and subsequent weekly samples.

- (2) A laboratory certified by the American Industrial Hygiene Association (AIHA) in the analysis of air samples by NMAM method 7400 (Asbestos and Other Fibers by PCM) or Fed/OSHA reference method must perform the sample analysis in accordance with these methods. In addition, the analyzing laboratory must meet the other requirements for analyst training and quality control as described in 29 CFR 1926.1101.

- 1.5.4 Daily Submittals: Submit results of personal air monitoring (8-hour time-weighted average and excursion results, including analytical laboratory reports) to LLNS within one working day following the day on which the results are available.
- 1.5.5 Final Submittals: Following completing asbestos-handling work, submit copies of access logs for the regulated area and completed shipping documents. This includes a list of what asbestos-containing materials were removed and from exact locations.

1.6 QUALITY ASSURANCE

1.6.1 Qualifications

- (a) Employees performing asbestos-handling work must be trained and certified in accordance with federal and State of California requirements and meet the training requirements for "workers" specified 40 CFR 763. Employees must have current certification with documented attendance at applicable certification refresher classes.
- (b) Competent persons must meet the requirements for a "competent person" as described in 29 CFR 1926.1101. Additionally, supervisors must meet the training requirements specified in 40 CFR 763. Supervisors and competent persons must have current certification with documented attendance at applicable certification classes.

PART 2 PRODUCTS

2.1 GENERAL

- 2.1.1 Provide material, equipment, tools, and devices required to complete the asbestos safety work in accordance with 29 CFR 1926.1101 and as follows:
 - (a) Polyethylene sheeting: Fire retardant with a minimum thickness of 6-mil where the largest size possible is provided to minimize seams.
 - (b) Asbestos waste bags and glove bags: 6-mil thick.

PART 3 EXECUTION

3.1 GENERAL WORK PROCEDURES

- 3.1.1 Test and certify HEPA filtered equipment in accordance with "HEPA Filter Certification" in section 01 35 23 - General Safety Provisions.
- 3.1.2 When using HEPA-filtered vacuum cleaner to provide negative pressure to a mini-enclosure or glove bag, the vacuum cleaner must pass the current certification test within the past 12 months and is only used as part of the work of this section.
- 3.1.3 For unclassified asbestos work, perform work in accordance with controls outlined in 29 CFR 1926.1101 (g).
- 3.1.4 Do not eat, drink, use tobacco products, or apply cosmetics in the designated regulated area.

3.2 GLOVE BAGS

- 3.2.1 Perform asbestos work in accordance with controls outlined in 29 CFR 1926.1101 for class III work.

3.2.2 Shut-off and tag-out all ventilation units that service the area where the asbestos-containing material is being removed.

3.3 ASBESTOS REMOVAL USING MINI-ENCLOSURES

3.3.1 Except in circumstances where LLNS permits other procedures, handle asbestos within a mini-enclosure, as defined in 29 CFR 1926.1101. A mini-enclosure is a small, walk-in enclosure that cannot accommodate more than two people. Characteristics of a mini-enclosure include isolation of the work area from surrounding areas (typically using disposable plastic sheeting) and establishment of negative pressure within the isolated area.

3.3.2 Where the mini-enclosure area approach is used, the minimum characteristics of that work must include the following items, in addition to other applicable requirements presented in this section and in applicable regulations and laws.

(a) Isolation

- (1) Shut off and tagout ventilation units that service the ACM contaminated area. Protect the surrounding areas of the building or the general environment by constructing a mini-enclosure. Construct this enclosure from materials that meet the fire-resistance requirements.
- (2) Critical barriers: Install initial covers over ventilation duct openings, windows, doors, and other transitions from the work area to adjacent non-isolated areas, including doorways on the decontamination chambers.
- (3) Provide transparent viewing ports at appropriate locations in critical barriers for LLNS or local air quality district (BAAQMD, SJVAPCD) representatives to observe the work areas from outside the barrier.
- (4) Make barriers isolating the work area from the surrounding areas complete and as airtight as possible.
- (5) Design the above listed isolation controls such that they remain intact and airtight throughout the expected duration of the work in the isolated area.

(b) Inspection

- (1) Inspect mini-enclosures for leaks.
- (2) Smoke-test the mini-enclosure to detect breaches.
- (3) Seal breaches prior to starting work.

(c) Air Movement: Direct air withing the mini-enclosure away from the breathing zone of workers.

3.4 ADMINISTRATIVE CONTROLS

3.4.1 Do not eat, drink, use tobacco products, or apply cosmetics in the designated regulated area.

3.5 AIR SAMPLING

3.5.1 Conduct employee sampling in accordance with Fed/OSHA requirements pertaining to air sampling.

3.5.2 Stop work and immediately contact the STR if evidence suggests or confirms potential exposure exceeding the limits.

3.6 RESPONSE TO FAILURE OF CONTROL PROCEDURES

3.6.1 Elevated Perimeter Samples

- (a) If a perimeter sample initially obtained by LLNS and analyzed by phase contrast microscopy (PCM) is found to exceed 0.01 fibers per cubic centimeter (f/cc) or the pre-established baseline level, immediately stop asbestos-removal work. If the Subcontractor obtained the sample, immediately inform LLNS of the elevated sample result.
- (b) LLNS may convene a meeting within 24 hours to determine the cause of the elevated fiber levels. If LLNS determines that the elevated fiber level most likely resulted from failure in the Subcontractor's control procedures, LLNS may have the subject perimeter samples re-analyzed by TEM to verify that the fibers detected are asbestos.
- (c) If analysis indicates the presence of asbestos in concentrations greater than 0.01 f/cc (or 70 s/mm²), do the following:
 - (1) Make corrections or improvements to work procedures to reduce leakage of fibers from work area.
 - (2) Erect critical barriers surrounding area where elevated asbestos level was detected.
 - (3) Decontaminate surrounding areas, as stipulated by LLNS.
 - (4) Continue decontamination until sampling by LLNS, taken using appropriate procedures and analyzed by TEM or PCM, indicate an airborne asbestos level of less than 70s/mm² or 0.01 f/cc.

3.6.2 Observed Deficiency in Engineering Controls

- (a) Immediately correct observed deficiencies in the engineering controls, such as failure of plastic barriers or covering, loss of required negative pressure, clogging of shower drain, and loss of exhaust airflow.
- (b) If you cannot correct the problem immediately, stop asbestos work pending correction of the deficiency.

3.6.3 Observed Deficiency in Work Practices: Promptly correct identified deficiencies in work practices, use of equipment, and personal-protective controls.

3.7 WASTE HANDLING

- 3.7.1 Handle, contain, label, store, transport, and dispose of asbestos-containing waste in accordance with 29 CFR 1926.1101, other applicable laws, codes, and regulations.
- 3.7.2 Turn over friable ACM to LLNS. LLNS will manage and dispose of hazardous (friable asbestos-contaminated) waste.
- 3.7.3 Transport nonfriable, nonhazardous ACM to the Waste Management Altamont Landfill or Republic Services Vasco Road Landfill and dispose of in accordance with applicable laws and regulations. For alternate disposal sites, submit the proposed site information and description and quantity of materials to be disposed to LLNS for evaluation on a case-by-case basis.

3.8 CLEARANCE CRITERIA

- 3.8.1 LLNS will consider the workspace cleared of asbestos when the Subcontractor removes asbestos, other materials, and items as intended, including dust, debris, or residue and LLNS determines by visual inspection that the work is complete.

END OF SECTION 01 35 23.19

SECTION 01 35 23.21 LEAD WORK EXPOSURE PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Controls for occupational lead exposure above the action level of 30 $\mu\text{g}/\text{m}^3$, over an 8-hour time weighted average without taking respiratory protection into consideration.
- 1.1.2 Controls to prevent cross-contamination of lead dust to LLNS facilities and equipment.

1.2 RELATED REQUIREMENTS

- 1.2.1 Section 01 35 23 - General Safety Provisions
- 1.2.2 Section 01 35 43 - Environmental Protection

1.3 REFERENCES

- 1.3.1 29 CFR 1910.134 - Respiratory protection; Current Edition.
- 1.3.2 29 CFR 1926.62 - Lead; current edition.
- 1.3.3 NMAM - NIOSH Manual of Analytical Methods; 5th edition.

1.4 ABBREVIATIONS

- 1.4.1 **AIHA.** American Industrial Hygiene Association.
- 1.4.2 **AL.** Action Level of thirty micrograms per cubic meter of air (30 $\mu\text{g}/\text{m}^3$) averaged over an 8-hour period.
- 1.4.3 **HEPA.** High-Efficiency Particulate Air.
- 1.4.4 **NID.** Negative Initial Determination. An exposure assessment also considers other information, including levels of worker training, supervision, and previous monitoring results. A conclusion that the planned work (including trigger tasks) will not exceed the PEL and will be conducted under situations closely resembling other similar jobs is called an NID.
- 1.4.5 **PEL.** Permissible Exposure Limit of 50 micrograms per cubic meter of air (50 $\mu\text{g}/\text{m}^3$) averaged over an 8-hour period.
- 1.4.6 **PPE.** Personal Protective Equipment
- 1.4.7 **TCLP.** Toxicity Characteristic Leaching Procedure

1.5 DEFINITIONS

- 1.5.1 **trigger tasks.** Tasks or operations with presumed human exposure above predefined thresholds. Trigger tasks are divided into three groups based on the exposure thresholds.
 - (a) Group 1 Trigger Tasks: Exposure below 500 $\mu\text{g}/\text{m}^3$. Examples include manual dry scraping and sanding, manual demolition of structures, heat gun applications, power tool cleaning with dust collection systems, and spray painting with lead-based paint.
 - (b) Group 2 Trigger Tasks: Exposure above 500 $\mu\text{g}/\text{m}^3$. Examples include lead burning, using lead-containing mortar, power tool cleaning without dust collection system, rivet busting, cleaning activities where dry expendable abrasives are used, and movement and removal of abrasive blasting enclosures.

- (c) Group 2 Trigger Tasks: Exposure above 2,500 $\mu\text{g}/\text{m}^3$. Examples include abrasive blasting, welding, cutting, and torch burning on lead-containing coatings or painted structures.

1.6 SUBMITTALS

1.6.1 Initial Exposure Assessment/Air Sampling Plan:

- (a) Prior to the start of operations where lead or lead-containing materials are used, disturbed, or removed, submit an exposure assessment to LLNS in accordance with Subpart 1.04 of this section and 29 CFR 1926.62.
- (b) A Negative Initial Determination (NID) may be used as well, provided it has been developed in accordance with 29 CFR 1926.62(d)(5)

1.6.2 Lead Safety Plan:

- (a) Address the Subcontractor lead program in the corporate safety plan/program provided under section 01 35 23 - General Safety Provisions and in a project-specific lead safety plan.
- (b) Include the specific items as listed in 29 CFR 1926.62(e)(2).
- (c) Detail the means and methods for conducting the specified work, and detail procedures and equipment to keep lead exposure of LLNS and Subcontractor personnel below the PEL and protect LLNL facilities and the environment from contamination.

1.6.3 Pre-Start Submittals: Provide the following items prior to the start of lead trigger tasks or other activities that can release airborne lead in excess of the PEL.

- (a) Copies of a notarized statement by the examining medical doctor certifying the date of OSHA-required medical examination and blood testing (29 CFR 1926.62) for each employee on the project who is or may be exposed to lead above the action level for any day of the year in accordance with 29 CFR 1926.62.
- (b) Record of successful respirator fit testing and training, performed by a qualified individual within the previous 12 months, for each employee using a respirator on this project with the employee's name with each record.
- (c) Air-sampling plan.
- (d) Lead safety plan.
- (e) List of supervisors and workers assigned, or potentially assigned, to the project.
- (f) Evidence of employee training meeting the requirements.
- (g) List of encapsulants, spray glues, chemicals, and materials proposed for use on the project.
- (h) Evidence of HEPA-filtered equipment certification.

1.6.4 Daily Submittals

- (a) Submit NID records in accordance with 29 CFR 1926.62(d)(5) or results of personal air monitoring, TCLP testing, and other relevant environmental testing performed on the project site, to LLNS within one working day following the day on which the results are available.

1.6.5 Closeout Submittals

- (a) Copies of manifests and receipts acknowledging disposal of nonhazardous waste material from the project showing delivery date, quantity, and appropriate signature of the landfill authorized representative.

- (b) Results of personal air monitoring, TCLP testing, and any other relevant testing performed on the project site.

1.7 QUALITY ASSURANCE

- 1.7.1 Ensure that employees performing work with lead-containing material, or work that disturbs lead-containing material that applies to this section, have had a communication of hazards in accordance with 29 CFR 1926.62(l).
- 1.7.2 Provide lead worker training to personnel anticipated to be exposed to lead levels exceeding the action level and to those subject to exposure to lead compounds that cause skin irritation. Employees are required to have received lead worker training within one year of the start of work of this Subcontract. Provide training in accordance with 29 CFR 1926.62(l)(1)(ii-iv), (l)(2), and (l)(3).

PART 2 PRODUCTS

2.1 GENERAL

- 2.1.1 Provide material, equipment, tools, and devices required to complete the lead work safely.

PART 3 EXECUTION

3.1 EXAMINATION

- 3.1.1 Convene a pre-start meeting with LLNS to discuss lead work issues.
- 3.1.2 Assume painted materials that have not been tested and analyzed for lead do contain lead.
- 3.1.3 If the activity is not a trigger task and does not have the potential to expose workers above the action level, then refer to section 01 35 43 - Environmental Protection.

3.2 PREPARATION

- 3.2.1 Instruct workers in personal protection, work procedures, emergency evacuation procedures, and use of equipment (including procedures unique to this project) prior to commencing work.
- 3.2.2 Make necessary equipment readily available for the employee and enforce the use of provided gear.

3.3 FIELD QUALITY CONTROL

- 3.3.1 Initially determine, by a review of previous exposure monitoring data, objective data, calculation, or air sampling plan, if work may expose personnel to lead at or above the OSHA action level, or at or above the level indicated for the appropriate trigger task in compliance with 29 CFR 1926.62(d).
- 3.3.2 Conduct air sampling in accordance with 29 CFR 1926.62 to initially determine if work may expose personnel to lead at or above the OSHA action level, or at or above the exposure controlled by the minimum respirator protection factor specified in 29 CFR 1926.62 for the specific trigger task performed.
 - (a) Air sampling may be conducted as part of an initial exposure assessment of operations where lead or lead-containing materials are being used, disturbed, or removed. Air sampling must be conducted for trigger task operations.
 - (b) Increase engineering, administrative, and PPE controls, as necessary, based on this initial exposure assessment.

- 3.3.3 Use a laboratory certified by the AIHA Environmental Lead Laboratory Accreditation Program (ELLAP) to perform analysis of the air samples in accordance with OSHA ID121, NMAM method 7082.
- 3.3.4 If sample results or the initial exposure assessment, performed in accordance with 29 CFR 1926.62, indicate exposures below the action level, further exposure determination does not need to be repeated except as otherwise provided in 29 CFR 1926.62(d)(7).

3.4 ENGINEERING CONTROLS AND GENERAL WORK PRACTICES

- 3.4.1 Use engineering and administrative controls, regardless of the need to use respiratory protection, to minimize potential exposure of Subcontractor and LLNS personnel to airborne lead dust.
- 3.4.2 If reasonable engineered and administrative controls cannot achieve compliance with the exposure standards specified in these specifications, use PPE to minimize Subcontractor employee exposure to lead.
- (a) PPE may include disposable coveralls, gloves, head covers, work shoes with disposable covers, respirators, eye protection, and other necessary equipment.
 - (b) Select PPE to mitigate exposure hazards, including lead, paint stripper, paint, and lockdown agent.
 - (c) Reusable work coveralls that comply with the requirements of 29 CFR 1926.62(g)(2) are an acceptable alternative to disposable coveralls.
 - (d) Do not allow personnel to wear reusable coveralls home. The Subcontractor is responsible for laundering reusable clothing.
- 3.4.3 Use respiratory protection meeting the requirements of 29 CFR 1910.134 and 29 CFR 1926.62. Use the protection factors given in 29 CFR 1910.134(d)(3)(i)(A).
- 3.4.4 Submit a description of the specific control methods (e.g., work process description, wet methods) as part of the lead safety plan.
- 3.4.5 Exhaust systems at the source of dust, particulate, or fume generation or within the general work area must be HEPA filtered.
- 3.4.6 If power tools are necessary for lead work, use power tools with HEPA-filter exhausts (if available).
- 3.4.7 Establish a regulated area that will keep unprotected personnel out and prevent the spread of lead dust beyond the boundaries of the area.
- (a) For work inside buildings, erect critical barriers over ventilation system vents, doors, open areas, and other penetrations.
 - (b) If necessary, configure the ventilation system to place the work area under negative pressure relative to the surrounding areas.
- 3.4.8 Maintain surfaces as free as practicable of accumulations of lead by HEPA-vacuuming and wet-wiping.
- 3.4.9 Use wet methods.
- 3.4.10 Use HEPA filtered equipment tested and certified in accordance with section 01 35 23 - General Safety Provisions.

3.5 ADMINISTRATIVE CONTROLS

- 3.5.1 Personal Hygienic Practices and Housekeeping
- 3.5.2 Follow controls listed in 29 CFR 1926.62.
- 3.5.3 If shower use is required:
 - (a) Use showers as specified in the Project Requirements Document.
 - (b) Ensure that other people do not use showers provided by LLNS while the showers have potential lead dust contamination.
 - (c) Decontaminate showers before use by other LLNS employees.
- 3.5.4 Promptly place lead-containing demolition or renovation debris (e.g., gypsum wallboard) in plastic bags or other sealable containers.
- 3.5.5 Do not allow debris to accumulate in the workspace.
- 3.5.6 Post DANGER Lead Work Area signs, in accordance with 29 CFR 1926.62(m)(1)(i), at likely entrances to areas where conducting lead trigger tasks and other activity that can release airborne lead in excess of the PEL and for which there is no NID. Illuminate these signs so that they are easily visible to employees and visitors.

3.6 SURFACE CONTAMINATION SAMPLING

- 3.6.1 Residual surface contamination may pose a hazard to people who subsequently occupy areas where disturbance of lead-containing materials generated an aerosol.
- 3.6.2 Clean contaminated surfaces sufficiently so that they are visibly dust free.
- 3.6.3 LLNS will collect surface wipe samples to confirm clean-up resulted in levels below the limit for release for public use (200 µg/ft²).

3.7 WASTE HANDLING

- 3.7.1 Until analytical results are available, segregate waste materials (including water) and treat as potentially hazardous.
- 3.7.2 Contact LLNS in advance of waste generation for requirements regarding the proper management of hazardous waste specific to the project. LLNS will dispose of hazardous waste generated from work performed at LLNL facilities, unless directed otherwise within the LLNS-issued Project Requirements Document.

3.8 INSPECTIONS

- 3.8.1 LLNS will conduct a variety of inspections of the work site to ensure compliance with the provisions of this document and applicable laws and regulations.

END OF SECTION 01 35 23.21

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SECTION 01 35 23.23 RADIOLOGICAL SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Safety requirements for radiological work. Further information may be found in the Subcontract article entitled "PAAA Quality Assurance Requirements," the Subcontractor Area Hazards Control List (SAHCL), the Project Requirements Document, and the sampling/characterization data furnished by LLNS.

1.2 REFERENCES

- 1.2.1 10 CFR 835 - Occupational Radiation Protection; current edition.
1.2.2 DOE-HDBK-1122 - Radiological Control Technician Training; 2009.
1.2.3 LLNL MAN-2050 - LLNL Radiological Control Manual; 2023.

1.3 ACRONYMS AND ABBREVIATIONS

- ACL.** administrative control level.
ALARA. as low as reasonably achievable.
ES&H. [LLNL] Environment, Safety, and Health Directorate.
HP. health physicist.
HP-FO. health physics field operations [procedures].
IST. integrated safety team.
PPE. personal protective equipment.
RCA. radiologically controlled area.
RCM. [LLNS] radiological control manager.
RCT. radiological control technician.
RSO. radiation safety officer.
SETO. [LLNL] Safety Education Training Office.
SRS. sealed radioactive source.

1.4 SUBMITTALS

- 1.4.1 Radiological Work Plan detailing how radiological work activities will be performed in compliance with LLNS-specific radiological controls. Personnel responsible for writing the Radiological Work Plan must have the skills, knowledge, and ability to develop appropriate radiological controls. At a minimum, include the following:
- (a) Description of work.
 - (b) Work area radiological conditions (or potential conditions).
 - (c) Training requirements for entry.
 - (d) Minimum ratio of radiological control technicians to radiological workers.
 - (e) Pre-job briefing requirements.

- (f) Characterization plans.
 - (g) Radiological controls.
 - (h) Required personal protective equipment (PPE).
 - (i) Required postings, barriers, and entry/exit requirements.
 - (j) Survey/monitoring responsibilities and documentation requirements.
 - (k) Established administrative control levels (ACLs) and methodology used to establish the levels (if applicable).
 - (l) Decontamination methods.
 - (m) Emergency response provisions.
 - (n) Requirements for release of items from radiological controls.
 - (o) Radiological hold points through completion and demobilization.
- 1.4.2 Radiological training qualification documentation for all radiological workers. Maintain a copy at the jobsite for LLNS review.
- 1.4.3 Results for all radiation and contamination surveys. Submit within 3 workdays of survey completion.
- 1.4.4 Results for free-release surveys of items from radiological control [in accordance with LLNS procedure HP-FO-450]. The LLNS integrated safety team (IST) health physicist's (HP) approval is required prior to release of the item.
- 1.4.5 Calibration and maintenance records for instruments used for radiological monitoring if using non-LLNS instruments. Submit prior to instrument use.
- 1.4.6 Survey records. Follow LLNS's standard survey protocols (reference LLNS procedures: HP-FO-501, HP-FO-502, HP-FO-120).

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

- (a) Radiological Control Technicians (RCT) (or equivalent title): Qualified in accordance with at least one of the following:
 - (1) DOE-HDBK-1122, *Radiological Control Technician Training*.
 - (2) Certified by the National Registry of Radiation Protection Technologists (NRRPT).
 - (3) Equivalent experience, which is defined as having at least five years of current radiation protection field experience relevant to the project scope. The LLNS radiological controls manager (RCM) or SETO will adjudicate this qualification.
- (b) Radiological Workers: Trained and competent to work safely in and around radiological hazards.

1.6 DESIGN-BUILD PROJECT REQUIREMENTS

- 1.6.1 Designs for new facilities and major modification of existing facilities or laboratories must comply with the criteria specified in LLNL MAN-2050, section 13.2.1.A and must consider the guidance in appendix C, "Design Considerations for Facilities and Equipment."

1.7 LLNS-PROVIDED TRAINING

- 1.7.1 Location-based training may be required to cover such topics as response to local-area alarms, emergency actions, and facility-specific requirements. LLNS will perform this training as appropriate for the project location and conditions.
- 1.7.2 LLNS will also provide the following to Subcontractor RCTs:
- (a) Job performance training on the proper use of radiation protection instrumentation and LLNS swipe techniques used to assess surface contamination levels. If the Subcontractor provides their own radiation protection instrumentation, the Subcontractor must provide LLNS with the documentation showing the Subcontractor RCTs have been trained on the proper use of the instrumentation and calibration records.
 - (b) Completion of LLNS survey results documentation, including review of applicable HP-FO procedures.
 - (c) LLNS-specific sample database system training for no more than two RCTs. These individuals will have access to a LLNL computer for sample entry. The RCTs are responsible for coordinating with the LLNL Radiological and Bioassay Measurements Laboratory (RMBL) for sample delivery.

1.8 LLNS INTERFACES

- 1.8.1 The STR is the primary point of contact. Additional LLNS contacts may include the following:
- (a) LLNS RCM: The RCM has ultimate authority over all radiological safety matters at LLNL. Responsible for ensuring compliance with regulatory requirements. The RCM is the final arbiter of radiological issues.
 - (b) LLNS ES&H IST Health Physicist: The HP is responsible for overseeing the conduct of radiological operations and concurring with radiological work controls. The HP is the primary point-of-contact for addressing and communicating radiological safety concerns to LLNS management. The HP acts as a resource to the Subcontractor on known area radiological conditions, facility specific radiological controls, and LLNS radiological program requirements. The HP will also review and approve documented surveys performed by the Subcontractor.
 - (c) LLNS Health and Safety (H&S) Technologist
 - (1) LLNS will provide an H&S technologist (i.e., an RCT) to conduct training on LLNS standard swipe and survey protocols, documentation forms and LLNS instrumentation. In addition, the assigned H&S technologist(s) will provide oversight and feedback and perform independent sampling and workplace surveys to confirm Subcontractor quality performance.

Note: Support provided by LLNS H&S technicians/RCTs and HPs does not relieve the Subcontractor from complying with LLNL MAN-2050 requirements or those found in their Radiological Work Plan.
 - (d) LLNL Radioactive and Hazardous Waste Management (RHWM): LLNS will provide RHWM support for the characterization, packaging, and disposal of radioactive, hazardous, universal, and mixed waste.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.1 PREPARATION**

- 3.1.1 Identify workers who are likely to receive >0.1 rem from internal exposures and provide those names in advance to LLNS. Those workers must participate in LLNS's internal dosimetry monitoring program. In addition, LLNS requires baseline bioassay samples prior to the start of work and may also require post-incident and exit bioassay samples.
- 3.1.2 The STR will coordinate with the LLNS Environment, Safety, and Health (ES&H) Integrated Safety Team (IST) health physicist (HP) to determine the types of external dosimetry required for the work and the external dosimetry exchange frequency.
- 3.1.3 Conduct pre-job briefings.
- 3.1.4 Ensure workers meet LLNS' radiological training requirements before being permitted unescorted access to RCAs and before performing radiological work.
- 3.1.5 Ensure workers meeting the monitoring requirements wear a LLNS-issued dosimeter and return the dosimeter at the end of the job or at the assigned exchange frequency, whichever is shorter. Note: Most subcontractors are considered "Visitors."
- 3.1.6 Ensure workers entering a high radiation area wear a LLNS-issued supplemental dosimeter.
- 3.1.7 Document "as low as reasonably achievable" (ALARA) planning, including establishing administrative control levels (ACLs) for all individuals likely to exceed an annual dose of 0.5 rem from all operations.
- 3.1.8 Ensure the corporate health physicist (HP) or radiation safety officer (RSO) responsible for development of the Radiological Work Plan is available to answer questions regarding the plan and to provide guidance during off-normal events.
- 3.1.9 Ensure workers have the skills, knowledge, and ability to work safely in and around radiological hazards. This may require completion of one or more LLNS radiological training courses or approval of equivalent vendor training. The LLNS Safety Education and Training Office (SETO) can grant training equivalencies.

3.2 GENERAL WORK REQUIREMENTS

- 3.2.1 Perform radiological work in accordance with LLNL MAN-2050; this document incorporates the requirements of all applicable regulations, including 10 CFR 835. Specific sections within this document are referenced in attachment 01 35 23.23-A.
- 3.2.2 Follow LLNS-developed Health Physics Field Operations (HP-FO) procedures. LLNS will furnish HP-FO procedures pertinent to the project to the Subcontractor when applicable to the work. These procedures may include the following:
 - (a) HP-FO-120, *Completing the Radiation/Contamination Survey Form*
 - (b) HP-FO-501, *Conducting Radiation Surveys*
 - (c) HP-FO-502, *Conducting Contamination Surveys*
 - (d) HP-FO-503, *Using the Ludlum Model 2929 and 3030E Swipe Counters*

- 3.2.3 Conduct radiological activities in a manner that protects the health and safety of employees, contractors, the general public, and the environment.
- 3.2.4 Ensure that radiological exposures and releases are maintained ALARA below the applicable limits.
- 3.2.5 Adhere to the limitations and controls in the Subcontractor's Radiological Work Plan.
- 3.2.6 Implement access controls appropriate to the hazards in the area.
- 3.2.7 Establish and maintain a radiologically controlled area (RCA) throughout the duration of the project.
- 3.2.8 Conduct routine, periodic surveys. Submit all swipe samples taken by the Subcontractor during work or to characterize materials for release from radiological controls to the LLNS-designated field representative for analysis. The RCTs are responsible for coordinating with the LLNL Radiological and Bioassay Measurements Laboratory (RMBL) for sample delivery.
 - (a) Swipe sampling and documented surveys must be performed by Subcontractor RCT staff.
 - (b) Record portable survey instrument results on forms supplied or approved by LLNS.
 - (c) The Subcontractor HP and the LLNS IST HP must review and approve documented surveys performed by the Subcontractor RCTs.
- 3.2.9 Conduct work area monitoring to identify adverse trends so that corrective actions can be taken.
- 3.2.10 Use calibrated instruments that are function-tested daily and appropriate to the radiation being monitored. LLNS will provide instrumentation. LLNS may provide instrumentation if agreed between Subcontractor and LLNS.
- 3.2.11 Report off-normal events in a timely manner to the IST HP and STR. Stop or pause work, investigate, and implement corrective actions to prevent recurrence.
- 3.2.12 Ensure individuals follow exiting monitoring requirements.
- 3.2.13 Implement prior approved decontamination procedures to abate surface contamination that exceeds the LLNL MAN-2050 appendix D thresholds or label and control the items/area as radioactively contaminated. Decontaminate surfaces or areas with contamination below appendix D levels per LLNS direction in the Project Requirements Document.
- 3.2.14 Segregate materials (e.g., clean or contaminated) while waiting for evaluation and disposal guidance. This includes materials or tools used during the radiological work that have been sampled and are awaiting review and approval of results by the LLNS IST HP before removal from the work area.

3.3 POSTING AND LABELING

- 3.3.1 Clearly and conspicuously post areas requiring radiological posting with the appropriate sign.
- 3.3.2 Maintain all posting, labeling, and physical barriers to communicate the radiological status and entry requirements.
- 3.3.3 Ensure each item or container of radioactive material bears a durable, clearly visible label with a radiation trefoil symbol and the words Caution [or Danger] Radioactive Material.
- 3.3.4 LLNS will provide radiological postings, signs, and labels.

3.4 ADDITIONAL REQUIREMENTS FOR WORK WITH RADIOACTIVE MATERIALS

- 3.4.1 Work with radioactive materials may include handling sealed radioactive sources (SRSs), bulk radioactive materials, or material and equipment that is contaminated or activated.
- 3.4.2 Comply with requirements of LLNL MAN-2050 if using or storing Subcontractor-owned radioactive material (e.g., soil density gauges, radiography sources) on-site. Describe the use and storage means in the Radiological Work Plan.
- 3.4.3 Follow the applicable Department of Transportation (DOT) regulations while transporting Subcontractor-owned radioactive material or Subcontractor-owned equipment containing radioactive sources to/from the LLNL site. LLNS does not require processing the radioactive material through LLNL Materials Management (MM). (As a courtesy, MM Vaults and Transportation Group may provide shipping support for a Subcontractor's radioactive material for either receipt on-site or shipment off-site. Contact the STR to negotiate and prearrange shipping support).
- 3.4.4 Establish controls and procedures to prevent the spread of removable contamination outside of radiologically controlled areas under normal operating conditions. Surface contamination thresholds are specified in LLNL MAN-2050, appendix D.
- 3.4.5 Properly characterize, package, and label radioactive waste. Turn over all hazardous, radioactive, universal, and mixed waste to LLNS for final disposition. Section 01 35 43 - Environmental Protection includes related information.
- 3.4.6 Control SRSs and only use them for purposes and in environments for which they were intended.

3.5 ADDITIONAL REQUIREMENTS FOR WORK WITH RADIATION GENERATING DEVICES (RGD)

- 3.5.1 If using Subcontractor-owned radiation generating devices (RGDs) on-site, comply with LLNL MAN-2050 and HP-FO-551 if LLNS personnel will be operating Subcontractor-owned RGDs.
- 3.5.2 RGDs (e.g., radiography RGDs) that would otherwise require classification at LLNL but are owned by others must have LLNS approval and the concurrence of the IST HP prior to being brought on-site.
- 3.5.3 Establish and use written procedures for operation of an RGD, testing interlocks, and aligning radiation beams. Use of manufacturer-provided operating procedures is acceptable as long as they adequately describe and cover the work activities.
- 3.5.4 Field radiography operations must comply with the requirements specified in LLNL MAN-2050.
- 3.5.5 Safety systems installed by the manufacturer must not be disabled or modified without LLNS approval and concurrence of the LLNS IST HP.
- 3.5.6 Subcontractor-owned RGDs that remain on-site for six months or more are subject to additional controls.

ATTACHMENT 01 35 23.23-A

RADIOLOGICAL SAFETY PLANNING MATRIX

Program Element	Sub-element	LLNS responsibility	Subcontractor responsibility	LLNL MAN-2050 reference
GENERAL				

Program Element	Sub-element	LLNS responsibility	Subcontractor responsibility	LLNL MAN-2050 reference
Organization and Administration		Provide copies of all applicable reference standards and documents to Subcontractor for use in preparing its Radiological Work Plan. Review, comment and concur on that Plan. Provide required LLNS interfaces.	Organize and administer a radiological safety program in accordance with the standards and reference documents. Document and obtain LLNS approval of its Radiological Work Plan that addresses radiological requirements.	
ALARA Program			Perform radiological work in accordance with ALARA principles. Perform documented ALARA planning.	Sections 13.1 and 4.2
Individual Dose Limits		Review and concur with ACLs and development methodology.	Determine each worker's year-to-date and attempt to determine their lifetime occupational radiation doses. Report them to LLNS. Determine if there is a need to establish ACLs in excess of the default 500 mrem ACL. If required, submit with methodology to LLNL for review and concur. Communicate to workers about LLNS Declared Pregnant Worker program.	Sections 4.1, 4.2, 4.4, and 4.5
Monitoring Individual Doses	External dose monitoring	Provide dosimetry and report results to the Subcontractor.	Ensure workers wear LLNS-provided dosimetry throughout project. Return dosimeters to LLNL at end of job or at the	Sections 4.7 and 4.9

Program Element	Sub-element	LLNS responsibility	Subcontractor responsibility	LLNL MAN-2050 reference
			assigned exchange frequency.	
Internal Dosimetry	Internal dose monitoring	Provide required internal dose monitoring. Process baseline bioassay samples for analysis, if needed. Report analytical results to the Subcontractor.	Identify workers likely to receive >0.1 rem internal dose and provide names to LLNS. Ensure workers comply with internal dose monitoring as required.	Section 4.8
Posting and Labeling		Provide area posting signs and labels.	Properly post areas, properly label contaminated equipment, radioactive materials, waste, etc. as specified in the Radiological Work Plan.	Sections 3.2, 3.2.1, 3.6, and 18.7.1
Work Planning		Provide copies of LLNS documents and relevant LLNS sampling and survey procedures (HP-FO procedures). Review and concur with Radiological Work Plan for compliance with LLNS requirements.	Develop a Radiological Work Plan that is 1) commensurate with the task and radiological conditions and 2) in accordance with MAN-2050, and LLNS applicable procedures (HP-FO procedures). Submit Radiological Work Plan for LLNS review and concurrence.	Sections 14.2 and 14.3
Conducting Routine Radiological Work	General		In the Subcontractor's Radiological Work Plan, specify radiological controls for the intended tasks and radiological hazards (e.g. dispersible material handling, decontamination, etc.).	Sections 3.3, 6, 7, and 12

Program Element	Sub-element	LLNS responsibility	Subcontractor responsibility	LLNL MAN-2050 reference
			Specify PPE requirements for tasks.	
Conducting Routine Radiological Work	Access control		Maintain an established Radiologically Controlled Area throughout the duration of the project and control access. Provide specifics in the Subcontractor's Radiological Work Plan.	Section 5.1
Conducting Routine Radiological Work	Monitoring the Work Environment, Radiation Monitoring	Conduct area monitoring at the perimeter of the Subcontractor work areas as needed.	Implement requirements as specified in Subcontractor's Radiological Work Plan. Conduct area monitoring to detect radiological changes and identify adverse trends.	Chapter 8, Sections 18.7.7, and 18.8.4
Conducting Routine Radiological Work	Airborne radioactivity controls	Provide LLNS Health Physicist IST HP review and signature on all sample results. Provide all radioactive sample analyses.	Implement controls as specified in the Subcontractor's Radiological Work Plan. Reference LLNS procedures in describing how air sampling/air monitoring will be performed. Submit samples and report results using LLNS database / reporting form.	Sections 3.8 and 8.4
Conducting Routine Radiological Work	Instrument Calibration and Maintenance	Provide calibrated instrumentation, as needed.	Check instrument calibration and function. Report any issues to the LLNS H&S tech or IST HP. Take damaged, out-of-calibration and/or, non-functioning instruments	Section 15.1

Program Element	Sub-element	LLNS responsibility	Subcontractor responsibility	LLNL MAN-2050 reference
			out of service and return to H&S tech.	
Conducting Routine Radiological Work	Release of Materials and Equipment	Provide sampling and survey procedures. Provide IST HP review and signature on all documented surveys and sample results. Provide all rad sample analyses.	Develop and implement controls compliant with LLNS requirements. RCT staff are responsible for performing official "documented surveys" and swipe sampling prior to releasing equipment or materials from radiological controls. Submit samples and report results utilizing LLNS database / reporting form.	Section 9.8
Conducting Routine Radiological Work	Off-Normal Situations	Review and concur with Subcontractor off-normal investigations and proposed corrective actions.	Identify and report off-normal events in a timely manner to the STR and IST HP. Investigate and propose corrective actions to prevent recurrence. Update Subcontractor's Radiological Work Plan as needed.	Section 12.4
Radiation Safety Training	General	Provide or grant equivalency for LLNS Rad Worker training.	Ensure workers have the skills, knowledge, and ability to work safely in and around radiological hazards and capable of successfully completing LLNS training as required. Maintain radiological training documentation at job site.	Chapter 16
Radiation Safety Training	Specialized training	Provide training to RCTs on LLNS instrumentation,	Ensure RCTs have the skills, knowledge, and ability to perform their	Sections 4.7 and 4.9, Chapter 16

Program Element	Sub-element	LLNS responsibility	Subcontractor responsibility	LLNL MAN-2050 reference
		sample database, survey and sample forms, swipe techniques and radiological procedures. Provide facility specific training as required.	assigned duties.	
Records		Provide training on LLNS forms and databases. Provide IST HP support to review and approve documented surveys performed by RCTs.	Provide completed forms and sampling documents to LLNS throughout the project.	Chapter 17
ADDITIONAL REQUIREMENTS FOR WORK WITH RADIOACTIVE MATERIALS				
	Radioactive and mixed waste	Provide packaging requirements and disposal.	Properly package, characterize, and label waste following LLNS guidance and procedures. Turn over waste to LLNS for disposal.	Chapter 10
	Sealed Radioactive Source (SRS) Accountability and Control		Specify SRS controls and procedures in Radiological Work Plan. Include the storage and control (accountability) of sources.	Chapter 9
ADDITIONAL REQUIREMENTS FOR WORK WITH RADIATION GENERATING DEVICES (RGD)				
	Acquisition of RGDs for project use.	Provide required reviews and approvals.	Obtain LLNS approval prior to bringing RGDs on-site. Provide written procedures for operation, interlock tests and radiation beam alignment. Obtain prior approval for	Section 18.5.1

Program Element	Sub-element	LLNS responsibility	Subcontractor responsibility	LLNL MAN-2050 reference
			safety system modification or disablement.	
	Field radiography applications		Provide written procedures for work involving field radiography equipment.	Sections 18.5.3 and 18.8.6
	Control of RGDs		Subcontractor must ensure by procedure and administrative controls that RGDs can only be operated by authorized and trained individuals.	Section 18.10.3

END OF SECTION 01 35 23.23

SECTION 01 35 23.25 BERYLLIUM EXPOSURE PREVENTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Beryllium exposure prevention requirements to ensure compliance with the requirements of 10 CFR 850 (the "Rule").

1.2 APPLICABILITY

- 1.2.1 This section applies to subcontracted work where a worker may be occupationally exposed to beryllium through either dermal or inhalation routes. As designated herein, the Subcontractor in charge of the particular activity is primarily responsible for complying with the Rule as the designated "responsible contractor."

1.3 REFERENCES

- 1.3.1 10 CFR 850 - Chronic Beryllium Disease Prevention Program; 2022.
- 1.3.2 DOE-STD-1187 - Beryllium-Associated Worker Registry Data Collection and Management Guidance; 2019.

1.4 DEFINITIONS

BeLPT. Beryllium lymphocyte proliferation test.

beryllium-associated worker. A worker who was in the past or is currently exposed or potentially exposed to beryllium at a Department of Energy (DOE) facility. Exposure may be due to work with or around beryllium or through incidental exposure. The term includes current beryllium workers, past beryllium workers, incidentally exposed workers, workers whose work history shows that they may have been exposed to beryllium, workers who exhibit signs and symptoms of beryllium exposure, and workers who are receiving medical removal protection benefits.

beryllium-affected worker. A current worker who is diagnosed by an occupational medical provider as having a beryllium-exposure (e.g., probable sensitized, sensitized, or chronic beryllium disease).

CBDPP. LLNS Chronic Beryllium Disease Prevention Program.

HSD. LLNS health services director.

list. The list of beryllium-associated workers as required under 10 CFR 850.34(a)(4).

probable sensitized workers. Beryllium-associated workers who have been tested and determined to have one abnormal BeLPT and one borderline BeLPT, or determined to have three borderline BeLPTs.

responsible contractor. The contractor who directly employs (or in the case of independent contractors, has direct privity of contract with) beryllium-associated workers. For the purposes of this Subcontract, the Subcontractor is the "responsible contractor."

Rule. Refers to 10 CFR, Part 850, Chronic Beryllium Disease Prevention Program.

sensitized workers. Beryllium-associated workers who have been tested and determined to have two abnormal BeLPTs.

MD. The Subcontractor's medical director.

1.5 LLNS RESPONSIBILITIES

- 1.5.1 Comply with requirements of the Rule, except for those specifically set forth below as "Subcontractor Responsibilities."
- 1.5.2 Provide the Subcontractor with relevant information that is reasonably needed by the Subcontractor and its medical director (MD) to establish and maintain the List.
- 1.5.3 Develop and provide the Subcontractor with LLNS Chronic Beryllium Disease Prevention Program (CBDPP) in electronic format.

1.6 SUBCONTRACTOR RESPONSIBILITIES

- 1.6.1 The Subcontractor, as the responsible contractor for the purposes of compliance with the Rule, is responsible for the following actions.
- 1.6.2 Comply with the current version of the LLNS CBDPP.
- 1.6.3 Respiratory Protection: Ensure that respiratory protection, when specified by LLNS on the basis of the hazard assessment, is provided to all beryllium-associated workers commensurate with the Subcontractor's respiratory protection program.
- 1.6.4 Medical Surveillance: Develop and implement a medical surveillance program for beryllium-associated workers who voluntarily participate in the program as required under 10 CFR 850.34.
 - (a) List: Establish and maintain during the term of the Subcontract a list of beryllium-associated workers that meets the requirements set forth in 10 CFR 850.34(a)(4).
 - (b) Medical Evaluations: The Subcontractor is solely responsible for determining how it will comply with these requirements for its medical surveillance program. Provide one or more of the following to each beryllium-associated worker who voluntarily participates in the program:
 - (1) The medical evaluations described in 10 CFR 850.34(b).
 - (2) Multiple physician review process described in 10 CFR 850.34(c).
 - (3) The alternative physician determination as described in 10 CFR 850.34(d).
 - (c) Medical Consent: Provide each beryllium-associated worker who voluntarily participates in the program the medical consent information required under 10 CFR 850.36.
 - (d) Subcontractor Medical Director: Retain and supervise a qualified MD.
 - (1) Make information required under the Rule available to the MD, including, but not limited to, the information required under 10 CFR 850.34(a)(5) and 10 CFR 850.34(a)(6), and follow the recommendations of the MD as otherwise required under the Rule.
 - (2) The MD is responsible for the overall administration of the Subcontractor's medical surveillance program and taking such actions as are reasonably required to comply with the Rule including, but not limited to, the following:
 - (A) Ensuring that the medical evaluations and procedures required under the Rule are performed by, or under the supervision of, a licensed physician who is familiar with the health effects of beryllium, as required under 10 CFR 850.34(a)(3);
 - (B) Complying with 10 CFR 850.34(c)(6);
 - (C) Complying with 10 CFR 850.34(e);

- (D) Obtaining the signatures required under 10 CFR 850.36(c); and
 - (E) Making the determinations regarding medical removal as provided in 10 CFR 850.35 including, but not limited to, the worker consultation required under 10 CFR 850.35(a)(3). The MD must also prepare and submit semi-annual registry information according to DOE guidelines contained in DOE-STD-1187.
- (3) At least five working days before work is scheduled to begin, provide the LLNS contract analyst with the name, address, telephone number, and the curriculum vitae of the MD responsible for administering the medical surveillance program.
- (e) Medical Removal. Comply with applicable procedures, consultations, and disclosures as required by 10 CFR 850.35 and as follows:
- (1) Provide medically removed beryllium-associated workers with the protection benefits required under 10 CFR 850.35(b), subject to an equitable adjustment to the Subcontract price.
 - (2) Recommend temporary or permanent removal of beryllium-affected workers.
 - (3) Immediately notify LLNS (attention LLNS HSD) of workers recommended for temporary or permanent medical removal.
 - (4) Provide a de-identified occupational questionnaire to worker(s) recommended for removal. The worker(s) must complete the questionnaire in its entirety. Submit the completed questionnaire(s) to LLNS (attention LLNS HSD).
- 1.6.5 Training and Counseling: Consistent with 10 CFR 850.37, ensure that each applicable worker completes beryllium training and counseling courses. The Subcontract specifies the training and counseling requirements, which may be updated and revised from time to time.
- (a) Ensure compliance with 10 CFR 850.37(d) and 10 CFR 850.37(e) by continuously monitoring situations affecting its workers and the knowledge and expertise of the Subcontractor's workforce.
 - (b) When and if additional training is required per 10 CFR 850.37(e), promptly notify LLNS in writing, coordinate the appropriate training courses applicable to the circumstances, and take all reasonable steps necessary to protect worker general health, safety, and well-being.
 - (c) Provide counseling related to beryllium-affected workers consistent with 10 CFR 850.37(f).
- 1.6.6 Recordkeeping: Comply with applicable record keeping requirements under 10 CFR 850.39. Submit DOE required data, to the Beryllium Registry Data Center at Oak Ridge Institute for Science and Education, per DOE-STD-1187. This includes medical surveillance and personal exposure monitoring data (if collected). In addition to the DOE submission, at a minimum, provide the following to LLNS:
- (a) Beryllium-associated Workers List: Within 180 days of beginning work, develop a list of beryllium-associated workers ("beryllium-associated workers list") who may be eligible for protective measures in compliance with 10 CFR 850.36 and submit list to LLNS (to the attention of LLNS HSD). Follow requirements of 10 CFR 850.34(a)(4). Thereafter, provide updated versions of the beryllium-associated workers list to LLNS (to the attention of LLNS HSD) every 180 days until the expiration (or termination) of the Subcontract.

- (b) Medical Surveillance Information, if permission is provided by the employee: The worker or their designated physician is primarily responsible for maintaining the employee's medical surveillance information, unless the employee consents to providing this information to the LLNS HSD, who will maintain such records for up to 75 years.
- 1.6.7 Performance Feedback: As the responsible contractor, comply with applicable performance feedback requirements under 10 CFR 850.40, such as communicating feedback in a timely manner to interested stakeholders.
- (a) Lower-Tier Subcontractors: To the extent that an employee or independent contractor of a lower-tier subcontractor qualifies as a beryllium-associated worker, the Subcontractor is deemed the responsible contractor for such workers and is responsible for ensuring compliance with the Rule.
- (b) Pre-Start Submittals: Provide the following submittals if respiratory protection is required by the LLNS hazard assessment.
- (1) Subcontractor's respiratory protection program.
 - (2) Record of successful respirator fit testing and training performed by a qualified individual within the previous 12 months for each worker required to use a respirator for this project. Record must include each worker's name.
 - (3) A written medical evaluation performed by a physician or other licensed health care professional with a determination that the worker is medically able to use the specified respirator(s).

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 35 23.25

SECTION 01 35 43 ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Environmental Management System.
- 1.1.2 Storm water pollution prevention.
- 1.1.3 Air Emissions.
- 1.1.4 Material and waste discharges.
- 1.1.5 Protection of cultural or paleontological resources.
- 1.1.6 Protection of biological resources.
- 1.1.7 Conservation of energy and water.
- 1.1.8 Lead and asbestos exposure.
- 1.1.9 Imported fill material.
- 1.1.10 Disposal of excess soil, asphalt, concrete and other materials.
- 1.1.11 Subcontractor use and management of nonhazardous and hazardous waste.
- 1.1.12 Controlled items and materials.

1.2 RELATED REQUIREMENTS

- 1.2.1 01 35 23.13 - Asbestos Safety: Class I and II.
- 1.2.2 01 35 23.19 - Asbestos Safety: Class III, IV, and Unclassified.
- 1.2.3 01 35 23.21 - Lead Work Exposure Protection.

1.3 DEFINITIONS

dust nuisance. Airborne particulate matter in sufficient quantity to obscure an observer's view by more than 20 percent for more than 3 minutes in any 1 hour.

1.4 REFERENCES

- 1.4.1 13 CCR 2025 - Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants, from In-Use Heavy-Duty Diesel-Fueled Vehicles; current edition.
- 1.4.2 13 CCR 2449 - 2449.2 - In-Use Off-Road Diesel-Fueled Fleets; current edition.
- 1.4.3 13 CCR 2775 - 2775.2 - Large Spark-Ignition (LSI) Engine Fleet Requirements; current edition.
- 1.4.4 17 CCR §94507-94517 - Consumer Products; current edition.
- 1.4.5 17 CCR §95371-95379 - California Code of Regulations, Title 17, Division 3, Chapter 1, Subchapter 10 Climate Change, Article 4, Sub Article 5 - Prohibitions on Use of Certain Hydrofluorocarbons in Stationary Refrigeration, Chillers, Aerosols—Propellants, and Foam End-Uses; current edition.
- 1.4.6 17 CCR 95380 - 95398 - Management of High Global Warming Potential Refrigerants for Stationary Sources; current edition.
- 1.4.7 40 CFR 82 - Protection of Stratospheric Ozone; current edition.

- 1.4.8 40 CFR 112 - Oil Pollution Prevention; 2022.
- 1.4.9 42 USC Ch. 85 - Air Pollution Prevention and Control; current edition.
- 1.4.10 BAAQMD regulation 9, rule 6 - Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters; Current Edition.
- 1.4.11 BAAQMD regulation 9, rule 7 - Nitrogen Oxides And Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, And Process Heaters; Current Edition.
- 1.4.12 Clean Air Act - 42 USC Ch. 85 - Air Pollution Prevention and Control; current edition.
- 1.4.13 SJVAPCD regulation IV, rule 4306 - Boilers, Steam Generators, and Process Heaters – Phase 3; current edition.
- 1.4.14 SJVAPCD regulation IV, rule 4307 - Boilers, Steam Generators, and Process Heaters – 2.0 MMBTU/HR to 5.0 MMBTU/HR; current edition.
- 1.4.15 SJVAPCD regulation IV, rule 4308 - Boilers, Steam Generators, and Process Heaters – 0.075 MMBTU/HR to 2.0 MMBTU/HR; current edition.
- 1.4.16 SJVAPCD regulation IV, rule 4320 - Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater Than 5.0 MMBTU/HR; current edition.

1.5 SUBMITTALS

- 1.5.1 Storm Water Pollution Prevention Plan (SWPPP). Include a site restoration plan designed to achieve final stabilization as defined by the Construction General Permit, section II.D.
- 1.5.2 Solid Waste Management Plan (SWMP). Use the attached form (attachment 01 35 43-2). Include the nonhazardous construction and demolition solid waste components (e.g., wood, non-friable asbestos, metals by type), estimated waste amounts for each waste component, and their proposed disposition (i.e., solid waste disposal or recycling).
- 1.5.3 Waste Records
 - (a) Submit final, actual disposal amounts at project completion.
 - (b) Submit disposal and recycling receipts at project completion.
- 1.5.4 Hazardous Material Inventory form (attachment 01 35 43-3).
- 1.5.5 Refrigerant Records
 - (a) EPA certification cards for technicians performing work handling refrigerants.
 - (b) Refrigerant recovery equipment certification, make, model, and serial number.
 - (c) Maintenance, service, repair and disposal records: location and identification of the refrigeration equipment; maintenance, service, repair or disposal date; parts of the refrigeration equipment being maintained, serviced, repaired or disposed; type of maintenance, service, repair or disposal for each part; names of the persons performing the maintenance, service, repair or disposal; and the type and amount of refrigerant added to or removed from the equipment. Use attachment 01 35 43-4.
 - (d) Leak inspections records: Inspection date, inspection methods, location of each identified leak, and a certification that all visible and accessible parts of the refrigeration equipment were inspected. Use attachment 01 35 43-4.

- (e) Initial and follow-up verification test records: Refrigeration equipment location and identification, test dates, locations of all repaired leaks that were tested, types of verification tests used and the results of the tests. Use attachment 01 35 43-4.
 - (f) Disposal Records: make, model, serial numbers of equipment, and date of disposal, certified technician's name and company, certification number (redact social security numbers) and certification type (I, II, III or Universal), refrigerant type, quantity recovered (lbs.), and date recovered. Use attachment 01 35 43-5.
 - (g) Refrigerant reclamation/destruction records, type and quantity of refrigerants transferred for reclamation/destruction, who it was transferred to, date of transfer, and facility proof of certification.
- 1.5.6 Building Flush Plan. Include, at a minimum, a description of the process, an estimate for the quantity of wastewater generated, and the Safety Data Sheets (SDS) for the chemicals used.
- 1.5.7 Portable Engine/Equipment Operation Log (see attachment 01 35 43-6).

1.6 QUALITY ASSURANCE

- 1.6.1 SWPPPs must be prepared by qualified SWPPP developers as defined in the permit.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 ENVIRONMENTAL MANAGEMENT SYSTEM

- 3.1.1 Perform the work in a manner that supports Lawrence Livermore National Security's, LLC (LLNS') commitment to be a responsible steward of the environmental resources under its control and the implementation of the LLNS' Environmental Management System (EMS) by incorporating the following actions into planning and conducting the work:
- (a) Protect the air, water, land, and other natural and cultural resources.
 - (b) Comply with applicable environmental requirements.
 - (c) Prevent pollution, minimize waste, and conserve resources.

3.2 STORM WATER POLLUTION PREVENTION

Note: This article is not applicable if there is no outdoor work, including equipment, materials, and chemical staging, or land disturbance (such as trenching or grading).

- 3.2.1 Comply with California State Water Resources Control Board "Industrial General Storm Water Permit" (IGP) (2014-0057-DWQ) when performing work in the following areas: the decontamination and waste treatment facility (DWTF) and the B612/625 complex at the Livermore Site; and B883, B845B, and the explosive waste storage facility at Site 300. Copies of LLNS' "Industrial Activities SWPPP" for the Livermore Site and Site 300, and the current IGP are available for Subcontractor review upon request.
- 3.2.2 If the project involves **land disturbance of less than one acre** (including staging areas), or the project has **potential for storm water impact**, then the Subcontractor is responsible for the following:

- (a) Maintain continual storm water pollution prevention and perform work to avoid discharge of pollutants into the storm drainage system. Failure to comply may result in LLNS stopping work until the Subcontractor performs remedial action. Refer to attachment 01 35 43-1 for applicable best management practices (BMPs).
- (b) The Subcontractor may propose alternate pollution prevention measures for those identified in the contract erosion control documents and attachment 01 35 43-1.
 - (1) Submit alternate pollution prevention measures for LLNS review.
 - (2) LLNS acceptance of alternate pollution prevention measures does not relieve the Subcontractor of responsibility for the quality and adequacy of the measures or Subcontractor implementation of them. Such acceptance does not warrant, acknowledge, or admit the quality and adequacy of the alternate pollution prevention measures.
- (c) Provide materials and labor required to implement and maintain pollution prevention measures.
- (d) If pollution is leaving the project site, implement necessary corrective measures. Failure to comply with the requirements of the SWPPP may result in criminal and civil liability of the Subcontractor under the Clean Water Act.
- (e) If storm water accumulates in a trench or other excavation within a known contamination source area, the water will be characterized by LLNS (in-situ or in a container) for known contaminants of concern prior to dewatering the excavation. Contact the LLNS Subcontract Technical Representative (STR) for assistance.
- (f) If storm water accumulates in a trench or other excavation outside of a known contamination source area, visually inspect the water for an oily sheen or other material. If no sheen is visible and water is clear, it may be released to the closest sanitary waste system or to ground.
 - (1) Do not discharge water into storm drains. If a sheen or other material e.g., sludge, solids, color change is present, the water will be characterized by LLNS (in-situ or in a container) prior to dewatering the excavation.
 - (2) Contact the STR for assistance.

3.2.3 If the project involves **land disturbance equal to or greater than one acre** (including staging areas), then the following paragraphs apply [Storm Water Pollution Prevention Plan (SWPPP)].

- (a) Develop a SWPPP covering the construction site for construction phases, including laydown areas, unpaved access roads, and borrow sites in accordance with requirements of the State of California "Construction General Permit" (order 2022-0057-DWQ).
- (b) Pay fees associated with coverage under the Construction General Permit directly to the State of California.
- (c) Provide documentation of the Construction General Permit required training and certifications for "Qualified SWPPP Developers and Qualified SWPP Practitioners," and qualifications for Subcontractor personnel that write the SWPPP, implement the BMPs, and perform inspections.
- (d) Keep a SWPPP binder on-site and available for review during working hours. Submit stormwater monitoring data to the STR within two days following a storm event.

- (e) Submit the SWPPP in accordance with 01 33 00 - Submittal Procedures for LLNS review and acceptance. Conform to the plan's provisions once it is accepted by LLNS. Failure to comply may result in LLNS halting work until the Subcontractor takes remedial action.
- (f) LLNS acceptance of the Subcontractor's SWPPP does not relieve the Subcontractor of responsibility for the quality and adequacy of the SWPPP or Rain Event Action Plan (REAP). LLNS acceptance does not warrant, acknowledge, or admit the quality and adequacy of the SWPPP.
- (g) Do not start construction activity until LLNS accepts the Subcontractor's SWPPP, a Notice of Intent has been submitted to the State, and the State assigns a discharge identification number.
- (h) Provide materials and labor (including the qualified SWPPP practitioners and storm water sampling personnel) as required to implement and maintain the SWPPP, pollution prevention measures, and inspections until acceptance of the notice of termination (NOT) by the regional water quality control board.
- (i) Do not use erosion control rolls, mats, or other similar materials containing monofilament, thin plastic thread, or plastic netting. Certain tightly woven (without gaps) plastic materials, such as SiltSoxx, are allowed if approved by the LLNS wildlife biologist. Silt fencing may not be use at Site 300 unless approved by the LLNS wildlife biologist. Contact the STR for assistance.
- (j) Prepare the notice of intent (NOI), annual report, ad hoc reports, NOT, and other permit registration documents in order for work to be covered by the Construction General Permit.
 - (1) Complete the NOT within 90 days of achieving final stabilization.
 - (2) Upload documents to the Storm Water Multiple Application and Report Tracking System (SMARTS).
 - (3) Promptly notify LLNS of ad hoc reports and numeric action limit (NAL) exceedance to accommodate the 10 day SMARTS certification requirement.
- (k) LLNS Responsibilities
 - (1) LLNS will link the Subcontractor as a data submitter in SMARTS. LLNS will notify the LRP when permit registration documents are ready for certification.
 - (2) LLNS reserves the right to inspect the site at any time. Failure to comply may result in LLNS halting work until the Subcontractor performs remedial action, which may include modifications to BMP implementation and methods used. In addition, failure to comply with the requirements of the SWPPP may result in criminal and civil liability of the Subcontractor under the Clean Water Act.
 - (3) LLNS may accept erosivity waivers for projects that fall within the Environmental Protection Agency's (EPA's) Small Construction Rainfall Erosivity Waiver. Application and processing of the waiver through SMARTS is the responsibility of the Subcontractor. A waiver does not relieve the Subcontractor of the requirements of article 3.2.2.

3.3 AIR EMISSIONS

3.3.1 Dust Control

- (a) Perform dust control to alleviate and prevent dust nuisance at, or near, the construction site as it pertains to the Subcontract work.
- (b) Use the following methods of dust control when disturbing soil:
 - (1) Spray water on loose soil that may become airborne.
 - (2) Cover stockpiled excavated material containing soil to prevent wind and water erosion and dispersal during storage.
 - (3) Prevent dust suppression water from entering storm drains.

3.3.2 Equipment Emissions

- (a) Internal Combustion Engines
 - (1) Comply with applicable Bay Area Air Quality Management District (BAAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD), or California Air Resources Board (CARB) requirements for stationary or portable equipment (e.g., generator, air compressors, lifts) with internal combustion engine's maximum brake horsepower rating (bhp):
 - (A) Greater than 50 bhp - stationary equipment.
 - (B) At 50 bhp and greater - portable equipment.
 - (2) For each portable equipment/engine subject to this section, within 30 days of the end of each calendar year and within 10 days of project close-out, provide the STR with the following records for each piece of portable equipment/engine (using attachment 01 35 43-6):
 - (A) Equipment type (e.g., generator, air compressor, lift).
 - (B) Equipment make and model.
 - (C) Internal combustion engine fuel type (e.g., diesel, gasoline, propane).
 - (D) Internal combustion make and model.
 - (E) Internal combustion engine maximum brake horsepower rating.
 - (F) Internal combustion engine Environmental Protection Agency (EPA) family identification number.
 - (G) Internal combustion engine emission factors.
 - (H) Total number of hours equipment/engine operated at LLNL on a calendar year basis.
- (b) Boilers and Water Heaters: Ensure boilers and water heaters used, procured, and/or installed comply with applicable BAAQMD, SJVAPCD, CARB, and/or EPA rules and regulations, including but not limited to:
 - (1) BAAQMD regulation 9, rule 6 (Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters) emission limits and certification requirements.
 - (2) BAAQMD regulation 9, rule 7 (Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters) emission limits, certification, stack gas temperature limits, insulation, and periodic testing requirements.

- (3) SJVAPCD regulation IV, rule 4306 (Boilers, Steam Generators, and Process Heaters – Phase 3), SJVAPCD regulation IV, rule 4307 (Boilers, Steam Generators, and Process Heaters – 2.0 MMBTU/HR to 5.0 MMBTU/HR), SJVAPCD regulation IV, rule 4308 (Boilers, Steam Generators, and Process Heaters – 0.075 MMBTU/HR to 2.0 MMBTU/HR), and SJVAPCD regulation IV, rule 4320 (Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater Than 5.0 MMBTU/HR).
- (c) Other Equipment that Emits Air Pollutants: Ensure air pollutant emitting equipment used, procured, and/or installed comply with applicable BAAQMD, SJVAPCD, CARB, and/or EPA rules and regulations.
- (d) Ensure products, equipment, and work comply with BAAQMD or SJVAPCD regulations and the air permits issued for the LLNL facility. Request a list of applicable air permits from the STR. Supply required information.
- (e) Equipment Containing Refrigerants: Perform installation, maintenance, service, repair, or disposal of equipment containing refrigerants in accordance with 40 CFR 82, subpart F and 17 CCR 95380 - 95398 as applicable to the work.
 - (1) Technician Certification. Subcontractors installing, maintaining, servicing, repairing, or disposing of equipment containing refrigerants, where the integrity of the refrigerant circuit could be violated, must be certified in accordance with 40 CFR 82, subpart F.
 - (2) Subcontractors repairing leaks to equipment subject to the 17 CCR 95380 - 95398 requirements must hold a current and active California contractor's license in the C38 – Refrigeration Contractor licensing classification.
 - (3) Recovery and Recycling Equipment Certification. Equipment used for refrigerant recovery or recycling must be certified in accordance with 40 CFR Part 82 Subpart F.
 - (4) Good Service Practices. Subcontractor must adhere to the following:
 - (A) Do not Intentionally vent refrigerants; this practice is prohibited.
 - (B) Inspect for and repair equipment leaks prior to adding refrigerant.
 - (C) Evacuate refrigerants to the required vacuum level specified in 40 CFR 82, subpart F prior to opening equipment for repair.
 - (5) Leak Repair on Equipment with Full Charge Capacity of 50 or More Pounds of Refrigerant:
 - (A) Perform a complete leak inspection on the entire accessible portion of the equipment. Identify all leak locations.
 - (B) Evacuate refrigerant to the required vacuum level prior to opening equipment for repair. Record the refrigerant type, quantity and date refrigerant was recovered.
 - (C) Make repairs.
 - (D) Perform an initial verification test demonstrating the leak repair attempts were successful, before adding refrigerant back into the equipment.
 - (E) Add refrigerant into equipment. Record the refrigerant type, quantity and date refrigerant was added.

- (F) Perform a follow-up verification test demonstrating the leak repair attempts were successful within 10 days of the successful initial verification test or 10 days of the appliance reaching normal operating conditions.
- (6) Disposing of Equipment Containing Refrigerants:
- (A) Recover refrigerant from equipment to be disposed of with a full charge capacity of more than 5 pounds prior to sending the equipment to DUS or prior to removing equipment from the Site.
 - (B) Do not recover refrigerant from small appliances to be disposed of that are hermetically sealed with a full charge capacity of 5 or less pounds and if the equipment will be sent to LLNL Donation, Utilization, and Sales (DUS).
 - (C) Recover refrigerant from small appliances to be disposed of by the Subcontractor (taken with the Subcontractor and not sent to DUS) prior to final disposal.
 - (D) Check with the STR to determine if recovered refrigerant is to be returned to LLNS for storage or if it is to be transferred offsite to a refrigerant consolidator, a USEPA certified reclaimer, or a destruction facility.
 - (E) If reclaiming refrigerant, use a U.S. EPA-certified reclaimer.
 - (F) If destroying refrigerant, use a U.S. EPA-certified or U.S. EPA-recognized commercially available ozone depleting substance destruction facility.
- (f) Vehicles
- (1) Comply with applicable CARB vehicle regulations. Relevant examples include the following:
 - (A) Large-spark ignition engine fleet requirements (aka CARB LSI regulation) in 13 CCR 2775 - 2775.2.
 - (B) Regulation for In-Use Off-Road Diesel-Fueled Fleets (also known as the CARB off-road diesel regulation) in 13 CCR 2449 - 2449.2.
 - (C) Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles (aka the CARB truck and bus regulation) in 13 CCR 2025.
 - (2) Comply with the following:
 - (A) Required vehicle/equipment labeling.
 - (B) LLNL idling policy.
 - (C) If operating vehicle(s) subject to the CARB fleet regulation on LLNL property, provide the STR with a copy of the associated compliance certificate, or a written affirmation of fleet-wide compliance for the fleet dispatching the vehicles issued by CARB, or a written statement from the vehicle owner that verifies that their on-road heavy duty diesel vehicle fleet complies with all CARB vehicle regulations.
- (g) Asbestos: Ensure that a 10-day BAAQMD or SJVAPCD notification is submitted prior to the following:
- (1) Demolition activities regardless of whether asbestos is present.

(2) Renovation activities involving the stripping or disturbance of regulated asbestos containing material (RACM) equal to or greater than:

- (A) Livermore Site (BAAQMD): 100 linear ft., 100 square ft., or 35 cubic ft.
- (B) Site 300 (SJVAPCD): 260 linear ft., 160 square ft., or 35 cubic ft.

3.3.3 Ensure that new, modified, or retrofitted equipment or products containing or manufactured with HFCs, purchased, installed, or used, comply with the following:

- (a) 17 CCR §95371-95379, Prohibition on Use of Certain Hydrofluorocarbons in Stationary Refrigeration, Stationary Air-conditioning, and Other End-Uses.
- (b) U.S. EPA Significant New Alternatives Policy (Clean Air Act, Section 612).

3.4 MATERIAL AND WASTE DISCHARGES

3.4.1 Do not discharge hazardous materials or wastes into the environment (i.e., air, soil, surface water, and groundwater).

- (a) Protect routes of entry to the environment, including direct discharges into air, soil, surface water, storm sewer, sanitary sewer, wells, and drainage channels from construction activities.
- (b) Achieve this through the safe and proper use and storage of tools, equipment, and materials.
- (c) Inspect construction equipment and vehicles daily for leaks of fuel, engine coolant, and hydraulic fluid.
- (d) Contain, repair, and immediately report leaks to the STR.
- (e) Stop work and immediately report accidental discharges into the environment to the STR.
- (f) Clean up discharges into the environment according to the guidance provided by STR.

3.4.2 Discharges to Sanitary Sewer: Do not discharge hazardous chemicals into the retention or sanitary system.

- (a) Supply a building flush plan prior to the installation of new piping that will require chemical treatment.
- (b) Obtain approval from the STR prior to discharging into the sanitary sewer system.
- (c) Refer to the Waste Discharge Authorization Record (WDAR) process flow chart in attachment 01 35 43-7 for more information on the management of wastewater at LLNL.

3.4.3 Discharges to Ground

- (a) Collect unused concrete in drums or lined containers. Remove excess concrete for proper disposal off-site and report the total quantity disposed of or recycled to the STR.
- (b) Collect construction and demolition debris to be recycled in appropriate roll-off bins, DUS scrap metal bins, or other containers for evaluation.
- (c) Discharge wash water from cleaning concrete trucks and concrete handling equipment in drums or lined containers and properly dispose off-site. Discharge wash and rinse water from pressure washing buildings as follows:
 - (1) Collect and manage hazardous materials (e.g., lead-based paint chips) as hazardous waste.

- (2) Collect wash water containing soap and discharge it to the sanitary sewer. Contact STR for guidance.
 - (3) Collect, characterize, and dispose of properly, wastewater resulting from washing hazardous residue or areas contaminated with hazardous materials. Contact STR for guidance.
 - (4) Discharge uncontaminated rinse water from pressure washing roofs through a filter system such as hay rolls or a filter bag. Contact STR for guidance.
 - (5) Do not discharge wash and rinse water into a storm drain, drainage channel, or other bodies of water.
- (d) Comply with Spill Prevention, Control, and Countermeasure (SPCC) requirements in 40 CFR 112, including, but not limited to the following:
- (1) Store oil and petroleum tanks/containers (e.g., diesel, gasoline, dielectric oil, mineral oil, motor oil, oil-based coolants, used oil, food oil, and oily wastewater) 55 gallons and larger in double-walled tanks/containers or in secondary containment sized to contain the largest container plus freeboard sufficient to accommodate a 24-hour 25-year storm if exposed to the elements.
 - (2) Periodically inspect all regulated bulk storage containers, portable bulk storage containers, electrical equipment and operating equipment that contain or are capable of containing 55 gallons or more of oil.
 - (3) Maintain appropriate spill response materials (e.g., spill kits, written spill response and notification protocols) to prevent and contain leaks from equipment (e.g., drip pans).
 - (4) Comply with and implement LLNS's site-wide SPCC plan. Personnel responsible for operating, maintaining, or inspecting aboveground oil-filled containers or equipment that contain or are capable of containing 55 gallons or more of oil are required to receive SPCC training from LLNS. The aforementioned personnel are also required to take an annual training refresher provided by LLNS.
 - (5) Provide reports of required SPCC inspections to the STR at a regular frequency. Notify the STR immediately if a spill or leak has occurred.
 - (6) Provide documentation of the material being stored and volume of oil for any oil oil-filled containers or equipment that contain or are capable of containing 55 gallons or more of oil.
 - (7) Notify the STR if oil-filled containers or equipment that contain or are capable of containing 55 gallons or more of oil will remain at the facility for 6 months or longer.

3.5 PROTECTION OF CULTURAL OR PALEONTOLOGICAL RESOURCES

- 3.5.1 LLNS will clearly mark known cultural or paleontological resource areas within construction zones by staking, fencing, and pink/black diagonally striped flagging. Avoid these areas during construction.
- 3.5.2 If cultural or paleontological resources are unearthed during construction activities, immediately stop work within 50 feet of the find until LLNS has assessed it and issued notice to proceed.
- (a) Examples of cultural resources include the following:

- (1) Prehistoric cultural deposits such as obsidian or chert flakes or tools; ground-stone mortars, slabs, or pestles; cultural deposits of shell or bone; beads, clothing, or woven articles; locally darkened midden (trash) soils; and human interments.
 - (2) Historic-period cultural materials, such as foundations or other structural remains; bottles, nails, barbed wire, ceramic pieces, buttons, weathered boards, and tin cans; refuse deposits; backfilled wells or privies; glass and pottery.
- (b) Examples of paleontological resources include fossils and bones that are not of human origin.
- 3.5.3 The Archaeological Resources Protection Act (ARPA) and the Antiquities Act regulate the protection and excavation of cultural and paleontological resources. Do not, under any circumstances, remove or disturb such resources. If discovered, leave in place, note their location, and immediately notify the STR.

3.6 PROTECTION OF BIOLOGICAL RESOURCES

- 3.6.1 Species listed as endangered, threatened, or proposed or candidates for listing under the federal Endangered Species Act (ESA) and/or California Endangered Species Act (CESA) occur at Site 300, the Livermore Site, and the Arroyo Mocho Site. Several other species occur at these LLNL sites that may receive protection under other federal and state regulations including the Migratory Bird Treaty Act (MBTA). Numerous federal and state laws outline the protection, management requirements, and penalties for noncompliance. Site-specific and project-specific requirements may apply that include, but are not limited to, pre-activity surveys, exclusion zones, and exclusion fencing. See the Project Requirements Document for project specific avoidance and minimization measures required by Biological Opinions with the U.S. Fish and Wildlife Service. Contact the STR for a determination.
- 3.6.2 All personnel conducting outdoor work at Site 300, the Livermore Site or the Arroyo Mocho Pumping Station must be current in EP0030 (LLNL Natural Resources Compliance and Safety). EP0026 (Livermore Site Natural Resources Compliance and Safety) may be substituted for EP0030 for individuals who will only work at the Livermore Site. If an LLNL natural resources training is required, then LLNS requires that laborers, craftsmen, supervisors, and foremen directly involved in the project to attend the above training.
- 3.6.3 Do not attempt to capture, relocate, or handle any wild or feral animal or remove nests. If wild or feral animals or nests are found in the work area, immediately cease work in that area, and contact the STR.
- 3.6.4 Do not feed or provide water for wild or feral animals at LLNL sites.
- 3.6.5 Do not bring or release animals to LLNL sites.
- 3.6.6 All staging, laydown and soil storage areas must be in previously disturbed areas approved by the LLNS wildlife biologist unless otherwise specified by LLNS.
- 3.6.7 Keep the project site clean and free of trash. Deposit food scraps, paper and aluminum wrappers, packaging, cans, bottles, and other food related and trash items in covered and closed trash containers that are not accessible by wildlife. Empty food trash bins at the end of each workday.
- 3.6.8 Open Excavations (outside or exterior of the building): Protect wildlife from entrapment in steep-walled excavations greater than 1 foot deep as follows:

- (a) Cover excavations completely at the end of each working day. Completely bury the edges of the cover (steel plate or plywood) to prevent wildlife access under the cover, or
- (b) Provide excavations with animal escape ramps constructed of earth fill or wooden planks (at least 6 inches wide). Earth ramps should be used whenever possible. Wooden planks or earthen ramps should at a 1:1 slope.
- (c) Before filling excavations, thoroughly inspect them for trapped animals. Contact the STR to obtain the assistance of a LLNS wildlife biologist to free trapped animals.
- (d) Backfill excavation as soon as possible and prior to the end of the project unless directed by LLNS.

3.6.9 Avoid impacts to nesting birds as described below:

- (a) The LLNS wildlife biologist will be contacted by the STR and given sufficient time to survey the affected area prior to initiation of project activities.
- (b) Projects that have the potential to impact nesting birds include but are not limited to the following:
 - (1) Construction of new facilities and demolition of existing facilities.
 - (2) Tree trimming or removal.
 - (3) Power washing building exteriors or window washing.
 - (4) HVAC work, roof replacement, or other exterior retrofit projects.
 - (5) Work within or around arroyos, drainage ditches, waterways or other protected water features.
- (c) If nesting birds are found at the project site, exclusion zones and site-specific avoidance measures may be required.
- (d) If a nest is found in or near the work area, pause work and avoid the area and contact the STR.
- (e) Do not attempt to move or disturb any nest.
- (f) Impacts to nesting birds, and project delays due to nesting birds, can typically be avoided by scheduling the activities after August 30 and before February 15 of any given year.

3.6.10 Implement appropriate erosion control measures as identified by LLNS, such as native seeding and burlap straw wattles, jute netting, or SiltSoxx. Do not use materials containing plastic monofilament, nylon net, plastic net, or photodegradable netting at LLNL sites. Certain tightly woven (without gaps) plastic materials are allowed if approved by the LLNS wildlife biologist. Silt fencing may not be used at Site 300 unless approved by the LLNS wildlife biologist. Contact the STR for assistance with these exceptions.

3.6.11 Do not violate the exclusion zones or other areas demarcated by LLNS. Exclusion zones may be shown on a map or marked in the field with pink and black flagging or exclusion tape.

3.6.12 All construction pipes, culverts, or similar structures (greater than 6-inches in diameter) that are stored in the project area for one or more overnight periods must be securely capped prior to storage or thoroughly inspected for animals if the pipe is subsequently buried, capped, or otherwise used or moved in any way.

3.6.13 Restrict exterior work at Site 300 involving construction, demolition, or ground disturbance to periods of low rainfall (less than 0.25-inch forecast during a 24-hour period and less than a 30 percent chance of rain forecast using the weather.gov forecast for the project site).¹

3.6.14 Perform exterior work at Site 300 involving construction, demolition, or ground disturbance only during daylight hours, which is defined as after sunrise and before sunset.¹

3.6.15 Wildlife Exclusionary Fencing

- (a) Install exclusionary fencing, if required by LLNS, to surround the project site prior to the start of work to preclude movement of wildlife into the project site.
- (b) When required, exclusion fencing must be installed prior to grading, excavation, construction, soil disturbance, or materials staging associated with this project.
- (c) Exclusion fencing must completely surround work areas. Include a gate that can be closed at the end of each workday, so that the project site is completely surrounded by exclusion fencing overnight.
- (d) The exclusion fencing must remain in place during outside work.
- (e) Use Ertec E-Fence, or equivalent, that is a minimum of 18 inches in height for the exclusion fencing.
- (f) Hold the exclusion fence in place at the base by sandbags or trenching at least 5 inches into the ground and backfilling on both sides of the fence. When trenching is not appropriate, hold the base of the fence down with sandbags, or other appropriate methods according to the manufacturer's specifications, in a manner that eliminates gaps.
- (g) When exclusion fencing spanning more than 50 linear feet is used, install one-way exit funnels at the base of the exclusion fence every 25 feet per manufacturer's specifications.
- (h) Follow the manufacturer's specifications when installing and maintaining the exclusionary fencing.
- (i) Inspection by the LLNS wildlife biologist after exclusion fence installation is required. Contact the STR to request an inspection by the LLNS wildlife biologist.
- (j) Maintain exclusionary fencing throughout the duration of the project.
- (k) Perform weekly inspections of the exclusionary fencing associated with the project.
- (l) Repair holes, tears, gaps, or downed fence observed during the inspection as soon as possible.
- (m) Document the weekly inspections, and repairs that are performed.
- (n) Maintain records of the inspections onsite and make available to LLNS upon request.

3.7 CONSERVATION OF ENERGY AND WATER

3.7.1 To the maximum extent practicable, implement conservation practices that reduce the consumption of water and electricity. Reduction practices may include the following:

- (a) Turn off electric-powered items (e.g., tools, office equipment, lights) when not in use.
- (b) Use energy efficient products (i.e., Energy Star products or Federal Energy Management Program- [FEMP] designated products) unless the energy-consuming product is not listed in the Energy Star program or FEMP.

- (c) Reduce LLNS-provided potable water use through signage and shutting-off water sources at night to minimize leakage.
- (d) Turn off water source when not in use.
- (e) Use water efficient products in work activities, where feasible.

3.8 LEAD

- 3.8.1 Workers may encounter lead-contaminated materials when performing work on this project. Refer to Section 01 35 23.21 - Lead Work Exposure Protection and the Project Requirements Document for further information.
- 3.8.2 LLNS tracks the amount of lead processed and disposed as required by Federal Emergency Planning and Community Right-to-Know Act (EPCRA), section 313 reporting regulations. The Subcontractor is responsible for documenting the amount of lead (weight) handled and submitting to LLNS.

3.9 ASBESTOS

- 3.9.1 Workers may encounter asbestos-containing materials when performing work on this project. Refer to Section 01 35 23.13 - Asbestos Safety: Class I and II, Section 01 35 23.19 - Asbestos Safety - Class III and Unclassified, and the Project Requirements Document for further information.

3.10 IMPORTED FILL MATERIAL

- 3.10.1 If the project involves importing fill material, test the material to ensure it meets the LLNL Soil Reuse Criteria before being brought onto the project site.
- 3.10.2 Identify a borrow material source, and have the materials sampled and tested. Chemical analysis of collected samples must be in accordance with section 3.1 of LLNL's *Soils Screening and Management Plan*.
- 3.10.3 Coordinate import of fill materials through the STR.
- 3.10.4 Composite samples for volatile organic compounds (VOCs) are not acceptable. Composite samples for heavy metals, pesticides, herbicides, or polycyclic aromatic hydrocarbons (PAHs) from unanalyzed stockpiled soil are also unacceptable unless the material is stockpiled at the borrow area and originates from the same source area.
- Note:** The individual or individuals that collect the samples must be trained (e.g., coursework or degree in Civil, Environmental, or Geotechnical Engineering, or Geology) to collect soil samples for environmental testing.
- 3.10.5 Analyze collected samples with a State of California Environmental Laboratory Accreditation Program (ELAP) certified laboratory. Guidelines for sampling of the proposed borrow material is outlined in the following table from the California Department of Toxic Substances Control (DTSC).

Recommended Fill Material Sampling Schedule

Area of Individual Borrow Area	Sampling Requirements
2 acres or less	Minimum of 4 samples
2 to 4 acres	Minimum of 1 sample every 1/2 acre
4 to 10 acres	Minimum of 8 samples

Greater than 10 acres	Minimum of 8 locations with 4 subsamples per location
Volume of Borrow Area Stockpile	Samples per Volume
Up to 1,000 cubic yards	1 sample per 250 cubic yards
1,000 to 5,000 cubic yards	4 samples for the first 1,000 cubic yards, +1 sample for each additional 500 cubic yards
Greater than 5,000 cubic yards	12 samples for the first 5,000 cubic yards, +1 sample per each additional 1,000 cubic yards

3.11 DISPOSAL OF EXCESS SOIL, ASPHALT, CONCRETE, AND OTHER MATERIALS

3.11.1 If the project involves demolition, soil disturbance, or both, then LLNS may need to test materials for contamination prior to disturbance, disposal, or re-use (disposal and re-use of excavated or demolished materials, e.g., asphalt, soil, concrete, and other materials). Coordinate such sample testing with the STR.

(a) Sampling and Evaluation

- (1) If LLNS **has evaluated** the materials and determines that off-site management is required, then the following must occur:
 - (2) Send non-hazardous, municipal, and industrial waste to Altamont Landfill & Resource Recovery, Vasco Road Landfill, Tracy Material Recovery, or Forward Landfill (including asphalt and concrete for recycling). Recycle materials through LLNS preferred pathways as indicated in the attached Solid Waste Management Plan (SWMP).
 - (3) Generated hazardous waste will be managed by LLNS.
 - (4) Coordinate disposal of materials demonstrating visual/detectable contamination with the STR.
 - (5) Immediately stop work and notify the STR if workers encounter unexpected, impacted soil and debris or suspect items (e.g., drums, boxes, cans, bottles, or discolored, malodorous, or otherwise suspected contaminated soil and debris) and wait for further direction regarding resumption of work.
- (6) If LLNS **has not evaluated** the materials to determine the proper disposition, LLNS will sample and evaluate materials resulting from excavating on the project site prior to the Subcontractor removing the materials from the site.
 - (A) Stockpile such materials in separate piles or in roll-off bins as designated by LLNS.
 - (B) Stake and identify each pile and separate piles by location.
 - (C) Place the materials on and cover with plastic sheeting at LLNS-designated location and secure against displacement until such materials are tested and approved for disposal.

3.11.2 Solid Waste Management: LLNS encourages and tracks recycling and solid waste diversion for construction waste and municipal waste generated during the project, such as scrap metal.

- (a) The disposal or recycling options must be indicated in the project SWMP. For alternate disposal or recycling sites, submit the proposed site information, description, quantity of materials to be disposed or recycled, and relevant facility work authorization (i.e., permits, licenses, certifications, etc.) to LLNS for evaluation. Contact the STR for coordination.
- (b) Manage recyclable materials through LLNS unless LLNS makes a prior agreement for the Subcontractor to recover the recycled materials.
- (c) Use LLNS paper and cardboard recycling bins, where available, to reduce the amount of municipal waste generated.
- (d) If recovered by the Subcontractor, E-waste must be managed through a Department of Toxic Substances Control (DTSC)-approved E-waste recycler and appliances must be recycled through a certified appliance recycler (CAR). Provide the STR with recycling receipts.

3.11.3 Treated Wood Waste (TWW)

- (a) If the project involves removal of treated wood, for example old treated wood used in construction for foundational supports, concrete or asphalt installation, do the following:
 - (1) Ensure personnel handling TWW are trained in accordance with Health and Safety Code §25230.12. Training topics should include safe handling practices, procedures for identifying and segregating TWW, requirements for alternative management standards, and proper disposal methods.
 - (2) Segregate non-utility from utility TWW and accumulate non-utility TWW in compliance with hazardous waste requirements identified in Title 22 of the California Code of Regulations before waste is turned over to LLNS for disposal.
 - (3) Label utility TWW as TWW-UTILITY SERVICE; accumulate and store in a manner that prevents the TWW from contact with the ground and water.
- (b) LLNS will manage the disposal, and provide labels and guidance to aid in utility TWW management.

3.11.4 Hazardous/Radioactive Waste (and other Regulated waste)

- (a) LLNS will manage hazardous and radioactive waste generated at LLNL. This includes universal waste such as electronics, batteries, and fluorescent light tubes.
 - (1) In situations when the contract dictates that certain wastes or materials e.g., spent lead-acid batteries or refrigerants, are managed and recycled by the subcontractor, the subcontractor must provide the following to the STR.
 - (A) The destination recycling facility
 - (B) Receipts or tickets received from the recycling facility upon deliver.
- (b) Do not place these types of waste items into waste containers without the knowledge of LLNS personnel responsible for managing these wastes and certifying the contents of the containers.
- (c) Contact the STR to obtain assistance from LLNS personnel responsible for managing these wastes.

- (d) Tire Recycling: Recycle all tires. If the project involves the recycle of ten or more tires, use a vendor in the California Tire Program. Track tire recycling in the SWMP and provide the STR with tire recycling receipts.
- (e) If sending materials to an off-site disposal facility, obtain prior approval from LLNS and report disposal material quantities and types to LLNS.

3.12 SUBCONTRACTOR USE AND MANAGEMENT OF NONHAZARDOUS AND HAZARDOUS MATERIALS

3.12.1 Nonhazardous Materials Use: LLNS has implemented a program to reduce or eliminate the use and release of toxic and hazardous chemicals and materials and requires Subcontractors to support this program. To the maximum extent possible without conflicting with the technical requirements of the subcontract, reduce or eliminate the use and release of toxic and hazardous chemicals and materials through the following:

- (a) Make maximum use of recycled content products (epa.gov/cpg) and bio-based products (e.g., cleaning supplies, sealants and coatings) that are United States Department of Agriculture (USDA)-designated items (www.biopreferred.gov) unless the product cannot be acquired as follows:
 - (1) Competitively within a time frame providing for compliance with the contract performance schedule.
 - (2) Meeting contract performance requirements
 - (3) At a reasonable price.
- (b) Use cleaning products that comply with either EPA's Safer Choice or Green Seal GS-37 standards. If Safer Choice or GS-37 products are not available, use products that comply with the California Air Resources Board Consumer Products Regulation (17 CCR §94507-94517).
 - (1) Use more environmentally benign solvents and solvent-free alternative systems that reduce or eliminate the use of hazardous substances and the generation of hazardous waste.
 - (2) Purchase materials in container sizes and amounts that minimize the amount of excess material generated by the project.
 - (3) Re-use or recycle surplus commodities and by products.
- (c) Implement appropriate management practices for nonhazardous and hazardous materials brought on-site to comply with federal, state, and local regulations including, but not limited to, the following:
 - (1) Do not store materials or waste near storm drainage systems
 - (2) Use secondary containment berms for containers of liquid materials
 - (3) Inspect storage areas
 - (4) Appropriately label containers

3.12.2 Hazardous Materials Use

- (a) Track and report the use of hazardous materials to LLNS.

- (b) Discuss with the STR the hazardous material types and quantities proposed for work activities to determine if materials require tracking.
- (c) Maintain tracking documents identified by LLNS and provide the documents to LLNS when the work activity is completed.
- (d) Use non-petroleum-based chemicals for removing potential asbestos-containing tile or mastic (e.g., Bean-e-doo or similar).
- (e) Purchase toxic and/or hazardous materials in container sizes and amounts that minimize the amount of excess material generated by the work.
- (f) Safety Data Sheets (SDS)
 - (1) Submit safety data sheets to the STR for all hazardous materials to be used on-site.
 - (2) Maintain copies of these SDS in a readily accessible location on-site.
 - (3) Store materials in containers in accordance with the requirements of the SDS within the construction boundary, or as directed by the STR in accordance with the SWPPP.
 - (4) Remove and dispose of such materials not incorporated in the work in accordance with the applicable federal, state, and local regulations.
- (g) Hazardous Materials Inventory: Complete and submit to the STR the LLNL "Hazardous Material Inventory" form attachment 01 35 43-3. Retain copies of the completed forms with the SDS for the work. If hazardous materials required by the specifications are to remain on site at the end of the project, advise the STR.
- (h) Transportation of Hazardous Materials: Comply with applicable federal and state regulations when transporting hazardous materials to the LLNL site. Comply with posted traffic signs and speed limits at LLNL sites.

3.13 CONTROLLED ITEMS AND MATERIALS

3.13.1 Do not use or bring the controlled items and materials listed below to LLNL Livermore Site or Site 300 without prior written approval from LLNS.

- (a) Asbestos products.
- (b) Beryllium or beryllium products.
- (c) Carcinogens and regulated materials.
- (d) Materials containing mercury.
- (e) Materials containing cadmium.
- (f) Lead or lead-based paint materials (defined as having greater than 600 ppm lead).
- (g) Hazardous materials with SDS.
- (h) Corrosive or toxic chemicals.
- (i) Flammable or combustible liquids.
- (j) Radioactive materials.
- (k) Radiation generating devices.
- (l) Non-ionizing radiation generating devices.

- (m) Explosives.
- (n) Thoriated welding rods – prohibited for welding purposes.
- (o) Water pipe and fittings, lead solder and flux, and plumbing fitting and fixtures having lead content exceeding the maximum allowable level defined in the California Health and Safety Code, Section 116875.
- (p) Animals.
- (q) Lasers.
- (r) Powder-actuated hand tools.

ATTACHMENTS

01 35 43-1 (3 PAGES): LLNL BEST MANAGEMENT PRACTICES (BMPS) FOR LAND DISTURBANCE LESS THAN 1 ACRE

01 35 43-2 (2 PAGES): SOLID WASTE MANAGEMENT PLAN (SWMP)

01 35 43-3 (2 PAGES): HAZARDOUS MATERIAL INVENTORY FORM

01 35 43-4 (4 PAGES): REFRIGERANT TRACKING FORM – SERVICE

01 35 43-5 (4 PAGES): REFRIGERANT TRACKING FORM - DISPOSAL

01 35 43-6 (1 PAGE): CONTRACTOR PORTABLE ENGINE/EQUIPMENT OPERATION LOG

01 35 43-7 (1 PAGE): WASTE DISCHARGE AUTHORIZATION RECORD (WDAR) PROCESS AT LLNL

END OF SECTION 01 35 43

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LLNL Best Management Practices for Land Disturbance Less than 1 Acre

PURPOSE

The requirements in this document are to ensure that LLNL non-industrial facilities and activities do not negatively affect storm water and receiving water quality as required by the following:

1. California Regional Water Quality Control Board, San Francisco Bay Region, Municipal Regional Storm Water NPDES permit R2-2022-0018 for the Livermore Site.
2. California Regional Water Quality Control Board, Central Valley Region, order number R5-2008-0148, *Waste Discharge Requirements Issued to Lawrence Livermore National Security, LLC, and the U.S. Department of Energy for Lawrence Livermore National Laboratory Experimental Test Site (Site 300) Sewage Evaporation and Percolation Ponds, Septic Systems, Cooling Tower Discharges, Mechanical Equipment Wastewater Discharges, and Other Low-Threat Discharges.*

The Storm Water Pollution Prevention Plans (SWPPP) for the Livermore Site and Site 300 document storm water requirements for the portions of LLNL (as listed in article **STORM WATER POLLUTION PREVENTION**) regulated by the *Industrial General Permit*.

SCOPE

These best management practices (BMPs) outline coverage for the non-industrial portions of LLNL sites; more specifically, construction-related activities where ground disturbance is less than one acre.

The intent is to prevent or reduce the discharge of pollutants to storm water from building repair, remodeling, construction, demolition, and land-disturbing activities. LLNS achieves this by using sediment and erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using nonhazardous or less hazardous alternative products, and training employees. The Subcontractor is responsible for following this approach for construction areas and activity, including laydown and storage areas.

Most of the BMPs discussed in this chapter are temporary measures specific to construction and ground-disturbing activities. Subcontractors performing work on-site are responsible for implementing BMPs. Where applicable, use BMPs identified in the most recent *Storm Water Best Management Practice Handbook: Construction (CASQA)*.

REQUIREMENTS

These BMPs include, but are not limited to the following:

- Use sediment control techniques when bare soil is temporarily exposed. See SE factsheet series in *Storm Water Best Management Practice Handbook: Construction (CASQA)*.
- Use soil erosion control techniques, when practical, where bare ground is temporarily exposed. See EC factsheet series in *Storm Water Best Management Practice Handbook: Construction (CASQA)*. LLNS prohibits the use of erosion control rolls, mats, or

other similar materials containing monofilament, thin plastic thread or plastic netting at the project site.

- Use permanent soil erosion control techniques in areas where buildings are removed and not replaced (e.g., landscaping, hydro-seeding, mulching, or graveling).
- Enclose painting operations, as appropriate, to be consistent with local air quality regulations and the *Occupational Safety and Health Administration* (OSHA).
- Cover and properly store materials of particular concern (e.g., soil piles, chemical storage, paints) exposed to weather, especially during the rainy season. Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are necessary, consider the use of plastic materials resistant to solar degradation.
- Properly store and dispose of waste materials generated from the activity. See Factsheet WM-5 in *Storm Water Best Management Practice Handbook: Construction* (CASQA).
- Provide spill response training for personnel who handle hazardous materials.
- Maintain good housekeeping practices while work is underway and remove debris in a timely manner.
- Prevent discharges of non-permitted wastewater to the storm water drainage system.
- Protect nearby storm drains to minimize the chance of inadvertent discharge of construction materials or sediment. See Factsheet SE-10 in *Storm Water Best Management Practice Handbook: Construction* (CASQA).
- Designate an appropriate concrete washout area for trucks. See Factsheet WM-8 in *Storm Water Best Management Practice Handbook: Construction* (CASQA).
- Clean any sediment or debris from the storm water drainage system in the immediate vicinity of the construction activities after those activities are completed.
- Filter or settle sediment-laden runoff prior to discharge (avoid use of straw bales).
- Provide effective stabilization for disturbed soil and other erodible areas prior to a forecasted storm.
- Maintain effective perimeter controls and stabilize site entrances and exits to sufficiently control discharging or tracking of erodible materials off the site. If track-out occurs, street sweep, as necessary. See factsheet TC-2 in *Storm Water Best Management Practice Handbook: Construction* (CASQA).
- Divert run-on and storm water generated off-site away from disturbed areas on-site.
- Implement effective wind erosion controls, and BMPs to control aerial deposition of site materials.
- Wash and clean vehicles and equipment in designated area and prevent pollutants from discharging into storm water. See Factsheet NS-08 in *Storm Water Best Management Practice Handbook: Construction* (CASQA).

- If re-fueling is necessary on-site, fuel vehicles in designated location. Design procedures and practices to prevent fuel spills and leaks and reduce and eliminate contamination of storm water. See Factsheet NS-09 in *Storm Water Best Management Practice Handbook: Construction (CASQA)*.
- If vehicle maintenance is necessary on-site, perform vehicle and equipment maintenance in a designated area and prevent pollutants from discharging into storm water. See Factsheet NS-10 in *Storm Water Best Management Practice Handbook: Construction (CASQA)*.
- Contain and clean up waste generated by grinding, drilling, sanding, sandblasting, and scraping. Use a vacuum for fine particle clean-up. Dispose of waste properly.

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Solid Waste Management Plan (SWMP)

 Company Name

Date

 Company Contact

Phone

 Mailing Address

 Task Description

 Process Description. Describe processes to minimize municipal solid waste, hazardous waste, and construction and demolition waste generation.

Waste Type	Preferred Facility/ Disposition*	Actual Facility/Disposition (Preferred or other - if other, approval must be received by the STR and detail provided)	Estimated Amount (lb.)	Final Amount (lb.) (provide at end of project along with receipts)
Concrete	Altamont landfill for recycling			
Lumber (no treated wood)	Recycle through LLNL woodyard			
Wood pallets and large landscape wood	Recycle through LLNL woodyard			
Steel and other metal (list types)	Recycle through LLNL Donation, Utilization, and Sales (DUS)			
Cardboard	Recycle in LLNL cardboard dumpster			
Asphalt	Altamont or Vasco landfill for disposal			
Non-friable asbestos	Altamont or Vasco landfill for disposal			
Tires	Recycle all tires. If > 10 tires are recycled, a vendor in the California Tire Program must be used.			
Other construction debris (describe)	Altamont, Vasco, Tracy, Forward landfills			

* LLNS has an agreement (Memorandum of Understanding) with the City of Livermore that applies to waste hauling with the City's franchised waste hauler (Livermore Sanitation, Inc.). Subcontractors must use Livermore Sanitation, Inc. unless an exception applies.

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Hazardous Material Inventory

Project Name

Estimated Start Date

Subcontract Number

Estimated End Date

Instructions:

1. Please list hazardous materials below for which the manufacturer or producer has prepared a Safety Data Sheet (SDS).
2. Indicate the quantity of each hazardous material (pounds, gallons, and the like) to be handled at the jobsite.
3. Provide a completed copy of this inventory form to LLNS STR, L-514.
4. Notify the STR and the ChemTrack Hotline on ext. 4-4404 if any materials will be left on site after the project is completed.

Material	Quantity	Material	Quantity

(Additional space for inventory information is provided on the next page.)

For more information regarding this inventory:

Subcontractor Name

Date

Contact Name

Phone

Questions? Please call the ChemTrack Hotline, ext.4 4404

Refrigerant Tracking Form - Service

Refrigerant Tracking Form - Service (Rev. 9/7/2022)

Work order # _____		Building: _____	
Date Issued: _____	Completed: _____	Unit ID: _____	Circuit #: _____
Team: _____		Specific Location: _____	
Mechanic: _____	Emp No: _____	Manufacture: _____	M/N: _____
Supervisor: _____		S/N: _____	Refrigerant type: _____
Reason for Dispatch			
Service Description			
Preventative Maintenance	Date: _____	Decommission	Refrigerant Transfer
Corrective Maintenance	_____	Mothballed	Disposal
Service Description notes: _____			
Recovery Unit			
Refrigerant	Model	Serial Number	
	Cylinder ID	Type	Condition
Recovered	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	Unit flat at "0" psi could not recover		Total Recovered:
Refrigerant	Cylinder ID	Type	Condition
Added	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	Start up Charge		Total Added:
Leaks		Leak Notes:	
Leak Inspection ¹	Date ¹ : _____	_____	
Method:	_____		
Leak Found	Date: _____	_____	
Leak repaired	Date: _____	_____	
Initial Verification test	Date: _____	_____	
Method:	_____		
Follow-up Verification Test	Date: _____	_____	
Method:	_____		
	Trace Gas Used	_____	_____
	Refrigerant Type:	_____	_____
	Cylinder ID:	_____	Quantity: _____

¹ By providing the leak inspection date the technician certifies that all visible and accessible parts of the appliance were inspected.

Instructions:

1. Complete top box (e.g., WO#, Dates, Name, Emp No., Building, Unit ID, Refrigerant Circuit #, Make, M/N, S/N, Refrigerant type).
2. In "Reason for Dispatch" section, describe why dispatched (PM, System down, Hot Call, etc.).
3. In "Service Description" section, check the appropriate type.
4. In "Service Description notes:" section briefly describe what you found upon arrival at the unit:
 - a. Major Maintenance = Recovery Required (If recovery stopped, state reason)
 - b. Non-Major Maintenance = Repairs without Recovery (tighten packing or flare fitting)
 - c. Part(s) of the appliance being repaired, maintained or serviced.
5. In the "Recovery Unit" section enter the refrigerant recovery equipment model number and serial number.
6. In the "Refrigerant Recovered" section enter the recovery cylinder ID, refrigerant type (e.g., R-410A), refrigerant condition (Usable, not usable), quantity recovered (lb.) and date of recovery.
7. Enter Total Recovered (lb.)
8. In the "Refrigerant Added" section enter the cylinder/drum ID, refrigerant type (e.g., R-410A), refrigerant condition (new, recovered), quantities (lb.) and date added.
9. Enter Total Added (lb.). This is the "net" amount of new refrigerant added.
10. Complete Hard Issue Form and submit it to B512 within 1 business day of adding refrigerant.

Leak Repair Requirements

11. Leak inspections must include all visible and accessible parts of the appliance. Enter leak inspection method and date.
12. If leaks are found enter the date. In "Leak Notes:" section list the leak locations and a description of each leak.
13. Enter the date the leak was repaired.
14. Enter the Initial Verification Test method and date. Test must be performed prior to adding refrigerant back into the system. In "Leak Notes:" section list the location(s) of all repaired leaks that were tested.
15. Enter the Follow-up Verification Test method and date. Test must be performed within 10 days of the successful initial verification test or 10 days of the appliance reaching normal operating conditions.
16. If a tracer gas was used enter the type and quantity.

Leak inspection determines the location of refrigerant leaks. Valid leak inspection methods include: ultrasonic tests, gas-imaging cameras, bubble tests as appropriate, or the use of a leak detection device operated and maintained according to manufacturer guidelines. Methods that determine whether the appliance is leaking refrigerant but not the location of a leak, such as standing pressure/vacuum decay tests, sight glass checks, viewing receiver levels, pressure checks, and charging charts, must be used in conjunction with methods that can determine the location of a leak.

Valid initial or follow-up verification test methods include soap bubbles as appropriate, electronic or ultrasonic leak detectors, pressure or vacuum tests, fluorescent dye and black light, infrared or near infrared tests, and handheld gas detection devices.

(Example)**Refrigerant Tracking Form - Service (Rev. 9/7/2022)**

Work order #	413739		Building:	B111			
Date Issued:	2/8/2021	Completec	2/17/2021	Unit ID:	111RCHS01-A1	Circuit #:	2
Team:	Operations			Specific Location	B111 RM. 191		
Mechanic:	PO-AC	Emp No:	XXXXXX	Manufacture:	Trane	M/N:	RTWD160F28
Supervisor:	Bill Briggs		S/N:	U12J04474	Refrigerant type:	R-134a	
Reason for Dispatch	Low Charge Found on PM #336235						
Service Description	Date	2/8/2021					
Preventative Maintenance		Decommission		Refrigerant Transfer			
Corrective Maintenance	X	Mothballed		Disposal			
Service Description notes:	Recover system charge, leak test, repair and charge with dataplate charge.						
Recovery Unit	Model	Applion G5 Twin		Serial Number	H10G0159		
Refrigerant	Cylinder ID	Type	Condition	Quantity (lbs)	Date		
Recovered	N/A	R-134a	Recovered	163	2/16/2021		
	Unit flat at "0" psi could not recover		Total Recovered:	163	2/16/2021		
Refrigerant	Cylinder ID	Type	Condition	Quantity (lbs)	Date		
Added	N/A	R-134a	Recovered	163	2/17/2021		
	CT02194172	R-134a	Virgin	20	2/17/2021		
	Start up Charge		Total Added:	20	2/17/2021		
Leaks				Leak Notes: Leaks found on return wye strainer and HPC			
Leak Inspection ¹	Date ¹ :	2/16/2021		service valve. Replaced HPC service valve. All leak repairs tested. All visible and accessible parts of the appliance were inspected.			
	Method:	ELECTRONIC, SOAP BUBBLES					
Leak Found	Date:	2/16/2021					
Leak repaired	Date:	2/16/2021					
Initial Verification test	Date:	2/16/2021					
	Method:	STANDING VACUUM TEST					
Follow-up Verification Test	Date:	2/17/2021					
	Method:	ELECTRONIC DETECTOR					
	Trace Gas Used	YES					
	Refrigerant Type:	R-22					
	Cylinder ID:			Quantity:			

¹ By providing the leak inspection date the technician certifies that all visible and accessible parts of the appliance were inspected.

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Refrigerant Tracking Form - Disposal

Refrigerant Tracking Form - Disposal (Rev. 9/7/2022)

Work order # _____		Building: _____	
Date Issued: _____	Completed: _____	Unit ID: _____	Circuit #: _____
Team: _____		Specific Location: _____	
Mechanic: _____	Emp No: _____	Manufacture: _____	M/N: _____
Supervisor: _____		S/N: _____	Refrigerant type: _____
Reason for Dispatch			
Service Description			
Preventative Maintenance	Date: _____	Decommission	Refrigerant Transfer
Corrective Maintenance		Mothballed	Disposal
Service Description notes:			
Recovery Unit	Model	Serial Number	
Refrigerant	Cylinder ID	Type	Condition
Recovered			Quantity (lbs)
			Date
Unit flat at "0" psi could not recover		Total Recovered:	

Instructions:

1. Complete top box (e.g., WO#, Dates, Name, Emp No., Building, Unit ID, Refrigerant Circuit #, Make, M/N, S/N, Refrigerant type).
2. In "Reason for Dispatch" section, Identify the type of equipment being disposed (e.g., chiller, roof top A/C, etc.)
3. In "Service Description" section, enter disposal date and place "X" in "Disposal" checkbox. If the recovered refrigerant will be taken offsite by a contractor place an "X" in the "Refrigerant Transfer " checkbox.
4. In "Service Description notes:" section describe where the refrigerant and equipment were transferred. For example, refrigerant taken by Rapid Recover, or onsite to B404 or refrigerant yard; equipment to DUS or taken with contractor.
5. In the "Recovery Unit" section enter the refrigerant recovery equipment model number and serial number.
6. In the "Refrigerant Recovered" section enter the recovery cylinder ID, refrigerant type (e.g., R-410A), refrigerant condition (Usable, not usable), quantity recovered (lb.) and date of recovery. If unit is flat, place an X in the "Unit flat at "0" psi could not recover" checkbox.

Prior to delivering drained equipment to DUS or otherwise removing from site:

7. Email a copy of this form to REFRIGERANT-DISPOSAL@lnl.gov.
8. Tape a copy of this form to the equipment.
9. Write your employee number and "Date Recovered: MM/DD/YYYY" on the refrigerant chamber using a paint pen.

(Example)**Refrigerant Tracking Form - Disposal (Rev. 9/7/2022)**

Work order #	241285 / FS-34591		Building:	B-170			
Date Issued:	8/5/2021	Completed	8/5/2021	Unit ID:	170RCHC01-1	Circuit #:	1
Team:	Rapid Recovery			Specific Location:	RM 1049		
Mechanic:	John Smith	Emp No:	XXXXXX	Manufacture:	McQuay	M/N:	07EB033610
Supervisor:				S/N:	55D81056-00	Refrigerant type:	R-134A
Reason for Dispatch	Chiller						
Service Description	Date	8/5/2021					
Preventative Maintenance	<input type="checkbox"/>	Decommission	<input type="checkbox"/>	Refrigerant Transfer	<input type="checkbox"/>		
Corrective Maintenance	<input type="checkbox"/>	Mothballed	<input type="checkbox"/>	Disposal	<input checked="" type="checkbox"/>		
Service Description notes:	Recovered refrigerant transferred to Rapid Recovery, equipment taken offsite by Air Systems, Inc.						
Recovery Unit	Model	EM-2, El Machino	Serial Number	101246			
Refrigerant	Cylinder ID	Type	Condition	Quantity (lbs)	Date		
Recovered	000071240SMP	R-134A	Usable	143	8/5/2021		
	000629240SMP	R-134A	Usable	180	8/5/2021		
	005096240RRSMP	R-134A	Usable	269	8/5/2021		
	Unit flat at "0" psi could not recover		Total Recovered:	592	8/5/2021		

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Portable Engine/Equipment Operation Log

(Required for portable equipment ≥ 50 bhp operated at LLNL sites)

SUBCONTRACTOR INFORMATION	
Subcontractor Name:	
Subcontractor Equipment ID#:	

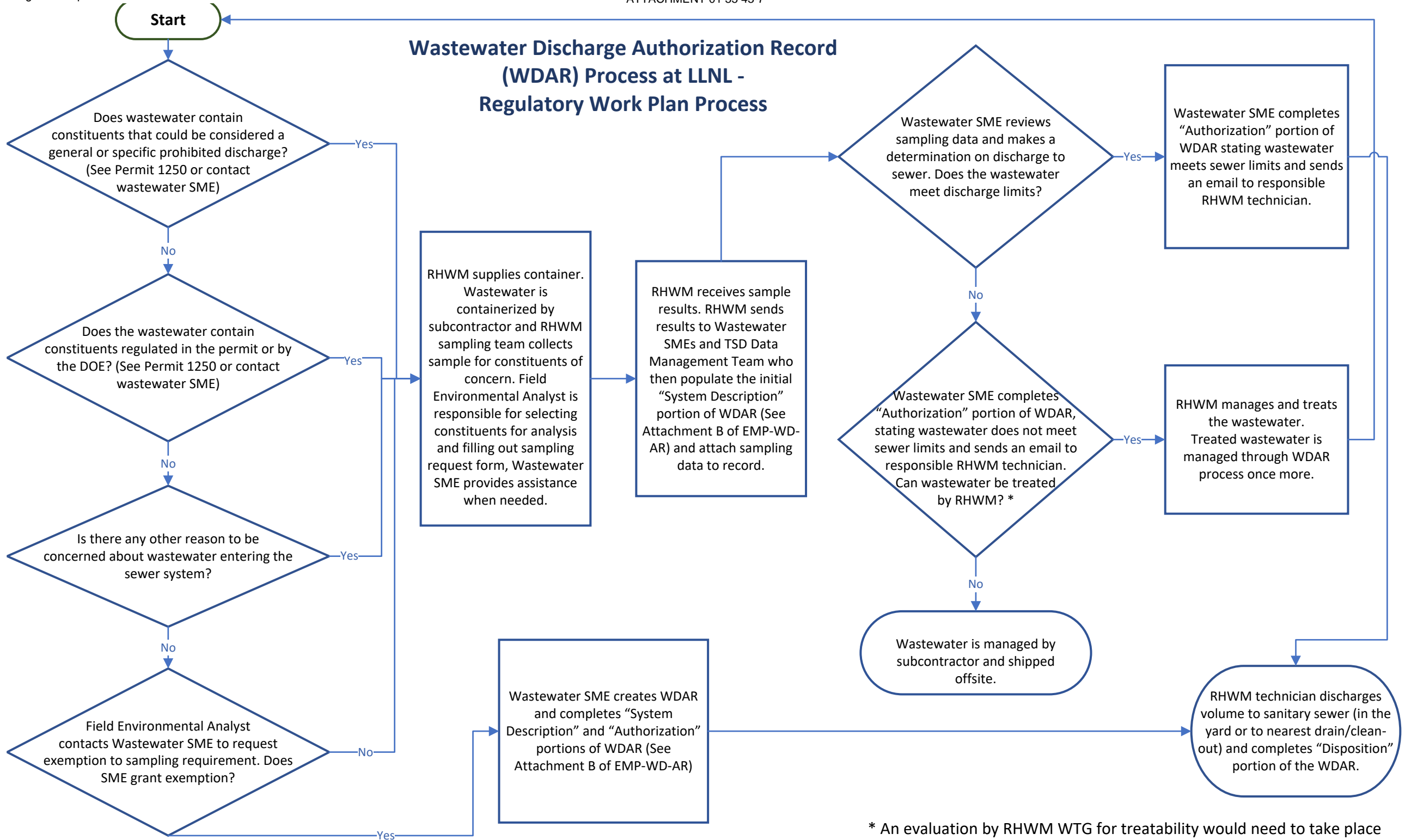
PORTABLE EQUIPMENT INFORMATION				
<i>*** Attach a copy of the equipment's CARB PERP registration certificate ***</i>				
CARB PERP Registration Number:		Expiration Date:	1/23/2024	
ENGINE DATA				
<i>*** Provide a photograph of the engine's manufacturer-applied ID plate(s) ***</i>				
Manufacturer:		Model:		Serial Number:
Engine EPA Family ID:				
Maximum Brake Horsepower Rating (per engine data plate):				
Engine Powers a:	<input checked="" type="checkbox"/> Generator	<input type="checkbox"/> Compressor	<input type="checkbox"/> Pump	<input type="checkbox"/> Other:
Fuel Type:	<input type="checkbox"/> Diesel	<input type="checkbox"/> Gasoline	<input type="checkbox"/> LPG/Propane	<input type="checkbox"/> Other:

EQUIPMENT HOUR METER READING LOG		
<i>*** Record at least once per week ***</i>		
Date	Location	Hour Meter Reading
	<i>Initial Reading (prior to operation)</i>	
	<i>Final Reading (prior to leaving site)</i>	

COMPLETED BY			
Name:		Phone #:	
Title:		Cell #:	
Signature:		Email:	

Return Completed Log to LLNL Environmental Functional Area – Air Quality Office
(contact: Tony Wegrecki, wegrecki2@llnl.gov)

Wastewater Discharge Authorization Record (WDAR) Process at LLNL - Regulatory Work Plan Process



* An evaluation by RHWM WTG for treatability would need to take place

SECTION 01 40 00 QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Basis for acceptance
- 1.1.2 Quality assurance
- 1.1.3 Quality control
- 1.1.4 Material inspection
- 1.1.5 Mockups
- 1.1.6 Manufacturer's field services
- 1.1.7 Repair and protection
- 1.1.8 Testing and Inspection Activities

1.2 REFERENCES

- 1.2.1 29 CFR 1910.7 - Definition and requirements for a nationally recognized testing laboratory; 2022.

1.3 RELATED REQUIREMENTS

- 1.3.1 Section 01 33 00 - Submittal Procedures
- 1.3.2 Section 01 45 23 - Testing and Laboratory Services

1.4 DEFINITIONS

- 1.4.1 **installer/applicator/erector.** Subcontractor or another entity engaged by Subcontractor as an employee or lower-tier subcontractor to perform a specific construction operation, including installation, erection, application, assembly, and similar operations.
- 1.4.2 **mock-ups.** Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mock-ups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mock-ups are not samples. Unless otherwise indicated, approved mock-ups establish the standard by which the work will be judged.
 - (a) Laboratory Mock-ups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.
 - (b) Integrated Exterior Mock-ups: Mock-ups of the exterior envelope constructed on-site as freestanding temporary built elements or as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.
 - (c) Room Mockups: Mock-ups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.

- 1.4.3 **product tests.** Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to National Institute of Standards and Technology's (NIST) National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- 1.4.4 **source quality control tests:** Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- 1.4.5 **quality assurance (QA).** Activities, actions, and procedures performed before and during execution of the work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- 1.4.6 **quality control (QC).** Tests, inspections, procedures, and related actions to evaluate compliance of actual products incorporated into the work and completed construction with specified requirements. Subcontractor's quality-control services do not include contract administration activities performed by LLNS.

1.5 **NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL)**

- 1.5.1 Submit materials and equipment documentation that are tested and listed or labeled by a NRTL recognized by the Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.7 such as, but not limited to, Underwriters Laboratories (UL) or FM Global (FM). In cases where no material or equipment of the type specified is NRTL listed, submit relevant technical data regarding the proposed material and equipment, in writing, to LLNS for resolution in accordance with section 01 33 00 - Submittal Procedures.
- 1.5.2 LLNS, solely at its discretion, may require the Subcontractor to submit additional manufacturer's information, such as specific testing procedures used, testing conditions, and other details of the tests.

1.6 **BASIS FOR ACCEPTANCE**

- 1.6.1 The basis for inspection/acceptance is compliance with the requirements set forth in the Subcontract and terms and conditions of the Subcontract. LLNS will reject non-conforming products or services. Correct deficiencies within 14 calendar days of the rejection notice in accordance with the applicable clauses. If the Subcontractor cannot correct deficiencies within 14 calendar days, immediately notify the STR of the reason for the delay and provide a proposed corrective action plan within the 14 calendar days.

1.7 **TESTING AND INSPECTION**

- 1.7.1 Testing and inspection activities are required to verify compliance with requirements specified or indicated. These services do not relieve Subcontractor of responsibility for compliance with the Subcontract document requirements.
- (a) Specific QA and QC requirements for individual work results are specified in their respective specification sections. Requirements in individual sections may also cover production of standard products.

- (b) Specified tests, inspections, and related actions do not limit Subcontractor's other quality - assurance and quality- control procedures that facilitate compliance with the Subcontract document requirements.
- (c) Requirements for Subcontractor to provide quality assurance and quality control activities required by LLNS, the Government, or authorities having jurisdiction are not limited by provisions of this section.
- (d) Specific test and inspection requirements are specified in technical specification sections.

1.8 QUALITY ASSURANCE

1.8.1 Subcontractor Responsibilities

- (a) General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual specification sections specify additional requirements.
- (b) Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- (c) Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- (d) Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this project, whose work has resulted in construction with a record of successful in-service performance.
- (e) Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of California and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this project.

1.8.2 Subcontractor's Quality Plan

- (a) See the Project Requirements Document and Administrative Requirements section for quality manager requirements.
- (b) Prior to start of construction, prepare and submit a project-specific quality plan for LLNS review and acceptance. Describe Subcontractor's quality assurance and quality control activities and include the following:
 - (1) Identify key QA/QC personnel in an organization chart.
 - (2) Identify personnel responsible for quality.
 - (3) Include a chart showing lines of authority, qualifications (in resume form), duties, and responsibilities of each person assigned to the QA/QC function.
 - (4) Identify material sources that require source inspection per Subcontract documents.
 - (5) Describe materials management and control at the source and in the field.

- (6) Describe materials and equipment receipt inspections.
- (7) Describe the coordination procedures for inspection and testing.
- (8) Describe the submittal process for product submittals and material certifications as per Subcontract documents and complying with the submittal section 01 33 00 - Submittal Procedures.
- (9) Describe quality control of installation activities and process control.
- (10) Describe control of testing and measuring equipment.
- (11) Provide the method for preventing and identifying suspect/counterfeit items.
- (12) Provide the method for identifying, tracking, and resolving non-conforming items.

1.9 QUALITY CONTROL

- 1.9.1 LLNS Responsibilities: Where quality control services are indicated as LLNS responsibility, LLNS will engage a qualified testing agency to perform these services.
- (a) LLNS will furnish Subcontractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
- 1.9.2 Subcontractor Responsibilities: Tests and inspections not explicitly assigned to LLNS are Subcontractor's responsibility. Perform additional quality control activities, whether specified or not, to verify and document that the work complies with requirements.
- (a) Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Subcontractor by authorities having jurisdiction, whether specified or not.
 - (b) Engage a qualified testing agency to perform quality control services as indicated in the Project Requirements Document and other specification sections. Do not employ same entity engaged by LLNS, unless agreed to in writing by LLNS.
 - (c) Notify testing agencies and STR at least 72 hours in advance of time when work that requires testing or inspection will be performed.
 - (d) Where quality-control services are indicated as Subcontractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
 - (e) Testing and inspection requested by Subcontractor and not required by the Subcontract documents are Subcontractor's responsibility.
- 1.9.3 Retesting/Re-inspecting: Regardless of whether original tests or inspections were Subcontractor's responsibility, provide quality control services, including retesting and re-inspecting, for construction that replaced work that failed to comply with the Subcontract documents.
- 1.9.4 Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1.9.5 For design-build projects, the engineer-of-record for each discipline and the architect-of-record must routinely visit the construction site to observe the progress and construction of the project to ensure quality and adherence to the subcontract documents. See the Project Requirements Document for the frequency of visits.

1.10 MATERIAL INSPECTION

1.10.1 LLNS prohibits suspect and counterfeit materials under the general provisions clause entitled "Quality of Materials and Supplies." LLNS may conduct periodic inspections of Subcontractor materials for compliance.

1.10.2 Subcontractor Examination

- (a) Promptly examine shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- (b) Receive LLNS-furnished equipment/materials shipped to the jobsite and examine them in accordance with the above requirements.

1.11 MOCK-UPS

1.11.1 When required by individual technical specifications section, erect a complete, full-scale mock-up of assembly at the project site.

1.11.2 LLNS or the designated testing laboratory will perform tests specified in the Project Requirements Document and in accordance with this section. The accepted mock-up becomes the comparison standard for the remaining work.

1.11.3 Remove mock-up and clear area at completion, when approved by LLNS.

1.12 MANUFACTURERS' FIELD SERVICES

1.12.1 When specified in the Project Requirements Document and other specification sections, require that the supplier/manufacturer provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, test, adjust, and balance of equipment as applicable, and to make appropriate recommendations.

1.12.2 Submit the representative's written report, which lists observations and recommendations, to LLNS.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

3.1.1 Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

- (a) Date test or inspection was conducted.
- (b) Description of the Work tested or inspected.
- (c) Date test or inspection results were transmitted to Architect.
- (d) Identification of testing agency or special inspector conducting test or inspection.

3.1.2 Maintain log at project site. Post changes and revisions as they occur. Provide access to test and inspection log for LLNS reference during normal working hours.

3.1.3 Submit log at project close-out as part of project record documents

3.2 REPAIR AND PROTECTION

- 3.2.1 General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
- (a) Provide materials and comply with installation requirements specified in other specification sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Subcontract document requirements for cutting and patching.
- 3.2.2 Protect construction exposed by or for quality-control service activities.
- 3.2.3 Repair and protection are Subcontractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 41 00 REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 GENERAL

- 1.1.1 Perform work in accordance with the version of the codes and standards in effect at time of Subcontract execution unless otherwise noted. The codes and standards listed in the individual specification sections, or as shown on the Subcontract drawings, are the minimum requirements.
- 1.1.2 Meet or exceed codes and standards when required by these Subcontract Documents.
- 1.1.3 When required by these specifications, comply with the codes and standards promulgated by the agencies and organizations in this section, those identified in divisions 02 through 40, and those identified in the Project Requirements Document. Bring conflicts between codes, standards, specifications, drawings, and the referenced documents to the attention of LLNS, in writing, for resolution before taking related action.
- 1.1.4 Prepare design in accordance with the codes and standards in this section.
- 1.1.5 Refer to individual sections of this specification and the Subcontract drawings for other names and abbreviations of trade associations and standards applicable to specific portions of the work. Other codes or standards may be cited elsewhere in the construction specifications and drawings and apply as if repeated here.

1.2 QUALITY ASSURANCE

- 1.2.1 Compliance with Applicable Codes and Standards: In procuring items used in this work, verify the detailed requirements of the specifically named codes and standards and verify that the items procured for use in this work meet or exceed the specified requirements.

1.3 CODES AND STANDARDS

- 1.3.1 10 CFR 433 - Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi-Family High-Rise Residential Buildings; 2022.
- 1.3.2 10 CFR 850 - Chronic Beryllium Disease Prevention Program; 2022.
- 1.3.3 29 CFR 1904 - Recording and Reporting Occupational Injuries and Illnesses; 2022.
- 1.3.4 29 CFR 1926 - Safety and Health Regulations for Construction; current edition.
- 1.3.5 41 CFR 102-74.155-200 - Facility Management: Energy Conservation; 2022.
- 1.3.6 ANSI A10 - Construction and Demolition Standards; current edition.
- 1.3.7 ANSI Z49.1 - Safety In Welding, Cutting, And Allied Processes; 2012.
- 1.3.8 ANSI/ASME B30.17 - Overhead And Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist); 2006.
- 1.3.9 ANSI/ASSE Z88.2 - Practices for Respiratory Protection; 2015.
- 1.3.10 ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

- 1.3.11 ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- 1.3.12 CAL TITLE 24 P2 - California Code of Regulations, Title 24, Part 2 (California Building Code); 2022.
- 1.3.13 CAL TITLE 24 P3 - California Code of Regulations, Title 24, Part 3 (California Electrical Code); 2022.
- 1.3.14 CAL TITLE 24 P4 - California Code of Regulations, Title 24, Part 4 (California Mechanical Code); 2022.
- 1.3.15 CAL TITLE 24 P5 - California Code of Regulations, Title 24, Part 5 (California Plumbing Code); 2022.
- 1.3.16 CAL TITLE 24 P6 - California Code of Regulations, Title 24, Part 6 (California Energy Code); 2016.
- 1.3.17 CAL TITLE 24 P9 - California Code of Regulations, Title 24, Part 9 (California Fire Code); 2022.
- 1.3.18 Caltrans MUTCD - Caltrans Manual on Uniform Traffic Control Devices; 2014.
- 1.3.19 NFPA 1 - Fire Code; 2018.
- 1.3.20 NFPA 10 - Standard for Portable Fire Extinguishers; 2017, with Errata (2018).
- 1.3.21 NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- 1.3.22 NFPA 30 - Flammable and Combustible Liquids Code; 2018.
- 1.3.23 NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- 1.3.24 NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.
- 1.3.25 NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.
- 1.3.26 NFPA 75 - Standard for the Fire Protection of Information Technology Equipment; 2017.
- 1.3.27 NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- 1.3.28 NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- 1.3.29 NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- 1.3.30 NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2019.
- 1.3.31 NFPA 2001 - Standard on Clean Agent Fire Extinguishing Systems; 2022, with Errata.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 41 00

SECTION 01 41 26 PERMIT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 On-site permitting and authorizations
- 1.1.2 Off-site special permitting
- 1.1.3 Off-site agency notifications

1.2 REFERENCES

- 1.2.1 BAAQMD regulation 11, rule 2 - Bay Area Air Quality Management District (BAAQMD), Regulation 11 - Hazardous Pollutants, Rule 2 - Asbestos Demolition, Renovation, and Manufacturing; current edition.
- 1.2.2 California Labor Code, section 7301.1 - California Labor Code, chapter 2 - Elevators, Escalators, Platform and Stairway Chair Lifts, Dumbwaiters, Moving Walks, Automated People Movers, and Other Conveyances, section 7301.1; current edition.
- 1.2.3 SJVUAPCD, regulation IV, rule 4002 - San Joaquin Valley Air Pollution Control District (SJVUAPCD), Regulation IV - Prohibitions, Rule 4002 - National Emission Standards for Hazardous Air Pollutants; current edition.

1.3 ON-SITE PERMITTING AND AUTHORIZATIONS

- 1.3.1 General: LLNS requires several permits for work at LLNL and site 300, and special permits for work in certain facilities or directorates. LLNS will obtain these permits and authorizations on behalf of the Subcontractor. Schedule the work to allow time for LLNS to obtain these permits and comply with the permit requirements. Refer to the schedule at the end of this section for a general listing of permits issued on site. The LLNS subcontract technical representative (STR) will coordinate this activity.
- 1.3.2 NIF Directorate Work Permits: The LLNL NIF Principal Directorate requires work permits for work within building 581. Coordinate these permits through the STR prior to the daily work team meeting and start of work.
- 1.3.3 Specific Hazard Permits: LLNS may require specific hazard permits.
- 1.3.4 Modifications or Connections to Existing Utilities: If modifications or connections to the existing utilities (e.g., electric power, water, gas, communications, and air) require an interruption of services, give the STR written notice 14 calendar days prior to the desired modification or connection, or as defined in the specifications. The STR will obtain a utilities outage permit.

1.4 OFF-SITE SPECIAL PERMITTING

- 1.4.1 Although LLNS is generally not required to secure permits from local jurisdictions for work on site, certain types of work may entail obtaining permits from off-site agencies. Examples include elevator construction, soil remediation due to contamination, closing existing underground water tanks, and other environmentally regulated activities. In such instances, LLNS may be required to obtain the permit, but the Subcontractor may also be required to prepare documentation for the permit. Other permits require the Subcontractor to obtain the permit. In both cases, comply with regulations regarding the work under the issued permit. Refer to the following paragraphs and the Project Requirements Document, as applicable, for a listing of such special requirements.
- 1.4.2 When constructing an elevator, lift, or hoist, obtain necessary permits from the State of California in accordance with California Labor Code, section 7301.1. The Subcontractor is solely responsible for obtaining these permits and bears the consequences of delays associated with the issuance of permits.

1.5 OFF-SITE AGENCY NOTIFICATIONS

- 1.5.1 When the Subcontractor is conducting certain activities on site, notify off-site agencies having jurisdiction over this work. Two examples of such an activity are demolition and asbestos abatement work, which require at least 10 days prior notification to the local air resource board (BAAQMD regulation 11, rule 2 or SJVUAPCD, regulation IV, rule 4002). Before beginning work that requires off site agency notification, submit proof to LLNS that the agency has received such notification.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 ON-SITE PERMITTING

Type	Description	Section	Advance Notification
Soil and Excavation	Soil disturbance	01 35 23	14 days
Concrete Penetrations	Saw cutting, coring, drilling, demolition, anchoring	01 35 23	14 days
Hot Work	Thermal heat and spark producing activities	01 35 23	24 hours
Utility Outages	Fire sprinkler system, mechanical systems or equipment, low-voltage systems or equipment		14 days
LLNL Building Department	Permit to execute construction		21 days
NIF & PS, or Superblock Work Permit	Work within the NIF & PS directorate		14 days
NIF & PS, or Superblock Hoisting Permit	Work within the NIF & PS directorate		14 days
Roof Access		01 35 23	14 days
Building/Equipment Drain Outage	Installing, removing, or modifying structure system or component		14 days

Type	Description	Section	Advance Notification
	drainage system		
Computation VESDA	Fire systems shutdown for under-floor or above-ceiling access in data centers		14 days

END OF SECTION 01 41 26

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SECTION 01 42 16 DEFINITIONS

PART 1 GENERAL

1.1 SUMMARY

- 1.1.1 This section supplements the definitions in the Subcontract and General Provisions. In the event of conflicts between the definitions in this section and those defined in the Subcontract or General Provisions, the Subcontract and General Provisions prevail.
- 1.1.2 Other definitions are included in individual specification sections.
- 1.1.3 Unless otherwise specifically defined, interpret terms that have well-known technical or trade meanings in accordance with their well-known meanings.

1.2 DEFINITIONS

- 1.2.1 **and/or**: If used, this means that either or both of the items so joined are required.
- 1.2.2 **applicable**: As appropriate for the particular condition, circumstance, or situation.
- 1.2.3 **equal** or **equivalent**: As determined by the STR as being equivalent considering such attributes as durability, finish, function, suitability, quality, utility, performance, capacity, physical size and weight, and aesthetic features.
- 1.2.4 **beneficial occupancy**: A stage in the work when LLNS reserves the right, at its option and convenience, to occupy or otherwise use all or any part of the work prior to final completion.
- 1.2.5 **defective work**: Work, in whole or in part, that does not conform to the requirements of the Subcontract Documents.
- 1.2.6 **final acceptance**: Acceptance of the work as completed (no outstanding items remaining), including deficiencies known to exist.
- 1.2.7 **final completion**: The date on which the Subcontractor's obligations under this Subcontract are complete and accepted by LLNS and final payment becomes due and payable.
- 1.2.8 **furnish**: To supply, deliver to the site, unload, and inspect for damage. Ready for installation and in usable or operable condition.
- 1.2.9 **indicated**: Refers to graphic representations, notes, or schedules on the drawings, or other paragraphs or schedules in the specifications, and similar requirements in the subcontract documents.
- 1.2.10 **install**: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and similar actions as necessary to incorporate products complete in place and make ready for use. Includes furnishing of necessary labor, materials, tools, equipment, and transportation. Includes testing and inspection necessary for proper installation, application, erection, and similar actions, and for verification of the quality of the work, as provided in the Subcontract Documents.
- 1.2.11 **must**: Denotes the imperative (48 CFR 2.101) (i.e., a command, an obligation, or a requirement).

- 1.2.12 **product:** Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- 1.2.13 **project:** The building, facility, or other improvements for which the Subcontractor is to perform Work under this Subcontract. It may also include construction by LLNS or others.
- 1.2.14 **provide:** To furnish and install complete and ready for intended use.
- 1.2.15 **regulation:** Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of work.
- 1.2.16 **required:** Necessary for performance of the work in conformance with the requirements of the Subcontract Documents, excluding matters regarding the means, methods, techniques, sequences, and procedures of construction, such as:
- (a) Regulatory requirements of authorities having jurisdiction
 - (b) Requirements of referenced standards
 - (c) Requirements generally recognized as accepted construction practices
 - (d) Notes, schedules, and graphic representations on the drawings
 - (e) Requirements specified or referenced in the specifications
 - (f) Duties and responsibilities stated in the bidding and contract requirements
- 1.2.17 **shall:** (see "must"). Denotes the imperative (48 CFR 2.101).
- 1.2.18 **site:** Same as project site; the area or areas or spaces occupied by the project and including adjacent areas and other related areas occupied or used by the Subcontractor for construction activities, either exclusively or with others performing other construction on the project. The extent of the site is shown on the Drawings.
- 1.2.19 **Subcontract Documents:** The Subcontract Documents consist of (a) the Subcontract Agreement; (b) documents listed in the article 1 of the Subcontract Agreement as incorporated documents; (c) drawings, specifications, addenda issued and acknowledge before execution of the Subcontract Agreement; (d) change orders, interim directives, and amendments issued in accordance with the Subcontract Agreement; and (e) other documents defined as "Subcontract Documents" elsewhere in the Subcontract Documents.
- 1.2.20 **substantial completion:** Work and related Subcontract obligations are complete in accordance with the Subcontract Documents such that LLNS may enjoy the intended access, occupancy, possession, and use of the entire work without impairment due to incomplete or deficient work, and without interference from the Subcontractor's completion of remaining work or correction of deficiencies in completed work. Under no circumstances is the work "substantially complete" if fire and life safety systems are not tested and accepted by the authority having jurisdiction.

- 1.2.21 **Subcontract Technical Representative (STR)**: A LLNS employee responsible for the contract-related elements of a subcontracted work activity, such as coordinating submittals and communication with the Subcontractor, assuring inspection/acceptance of services or products, and close-out of the Subcontract. The STR is a LLNS technical representative and will represent LLNS in matters relating to the technical performance of the work.
- 1.2.22 **supplier**: Person or entity retained by the Subcontractor to provide material, products, or equipment for the Work.
- 1.2.23 **supply**: Same as furnish.
- 1.2.24 **will**: Used about acts and actions required of LLNS.
- 1.2.25 **work**: See 48 CFR 2.101.

1.3 REFERENCES

- 1.3.1 48 CFR 2.101 - Federal Acquisition Regulations (FAR), Part 2 - Definitions of Words and Terms, Subpart 2.1 - Definitions, section 2.101 - Definitions.; current edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 42 16

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SECTION 01 45 23 TESTING AND LABORATORY SERVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Subcontractor-provided independent testing laboratory services
- 1.1.2 LLNS-provided independent testing laboratory services

1.2 REFERENCES

- 1.2.1 ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012 (Reapproved 2021).
- 1.2.2 ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).
- 1.2.3 ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)); 2012 (Reapproved 2021).
- 1.2.4 ASTM D2829/D2829M - Standard Practice for Sampling and Analysis of Existing Built-Up Roof Systems; 2019.
- 1.2.5 ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.
- 1.2.6 ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.

1.3 SUBCONTRACTOR PERFORMANCE REQUIREMENTS

- 1.3.1 Employ and pay for independent testing laboratory services to perform specified inspection and testing. Required tests include those indicated as the Subcontractor's responsibility in article SCHEDULE OF SUBCONTRACTOR'S INSPECTIONS AND TESTS and the Project Requirements Document.
- 1.3.2 Employing testing laboratories does not relieve the Subcontractor of obligation to perform work in accordance with requirements of Subcontract documents.
- 1.3.3 Submittals
 - (a) Prior to start of work requiring Subcontractor-provided testing services, submit testing laboratory name, address, and telephone number, and names of full-time registered engineer and responsible officer.
 - (b) Submit one copy of the most recent [National Institute of Standards and Technology](#)(NIST) materials reference laboratory report for the inspection of the testing facility. Ensure that the facility does not have outstanding NIST deficiencies.
- 1.3.4 Quality Assurance
 - (a) Ensure that the testing laboratory subcontract provides for a full-time registered engineer on staff. The sole purpose of the registered engineer is to review the services provided under the Subcontract for compliance with the various provisions of Subcontract and applicable statutory requirements.

- (b) Only testing laboratories authorized to operate in the State of California are acceptable to LLNS.
 - (c) Ensure that testing equipment is calibrated at reasonable intervals using devices with accuracy traceable to either NIST standards or accepted values of natural physical constants.
- 1.3.5 Testing Laboratory Responsibilities: Ensure that the testing laboratory is responsible for the following:
- (a) Test samples of mixes submitted by the Subcontractor, and testing samples in accordance with the specified standards.
 - (b) Provide qualified personnel at LLNL after due notice from the Subcontractor.
 - (c) Perform specified inspection, sampling, and testing of products in accordance with specified standards.
 - (d) Ascertain material and mix compliance with requirements of subcontract documents
 - (e) Promptly notify LLNS and the Subcontractor of observed irregularities or nonconformance of work or products.
 - (f) Perform additional inspections and tests required by LLNS.
 - (g) Attend preconstruction and progress meetings.
- 1.3.6 Testing Laboratory Reports: After each inspection and test, promptly submit electronic copies of laboratory test reports to LLNS. At a minimum, include the following in the report: issue date, project title, project file number (PFN, obtained from LLNS) and subcontract number, inspector name, sampling or inspection date and time, product identification, specification section, location in the project, inspection or test type, test date, test results, and conformance statement. When requested by LLNS, provide interpretation of test results.
- 1.3.7 Limits on Testing Laboratory Authority: The testing laboratory is not empowered to do any of the following:
- (a) Release, revoke, alter, or increase requirements of subcontract documents.
 - (b) Approve or accept a portion of the work.
 - (c) Stop a portion of the work.
- 1.3.8 Subcontractor Responsibilities: Notify LLNS and testing laboratory at least 72 hours prior to performing work that requires inspection and testing services.

1.4 LLNS-PROVIDED LABORATORY SERVICES

- 1.4.1 LLNS will employ and pay for an independent testing laboratory to perform inspections, tests, and other services as indicated in the Project Requirements Document and division 02 through division 49 specification sections.
- 1.4.2 Testing Laboratory Responsibilities
- (a) Perform services in accordance with requirements of governing authorities, with the requirements of ASTM D2829/D2829M, or ASTM D3740, or ASTM E329, and applicable standards of NIST (depending upon project requirements).
 - (b) Perform tests and analysis of fill material in accordance with either ASTM D698 or ASTM D1557, depending upon project requirements.

- (c) Perform compaction testing in accordance with ASTM D1556/D1556M or ASTM D1557, depending upon fill material used and project requirements.
- (d) After each inspection and test, submit the electronic test report to LLNS and to the Subcontractor. At a minimum, test reports are required to include the following: issue date, project title, project file number (PFN), subcontract number, inspector's name, sampling or inspection date and time, product identification, specifications section, location in the project, inspection or test type, test date, test results, and conformance statement. When requested by LLNS, provide interpretation of test results.

1.4.3 Subcontractor Responsibilities

- (a) Cooperate with testing laboratory personnel, provide access to work, furnish tools, material samples, design mix, equipment, storage, and assistance as requested by LLNS or testing laboratory personnel.
- (b) Deliver adequate samples of proposed materials that require testing and proposed mix designs, to the testing laboratory at the designated location.
- (c) Notify LLNS at least 48 hours prior to performing work that requires testing services.
- (d) If tests indicate that the work does not meet specified requirements, remove and replace the work at no additional cost to LLNS. Or submit the proposed repair extent, products and procedures for LLNS acceptance. A delay in schedule caused by repairs or replacement work is at the Subcontractor's expense. The Subcontractor is responsible for hiring an engineer when structural repairs need to be validated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SCHEDULE OF SUBCONTRACTOR'S INSPECTIONS AND TESTS

- 3.1.1 Provide a complete schedule of inspections and tests for review and acceptance by LLNS.
- 3.1.2 Obtain written approval from LLNS prior to proceeding with inspections and tests.

END OF SECTION 01 45 23

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SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS, AND SITE CLEAN-UP

PART 1 GENERAL**1.1 SECTION INCLUDES**

- 1.1.1 Temporary electricity, telephone, and water service
- 1.1.2 General sanitation
- 1.1.3 Barriers
- 1.1.4 Project site access controls
- 1.1.5 Traffic control
- 1.1.6 Protection of installed work, existing structures, and trees
- 1.1.7 Progress cleaning and waste removal
- 1.1.8 Field offices, sheds, and break areas
- 1.1.9 Repair and remove of temporary utilities, facilities, and controls

1.2 RELATED REQUIREMENTS

- 1.2.1 Section 01 70 00 - Execution and Close-Out Procedures for final cleaning procedures

1.3 REFERENCES

- 1.3.1 29 CFR 1926.51 - Sanitation; 2022.
- 1.3.2 Caltrans MUTCD - Caltrans Manual on Uniform Traffic Control Devices; 2014.

1.4 TEMPORARY ELECTRICITY

- 1.4.1 Service: See the Project Requirements Document.
- 1.4.2 Conditions
 - (a) LLNS does not guarantee power capacity available nor is LLNS responsible for service interruptions.
 - (b) Provide and maintain the electrical power distribution system downstream of LLNS-furnished electrical service.

1.5 TEMPORARY TELEPHONE SERVICE

- 1.5.1 A restricted-use LLNL telephone at site 300 in building 889 is available for AT&T operator-assisted and calling card calls.

1.6 TEMPORARY WATER SERVICE

- 1.6.1 Temporary water is available on a limited basis to the Subcontractor. Potable water is the responsibility of the Subcontractor.

1.7 GENERAL SANITATION

- 1.7.1 Ensure the construction work area conforms to the requirements of 29 CFR 1926.51.

1.8 BARRIERS

- 1.8.1 Always place barricading and signage to encompass the entire potentially affected area of the hazard or entirety of the project. Accompany barricades with appropriate signs and place on access points.
- 1.8.2 Use hard/rigid type barriers capable of standing up to inclement weather conditions. Hard barrier control options include, but are not limited to, high visibility crowd control barricades or high visibility jersey type barricades for pedestrian detours.
- 1.8.3 Protect public traffic and employees; provide safe and accessible walkways around obstructions; and maintain on or near the construction, sufficient light to protect personnel from injury. Provide electrically operated warning lights on barricades during hours of darkness. Do not use open flame lights.
- 1.8.4 Provide protective closure facilities, such as roofing, canopies, and seals at existing buildings where making connections or modifications to prevent the entry of rain and other weather elements so that equipment, facilities and structure are protected and retained in operating condition.

1.9 PROJECT SITE ACCESS CONTROLS

- 1.9.1 Establish clear limits of construction area and entry control. Provide entry-control sign-in boards, properly delineated boundaries, list of facility points of contact (FPOCs), access requirements, and the like.

1.10 TRAFFIC CONTROL

- 1.10.1 Notify the STR at least 72 hours prior to expected delivery of large shipments at the jobsite.
- 1.10.2 Provide full-time flagman whenever heavy equipment or trucks are crossing or entering onto LLNL or site 300 roads, parking lots, or pathways.
- 1.10.3 Develop and submit pedestrian, bicycle, and vehicular traffic control plans for approval where work affects laboratory roadway and pathway network. Clearly show location of signs, barricades, flagman and other temporary devices. Account for all phases of construction. Plans must conform with the latest edition of the Caltrans MUTCD.

1.11 PROTECTION OF INSTALLED WORK

- 1.11.1 Protect installed work and provide special protection where specified in individual specification sections or in the Project Requirements Document.
- 1.11.2 Provide temporary and removable protection for installed products, structures, and equipment.

1.12 PROTECTION OF EXISTING STRUCTURES, EQUIPMENT, AND TREES

- 1.12.1 Protect existing structures, equipment, trees, and shrubbery to remain against damage.
- 1.12.2 Provide for temporary watering of existing trees and ground cover where existing irrigation is disrupted by construction. Replace damaged or removed irrigation.
- 1.12.3 Provide tree protection when working adjacent to trees that are not approved for removal.

- 1.12.4 Do not overload load-bearing structural elements, including utility vaults and roofs. Verify adequacy of structural elements to support temporary loads including personnel or equipment used to place loads. Provide written verification from a California licensed civil or structural engineer (not a LLNS engineer) to the STR, that structural elements are adequate to support temporary loads that Subcontractor places on roofs, structures, utility vaults, and other load-bearing elements.
- 1.12.5 Protect utility vaults and equipment in or near parking areas and roadways from vehicle and construction equipment damage. Examples include vehicle barriers to prevent construction vehicles from crossing below-grade utility vaults, using traffic-rated steel plates if vehicle traffic is unavoidable, and using vehicle barriers to protect above-grade equipment.
- 1.12.6 Ensure that lifting operations will not cause collateral damage to structures, the environment, and the item being lifted.
- 1.12.7 See the General Provisions, clause 5, "Permits, Responsibilities, and Assumption of Risk" in the Subcontract documents for requirements if trees, structures, shrubs or other elements are damaged.

1.13 PROGRESS CLEANING AND WASTE REMOVAL

- 1.13.1 Keep the construction area clean and remove accumulated debris, waste materials, and rubbish each day in accordance with the solid waste management plan (section 01 35 43 - Environmental Protection). Assign required labor to perform clean-up and provide dumpsters for rubbish, debris, and nonhazardous waste materials. If, in the opinion of LLNS, the jobsite is not adequately clean and orderly, and presents a potential safety or fire hazard, LLNS will direct the Subcontractor to immediately stop work in the affected area, correct the defects, and perform necessary clean-up. Refer to section 01 70 00 - Execution and Close-Out Procedures for final cleaning.

1.14 FIELD OFFICES, SHEDS, AND BREAK AREAS

- 1.14.1 Provide temporary storage, office space, and break areas at the site for the safe and proper storage of tools, materials, and Subcontractor employee use. Locate these temporary facilities where directed by the STR. Remove them when work is complete. Provide and maintain trash receptacles with covers.

1.15 REPAIR AND REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

- 1.15.1 Remove temporary utilities, equipment, facilities, and materials; restore utilities to their initial condition prior to final inspection and as directed by the STR.
- 1.15.2 Remove temporary underground installations to the minimum depth required or as indicated on the subcontract documents. Grade site as indicated or restore to original condition.
- 1.15.3 Clean and repair or replace damage caused by work or use of temporary work at no additional cost to LLNS.
- 1.15.4 Replace each tree removed or damaged with a boxed specimen, 6-inch minimum trunk diameter, of like kind at locations directed by LLNS, unless otherwise instructed by LLNS, at no additional cost to LLNS.
- 1.15.5 Restore existing and permanent facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION 01 50 00

SECTION 01 66 00 PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 GENERAL

1.1 TRANSPORTATION AND HANDLING

1.1.1 Transport and handle products in accordance with manufacturer's written instructions.

1.2 STORAGE AND PROTECTION

1.2.1 Except as directed by the STR, store and protect products in accordance with manufacturers' written instructions. LLNS is not responsible for storage.

1.2.2 Exterior Storage

(a) If exterior storage of materials is available and acceptable to LLNS, then comply with the following:

(1) Arrange storage of products in accordance with section 01 35 43 - Environmental Protection to permit access for inspection.

(2) Ensure products are undamaged and are maintained in acceptable condition.

(3) Store material to prevent contamination of storm water runoff.

(b) When the Project Requirements Document indicates exterior storage of materials is unavailable, or unfavorable to the materials, provide bonded off-site storage and protection for materials.

1.2.3 Maintain finished surfaces clean, unmarred, and protected until accepted by the construction manager.

1.3 REPAIRS AND REPLACEMENTS

1.3.1 In event of damage to materials, equipment, facilities, or property, replace or repair as directed by the STR. Remove damaged materials from LLNL.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 66 00

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SECTION 01 70 00 EXECUTION AND CLOSE-OUT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Substantial completion procedures.
- 1.1.2 Final completion procedures.
- 1.1.3 General requirements for manuals.
- 1.1.4 Warranties.
- 1.1.5 Progress cleaning, final cleaning, and cleaning agents.
- 1.1.6 Protection of installed work.
- 1.1.7 System start-up.
- 1.1.8 Adjusting.
- 1.1.9 Repair of the work.
- 1.1.10 Demonstration.

1.2 RELATED REQUIREMENTS

- 1.2.1 Section 01 33 00 - Submittal Procedures.
- 1.2.2 Section 01 78 39 - Project Record Documents.
- 1.2.3 Section 01 91 13 - General Commissioning Requirements.

1.3 DEFINITIONS

- 1.3.1 **fly sheet.** a sheet of a folder, booklet, or catalog giving directions for the use of or information about the material that follows

1.4 REFERENCES

- 1.4.1 29 CFR 1910.147 - The control of hazardous energy (lockout/tagout); current edition.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- 1.5.1 Provide written notice to the STR that work is substantially complete in accordance with subcontract documents.
- 1.5.2 Subcontractor's Closeout Meeting: At least 60 days prior to the scheduled beneficial occupancy date (BOD) or at 80 percent construction completion, schedule and meet with LLNS to identify actions necessary for completing the work (punch list) and have a plan for accomplishing these actions in a timely matter.
 - (a) The agenda should include, but not be limited to the following:
 - (1) Status of progress vs. schedule of project.
 - (2) Submittals as detailed in this section, Section 01 78 39 - Project Record Documents, and the Project Requirements Document.
 - (3) Warranty information.
 - (4) Commissioning.

- (5) Correction of deficiencies.
- (6) Beneficial occupancy requirements.
- (7) Training for LLNS personnel.

1.5.3 Submittals Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of substantial completion. List items below that are incomplete at time of request.

- (a) Submit closeout submittals specified in other division 01 sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
- (b) Submit closeout submittals specified in individual sections, including specific warranties, workmanship bonds, final certifications, and similar documents.
- (c) Submit maintenance material submittals specified in individual sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by the STR. Label with manufacturer's name and model number. Obtain receipt prior to final payment.
- (d) Submit testing, adjusting, and balancing records.
- (e) Submit changeover information related to LLNS occupancy, use, operation, and maintenance.

1.5.4 Procedures Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of substantial completion. List items below that are incomplete at time of request.

- (a) Make final changeover of permanent locks and deliver keys to LLNS.
- (b) Complete startup and testing of systems and equipment.
- (c) Perform preventive maintenance on equipment used prior to substantial completion.
- (d) Instruct LLNS personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- (e) Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.
- (f) Complete final cleaning requirements.
- (g) Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

1.6 FINAL COMPLETION PROCEDURES

1.6.1 Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

- (a) Submit final application for payment identifying total adjusted subcontract sum, previous payments, and sum remaining due.
- (b) Submit certified copy of substantial completion inspection list of items that needed to be completed or corrected (punch list), endorsed and dated by LLNS. Certified copy of the list must state that each item has been completed or otherwise resolved for final acceptance.
- (c) Re-submit record drawings prior to the request for final inspection and payment if changes were made after submittals for substantial completion.

- 1.6.2 Provide written notice to the STR that work is complete in accordance with subcontract documents and is ready for final inspection and acceptance. LLNS will verify the Subcontractor has resolved punch list items and provided compliant and complete technical submittals to support final acceptance.

1.7 PROJECT RECORD DOCUMENTS

1.7.1 Final Submittal of Project Documents

- (a) Prior to final acceptance inspection, submit project record documents, as defined in section 01 78 39 - Project Record Documents, to LLNS. Include electronic set of drawings and specifications.
- (b) Submit drawings in an Autodesk supported version of AutoCAD as described in section 01 33 00 - Submittal Procedures.

1.8 GENERAL REQUIREMENTS FOR MANUALS

- 1.8.1 Have personnel experienced in maintenance and operation of described products compile operating and maintenance data in the form of manuals appropriate for care and maintenance of products provided under the subcontract and specific information requested in various technical sections of these specifications.

1.8.2 Submittal of Manuals:

- (a) Submit content outlines before start of work. LLNS will review and return one with comments.
- (b) Submit an electronic copy, via LLNS construction management software, of revised final volumes in final form.

1.8.3 Operation and Maintenance Data Manual Content:

- (a) "Part 1" - Directory, listing names, addresses, and telephone numbers of the Subcontractor, lower-tier subcontractors, and major equipment suppliers.
- (b) "Part 2" - Operation and maintenance instructions arranged by equipment and or system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
 - (1) Significant design criteria.
 - (2) Equipment list and description.
 - (3) Parts list for each component, including recommended spare parts.
 - (4) Operating instructions.
 - (5) Maintenance instructions for equipment and systems.
 - (6) For multiple-energy-source equipment, written lockout/tagout procedures prepared in accordance with 29 CFR 1910.147(c)(4).
- (c) "Part 3" - Project documents and certificates including the following:
 - (1) Shop drawings, product data, and calculations.
 - (2) Certificates.
 - (3) Warranties.
 - (4) Inspection reports.

1.8.4 Materials and Finishes Manual Content:

- (a) Building Products, Applied Materials, and Finishes: Include manufacturer and (name, address, and phone number) product data, with catalog number, size, composition, and color and texture designations. Provide information for reordering custom manufactured products.
- (b) Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- (c) Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- (d) Additional Requirements: As specified in individual specification sections.
- (e) Provide a table of contents line item for design data and tabbed fly-sheet.

1.9 WARRANTIES

1.9.1 Submit a warranty/master equipment list as shown in attachment 01 70 00-1 to the end of this section. LLNS will provide an electronic form upon request.

1.9.2 Form of Submittals

- (a) Bind submittals in 8 1/2 inch by 11-inch, three side-ring type "D" binders with durable plastic covers.
- (b) Cover: Identify each binder with typed or printed title WARRANTIES. Include the following: title of project; name, address, and telephone number of the Subcontractor and equipment supplier; and name of responsible company principal.
- (c) Table of Contents: Develop the table of contents, neatly typed, in the sequence of the project manual table of contents. Identify each item with the number and title of the applicable specification section and the name of product or work item.
- (d) Separate each warranty with index tab sheets keyed to the table of contents listing. Provide full information using separate typed sheets as necessary. List the Subcontractor, supplier, and manufacturer with name, address, and telephone number of responsible company principal.
- (e) Submit an electronic copy of the manual.

1.9.3 Preparation of Submittals

- (a) Obtain warranties, guarantees, executed by responsible Subcontractors, suppliers, and manufacturers after acceptance of the applicable item of work. Except for items put into use with LLNS' permission, leave date of beginning of time of warranty until the date of substantial completion is determined. Submit the executed original.
- (b) Provide a copy of each warranty/guarantee and service contract issued. Include an information sheet for LLNS personnel giving:
 - (1) Proper procedures in the event of failure.
 - (2) Required maintenance to maintain service contracts.
 - (3) Instances which might affect the validity of service contracts.

- (c) Verify that documents are in proper form, comply with subcontract documents, and contain full information.
- (d) Co-execute submittals when required.
- (e) Submit one original, signed copies, of each, and an electronic version.

1.9.4 Timing for Submittals

- (a) For equipment or equipment component parts put into service during construction with LLNS' permission, submit documents within 14 calendar days after LLNS acceptance of equipment.
- (b) For items of work for which acceptance is delayed beyond date of substantial completion, submit documents within 14 calendar days after acceptance. List the date of acceptance as the beginning of the warranty period.

1.9.5 Construction and Installation Workmanship Warranty

- (a) Provide warranty in accordance with the clause entitled, "Warranty of Construction" in the General Provisions. Unless otherwise stated, provide this warranty in addition to equipment, subsystem and component warranties or specific warranties stated elsewhere in the subcontract.

PART 2 PRODUCTS

2.1 CLEANING AGENTS

- 2.1.1 Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned.
- 2.1.2 Make maximum use of bio-based products (e.g., cleaning supplies, sealers, and coatings) that are United States Department of Agriculture (USDA)-designated items (www.biopreferred.gov) unless the product:
 - (a) cannot be acquired competitively without delaying the contract performance schedule;
 - (b) does meet Subcontract performance requirements; or
 - (c) cannot be procured at a reasonable price.
- 2.1.3 Use cleaning products that comply with either EPA's Safer Choice or Green Seal GS-37 standards. If Safer Choice or GS-37 products are not available, use products that comply with the California Air Resources Board Consumer Products Regulation (California Code of Regulations, Title 17, article 2, Sections 94507 to 94517).

PART 3 EXECUTION

3.1 PROGRESS CLEANING

- 3.1.1 Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- 3.1.2 Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- 3.1.3 Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- 3.1.4 Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.2 PROTECTION OF INSTALLED WORK

- 3.2.1 Protect installed work from damage by construction operations.
- 3.2.2 Provide special protection where specified in individual specification sections.
- 3.2.3 Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- 3.2.4 Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- 3.2.5 Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- 3.2.6 Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
- 3.2.7 Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- 3.2.8 Prohibit traffic from landscaped areas.
- 3.2.9 Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.3 SYSTEM START-UP

- 3.3.1 Coordinate with requirements of section 01 91 13 - General Commissioning Requirements (if applicable to the project).
- 3.3.2 Coordinate schedule for start-up of various equipment and systems.
- 3.3.3 Notify STR seven calendar days prior to start-up of each item.
- 3.3.4 Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- 3.3.5 Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- 3.3.6 Verify that wiring and support components for equipment are complete and tested.
- 3.3.7 Execute start-up under supervision of applicable Subcontractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- 3.3.8 When specified in individual specification sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- 3.3.9 Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.4 ADJUSTING

- 3.4.1 Adjust operating products and equipment to ensure smooth and unhindered operation.

3.5 FINAL CLEANING

- 3.5.1 Execute final cleaning prior to final LLNS' project assessment.
- 3.5.2 Comply with manufacturer recommended cleaning instructions.
- 3.5.3 Clean debris from drainage systems.

- 3.5.4 Employ professional building cleaners to thoroughly clean building.
- 3.5.5 Clean site: Complete the following cleaning operations, as applicable to the project, before requesting inspection for certification of substantial completion for entire project or for a designated portion of project:
- (a) Clean project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances. Wash down and scrub, areas affected by the scope of work, material laydown areas and temporary restroom facility areas, and paving soiled as a result of construction activities.
 - (b) Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - (c) Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - (d) Ensure areas including parking lots, lay down areas, grassy areas, and construction defined areas are free from nails, screws and other materials capable of puncturing or damaging items such as tires, shoes, and lawnmowers.
 - (e) Remove tools, construction equipment, machinery, and surplus material from project site.
 - (f) Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition. Clean exterior side of windows, storefronts, and curtain walls, including window framing.
 - (g) Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - (h) Sweep concrete floors broom clean in unoccupied spaces.
 - (i) Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - (j) Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - (k) Remove labels that are not permanent.
 - (l) Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - (m) Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - (n) Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- 3.5.6 Remove waste and surplus materials, rubbish, and construction facilities from the site following requirements in section 01 35 43 - Environmental Protection for further details.
- 3.5.7 Cleaning Inspection
- (a) Prior to acceptance by LLNS as substantially complete, jointly with STR, conduct an inspection of interior and exterior surfaces to verify that entire Work is cleaned to STR's satisfaction.

- (b) Should final cleaning be inadequate, as determined by the STR, and the Subcontractor fails to correct conditions, LLNS may engage cleaning service under separate contract and deduct cost from subcontract sum.

3.6 REPAIR OF THE WORK

- 3.6.1 Complete repair and restoration operations before requesting inspection for determination of substantial completion.
- 3.6.2 Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction to specified conditions and damaged permanent facilities used during construction to original condition.
 - (a) Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - (b) Touch-up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - (1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - (c) Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - (d) Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.7 DEMONSTRATION

- 3.7.1 Before final inspection, instruct LLNS's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems at agreed upon times. Base instruction duration as indicated in the individual specification sections or in the Project Requirements Document.
- 3.7.2 Use operation and maintenance manuals as the basis for instruction. Review contents of manual with personnel in detail to explain aspects of operation and maintenance.
- 3.7.3 Prepare and insert additional data in operation and maintenance manual when the need for such data becomes apparent during instruction.

ATTACHMENT 01 70 00-1

FORM BUS-496 WARRANTY MASTER EQUIPMENT LIST REPORT
"B311 Region ACHES-46 Project"

Item No.	Type	Equipment ID No.	State	Brand	Location	Area/Div	Client/Division	Fund Location	Manufacturer	Model No.	Serial Number	CFM	V.S.T. No. W.C.	Supply To EP	Value/HSN	Make/Model/Year	Costs/Total Inv. (USD) (B311-000110)	Relig/Inst	Non. Inst	Min. Life/Estimate	Life/Component (Years) (B311-000110)	Start of Warranty/Estimated (Date)	Warranty Period (Y/M/D)	Warranty Period (Y/M/D)	Warranty Period (Y/M/D)	State	Supplier/Contract Responsible for the Warranty	Specification Description/Notes	
1	Oil Filter	400000000	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	Subsea	
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END OF SECTION 01 70 00

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SECTION 01 78 39 PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Section includes administrative and procedural requirements for project record documents, including the following:
- (a) Record drawings (drawings showing the changes, also known as red-line).
 - (b) Record specifications (specifications showing the changes).
 - (c) Record product data.
 - (d) Miscellaneous record submittals.

1.2 RELATED REQUIREMENTS

- 1.2.1 Section 01 70 00 - Execution and Close-Out Procedures for general closeout procedures.
- 1.2.2 Section 01 33 00 - Submittal Procedures.

1.3 DEFINITIONS

- 1.3.1 **released for construction.** Design documents that are stamped and sealed by the designer-of-record, stamped as released for construction, and signed by LLNS for release.
- 1.3.2 **final drawings.** Drawings that represent existing conditions either before construction activities or after construction is complete and drawings are updated to the new existing conditions.
- 1.3.3 **record drawings.** Drawings that are red-lined and show field changes made during construction.

1.4 CLOSE-OUT SUBMITTALS

- 1.4.1 Record Drawings (including shop drawings): Comply with the following:
- (a) Ensure shop drawing numbers are those supplied by the STR.
 - (b) Number of Copies: Submit one set of marked-up record drawings as follows.
 - (1) Initial Submittal:
 - (A) Submit PDF electronic files of marked up drawings, PDF of scanned marked-up drawings, or hardcopy of marked-up drawings.
 - (B) LLNS will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - (2) Final Submittal:
 - (A) Submit set of marked-up record drawings, either PDF electronic files of scanned marked-up record drawings, or annotated digital files of drawings.
 - (B) Submit each drawing, whether or not changes and additional information were recorded.
- 1.4.2 Record Specifications: Submit electronic copies of annotated project specifications, including addenda and contract modifications, showing changes.

- 1.4.3 Record Product Data: Submit annotated electronic files of each submittal with changes made. Where record product data are required as part of operation and maintenance manuals, submit duplicate marked-up product data as a component of the manual.
- 1.4.4 Miscellaneous Record Submittals: See other specification sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated electronic files and directories of each submittal.
- 1.4.5 Reports: Submit electronic report weekly indicating items incorporated into project record documents concurrent with progress of the work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated. The submittal or the RFI log may be used for this reporting.

1.5 RECORD DRAWINGS

- 1.5.1 Record Drawings: Maintain throughout construction, at the site, one set of marked-up copies (paper or electronic) of the Subcontract drawings and shop drawings. Incorporate new and revised drawings within one week of modifications into the record drawings. Each change should reference the associated RFI or the engineering change notice, if applicable. Review these record drawings weekly with the STR.
- (a) Preparation: Mark record drawings to show the actual installation where installation varies from engineer-of-record issued drawings. Require individual or entity who obtained record data, whether individual or entity is installer, lower-tier subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record drawings.
- (1) Give attention to information on concealed elements that would be difficult to identify or measure and record later.
 - (2) Accurately record information in an acceptable drawing technique.
 - (3) Record data as soon as possible after obtaining it.
 - (4) Record and check the markup before enclosing concealed installations.
 - (5) Cross-reference record drawings to corresponding photographic (taken by LLNS) documentation.
- (b) Content: Types of items requiring marking include, but are not limited to, the following:
- (1) Dimensional changes to drawings.
 - (2) Revisions to details shown on drawings.
 - (3) Depths of foundations.
 - (4) Locations and depths of underground utilities.
 - (5) Locations and depths of existing underground utilities uncovered during excavation.
 - (6) Revisions to routing of piping and conduits.
 - (7) Revisions to electrical circuitry.
 - (8) Actual equipment locations.
 - (9) Duct size and routing.
 - (10) Locations of concealed internal utilities.

- (11) Changes made by change order or change directive.
- (12) Changes made following LLNS written orders.
- (13) Details not on the original drawings.
- (14) Field records for variable and concealed conditions.
- (15) Record information on the work that is shown only schematically.
- (c) Mark the drawings and shop drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record drawings.
- (d) Mark record sets with red color. Use other colors to distinguish between changes for different categories of the Work at same location.
- (e) Mark important additional information that was either shown schematically or omitted from original drawings.
- (f) Note construction change directive numbers, alternate numbers, change order numbers, and similar identification, where applicable.

1.6 RECORD SPECIFICATIONS

- 1.6.1 Preparation: Mark specifications to indicate the actual product installation where installation varies from that indicated in specifications, addenda, and Subcontract modifications.
- (a) Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - (b) Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - (c) Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - (d) Note related change order, record product data, and record drawings where applicable.
- 1.6.2 Format: Submit record Specifications as annotated PDF electronic file, or scanned PDF electronic file(s) of marked-up paper copy of Specifications

1.7 RECORD PRODUCT DATA

- 1.7.1 Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- 1.7.2 Preparation: Mark product data to indicate the actual product installation where installation varies substantially from that indicated in product data submittal.
- (a) Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - (b) Include significant changes in the product delivered to project site and changes in manufacturer's written instructions for installation.
 - (c) Note related change orders, record specifications, and record drawings where applicable.

1.7.3 Format: Submit record product data as annotated PDF electronic file, or scanned PDF electronic file(s) of marked-up paper copy of product data. Include record product data directory organized by specification section number and title, electronically linked to each item of record product data.

1.8 MISCELLANEOUS RECORD SUBMITTALS

1.8.1 Assemble miscellaneous records required by other specification sections for miscellaneous record keeping and submittal in connection with actual performance of the work. File miscellaneous records and identify each, ready for continued use and reference.

1.8.2 Format: Submit miscellaneous record submittals as PDF electronic file or scanned PDF electronic file(s) of marked-up miscellaneous record submittals. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

1.9 MAINTENANCE OF RECORD DOCUMENTS

1.9.1 Store record documents in the field office apart from the Subcontract documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss or maintain electronically. Provide access to project record documents for the STR's reference during normal working hours.

1.10 FINAL DOCUMENTS (APPLICABLE TO DESIGN-BUILD SUBCONTRACTS ONLY)

1.10.1 Final digital data files: Immediately before inspection for certificate of substantial completion, submit marked-up record drawings to the STR for approval per article Record Drawings in this section. When authorized, prepare a full set of corrected digital data files of the Subcontract drawings, as follows:

- (a) Comply with *LLNL Drafting Standards*, PMO.DT-ST-05.
- (b) Format: Same digital data software program, version, and operating system as the original Subcontract drawings.
- (c) Incorporate changes and additional information previously marked on record drawings. Delete, redraw, and add details and notations where applicable.
- (d) Refer instances of uncertainty to the STR for resolution.
- (e) Final digital data files: Organize digital data (CAD and Revit) information into separate electronic files that correspond to each sheet of the Subcontract drawings. Name each file with the sheet identification. Include identification in each digital data file in conformance with *LLNL Drafting Standards*.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 78 39