THE NATION'S URANIUM PROCESSING FACILITY

Preparer:

06/26/23
Date

Anton R. Panev
UPF ES&H Issues Management

Approval:

06/26/23
Date

Kieran S. Kelly
UPF ES&H Manager, BNI

06/27/23
Date

Gary J. Cough
UPF Site Manager

07/31/23
Effective Date

RC-UPF DMC
06/29/23 14:30

This document has been reviewed by a Y-12 DC / UCNI-RO and has been determined to be UNCLASSIFIED and contains no UCNI. This review does not constitute clearance for Public Release.

Name: Steve Buffalo Date: 06/28/23

REVISION LOG

Revision 0	☒ Intent ☐ Non-Intent

- Initial Issue
- This Procedure was created in response to Condition Report 25774-000-GCA-GAM-04038, *Failure to Sustain Corrective Actions Taken for Dropped Object Prevention at UPF [**CA]*
- No forms have been edited as part of this revision
- An evaluation determination has been performed confirming that this Procedure does implement requirements tracked in the Programmatic Requirements Management System (PRMS)

CONTENTS

1.0 PURPOSE

This Procedure describes how risk assessments are to be used by Environmental, Safety, and Health (ES&H) personnel inclusive of activities associated with business development, engineering, procurement, construction, and startup. It also describes how the outcome of risk assessment is used to establish ES&H objectives and quantifiable targets (metrics) using leading indicators.

2.0 SCOPE

ES&H risk assessment and the setting of objectives is a requirement at the Uranium Processing Facility (UPF) Project. The intent is to:

- Establish a risk-based strategy for ES&H program development and execution
- Use defined objectives and metrics to drive risk-reduction strategies
- Shift focus from lagging indicators to leading indicators and prevention, for a more proactive strategy
- Use information from risk assessment to tailor and improve training, inspections, communication, planning, and needed controls and mitigation practices

The following are examples of factors that may present risks:

- Work methods, tools, and equipment
- Site location, congestion, and workforce size
- Employee and subcontractor experience
- Environmental conditions, and proximity to natural and cultural resources and communities
- Vehicle and pedestrian traffic, onsite and offsite
- Regulatory and contract requirements
- Hazardous substances and materials
- Availability of emergency and medical support
- Health concerns and pathogen exposure
- Extreme and seasonal weather
- Community expectations and commitments

There are sequential activities related to risk assessment and the setting of objectives. These include a stepwise process of risk identification, analysis, and evaluation. Such steps involve:

- Recognizing the need to perform a risk assessment and the factors to be considered
- Identifying ES&H hazards, aspects, and opportunities
- Assigning severity/probability levels using a risk matrix and then calculating a risk score to help prioritize actions
- Identifying the controls and mitigation needed to reduce risks
- Establishing objectives and performance metrics based on the assessment of risks and opportunities
- Integrating controls and mitigation measures into program execution

- Monitoring of conditions that pose risk and updating of the risk assessment
- Evaluating the effectiveness of controls and mitigation practices, and their required application

3.0 RESPONSIBILITIES

3.1 UPF Site Manager/Project Startup Manager

The Site Manager/Project Startup Manager (PSUM) is responsible for:

- Reviewing the recommended objectives and the associated actions and metrics
- Establishing resources to accomplish the objectives and assessment process

3.2 UPF Environmental, Safety, and Health Manager, BNI

The Environmental, Safety, and Health (ES&H) Manager, Bechtel National, Inc. (BNI) is responsible for:

- Interpreting this Procedure (intent and application) and the associated requirements
- Defining and establishing the ES&H objectives in coordination with the Site Manager/PSUM or equivalent

3.3 UPF ES&H Representative

The ES&H Representative is responsible for:

- Completing the assessment process described in this Procedure

4.0 RISK ASSESSMENT CONCEPTS

Potential risks are associated with most activities and tasks, and many risks involve ES&H subjects. Some risks may be insignificant and require no action, while others may have serious or imminent consequences for people, the environment, property, and communities.

Consequences can precipitate legal action and contract noncompliance, as well as impact a project's cost, schedule, customer and community relations, and company reputation.

This structured approach to risk management is applied to program development, implementation, and improvement. When determining ES&H risks and opportunities for a work location or project phase, one must identify the environmental aspects, safety and health topics, and potential impacts and hazards associated with them.

Environmental aspects related to UPF activities include subjects such as stormwater management, air emissions, wastewater discharges, hazardous waste generation, waste management, land contamination, vegetation clearing, and use of natural resources (e.g., water, energy, natural materials).

Safety and health topics related to UPF activities include subjects such as confined space entry, excavation and trenching, electrical work, cranes and rigging, traffic

management, chemical products, hand and power tools, sandblasting, dropped objects, and welding.

Opportunities are circumstances making it possible to do something new or beneficial; however, opportunities also can present risk, whether implemented or not. For that reason, risks and opportunities commonly are cited together in a Risk Register. In contrast to opportunity, a risk is something that already exists, or is expected as part of the operation, and mitigated through specific planning and actions.

Examples of ES&H Risks are:

- Undefined ES&H requirements
- Injuries or illness because of work tasks
- Legal and regulatory violations and citations
- Inadequate ES&H training, plans, and staffing
- Incomplete ES&H data management
- External threats, including public conflicts
- Design reviews without ES&H input
- Exposure to infectious disease
- Heavy equipment operations
- Confined work spaces
- Weather events
- Inappropriate disposal of hazardous waste

Examples of ES&H opportunities are:

- Integration of sustainability initiatives in work planning
- Integration of ES&H disciplines to enhance program delivery
- Recognition and use of new best practices
- Enhanced coordination among Functions
- Communication of ES&H initiatives and successes to stakeholders
- New technology to reduce waste materials
- More effective safety or environmental controls and monitoring methods

Once the environmental aspects and safety and health topics are identified, the potential impacts associated with each are evaluated and scored using a numeric scale considering probability and severity. Mitigation strategies are then determined, giving greatest emphasis to the risks with the highest numeric scores. Items in the resulting Risk Register can then be sorted by subject or risk score, with scores color-coded for emphasis.

ES&H topics identified as having the greatest risk will be included within the overall project UPF Risk Register that contains collective input from various Functions. Those ES&H topics usually reflect catastrophic risks to people, the environment, cost, or schedule. In contrast, numerous ES&H topics representing all risk levels are included within a project ES&H Risk Register. That register is prepared, maintained, and used as a reference tool by Job Hazard Analysis (JHA) planners associated with engineering, construction, and startup.

The ES&H Risk Register includes detailed descriptions, inclusive of controls and mitigation to be applied, and any recognized opportunities spanning a specific duration or project lifecycle. The term lifecycle relates to a contract duration over which the ES&H program is applied, but it can include the longevity of a material or product, from the supply chain process through its incorporation in a completed project.

The ES&H Risk Register evolves over a project's lifecycle, with items added, deleted, or downgraded/upgraded over time. Mitigation and control measures are identified for each item, and updated with experience and newly emerging information. The mitigation and controls necessary to lower risks are subsequently integrated with planning activities, such as a JHA prepared by construction planners and others.

5.0 RISK ASSESSMENT STRATEGY

The UPF Project uses a three-tiered approach to ES&H risk assessment, as applicable to the work scope, with each sequential tier using information or feedback from the other to enhance planning and controls. The progressive tiers are:

- ES&H Risk Register
- JHA
- Field Level Hazard Assessment (FLHA)

The first tier of risk assessment is covered by this Procedure, the other two tiers are introduced in this Procedure but further described in Y17-95-64-823, *UPF Field Level Hazard Assessment/Job Hazard Analysis*. This stepwise strategy establishes participation in hazard identification among multiple parties, downward and upward communication of hazards within the organization, sharing of mitigation methods, and opportunity for improvement.

The three-tier system of risk assessment establishes and assures continual feedback and enhanced risk awareness during project execution. For example, information from assessments, FLHAs, and incident investigations are used to improve the Risk Register, JHAs, and mitigation planning as the project progresses. That information also must be used to improve training and awareness campaigns.

5.1 Tier One of Risk Assessment

The first tier involves identification of major ES&H-related risks that influence contract execution and the development and implementation of the ES&H program. These can be expressed as the potential for impacts or opportunities. The resulting ES&H Risk Register is first developed during the business development phase and early project mobilization. It is updated by ES&H personnel regularly throughout the project lifecycle as some risks that were initially perceived are downgraded, and new risks emerge, because of changing work practices and incidents (see UPF-CP-108, *UPF Event Management and Investigation*). Thus, it is a working tool (living document) to be actively used by ES&H and planning personnel.

5.2 Tier Two of Risk Assessment

The second tier involves hazard assessment during design and work planning, such as during preparation of a construction work package. Information within the ES&H

Risk Register should be used to help prepare the JHA which identifies the sequence of major tasks and associated hazards, risks, and mitigation measures.

The JHA will be prepared by all applicable project personnel with assistance from ES&H personnel. The UPF Project may have numerous JHAs, each associated with specific project elements (see Y17-95-64-823). The ES&H Risk Register must be kept current to support the JHA process, and made readily accessible to team members responsible for creating JHAs.

5.3 Tier Three of Risk Assessment

The third tier of risk assessment emphasizes employee involvement at the work interface. Information in the JHA is supplemented by a daily FLHA of task-specific hazards and worksite conditions identified by the workers who will be executing the work. The FLHA allows tailoring of risk management given real-time worksite conditions and crew knowledge and experience.

Weather, crew size, tools, adjacent work crews and activities, individual training and competencies, site conditions and congestion, material storage, traffic, needed personal protective equipment, and concurrent work by other crews and subcontractors are examples of the many factors considered during the FLHA.

The FLHA process considers actual field, task, and human factors on the day of work execution and promotes employee input and discussion. The crew must acknowledge understanding of the hazards and required mitigation by signing the FLHA form (UCN-23552, *Field Level Hazard Assessment [FLHA] Card),* that they helped prepare.

6.0 ASSESSMENT PROCESS

The risk assessment process includes hazards, aspects, threats, and opportunities. These should be identified during the earliest project phase (beginning with the bid phase and preliminary engineering) but can be recognized as actual or potential issues during any phase of a project's lifecycle.

6.1 Risk Register Planning

An ES&H Risk Register is used by the UPF Project to capture risks and opportunities associated with environmental, safety, and health subjects and issues. The stepwise process to initially develop an ES&H Risk Register involves:

- Identifying the format that will be used
- Using a team approach (e.g., workshop) to capture the breadth of potential risks
- Assigning severity and probability values so that risks can be scored and then ranked (prioritized)
- Identifying alternatives and a hierarchy of controls and mitigation strategies to lower risks
- Assigning final ranking reflecting the risk priority number (color-coding)

Sample questions that may facilitate preparation of an ES&H Risk Register are provided in **Appendix B, *Risk Assessment Questions - Example***. Risk assessment must cover all three ES&H disciplines and technical, administrative, regulatory,

contract, and applicable stakeholder and social topics. The controls and mitigation associated with risks should be reflected in the ES&H management plans, especially for the higher-ranked risks.

A lifecycle perspective must be used. For example, stages of work and product or services delivery must be considered over the contract lifecycle such as acquisition of raw materials, design, material and equipment transportation, construction, operations, final disposition of the project, and disposal of waste materials. Certain risks may increase or decrease as the project progresses, warranting changes in the controls applied.

The most significant information from the project ES&H Risk Register should be fed upward to the project-wide one that compiles major risks from all Functions and Services on the project (see RA-PJ-801768-A001, *Uranium Processing Facility Risk Management Plan*). Such items provided by ES&H normally involve the most significant risks to life, the environment, communities, reputation, or cost/schedule.

The format used for the ES&H Risk Register need not match that used for the high-level project/facility one. The ES&H one must be easily applied, recognizing that it is a working tool for ES&H and JHA planning. It must reflect ever-changing frontline risks and dynamic conditions associated with incidents, new tasks, and daily and seasonal events. It should be updated regularly by ES&H personnel for timely application of controls and related training. The format and data collection should be consistent with ES&H industry standards for risk assessment and this Procedure.

6.2 Severity and Probability Levels

For the purpose of this Procedure, a 5 x 5 Risk Assessment Matrix is described to illustrate risk assessment; it is the working tool useable by ES&H personnel and JHA planners. This matrix is recognized within the ES&H industry, and among regulatory authorities, as a standard method for ES&H risk assessment.

An explanation of probability and severity levels used in the matrix is provided in **Appendices C, *Severity and Probability Levels*,** and **D, *Risk Assessment Matrix,*** and shows the 5 x 5 matrix used to score risks based on probability and severity. Together, the severity and probability levels are used to determine the risk level. The scoring system is used to help prioritize and track each item in the register.

The severity level is based on the potential consequence. Using the 5 x 5 matrix, severity levels range from 0 (None) to 1 (Minor); 2 (Moderate); 3 (Elevated); 4 (Severe) and 5 (Critical). Probability levels range from 1 (Unlikely) to 2 (Rare); 3 (Possible); 4 (Likely); and 5 (Very Likely).

To calculate the risk level for each hazard, multiply the severity level by the probability level. Using the 5 x 5 matrix method shown in **Appendix D** risk levels can be described as follows:

- Low (Scored 0-4): The risk is considered broadly acceptable and can be managed with routine procedures; risk reduction is at the project discretion
- Medium (scored 5-9): Risk may be acceptable if reasonable controls and mitigation are in place to reduce hazards to an acceptable level and monitored

- High (Scored 10-25): Risks are unacceptable and must be eliminated or reduced by controls and mitigation practices to an acceptable level. Ongoing monitoring will be required

The severity and probability scoring should be repeated once controls and mitigation practices are identified. This will help demonstrate risk reduction using mitigation practices and the correct mix of controls to be used.

6.3 Hierarchy of Controls

Risk control involves the elimination or reduction of hazards. If unacceptable risks are identified by the risk assessment, control options and mitigation measures must be defined.

The hierarchy of preferred control options is shown in **Appendix E, *Hierarchy of Controls***, from which the most effective measures must be identified. The hierarchy of controls is: Elimination; Substitution; Engineering Controls; Administrative Controls; and Personal Protective Equipment (PPE). Controls must reflect risks associated with onsite activities, potential community and other offsite impacts, and supply chains. A combination of controls often is required. For environmental risks, the last level in the hierarchy of controls can be compensatory mitigation for anticipated impacts.

Multiple methods are used to monitor for risks and evaluate controls and mitigation measures. This primarily will involve inspection and monitoring by the project ES&H representatives and frontline supervision, followed by timely adjustment of controls, altering of site conditions, or employee guidance on acceptable behavior. Updated Risk Registers over time will reflect the effectiveness of actions and capture historic use of controls and mitigation measures.

6.4 Risk Register Execution

An example Risk Register for ES&H is provided in **Appendix F, *ES&H Risk Register - Example***, based on qualitative information and the 5 x 5 risk matrix method. All significant risks identified in the ES&H Risk Register will be elevated to the UPF Risk Register.

The UPF ES&H Risk Registers should have sortable information and include the following content:

- Hazards and Aspects
- Risks and Opportunities
- Project Location and Phase
- Unmitigated Conditions (Severity, Probability, Score)
- Mitigation and Control Measures
- Mitigated Conditions (Severity, Probability, Score)
- Responsible Persons or Entity
- Actions to be Completed
- Status/Notes

Risk Registers can be used to first evaluate and score risks without application of mitigation measures, to demonstrate the need for controls, and subsequently scored

with various controls applied to demonstrate the extent of risk reduction achievable through various means. This process allows for required mitigation methods and controls to be better identified and strategically incorporated in ES&H management plans and daily work planning.

The ES&H Risk Register must be one of the references in the ES&H management plan (see PL-SH-801768-A007, *Bechtel National, Inc. Uranium Processing Facility Environmental, Safety, and Health Plan*), with notation to see the current version in the document control system. It must be reviewed regularly over the project lifecycle and updated when a noteworthy new risk is identified. Such updates may result from incidents, incident trends, inspection trends, audits, near misses, regulatory or legal requirements or actions, customer requirements or observations, or changed work scope or site conditions. Mitigation measures to reduce risk must be identified for any new entry in the Risk Register.

The predictive value of the ES&H Risk Register for ES&H and planning personnel, and the specified mitigation practices within it, are to be improved over the project lifecycle using actual data from incidents and near miss events.

The updated E&SH Risk Register is a mechanism for field observations and incident findings to flow back into the planning process for risk reduction and improvement. The ES&H Risk Register must be reviewed at least annually.

7.0 OBJECTIVES

Objectives are established once the risks and opportunities are identified. Objectives define the expectations and actions for achieving continual improvement and lowering risks. They must focus primarily on leading indicators of program performance and participation (e.g., inspection data, training), rather than lagging indicators (i.e., incident rates).

Each significant risk in the ES&H Risk Register must have at least one corresponding objective with targets (performance measures) that covers it.

A risk, and the associated target and object, is shown in the following examples:

- Risk: Failure to properly store hazardous materials and cause impact to the workforce and a nearby pond
- Objective: Construction supervisors to store hazardous materials daily in proper containers, labeled, and with secondary containment
- Target: ES&H to perform documented inspections of hazardous waste areas weekly and confirm 100% compliance with storage requirements

The ES&H Manager, BNI, is responsible for defining and establishing the ES&H objectives in coordination with the Project Director and Site/Startup Manager or designee. The ES&H Manager is responsible for tracking and reporting on the objectives and keeping them current.

Senior Management is responsible for reviewing and approving the recommended objectives and the associated actions and metrics annually. They also are responsible for establishing resources to accomplish the objectives.

7.1 Setting Objectives

Objectives must be compatible with the project ES&H command media and the scope of work. They should align with the type of risks and opportunities identified during risk assessment.

ES&H objectives should include all three ES&H disciplines and be:

- Specific to the risks identified
- Measurable so that progress can be determined
- Achievable with available resources
- Realistic regarding the ability to meet them
- Schedule-based so met by a specified time
- Timely so achievable within a reasonable time-period

Factors to be considered are the risks identified, regulatory and contract obligations, Bechtel ES&H standards, technical and administrative options to achieve defined metrics (targets), and stakeholder expectations. The responsible party for achieving each objective must be identified.

The targets assigned to each objective should have quantifiable metrics, such as the frequency of an action or a number or percentage value to be achieved. Targets also must be realistic yet reflect the importance of risk management. They serve as leading indicators to define acceptable ES&H performance.

A table of ES&H objectives must be prepared in parallel with the ES&H Risk Register. These two records will be submitted in a timely manner to the UPF Document Management Center as they are finalized or updated. An example table of objectives and targets is shown in **Appendix G, *Table of ES&H Objectives – Example***. The content of such a table should include:

- Risk or Opportunity
- Objective
- Target and Performance Measure
- Actions to be Applied
- Responsible Persons
- Schedule
- Status

Objectives can span numerous subjects, such as:

- Training programs and training participation
- Improved procedures or plans
- Compliant recordkeeping
- Field inspection results
- Audit frequency and results
- Regulatory compliance
- Improved or sustained mitigation measures
- Incident rates and near-miss reporting
- Timeliness of corrective actions

- Protection of unique resources
- Specialty subjects such as waste or energy management goals, each should have a measurable target

7.2 Reviewing Objectives

Project ES&H representatives responsible for field monitoring, inspections, and program management must track and determine the status of objectives and targets.

The ES&H Risk Register and coinciding objectives must be reviewed at least annually by Senior Management. Objectives and targets must be updated accordingly.

Items added to the Risk Register may require new objectives to be established. Items that can be downgraded on the Risk Register over time may justify elimination of an associated objective and performance metric. Objectives are expected to change over the project lifecycle as risks, aspects, tasks, site conditions, and stakeholder issues change.

8.0 RECORDS

Records generated by this Document shall be maintained in accordance with Y15-95-800, *UPF Document Management*.

The following records generated are:

Record or Form Number	Record Title	System/ Location	Document Type
RP-SH-801768-AXXX	*ES&H Risk Register*	InfoWorks	RP
RP-SH-801768-AXXX	*Table of ES&H Objectives*	InfoWorks	RP

9.0 REFERENCES

9.1 Source References

None

9.2 Interfacing References

PL-SH-801768-A007, *Bechtel National, Inc. Uranium Processing Facility Environmental, Safety, and Health Plan*

RA-PJ-801768-A001, *Uranium Processing Facility Risk Management Plan*

UPF-CP-108, *UPF Event Management and Investigation*

Y15-95-800, *UPF Document Management*

Y17-95-64-823, *UPF Field Level Hazard Assessment/Job Hazard Analysis*

9.3 Forms

UCN-23552, *Field Level Hazard Assessment (FLHA) Card*

10.0 SUPPLEMENTAL INFORMATION

Appendix A, *Acronyms and Definitions*

Appendix B, *Risk Assessment Questions - Example*

Appendix C, *Severity and Probability Levels*

Appendix D, *Risk Assessment Matrix*

Appendix E, *Hierarchy of Controls*

Appendix F, *ES&H Risk Register - Example*

Appendix G, *Table of ES&H Objectives - Example*

APPENDIX A
Acronyms and Definitions

Acronyms

ES&H	Environmental, Safety, and Health
FLHA	Field Level Hazard Analysis
JHA	Job Hazard Assessment
PPE	Personal Protective Equipment
PSUM	Project Startup Manager
UPF	Uranium Processing Facility

Definitions

Environmental Aspect	An element of Bechtel's activities or products or services that can interact with the environment. In Bechtel terminology, these are the environmental subjects, activities, and issues associated with scopes of work and facilities.
Environmental Impacts	Any change to the environment, whether adverse or beneficial, wholly or partially, resulting from the environmental aspects.
ES&H Incident	Any event, or series of events, which causes or could cause harm (injury, illness, or damage) to persons, property, or the environment.
Hazard	An object, physical or natural attributes, or condition with the potential to harm human health, property, or the environment.
Impact	A positive or negative outcome of an action or activity; if not specified or described as positive, assumed to be negative.
Indicator	A qualitative or quantitative measurement that reflects the condition or status of ES&H performance; they can be leading (e.g., behavioral observations and inspection results) or lagging (e.g., injuries and incidents).
Objective	An intended outcome to be achieved consistent with ES&H policy and plans.
Opportunity	A set of circumstances which makes it possible to do something. Taking or not taking an opportunity can alter levels of risk.
Probability	The likelihood that an event will occur.
Residual Risk	The level of risk that remains after all reasonable risk-reduction measures have been taken. This may or may not be considered acceptable.
Risk	A composite of the likelihood that a specific undesirable event will occur and the severity of the potential consequences of the event.
Risk Assessment	An evaluation of exposure to potential loss.
Severity	Level of impact resulting from a hazard.
Target	A measurable performance value to be achieved during program execution that is associated with a specific objective to help manage risk.

APPENDIX B
Risk Assessment Questions - Example
(Page 1 of 3)

1	E	Have responsibilities for hazardous waste generation and disposal, including recordkeeping, been defined and acceptable?
2	E	Does the contract adequately define hazardous substances and responsibilities for them?
3	E	Are requirements in permits/approvals/environmental assessments and studies consistent with the proposed project?
4	E	Are adequate resources, including qualified environmental personnel, being applied to the project?
5	E	Are there schedule or financial consequences for environmental non-performance?
6	E	Are there environmental justice or community concerns associated with the project?
7	E	Does Bechtel have accurate knowledge of subsurface conditions (groundwater, soil contamination)?
8	E	Are an excessive number of environmental plans and studies required post-bid?
9	E	Is the extent of contamination onsite, and methods for handling it, known?
10	E	Are qualified environmental subcontractors available to assist permitting and mitigation?
11	E	Have unique/protected natural resources in/near the project been identified (parkland, fish, wildlife, vegetation)?
12	E	Have protected cultural resources been identified adequately (archaeological sites, historic structures)?
13	E	Has the extent and cost of onsite monitoring and inspection activities been recognized and can they be reasonably executed?
14	E	Are sensitive resource boundaries and limits of construction overly restrictive and delineated?
15	E	What are the sustainable development concerns and required actions?
16	E	Is Bechtel responsible for delays associated with removal or storage of pre-existing hazardous waste?
17	E	Is there existing soil or water contamination on the project site that involves regulatory agencies or community impact?
18	E	Is any existing soil or water contamination on the project site adequately addressed in contracts and specifications?
19	E	What are the required and proposed mitigation measures for environmental issues and are they adequate or excessive?
20	E	Are there schedule moratoriums because of seasonal protected resources (e.g., breeding/nesting periods)?
21	E	Does an EA or EIS deem the proposed project as unacceptable or prone to risk?
22	E	Does Bechtel have liability for pre-existing hazardous substances on the project site and discoveries?
23	E	Has adequate soil and groundwater characterization been performed?
24	E	Does the work include characterization, handling, remediation, transportation or disposal of hazardous substances/waste?
25	E	Will environmental specialty subcontractors be required?
26	E	Has an environmental assessment report been written (e.g., EA, EIS, ESIA) and mitigation requirements understood?
27	E	Have disposal of surplus materials and construction waste and debris requirements been identified?
28	E	Have environmental mitigation plans been identified or developed (e.g., wetlands, sensitive areas, brownfields, etc.)?
29	E	Have responsibilities for permitting been defined including permitting delays, non-compliance, liability, and agency notifications?
30	E	Have Environmental Management System ISO 14001 requirements and audit frequency been recognized?
31	E	Have post construction environmental resource monitoring/surveys been identified?
32	E	Can selection of materials and processes be done to reduce the amount of hazardous materials used and waste generated?
33	E	Have public issues and concerns been adequately defined, including those of elected officials, community leaders, and NGOs?
34	E	Are there possible difficulties in gaining community public acceptance?

APPENDIX B
Risk Assessment Questions - Example
(Page 2 of 3)

35	E	Are there potential community conflicts that could impact schedules and haul routes (e.g., time of day; day of the week; festivals)?
36	E	Are there existing facilities that may contain asbestos, lead paint, or other hazardous substances?
37	E	Have project restoration requirements been identified and incorporated into the project schedule and budget?
38	E	What permits, approvals, and licenses currently exist and are amendments needed?
39	E	Are the requirements in permits/approvals/EA/EIS documents consistent with the financial institution requirements?
40	E	Have the environmental design criteria been identified, and environmental requirements, and incorporated into the design basis?
41	ESH	Are there security risks in/near the project site?
42	ESH	Can Bechtel conduct work in a manner to adequately protect the environmental, safety and/or health of our workforce?
43	ESH	Can Bechtel conduct work in a manner to adequately protect the environmental, safety and/or health of local communities?
44	ESH	Could geographic constraints such as weather and health risks affect the success of the project?
45	ESH	Does the project scope involve demolition of existing facilities, excavation, or modifications to existing facilities?
46	ESH	Have ES&H support budget and staffing plans been developed commensurate with the requirements and risks?
47	ESH	Has the customer/partner history of compliance been researched?
48	ESH	Have the Lessons Learned data been searched for applicable topics/lessons that can be applied to this project?
49	ESH	Have all government reporting and regulatory requirements been identified?
50	ESH	Have applicable ES&H regulations or standards been reviewed for establishing the appropriate design criteria?
51	ESH	Have constructability issues and ES&H requirements been collectively reviewed?
52	ESH	Have ES&H Managers assigned to similar projects been contacted for Lessons Learned?
53	ESH	Have ES&H record retention requirements been identified?
54	ESH	Have issues relating to site and seasonal conditions been identified?
55	ESH	Have labor issues been identified?
56	ESH	Is the potential for agency consultation, inspections, added requirements, and penalties/fines understood?
57	ESH	Have the exposure claims of workers/third parties to hazardous substances been evaluated?
58	ESH	Have vendor design packages been reviewed for conformance to company and customer requirements?
59	ESH	Can chemical use be reduced based on design and inventory control to limit waste generation?
60	ESH	Is the ES&H work scope included in the subcontractor ITB packages?
61	ESH	Is there alignment between Bechtel's Zero Incident Philosophy and the potential partner/customer's philosophy towards ES&H?
62	ESH	What are the risks associated with the customer, partner, or country?
63	ESH	What indemnities exist (e.g., injury or death)?
64	ESH	What is the reputation of the host country regarding ESH?
65	ESH	What is the reputation of the partner/customer regarding ES&H?
66	ESH	Will Bechtel be able to effectively implement its suite of ES&H tools and processes in this work environment?
67	ESH	Has an ES&H Risk Register been completed with identification of controls and mitigation?
68	ESH	Has the extent of ES&H training been identified, including costs?
69	H	Are there unusual health risks for employees or endemic diseases where the project is located?
70	H	Are there site conditions or work methods that pose potential health risks?

APPENDIX B
Risk Assessment Questions - Example
(Page 3 of 3)

71	H	Are there epidemic or pandemic conditions present that present a health risk?
72	H	Can adequate health care be obtained by employees at or near the project location?
73	H	Can employee evacuation or transport to a major hospital be accomplished?
74	H	Are there work processes that will generate health risks such as to hearing, respiratory, vision, or dermal exposure?
75	S	Have safety responsibilities been determined for evacuation plans and compliance with labor/safety laws?
76	S	Can incidents affect third parties or the work impact public safety (traffic, pedestrians)?
77	S	Are subcontractors available with effective safety records and a similar ES&H philosophy as Bechtel's?
78	S	Does Bechtel have to accept unusual safety risks?
79	S	What are the risk/stability issues associated with the location and country where work is planned?
80	S	Are there high-risk work activities such as work over water, work at height, marine operations, explosive, or railway operations?
81	S	How experienced are the local workforce and subcontractors?
82	S	Have local laws on health/safety been identified and evaluated?
83	S	What are the safety risks in/near the project site, including activities by others and laydown/staging areas?
84	S	What issues exist for transportation of materials and equipment on public highways and roadways?

E = Environmental; S = Safety; H = Health

APPENDIX C
Severity and Probability Levels

Severity Level		Potential Consequences / Impacts			
		Safety and Human Health	**Environmental**	**Company Reputation**	**Liability/ Property Loss**
0	**None**	No injury or damage to health	No impact	No concern	No loss
1	**Minor**	First aid or slight injury/illness no treatment	Insignificant impact fully contained	Company/client concern, no media attention	Slight loss (<$10K)
2	**Moderate**	Recordable injury, medical treatment, restricted work, temporary effect	Negligible short-term impact, confined on site, no regulatory exceedance	Community concern with potential for local media attention	Minor loss ($10-<$100K)
3	**Elevated**	Lost time injury/illness or permanent disability	Moderate to significant impact confined on site, regulatory exceedance, or any offsite impact	State or provincial concern with regional media attention	Moderate loss ($100-<$1M)
4	**Severe**	Single fatality or permanent disability of three or more persons	Significant impact on or off site, or potential enforcement action	National media attention	Major loss ($1M-<$10M)
5	**Critical**	Multiple fatalities	Catastrophic impact, long-term liability, or irreversible damage	International media attention	Catastrophic loss (>$10M)

Probability Level	Probability Test	
	Probability	**Definition**
1	Unlikely	Consequence unheard of/not known to have occurred; very unlikely to occur under normal operating conditions
2	Rare	Consequence known to have occurred in EPC industry; unlikely to occur during normal operating conditions
3	Possible	Consequence has occurred in Bechtel; may occur under normal operating conditions
4	Likely	Consequence occurs several times per year in Bechtel; very likely to occur at some time under normal operating conditions
5	Very Likely	Consequence occurs several times per year at similar projects/locations; can be reasonably expected to occur under normal operating conditions

APPENDIX D
Risk Assessment Matrix

Severity Level		Probability Level Increasing Probability				
		1 – Unlikely (Improbable)	**2 - Rare**	**3 - Possible**	**4 - Likely**	**5 - Very Likely (Near Certain)**
Increasing Severity	**0 – None**	0 Low	0 Low	0 Low	0 Low	0 Low
	1 - Minor	1 Low	2 Low	3 Low	4 Low	5 Medium
	2 - Moderate	2 Low	4 Low	6 Medium	8 Medium	10 High
	3 - Elevated	3 Low	6 Medium	9 Medium	12 High	15 High
	4 - Severe	4 Low	8 Medium	12 High	16 High	20 High
	5 - Critical	5 Medium	10 High	15 High	20 High	25 High

NOTE: *Multiply the Severity level by Probability level to determine the Risk score.*

Scores from 0-4 are Low priority, 5-8 are Medium priority, and 10-25 are High priority.

APPENDIX E
Hierarchy of Controls

Preference	Hierarchy of Control Options	Action	Examples
Decreasing Preference	Elimination or Substitution of Hazard	Remove Hazard by Eliminating or Substituting with Less Severe Hazard	▪ Eliminate Use of Hazardous Substances ▪ Design to Eliminate Hazards, Such as Falls, Hazardous Materials, Noise, Confined Spaces, And Manual Material Handling ▪ Substitute with A Less Hazardous Material or Different Form (E.G., Pellets in Place of Powder)
	Engineering Control	Reduce Hazard by Use of Design and Engineering Controls	▪ Enclose or Segregate Hazardous Plant ▪ Install Emission Control Equipment ▪ Ventilation Equipment ▪ Machine Guarding ▪ Sound Enclosures ▪ Circuit Breakers ▪ Platforms and Guard Rails ▪ Automatic Shut-Down System
	Warning Sys- tem	Use of Protective Systems and Alarms to Signify Breach of Acceptable Risk	▪ High-Level Alarms ▪ Signs/Labels ▪ Backup Alarms
	Administrative Control	Implement Working Procedures That Will Re- duce the Hazard	▪ Develop/Use Operating, Inspection, Maintenance and Safe Working Procedures ▪ Rotation of Workers ▪ Safety Equipment Inspections ▪ Permit to Work Systems (Confined Space Permits) ▪ Emergency Response Procedures ▪ Training and Other Procedures
	Personal Protective Equipment (PPE)	Protect Personnel from Residual Risks After All Other Options Are Exhausted	▪ Use of Ear Protection in Noisy Areas ▪ Use of Eye Protection in Dusty Environments or Grinding Activities ▪ Use of Breathing Air Systems in Enclosed Areas ▪ Safety Harnesses and Lanyards ▪ Gloves, Respirators, Face Shields

APPENDIX F
ES&H Risk Register - Example

Project Name:	**Date Created/Updated:**
Completed by:	**Revision Number:**

* R = Risk; O = Opportunity

Hazard/Aspect	Risks and Opportunities	R / O *	Location / Project Phase	Unmitigated			Mitigation / Control Measures	Mitigated			Responsible Person(s)	Actions	Status
				Severity	Probability	Risk Priority		Severity	Probability	Risk Priority			
(*Example only*) Handling of hazardous materials near waterway(s) and protected habitats	Spill or Release to the environment	R	Phase 3	5	3	High (15)	Stormwater runoff controls; spill response team on standby during movement of hazardous materials near sensitive areas; spill containment in place; daily inspection of containers for leaks, rust, or other container integrity issues.	2	3	Medium (6)	Superintendent ES&H Inspector	Install secondary containment systems for all hazardous materials; perform daily inspections; personnel training	Secondary containment in place and monitored; inspections documented; training records maintained
Truck access onto public roadway from site	Collision with public vehicle at site entrance	R	Phase 2	4	2	Medium (8)	Traffic management plan; controls, including signage and lighting; speed restrictions; driver training	2	2	Low (4)	Traffic Engineer Superintendent	Install lighting and warning signs; establish speed restriction; train drivers on local conditions	Lighting and signs installed; orientation includes driving requirements
Manual lifting of roofing materials	Back injury during manual handling	R	Area 3 Phase 4	3	3	Medium (9)	Restrict load sizes for manual handling; use equipment for bundles > 50 pounds	3	1	Low (3)	Superintendent Procurement	Inform suppliers of packaging practices; establish restrictions on weight for manual handling; make forklifts available	Purchase orders now specify minimization of pack- aging; lift equipment and opera- tors established
Noise from genera- tors and pneumatic equipment	Community disturbance and work stoppages; reputation impact and fines	R	Phase 3	3	4	High (12)	Schedule noisier activities before 9 PM; use noise barriers and generators with muffling systems; develop monitoring plan	2	2	Low (4)	Superintendent ES&H Inspector	Inform Project Controls of schedule requirements; procure whisper genera- tors; build noise barriers; monitor neighborhood	Project Controls integrated schedule requirements; noise mitigation measures included in ES&H plans

APPENDIX G
Table of ES&H Objectives - Example

Project Name:	**Date Created/Updated:**
Completed by:	**Revision Number:**

No.	Risk or Opportunity Summary	Objective	Target and Performance Measure	E, S, *or* H	Actions to be Applied	Responsible Person(s)	Schedule	Status/Notes
1.0	Noncompliance with regulatory requirements Inadequate mitigation measures	Sustain integration of ES&H requirements in design and construction planning	1.1 Review 100% of all environ- mentally relevant engineering products	E	Participate in design reviews	Environmental Manager	Follow Engineering schedule	In progress; on target
			1.2 Review and sign-off on 100% of all JHAs prior to issuance	S	Participate in JHA reviews	Safety Manager	Follow construction planning schedule	In progress; on target
2.0	Non-obtainment of required permits and schedule impacts	Obtain all regulatory approvals and permits on schedule	2.1 Submit each permit application per milestones established in the project schedule	E	Advise Engineering of the deliverables needed for permitting; prepare applications	Environmental Manager	Begin submittals February 2020	Completed March 2021
			2.2 Obtain all federal permits and approvals per schedule mile- stones and without delaying construction	E	Confirm durations for permit approvals; tie them to construction start in master schedule	Environmental Manager	Begin submittals January 2020; Receipt > 30 days before construction start	In progress; on target
3.0	Lack of awareness of ES&H requirements leading to noncompliance and injuries	Establish a comprehensive training and aware- ness program	3.1 Give ES&H Orientation to 100% of project and subcontractor employees prior to field entry	ES&H	Develop training course; up- date it as the project progresses	ES&H Manager	Begin March 2020; Mon- days and Wednesdays	In progress; on target; 630 personnel trained
			3.2 Give ES&H for supervisor training; 100% of foreman within 30 days of assignment	ES&H	Develop supervisor training course and notify construction of training schedule	ES&H Manager	Begin March 2020; every other Monday	In progress; on target; 47 foreman trained
4.0	Noncompliance with legal and permit requirements	Maintain an inspection, monitoring, and audit program to assure proper application of mitigation measures and controls	4.1 Sustain daily ES&H field inspections and documentation; sustain > 90% compliance monthly in all categories	ES&H	Implement a structured inspection program and data management	ES&H Manager	ES&H personnel hired and trained; data collection started March 2020	In progress; on target over six months
			4.2 Achieve no major nonconformities during audits; complete all corrective actions within 30 days	ES&H	Schedule audits	ES&H Manager	Audits by the GBU and Corporate every six months	In progress; on target through two audits