PACIFIC GAS AND ELECTRIC COMPANY
Embarcadero-Potrero 230 kV Transmission Project
NTP # 1 Potrero Site Preparation Submittal

APM or MM addressed:	APM – HM-2 **Development and Implementation of a Health and Safety Plan.**
Attachments:	1. ABB Health and Safety Plan
Date Submitted:	July 23, 2014

APM – HM-2 Development and Implementation of a Health and Safety Plan. *PG&E will prepare a project-specific health and safety (H&S) plan prior to project construction. The purpose of the plan is to minimize potential safety hazards to site construction workers. The H&S plan will outline the project team H&S responsibilities; present job safety analyses, H&S procedures, and personal protective equipment requirements; establish worker training and monitoring requirements; and describe emergency response procedures relevant to project activities. Each contractor will be responsible for preparing and submitting to PG&E their own H&S Plan specific to their activities using the PG&E Plan for project-specific information.*

PG&E response:

Please see the attached Health and Safety Plan for the NTP #1 Potrero GIS project.

Power Systems North America
Environmental, Health, Safety and Security Site Plan

Pacific Gas & Electric
Potrero 230-115 kV GIS and MPAC Project
1201 Illinois St., San Francisco, CA 94107

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Resp. dept	*Power Systems NAM*	*Approved*				
ABB			Doc. no.	Lang. **English**	Rev. ind. **P**	Page. **1**

SYNOPSIS

This document presents ABB's Environmental, Health, Safety & Security plan for this project. The plan is to be utilized to detail the methods, systems and strategies for successful execution of the project. However, it is not intended to be an exhaustive, detailed document but rather to provide guiding principles and common best practices to ensure the safety and well-being of personnel and to protect and address any environmental concerns. This plan may require additions, updates or modifications to existing content based upon changes in legislation, change of scope or new and potentially unforeseen challenges.

Document Template Revision Control Table

Rev. ind.	Page (P) Chapt. (C)	Description	Date Dept./Init.
J		Major Revision (Rev. O)	Dec 14, 2010
K		Appendix 1 revised to include Civil Works Risk assessment	Mar 21, 2011
L		Minor Cover page revisions	Jul 25, 2011
M		Minor last page revisions	Aug 18, 2011
N		Replace Minimum Approach Distance table	Aug 29, 2011
O		Risk Assessment tables re-formatted, added safety objectives and additional safety info added throughout document, minor formatting	Mar 28, 2012
P		Major Revision (Rev. P)	Dec 26, 2013
Q		Major revision for Potrero Project	Jun 27, 2014 Jul 2, 2014 Jul 7, 2014
R		Major revision for Potrero Project	

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1. Introduction

This project specific environmental, health, safety and security plan has been developed for the*… Pacific Gas & Electric (PGE) San Francisco, CA - Potrero Substation 230-115 KV and MPAC Project.* It is to be implemented and maintained by ABB and their contractors upon commencement of site based construction activities and will remain in place throughout the course of the project. The plan establishes a defined set of parameters regarding how ABB and their contractors will manage the environmental, health, safety and security related activities and responsibilities, as well as other associated risks with the project in accordance with the local environmental, health and safety authority requirements and practices.

This environmental, health safety and security plan has been tailored to the project and site to which it is associated and has been designed in accordance with the ABB (OHSAS 18001 compliant) Occupational Health and Safety Management System. It is intended as a working reference, providing line management and employees with a document resource necessary for them to achieve their objectives and those of ABB and Pacific Gas & Electric**.**

1.1 Plan Objectives

The objectives of this document are to…

- ***Describe the EHS system to be applied whilst ABB and its contractors are operating upon this project***
- ***Detail ABB's vision, objectives and targets for this project's safe and quality completion***
- ***Ensure alignment with and demonstrate that this EHS plan is a compliment to the client's environmental, safety, health and security management system requirements***
- ***Reference the policies and best practices applicable and the procedures and documentation to be implemented on this project***
- ***Describe the processes which will be implemented to ensure the work and related activities can be undertaken in a safe and healthy manner and will not adversely affect the workforce, other personnel or the environment***

1.2 Project Objectives

ABB's objective for this project is zero harm to people, no destruction to the environment, and no equipment damage.

- Zero recordable injuries
- Zero recordable vehicle incidents
- Zero plant equipment damage
- Zero regulatory reportable environmental spills

ABB and its contractors shall follow all EHS requirements, as applicable, and meet any additional safe work practices which may be established for this project.

In order to achieve these objectives, applicable education and training including close monitoring of all activities shall be instituted. Should an unwanted event occur, the incident shall be reported immediately in accordance with the ABB Incident reporting protocol or the client's protocol ***(whichever is deemed most stringent)***.

Please note the following mandatory requirements…

- ***Special precautions and procedures shall be instituted for all activities deemed as "high risk"***
- ***100% participation in proactive hazard recognition and reporting.***

2. Project Description

Potrero Substation is a critical source of power to the local San Francisco area and provides interconnections to other substations. In the 1960's when built, the 115/12 kV substation was designed mainly as the switchyard for PG&E's (now Mirant's) Potrero Power Plant. The existing 115 kV switchyard contains two 115 kV overhead (OH) connections to the Power Plant, six (6) 115 kV PG&E underground (UG) transmission lines, two (2) 115 kV UG cable connections to the existing Trans bay HVDC facility with a single termination point, one (1) 115 kV Static Var Compensator, and three (3) 115/12 kV distribution transformers. The 12 kV portion of the switchyard includes several 12 kV feeders serving local PG&E customers, two (2) bus paralleling circuit breakers, and two (2) bus sectionalizing circuit breakers.

At the present time there is no 230 kV equipment at the existing substation; nor is there space available at the existing site for a 230 kV switchyard. In order to provide interconnection to PG&E's 230 kV system, a new pre-engineered metal building will be installed (on the previously owned GenOn property), and will house Gas Insulated Substation (GIS) equipment for both 230 kV and 115 kV systems. A new 230/115 kV, 420 MVA transformer, and 230 kV shunt reactor will be located just outside the metal building. The new Potrero 230/115 kV switchyard will step-up the resident 115 kV to 230 kV for connection to the new ZA cable, and thus provide interconnection between Potrero's 115 kV and Embarcadero's 230 kV transmission systems. This project will dramatically improve Potrero Substation's reliability and flexibility. Installation of upgraded protection, automation and control equipment on the new GIS systems will also increase operational visibility and provide enhanced remote control capabilities.

Potrero (the Project) is a separate filings with the CPUC and shall be authorized and managed as single project. As such; a Scope of Work has been developed clearly defining the limits of work for the project. Furthermore; the project has been divided into two areas of Work: one substation engineering, GIS purchase & project administration, two - substation building erection and gas insulated equipment installed, tested and commissioned.

2.1 Details of Work Packages

The Project description is as follows:

- Construct a new Engineered Gas Insulated Substation (GIS) building at the old GenOn property to house new GIS, modular protection, control and automation like (MPAC-like) equipment, AC station service, and DC battery equipment.
- Install two 230 kV GIS BAAH bays, initially configured in a ring bus arrangement with circuit breakers, disconnect switches, and future BAAH equipment.
- Install one three-phase 230/115 kV, 420MVA transformer bank with Load-Tap Change (LTC) and 12 kV station service windings.
- Install one 230 kV shunt reactor for the ZA Embarcadero-Potrero cable with a circuit breaker and disconnect switch.
- Install one 230 kV cable termination for the new ZA Embarcadero-Potrero cable.
- Provide one spare position for a future 230 kV cable connection, transformer bank, shunt reactor and associated GIS circuit breakers and disconnect switches.
- Install two 115 kV GIS bus sectionalizing breakers with associated disconnect switches.
- Install new 115 kV cables (2 cables per phase) for connection between the new Potrero 115 kV GIS sectionalizing breakers and existing 115 kV Bus Section "D".
- Install one 115 kV GIS BAAH bay with circuit breakers and disconnect switches for the low-side of the 230/115 kV transformer bank, plus a spare bay/position for the future bank.
- Install 115 kV and 230 kV capacitance coupled voltage transformers (CCVTs) or potential transformers (PTs) as required.

- Install new MPAC-like equipment inside the new GIS building for the new 230 & 115 kV GIS equipment, along with any temporary protection and automation requirements.
- Provide new AC station service and DC battery system to supply the new 230/115 kV GIS building, GIS and MPAC-like equipment.

2.2 Details of Worksite & Geographic Location.

Pacific Gas & Electric - Potrero Substation 230-115 KV GIS and MPAC Project, 1201 Illinois St, San Francisco, CA 94107; 37˚45'24"N & 122˚23'14"W ; Elevation 20ft.

2.3 Project Schedules

Potrero Scehdule update 2014 05 30.p

Please note, as schedules change, modifications may need to be made to the schedule document.

3. EHS Management System & Policy Statement

It is ABB's policy to provide a safe and healthy working environment at its sites and facilities. It is our practice to take action to prevent incidents by minimizing so far as is reasonably practicable, the causes of hazards inherent to the working environment.

ABB has a rigorous EHS program, led by a director with extensive experience with assistance from a diverse set of EH&S Specialists. This team provides the skills and applied knowledge to function across all business and service sectors. We have an adaptable workforce capable of providing guidance in any context.

Management's commitment to our EHS program is demonstrated by their involvement in ensuring each of our workplaces is safe and healthy. Management actively participates in regularly scheduled training and must lead various EHS initiatives which are tracked in our leading indicator statistics. Conducting all employee meetings, Safety Observation Tours (SOT's) and having personal contact with personnel at all levels are but a few examples how management demonstrates their commitment to ensuring a safe and healthy work environment for ABB personnel and our contractors.

3.1 Environmental, Health and Safety Statement

ABB strives to provide a safe and healthy working environment at all sites and facilities that it owns and operates, and to take adequate steps to prevent incidents an injury to health arising out of the course of work by minimizing or eliminating, the causes of hazards inherent to the working environment.

To achieve ABB's EHS objectives requires that we fully integrate the values of responsible environmental, health and safety practices into all of the endeavours we pursue. We encourage safety leadership at every level, recognizing that all incidents are preventable, and ensuring appropriate resources to achieve world-class performance. We equate success with safe execution of projects.

3.2 Due Diligence

Every employer has an obligation to ensure that workplaces and the tasks are performed in a safe manner and will not injure or harm the health of workers. It is our central value to adhere to the Occupational Safety & Health Administration's "General Duty Clause". Please note the following, taken directly from ***Section 5 "Duties" of the Williams-Stieger Occupational Safety & Health Act of 1970***…

(a) Each employer –

(1) Shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;

(2) Shall comply with occupational safety and health standards promulgated under this Act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct. A proactive approach in preventing incidents and injuries is a good defence for due diligence.

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=OSHACT&p_id=3359

3.3 Power Systems EHS Policy Statement

At the heart of our EHS program, is the Power Systems Division EHS policy statement which clearly defines our commitment to ensuring a safe, healthy workplace and to our environment. This policy is signed by our most senior managers and the business division president.

January 2014

Health, Safety and Environmental Policy
Power Systems – North American Region

ABB is a world leader in the design and development of power and automation technologies and as such ABB adopts a leadership role in the management of health, safety and environmental (HSE) risks and impacts.

It is ABB's goals that no person shall suffer injury or ill health as a direct consequence of ABB's industrial undertaking and that ABB's manufacturing processes, construction activities and products maximize resource efficiency and minimize any adverse environmental impact. Our goal is zero incidents that harm people or the environment.

We will actively management health, safety and environmental risks by incorporating the following key elements:

1. *Effective **leadership, commitment, and accountability** in respect of HSE risks;*
2. *Clear **roles and responsibilities** within the organization structure;*
3. *Appropriate levels of **HSE competence** commensurate with the level of risk identified;*
4. *Effective **risk identification and evaluation** process;*
5. *Appropriate **standards of risk control** to achieve HSE risk minimization;*
6. *Effective **communication, consultation, and coordination** of HSE risks with all our stakeholders;*
7. *Adequate **competent supervision** of activities to ensure compliance with ABB standards;*
8. *Effective **monitoring and measurement** process to ensure adequate HSE performance is maintained;*
9. *Standard process where we **learn** from our experience and develop our HSE culture to maintain excellence;*
10. *Establish annual **HSE improvement plans** to ensure continuous improvement in performance.*

These policy elements are amplified through ABB's HSE standards and incorporated into HSE Management System in accordance with relevant Federal and local State/Provincial/Territorial requirements.

It is important that as a global business we achieve HSE excellence in all aspects of our business and that these principles are extended to our supply chain, including in particular, our contractors to ensure that the same standards of HSE performance are achieved throughout all of our operations. **As executive management of Power Systems, North America Division, we fully endorse this policy on behalf of all managers of Power System local business units.**

Anders Sjoelin
President, Power System – North America

Jean M. Gatz
Sr VP/GM – PSSS

Mark Taft
Sr VP/GM – PSPG

Tomas Leander
Sr VP/GM – PSGS

Andreas Berthou
Sr VP/GM - PSAC

January 2014 (A.1)

This policy is prominently posted throughout our ABB offices and facilities. The introduction of our EHS Policy Statement is part of our new employee induction as well as our contractor inductions.

3.4 Project Specific Policy Requirements – (if applicable)

Please identify customer and project specific policies and procedures here. Please see Appendices.

4.0 Hazard Identification, Risk Assessment & Control

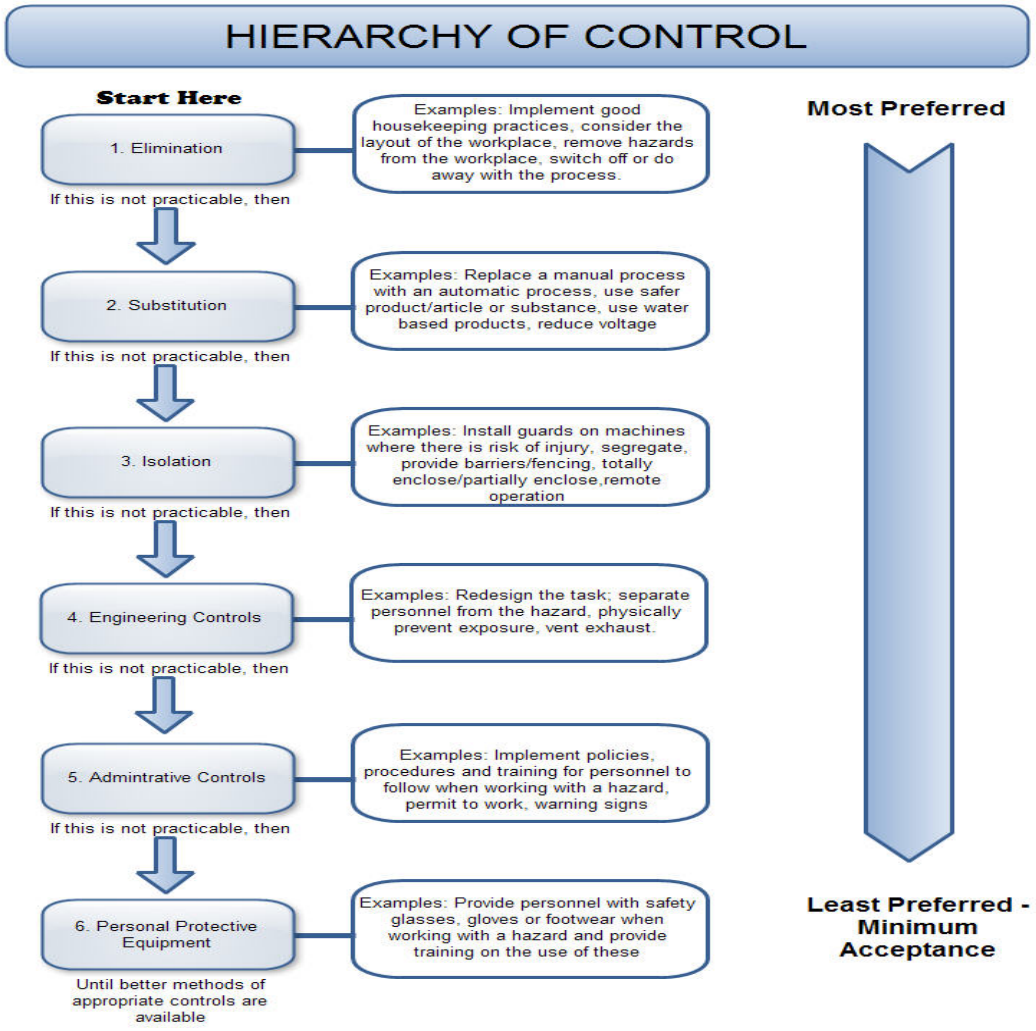
A suitable and thorough risk assessment shall be adapted to suit the worksite including effective use of the findings is considered to be an integral part of successful health and safety management.

The project team will utilize the ***ABB OHSMS 18001 Compliant Risk Management System*** to proactively identify and control the hazards and risks to employees and non-employees from ABB project activities. The risks considered are those that result from routine and non-routine activities, activities of employees and non-employees.

Risk assessment is the process of identifying hazards, assessing the level of risk posed by these hazards, implementing controls to eliminate or minimize these risks and the monitoring of the effectiveness of these controls. Contractors may use their own methods of risk assessment for their job once reviewed and approved by ABB.

All risks shall be managed using the hierarchy of control model as detailed on the following page.

4.1 Hierarchy of Controls



4.2 Key Project Risk Exposures and Control Measures

There are a number of key risk exposures that will need to be managed throughout the project in order to ensure that the risk to ABB and the client is minimized. ***They are as follows…***

I. ABB

- ***Extremely finite operational and installation space, thus leading to the absolute requirement of pre-task hazard assessment and constant observation of all activities.***
- ***Thoroughly planned and executed logistics, delivery and placement of equipment and materials.***
- ***Identification acknowledgement of potential sources of hazardous energy at all times.***
- ***Assurance & verification of credentials and competence of all personnel operating upon the project site, with special focus paid to those tasked with operating heavy equipment around temporary or permanent installations.***
- ***Site and safety orientation for all employees.***
- ***Significant environmental scope.***

4.3 Management of Change

The management of design change shall be through ABB change management system, with overall responsibility held by the ABB Project Manager. This is to ensure that any safety implications with regard to the change have been fully considered.

ABB will ensure that any changes or additions of plant, processes or substances used or any changes to environmental, health and safety management system will be reviewed and revised as needed. ABB will consult with employees, relevant contractors, health & safety advisors, and where appropriate the customer when any change is proposed.

4.4 Legal and Other Compliance

All ABB employees, partners, and subcontractors will comply with all applicable provisions of Federal, local State or Provincial laws and regulations. ***The standards to be implemented include, but are not limited to…***

All relevant ABB, codified safe work policies
OHSMS 18001
ISO 9001
ISO 14001
OSHA CFR 1926 & CFR 1910
California Code of Regulations (CCR) Title 8 Sec. 5156, 5157, 5158
Cal OSHA
EPA CFR 40
DOT CFR 49
NFPA 70E
NFPA National Electrical Code (NEC)
IEEE NESC
MUTCD
ANSI & ASTM Standards adopted by consensus and determined to be applicable by internal personnel
As well as all local, state & federal guidelines determined to be applicable for work within this specific context

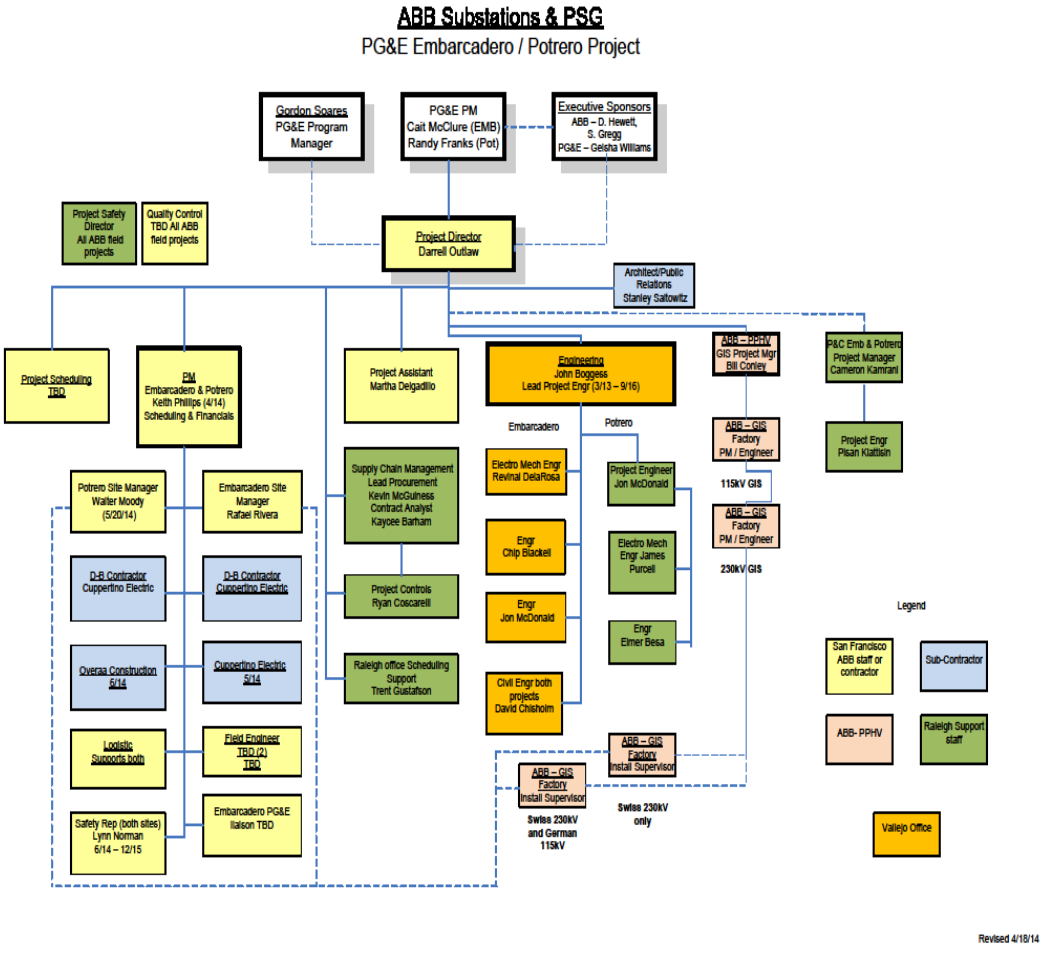
Where appropriate the project equipment will be registered or licensed in accordance with Federal, State or Provincial authorities.

All the required licenses to operate any equipment are to be held by the operating employee; otherwise that equipment will not be operated.

Should a conflict in standards be determined, the most stringent standard shall be followed

5. Organization Structure, Roles & Responsibilities

The project organization is set up as is shown below…**Please insert project specific org chart here.**



5.1 ABB Personnel Responsibilities as Defined by Position/Job Title

5.1.1 Project Engineer

The Project Engineer is accountable for all aspects of health and safety in respect to the product/system being supplied ***and in particular to ensure that…***

- ***Health and safety is considered in all aspects of the system design and for the complete lifecycle of the deliverables.***
- ***Ensure during ABB design review process, hazards that could give rise to health and safety risks are identified and mitigated as far as is reasonably practicable.***
- ***Ensure the design takes account of future operational and maintenance requirements of the equipment.***
- ***The complete system, as installed, meets required environmental, health and safety standards.***
- ***Adequate information on identified environmental, health and safety risks and required controls is provided with the design.***
- ***Ensure that the "as built" drawings are prepared and submitted to the ABB contractor's representative for inclusion in the health and safety file.***
- ***Ensure that all the relevant type approval certificates and commissioning documentation is retained for inclusion in the health and safety file.***

5.1.2 Project Director or Project Manager

The project manager is responsible for all aspects of project health and safety management on assigned projects and shall be held accountable for the project's health and safety performance. ***The project manager must ensure that…***

- ***The health and safety plan is developed for the project and updated during work execution, where and whenever necessary. They shall ensure that all significant health and safety risks are identified, eliminated or minimized/controlled.***
- ***Risk assessments have been carried out in respect of each phase of the project (including a preliminary project risk assessment) and such documents are shared with appropriate ABB employees and subcontractors.***
- ***Planning and scheduling of activities identifies significant health and safety risks and eliminates or minimizes them.***
- ***Project health and safety performance is monitored and reported routinely and at least monthly to the Division EHS office.***
- ***Only competent contractors are appointed and that their employees and any sub-contractors are competent.***
- ***Contractors prepare a project specific safety plan, conduct risk/hazards assessments, and complete submit their written Illness & Injury Prevention Plan to ABB for review before the start of work.***
- ***Appoint a site manager who is competent to perform the health and safety duties contained in the ABB Health and Safety Guide for Site Managers, ABB, the customer, and local requirements.***
- ***Ensure change control procedures are carried out and that changes are communicated to all affected parties. This should include details of any changes to the safe systems of work previously developed and/or agreed. Where changes to safe systems of work are required this must be done in consultation with the relevant parties and the ABB EHS Advisor.***
- ***Establish any formal communications required with the Client, ABB Local Business Unit, ABB contractor(s) or other relevant stakeholders.***

5.1.3 Site Manager

The site manager is responsible for all aspects of environmental, health and safety on site and shall be accountable to the Project Manager and operations department. ***The site manager ensures that…***

- ***The project health and safety plan is implemented, monitored and maintained, as well as all personnel and visitor's on site follows the plan's requirements.***
- ***All risk assessments and safe work procedures or instructions are reviewed by employees or contractors prior to the commencement of work.***
- ***Only authorized persons are permitted on site.***
- ***Unsafe activities are immediately halted and safe operations restored.***
- ***Contractors work in accordance with their approved safe working procedures or follow ABB procedures, whichever is more stringent.***
- ***Contractors conduct risk/hazards assessments and conduct daily pre-job safety briefings.***
- ***Daily pre-job safety briefings are carried out, and weekly health and safety coordination meetings are conducted.***
- ***ABB site personnel and contractors are competent, trained and formally authorized to carry out the work.***
- ***Incidents, near miss/good catch events are reported, investigated, and corrective actions implemented where necessary.***
- ***Carry out weekly site Safety Observation Tours (SOTs), follow up with actions where necessary and maintain records.***

5.1.4 ABB Contractors

The ABB contractor is responsible for ensuring that…

- ***All of their employees on the site comply with the requirements of this Environmental, Health, Safety and Security plan, as well as any site rules that may have been established.***
- ***When required, prepare an Environmental, Health, Safety plan (an Injury and Illness Prevention Plan is acceptable) specific to the project work to be performed.***
- ***The works are carried out in accordance with the safe work procedure (or IIPP).***
- ***Routine check and monitor throughout each shift to ensure that all the specified protection measures are being employed.***
- ***Wearing of required personal protective equipment by all their workers on site and any visitors that may be brought on site.***
- ***Report and record all incidents and near misses/good catches, and participate in established key performance indicator requirements.***
- ***Participate in the ABB site induction and adhere to all established requirements.***

5.1.5 ABB Site Safety Personnel

The Site Safety Advisor is responsible for providing health and safety advice and guidance to site managers, employees, and others at the jobsite. ***This includes…***

- ***Advise and support site personnel in respect to all health and safety matters, up to and including EHS training.***
- ***Assist in maintaining, monitoring and implementation of the site specific environmental, health, safety and security plan.***
- ***Liaise with the ABB Site Manager and Local BU Safety Advisor for any emerging issues at site.***
- ***Assist in investigation of all incidents and communication of lessons learned.***

- ***Identify trends in site incident data and propose suitable interventions.***
- ***Provide EHS training and induction program to ensure that the health and safety competencies of all site personnel is maintained.***
- ***Perform regular safety audits of the site or facility***
- ***Liaison with local authorities for health and safety, where necessary.***

5.1.6 ABB Local Business Unit (LBU) EHS Advisor

The Local BU Safety Advisor is responsible for providing health and safety advice and guidance to the ABB project team. ***Responsibilities include, but are not limited to…***

- ***Advise and assist in the preparation of the environmental, health, safety & security plan.***
- ***Assist project team in conducting hazards and risk assessment for all phases of the project.***
- ***Arrange training to ensure that the health and safety competencies of all project personnel are attained.***
- ***Ensure all incidents are investigated and communication of lessons learned.***
- ***Work seamlessly with site EHS advisors to ensure ABB process, procedures and rules are followed.***
- ***Record and maintain safety statistics and submit them to the EHS Director, PS NAM in a timely manner.***
- ***Be the general health and safety liaison with local authorities, when necessary.***
- ***Review the ABB contractors EHS plan and ensure it meets minimum requirements as established by ABB.***

The general roles and responsibilities for each organization in respect of health and safety are as follows:

ROLE	RESPONSIBILITY
John Boggess – ABB	Project Engineer
Darrell Outlaw - ABB	Project Manager
TBD	Site Manager
Overaa	Project Manager
	Asst. Project Manager
David Chisholm – ABB	Civil field Engineer
Lynn Norman – ABB	Safety Representative

The following matrix specifies the accountabilities and responsibilities of the parties involved on this project.

R = Responsible A = Accountable C = Consultant I = Information Actions	**Client or Client Representative**	**ABB Project Manager**	**ABB Site Manager**	**ABB Site E&S Manager**	**ABB Local BU H&S Advisor**	**ABB Contractors**	**Comments**
Prepare Environmental, Health & Safety Plan		A	C	C	C	R	To be compiled at contract award
Incident Reporting	I	A	R	R	C	R	All incidents within 24 hours. Fatality immediately
Risk / Hazards Assessment	I	A,R	R	R,C	R,C	R	Initial assessment to be compiled at contract award.
Incident Investigation	I	A	R	R	C	R	Within 2 days
Health & Safety Audits	I	A	C	C	R	C	Undertaken Monthly
Inspections	I	A	C	R	C	C	Weekly
Safety Observation Tours (SOTs)		R	A,C	R,C	C	R	At least one per week
Near Miss / Good Catch	I	A, R	R	R	C	R	All workers
Safety Meetings		I	A,C	R	C	R,C	Work site safety plan completed prior to work starting and reviewed monthly
Toolbox Meetings		I	A,C	R	C	R,C	Daily
Pre-Job Safety Briefing (performed before the start of each specific task)		I	A,C	R,C	C	R	Daily
Safe Work Procedures (SWP)		I	C	A,R	C	R	
Induction Training	I	I	A,C	R	R	R	All workers to receive induction training
Key Performance Indicator (KPI) Achievement Reward		A	R	C	C	R	Per agreed activities and milestones
Obtaining work permits		I	A,R	C	C	R	
Emergency preparedness	I	A	A,R	R	C	R	
Contractor Management		A,R	R	R	C		
Customer Liaison Health & Safety Coordination	C	A	C, R	C	C		
Housekeeping		I	A,R	R	C	R	All

6. Coordination and Control of Contractors

6.1 Contractor Selection and Coordination of Site Activities

All contractors used in undertaking the work shall be evaluated in accordance with ABB procedures, to ensure they and their employees have the appropriate levels of competence, training and experience for the works. Contractor shall be selected based upon their overall competence.

Contractors shall provide the following documents for review…

- ***Health, environmental and safety management system/program***
- ***Policy on environmental, health and safety***
- ***Enforcement data from all regulatory agencies***
- ***Incident records***
- ***Examples of a site specific EHS plan for a similar project***
- ***Examples of risk assessments and safe work procedures***
- ***Experience & knowledge of safety requirements***
- ***Management of subcontractors if relevant***
- ***Proof of EMR rating***
- ***Proof of insurance***

While the ABB Site Manager holds overall control of the site, contractors shall control their workers through regular site supervision for the duration of the works.

The contractor once selected shall be required to attend a kick off meeting when the health and safety plan will be discussed in terms of its implementation. ***The specific coordination measures will be as follows…***

- ***The selected contractor will be briefed on the requirements of the plan;***
- ***The site operations will commence with a site induction for all personnel who will be working on site once the site has been mobilized.***
- ***Prior to each phase of the project the contractor will be briefed on the safety and other requirements in accordance with the hazards and risk assessment;***
- ***The contractor must conduct a hazard analysis and carry out Pre-Job Safety Briefing daily for each job that is to be undertaken.***

A weekly site safety meeting will be held with the contractor to review…

- ***General progress with the operation***
- ***Review the health and safety measures***
- ***Incidents and near misses / good catches***
- ***Planning for next stage***
- ***Risks and hazards identified and risk control requirements specified***
- ***Client concerns***
- ***Project specific concerns***

6.2 Site Induction and Orientation

Persons entering within the confines of ABB work areas shall receive a site induction provided by the ABB Site Manager or his nominated representative. Visitors, Client representatives and delivery personnel may also be required to undertake induction training, or alternatively, a person approved by the ABB Site Manager can "personally" escort these people while they are at site. During the induction process, the following topics shall be covered. The induction process shall develop continuously, with other topics or additional information being included as necessary as the profile of the site changes.

Please note the following list of minimum mandatory induction & orientation topics…

- ***ABB site safety rules***
- ***Alcohol and drugs policy***
- ***Communication protocols***
- ***Control of Substances Hazardous to Health (Haz-Com)***
- ***Demarcation and safe working areas***
- ***Disciplinary policy***
- ***Emergency action, response procedure and evacuation plan***
- ***Environmental awareness and identification of sensitive areas or area specific regulations***
- ***Environmental precautions & control measures (Waste management, SWPPP, Dewatering, Erosion Control, Secondary containment, soil & water sampling and SPCC requirements)***
- ***Familiarization with the Site Specific EH&S plan***
- ***Fire and emergency procedures***
- ***First aid facilities and welfare***
- ***Designated first-aid personnel***
- ***Importance of conformance to all aspects of site specific requirements***
- ***Incident reporting, and investigation***
- ***Monitoring and checking procedure (e.g. Site Observation Tours)***
- ***Name of local EHS advisor and contact number***
- ***Near Miss / Good Catch Reporting (Key Performance Indicator)***
- ***Permit-to-Work system***
- ***Personal protective equipment***
- ***Pre-Job Safety Briefing***
- ***Risk assessments and safe work procedure***
- ***Safety Observation Tours and safety audits (Key Performance Indicator)***
- ***Site access and egress***
- ***Site boundaries***
- ***Smoking policy and designated smoking areas***
- ***Traffic management***
- ***Weekly safety meeting at site***

Individuals who have undergone the site induction shall sign to acknowledge undertaking the process. All site inductions are to be documented and records be kept at the site. Such documents shall be readily available for verification, when requested. Site induction shall include additional training information located in appendices.

6.3 Incident Reporting and Crisis Management Protocols

In the case where an unplanned, unwanted event occurs on site, a thorough investigation must be immediately conducted to ensure remedial action and control measures are implemented to avoid a recurrence. This may include an incident resulting in an injury, damage to equipment, loss of production or the damage to the environment and includes any incident resulting in a loss. Reports are to be submitted to ABB project manager and copies sent to local safety advisor.

It is important to remember that…

- ***All incidents that occur on site must be reported immediately to the crew foreman and the ABB Site Manager;***
- ***An incident report shall be completed and submitted within 24 hours.***
- ***The project manager for ABB shall be notified immediately for all serious events, injuries, and high potential near misses. For other less serious events and incidents, notification may be provided within 24 hours as well.***
- ***All incidents are to be investigated and the report submitted to the ABB Project manager.***
- ***Immediate notification must be made to ABB Project Manager for any fatality, serious injuries and high potential incident.***
- ***All incidents must be provided, in writing, to NYPA management in the following time frames… Accident Report 24 hours written, Incident Reports 24 hours written, Injury Immediate Verbal Notification / 48 hours written, Near Miss Immediate Verbal Notification/ 48 hours written, Safety Checklist Daily written.***

In case of an incident…

- ***Stabilize the scene, eliminate the hazard to avoid further injuries***
- ***Provide First Aid. If the injured needs to see a doctor, transportation must be provided***
- ***Contact your Local Safety Coordinator/Advisor or EHS Director and provide incident details immediately***
- ***Investigate the incident immediately***
- ***Request each witness to complete a witness statement***
- ***Complete the incident/investigation form***

6.4 Site Emergency Action, Escape & Response Plan

The ABB Site Manager will be responsible for implementing a site emergency and evacuation plan for the project site and personnel.

This plan shall cover at a minimum…

- ***Action in the event of an emergency***
- ***Alarm method***
- ***Closest medical clinic (occupational health) or hospital (level 1 trauma center)***
- ***First Aid station or kits***
- ***Method of transportation***
- ***Muster point location(s)***
- ***Name of designated first aid / CPR attendant(s) or first responders***
- ***Telephone contact details for local fire department, ambulance and police station***
- ***Latitude and Longitude if airlift is required***

A site notice board shall be displayed giving details of the emergency procedure to be followed together with the names addresses and telephone numbers of the local agencies. This shall include ambulance, hospital and police. ***Please see appendix for the Emergency Action, Escape and Response plan***

6.5 Illness & Injury Prevention Plans

An Illness & Injury Prevention Plan must be prepared and submitted (to ABB) by all contractors who are undertaking work. The safe work procedure must be submitted to the ABB Site Manager for review at least 5 days prior to work commencing. Contractor shall ensure that competent and trained workers are utilized for the task. Training records shall be readily available for inspection.

This shall include as a minimum the following…

- ***A description of the activity or task to be undertaken***
- ***The anticipated hazards and a plan to address the hazards***
- ***Details of location;***
- ***Resources to be used;***
- ***A description of the method of working to be employed including the sequence of activities;***
- ***Safety precautions to be applied.***
- ***Any relevant emergency or contingency requirements.***

6.6 Enforcement of Controls

Once the safety requirements have been adequately communicated, personnel have been trained and clarity has been provided on all applicable site requirements, workers shall be accountable to ensure they comply with all of these requirements. Supervisors and Managers are accountable to ensure all requirements are followed at all times without exception. In some cases positive reinforcement methods may encourage safe behaviours. However, serious or repeated non-compliances shall not be tolerated and a constructive progressive disciplinary system shall be established and implemented.

6.7 Resources – Safety Equipment / Supplies

The resources required for a safe execution of this project are likely to include the following…

- ***Personal protective equipment to include high visibility safety vests, safety shoes, hard hat, safety glasses or goggles, gloves and flame resistant clothing.***
- ***Forearm guards, earplugs or muffs***
- ***Adequate first aid equipment;***
- ***Physical barriers for demarcation of hazardous areas (e.g. trench or vaults) to protect workers and general public;***
- ***Safety signage;***
- ***Provide canopy or tent as shade for workers during summer hot days***
- ***Traffic control arrangements and associated equipment, as required.***
- ***Waste containers – waste is to be separated (wood, glass, metal and general garbage)***
- ***Toilet facilities suitably ventilated and lit.***
- ***Potable water supply and drinking vessels;***
- ***Washing facilities.***

6.8 Education and Training

All ABB personnel, contractors and vendor personnel working on this project shall be competent and have the necessary skills and aptitudes to perform their assigned work and shall have the necessary qualifications to operate equipment to avoid harm to people and or the environment.

6.8.1 Site Induction & Orientation

Persons entering within the confines of ABB work areas shall receive a site induction provided by the ABB Site Manager or his nominated representative. Refer to section 6.2 for induction topic details.

6.8.2 Competency & Qualification

The Project Manager will work closely with the local Safety Advisor to identify the training and education, and experience needs of all employees and contractors whose work may create hazards and risks to personnel on the project. The ABB PS NAM competency matrix can be used as a guide to determine workers training requirement.

The minimum EHS training and education subjects for workers associated with this project are:

- ***Basic Due Diligence Responsibilities***
- ***Dust control***
- ***Electrical safety and Lockout/Tagout (if applicable to duties)***
- ***Emergency Procedures***
- ***Environmental awareness***
- ***Hands/arms safety***
- ***Hazard Reporting and conducting Pre-Job Safety Briefings***
- ***Heat related illnesses awareness and prevention.***
- ***Housekeeping***
- ***Near Miss, Good Catch & Incident Reporting***
- ***CFR 1926 OSHA-10 hour safety training (for employees)***
- ***CFR 1926 OSHA-30 hour safety training (for supervisors)***
- ***Safety Observation Tours (SOT's)***
- ***Site access, parking & security requirements***
- ***Sprain and strain prevention and pre-work stretching routine***
- ***Tools, equipment and machinery inspection and testing***
- ***Use of PPE***

All personnel including contractors and vendors shall provide proof of competency training directly related to their assigned work. Also, a full review of training requirements, specific to this project, shall also be conducted on site.

Training shall be provided by a combination of formal and informal process and be carried out utilizing any combination of ABB line management representatives, supervisory staff and independent trainers. Training requirements will be made known to ABB employees and contractors prior to or during the project kick-off meeting. Training records will be maintained locally.

Note: Mandatory certification of competency and qualifications are required for certain tasks or the operation of certain equipment. Records of these documents are to be kept on employee personnel files. An example of certifications required are Crane Operator Certification/Licensure, qualified rigger and certified flagger.

7. Monitoring

Daily monitoring of site activities by site supervisory personnel is an integral part of their duties. Informal daily site tours shall be conducted regularly during each shift to ensure all activities are carried out in a safe manner and do not cause undue risk to personnel. The health and safety requirements have been set out in this plan and the following arrangements are provided to check on compliance with the plan as a whole to ensure that ABB's policy is complied with and that health and safe performance on the project is monitored and reviewed.

ITEM	METHOD	DATA	RESPONSIBILITY	FREQUENCY
Public safety protection measures 1. Physical protection measures 2. Lighting 3. Signage	Routine check at the start and finish of the day	Record non - compliances/comments in site log book	Site Manager	Twice per day
General Site safety standards 1. PPE worn 2. Housekeeping 3. Machinery and equipment 4. Protection of excavations 5. Traffic safety requirements 6. Pre-job safety briefing	•Site Observation Tours •Planned Inspections	•Site Observation Tours •Planned Inspections	ABB Site Manager	Weekly
Safety requirements re safe work procedures / practices	Pre-job safety briefing	Record in site safety file.	Site Foremen	Daily
Competence of contractor	Pre-contract submissions	Records /questionnaire	Project manager	Pre-contract
Competence of key personnel Site Foreman, Excavator operator, first aider and others as appropriate.	Project kick off meeting.	Certificates of qualifications & references Licence	ABB Site Manager	Pre-start
Maintenance and testing of heavy vehicle and equipment	•Project kick off meeting. •Pre-Job Briefing •Daily Inspections •Planned Inspections •Audits	Records of examination and inspection	ABB Site Manager	Pre-start and when new equipment is brought on site.
Site health and safety plan – construction phase	Review / update prior to work starting on site	Approval	ABB Project Manager	Pre-start
Safe work procedures submitted in advance of work	Progress check on contractor	Record in site safety file.	ABB Site Manager	5 days in advance of the scheduled work
Incidents & near misses / good catches	Review weekly at site meeting	Record in site safety file.	ABB Site Manger	Weekly

Refer to **Appendix 4** for a list of forms.

7.1 Inspections and Audits

Regular planned inspections are to be conducted at this project site as per this site safety plan requirements. Site supervisory personnel are trained and well versed on conducting workplace inspections and verifications using related assessment tools. Reports are shared with all workers and ABB.

In depth audits will be conducted regularly by safety professionals. A detailed schedule is to be developed to ensure that proper compliance monitoring activities are taking place.

7.2 Monthly Data Reporting

The following data SHALL be submitted by the site manager (or any individual acting within that role) to the Local Business Unit Safety Advisor (Lynn Norman or David Leslie) & the Business Unit Safety Administrator (Kathy Boccia) no later than the 2ND DAY of the following month. The submission MUST include the total number of…

- ***First aid cases, both doctor assisted and on-site treatment***
- ***Hours worked by ABB personnel and all subcontractors***
- ***The quantity of persons working on the project site***
- ***Recordable, restricted and lost time injuries (to be determined in conjunction with LBU Safety Advisor and Medical Personnel)***
- ***Near miss reports***
- ***Number of health and safety audits of any kind (this includes both internal and external customer or regulatory audits)***
- ***Vehicle mileage recorded by ABB personnel only***
- ***Number of motor vehicle incidents/accidents (no matter how minor)***
- ***Safety Observation Tours or SOT's performed upon site by all personnel (Please note, these must be scanned and forwarded every month)***
- ***Good Catch reports performed on site by all personnel (Please note, these must be scanned and forwarded every month)***
- ***Spills or environmental event reports (regardless of severity)***
- ***State/Federal inspections of any kind, including citations or notices***
- ***JHA's/JSA's, pre-job safety briefings, vehicle & equipment inspections, weekly safety meetings sign-in sheets, site induction list (an accounting of all personnel and contractors inducted into site activities***

7.3 Documentation and Record Keeping

Copies of all pertinent documentation shall be retained on site. For example, copies of worker competency certificates, licenses and training shall be inserted into the appropriate tab within the site safety and health plan documents. Infraction information and disciplinary notices shall be documented and kept within the same location.

Other examples of documentation retained on site include:

- ***Advisories/notices***
- ***Audit reports***
- ***Incident reports and Lessons Learned***
- ***Indoctrination records (sign-in checklists)***
- ***Inspection records by Client***
- ***Meeting minutes***
- ***Near miss/hazard reports***
- ***Pre-Job Briefings, Tailboard forms, JSA's, Equipment Inspections***
- ***Safety Alert's***
- ***SOT's & Good Catches***

COMMUNICATION & CONSULTATION

This table specifies what needs to be communicated to whom, who is preparing the document, what form the document will take (how) and when it will be communicated.

What	Who		How	When
	From	To		
Environmental, Health & Safety, Plan	Principal Contractor	Project Team Contractor Employer Site Manager	Document	Prior to mobilization
Client Requirements	Client	Principal Contractor	Meetings Emails /Letters Contract Drawings	Pre-bid, Design Review, Kick-Off
Environmental, Health & Safety Notifications	Principal Contractor	All Prime Contractors Employer	Meetings Email Weekly safety meeting	As & When required
Scope of work Change	Client	Principal Contractor	Emails Meetings	As & When required
Risk / Hazards Assessment	Principal Contractor	All Prime Contractors	Emails Meetings Health and Safety Plan	1 month prior to mobilization
Incident Reporting (Including. Near Miss & Good Catch)	All	Client Site Manager Project Manager Safety Advisor	Accident/ Incident Report Near Miss / Good Catch Form	See section **7.3**
Emergency Preparedness	Principal Contractor	All Prime Contractors Client	Briefing Tool Box Document / Safety Boards	Prior to mobilization
Site Observation Tours (SOT) & Audit Results	Site Manager	Project Manager Safety Advisor	Report	SOT – Weekly Audit – when conducted.

7.4 Project Completion

Upon completion of the project the following documentation will be compiled and handed to the client or customer representative…

- ***Any compliance certificates***
- ***Any relevant survey results***
- ***As-built drawings***
- ***Design and manufacturing data in respect of the equipment.***
- ***Geological data***
- ***Operating and maintenance manuals***
- ***Test and commissioning report containing all test results***

Appendix 1 – Project Risk Assessment Methodology

CONSEQUENCES		
Description	**Score**	**Definition**
Fatal Injury	5	Multiple or single fatality per event
Severe Injury	4	A major fracture of any bone, loss of limb or eye, loss of sight or hearing (permanent), acute illness requiring medical treatment, any injury requiring > 30 days off work
Major Injury	3	Fracture of the hand, wrist, or ankle, unconsciousness, major burn, amputation of fingers or toes, loss of sight or hearing (temporary), any injury leading to 3-30 days off work
Minor Injury	2	Fracture of digits, strains, scratches, cuts and abrasions, minor burn, general discomfort, minor occupational related illness, occupationally induced allergic reaction, any injury resulting in < 3 days off work
Superficial Injury	1	Very minor or superficial injury where First Aid may be required but no lost time or medical treatment results.

PROBABILITIES		
Description	**Score**	**Definition**
Highly likely	5	Event is likely to occur if controls are not adequate. Possible weekly frequency of occurrence
Likely	4	Event is likely to occur at least once a month
Possible	3	Event could occur at least once every year
Unlikely	2	Expected to occur every few years
Remote	1	Very rare event likely only every 10 years

Appendix 1 – Project Risk Assessment Methodology –continued

LIKELIHOOD OF OCCURRENCE						
SEVERITY		Highly Likely (5)	Likely (4)	Possible (3)	Unlikely (2)	Remote (1)
	High likely (5)	25	20	15	10	5
	Likely (4)	20	16	12	8	4
	Possible (3)	15	12	9	6	3
	Unlikely (2)	10	8	6	4	2
	Remote (1)	5	4	3	2	1

LEVEL OF RISK	
Level Of Risk	Action and Timescale
HIGH	Immediate requirement to review and investigate the case for removing / reducing the risk or improving the control measures
MEDIUM	Risk not broadly acceptable. Need investigation to consider reasonably practicable improvements to achieve as low as reasonably practical.
LOW	Detailed working to support conclusion

APPENDIX 1: Project Risk Assessment

< Review all risks and adjust according to project applicability >

(1) Engineering Design & Testing

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation & Standards	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Stationary positions held for long periods of time	Sprains, strains, stiffness, chronic limitations to range of motion, clotting & deep vein thrombosis, numbness in extremities, fatigue	3	3	9	Occupational therapy and biomechanical engineering safe work practices,	• Follow established ergonomics guidelines • Avoid static positions for extended periods, regularly get up and move around – report injuries to supervisor • Stretch and flex prior to commencing work • Stay hydrated and eat healthy • Anthropometric & ergonomic selection of furniture	2	2	4	6/11/2014
Working in field or permanent offices	Slips, trips & falls leading directly to contusion, abrasion, fracture, laceration, infection, injection, concussion	3	4	12	OSHA CFR 1910, 1926, ABB NAM Guidelines, OHSAS 18001, ANSI Z-10, BBSM	• Housekeeping, keep all work areas and aisles clear of materials, trash, cordage, etc. • Safety Observation Tours • Emphasize familiarity with surroundings	2	3	6	6/11/2014
Proximity to activated electrical power equipment or sources while surveying project site (overhead lines, bushings)	Shock, Arc-flash, electrocution, burns 1-3, flying debris in eyes, burned corneas, inhalation of hazardous or superheated gases, inhalation of known human carcinogen, impalement, death	5	4	20	NFPA 70e, IEEE NESC, ABB NAM Guidelines, ANSI	• Proper pre-task planning (JHA and orientation) • Ensure minimum approach distances are maintained • Qualified employees who have received annual safety training. • CPR/FA/AED/BBP & Fire extinguishing training • Test and verify • PPE	5	2	10	6/11/2014

(1) Engineering Design & Testing

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation & Standards	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Manual lifting, movement and relocation of objects	Strains, sprains, contusions, abrasions, dislocations, fractures, tears in ligaments and cartilage, lacerations	3	4	12	OSHA CFR 1910 and 1926, ABB Nam Guidelines, occupational therapy safe work guidelines	• Proper planning • Use of hand-truck or pallet jack • Use ergonomically sound manual lifting procedures • Ask for assistance • Wear personal protective equipment (i.e. gloves, boots, etc.)	1	3	3	6/11/2014
Opening panels to inspect and diagnose electrical apparatus condition (energization, induction and capacitance)	Shock, Arc-flash, electrocution, burns 1-3, flying debris in eyes, burned corneas, inhalation of hazardous or superheated gases, inhalation of known human carcinogen, death, impalement	5	5	25	NFPA 70e, IEEE NEC, ABB NAM Guidelines, ANSI & ASTM	• Proper pre-task planning (JHA and orientation) • Ensure minimum approach distances are maintained • Qualified employees who have received annual safety training. • CPR/FA/AED/BBP & Fire extinguishing training • Test and verify • PPE • Review/verify with design drawings and coordinate with the project design team	5	2	10	6/11/2014
Travelling to and within project areas… vehicle and equipment operations	Death, amputation, static, viscous and inertial injuries to the body, fractures, concussions, contusions, abrasions, property damage, vehicular manslaughter, embarrassment, loss of business	5	4	20	OSHA 1910 and 1926, DOT, MUTCD, Local and state laws, ABB NAM Guidelines, Customer safe work practices	• Follow defensive driving guidelines • Avoid distractions/no portable communications device while driving • Maintain vehicle in good condition • Back in to park • Competency training and verification	5	2	10	6/11/2014

(1) Engineering Design & Testing

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation & Standards	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Entering into industrial areas where equipment produces more than 85dbA noise level	Noise induced hearing loss, standard threshold shift, confusion, headache, poor judgement	4	2	8	OSHA CFR 1910 and 1926	• Limit noise level to less than 85dbA by using special coating for sound proofing material • Identify areas with excessive noise • Limit access to said areas • PPE • Place warning stickers on equipment. • Design quieter equipment • Maintain equipment	4	1	4	6/11/2014
Employee working alone	No rescue availability, unrecognized hazards	4	4	16	OSHA CFR 1910 and 1926, NFPA, NESC, ABB NAM Guidelines,	• Follow ABB Lone Worker Policy	4	1	4	6/11/2014
Entering into low-light or visibility areas	Slips, trips & falls, lacerations, impalement, infection, unrecognized hazards and project scope, fractures, contusions, abrasions, death	5	3	15	OSHA CFR 1910 and 1926, ABB NAM Guidelines	• Review work risk assessment • Inspect working area • Utilize light meter • Install necessary temporary lighting fixtures • Use and maintain required PPE	5	1	5	6/11/2014
Excessive hours spent engaged in work	Poor judgement, mistakes, unrecognized hazards/scope, impaired driving, vehicular manslaughter, property damage, loss of reputation, cost overruns	4	4	16	ABB NAM Guidelines	• Follow established hours of work policy, adequate rest, leisure, sleep time, avoid more than 6 days of work per week	4	1	4	6/11/2014

(2) Civil Works

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Staging vacuum truck for rock removal operation, moving vehicles	Struck-by moving vehicles leading to elastic, viscous and inertial injuries, lacerations, abrasions, puncture, fractures	5	2	10	OSHA 1910, 1926, DOT, ABB NAM Guidelines	Spotters, qualified operators, delineation & barricades, controlled access	5	1	5	
Staging steel containment boxes for rock removal operation	Struck-by lost load leading to elastic, viscous and inertial injuries, lacerations, abrasions, puncture, fractures	4	2	8	OSHA 1910, DOT, ABB NAM Guidelines	Spotters, qualified operators, delineation & barricades, controlled access	4	1	4	
Vacuuming operations inside bays	Inadvertent contact with hazardous source of energy (electrical, thermal), 1-3 degree burns, inhalation of plasma, vaporization of the mucus membranes (eyes), shock and destabilization of heart rhythm, death; inhalation, absorption, injection, ingestion of toxic substance	5	5	25	OSHA 1910, 1926, NEC, NFPA 70E, ABB NAM Guidelines	Qualified electrical supervision, pre-task hazard analysis, post-task review, bonding and grounding procedures, orientation, lock-out/tag-out procedures, PPE, dust control, sampling	5	2	10	
Transport of removed rock to staging area	Struck-by moving vehicles	5	2	10	OSHA 1910, 1926, DOT, ABB NAM Guidelines	Spotters, qualified operators, delineation & barricades, controlled access	5	1	5	
Offloading of steel boxes and reloading onto flatbed	Struck-by steel boxes	5	2	10	OSHA 1910, 1926, DOT, ABB NAM Guidelines	Spotters, qualified operators, delineation & barricades, controlled access	5	1	5	

(2) Civil Works

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Inspection of core drill (equipment)	leading to elastic, viscous and inertial injuries, lacerations, abrasions, puncture, fractures	5	2	10	OSHA 1910, 1926, DOT, ABB NAM Guidelines	Spotters, qualified operators, delineation & barricades, controlled access	5	1	5	
Inspection of temporary power source and equipment	leading to elastic, viscous and inertial injuries, lacerations, abrasions, puncture, fractures	4	2	8	OSHA 1910, DOT, ABB NAM Guidelines	Spotters, qualified operators, delineation & barricades, controlled access	4	1	4	
Inspection of area to be core drilled	Inadvertent contact with hazardous source of energy (electrical, thermal), 1-3 degree burns, inhalation of plasma, vaporization of the mucus membranes (eyes), shock and destabilization of heart rhythm, death; inhalation, absorption, injection, ingestion of toxic substance	5	5	25	OSHA 1910, 1926, NEC, NFPA 70E, ABB NAM Guidelines, local and State regulations	Qualified electrical supervision, pre-task hazard analysis, post-task review, bonding and grounding procedures, orientation, lock-out/tag-out procedures, PPE, dust control, sampling	5	2	10	
Arrangement and inspection of water supply for dust control	Struck-by moving vehicles	5	2	10	OSHA 1910, 1926, DOT, ABB NAM Guidelines	Spotters, qualified operators, delineation & barricades, controlled access	5	1	5	
Noise generated from vehicles and construction equipment	Overexposure may result in haring loss	4	2	8	OSHA 1910, 1926 ABB NAM Guidwelines	Use less noisy equipment train workers in hearing conservation & use of hearing protection				
Movement of steel boxes and/or their contents	Spills related to vehicle and steel box contents (rock)	3	2	6	OSHA, EPA, DOT	Spotters, qualified operators, delineation & barricades, controlled access, secondary containment	2	1	2	

(2) Civil Works

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Excavation of trenches	Soil cave-in, previously disturbed soil. weight and vibration of vehicle	4	2	8	OSHA 1910 & 1926 REGULATIONS	Conduct risk assessment, competent person to inspect, install proper shoring, barricades and warning signs, excavated materials & tools stored least 2ft from edge. Provide access egress	4	1	4	
Excavations, trenching	Inadvertent contact with hazardous source of energy (electrical, thermal), 1-3 degree burns, inhalation of plasma, vaporization of the mucus membranes (eyes), shock and destabilization of heart rhythm, death; inhalation, absorption, injection, ingestion of toxic substance	5	5	25	OSHA 1910, 1926, NEC, NFPA 70E, ABB NAM Guidelines	Qualified electrical supervision, pre-task hazard analysis, post-task review, bonding and grounding procedures, orientation, lock-out/tag-out procedures, PPE, dust control, sampling	5	2	10	
Heat Stress	Heat related illnesses e.g. heat exhaustion and heat stroke	4	3	12	OSHA 1910 & 1926 REGULATIONS ABB NAM Guidelines	• drink plenty of water • seek shade during break periods • don't work alone • limit time in hot areas • limit heavy duty activities in cooler time of the day when possible	5	1	5	

(2) Civil Works

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Failure to maintain shoring	**Water seepage causing collapse of soil, rain storms**	**4**	**4**	**16**	**OSHA 1910 & 1926 REGULATIONS**	**Means of de-watering the excavation. Inspect and maintain proper shoring**	**4**	**1**	**4**	
Dust and emissions created by earthmoving activities, wind and construction vehicles. Dirt, mud or other debris tracked onto paved public road ; adhering to the side or undercarriage	Environmental pollution and public safety.	**2**	**3**	**6**	EPA, OSHA, county and city ordinance.	• Use trackout pad to remove dirt / mud of vehicle tires. •sweep the dirt / mud at gate entrance. • vehicles carrying construction material to be properly covered or effective means.. •sprinkling the ground surface with water until it is moist. • use safety glasses with sideshields	2	1	2	
Toxic or flammable gases present in soil	**Exposure to greater than PEL without proper PPE, adverse health effects**	**3**	**1**	**4**	**OSHA 1910 & 1926 & NIOSH REGULATIONS ABB NAM Guidelines**	**Use 4-gas monitor to detect air readings in trenches or vaults with depth of 5ft or greater**	**3**	**1**	**3**	
Underground utilities such as telecom, gas and electrical lines, water piping, etc.	Electrocution Circuit outage Damage to equipment.	5	4	20	OSHA 1910 and 1926 regulations or applicable local regulation or standard ABB NAM Guidelines	• locate underground utilities (e.g. DigAlert or blue stick) before digging. • hand dig or hydro vacuum if digging is close to utilities lines. • Refer to survey report and drawing, if available. - use required PPE and equipment.	5	1	5	

(2) Civil Works

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Poor housekeeping.	Trip and slip hazards, step on sharp objects, contact with sharp edges or protruding objects	3	2	6	OSHA 1910 and 1926 standards.	• clean up the work area frequently. • use safe work practices. • monitor the work areas by conducting regular SOT and report of good catches. • raise safety awareness during daily pre-job briefing and weekly safety meeting.	3	1	3	
Handling & Hoisting Loads	Inadequate rigging, or mechanical Failure	5	4	20	OSHA regulations or applicable local regulation or standard	• qualified personal work on equipment • tag of equipment • barricade area • daily Inspection & Log • attend coordination meeting • follow existing procedures • do not leave a suspended load unattended	5	2	10	
Working around open holes	Fall in open Holes not barricaded or covered.	3	2	6	OSHA 1910 and 1926 standards. ABB NAM Guidelines	• use barricade and/or cover open holes. • use proper signage	3	1	3	
Ergonomic	Injury/strains/ soft tissue	3	3	9	OSHA 1910 and 1926 ABB NAM Guidelines	• follow established ergonomics guidelines • avoid repetitive activity for long durations – report injuries to supervisor	2	2	4	
Hours of Work/Fatigue Mgmt.	Health	4	4	16	OSHA 1910 and 1926, ABB NAM guidelines	• follow established hours of work policy, adequate rest, leisure, sleep time, avoid more than 6 day/weeks	2	2	4	

(3) Installation

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Sparks of burning and welding is not contained	Fire hazards	4	2	8	OSHA & NFPA standards.	• follow established procedures for burning and welding • have extinguisher readily available prior to working • cover or remove combustibles • have water & sand available • use welding curtains • have a safety watcher..	4	1	4	
Equipment placed at height and not properly secured.	Equipment falls and strike people or equipment.	5	3	12	OSHA standard	• contractor to provide trained crane operator for installation work • competent personnel for rigging • areas will be roped off • rigging must be inspected prior to use • one signal man for directions only. • always wear hard hat. • do no throw debris or tools from height.	5	2	10	
Sharp edges of equipment or structures.	Lacerations, Cuts and Scrapes, etc.	3	2	6	OSHA standards.	• wear proper PPE • housekeeping • pad or guard against contact. • daily Pre-Job Safety Briefing • use proper tools • wear cut resistant gloves when working on or near sharp edges.	3	1	3	

(3) Installation

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Worker Falls from Ladder	Ladder not properly setup or use. Not using 3-point contact when climbing. Carry heavy equipment while climbing. Slippery rungs surface.	4	3	12	OSHA 1910 and 1926, ABB NAM Guidelines	• secure ladder at the top and bottom • fall Protection Training • 5 point harness and tie off to secure anchor point (over 10 Ft) • inspect all equipment before use and log • follow regulations • use 3-point contact at all time when climbing • do not place ladder at doorway..	4	1	4	
Working at height (6 ft or greater)	Without using proper fall protection.	4	3	12	OSHA 1910 and 1926, ABB NAM Guidelines	• install and use customized fall protection. • guard rails must be in place, where practicable. • use proper signage • follow procedures & regulations • wear PPE, as required • fall Protection Training • use full body harness. -Inspect all equipment before use	4	1	4	
Handling & Hoisting Loads	Inadequate rigging, or mechanical Failure	5	4	20	OSHA 1910 and 1926 regulations or applicable local regulation or standard ABB NAM Guidelines	• qualified personal work on equipment • tag of equipment • barricade area • daily Inspection & Log • attend coordination meeting • follow existing procedures • do not leave a suspended load unattended	5	2	10	
Tools and operating equipment are noisy	Not using hearing protection.	4	2	8	OSHA and local/ state standards	• proper training on equipment • hearing protection • proper PPE • double hearing protection, as necessary	4	1	4	

(3) Installation

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Hazardous Chemicals.	Contact without protection. Irritation to hand or other body parts.	3	2	6	OSHA 1910 and 1926 regulations or applicable local regulation or standard. NIOSH ABB NAM Guidelines	• workers trained in HazCom • review MSDS before using. • follow safe work practices. • all chemicals brought on to the site shall have MSDS and be made readily made available to workers. • wear chemical goggles, proper gloves, aprons where necessary. Follow the MSDS instructions.	3	1	3	
Inadequate Illumination	Personal injury, impact quality of work and productivity	2	1	2	OSHA and local & State standards, ABB NAM Guidelines	-Ensure adequate lighting & Emergency lighting -Materials not to block exit routes - Good housekeeping	2	1	2	
Heat stress	Not acclimatized to working in high heat outdoor environment. Personal health.	5	3	15	OSHA and local & state standard.	• drink plenty of water • seek shade during break periods • don't work alone • limit time in hot areas • limit heavy duty activities in cooler time of the day when possible	5	1	5	
Workers or electrical equipment are subject to water or wet condition.	Not using GFCI or cord with double insulation.	5	3	15	OSHA 1910 and 1926 regulations or applicable local regulation or standard ABB NAM Guidelines	• GFIC equipment and/or • follow good electrical practice • electrical cords with double insulation. • assured grounding.	5	2	10	
Operating electrical switch	Arcing	4	2	8	OSHA 1910 and 1926 regulations or applicable local regulation or standard, ABB NAM Guidelines	• follow LOTO procedure • follow switching procedure • wear arc flash rated clothing	4	1	4	

(3) Installation

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date (yy/mm/dd)
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Use personal cell phone while engaging in work activities	Lost concentration/ distraction	3	2	6	Best practices ABB NAM Guidelines	• clear policy prohibiting the use cell phone while engaging in high risk work • cell phone be kept at designated location and can only be used during breaks or lunch, or pre-arranged with supervisor..	3	1	3	
Unexpected energization of equipment	LOTO and protective grounding not in placed.	5	3	15	OSHA 1910 and 1926, NEC, NFPA regulations or applicable local regulation or standard, ABB NAM Guidelines	• locking and tagging procedures - use proper signage and rope-off energized equipment Follow ABB 7 Steps That Save Lives. Use proper insulating equipment.	5	2	10	
Ergonomic	Injury/strains/ soft tissue	3	3	9	OSHA 1910 and 1926 regulations or applicable local regulation or standard	• follow established ergonomics guidelines • avoid repetitive activity for long durations – report injuries to supervisor	2	2	4	
Travelling, vehicle operation	Personal injury/damage	5	2	10	OSHA 1910 and 1926 regulations or applicable local regulation or standard	follow defensive driving guidelines • avoid distractions/no portable communications device while driving. • maintain vehicle in good condition	2	2	4	

4 Commissioning

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date dd/mm/yyyy
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Commissioning engineers not familiar with the specific hazards of the station and safety requirements.	Not under supervision of a qualified person.	4	3	12	OSHA 1910 and 1926 regulations or applicable local regulation or standard	• attend the grid operator site orientation and ABB site safety orientation before starting work. • review of JHA • wear proper PPE • daily Pre-Job Safety Briefing • review and familiar with site EHS plan.	4	1	4	
Inadequate lighting	Trips, falls, work errors leading to possible injury	3	2	6	OSHA standard	• report deficiencies • install Portable lighting	3	1	3	
Use personal cell phone while engaging in work activities	Lost of concentration/ distraction	3	2	6	Best practices	• clear policy prohibiting the use cell phone while engaging in high risk work • cell phone be kept at designated location and can only be used during breaks or lunch, or pre-arranged with supervisor..	3	1	3	
Mis-coordination of equipment commissioning with client system operator.	Electrical permit to work not being used.	5	3	15	ANSI / IEEE / National Electrical Code. Client best practices.	• conduct job hazards analysis. • pre-job briefing with client representative • use 3-way communication. • proper PPE as per arc-flash labels. • protection to be checked prior to powering up • use electrical permit-to-work.	5	2	10	
Malfunction of electrical apparatus. E.g. Voltmeter, etc.	Not calibrated or inspected before use.	4	3	12	OSHA regulations or equipment manufacturer's instructions.	• proper training on equipment • follow manufacturer's instructions • proper PPE • protection, as necessary • perform functional test before each use.	4	1	4	

4 Commissioning

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date dd/mm/yyyy
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
Induction or backfeed.	Personal protective grounding not in effect.	5	4	20	OSHA/ NFPA standards	• use multi-meter to test circuit • use latest drawings • follow LOTO procedure • establish equi-potential grounding. • use electrical Permit to Work.	5	2	10	
Step and Touch potential	Worker not aware of voltage gradient exists; or getting in series of two different potentials.	5	3	15	OSHA standard and IEEE studies.	• workers to be trained in electrical safe work practices and substation hazards. • avoid touching any equipment without ensuring it is safe to do so. • do not use station power and extend the cord outside of the substation. • ground heavy equipment and machines to the station ground grid when used in the substation. • use 4/0 AWG grounding cables for grounding vehicle and equipment. Cable shall bear valid in-service inspection and testing tag.	5	2	10	
Wrong electrical source is shut-down	Testing not made to ensure positive isolation.	5	3	15	Client drawing and switching order. OSHA 1910 and 1926 regulations or applicable local regulation or standard	• test circuit with multi-meter • review station isolation schematic and single line drawing. • walk down the equipment to verify isolation points with client clearance holder.	5	1	5	
Commissioning team not aware of other on- going work	Overlapping of activities which may endanger other crews at site.	4	2	8	OSHA Standard.	• attend daily Pre-Job Safety Briefing. • foreman to participate in weekly safety meeting.	4	1	4	
Ergonomic	Injury/strains/ soft tissue	3	3	9	OSHA 1910 and 1926 regulations or applicable local	• follow established ergonomics guidelines • avoid repetitive activity for long	2	2	4	

4 Commissioning

Risk (R) = Consequences (a) x Probability (b). Refer to risk assessment metrics page for additional information. Consequence and Probability scores are 1 through 5 (5 being the most severe consequence and highest probability).

HAZARD		Assessed Risk before controls			Applicable legislation	Proposed Controls	Assessed risk with controls			Review date dd/mm/yyyy
Condition or Action	Consequence	Consequence (a)	Probability (b)	RISK (R)			(a)	(b)	(R)	
					regulation or standard	durations – report juries to supervisor				
Commissioning team not aware of other on- going work	Overlapping of activities which may endanger other crews at site.	4	2	8	OSHA Standard.	• attend daily Pre-Job Safety Briefing. • foreman to participate in weekly safety meeting.	4	1	4	
Ergonomic	Injury/strains/ soft tissue	3	3	9	OSHA 1910 and 1926 regulations or applicable local regulation or standard	• follow established ergonomics guidelines • avoid repetitive activity for long durations – report juries to supervisor	2	2	4	
Hours of Work/Fatigue Mgmt.	Health	4	4	16	OSHA 1910 and 1926 regulations or applicable local regulation or standard, ABB NAM Guidelines	• follow established hours of work policy, adequate rest, leisure, sleep time, avoid more than 6 day/weeks	2	2	4	

Traffic Management

Only employees with a current driver's licence and the relevant site endorsement will be able to operate mobile equipment/vehicles on site.

Traffic in and around the work place shall be kept to a minimum and restricted to those vehicles involved in work activities. All drivers must observe the posted speed limit.

Notices and Signs

Relevant safety notices and signs shall be prominently displayed in such a manner as to ensure personnel in the vicinity are made aware of the potential hazard.

Barricading

Barricades are destined to restrict access to locations where hazardous conditions are prevalent.

All potentially hazardous areas or processes shall be adequately highlighted by the appropriate warning sign and where deemed necessary, be bunted off with the appropriate barricade tape & information tag. Fixed temporary guardrails shall be erected at entry points to areas requiring the removal of permanent guard railing or other means of fall protection.

***Typical appropriate barricading situations include*:**

- **Danger areas/restricted access**
- **Enclosed space entry**
- **High Voltage Work**
- **Hot Work**
- **Overhead Work**
- **Scaffold erection and protection**
- **Traffic and pedestrian control**
- **Trenching**

Fall Protection

Supervisors are responsible for ensuring the hierarchy of control for the prevention of falls has been considered prior to allocating tasks requiring the use of fall restraint equipment.

Tasks requiring the use of Elevating Platforms (boom lifts, scissor lifts etc.) shall be used after the completion of risk assessment.

All employees required to perform work utilizing fall restraint/arrest systems shall have completed adequate training or instruction to perform the tasks and identify hazards involved by means of the risk assessment process.

The requirements of Fall Protection Program shall be observed when working at a height of 6 foot or greater.

Trenching

In trenches deeper than 4 feet (1.22 meters), locate means of exit, such as ladders or steps, so they are no more than 25 feet (7.62 meters) of travel from anywhere in the trench. For trenches (or any excavation) 5 feet (1.52 meters) or more in depth shall have cave-in protection through shoring, sloping, benching, or the use of hydraulic shoring, trench shields, or trench boxes. Trenches less than 5 feet (1.52 meters) in depth and showing potential of cave-in will also be provided with cave-in protection. The specific requirements for each trench are dependent on upon the soil classification as determined by a competent person.

In addition, In particular employees and contractors shall…

- **Be trained in the hazards associated with the specific trenching/excavation work tasks;**
- **Be trained in the proper use of all personal protective equipment (PPE) being used or required at the trenching/excavation site;**
- **Keep excavated materials at least two feet back from the edge of the trench;**
- **Store all material at least two feet from the edge of the trench;**
- **Keep heavy loads of all kinds as far as possible form a trench;**
- **Don't allow water to accumulate in a trench. Water reduces soil stability;**
- **Soil classification must be performed by a competent person using acceptable visual and manual testing methods;**
- **Atmosphere must be tested for hazards prior to entry;**
- **Always check with utility companies before digging. Locate all underground utilities near the trenching operation. Support any utilities adjacent to or crossing the trench. Overhead power lines are also a potential hazard;**
- **Use a spotter to probe for underground cables and utilities in areas where such items are known to exist;**
- **A competent person must inspect the trench, adjacent areas, and any protective systems for possible cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions. Inspections must be performed daily: before work begins, throughout the shift, and after every rainstorm or other hazard-increasing occurrence.**

Ladders

All personnel and contractors shall undertake work from ladders in accordance with local regulations. ***In particular employees and contractors shall…***

- **Use the proper ladder for the task (check the label on ladder for the rating)**
- **Inspect ladders prior to use to ensure that they are in good condition for safe operation;**
- **Use 3 point contact when ascending or descending;**
- **Hoist materials to work levels;**
- **Use ladders only for works of a minor nature;**
- **Secure all ladders at the top and bottom;**
- **Ensure that only one person works from a ladder;**
- **Not over reach when using a ladder; and**
- **Not carry out any cutting or work involving the use of power tools from a ladder.**
- **Not carry out any cutting or work involving the use of power tools from a ladder.**

Scaffolding

Scaffolding is a preferred method to ladder use, however, personnel erecting scaffold must hold the relevant certification to carry out the task and daily inspections before use. All scaffolds and work platforms erected and constructed shall comply with Scaffolding General Requirements. Permitting must be used at all times to determine safe use process.

Housekeeping

Housekeeping shall be considered an extension of every activity on the site. The site shall maintain a high standard of housekeeping at all times. Supervisors shall be responsible for ensuring an informal inspection is conducted on a daily basis. The areas within their control are to be maintained in a tidy, safe condition, materials and equipment not in use are neatly stacked away from the work areas and clear of access ways and emergency exits. Daily clean-up of all work areas is mandatory by all personnel. Materials shall be disposed of in appropriate containers separating wood, metal, glass and general garbage. In basic terms, housekeeping shall be constantly monitored to ensure a safe and productive work environment.

Hazardous Materials

All hazardous materials must be stored safely. Consideration must be given to physical and chemical characteristics of the substance. All equipment used near or within a hazardous material storage area must be safe and suitable. Hazardous materials must be correctly labelled and packaged. All practical precautions must be taken to prevent the loss of control of hazardous materials.

Any material or substances that are or may be considered hazardous to personnel or the environment shall be assessed, handled, stored, transported, ***used or applied according to…***

- ***Manufacturer's Recommendations***
- ***Statutory Requirements***
- ***Keep materials stored away from heat***
- ***All appropriate PPE must be used for the task***

The Site Manager shall maintain a register of such substances and valid copies of all associated SDS sheets.

Personnel Protective Equipment

The ABB or client site inductions shall be used as a forum to prescribe the minimum personal protective equipment that is required for all personnel whilst they work on the site. Additional PPE requirements shall be identified through risk assessment activities, MSDS' (Safety Data Sheets 2014) and site procedures. Areas where personal protective equipment is required to be worn shall have signs prominently posted. Instruction on the correct use and maintenance of personal protective equipment shall form part of the nominated training and safety meetings. PPE must be maintained in good condition and worn as per the manufacturer's recommendations.

Standard PPE Requirements

All personnel and visitors entering operational areas shall conform to the minimum site requirements for personal protective clothing and equipment. ***The standard PPE on this site is…***

- **Long sleeve shirt and long trousers**
- **Safety footwear (with toe protection). Safety footwear must meet ANSI minimum compression and impact performance standard Z41-1991 standard.**
- **Hearing protection when securing bolts using powered tool.**
- **Safety Glasses with side shields**
- **Hard hat**
- **Gloves appropriate for the hazards (e.g. ANSI rated cut resistant, rubber insulated gloves for electrical hazards, nitrile gloves for chemical hazards, etc.)**
- **High visibility clothing or vest**

Smoking Policy

A smoke free work place policy is in place to protect employees from the effects of cigarette smoking. The policy is to apply in all work areas.

All common areas – offices, toilets, change rooms and tea/lunch rooms will be smoke free.

The site shall designate a smoking area and communicate to all personnel at site.

Drugs and Alcohol

The use, possession, distribution or sale of illegal drugs and controlled substances by any ABB employee or contractor is strictly prohibited.

Communicable Diseases and Blood-Borne Pathogens

The following measures will be adopted to reduce the spread of communicable diseases acquired through casual contact…

- **Provision of adequate hand washing facilities in amenities and meal rooms.**
- **Adequate toilet facilities**
- **Adequate supply of potable water at all times**
- **Adequate refuse facilities**
- **First Aid facilities and appropriate protective equipment against blood-borne pathogens**
- **Normal procedures for first aid treatments e.g. wearing disposable gloves and contaminated surfaces to be washed down with disinfectant**
- **Good ventilation in enclosed areas**
-

Manual Handling

Manual handling activities shall be assessed for potential risk and appropriate precautions taken. Recommended practices for the prevention of manual handling injuries shall be addressed at time of induction and reiterated during the risk review by the area supervisor and the allocated team.

Portable Electrical Power Tools and Equipment

All portable electric tools used by employees shall meet the standards set out in OSHA regulation, ANSI Standard or local regulation or standard.

- ***An electrical portable power tool shall be grounded or have a protective system of double insulation.***
- ***Risk of electric shock is greater in areas that are wet or damp. Install ground fault circuit interrupting receptacles (GFCI). When permanent GFCIs are not practical, temporary GFCIs shall be used (extension cord combined with a CFCI).***
- ***All portable electric tools used by employees in a fire hazard area shall be marked as appropriate for use or designed for use in the area of that hazard.***
- ***Where an air hose is connected to a portable air-powered tool used by an employee, a restraining device shall be attached:***
- ***-to the tool, where an employee may be injured by the tool falling; and***
- ***-to all hose connections, in order to prevent injury to an employee in the event of an accidental disconnection of a hose.***
- ***Employees shall ensure that the tool end of any flexible shaft portable power tool is secured in a manner that will prevent the flexible shaft from whipping when the motor is started.***

Electrical Work

All work or alterations to any electrical equipment shall only be undertaken by suitable qualified electrical workers.

All electrical work undertaken shall conform to ANSI, IEEE, National Electrical Code or local instructions issued and documented by the local electricity provider.

All electrical personnel are to be familiar with first aid and resuscitation techniques. It is recommended that an AED be available and that that personnel be trained in the use an AED.

All electrical equipment including cables, leads or extension cords are to be examined and tested at regular intervals. The findings of these inspections are to be recorded and action taken for the repair, replacement or destruction of the damaged equipment after suitable approval has been granted.

Switchboards shall be kept locked at all times. The key shall be secured in a safe place to prevent unauthorized access.

Conductors, switchgear and electrical apparatus will always be considered as being live until it have proved them to be dead by means of approved test apparatus or voltmeters. Test equipment must be calibrated in accordance to the manufacturer's instruction and maintained in good working order.

It is ABB policy that no work is to be performed on live circuits, however for the purposes of testing and troubleshooting, it may be necessary to work live. Under such situations, the matter must be reported to the area Supervisor BEFORE work is commenced so that a properly planned and safe approach can be adopted. A ***permit-to-work*** must be completed by the supervisor and signed by employees.

For further information please refer to ***ABB Electrical Safety Code of Practice*** and the ***ABB Seven Steps that Save Lives***.

Working on or Near Exposed Live Circuits and Equipment

When working on exposed live low voltage mains and apparatus adequate precautions ***MUST*** be taken otherwise death or injury may result.

Insulating rubber gloves must be worn when working on or near exposed live low voltage mains and apparatus (50v-40kV). They shall not be used on live high voltage mains and apparatus except when used in conjunction with insulating sticks and the like.

Insulating blankets and hose are to be used by employees when working on or adjacent to exposed live low voltage mains and apparatus. When insulating blanket and hose are used to cover conductors or grounded metal, the blanket and/or hose must be securely to prevent displacement. Conductors and apparatus taken out of service must be proven dead by testing.

Precautions must be taken to ensure that the supply remains de-energized by locking out the main control switch and any other control points which are capable of restoring supply.

Proper locks and tags are to be securely attached to the operating lever or push buttons so there is no risk of them becoming dislodged, or of an operator being able to restore power or operate the equipment whilst being unaware of the danger by doing so. Appropriate fire resistant (FR) clothing must be worn when required by policy or in the presence of hazards.

High Voltage

Employees working in the vicinity of exposed live high voltage mains and apparatus, shall not allow any portion of their bodies or any movable object or tool (other than equipment issued for testing) to come within the minimum safe working distances (see table below) or per distances as specified in local standards that are in effect.

When it is likely that an employee's body or any object which he/she might be carrying could come within the distances specified in the table below, suitable screens must be erected, or the exposed high voltage mains and apparatus must be made dead and isolated and earthed.

However, exposed live high voltage mains and apparatus may be approached closer than the minimum safe working distances for the purpose of inspecting testing or operating, or for the fixing of screens by persons authorised to do so.

Minimum Safe Distance Table

Nominal voltage in kilovolts (kV) phase to phase	Distance			
	Phase to ground exposure		Phase to phase exposure	
	(ft-in)	(m)	(ft-in)	(m)
0.05 to 1.0	([4])	([4])	([4])	([4])
1.1 to 15.0	2-1	0.64	2-2	0.66
15.1 to 36.0	2-4	0.77	2-7	0.77
36.1 to 46.0	2-7	0.77	2-10	0.85
46.1 to 72.5	3-0	0.90	3-6	1.05
72.6 to 121	3-2	0.95	4-3	1.29
138 to 145	3-7	1.09	4-11	1.50
161 to 169	4-0	1.22	5-8	1.71
230 to 242	5-3	1.59	7-6	2.27
345 to 362	8-6	2.59	12-6	3.80
500 to 550	11-3	3.42	18-1	5.50
765 to 800	14-11	4.53	26-0	7.91

Safe Distance Table Notes:
Note 1: These distances take into consideration the highest switching surge an employee will be exposed to on any system with air as the insulating medium and the maximum voltages shown.
Note 2: The clear live-line tool distance shall equal or exceed the values for the indicated voltage ranges.
Note 3: See Appendix B of OSHA Standard 29 CFR 1910.269 to this section for information on how the minimum approach distances listed in the tables were derived.
[4]Avoid contact.

Working on High Voltage Mains and Apparatus

Except when authority is given the special tools and equipment are provided for working on live high voltage mains and apparatus, ***high voltage mains and apparatus shall not be worked on until…***

- **They have been isolated from all possible sources of supply;**
- **Danger notices have been displayed on or adjacent to controls and devices by which the mains and apparatus may be energized;**
- **They have been proved dead;**
- **They have been earthed and short circuited;**
- **Tape Barriers have been erected where appropriate;**
- **An access permit has been issued.**

Where high voltage mains and apparatus to be worked on are to be divided into two or more sections, this rule shall be observed with regard to each section.

Please note the following warning…
It should be remembered that voltage transformers as well as power transformers area possible source of high voltage supply and care must be taken to ensure that they are isolated on both high and low voltage sides.

Isolation and Tagging

Employees and contractors shall visually verify the status of isolation points **PRIOR** to the allocation of tasks requiring personnel to work under the protection of danger tags, isolation locks or any other isolation requirements.

The ABB or client's Lock-Out/Tag-Out (LOTO) procedure, whichever is more stringent, shall be utilized for these activities.

Hot Work

"Hot Work" is any work activity, which can generate sufficient heat to ignite any materials in the work area. Such work shall include but not be limited to, welding, burning, grinding, soldering etc.

Hot work shall not be carried out in a hazardous area unless a hot work permit is authorized.

Adequate fire protection shall be provided for all hot work activities. Fume extraction & ventilation shall be provided for those processes where a risk assessment has identified the need.

Overhead Work

All overhead work where there is the potential to fall from one level to another or create the potential for falling objects shall be the subject of a risk assessment.

Prior to the commencement of the work, a 7 foot (2.1 meters) barrier (delineated area on all sides) of the area shall be barricaded to prevent unauthorized entry. Adequate signage should be placed on all four sides of the cordon to indicate overhead work activities.

Confined Spaces

All conditions, precautions, etc. as outlined in health and safety regulations for safe working in a confined space and the ABB (or Employer) confined space procedure shall be complied with when working in confined spaces. Follow OSHA 1910.146 and CCR Title 8 Sec 5156, 5157, 5158.
Risk assessments and permits shall be completed as outlined in the procedure.

Asbestos (if present)

Asbestos presents a risk only when it is airborne. The risk to health increases as the number of fibres inhaled increases.

Asbestos encountered in any form must not be interfered with. The situation must be reported immediately to a supervisor or manager.

Removal of asbestos can only be undertaken by licensed asbestos removers. The ABB Asbestos Code of Practice provides further guidance. Contact your LBU safety advisor for assistance.

Lone Worker

Adequate communication systems must be established for those occasions where employees are called to work after hours.
A local procedure for working alone will be developed and documented, if necessary, working alone should be avoided.

Noise

Areas where persons may be exposed to hazardous noise levels are to be designated as hearing protection areas and signage must be posted indicating hearing protection required. No person should be present in a hearing protection area during normal operation, unless wearing appropriate personal hearing protectors.

Cranes, Hoists, Lifting Equipment

Crane operators must be trained, competent and completely familiar with the equipment, its features and operational characteristics. A pre-operational equipment check should be performed prior to each and every use. Other important checks include a survey of the surrounding ground, load and overhead conditions. These checks must be performed not only to meet legal requirements, but also to ensure safe operation, high performance and long life for the crane.

To ensure safe operation it is essential that the operator follow all manufacturers' instructions for loading and unloading, maintenance and inspection. Daily and yearly inspections and a complete crane logbook shall be maintained and available for inspection.

Rated load capacity charts, recommended operating speeds, special hazard warnings and other essential information shall be clearly posted on all cranes and hoists and on other relevant equipment.

All lifting gear shall be clearly marked with the safe working load in line the relevant standards.

A register of all lifting gear shall be maintained on site. Inspection and test records shall be maintained with this register. Any equipment found to be defective will be removed from service and tagged for repair or destroyed if repair is not practical

Forklifts

Forklift operators shall operate a forklift in an efficient and safe manner so as not to endanger the safety of any persons or property. Operators must hold a current forklift driver's licence to operate a forklift truck. Forklifts shall be maintained in a safe working condition by an authorised mechanic. All forklifts must have proper lifting attachments for the job to be done in accordance with regulations. The operator must follow the forklift manufacturer's safe operating instructions.

Aerial Lifts (Elevated Work Platforms)

Aerial lifts such as cherry pickers, bucket trucks, or scissor lifts used to access above ground job-sites must be used in a safe manner so as not endanger the safety of any person or property. ***The following safety guides must be followed…***

Make sure that workers who operate aerial lifts are properly trained in the safe use of the equipment Maintain and operate elevating work platforms according to the manufacturer's instructions

- ***Perform and document circle checks prior to use. Report any damages to the supervisor immediately.***
- ***Never override hydraulic, mechanical, or electrical safety devices.***
-

- ***Never Move the equipment with workers in an elevated platform unless this is permitted by the manufacturer***
- ***Workers are not permitted to position themselves between overhead hazards, such as joist and beams, and the rails of the basket. Movement of the lift could crush the worker.***
- ***Maintain a minimum clearance of at least 10 feet (3 meters), away from the nearest energized overhead lines. Please note this can increase depending upon the voltage of the electrical apparatus.***
- ***Always treat lines, wires and other conductors as energized, even if they are down or appear to be insulated.***
- ***Use a body harness or restraining belt with a lanyard attached to the boom or basket to prevent the worker from being rejected or pulled from the basket***
- ***Set the brakes and use wheel chocks when on an incline***
- ***Use outriggers, if provided***
- ***Do not exceed the load limits of the equipment. Allow for the combined weight of the worker, tools and materials.***
- ***Bond and ground utilizing the appropriate equipment to direct static or overcurrent to the ground-grid.***

Public Safety

ABB has a duty of care to ensure the safety and health, of employees and others in the workplace such as visitors and contractors. ***All visitors and contractors must sign in at site personnel log-in sheet.***

Visitors

Visiting Worker Obligations

Contractors, trade and delivery people are required to comply with legislative requirements and the safety standards set by the site management.

Visiting Public Obligations

Visitors to the site will be instructed and advised to abide by the ABB environmental, safety, health and security policies, and comply with any instructions given to them during their visit. Management shall monitor and ensure adherence to said guidelines. Visitors must be accompanied by a designated person at all times.

Protective Equipment for Visitors

Personal protective equipment (PPE) must be supplied to visitors where necessary. For example, steel toe boots, hard hats on site where there is the potential over-head hazards, safety glasses and ear plugs where hearing protection is required.

Tour guides must point out hazards such as forklifts in use; hazard and warning signs, emergency showers and eye baths; and any other health or safety precautions.

Access to Work Areas

Visitors will not be permitted to enter any work area without authority and close supervision by a designated representative.

After the risk factors to the public have been assessed, action must be taken to control the hazards. For example, moving machinery must be guarded, open access to pits must be closed off, or the worksite must be completely 'off limits' to the public.

All doors, fences, guards, covers and other protective equipment preventing access to hazardous areas, operations, plant or substances must be kept closed and secured in order to prevent access by children, for example, chemical storage facilities should be kept locked when not in use.

APPENDIX 3: Earthquake Procedures

The following procedures will provide guidance during an earthquake.

Table 1. Earthquake Procedure

Person	Notification or Action
Site Personnel	Move away from overhead hazards and remember to "DROP, COVER & HOLD." If you're inside a trailer: Stay There. Take cover under sturdy desks or tables near the center of the building, or supported doorways. Stay away from windows, mirrors, hanging objects, tall unsecured furniture and fixtures. If you're outside: Stay There. Do not enter a trailer. Move to an open space away from trailer, trees, and power-lines. Drop to the ground. If you're inside a vehicle: Stop and Remain There. If possible avoid stopping near tall buildings or underpasses. After the shaking stops, check yourself for injuries. Check others for injuries. If trained, give first aid and/or medical assistance to the injured employees. Eliminate any fire hazards by shutting down equipment and turning off any gas. Listen to the radio for instructions. If after shock is felt, go to Step 1 and start over. Contact Emergency Services to report any life-threatening emergencies. Do not use matches, candles, cigarette lighters or other open flame devices during or after the shock because of possible gas line leaks.
Site Manager or Designee	Follow site procedure on emergency reporting. If instructed to do so by local authorities, turn off all utilities at the main switch and the all gas valves. After the shaking and when safe to do so, assemble employees and conduct a headcount to verify everyone is accounted for. Notify Emergency Services, if necessary. Dispatch personnel to rendezvous with Emergency Services outside the building or facility and escort them to the location of the medical emergency. Notify the Safety Manager. Record all activities carried out.

All site personnel shall be familiarized on earthquake procedure during site induction. Employees will be informed on emergency evacuation routes/assembly area, their responsibilities, and notification requirements. Contractors and visitor will be informed of this earthquake procedure.

APPENDIX 4: Forms, Guidelines and Checklists

	Description	File name
A	Site Induction Checklist	Contractor Site Induction.pdf ***To include below training appendices***
B	Pre-Job Safety Briefing Form	PS-NAM EHS Pre-Job Safety Briefing.doc
C	Permit to Work Form	ELECTRICAL PERMIT-To- Work (R2 PS-NAM Lockout-Tagout Perm PS-NAM Lockout-Tagout Log.c
D	Near Miss / Good Catch Instruction and Form	PS-NAM Near Miss Good & Catch Report PS NAM Near Miss & Good Catch Form.doc
E	Injury / Illness Reporting Form	Incident Report.docx
F	Site Observation Tour SOT) Form and Guide	PS-NAM Safety Observation Audit.do PS-NAM Safety Observation Tour_Gu
G	OHS Training Sign-In Record Form	OHS Training Sign-In Form.doc
H	Electrical Safety	7 steps that save lives.doc 7 Steps POSTER.pdf
I	First Aid Requirements	PS-NAM First Aid.pdf
J	Non-Compliance Form	PS-NAM Notice of Non-Compliance Form

APPENDIX 5: Site Specific Safety Plan Review and Acceptance

By signing below, you acknowledge your acceptance of the requirements in this Site Specific Safety Plan. It is the responsibility of the ABB Site Manager to ensure this plan is made readily available to all personnel working on the project and it is the responsibility of the Contractor Project Manager to ensure that any subcontractor or suppliers working on their behalf are provided with a copy of this plan prior to commencing work.

Reviewed and Accepted by:	
ABB Project Manager: **Darrel Outlaw** *Signature:* _____	Date: _____
ABB Site Manager: _____ *Signature:* _____	Date: _____
ABB LBU OHS Advisor: David B. Leslie/Cecil L. Norman *Signature:* _____	Date: _____
Customer: _____ *Signature:* _____	Date: _____
Contractor Project Manager: _____ *Signature:* _____ Company Name: _____	Date: _____
Contractor Project Manager: _____ *Signature:* _____ Company Name: _____	Date: _____

Additional Appendices…

Customer Site Specific Training Process and Site Requirements…*to be inserted here, if necessary.*

I. ***PG&E Site Specific Training***

II. *Hourly Workforce*
- a. *Union Card. If the contractor is non-union, resumes showing experience that qualifies them to perform the work.*
- b. *OSHA 10-hour, minimum*
- c. *All employees should be CARCO cleared.*
- d. *Any additional pertinent training, internal to their company and industry standard, that aligns with the work they are performing.*
  - i. *Example – rigging training, forklift license, etc.*

III. *Supervision*
- a. *Resumes showing experience that qualifies them to perform the work*
- b. *OSHA 10-hour, minimum*
- c. *All employees should be CARCO cleared.*

Additionally, I will need a health and safety plan from ABB and all subcontractors, with adequate time to review, prior to mobilization on-site.
Plan on spending the majority of the morning the first day in training for CCP-1(lock out / tag out) training, NERC-CIP training, and Safety Orientation. This training will be required for both hourly and supervision.

IV. ***NAM Field Operations Health and Safety Requirements for Chemical Handling and Control***

3BUD000013
Chemical Handling a

Project Documents…*to be inserted here, if necessary.*

V.

ABB preliminary
method statement.p

VI. ***Method statement from electrical contractor***

VII. ***Method statement from civil contractor***

Site Specific Safety Guidelines…*to be inserted here, if necessary.*

Emergency Action, Escape & Response Plan…**Contact the security detail so that they can call and coordinate with 911!**

Location:

Pacific Gas & Electric, Potrero Substation 230-115 KV GIS and MPAC Project, 1201 Illinois St, San Francisco, CA 94107; 37°45'24"N & 122°23'14"W ; Elevation 20ft.

Project Office – ABB Potrero Office 2800 3rd St, San Francisco, Ca 94107

Level 1 Trauma Center Address and contact information…**Contact the security detail so that they can call and coordinate with 911!**

San Francisco General Hospital
1001 Potrero Ave.
San Francisco, CA
Distance: 1.6 miles
Estimated Time: 8-10 minutes

Fire Department Address…Contact the security detail so that they can call and coordinate with 911!

San Francisco City Fire Department
849 Avenue "D"
San Francisco, CA
(415)-434-3473

San Francisco Fire City Department
218 Lincoln Blvd
San Francisco, CA
415-800-8911

Additional Location Information and Directions… Contact the security detail so that they can call and coordinate with 911!

San Francisco City Police Department
1125 Fillmore St
San Francisco, CA
(415)-614-3400

Key Definitions

Audit – a detailed evaluation of a system which includes several different elements.

Good Catch – an observed hazard which can include unsafe conditions, unsafe acts, and improper use of equipment or malfunctioning equipment that has the potential to cause harm.

Incident – unplanned, unwanted event resulting in a loss.

Inspection – systematic evaluation of activities at a worksite.

Near Miss – a close call, an event which did not produce a loss, but had the potential to result in a loss

Pre-Job Safety Briefing – the pre-job briefing tool is a method of breaking down a job (task) into individual steps and highlighting the potential hazards and protective safety measures for each of the steps. A Pre-Job Safety Briefing must be completed prior to the start of each job or when there is a change in the job scope. This is the same thing as a ***Job Hazard Analysis (JHA)***.

Risk assessment – a risk assessment is the overall process of estimating the magnitude of risk and deciding whether or not the risk is tolerable.

Permit required safe work procedures **(Permit-to-Work System) –** step by step instructions on how to perform high-risk tasks safely, including hazard assessments beyond the daily JHA. For example, confined space plans & permits, hot-work plans & permits and critical lift plans, all of which are to be reviewed and permissions issued by the site manager (as well as the LBU safety advisor and operations management if necessary), should be included in this category.

SOT – the “Safety Observation Tour” (SOT) program is launched as a management safety activity at a job site or operating facility to promote safety discussions based on observations. The goal is to raise safety awareness and increase hazards recognition with employees and contractors. It also helps management to identify weaknesses and strengths of our safety and health programs.

PDC - Power Distribution Center

PPMV - ABB Power Products Medium Voltage

PSSS - ABB Power Systems Substations

PPTR - ABB Power Products Transformers