



CLARKSVILLE

Safety Management Plan

2022 Smelter Major Outage

Revision 5

August 10, 2021

NYRSTAR CLARKSVILLE

APPROVALS			
	Approver	Comments	
Group Manager – North American Projects	Signed: Name: William Whitlock Date:		
Asset Manager	Signed: Name: David DeWitt Date:		
Production Manager	Signed: Name: Kelly Tinker Date:		
Technology Manager	Signed: Name: Terry Dabbs Date:		
SHEQ Manager – Clarksville	Signed: Name: Kevin Cook Date:		
General Manager – Clarksville	Signed: Name: Javier Hernandez-Gallegos Date:		

Acknowledge Receipt & Acceptance		
	Receiver	Comments
Reliability Superintendent	Signed: Name: Wade Holitzke Date:	
Project Manager – Acid Plant	Signed: Name: Jeff Hunziker Date:	
Project Manager – Waste Heat Boiler	Signed: Name: Peter Fisackerly Date:	
Project Manager – Gas Cleaning	Signed: Name: Jeff MacQueen Date:	
Roaster Superintendent	Signed: Name: Randy Wall Date:	
Project Execution Lead	Signed: Name: Joshua Hulshizer Date:	
Regional Supply Chain Specialist	Signed: Name: Charlise Walker Date:	
US Projects Controller	Signed: Name: Michael Johnson Date:	

CONTENTS

- 1. INTRODUCTION**
- 2. OUTAGE SAFETY PHILOSOPHY**
- 3. OUTAGE ORGANIZATION CHART**
- 4. HAZARD IDENTIFICATION, EVALUATION AND CONTROL**
- 5. CONTRACTOR REQUIREMENTS**
- 6. ACCESS CONTROL**
- 7. ISOLATIONS / LOCKOUTS**
- 8. MONITORING OF SAFETY STRATEGY (AUDITS)**
- 9. SAFETY COMMUNICATIONS**
- 10. CONTRACTOR SAFETY MANAGEMENT**
- 11. INCIDENT REPORTING**
- 12. LEGISLATIVE REQUIREMENTS**
- 13. EMERGENCY RESPONSE PLAN**
- 14. PROJECT SPECIFIC CONTROL INITIATIVES DEFINED**
- 15. APPENDIX 1: DETAILS OF ROLES AND RESPONSIBILITIES**
- 16. APPENDIX 2: OUTAGE MAIN HAZARDS, CONSEQUENCES AND CONTROLS**
- 17. APPENDIX 3: SITE MAP**
- 18. APPENDIX 4: WORK AREA STANDARD INSPECTION (WASI)**
- 19. APPENDIX 5: NYRSTAR SAFETY RISK RATING SYSTEM**
- 20. APPENDIX 6: NYRSTAR SCAFFOLDING INSPECTION CHECKSHEET**
- 21. APPENDIX 7: NYRSTAR LOCKOUT PROVISIONS**
- 22. APPENDIX 8: NIOSH WORK/REST SCHEDULES**
- 23. APPENDIX 9: INJURY ESCALATION CHART**

1 INTRODUCTION

This Safety Management Plan (SMP) covers work to be carried out during the planned Spring 2022 Smelter Major Outage (SMO) and pre-construction activities related to the SMO. This outage is to service and maintain the plant.

The purpose of this SMP is to describe the procedures that will be used to incorporate the Nyrstar safety requirements into the SMO.

This SMP details a structure of systems and procedures, which will allow safety targets to be achieved. Safety is the responsibility of every person working during the SMO, and therefore clearly defined responsibilities will identify the actions required by individuals which will contribute towards achieving SMO safety targets (see Appendix 1 –for responsibilities).

2 OUTAGE SAFETY PHILOSOPHY

Nyrstar is committed to everyone going home safe & healthy every day. For the SMO to succeed and achieve its safety targets, it requires the combined efforts of all Nyrstar employees, Contractors, Sub-contractors and Visitors involved in the SMO. All employees and contractors are required to intervene to prevent harm whenever there is an unsafe condition that exists or an unsafe act that conducted.

2.1 OUTAGE SAFETY GOALS

	2020 SMO1 Results	2022 SMO2 Goals
Near Misses	3	< 3
First Aids	3	< 3
Recordable IFR	0	0
Lost Time IFR	0	0
All IFR	No data available	< 100
LOTO Verifications per Shift	N/A	2

The Occupational Health and Safety (OHS) targets for all scheduled SMO activities are:

- To complete the SMO with Lost Time Injury (LTI) and Recordable Injury Frequency Rates of ZERO.
- To complete the SMO with an All Injury Frequency Rate (AIFR) of less than 100.
- To achieve our aim, we have systems in place which identify, assess and eliminate or control hazards associated with all work carried out during the Project.
- To achieve 100% LOTO compliance.
- To achieve 100% compliance with this SMP.

2.2 NYRSTAR HEALTH & SAFETY VISION

Our Towards Zero vision is for our people to return home safe and healthy every day.

3 OUTAGE ORGANIZATION CHART

Refer to Appendix 1 for details of Roles and Responsibilities.

4 HAZARD IDENTIFICATION, EVALUATION AND CONTROL

4.1 THE HAZARD TRAIL CHECKLIST

The hazards associated with the Project will be identified and controlled using the following procedure relating to hazard and documentation.

HAZARD TRAIL	REF	STAGE OR METHOD	DOCUMENTATION TRAIL
Prior to Project commencing			
EVALUATE HAZARDS		Risk Rating based on Severity / Consequence	Nyrstar Risk Rating Procedure and Risk Rating
CONTROL HAZARDS		Eliminate the hazard Isolate the hazard Minimize the hazard	Risk Register and Rating
Pre-Outage Expectations			
CONSULTATIONS AT PRE OUTAGE MEETING	4.6 10.2	Briefing of Service Providers Contractor Safety Management Plans Risk Assessments Risk Registers	Copy of Plan Risk Assessments retained Copy of communication providing feedback or requiring amendments by Contractors
DEVELOPED STANDARD OPERATING PROCEDURES (SOP)		Prior to start of Project Work	Jobs that have been refined through active use and review may become controlled documents as an SOP. Authority to proceed (signed SOP)

PERSONAL PROTECTIVE EQUIPMENT		Nyrstar Clarksville minimum requirement for all on-site personnel	Minimum PPE Requirements: <ul style="list-style-type: none"> ANSI Approved Hard Hats w/Hi Viz markings Safety Toed Integral Metatarsal Footwear. ANSI Z87.1- Approved Eyewear w / Side Shields Long Trousers Shirts – Long-sleeved, Hi-Viz with reflective stripes (ANSI Type II)
INDUCTIONS	5.1	Site Induction Lock Out, Confined Space Entry	Record of attendees maintained by Nyrstar, Access Card provided
TRAINING/PRE-ARRIVAL DOCUMENTATION	5.2 5.3	Annual OSHA 10 Hour Training Verifications Drug Screen Info Certificate of Insurance	Record of course content Training records and/or certifications maintained by Nyrstar and provided by Contractors. Drug Screen and COI's required before contractor personnel will be allowed on-site.
DEVELOPED RISK ASSESSMENTS	4.3	Prior to start of Project Work	Contractor document hazards introduced by their methodology and sequence of work. Risk Assessment incorporates feedback from Nyrstar personnel.
CLEARANCES AND WORK PERMITS	5.2 8.7	Prior to start of SMO projects, prepare Safe Work Permits and other Permits as required (confined space, hot work, heights, excavation and line breaks, entry to hazardous areas, multiple isolations, demolition, electrical isolation)	Safe Work Permit and other Permits signed by Nyrstar personnel authorizing particular work to proceed.
SMO SCHEDULE	4.7 14	Prior to start of SMO, line items are cross referenced to SOP's, Work Permits, and Other Permits. To include WASI check sheet.	Project schedule indicates the cross reference Safe Work Permit
During Outage Expectations			
ACCESS CONTROL	6.1	Restricted access to SMO area	Visitor procedures (signing in)
COMMUNICATIONS	9.1 9.2	Daily Management Outage Status meeting (Outage Manager) Area Owners Daily Shift Start Meeting	Handout to crews. Notes

		Safety performance against target	
MONITORING OF SAFETY STRATEGY	8.1 8.2 8.3 8.4 8.7 11.1 11.4 11.6	Outage Manager Senior Management Audit (SMT) Outage Safety Group Area Owner Audits Work Permit Audits Incident and reporting Publication of injury/incident data Safety KPI's	Risk Information Management System (RIMS) Minutes of safety meetings /RIMS Completed Audit Sheets/RIMS Nyrstar RIMS Entry Nyrstar RIMS Entry/Site Notice Outage summary report
MONITORING OF ISOLATIONS	8.6	Audits of Isolation	Isolation Audits

4.2 HAZARD EVALUATION AND CONTROL

Hazards will be evaluated using Nyrstar's Risk Assessment methodology. This requires a numeric rating be applied to an assessment of:

- How serious is the accident or injury likely to be (Consequence / Impact)
- How likely is it to result in an accident or injury (Frequency)

The two figures determine a risk score from which the need to develop a control mitigation plan is determined. (Appendix 5)

Identified hazards will be controlled using the following **Hierarchy of Hazard Control**.

- Eliminate the Hazard
- Isolate the Hazard
- Minimize the Hazard

Hazards will be controlled by the highest means possible in the Hierarchy of Hazard Control with the emphasis being placed on eliminating the hazards. e.g. when working at heights, using a harness should be the last resort.

4.3 GENERAL SMO HAZARDS

The SMO will implement and adhere to the Nyrstar Safety procedures as contained in the Clarksville SMP. Because SMO activities are undertaken in areas adjacent to operating plants, they present some unique safety challenges.

General hazards and risks have been identified as (but not limited to):

- Conflicting activities on multiple levels
- Personnel locking onto the wrong isolation points
- Work in confined spaces
- Residual acid in tanks / vessels and lines
- Heavy equipment / crane lifts inside work operating areas
- Ongoing production in adjacent plant areas

- Unusual and / or awkward lifts of equipment and materials
- Conflicts between mobile / overhead cranes / or other mobile equipment
- Conflicts with site vehicle movement
- Demolition activities (confined space work, dust, noise, fumes)
- Radiant Heat, dust and fumes
- Working at Heights
- Overhead / suspended hazards
- Access and egress constraints
- Ongoing needs of operational personnel in the Outage area
- Environmental / Weather

Appendix 2 details the consequences, controls and protective measures for the hazards identified above.

4.4 Reporting Unsafe Conditions and Unsafe Acts

Each contractor, upon entry to the site, will receive a hazard report booklet to report unsafe conditions and actions. The white copy in the booklet is to be completed and given to the contractor supervisor. The green copy is to remain in the booklet. The contractor supervisor is expected to review the white copy and turn it in the Nyrstar Job Owner. The Nyrstar Job Owner is expected to review the incident for possible follow-up actions and then enter the incident into RIMS.

4.5 SMO JOBS

Once the Job Schedule has been finalized, all jobs on the schedule will have Risk Assessments (PTRA / Formal) documented for them. These will identify hazards and work methods. Some tasks that are carried out regularly, and have been thoroughly reviewed, will have SOP's. If an SOP exists, then a Formal Risk Assessment will not be required.

Note:

1. No job will commence without an SOP or a Risk Assessment and a Safe Work Permit being signed off.
 - a. All those working on the activities described in that Risk Assessment, will be briefed on the contents of the Risk Assessment before they start on that job.
2. For high risk activities, a Formal Risk Assessment will be required

4.6 BRIEFING SERVICE PROVIDERS (CONTRACTORS)

Pre Outage reviews with Service Providers (Contractors) will include the following:

- Discussion and indication of all known hazards
- The consequences of the hazards
- Project area conditions, including access, barriers and boundaries
- SMO emergency procedures
- Injury Escalation Chart (**Appendix 23**)

Bid packages will include the Nyrstar Risk Assessment and Outage requirements.

Commented [ST1]: Corrected per Dave DeWitt's comment.

5 CONTRACTOR SAFETY MANAGEMENT

5.1 CONTRACTOR SAFETY MANAGEMENT PLANS

All contractors working on Project jobs will be required to submit their own Health and Safety Plans, including inspection records and procedures for equipment (i.e., mobile equipment, electrical equipment, lifting equipment, etc.) that will be used onsite, for review and acceptance by Nyrstar. Contractor Safety Plans should include:

- Health and safety policy
- Safety targets (KPI's)
- Roles and responsibilities (key people/positions identified)
- Safety records kept (Lost Time Injuries, Medical treatments etc)
- Policies and procedures for:
 - Mobile equipment
 - Lifting equipment, i.e. slings and chains
 - Lockout/tagout
 - PPE
 - Hazard Communication
 - Any hazardous substances that will be brought to site and their means of control (prior approval required from Nyrstar Environmental).
 - Housekeeping
 - Hazard control
 - Electrical safety
 - Confined space
 - Incident/Accident reporting and investigation
 - Hot work
 - Safety inspections

5.1.1 FORMAL RISK ASSESSMENT EXAMPLE

In doing the Formal Risk Assessment, each job will be broken down into hazards and each hazard analysed in detail, as per the following example.

ASSESSMENT TEAM MEMBERS:	David Gilland, Rob Jones, Craig Peterson, Matt Clark		
DATE OF ASSESSMENT:	9/4/2015	CONTROL VERIFICATION DATE:	
DEPARTMENT:	Roast Acid	AREA:	Auxiliary Boiler

Hazard	Scenario	Consequence of an event happening Inherent Risk			Controls	Final Risk Rating Residual Risk		
		Consequence	Like likelihood	Rating		Consequence	Like likelihood	Rating
Operation of Auxiliary Boiler without Automatic Shutdown functions (High Water).	Auxiliary Boiler will not shut down in the event of a High Water level allowing carryover of water into Plant Steam system	3	B	Med	Station Operator at Auxiliary Boiler when operating. Operator to shut down Boiler if water level rises to within 2in of the top of the water gauge glass (Permanently Marked)	1	D	Low
Operation of Auxiliary Boiler without Automatic Shutdown functions (Low Water).	Auxiliary Boiler will not shut down in the event of a Low Water level creating possible Ruptured boiler tube.	3	B	Med	Station Operator at Auxiliary Boiler when operating. Operator to shut down Boiler if water level rises to within 2in of the bottom of the water gauge glass (Permanently Marked)	1	D	Low
Operation of Auxiliary Boiler without Automatic Shutdown functions (Low Fuel Oil pressure).	Auxiliary Boiler will not shut down in the event of a Low Fuel Supply pressure creating possible accumulation of raw fuel in a hot firebox/Flare Back if the fuel ignites.	3	B	Med	Station Operator at Auxiliary Boiler when operating. Operator to shut down Boiler if Fuel Oil Supply pressure drops below 40 psi (Permanently Marked).	1	D	Low

6 CONTRACTOR REQUIREMENTS

To promote safety awareness among those working on the SMO, the following training will be provided.

6.1 SMO INDUCTION TRAINING FOR PROJECT ACTIVITIES

All contractors involved with the SMO will receive SMO induction training valid for the current Project only. This induction will be delivered by Nyrstar and include:

- Overview of SMO activities
- Overview of the SMO Safety Management Plan
- Access routes
- Area hazards
- Emergency response
- Accident /Near Miss reporting requirements
- STOP Program
- Use of SOP's / Risk Assessments
- Isolations and lockouts
- Confined space entry requirements
- Hot work
- Working at heights

6.2 OSHA 10 HOUR TRAINING

All contractors shall be able to provide the applicable OSHA 10 Hour refresher training records of their employee's before entering the Plant site. (See 25 Appendix 10). Valid training is considered to have taken place any time after May 1, 2021.

6.3 DRUG SCREEN AND INSURANCE INFO

Drug Screens must be submitted before contractor personnel are permitted to work on-site. Results will be valid for the current calendar year. If a drug screen was conducted in December of the previous year, the drug screen results will be valid for the current year. Drug screens must be conducted by a certified lab. Screening must analyze the following drug classes:

- a. Amphetamines
- b. Cocaine
- c. Marijuana
- d. Opiates
- e. Oxycodone
- f. Barbiturates
- g. Benzodiazepines
- h. Methadone
- i. Phencyclidine

Equipment damage incidents involving mobile equipment will result in drug testing of the mobile equipment operator(s).

Any injury treated off-site will require a drug test of the treated individual. An individual returning to work after being off due to an injury will be drug tested prior to returning to work.

NCI may request that an individual provide a urine and/ or saliva sample to an authorized person of where that individual:

- Has been directly or indirectly involved in an incident in the workplace
- May have breached safety precautions or procedures
- Has, or may have, committed an act of misconduct, the consequences or potential consequences of which may have been significant
- Displays any material decline in work performance or work attendance or any irrational or uncharacteristic behavior
- If evidence is found of possible drug use at work (e.g. drug paraphernalia, etc.) and NCI can identify with reasonable certainty those who may have been involved
- Is reasonably suspected of having contravened this policy

Please refer to TP-563-00007 Drug Program Policy for additional information.

A current Certificate of Insurance is required before any personnel will be permitted to work on site.

7 ACCESS CONTROL

7.1 PROJECT PERSONNEL ACCESS

To gain access to the Project Areas, Contractor personnel will be required to have completed the SMO Induction for contractors or visitors as covered in Section 6. On completion of these, individuals will be provided with a contractor entry card. This will allow them access to the site through the security gate.

7.2 VISITOR ACCESS

SMO visitors are to report to the Nyrstar Security Office where a temporary visitor entry card will be arranged. The Security Officers will arrange access to the SMO area, by contacting the visitors' identified contact person. Visitor site access will involve being accompanied at all times by a person who has completed the Site induction visitor training. Visitors are to wear appropriate PPE to include Hi Viz garments.

Personnel escorting visitors are responsible for ensuring that during an emergency, visitors in their charge proceed safely to the Emergency Assembly Area where they will be accounted for (see Section 13.6).

7.3 VEHICLE ACCESS

Only vehicles required for the SMO will be allowed on the site by security. Contractor's work vehicles must meet the minimum established standards of having flashing warning lights, a fire extinguisher, and a first aid kit. The Project leads will approve a minimal amount of vehicles for the contractors they are responsible for. Approved vehicles will be issued a vehicle pass sticker to be visibly displayed on the windshield at all times while onsite. Approved vehicles are to be used for unloading purposes only. After unloading of equipment is complete, the contractor vehicles must reverse park in the designated outage parking area. Contractor private vehicles are to be reverse parked in the designated contractor parking area, located near the main gate. Contractor's personnel will walk to their Project area after passing through the security gate along defined walkways.

Commented [WW2]: We need to look at how we control this and limit the amount of cars on site, SMO Manager need to approve and we need to get stickers made for windscreens that are clear. Also Security need to enforce this.

We also need info on Onsite and Offsite parking requirements as well as Chocking of vehicles and mobile equipment.

Commented [ST3R2]: Project leads will approve a minimal amount of vehicles for their contracts. Stickers will be made and security will be trained on process. Vehicle parking and chocking requirements are specified in TP-563-00013.

8 ISOLATIONS / LOCKOUTS

All SMO isolations / lockouts will be carried out in accordance with Nyrstar Clarksville Procedures / Policies.

- Operation Team Leader or his designate will develop the Project isolation procedures, identified from Operators, or others suitably qualified and familiar with site isolation procedures in the SMO areas.
- This procedure will include separate Lock out Procedures for each activity area and Outage sequence indicating all isolation points.
- The isolation procedures will be reviewed by relevant Operators and Maintenance Personnel.
- For purposes of isolation, the Operations Superintendents and Project Managers retain responsibility for all isolations affecting the defined Project areas; (See Appendix 7)
- Production personnel will use the Nyrstar Clarksville isolation systems to perform isolations in the SMO areas.
- **All equipment isolations will be completed under the Group lockout procedures. All personnel involved in the Project will apply their personal lockout device (padlock) onto the relevant Group isolation lockbox that will properly identify the equipment that has been isolated in it. Each contractor group will apply their locks together and utilize one multi-lock device attached to the Group Lockout Box.**
- See special provisions for “verification of lockouts” in Appendix 7.

To ensure adequate controls are maintained in regards to isolations, SMO activities will be divided into three main isolation stages with various isolation requirements applying to each stage. These three stages are:

8.1 STAGE 1- COOL DOWN PERIOD WITH LIMITED ACCESS TO WORK AREAS

This involves the initial isolations applied by Production personnel to make the SMO areas safe for the commencement of Project activities.

8.2 STAGE 2 - PLANT ACCESS, DEMOLITION, MAINTENANCE ACTIVITIES

During this phase, if plant production personnel wish to isolate or de-isolate any energy sources, which could affect the SMO area(s), they must first consult with the Operation Team Leader or his Designate responsible for the Project isolation procedures, as well as the Project Manager for the project area. The addition or removal of any isolation must be carried out in compliance with established procedures. The safety of personnel during the de-isolation process will be managed as per 8.3 below.

8.3 STAGE 3- COMMISSIONING AND HEAT UP PHASE

This phase involves the testing and energizing of equipment. During this phase, normal isolation procedures will apply. Where isolations have to be removed, the Operation Team Leader or his designate in consultation with the Maintenance Personnel will determine which isolation lockboxes are affected and will manage the process in conjunction with all personnel involved to ensure that non-essential people are out of the area. See also Special Event De-Isolation (Section 8.4).

8.4 SPECIAL EVENT EQUIPMENT TESTING / OPERATION

Re-energization will be carried out in compliance with established Procedures. If a specific / special event /incident requires it, Nyrstar Personnel in charge of the task will communicate the need for re-energization with Project personnel at the Daily Safety Huddle meeting (see Section 10.2). Project personnel will be required to remove their personal locks from the group isolation lockboxes and remain out of the area until given clearance by the Team Leader or his Designate. At that time, they will lock back onto the relevant Group Isolation lockboxes, prior to being allowed back into the Project area.

8.5 LOCKOUT DEVICE COLOR CODE SYSTEM

The following lock colors are used at Nyrstar Clarksville:

Production Personnel Lock (Red)

The lock used by production personnel for lockout isolation purposes.

Maintenance Personnel Lock (Black)

The lock used by maintenance personnel for lockout isolation purposes.

Contractor Lock (Brown)

The lock used by contractor personnel for lockout isolation purposes.

Group / Equipment Locks (Green)

The lock used to secure the individual isolation points of the lockout procedures. The keys of these locks will be put in a Group Lock Box, and all personnel working on the identified equipment will apply their personal locks to the box. The keys to the individual isolation points secured with the use of Green locks cannot be accessed until all personal locks have been removed from the Group Lockbox.

The purpose and use of the various locks is explained further in the Nyrstar Clarksville Safety Policy No. TP-563-00011.

9 MONITORING OF SAFETY STRATEGY (AUDITS)

The following activities will help monitor the effectiveness of the safety systems and procedures included in this SMP and will help identify opportunities for continual improvement during the SMO. In these activities, a high level of participation from **all** levels is required. A safety audit database (RIMS) will be used to record all audits. Actions arising from these audits will be allocated to an individual for follow up.

9.1 SENIOR MANAGEMENT SAFETY AUDITS

Nyrstar Senior Management will conduct regular WASI's to assess the overall state of safety on the SMO and to demonstrate Management commitment to safety. (Appendix 4)

9.2 SAFETY DEPARTMENT (WASI)

The Nyrstar Safety Department and contractor Safety Representative will conduct a WASI of all work areas, with the objective of assessing how well the various elements of the Safety Management Plan are being implemented. This audit is aimed at providing both an overall

assessment and detailed observations on the state of safety on the SMO. Contractor Safety Reps are required to complete 2 WASI's each day (1 morning, 1 afternoon). (Appendix 4)

9.3 NYRSTAR JOB OWNER SYSTEM (BUDDY SYSTEM)

Nyrstar will assign Job Owners to each work area. Their responsibility will be oversight of their own work areas. The Buddy System is an effective method by which a deployed staff member shares in the responsibility for his or her partner's safety and well-being. The Buddy System will be deployed in 2-person teams (minimum) per shift.

Buddies should:

- Get to know your buddy's background, prior experience, and job role.
- Stay close to your buddy and communicate regularly.
- Look out for hazardous conditions, safety demands, and stressors.
- Identify your buddy's strengths and weaknesses.
- Monitor your buddy for stress (including environmental stressors).
- Check on your buddy's workload and encourage breaks when needed.
- Observe each other putting on and taking off personal protective equipment.
- Communicate basic needs and limits to leadership – make your buddy feel “safe” to speak up.
- Encourage routine sleep, exercise, eating.
- Acknowledge tough situations and recognize accomplishments, even small ones.
- Reach out to a buddy who may be struggling.
- Offer help with practical needs or finding services.
- Get help for your buddy, if necessary.

9.4 NYRSTAR JOB OWNER SAFETY INSPECTIONS

All Job Owners or their designate will conduct daily safety inspections of their own work areas, including daily LOTO compliance. The objective of a safety inspection is to identify and control hazards and potential hazards within a specific area of responsibility. Results of findings will be shared at the Daily Management Project Status Meeting, as well as discussing results from the previous shifts inspections. Results will be provided to the Safety Department. These will help focus safety initiatives. Job Owners will be responsible for ensuring corrective actions are implemented.

9.5 STOP CARD AUDITS

It is expected that “STOP for Each Other” cards will be used by Nyrstar personnel to monitor work activities and work groups. As well as identifying any deficiencies, STOP Cards should also identify good performance.

Commented [WW4]: We need to expand on how this will be used during the outage on a shift by shift basis.

Commented [ST5R4]: Expanded on what the Buddy System is and how it will be used.

9.6 ISOLATION PROCEDURES AUDIT

During the Project, regular audits of the Isolation / Lockout Procedures will be carried out by Nyrstar's Safety Department. These will be carried out in accordance with the Nyrstar Clarksville Isolation Procedure (Nyrstar Clarksville Safety Policy (TP-563-00011)).

9.7 WORK PERMIT AUDITS

A sample of Safe Work Permits and Risk Assessments will be audited by Nyrstar Safety Department personnel and each Contractor's Safety Representative daily to identify opportunities for improvement.

9.8 AUDIT FOLLOW UP

All audit actions that cannot be immediately corrected will be assigned to the responsible Team Leaders for follow up, or are to be raised at the Daily Management Project Status meeting if it presents coordination or control problems.

10 SAFETY COMMUNICATIONS

To ensure that communication of relevant safety information occurs at all levels; the following procedures will be used.

10.1 DAILY MANAGEMENT PROJECT STATUS MEETING

A daily meeting will be held with all management and supervisory personnel to discuss issues relating to safety, scheduling, and to address coordination issues. This meeting may be run by the Project Manager, or their delegate. Typically the following areas relating to safety will be discussed.

- Any Risk Assessments required for the day's activities that have not already been developed
- Reports from any audits / inspections conducted on the previous day
- Shift safety performance against the target
- Any incidents / near misses which have occurred and actions taken to prevent recurrence
- Highlighting any work activities that may be in close proximity to each other
- Identifying major hazards in the day's activities
- Seek suggestions for safety improvements
- Coordination of activities relating to safety
- Providing the Daily Safety Huddle Topic

10.2 NYRSTAR & CONTRACTOR TEAM LEADERS DAILY SAFETY HUDDLE MEETINGS

Prior to starting work, all Nyrstar Job Owners and Contractor Team Leaders, or their delegate, will brief all members of their workgroups. Nyrstar Job Owners will attend and assist in providing information at these meetings. This meeting will include:

- Briefing on Risk Assessments required for the day's activities
- Reports from any audits / inspections conducted on the previous day
- Any incidents / near misses which have occurred and the actions taken to prevent reoccurrence
- Highlighting any work activities that may be in close proximity to each other
- Overview of the main hazards in the day's activities

- Suggestions for safety improvements
- Coordination of activities relating to safety
- Safety Huddle Topics

10.3 SAFETY NOTICES (DAILY RIMS REPORT)

Daily RIMS reports will be covered at the Daily Safety Huddles. These will provide information related to injuries, near misses, hazards, and outstanding acts reported the previous day.

10.4 RADIO COMMUNICATION RELATING TO SAFETY

To assist in communications, key personnel will be provided with hand held radios for specific activities. Channels will be allocated specifically for Roaster Personnel and Maintenance Personnel.

The following positions will be provided with hand held radios:

- Roaster Control Room (control center)
- Job Owners and Designates
- Safety Department
- Contractor Supervisors

10.5 SAFETY HUDDLE TOPICS

Project leadership may request that certain topics are covered based on the needs of the project, planned work, audit/inspection findings, etc.

11 INCIDENT REPORTING

11.1 Incident Reporting

Contractors are to report all incidents / near misses to Nyrstar immediately (See Section 11.2). Nyrstar will record all contractor injuries using the RIMS system.

11.2 Incident Investigation

The procedure for investigating incidents / near misses is contained in the Nyrstar RIMS system.

In addition to this procedure, the following will also apply:

- All injuries / incidents are to be reported immediately to Job Owners and Safety Advisors, who will inform the Project Manager and Safety Manager.
- Contractor/Nyrstar employees will seek treatment at the site First Aid Station and notify the Safety Department that they are part of the SMO (for statistical purposes).
- The injured person, when going for medical treatment, either to the First Aid Station, hospital or a doctor, is to be accompanied by their immediate supervisor.
- Contractor Supervisors will notify the Nyrstar Team Leaders for that area immediately. Team Leaders will ensure that the investigation is conducted in accordance with Nyrstar procedures and a Site Safety Alert is to be issued, if appropriate.
- Any injury which involves loss of life, serious injury, LTI, or a significant near miss, will require the immediate presence of the worker's Senior Manager on-site, to participate in the investigation which would be of the ICAM format as found in RIMS. The investigation would

be led by the Project Manager, or his representative, and supported by personnel from the Safety Department. In the event of a serious injury, the incident site shall remain undisturbed until the appropriate investigation has taken place, and clearance by OSHA has been received. (If Necessary)

- Contractor Management will notify the Nyrstar Project Manager prior to a Contractor's employee leaving the site to seek medical attention for a work related injury.
- The Contractor's Manager is responsible for reporting serious harm accidents to regulatory bodies (OSHA) as required by Regulatory Authorities.

11.3 INCIDENT FOLLOW-UP

Responsibility for ensuring that incident follow up actions are completed rests with the Project Manager and the applicable Contractor's Management (as appropriate).

11.4 PUBLICATION OF INCIDENT DATA

Information on incidents / near misses will be communicated in a number of ways. Incidents will be raised at the Daily Management Project Status Meeting. Personal details will be suppressed. Job Owners will discuss incidents / near misses with their crews at Daily Safety Huddles.

In cases of a serious incident, a Site Safety Alert may be generated and circulated by the SHEQ Manager.

11.5 CONTRACTOR MANAGEMENT RESPONSIBILITIES

The Management of the contract service provider responsible for the employee or work involved is responsible for ensuring that all injuries, incidents and / or near misses are reported and investigated, including the reporting to Nyrstar and the Project Manager.

11.6 SAFETY KEY PERFORMANCE INDICATORS (KPI's)

Based on the EHS policy, the following KPI's have been set:

Lagging:

0 Recordable Injuries

Leading:

100% LOTO compliance

100% participation for kick-off meeting by all contractors

100% attendance for Daily Safety Huddles by each contractor

2 documented safety inspections per day, by each contractor (one morning, one afternoon)

12 LEGISLATIVE REQUIREMENTS

12.1 STATUTORY COMPLIANCE

Various Acts, Regulations, and Nyrstar requirements are referred to in this SMP and in the Contractor Contract documents.

All Contractors must ensure that their Health and Safety Systems / Procedures meet the requirements of Tennessee OSHA / Federal OSHA or NYRSTAR when more restrictive.

12.2 COMMUNICATIONS WITH STATUTORY BODIES

All communications with statutory authorities, including all Notifiable work incidents will be processed through the Project Manager and the Nyrstar Safety Department.

13 EMERGENCY RESPONSE PLAN

13.1 EMERGENCY EXITS FROM PLANT BUILDINGS

The locations of all primary and secondary exit locations should be discussed with all Outage personnel. See also Section 7 Access Control and refer to TP-563-00021 Emergency Response Manual for additional information.

13.2 EMERGENCY ASSEMBLY AREAS (EAA's) (APPENDIX 3)

Each department has an EAA for assembly during an emergency. In addition, the plant's main EAA is in the employee parking area. See Appendix 3 for the locations of EAA's.

In the event of an emergency, Project personnel are to make their way out the nearest exit to one of the EAA's where they are to wait until given further instructions.

13.3 MAJOR EVENTS/EMERGENCIES

The following are the identified potential major production hazards that may impact on the Project:

- Fire
- Acid Leaks
- Explosions
- Spillage of hot / molten materials
- Weather Events

All emergencies from adjacent operating plant will be controlled by Nyrstar Operations personnel, following their normal response procedures and alarms.

To ensure the safety of SMO personnel, the alarm system will be activated by the Roaster Control Room or Security so as to initiate an evacuation of all Outage personnel because of an emergency.

13.4 ACCOUNTING FOR PERSONNEL

During an emergency evacuation alarm, all SMO personnel will assemble and remain at the EAA. A check by the Team Leaders, Job Owners, or Contractor Supervisors of their crews will be conducted to identify any missing personnel. Personnel will be accounted for by the Team Leaders, Job Owners, or Contractor Supervisors located at that point and information relayed via radio to the Project Manager or Security.

13.5 EMERGENCY EVACUATION RESPONSE PROCEDURE

- a. To raise the alarm, call Security at 3210 from any internal phone extension. Nyrstar Security can be direct dialed at 931-221-3210 from a mobile phone or contacted on Radio Security channel. Notify Security of the nature of the emergency and the exact location.

The Security Officer will activate the evacuation alarm, or arrange a response by the appropriate emergency service. **The EMERGENCY EVACUATION ALARM WILL BE A LONG WAIL SIREN TONE.**

- b. Where possible, make the work area safe, turn off equipment, notify others in the work area and then proceed via the nearest exit to the EAA. In case of tornado or lightning emergency, SMO contractors are to seek shelter in the rail/truck unloading building (EAA No. 2 on the Site Map in Appendix 3). Employees and contractors with indoor facilities are to seek shelter indoors during a lightning emergency and at their normal tornado shelter location during a tornado emergency.
 - 1. Per National Oceanic and Atmospheric Administration (NOAA) lightning safety guidance, a lightning emergency will be activated when lightning is detected within 8 miles of the site. The emergency will be lifted and work may resume after 30 minutes of no detected lightning strikes within a 6 mile radius of the site.
- c. Once at the EAA, the Team Leaders, Job Owners, or Contractor Supervisors will check off SMO personnel.
- d. Once checked off, Project personnel should await further instructions from the Team Leaders, Job Owners, or Contractor Supervisors such as when they can proceed back to their work area.
- e. Do not restart work until notified by the Team Leaders, Job Owners, or Contractor Supervisors.
- f. Emergency evacuation drills may be held at random intervals.

13.6 RESPONSIBILITIES FOR EMERGENCY ASSEMBLY AREAS

- Responsibility for the Emergency Assembly Area will remain with the Team Leaders, Job Owners, or Contractor Supervisors at all times.
- The Team Leaders, Job Owners, or Contractor Supervisors will compare the assembled employee names against the personnel that attended that Daily Safety Huddle.
- Normal Nyrstar emergency response procedures will be initiated. The site Safety Department / Security will arrange the dispatch of Emergency Services to the site.
- Once the emergency is over, Team Leaders, Job Owners, or Contractor Supervisors will make announcements at assembly points.

14 PROJECT SPECIFIC CONTROL INITIATIVES DEFINED

14.1 DECOMMISSIONING/DEREGULATION OF WORK AREAS

Decommissioning or deregulation of work areas because of special hazards will be a joint decision of the Project Manager, Area Superintendent, and the Safety Manager, or their designate, based on risk assessments of the affected areas.

14.2 HOUSEKEEPING / WASTE REMOVAL

Maintaining a clean and orderly job site is important to preventing workplace injuries. Contractors and Nyrstar workers shall ensure their work areas are kept in an orderly condition during the job, and will clean up the areas as a last step at the end of the shift or the completion of the job. Contractors and Job Owners will complete a housekeeping checklist each shift to ensure this task is complete (Appendix 11). Waste containers will be available for general trash, metal, wood, and special waste. Contact the Job Owner or SHEQ Manager to ensure proper waste disposal.

Commented [WW6]: This need to be part of a shift handover checklist requirements for the area owners and contractors.

Commented [ST7R6]: Completion of the housekeeping checklist is now a requirement per shift (Appendix 11).

14.3 CRANE LIFTS

All crane lifts of items that weigh over two (2) short tons, lifts of hazardous substances or dangerous goods, are to have a lifting plan that is written by the Crane Operator. This Lift Plan shall be reviewed & approved by the Nyrstar Outage Safety Personnel. These documented Lift Plans will effectively be the Risk Assessment for the lift. Copies of completed lift plans will be maintained by the Nyrstar Safety Department. Cranes must also have a horn

Crane lifts of items that weigh less than two (2) short tons can be considered routine lifts and should be included as a step in the Risk Assessment for the related job item.

Cranes should be equipped with an installed horn. Sound the horn prior to lifts. Lift zones are to be barricaded and tagged. Never walk under a suspended load.

Commented [WW8]: Are we able to specify that cranes come with the correct horn installed so that we do not have to rely on using canisters

Commented [ST9R8]: Cranes should be equipped with an installed horn.

14.4 MANUAL HANDLING

A manual handling procedure will be enforced to ensure that no person is required to physically lift, or move objects, or materials of such weight, size, or bulk as to likely to cause bodily harm to them. Maximum weights of materials for individual manual handling shall not exceed fifty (50) pounds. When lifting in excess of fifty (50) pounds, assistance is required or use of mechanical means is to be employed.

14.5 CONTROL OF HAZARDOUS SUBSTANCES AND DANGEROUS GOODS

Hazardous substances are defined as any substance, or mixture of substances, having properties capable of producing adverse effects on the health or safety of humans or the environment. i.e. materials which are explosive, gaseous, flammable, oxidizing, poisonous, infectious, radioactive, corrosive or ecotoxic (adverse toxic effect on biological, marine and terrestrial systems).

Any Contractor intending to bring any hazardous substances onto the Nyrstar site must seek formal written approval from the Nyrstar Environmental Coordinator and Project Manager.

This requires copies of the SDS sheet to be submitted. All hazardous substances must be stored in containers as specified by the manufacturer and be properly labelled.

Where any dangerous goods are to be lifted to height, this must be done using an approved container and a documented Lift Plan must be developed.

All hazardous waste and refractory materials will be disposed of as per Nyrstar and Environmental Department procedures.

14.6 HEAT STRESS MANAGEMENT

Contractors are expected to manage their heat stress exposures in accordance with the NIOSH Work/Rest Schedules included in Appendix 8. Cooling methods including ventilation should be employed as necessary to maintain the temperature of work areas in the green/"Normal" zone according to the NIOSH Work/Rest Schedules chart. The Safety Department can monitor the temperature and humidity using a WGT monitor and make work recommendations to the Job Owners.

14.7 WORKING HOURS

For contractors working on the SMO, working hours will be limited to no more than thirteen hours a day, with at least 10 hours offsite. As well as, no more than thirteen consecutive days without a day off.

Exceptions will be made on a case-by-case basis with approval of a Nyrstar manager.

14.8 USE OF DIESEL / GASOLINE DRIVEN EQUIPMENT

The SMO may require the use of diesel or gasoline driven equipment. When this type of equipment is required, the following will apply:

- Equipment will have fire extinguishing equipment fitted, or on standby status.
- Use spotters when back mobile equipment or operating in congested areas.
- Seat belt use is required on mobile equipment
- Where appropriate, equipment will be fitted with a remote Outage switch.
- Equipment is to be turned off during an emergency alarm.
- Equipment is preferably to be located outside of buildings in well-ventilated areas.
- Equipment is to be maintained so that its exhaust emissions do not cause a problem.
- Equipment is not to be located in a position where the exhaust could contaminate the atmosphere of an adjacent confined space.
- Bulk storage of fuel on site will not be allowed. Equipment is to be refuelled as required.
- The area around equipment is to be cleared of any combustible material.
- Machines shall not be located in areas where the potential for Carbon Monoxide collection exists.
- A noise limit of 85 DbA at 5 feet will apply.

14.9 FIRST AID

The Nyrstar First Aid Station is fully equipped for all first aid requirements. **All** injuries **MUST** be reported to the, Project Lead, Safety Department and the Project Manager.

14.10 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The following minimum standards of PPE will be worn at all times by persons working on the Nyrstar site including the Outage Project:

- ANSI Approved Eye Protection with Side shields

Commented [WW10]: Expand on this to be clear that we work 13 days and one day off, no more than 13Hrs a day and then at least 10 hours off site.

Commented [ST11R10]: Updated

- Face shield with chemical goggles if working on Acid Plant jobs with corrosive solution present, along with approved acid resistant PPE.
- Hard Hats will be ANSI approved. They shall be fitted with reflective tape / devices for visibility purposes.
- Safety Footwear – Safety toe to ANSI Standard with integral Metatarsal protection
- Clothing. - Industrial clothing which fully covers the legs and arms, and is of high visibility with reflective stripes for the upper body. Long sleeved garments are required to be fully down.
 - A high visibility vest may be used as a substitute for a shirt with reflective stripes.
- Gloves appropriate to the task being performed.

When necessary, additional items of PPE appropriate to specific tasks will also be required. These will be identified in the Risk Assessment.

14.10.1 Respiratory Protection

The roaster and waste heat boiler areas are regulated areas and require respiratory protection unless/until the areas are cleaned and deregulated by the area superintendent and safety manager. The primary respiratory hazards are cadmium and lead particulate. Silica is an additional respiratory hazard when demolishing, cutting or grinding refractory brick.

Demolition / Cleaning inside roaster or boiler, or Cutting of refractory brick

- Minimum level of respiratory protection for those involved in the demo or cleaning inside the roaster or waste heat boiler shall be any powered, air-purifying respirator (PAPR) with a helmet and hood (APF = 1,000) .
- Minimum level of respiratory protection for anyone demolishing, dry-cutting or grinding refractory brick shall be any full-face air-purifying respirator with a high-efficiency particulate filter (APF = 50).

Other work in regulated area

- For other work in the regulated area, the minimum level of respiratory protection shall be any particulate respirator equipped with one of the following filters: N95, R95, P95, N99, R99, P99, N100, R100, or P100 (APF = 10). No quarter-mask respirators shall be used; half-face is the minimum standard.
- Anyone wet-cutting refractory brick will also use this level of respiratory protection as the minimum standard. Anyone demolishing, dry-cutting or grinding refractory brick will use the higher APF = 50 standard of respiratory protection.

14.11 DRUGS AND ALCOHOL

All personnel are subject to random alcohol and / or drug testing while working on the Nyrstar Clarksville site.

Being under the influence of, or in possession of drugs and/or alcohol on the Nyrstar site is a breach of the Safety Policy and will not be tolerated. The consequence of such behavior will include immediate removal from site.

14.12 TOBACCO USE / SMOKING

Tobacco use is only permitted in designated tobacco use areas. These areas are clearly designated by signs. All tobacco users shall be responsible for their debris (i.e., cigarette

butts, chewing tobacco, etc.). Under no circumstances shall tobacco use debris be disposed on the grounds.

14.13 WORKING AT HEIGHTS

14.13.1 General

Work at heights shall be prevented or eliminated wherever possible, through the development of alternative techniques or procedures or the use of safe fixed working platforms. When this is not feasible, preferred controls include scaffolding, temporary barriers or the use of high reach equipment; remaining fall hazards will be controlled by means of personal fall protection systems. Work areas shall be kept clean in order to avoid exceeding load limits and to eliminate slip/trip hazards. *Refer to Life Saving Rule #3 in the Nyrstar Life-Saving Rules booklet for additional information.*

To prevent dropped objects when working at heights, workers should:

- use tethered tools or tools attached to lanyards.
- only bring up the tools they need to do their job.
- hoist up tools in buckets, bags, and/or pouches.
- verify toe boards are in place on scaffolding or man lifts.
- utilize debris nets if none of the other practices listed above are not adequate.

14.13.2 Elevated Work Platforms

Elevating Work Platforms (EWP's) include scissor lifts, cherry pickers, boom lifts and travel towers. EWPs shall comply with the following requirements:

- Shall be inspected prior to use by each shift.
 - Contractors may use their company provided inspection checklist or Nyrstar's Pre-Use checklist.
 - This requirement will be verified by the contractor representative and spot-checked by the Nyrstar Job Owner or SHEQ department representative.
- The use of EWPs is only allowed by properly trained and qualified personnel.
- High reach equipment will not be operated in wind conditions exceeding 25 MPH.
- Unless designed for rough terrain, EWPs will only be used on solid, horizontal surfaces. Areas underneath the EWP's will be properly secured with barricade tape and tags.
- As a risk of falls and / or ejection exists, personal fall protection equipment which includes a safety harness and retractable life line are required when working in EWP's.

14.13.3 Personal Fall Prevention / Protection Equipment

- Personal fall prevention / protection equipment (fall arrest system) will be used whenever there is a risk of falling of 4ft. or more and from where a person is likely to fall that cannot be completely controlled by other measures such as permanent or temporary barriers.
- Travel restraint systems will be strategically positioned to allow a worker to travel far enough to reach an unprotected edge, but not far enough to fall over. These systems consist of a full body harness, relief step and a lanyard connected to an anchor point that is capable of supporting 5000 pounds or an adequately anchored lifeline. The

Commented [WW12]: This section should contain info on all of our lifesaving rules, we also need to deal with Dropped Objects and what we consider as the controls to reduce that risk. Like Buckets, drop mats, Lanyards and carry stuff up and down stairs.

Commented [ST13R12]: Complete

Commented [WW14]: How will we deal with Pre-use inspections at least ones per shift and when hanging from one work crew to the other.

Commented [ST15R14]: Complete

use of self-retracting lifelines is strongly preferred; lanyards should only be used when the use of self-retracting lifelines is not feasible.

- When no dedicated anchor point exists, anchor straps or beam straps will be used for tying off to alternative anchorage points such as steel beams and other structural members. Connecting lanyards or self-retracting lifelines to each other will not be allowed.
- All persons using personal fall prevention/protection equipment will be properly trained in its use.
- All fall protection/prevention equipment will be inspected (at least monthly by a competent person), documented, with a color-coded wire tie attached to the equipment. It will also be inspected before each use by the wearer.
- All fall protection equipment subjected to impact loading will be destroyed and discarded.

14.13.4 Portable Ladders

Use of ladders should be eliminated as much as possible and will be required to be specifically approved for use by the SMO Manager.

If approved, follow the guidance below for safe ladder use.

- When ascending or descending a ladder, the worker must face the ladder.
- When a ladder is used to gain access to elevated surfaces or roofs, the top of the ladder shall extend a minimum of three feet above the point of support.
- Portable stepladders shall be used when the legs are completely opened with the spreaders locked in place.
- Working from ladders is prohibited except for occasional tasks of limited duration, provided 3 points of contact can be maintained.
- If working from a portable ladder while on scaffolding, an elevated work platform, or any elevated working surface, personal fall protection must be worn.

Commented [WW16]: Use of ladders should be eliminated as far as possible and should be specifically approved for use by the SMO manager

Commented [ST17R16]: Statement added to beginning of paragraph.

15 APPENDIX 1: DETAILS OF ROLES AND RESPONSIBILITIES

15.1 PROJECT MANAGERS / AREA OWNERS

The Project Managers will be responsible for:

- Ensuring the development, implementation and monitoring of the SMP.
- Conducting regular management safety inspections of work areas during Outage activities.
- Participate in incident and near miss investigations for high severity incidents (LTI or potential LTI's or serious near misses). The SMO22 Project Manager in consultation with the Safety department will assign who will lead the investigation.
- Ensuring Risk Assessments are developed and completed for all identified Project jobs.
- Reviewing and authorizing changes to the SMP as required.
- Demonstrating clear commitment to safety at all times through positive reinforcement of safety strategies.
- Reviewing Contractors Safety Plans and/or risk assessments prior to Outage commencement.
- Ensuring contractor's conformance to their submitted Safety Plans and/or risk assessments.
- Chairing the Daily Management Status Meeting.
- Auditing of Outage safety management, conditions and documentation.

15.2 OUTAGE SAFETY MANAGER

The Safety Manager is responsible for:

- Reviewing the currency of the SMP
- Oversight of all safety activities required by the SMP
- Compiling daily summaries of all audits completed and actions required
- Carrying out safety inspections daily
- Enforcement of safety rules and procedures
- Reviewing contractors Risk Assessments
- Monitor that the contents of Risk Assessments are clearly communicated to all personnel involved in the particular task
- Reviewing and approving of mobile crane lifts that exceed two tons
- Participating in accident/incident investigations
- Attending and reporting on safety events at the Daily Outage Update meeting
- Providing safety advice to everyone working on the Outage
- Monitoring adherence to isolation / lockout procedures
- Collecting Contractor KPI information
- Monitoring housekeeping standards
- Auditing contractors for compliance with the Nyrstar Procedures, the SMP and Contractor's submitted Safety Plans and/or risk assessments
- Demonstrating, through actions, a commitment to safety

15.3 Contractor SAFETY Representative

Each contractor must provide a Safety Representative for the SMO. Each Safety Representative is responsible for:

- Oversight of all safety activities for their company's portion of the SMO
- Compiling daily summaries of all audits completed and actions required
- Carrying out safety inspections daily
- Positive reinforcement of safety rules and procedures
- Reviewing contractors Risk Assessments
- Monitor that the contents of Risk Assessments are clearly communicated to all personnel involved in the particular task
- Reviewing and approving of mobile crane lifts that exceed two tons
- Initiating all accident/incident investigations, using the Injury Escalation Chart (**Appendix 23**)
- Attending and reporting on safety events at the Daily Outage Update meeting
- Providing safety advice to everyone working on the Outage
- Monitoring adherence to isolation / lockout procedures
- Collecting Contractor KPI information
- Monitoring housekeeping standards
- Auditing contractors for compliance with the SMP and Contractor's submitted Safety Plans and/or risk assessments
- Demonstrating, through actions, a commitment to safety

15.4 OUTAGE SAFETY ADVISOR

The Outage Safety Advisor shall be responsible for

- Carrying out safety inspections daily
- Attending pre-Outage planning sessions
- Working with the Outage Manager to obtain all required documentation and other Safety associated paperwork required from Contractors as necessary
- Positive reinforcement of safety rules and procedures
- Reviewing contractors Risk Assessments
- Monitor that the contents of Risk Assessments are clearly communicated to all personnel involved in the particular task
- Participating in accident/incident investigations
- Attending and reporting on safety events at the Daily Outage Update meeting
- Providing safety advice to everyone working on the Outage
- Monitoring adherence to isolation / lockout procedures
- Monitoring housekeeping standards
- Auditing contractors for compliance with the SMP and Contractor's submitted Safety Plans and/or risk assessments
- Demonstrating, through actions, a commitment to safety

15.5 JOB OWNERS (OR THEIR DESIGNATE)

Job Owners are responsible for:

- Participating in developing safe work procedures through Risk Assessments
- Participating in incident / near miss investigations as required
- Monitoring contractors for compliance with rules and procedures
- Demonstrating through actions a commitment to safety
- Attending daily communications meetings
- Participating in safety inspections and audits
- Communicating job and safety requirements through Daily Safety Huddle meetings
- Job specific safety documentation
- Notifying the Safety Department and the Outage Manager of any incidents / near misses that occur in their area
- Ensuring that all Outage tasks have a SOP or Risk Assessment signed off prior to job commencement
- Ensuring that all those working on a job have been briefed on the SOP or Risk Assessment

15.6 EXTERNAL SERVICES

External Services is responsible for:

- The development, submission, implementation and monitoring conformance with their safety management plan, and liaising with Nyrstar Safety Personnel
- The safety and safety administration of their sub-contractors
- Holding their supervisors responsible for the safety performance of the work group
- Provision of personnel to attend relevant training
- Immediate participation in site investigation of significant accidents and near misses
- Providing personnel with adequate experience, skills and applicable licenses for Outage jobs
- Attending Daily Safety Huddle meetings
- Ensuring all Outage personnel they supply have attended the required Nyrstar Clarksville Inductions
- Providing adequate supervision
- Conducting worksite inspections and audits
- Preparing Risk Assessments
- Safety documentation
- Ensuring their personal (employees and subcontractors) hold the appropriate qualifications or certifications for the activities they are performing

15.7 CONTRACTOR SUPERVISORS

All contractor supervisors are responsible for:

- Ensuring that relevant Risk Assessments are completed and submitted
- Ensuring that the contents of Risk Assessments are clearly communicated to all personnel involved in the particular task
- Safety Huddle Meetings are conducted at the start of each shift. Meetings to be documented and attendance recorded

- Housekeeping is maintained to a high standard
- Carrying out incident / near miss investigations in own area
- Rectifying or controlling hazards immediately
- Ensuring their personnel have undergone the relevant safety inductions
- Personnel remain within their assigned work areas
- Carrying out safety inspections of own work areas daily
- Seeking input from group on how to improve safety on the job
- Positive reinforcement of safety rules and procedures
- All personnel under their direction comply with site rules and procedures
- Safety documentation
- Scaffold erections shall require a designated competent person to conduct inspection and tagging procedures for each shift in which a scaffold is to be used per Policy TP-563-00014. (Appendix 6)

15.8 ALL EMPLOYEES

All employees are responsible for:

- Locking on to the relevant group isolation for the task being performed
- Their own safety and that of their fellow worker
- Following site rules and procedures
- Wearing applicable PPE
- Maintaining an orderly worksite
- Identifying and controlling hazards within their own areas
- Taking appropriate action if an unsafe situation arises
- In an emergency, making their area as safe as possible and proceeding to the assembly area
- Submitting ideas at Daily Safety Huddles on how to improve safety on site
- Only undertaking activities they have been trained or are qualified to perform

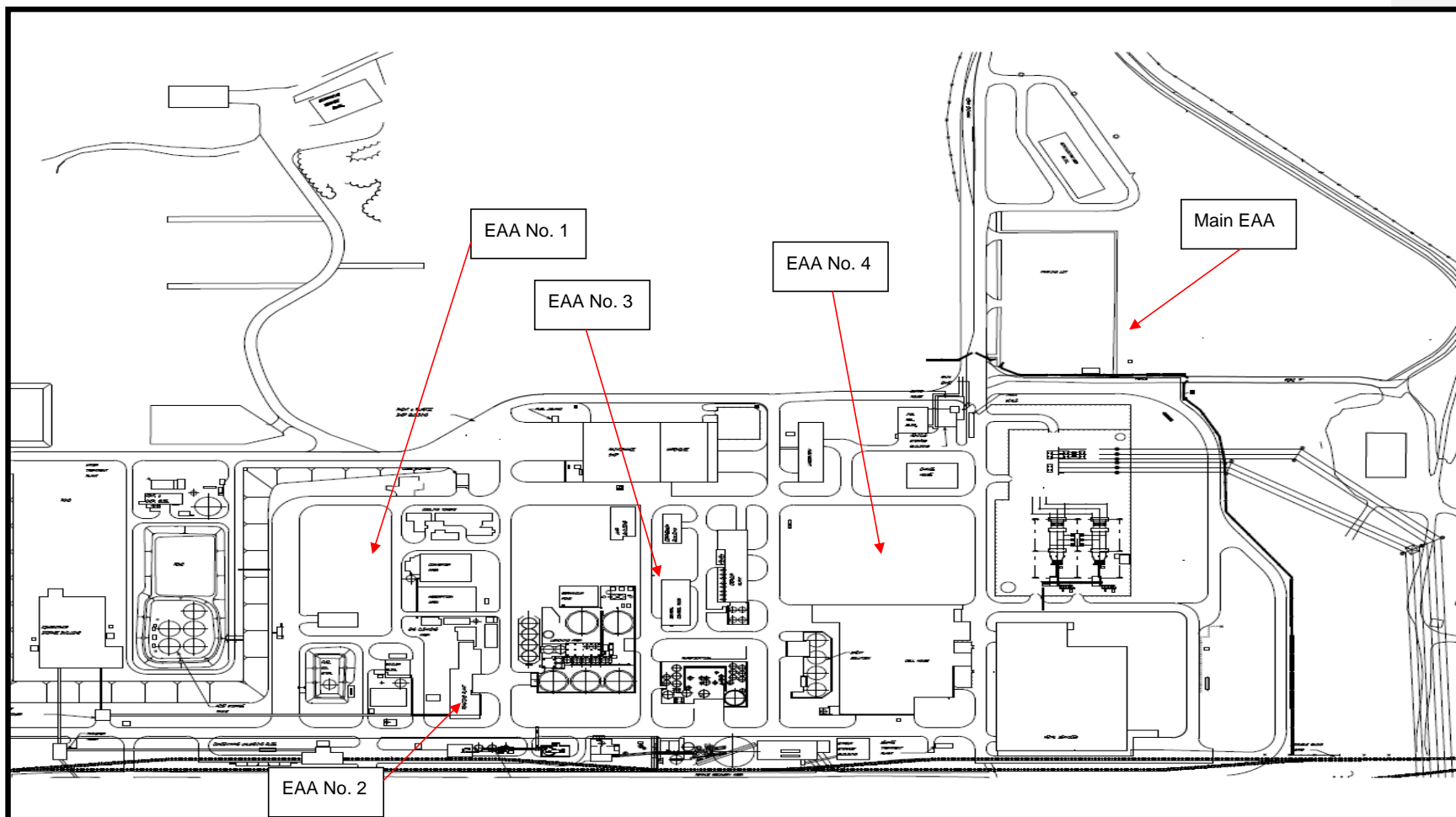
16 APPENDIX 2: OUTAGE MAIN HAZARDS, CONSEQUENCES AND CONTROLS

Item	Hazard	Consequence	Control, Protective Measures
1	Conflicting activities on multiple levels	Falling tools, construction materials or debris from above	Temporary floors and platforms to be erected. Co-ordination and communication between groups. Tool tethering
2	Personnel locking onto wrong isolation points	Injury to workers from sources of energy	Specific isolation procedures to be developed. Risk Assessment's to identify isolation area.
3	Work in confined spaces	Oxygen depletion/enrichment (asphyxiation)	Confined space entry procedures to be followed, gas test, rescue plan and rescue Team available
4	Residual Acid in tanks and lines	Acid burns	Isolation and purging of lines. Acid suits. BUMBBB solution.
5	Heavy equipment lifts inside operating areas	Collisions between structures and moving equipment	Tape off areas. Risk Assessment to include acknowledgement
6	Ongoing production in adjacent plant areas	Vehicle movements in adjacent work areas. CO. Hot metal burns	Outage area to be indicated by marked access routes and barriers. Co-ordination.
7	Unusual and awkward lifts of equipment and materials	Dropping of equipment or materials resulting in injury or damage	Lifting plans. Risk Assessments to be carried out to identify and eliminate or control hazards. Coordination between work areas. People clear of suspended loads
8	Conflicts between cranes	Collision between crane booms / jibs	Lifting plans. Coordination between work areas and lifts.
9	Conflicts with site vehicle movements	Collision between operating machinery and stationary Outage vehicles	Co-ordination of parked vehicle location with production. Tape off access around stationary vehicle. Flagman if required
10	Demolition activities (confined space work, dust, noise, fumes gas cutting)	Falling materials, inhalation, manual handling strains	Correct PPE, fume extraction equipment. Defined hazardous work authorities (permits) required. Confined space entry procedures to be followed including a rescue plan. Confined Space attendants are issued a radio for emergency communications

Item	Hazard	Consequence	Control, Protective Measures
11	Heat, dust and fume	Detrimental to health of workers	Potable water available, PPE, Air Movers (extraction fans); Designated working periods for heat relief
12	Working at heights	Injury from falling / dropping items to lower levels	Risk Assessment to identify and eliminate or control hazards (use harness as a last resort) Work from Aerial Lifts require the use of a SRL / barricade tape. Tool tethering to prevent dropped objects
13	Overhead suspended refractory hazards	Falling refractory	Correct PPE. Overhead protection where available/practicable
14	Access and egress constraints	Selection of personnel. Difficult access/egress. Recovery problems	Confined space entry procedures. Ladders and steps provided. Site emergency response team.
15	Ongoing needs of operational personnel in the Outage area	Interference with Outage activities.	Co-ordination and communication between groups. Isolation procedures to be followed. Outage induction. Outage access requirements to be followed.
16	Environmental / Weather	Struck by lightning or wind-blown objects	Suspend outdoor activities if lightning is reported within 10 miles. Follow crane operators' guidelines with regard to suspending lifting for high winds.
17	Working in lead/cadmium regulated areas	Exposure to elevated levels of lead and cadmium	Follow respiratory protection requirements in Section 14.10.1.
18	Asbestos demo activities	Inhalation of airborne asbestos fibers	Use certified asbestos abatement contractor for asbestos abatement tasks, and ensure they use proper controls.

Note: The hierarchy of hazard control should apply. This requires that identified hazards are eliminated where possible, if not then they should be isolated and if that cannot be achieved then they should be minimised.

17 APPENDIX 3: SITE MAP





18 APPENDIX 4: WORK AREA STANDARD INSPECTION (WASI)

nyrstar WORK AREA STANDARD INSPECTION (WASI)				
Department/Area				
Inspection Date				
Conducted By (Print)	Last Name	First Name		
Personal Protective Equipment	Check	Yes	No	Comments
Is Personal Protective Equipment clean and in good condition? (no visible damage)				
Are personnel wearing Personal Protective Equipment at all times as required?				
Emergency	Check	Yes	No	Comments
Are safety showers and eye washers working and highly visible?				
Are safety showers and eye washers accessible with no obstruction?				
Are extinguishers full and charged?				
Have the extinguishers been inspected in the past month?				
Are emergency exits clear of obstruction?				
Are emergency exits clearly identified?				
Is BUM solution available and not expired?				
Lighting	Check	Yes	No	Comments
No faulty lamps, tubes and switches?				
Is the lighting in the area adequate?				
Housekeeping	Check	Yes	No	Comments
Are walkways clear of obstruction?				
Are items stored in a designated place?				
Half buried items, uneven surfaces, other tripping hazards?				
Are hoses not in use rolled up?				
Is waste in the designated bins?				
Are waste bins emptied?				
Are there oil spills on walkways?				

Hand Tools	Check	Yes	No	Comments
Are the tools in good condition?				
Are correct tools supplied and used for the job?				
Are tools stored in their designated place when not in use?				
Electrical Equipment and Wiring	Check	Yes	No	Comments
Are switchboards complete, all covers in place?				
Are redundant switches and removed buttons etc. blanked off?				
There are not temporary extension cords on the floor when not in use?				
There are not broken plugs, sockets or switches?				
Electrical Tools & Hydraulics	Check	Yes	No	Comments
Are the in-service inspection and testing of electrical/hydraulic equipment records available?				
Are the electrical/hydraulic power tools correctly tagged?				
Are the electric cables/air hoses in good condition?				
Are the extension leads correctly tagged?				
Are the portable residual current devices tagged?				
Ladders/Handrails/Platforms	Check	Yes	No	Comments
Are ladders in good condition and properly stored when not in use?				
Are ladders tagged?				
Are handrails in good condition and have kick bar?				
Are stairs in good condition and have handrail?				
No trip hazards or holes in walkway grating?				
Is grating attached/secured?				
Scaffolding	Check	Yes	No	Comments
Scaffold tagging in place?				
Scaffold tagging in date/current?				

August 10, 2021 Rev.5

[illegible]

20 APPENDIX 5: NYRSTAR SAFETY RISK RATING SYSTEM

Consequence Criteria

A consequence level should be chosen on the basis of the expected (most likely) impact on Nyrstar and its stakeholders taking into account current controls and their effectiveness. Choose the highest relevant consequence types for the basis for the rating.

Level	Financial (EBITDA)	Growth (NPV)	People	Environment and community	Reputation	Legal
6	>€100m loss or gain	>€500m loss or gain	Multiple fatalities or significant irreversible effects on 10's of people	Regional and long term impact on an area of significant environmental value. Destruction of an important population of plants and animals with recognized conservation value. Complete remediation impossible. Complete loss of trust by affected community threatening the continued viability of the business	Prominent International media coverage. Long term impact on share price Leads to changes at NMC or Board level.	Public inquiry taking up considerable resources and Executive management time. Major litigation or prosecution with damages/fines of >€50m+ plus significant costs. Custodial sentence for a manager. Suspension of shares by the FSMA.
5	>€10m, <€100m loss or gain	>€50m - <€500m loss or gain	Single fatality and/or severe irreversible disability to one or more persons	Destruction of an important population of plants or animals or of an area of significant environmental value. Complete remediation not practical or possible. Long-term community unrest and outrage significantly impacting business performance	National media coverage over several days. Shareholders and Board exercise control. Potential for class action. Major customers cancel key contracts.	Major litigation or prosecution with damages or fines of <€50m+ plus significant costs. Imposition of a fine by the FSMA Major breach of regulation leading to cancellation of operating license.
4	>€1m, <€10m loss or gain	>€5m, <€50m loss or gain	Extensive injuries / illnesses or irreversible disability or impairment to one or more persons	Extensive and medium-term impact to an area, plants or animals of recognized environmental value. Remediation possible but may be difficult or expensive. Community protest requiring intervention and substantial management attention	State media coverage over several days. Publicly disclosed involvement by regulator(s).	Litigation or prosecution costing <€5m or involving substantial management time (Manager level and above). Publishing of a warning by the FSMA. Breach of regulation leading to suspension of operating license.
3	>€100k, <€1m loss or gain	>€500k, <€5m loss or gain	Medium term reversible disability to one or more persons. Significant medical treatment, disabling or lost time injury	Localized and medium term impact to areas, plants or animals of significant environmental value. Remediation may be difficult or expensive. Persistent community complaints	State media coverage. Interest by regulator(s) and NGOs.	Major breach of regulation with punitive fine. Involvement of senior management
2	>€10k, <€100k loss or gain	>€50k, <€500k loss or gain	Recordable injuries or illnesses with up to one week of job restrictions or lost time	Localized and short term impact to an area, plants or animals of environmental value. Minor remediation is required Complaints from interested parties	Local media coverage interest by local NGOs. One or two community complaints.	Breach of regulation with investigation or report to authority with possible prosecution and fine
1	<€10k loss or gain	<€50k loss or gain	Minor injury or illness, first aid or medical treatment without job restrictions	Localized and short term environmental or community impact requiring no or very minor remediation	Kept on site. No media or community interest	Minor legal issues, non-compliances and breaches of regulation.



Likelihood Criteria

A likelihood category should be chosen on the basis of the chance that Nyrstar or its stakeholders could be affected at the chosen level of consequence.

Level	Criteria
F	<ul style="list-style-type: none">Is expected to occur in most circumstances, orCould occur within days to weeks
E	<ul style="list-style-type: none">Could occur in most circumstances, orCould occur within weeks to months
D	<ul style="list-style-type: none">Has occurred before in Nyrstar, orCould occur within months to years
C	<ul style="list-style-type: none">Has occurred before in the industry, orCould occur within the next few years
B	<ul style="list-style-type: none">Has occurred elsewhere, orCould occur within decades
A	<ul style="list-style-type: none">Requires exceptional circumstances and is unlikely, even in the long termOnly occurs as a "100 year event"

Control Effectiveness (CE)

The relative assessment of actual level of control that is currently present and effective compared with that reasonably achievable for that particular risk. CE will therefore be an indicator as to whether Nyrstar is doing all that it could or should to manage the risk under the circumstances.

Descriptor	Guide
Fully effective	Nothing more to be done except review and monitor the existing controls. Controls are well designed for the risk, address the root causes and Management believes that they are effective and reliable at all times.
Substantially effective	Most controls are designed correctly and are in place and effective. Some more work to be done to improve operating effectiveness or Management has doubts about operational effectiveness and reliability.
Partially effective	While the design of controls may be largely correct in that they treat most of the root causes of the risk, they are not currently very effective. or Some of the controls do not seem correctly designed in that they do not treat root causes, those that are correctly designed are operating effectively.
Largely ineffective	Significant control gaps. Either controls do not treat root causes or they do not operate at all effectively.
None or totally ineffective	Virtually no credible control. Management has no confidence that any degree of control is being achieved due to poor control design and / or very limited operational effectiveness.



Potential Maximum Consequence (PMC)

The total plausible worse case impact arising from a risk assuming all current controls fail. It is rated using a level from the consequence criteria on Page 1. It is the primary means used to prioritize controls for assurance. The controls that modify the risk where we believe the level is low but the PMC is high are the 'key' controls that have the highest priority for checking and assurance planning.

Risk Matrix

The matrix should be used to determine the priority of attention to the risk

Likelihood Rating	F	Medium	Medium	High	Very High	Very High	Very High
	E	Low	Medium	High	High	Very High	Very High
	D	Low	Medium	Medium	High	Very High	Very High
	C	Low	Low	Medium	High	High	Very High
	B	Low	Low	Medium	Medium	High	Very High
	A	Low	Low	Low	Medium	High	High
		1	2	3	4	5	6
Consequences							

Priority for Attention

Priority for attention and the seniority of management sign-off for continued toleration of risks will be as shown below. Authority is required if the action is not taken within the time suggested

Priority	Suggested action	Suggested timing	Authority for continued toleration of residual risk.
Very High	Where CE not as high as 'fully effective', take action to reduce residual risk to "high" or below	Short term. Normally within 1 month.	CEO and Board
High	Plan to deal with in keeping with the business plan.	Medium term. Normally within 3 months.	GMs
Medium	Plan in keeping with all other priorities.	Normally within 1 year	Managers
Low	Attend to when there is an opportunity to.	Ongoing control as part of a management system.	Supervisors

The decision to tolerate a risk should be based on a consideration of:

- Whether the risk is being controlled to a level that is reasonably achievable;
- Whether it would be cost-effective to further treat the risk;
- Nyrstar's willingness to tolerate risks of that type.

Low or tolerable risks may be accepted with minimal further treatment.

They will be monitored and periodically reviewed to ensure they remain so. If risks are not judged low or tolerable, they should be treated.

21 APPENDIX 6: NYRSTAR SCAFFOLDING INSPECTION CHECKSHEET

SCAFFOLD
INSPECTION
CHECK SHEET

Nyrstar Clarksville

Project:			
Address:			
Contractor:			
Date of Inspection:		Inspected by:	
		Signature:	
Inspection Criteria	Yes	No	Comments
1. Are scaffold components in safe condition for use?			
2. Are planks graded for scaffold use?			
3. Are working level platforms fully planked between guardrails (fully planked or decked with no gaps			
4. Are planks in good condition?			
5. Does plank have minimum 12" overlap and extend 6" – 18" beyond supports?			
6. Is the frame spacing and sill size capable of carrying intended loads?			
7. Erected under directions of Competent Person?			
8. Have screw jacks been used to level and plumb scaffold instead of unstable objects such as concrete blocks,			
9. Are base plates and/or screw jacks in firm contact with sills and frame?			
10. Is scaffold level and plumb?			
11. Are all scaffold legs braced with braces properly attached?			
12. Is guard railing in place on all open sides and ends?			
13. Has proper access been provided?			
14. Has overhead protection or wire screening been provided where necessary?			
15. Has scaffold been tied to structure at least every 30' in length and 26' in height?			
16. Have freestanding towers been guyed or tied every 26' in height?			

17. Have brackets and accessories been properly placed:			
Brackets?			
Putlogs?			
Tension & compression ties?			
Tube and clamp?			
All nuts and bolts tightened?			
18. Is scaffold free of makeshift devices or ladders to increase height?			
19. Is the front face within 14 inches of the work (or within 3 feet for outrigger scaffolds)?			
20. Are toe boards installed properly?			
21. Have hazardous conditions been provided for:			
Power lines?			
Wind loading?			
Possible washout of footings?			
Uplift and overturning moments due to placement of brackets, putlogs or other causes?			
22. Is there a competent person as defined on the project during the erection & disassembling process?			
23. Is scaffold able to hold four times its maximum intended load?			
24. Maximum permissible spans for 2X10-inch (nominal) or 2X9-inch (rough) planks are:			
Working load (psi): 60lbs per square: 1 foot.			
25. Secure metal scaffold to structure by a double looped #12 iron wire, or single looped #10 iron wire.			
26. Work platforms 6"feet or more above grade require top rail at a height of 42-45" from the platform.			
27. Mid-rail halfway between top rail and			
Note: Any scaffolding erected that does not meet the complete requirement will use a yellow card with the deviation noted in the comment section.			

Mobile Scaffolds			
1. Working area should be clear of all obstacles, which would cause a mobile scaffold to tip over.			
2. Frame should be properly braced. Use horizontal bracing near the bottom and at 20-foot intervals measured from the rolling surface.			
3. Wheels or casters should be provided with a locking device.			
4. Adjusting screws (if used) should not be extended more than 12 inches.			
5. Working platform height of a rolling scaffold should not exceed 4 times the smallest base dimension unless guyed or otherwise stabilized.			
6. Guardrails should be installed on all open sides and ends of platforms more than 6' in height.			
7. Do not use outriggers or other platform extensions without thorough consideration for overturning effect.			
8. Toe boards should be installed on all open sides and ends of platforms more than 6 feet in height.			
9. Cleat or secure all planks.			

22 APPENDIX 7: NYRSTAR LOCKOUT PROVISIONS

2022 Major Outage

Lockout Verification Procedure Change Notification

This notice addresses work performed in the planned project. The provisions outlined in this communication are not applicable for jobs outside the 2022 turnaround and concurrent work projects. The standard Lock-out / Tag-out Policy still applies to those areas.

The Changes – “Verifications of Lockout”

All equipment affected by the Project will be locked out using the standard Group Lock Box systems as identified in the established Policy. Each Group Lock Box shall be uniquely numbered and will clearly identify the systems / equipment that it controls.

The Authorized Operator shall apply all required Green locks / Tags to each isolation point for all identified equipment, as indicated by the documented equipment lockout procedures. The “Lock-out Tags” shall legibly identify the Authorized person that isolated each lockout point, along with the date of the lockout. All keys to the Green locks shall be placed inside the appropriate Group Lock Box. The Group Lock Box will be securely locked out by the Authorized Operator using the appropriate plant colored Lock-out Device and tag.

A second Authorized Person, along with the Authorized Asset Management Representative / Lead Man for the job, will verify that all equipment and systems isolated under the Group Lock Boxes are correctly locked out and zero energy is verified. Both of these people will sign and date the red “Isolation Certification Tag” and use it to attach their personal lockout devices to the appropriate Group Lock Box for the identified equipment. The initial Production and Asset Management locks applied at verification will remain on for the duration of the work. The Lockout(s) performed by the Asset Management Representative / Lead Man will serve as isolation verification for all subsequent Maintainers and Contractors that will perform work / service on the isolated equipment. These groups shall utilize separate multi hasp devices to denote Nyrstar Maintenance and Contractor personnel, attached to the Lead Man’s verification multi hasp device.

When the Maintenance / Contractor crew arrives at the job site to perform the work, the Authorized Operator will show them the correct Lockbox for the equipment that is to be worked on. Each person working on the equipment shall affix their personal Lock-out Devices and tags to the Group Lock Box as instructed by the Authorized Operator. The Operator will then authorize the Safe Work Permit for the task. Additional personnel joining the work crew will add their personal Lock-out Device to the Group Lock Box. No additional verification is required.

Normal procedure will be utilized for the removal of all crew and personal locks. No other aspects of the Lock-out / Tag-out Safety Policy are affected by this change.

23 APPENDIX 8: NIOSH WORK/REST SCHEDULES



Sample Work/Rest Schedule for Workers Wearing Normal Clothing*

The NIOSH work/rest schedule is based on air temperature, with adjustments for direct sunlight and humidity. It may not be applicable to all worksites. Other work/rest schedules are available, some of which are based on Wet Bulb Globe Temperature.

See reverse for temperature adjustments for the NIOSH work/rest schedule and examples of light, moderate, and heavy work.

Temperature (°F)	Light Work Minutes Work/Rest	Moderate Work Minutes Work/Rest	Heavy Work Minutes Work/Rest
90	Normal	Normal	Normal
91	Normal	Normal	Normal
92	Normal	Normal	Normal
93	Normal	Normal	Normal
94	Normal	Normal	Normal
95	Normal	Normal	45/15
96	Normal	Normal	45/15
97	Normal	Normal	40/20
98	Normal	Normal	35/25
99	Normal	Normal	35/25
100	Normal	45/15	30/30
101	Normal	40/20	30/30
102	Normal	35/25	25/35
103	Normal	30/30	20/40
104	Normal	30/30	20/40
105	Normal	25/35	15/45
106	45/15	20/40	Caution
107	40/20	15/45	Caution
108	35/25	Caution	Caution
109	30/30	Caution	Caution
110	15/45	Caution	Caution
111	Caution	Caution	Caution
112	Caution	Caution	Caution

Things you need to know:

- Continuous work in the heat is not advisable—you must take rest breaks periodically to allow your body to cool down.
- A variety of work/rest schedules are available that can be adapted to your worksite. Relying on self-pacing alone may not be sufficient.

Example

A worker performing heavy work in 104 °F temperatures should work for 20 minutes and rest for 40 minutes.

Example

A worker performing moderate work at 108 °F should use extreme caution! The risk for heat injury is high in this situation.

* From NIOSH Criteria for a Recommended Standard, Occupational Exposure to Heat and Hot Environments, <https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf>. Assumptions: workers are physically fit, well-rested, fully hydrated, under age 40, and environment has 30% humidity and perceptible air movement.

Temperature Adjustments for this Work/Rest Schedule

Adjust the temperature in the table based on:

Environmental conditions	AND	Humidity
• Full sun (no clouds): Add 13 °F		• 40% humidity: Add 3 °F
• Partly cloudy/overcast: Add 7 °F		• 50% humidity: Add 6 °F
• No shadows visible, in the shade, or at night: No adjustment		• 60% humidity or more: Add 9 °F

Example Adjustment

Conditions at a mine are 90 °F, with partly cloudy skies and 50% humidity. Adjust the table as follows:
Add 7 °F for partly cloudy skies and 6 °F for 50% humidity, to arrive at 103 °F.



Examples of Work at Different Intensity Levels

Light work

- Operating equipment
- Inspection work
- Walking on flat, level ground
- Using light hand tools (wrench, pliers, etc.). However, this may be moderate work depending on the task
- Travel by conveyance

Moderate work

- Jack-leg drilling
- Installing ground support
- Loading explosives
- Carrying equipment/supplies weighing 20–40 pounds
- Using hand tools (shovel, fin-hoe, scaling bar) for short periods

Heavy work

- Climbing
- Carrying equipment/supplies weighing 40 pounds or more
- Installing utilities
- Using hand tools (shovel, fin-hoe, scaling bar) for extended periods

Case Study: Use of Work/Rest Schedule

A crew was shoveling ore out from under the primary conveyor at a surface mine in Arizona in August. The high temperature that day was 113 °F. The crew was rotating in 10-minute shifts and hydrating between shifts. Coworkers noticed signs of heat illness in two employees, and they were transferred to the medical station for evaluation. From there they were sent to the hospital, where they were given IV saline and released home. Both employees recovered after rehydration at the hospital.

Lessons Learned

In extreme heat, even a work/rest schedule may not eliminate the risk of heat illness. In this case, use of work/rest schedules, frequent hydration, and team monitoring helped keep this situation from becoming even more serious. Without those safety precautions the workers could have potentially suffered more severe heat illness, possibly including heat stroke, which is life threatening.

24 APPENDIX 9: INJURY ESCALATION CHART

<u>Safety Event</u>	<u>Required Notification Group</u>	<u>Required Follow-Up Actions</u>
Near Miss	Immediate Supervisor	Near Miss report (to be completed w/in 24 hrs)
Report Only	Immediate supervisor, Nyrstar Buddy, & Project Manager	Report incident and follow-up with Site Nurse
Localized First Aid	Immediate supervisor, Nyrstar Buddy, & Project Manager	Report injury and follow-up with Site Nurse
Site Nurse Visit	Immediate supervisor, Nyrstar Buddy, Project Manager, & Project Sr. Safety Advisor	Report injury & initiate investigation (to be completed w/in 24 hrs)
Hospital visit	Immediate supervisor, Nyrstar Buddy, Project Manager, & Site LT	Report injury & initiate investigation (to be completed w/in 24 hrs)
Fatality	Immediate supervisor, Nyrstar Buddy, Project Manager, Site LT, & Nyrstar LT	Report injury & initiate investigation (to be completed w/in 24 hrs)

25 APPENDIX 10: CONTRACTOR EMPLOYEE SAFETY TRAINING CHECKLIST



Contractor Employee Safety Training Checklist

To be completed for each individual that will be on site. Date trained or refresher training must be less than a year old. Other forms of documentation showing this information are also acceptable.

Contractor:	Employee:	
Subject	Training Date	Trained By
Hazard Communication		
Hearing Conservation		
Personal Protective Equipment		
Fall Protection – Working at Heights		
Lock Out / Tag Out		
Emergency Procedures		
Fire Extinguishers		

Items above are required for all contractors to enter site

Mobile Equipment		
Cadmium / Lead		
Confined Spaces		
Bloodborne Pathogens		
Respiratory Protection - Medical Clearance / Fit Tested		
Excavations		
Cell House - Electrolytic Cell Work Zone		
Hazardous Waste Operations		

Items above are required for specific tasks performed on site

Employee Signature _____ Date: _____

26 APPENDIX 11: HOUSEKEEPING CHECKLIST



HOUSEKEEPING CHECKLIST

This checklist provides the basic requirements for workplace housekeeping. Should a "No" be recorded for any of the below checklist items, immediate follow-up action is necessary to remove the unsafe condition to prevent its reoccurrence.

S/N	Items				Remarks
1	Work area is clean, tidy and clutter-free.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
2	Aisles, walkways, stairways and exits are unobstructed.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
3	There are no objects protruding into aisles and walkways.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
4	No item is placed around emergency equipment (e.g., fire extinguishers, first aid kits).	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
5	Floors and working surfaces are in safe condition.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
6	Floor markings are highly visible and not faded.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
7	Floor openings or holes are guarded by a cover, grating or guardrail on all sides (except at entrances to stairways or ladders).	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
8	Physical barriers and warnings signs are installed around workplace hazards (e.g., sharp objects, protruding objects, a hot surface, a floor opening).	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
9	Lamps or light sources are clean and provide adequate illumination for working.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
10	Cords, cables and hoses are bundled up when not in use.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
11	Machine and equipment guards are in place and secure.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
12	Tools are in good condition and in their designated location.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
13	Storage areas are clean, tidy and organized.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
14	Stacked materials are placed on a flat and firm foundation.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
15	Storage racks used are adequate for the task and in good condition.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
16	Hazardous substances (e.g., flammable materials, toxic substances) are stored in compatible containers, under appropriate conditions, and affixed with GHS labels.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	
17	Proper waste bins for general waste, recyclable waste, hazardous waste, and etc. are provided and utilized at work areas to facilitate responsible disposal.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	

DATE: _____

SHIFT: _____

PROJECT AREA: _____

CONTRACTOR REP (PRINT NAME): _____

NYRSTAR JOB OWNER (PRINT NAME): _____