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Approved By: Von Meeks		
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1.0 Purpose

The purpose of this procedure is to ensure that occupational exposures to hexavalent chromium at the Galveston Bay Refinery (GBR) are evaluated and controlled to minimize the risk of injury. This procedure has been developed in accordance with Corporate HES Standards for toxic metals, the Industrial Hygiene Exposure Assessment Program, MPC Best Practices, and the OSHA Standards for Hexavalent Chromium; 29 CFR 1926.1126 (Construction) and 29 CFR 1910.1026 (General Industry).

2.0 Scope

This procedure applies to all Marathon employees and contractors performing work at the Galveston Bay Refinery where exposure to hexavalent chromium is reasonably foreseeable. For the duration of this procedure the term "welding fumes" will be used to represent hexavalent chromium.

3.0 Procedure

3.1 Roles and Responsibilities

3.1.1 Industrial Hygiene (Program Administrator)

- 3.1.1.1 Identify routine and non-routine tasks performed by GBR employees and contractors that may result in occupational exposure to welding fumes.
- 3.1.1.2 Conduct employee exposure assessments and recommend controls/personal protective equipment (PPE) to reduce employee exposures to levels below MPC's Occupational Exposure Limit (OEL).
- 3.1.1.3 Conduct personal air monitoring in accordance with the Exposure Assessment Methodology (EXAM) process.
- 3.1.1.4 Conduct employee training on the contents of this procedure as needed.
- 3.1.1.5 Provide written notification of monitoring results to employees through electronic mail or postings on bulletin boards.
- 3.1.1.6 Maintain accurate exposure measurement records.

3.1.2 Refinery Management

- 3.1.2.1 Ensure all employees follow the requirements of this program.
- 3.1.2.2 Ensure feasible engineering and work practice controls have been implemented.
- 3.1.2.3 Provide approved PPE to employees and ensure that the PPE is used properly.
- 3.1.2.4 Provide necessary resources to comply with OSHA regulatory requirements.

3.1.3 Employees

- 3.1.3.1 Follow appropriate work practices and procedures.
- 3.1.3.2 Use appropriate PPE as directed by supervision

3.1.4 Maintenance Supervisor/ Job Representative

- 3.1.4.1 Ensure that contractors follow the guidelines established by this program
- 3.1.4.2 Ensure that the Hexavalent Chromium Work Planning Protocol (Attachment A) is provided to all contractors performing welding jobs.

3.1.5 Maintenance/Construction/Turnaround Planner

- 3.1.5.1 Ensure that all chromium containing products associated with a job are properly identified prior to beginning the job. Identification shall include an

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evaluation of the metal, including percent chromium.

- 3.1.5.2 Consider the use of alternative materials that do not contain chromium or contain a lesser percentage of chromium.
- 3.1.5.3 Utilize the Hexavalent Chromium Work Planning Protocol (Attachment A) to determine the proper personal protective equipment to be worn for each job that involves chromium containing products.
- 3.1.5.4 Prior to the start of the job, notify the employee supervisor and the GBR industrial hygienist so that the proper PPE can be specified and employee exposure monitoring can be conducted if deemed necessary.
- 3.1.6 Health Services
 - 3.1.6.1 Medical surveillance shall be provided to all employees when (specific to hexavalent chromium):
 - Employees have, or may have, occupational exposure to hexavalent chromium at or above the action level for 30 or more days per year.
 - Employees are experiencing signs or symptoms associated with exposure to hexavalent chromium.
 - Employees are exposed to hexavalent chromium during an emergency.
 - 3.1.6.2 Complete a medical history questionnaire for covered employees.
 - 3.1.6.3 Determine the physical capabilities for those employees who wear respirators.
 - 3.1.6.4 Maintain accurate medical surveillance records including a list of covered employees.
- 3.1.7 Inspections
 - 3.1.7.1 Ensure that the Hexavalent Chromium Work Planning Protocol (Attachment A) is provided to all contractors performing welding jobs.
- 3.1.8 Contractors
 - 3.1.8.1 Complete the Hexavalent Chromium Work Planning Protocol (Attachment A) to determine the appropriate PPE.
 - 3.1.8.2 Provide the appropriate PPE and ensure it is used correctly
 - 3.1.8.3 Comply with all ventilation requirements for the job
 - 3.1.8.4 Review PPE and ventilation controls with the welders during the Job Safety & Analysis (JSA)
- 3.1.9 Training Department
 - 3.1.9.1 Ensure training is provided to all effected employees and is consistent with the OSHA Hexavalent Chromium and Hazard Communication Standards.
 - 3.1.9.2 Maintain accurate training records in accordance with regulatory requirements.

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3.2 General Requirements

3.2.1 Engineering and Work Practice Controls

- 3.2.1.1 The planning and performance of all hot work with the potential for employee exposure to hexavalent chromium will follow the Marathon Hexavalent Chromium Work Planning Protocol (Attachment A).
- 3.2.1.2 Engineering control, principally ventilation, is the primary method used to reduce employee exposure to welding fumes.
- 3.2.1.3 Local exhaust ventilation is preferred over general ventilation and is mandatory while working with chromium alloy-containing materials in any refinery shop.
- 3.2.1.4 Whenever feasible engineering controls or work practices are not adequate to reduce exposures to less than the OEL, appropriate respiratory protection and protective clothing must be used.
- 3.2.1.5 Exposure controls should include investigation into alternative materials that do not include chromium, as well as alternative lower fume-producing welding processes, such as substituting TIG welding for stick welding.
- 3.2.1.6 Job rotation is not an acceptable method to achieve compliance with the OEL.

3.2.2 Personal Protective Equipment

- 3.2.2.1 Appropriate personal protective equipment (PPE) shall be provided for respiratory protection and to avoid eye contact and dermal exposure to welding fumes.
- 3.2.2.2 For work with chromium containing metals, appropriate respiratory protection shall be determined using the Marathon Hexavalent Chromium Work Planning Protocol (Attachment 1).
 - 3.2.2.2.1 Tasks scoring 10 points or greater on the Hexavalent Chromium Exposure Determine form require at least a half-mask air purifying respirator (APR) with a P-100 or High Efficiency Particulate Air (HEPA) filter.

3.2.3 Personal Hygiene

- 3.2.3.1 Where protective clothing and equipment is required, change rooms shall be provided. Change rooms shall be equipped with separate storage facilities for protective clothing and equipment and street clothing to prevent cross-contamination.
- 3.2.3.2 Employees must wash their hands and face before each break, at the end of each work shift and at the end of the job.
- 3.2.3.3 Hand and face washing facilities are to be readily available. Workers shall not eat, drink, smoke or use smokeless tobacco until after removing or decontaminating their outer layer of clothing and washing their hands and face.

3.2.4 Housekeeping

- 3.2.4.1 All surfaces are to be maintained as free as practical of accumulations of welding fume containing dust and debris.
- 3.2.4.2 HEPA vacuums, clearly labeled for use only with welding fume containing

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dust, will be used for cleaning contaminated surfaces and protective clothing.

3.2.4.3 Dry shoveling, dry sweeping, and dry brushing may be used only where HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure to welding fume dust have been tried and found not to be effective.

3.2.4.4 Compressed air shall not be used to remove welding fume dust from any surface.

3.2.4.5 Cleaning equipment must be handled in a manner that minimizes the reentry of welding fume dust into the workplace.

3.2.5 Waste Disposal

3.2.5.1 Waste, scrap, debris, and other welding fume contaminated material designated for disposal are to be placed in appropriately labeled containers. Wear appropriate PPE when replacing HEPA vacuum filters. Contact the Environmental Department when the container is to be emptied.

3.2.5.2 When more practical, large scrap material may be decontaminated using a HEPA vacuum and disposed of by normal means.

3.2.6 Recordkeeping Requirements

3.2.6.1 Covered employee list (Health Services)

3.2.6.2 Medical surveillance information (Health Services)

3.2.6.3 Employee exposure monitoring results (Safety Department)

3.2.6.4 Signed employee exposure notification letter (Safety Department)

3.3 Training / Hazard Communication

3.3.1 Employee Information and Training

3.3.1.1 Employees who may come in contact with welding fumes(i.e. pipefitters, welder, inspectors, safety professionals) during the course of their employment shall be given initial and annual toxic metals awareness training. Annual training shall be in the form of Web Based Training (WBT). This training shall cover the following items:

- Types of toxic metal containing materials at the refinery.
- Signs and symptoms of exposure to welding fumes.
- Activities that may cause overexposure to welding fumes.
- Protective measures such as engineering and administrative controls.
- Personal Protective Equipment.
- Emergency procedures.

3.3.1.2 Contract and MPC employees who work directly with chromium containing materials and may be exposed to airborne hexavalent chromium in excess of the Action Level shall comply with the training requirements outlined in the OSHA Hexavalent Chromium Construction Standard (29 CFR 1926.1126) and General Industry Standard (29 CFR 1910.1026).

3.3.2 Hazard Communication (hexavalent chromium specific)

3.3.2.1 Whenever hot work is performed on chromium containing materials and the

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airborne concentration is expected to be above the OSHA 8 hour TWA, the work area must be barricaded and demarcated in order to effectively warn an employee working in the immediate area that hexavalent chromium exposure might occur. Barricades must be established using "Danger" tape with barricade tags or other equally effective means of keeping employees from entering the work area.

- 3.3.2.2 Warning signs must be placed in the area where work is being performed that may produce hexavalent chromium. The warning signs shall contain the following warning:

WARNING
HEXAVALENT CHROMIUM
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

- 3.3.2.3 Labels or other forms of warning are provided for containers of hexavalent chromium or mixtures containing hexavalent chromium. The labels must comply with requirement of the Hazard Communication Standard (29 CFR 1910.1200 f) and in addition include the following wording:

DANGER
CONTAINS HEXAVALENT CHROMIUM
CANCER HAZARD

- 3.3.2.4 Employees are provided with information and training on the hazards of hexavalent chromium at the time of initial assignment to a job classification where hexavalent chromium is present. If exposures are above the Action Level, employees will be provided with information and training at least annually thereafter.

3.4 Exposure Limits

Substance	MPC TWA OEL	OSHA TWA AL	OSHA TWA PEL	MPC Ceiling OEL	OSHA Ceiling PEL
Hexavalent Chromium	0.005 mg/m ³	0.0025 mg/m ³	0.005 mg/m ³	N/A	N/A

4.0 Definitions

- 4.1 **Time-Weighted Average (TWA)** – The time-weighted average concentration for a normal 8-hour work day or 40 hour work week to which nearly all workers may be repeatedly exposed without an adverse health effect.
- 4.2 **Covered Employee** – An employee who is included in a written exposure control plan when exposure monitoring for hexavalent chromium confirms results above the Action Level of 2.5 µg/m³.
- 4.3 **Hexavalent Chromium** – Chromium with a valence state of positive six in any form and in any compound, also called chrome six, hex chrome, chromium (VI), Cr(VI), Cr⁺⁶, or Cr⁶⁺. For CRC

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operations, the most likely sources of hexavalent chromium are stainless steel and other alloy welding rods, residual chromium on catalysts, refractory surfaces and furnace tubes, chromate-containing paints and residual chromium in old cooling tower wood supports.

4.4 **HEPA** – High Efficiency Particulate Air – filters that remove 99.97% of all particles 0.3 microns in diameter or larger.

4.5 **PEL** – Permissible Exposure Limit – a regulatory exposure limit set by OSHA.

4.7 **Regulated Area** – A demarcated area where an employee’s exposure to airborne concentrations of hexavalent chromium exceeds, or can reasonably be expected to exceed, the PEL. In the absence of monitoring data, this is based on a score of 19 or higher on the Hexavalent Chromium Exposure form.

5.0 References

5.1 OSHA Hexavalent Chromium Standard (Construction Industry), [29 CFR 1926.1126](#)

5.2 OSHA Hexavalent Chromium Standard (General Industry) [29 CFR 1910.1026](#)

5.3 OSHA Standard Interpretations, November 18, 2003, [Clarification of Maintenance vs. Construction Activities](#)

5.4 Marathon Corporate Health Services Toxic Metals Control Program, [HLT-2017](#)

6.0 Attachments

6.1 Attachment A – Marathon Hexavalent Chromium Work Planning Protocol

7.0 Revision History

Revision Number	Description of Change	Written by	Approved by	Revision Date	Effective Date
0	Original issue. New integrated site procedure replaces RSW-0028-TC under MOC 63422.	S. Lambert	V. J. Meeks	7/17/2019	7/31/2019

Attachment A: Marathon Hexavalent Chromium Work Planning Protocol

Marathon Hexavalent Chromium Work Planning Protocol

Date	Area	Description
Unit	Equipment	
Table 1: Hot Work Method (select only one)		
Score	Fume Level	Hot Work Process
<input type="checkbox"/> 9	Heavy Fume Production	Stick Welding, Arc Gouging, Torch Cutting, Flux Core Welding
<input type="checkbox"/> 3	Medium Fume Production	MIG Welding, Plasma Cutting, Grinding (Grinding means extensive prep work to prepare an item for welding, as opposed to grinding performed during the intermediate steps in completing a weld.)
<input type="checkbox"/> 1	Low Fume Production	TIG Welding
Table 2: Chromium Content (refer to attached Cr Content Table) (select only one)		
Score	Chrome Content	Chromium Content in base metal or filler rod/wire, whichever is higher
<input type="checkbox"/> 9	High Chromium Content	17% or higher
<input type="checkbox"/> 3	Medium Chromium Content	9% - 17%
<input type="checkbox"/> 1	Low Chromium Content	0.5% - 9%
<input type="checkbox"/> -5	Very Low Chromium Content	Less than 0.5% Chrome (Carbon Steel, Galvanized, Ductile Iron)
Table 3: Work Area (select only one)		
Score	Type of Space	Description
<input type="checkbox"/> 9	Confined Space	Includes all small confined spaces. For large confined spaces consult the IH for determination
<input type="checkbox"/> 3	Semi- Enclosed	Includes Weld Shops, Spark Enclosures, Hooches and indoor Shops without local exhaust ventilation
<input type="checkbox"/> 1	Open Air Location	Includes only open air welding without any barriers (i.e. no fire blanket or weld screen that may block air flow)
Table 4: Duration (Time spent actually performing hot work)		
Score	Task Duration	Time that hot work will take place in the area
<input type="checkbox"/> 4	Full Shift	More than $\frac{3}{4}$ of the work shift
<input type="checkbox"/> 2	Partial Shift	Between $\frac{1}{2}$ and $\frac{3}{4}$ of the work shift
<input type="checkbox"/> 1	Short	Between $\frac{1}{4}$ and $\frac{1}{2}$ of the work shift
<input type="checkbox"/> -1	Very Short	Less than $\frac{1}{4}$ of the work shift
Table 5: Ventilation		
Score	Type of Ventilation	Description
<input type="checkbox"/> -8	Local Exhaust Ventilation	Capture hood used so that weld plume visibly enters hood
<input type="checkbox"/> -4	Dilution Ventilation	Powered ventilation in use but weld plume does not visibly enter hood. Example: Coppus fan or air horn on manway
<input type="checkbox"/> 0	Natural or None	No other ventilation used
Total Score	See Description of compliance method based on score.	
	The use of monitoring data may override this determination as it may provide additional data.	

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Attachment A (cont)

Cr⁺⁶ Regulated Tasks or “Hot Zones”: 19 Points or Greater

Employee Awareness: Establish regulated area using Danger Tape, Cr⁺⁶ warning tags and signs. All personnel inside regulated area must wear required PPE. Training required for all personnel participating in all work in the regulated area.

Exposure Monitoring: Representative sampling shall be performed on alloy work greater than 2 hours in length total fume-producing time.

Respiratory Protection: A minimum of a half-mask Air Purifying Respirator (APR) with N100, R100 or P100 (HEPA) rating. Filtering face-piece respirators are not considered acceptable. Higher protection factor respirators may be needed in some instances.

Outer Clothing: Workers performing hot work must wear an outer layer of clothing, or other protective suit, that is properly decontaminated or discarded after each shift, before taking a break or at the end of the job; whichever comes sooner.

Hygiene: Hand and face washing facilities are to be readily available. Workers shall not eat, drink, smoke or use smokeless tobacco until after decontaminating the outer layer of clothing and washing their hands and face.

Decontamination:

- All contaminated materials that are not cleaned shall be bagged and sealed, and labeled with a “Hexavalent Chromium” warning label either for waste or laundry service.
- All surfaces should be maintained as free as practical of Cr⁺⁶ accumulations. Wet or HEPA methods should be utilized for decontamination. Compressed air blowing shall not be used. Areas that do not need to be decontaminated include: confined spaces that will return to process service and open air locations such as pipe racks, gravel areas, etc.

Cr⁺⁶ Controlled Tasks: 10 to 18 Points

Employee Awareness: Training required for all personnel participating in all work in the regulated area.

Exposure Monitoring: Representative sampling must be performed on alloy work greater than 2 hours in length total fume-producing time.

Respiratory Protection: A minimum of a half-mask Air Purifying Respirator (APR) with N100, R100 or P100 (HEPA) rating. Filtering face-piece respirators are not considered acceptable.

Cr⁺⁶ Conditional Tasks: 4 to 9 Points

Employee Awareness: Training required for all personnel participating in all work in the regulated area.

Exposure Monitoring: Representative sampling should be performed on alloy work greater than 2 hours in length total fume-producing time. For carbon steel, monitoring should be considered for further evaluation. Contact the Refinery IH for guidance.

Respiratory Protection: A minimum of a half-mask Air Purifying Respirator (APR) with N100, R100 or P100 (HEPA) rating. Filtering face-piece respirators are not considered acceptable.

Tasks Not Regulated: Less than or equal to 3 Points

No additional control measures beyond standard hot work protocols and prudent personal hygiene methods.

Any person who performs hot work on any chromium alloy will wear, at least, a half-mask Air-Purifying Respirator (APR) equipped with N100, R100 or P100 (HEPA) filters or cartridges. Filtering face-piece respirators are not considered acceptable for this use.

Attachment A (cont)

Chrome Content Determination:

Chrome content for welding operations is determined from the consumable/electrode. If not listed on the provided table, refer to the manufacturer's MSDS.

Chrome content for gauging, grinding, and cutting can be either the base metal or consumable depending on where the work is being completed. Use the base metal as default.

Low Chrome Content: 0.5 - 9%	
Material Type	Chrome Contents (%)
1 Cr	0.8 - 1.25
1 1/4 Cr	1.0 - 1.5
2 1/4 Cr	1.9 - 2.6

Medium Chrome Content: > 9 - 17%	
Material Type	Chrome Contents (%)
9 Cr	8.0 - 10.0
405 Stainless (ss)	11.5 - 14.5
410/410S (ss)	11.5 - 13.0
17-4 PH (ss)	15.5 - 17.5
Alloy 600	14.0 - 17.0
Alloy C-276	14.5 - 16.5

Welding Filler Material Not Included Above	
Material Type	Chrome Contents (%)
Inconel 117 Electrode	21.0 - 26.0
Inconel 617	20.0 - 24.0
Inconel 82	20.0 Average
Inconel 182	14.0 Average
Inconel A	15.0 Average
Inconel 112	21.5 Average

High Chrome Content > 17%	
Material Type	Chrome Contents (%)
304/304L (ss)	18.0 - 20.0
308 (ss)	19.0 - 21.0
309 (ss)	22.0 - 24.0
310 (ss)	24.0 - 26.0
316/316L (ss)	16.0 - 18.0
317/317L (ss)	18.0 - 20.0
321 (ss)	17.0 - 19.0
347 (ss)	17.0 - 19.0
904L (ss)	19.0 - 23.0
Alloy 20	19.0 - 21.0
AL-6X (ss)	20.0 - 22.0
Nitronic 50	20.5 - 23.5
Nitronic 60	16.0 - 18.0
Duplex 2205 (ss)	21.0 - 23.0
Alloy 800/800H	19.0 - 23.0
Inconel 625	20.0 - 23.0
Alloy 825	19.5 - 23.0