Joliet Refinery Chloride Pollutant Minimization Plan

NOVEMBER 11, 2022

CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature: _____

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Date Signed: 11/11/22

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1.0 Introduction

This Pollutant Minimization Plan (PMP) has been prepared by the ExxonMobil Joliet Refinery (the Refinery) to reduce the environmental impacts from the Refinery's chloride related operations. The Refinery is covered under the Time Limited Water Quality Standard for Chloride for the Chicago Area Waterways System and Lower Des Plaines River watersheds. This PMP has been prepared to meet the requirements laid out in the Time Limited Water Quality Standard (TLWQS) for Chloride. The term of this PMP covers the first 5-years of the TLWQS period and will be updated following the required re-evaluations (year 4 ½, 9 ½, and 14 ½).

Chlorides are commonly found in road salt, fertilizers, water softeners, dust suppressants, and certain industrial processes. Chloride-based deicers, like rock salt, are used on parking lots, sidewalks, and roads to provide safe surfaces to the public during the winter months. These deicers are one of most common sources of chloride in the Chicago region.

The water quality standard for chloride for the Chicago Area Waterway System (CAWS)/Lower Des Plaines River (LDPR) was updated to 500 mg/L as part of the rulemaking process finalized in 2015. The change in the chloride water quality standard took effect in 2018. Because portions of the CAWS/LDPR watershed were not able to meet this new standard during winter months due to the need to maintain public safety on roads, highways, sidewalks and parking lots, a joint submittal and supporting Refinery petition were submitted to the Illinois Pollution Control Board for a variance from the chloride standard. The joint petition laid out best management practices that can be achieved by the petitioners to reduce their chloride use while maintaining public safety during winter storms.

On November 4, 2021, the Illinois Pollution Control Board (IPCB) issued an Opinion and Order for a Time Limited Water Quality Standard (TLWQS) for Chloride for portions of the CAWS and Lower Des Plains River watersheds. The TLWQS for Chloride watersheds are defined in the Opinion and Order as the Des Plaines River watershed from the Kankakee River to the Will County Line (except for the DuPage River watershed) and the CAWS watershed (except the North Branch Chicago River watershed upstream of the North Shore Channel and those portions of the watershed located in Indiana). This is a watershed-based approach to reduce the chloride concentrations in the CAWS and Lower Des Plaines River. The TLWQS for Chloride requires all dischargers covered under the TLWQS for Chloride create PMPs and implement specific best management practices based on their operations to reduce their chloride discharges.

2.0 Facility Overview

Facility Name: ExxonMobil Joliet Refinery
Facility Address: 25915 South Frontage Road
City: Channahon State: IL Zip Code: 60410

The Joliet Refinery, is located on a 1,300-acre tract of land in Channahon Township in unincorporated Will County. The site is adjacent to Interstate 55 at the Arsenal Road exit, approximately 50 miles southwest of Chicago. To the immediate north of the Refinery is the Des Plaines River, while east and south of the Refinery is the former Joliet Army Arsenal, which has been redeveloped as an industrial complex, and the Midewin National Tallgrass Prairie. The Refinery employs approximately 630 full time employees, who operate, maintain, and manage the facility, which operates 24 hours a day. Built in 1972, the Joliet facility is one of the newest refineries in the United States and is also among the most energy-efficient refineries of its size in the country. The refinery uses state-of-the-art technology to process crude safely, reliably and efficiently. Today the refinery is equipped to handle approximately 250,000 barrels of crude per day, producing about 9 million gallons of gasoline and diesel fuel every day.

The Joliet Refinery discharges wastewater and storm water under NPDES Permit No. IL0002861 and has recently been issued general permit ILG103005 (Chloride Time Limited Water Quality Standard General Permit).

The Transportation Group, a subset of the Refinery's Maintenance Department, is responsible for providing snow and ice control for approximately 57 lane miles consisting of roads and parking lots at the Refinery as well as associated sidewalks and walkways. The Joliet Refinery's goal is to make all streets, parking lots and walkways safe and accessible during and after a winter storm. Safety is the number one priority for the Joliet Refinery. As a result, deicing, anti-icing, and other snow removal activities must be sufficient to ensure employee safety. Currently, anti-icing practices (brine application) are employed at the Refinery in advance of winter weather events when feasible and appropriate. The Refinery utilizes plows, shovels and snow blowers on walkways to remove snow prior to the application of salt. Salt is used for deicing after snow removal to make streets and walkways safe. To minimize corrosion risks, an acetate product is currently used on bridges. Refinery personnel (and contractors) who conduct snow removal activities are trained annually on best practices for snow and ice removal.

3.0 Chloride Sources

The following sources of chloride have been identified at the Refinery:

3.1 Winter Maintenance – The Transportation Group applies brine for anti-icing and salt for deicing during the winter months to provide safe walking, parking and driving surfaces for Refinery employees, contractors and visitors. The safety of Refinery employees, contractors and visitors is the Refinery' highest priority.

3.2 Process Operations – Several operations at the Refinery utilize salt and/or contribute chloride to the Refinery discharges including

3.2.1 Water Softening – Water used for boilers and the wet gas scrubber is treated prior to use including softening utilizing zeolite softeners. Salt is used in the regeneration of the zeolite softening equipment.

3.2.2 River Water Use – Water from the Des Plaines River, containing chloride, is withdrawn by the Refinery and discharged back to the LDPR. Chloride from the Des Plaines River water makes up between 33% and 60% of chloride discharged from the Refinery. Processes that utilize river water include:

- Cooling Tower Blowdowns - Cooling towers operate by evaporation which concentrates the salts in the intake water. In the winter, when the Des Plaines River is impacted by road salt runoff, chloride from cooling tower blow down is higher than during the other seasons
- Once through cooling- The Refinery utilizes river water for once through cooling. Again chloride in once through cooling water is higher during the winter months when the River is impacted by road salt runoff.

3.2.3 Salt in crude and other chemicals –

- Crude Oil – Crude oil can contain chloride salts, which are typically dissolved in water that is emulsified in the crude oil. Crude oil is treated in the desalter unit to remove dissolved salts from the crude oil. Effluent from the desalter unit are ultimately routed to the Refinery's wastewater treatment plant and are discharged via a NPDES permitted outfall.
- Other Chemicals – Chloride may be found in chemicals used for various purposes at the Refinery.

3.3 Level of Service for Winter Maintenance Activities

The Joliet Refinery's goal is to make all streets, parking lots and walkways safe and accessible during and after a winter storm. Safety is the number one priority for the Joliet Refinery. As a result, deicing, anti-icing, and other snow removal activities must be sufficient to ensure employee, contractor and visitor safety.

A Refinery map of the roads, parking lots, and walkways that should be cleared and deiced is located in Appendix 1. The map colors indicate the priority levels of each of the areas. Below Table 2.3-1 provides the priority level, description, and approximate area. Roads are assumed to be 12 feet wide.

Table 3.3-1: Priority level description and area

Priority Level	Description	Area (Thousand Square Feet)	Area (Lane Miles)
1	Main entrance road and around main gate including the serpentine road blocks. Remove ice and snow from main roads around process block and roadways between units; east and west side of Fire Station, and boat house. At this time, clear snow from fire hydrants around process block, propane truck rack, scale house, sulfur loading racks, asphalt loading area when operational, MIC building and building #111 NSR Office area.	320	10
2	Clear and remove snow for both east and west Employee Parking lots. Each parking lot will be divided equally with designated sections approved for immediate snow removal.	220	7
3	Clear all other main blacktop roadways – to include all Mechanical shop buildings, main administration building and OM building, TCI shops, Transportation, product dock and Coke dock, tank farm roads, WWT Process building, Utilities Control building, Main Warehouse, Flour Warehouse, and 8 acres.	610	19
4	Clear contractor entrance roads from Gate A & B to Gate 5 to include contractor parking lot.	140	5
5	Clean contractor entrance road from Gate C & D to Gate 4 to include contractor parking lot. Clean gate 2 contractor parking lot	190	6
6	Clear all WWT roads. Clear fire hydrant and post indicator in off-sites. Clear roads to flares and flare K.O. Drum.	330	10

4.0 Chloride Monitoring Data

Chloride monitoring data will be collected for the CAWS and Lower Des Plaines River watersheds per the IPCB order. Chloride data for the CAWS will be collected by MWRD for the CAWS watershed and provided to the chloride watershed workgroups as part of the annual reporting as required by the IPCB order. The Lower Des Plaines

Watershed Group also maintains a USGS monitoring station in the Des Plaines River at Channahon, IL that collects continuous conductivity data to estimate chloride concentrations. The data will be maintained by the workgroups.

5.0 Chloride Reduction BMPs for Industrial Sources

As part of the Chloride TLWQS, specific Best Management Practices (BMPs) were identified for industrial sources to reduce the chloride impact on the watershed. These BMPs will be implemented over the 15-year term and additional BMPs will be evaluated at 5-year intervals during the 15-year term. The BMPs identified are outlined below:

5.1 Watershed BMPs

5.1.1 **BMP** - *The permittee must participate in a Chlorides workgroup for the CAWS or LDPR, depending on the watershed within which the facility's discharge is located.*

Status - Currently Implemented

Description of Current Implementation - The ExxonMobil Joliet Refinery has been a member of the Lower Des Plaines Watershed Group/Chloride Workgroup since its inception in 2017. The Refinery continues to be a member.

5.2 Salt Storage and Handling BMPs

5.2.1 **BMP** -*Store all salt on an impermeable pad that must be constructed to ensure that minimal stormwater is coming into contact with salt unless the salt is stored in a container that ensures stormwater does not come into contact with the salt*

Status - Currently Implemented

Description of Current Implementation – In 2018, in anticipation of the need to implement of BMPs associated with deicing activities, the Refinery constructed a salt storage shed, which includes an impermeable paved floor and apron for salt storage.

BMP - *Cover salt piles at all times except when in active use, unless stored indoors.*

Status - Currently Implemented

Description of Current Implementation BMP - In 2018, in anticipation of the need to implement of BMPs associated with deicing activities, the Refinery constructed a salt storage shed, which consists of a 30' W X 41' L X 24'H building located west of the Refinery garage building and Trans Drive. The building is constructed of concrete base walls, a steel barrel arch roof, asphalt paved floor and apron, with a steel and fiberglass side shed for storage of additional deicing chemicals such as acetate.

BMP - *For working areas, provide berms and or sufficient slope to allow snow melt and stormwater to drain away from the area. If snow melt and stormwater cannot be drained away from the working area, channeling water to a collection point such as a sump, holding tank or lined basin for collection, discharge at a later time, use for prewetting, and use for make-up water for brine must be considered*

Status - Currently Implemented

Description of Current Implementation BMP - The salt storage area/building at the Refinery (constructed in 2018) was designed to drain snow melt and stormwater away from the area.

5.2.2 **BMP** - *Good housekeeping practices must be implemented at the site, including:*

- *cleanup of salt at the end of each day or conclusion of a storm event;*

- *tarping of trucks for transportation of bulk chloride;*
- *maintaining the pad and equipment;*
- *good practices during loading and unloading;*
- *cleanup of loading and spreading equipment after each snow/ice event;*
- *a written inspection program for storage facility, structures and work area;*
- *removing surplus materials from the site when winter activity finished where applicable;*
- *annual inspection and repairs completed when practical;*
- *evaluate the opportunity to reduce or reuse the wash water.*

Status - Currently Implemented

Description of Current Implementation BMP – The Refinery employs good housekeeping practices for winter road salt related work[1] including loading, salt deliveries, and facility inspections[2]. Housekeeping practices will be verified via routine inspections of the salt storage area (Appendix 2). Modifications to housekeeping practices will be made based on inspection findings. Additionally, the effectiveness of housekeeping practices will reviewed annually and required modifications will be documented in and maintained with this plan at the Refinery.

5.3 Winter Maintenance Operations BMPs

5.3.1 **BMP** - *Calibrate all salt spreading equipment at least annually before November 30th. Records of the calibration results must be maintained for each piece of spreading equipment.*

Status - Currently Implemented

Description of Current Implementation - Calibration is completed by Joliet Refinery staff or appropriate contractor staff each year. Calibration records will be kept for a period of 5 years.

5.3.2 **BMP** - *Pre-wet road salt before use, either by applying liquids to the salt stockpile, or by applying liquids by way of the spreading equipment as the salt is deposited on the road.*

Status - Will Implement 2023/2024 Snow Season

Description of Current Implementation BMP - The Refinery intends to implement this BMP. See section 5.3.10 below.

5.3.3 **BMP** - *Use equipment to measure the pavement temperature unless such equipment has already been installed on road salt spreading vehicles.*

Status - Currently Implementing

Description of Current Implementation - Weather and pavement temperature are critical factors in determining the correct type and amount of material to be applied to the roads. They should therefore be monitored and recorded to assist in decision making.

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[1] For this plan, it is understood that the housekeeping requirements, such as daily cleanup, etc. are intended to be employed by the winter maintenance/snow removal team for the salt storage and handling area at the Refinery.

[2] Note - the Refinery does not routinely transport bulk chloride.

Pavement temperature, not air temperature, is the deciding factor for treatment type. The following variables will be recorded using the form in Appendix 3 (or similar).

- Pavement Temperature
- Air Temperature
- Type of storm, precipitation type and amount expected, wind, intensity
- Conditions (sun exposure etc.)

All weather information excluding pavement temperature can be gathered from Refinery instrumentation, observations, or online information resources. To obtain pavement temperature, a temperature gauge will be used in the field. Snow captains are responsible for ensuring weather/pavement temperatures are recorded for each event and for providing this information to the snow removal team and appropriate contractors.

5.3.4 **BMP** - *Develop and implement a protocol to vary the salt application rate based on pavement temperature, existing weather conditions, and forecasted weather conditions.*

Status - Currently Implementing

Description of Current Implementation –The Refinery varies application rates and materials based on pavement temperatures and weather conditions. The Refinery utilizes a "plow first" approach and does not apply salt to roads/parking lots until snow has been removed/plowed. The Refinery utilizes the chart in Appendix 4 as guidelines for the snow team to aid in salt application. Information regarding use of temperature and weather conditions to vary salt application rates is included in the annual training. A copy of the chart will be placed in each truck at the beginning of the winter season.

5.3.5 **BMP** - *Track and record salt quantity used and storm conditions from each call-out.*

Status - Currently Implementing

Description of Current Implementation - Measurement and record keeping throughout the winter season provide information about the success of the deicing program. Measurement also allows the program to have accurate data to allow for medication of the program as needed to ensure effective. The information recorded for each event can then be aggregated to record the total salt usage and snowfall each season.

When salt or other material is distributed from trucks, the material usage will be determined by using the on-site truck scale. If the material is distributed using hand-spreading equipment, the amount of material used will be based on the capacity of the instrument and/or the package size of the material used. The form for measuring and recording material usage is located in Appendix 5.

5.3.6 **BMP** - *Develop a written plan for implementation of anti-icing, with milestones. The plan should consider increased use of liquids (e.g., carbohydrate products) beginning with critical locations such as bridges over streams.*

Status - Currently Implemented

Description of Current Implementation

This PMP will serve as the Refinery's written plan. The Joliet Refinery purchased an AccuBatch Brine Maker[3] in 2018. The brine maker produces brine in batches with a NaCl

[3] The Refinery will continue to utilize this brine maker or similar

concentration of approximately 20%-25%. Brine is transferred from the brine-making tank to a plastic tank in the truck when it is ready for application. The brine is applied to roads/parking lots with trucks and is applied with a spray pattern that leaves bare pavement between sprayed areas. When feasible, brine is used for anti-icing and is applied prior to snow/ice events based on weather forecasting when appropriate. Brine is not applied when rain is forecast nor is brine applied to gravel roads/parking lots.

5.3.7 **BMP** - *Provide employees involved in winter maintenance operations with annual training before November 30th on best management practices in the use of road salt in operations, including the practice of plowing first and applying salt only after snow has been cleared.*

Status - Currently Implemented

Description of Current Implementation

Training is an integral part of the snow removal plan to ensure the chloride reduction strategies are as effective as possible. Annual training is used to reinforce the Refinery's commitment to safety, reeducate the snow removal team of their operational responsibilities and chloride reduction objectives as well as provide any new guidance.

Training of all appropriate snow removal staff will be performed annually before November 30th.

Training will include guidance on best management practices, including plowing first, interpretation of weather and pavement when making decisions, equipment calibration, application of anti-icing and deicing materials, and recordkeeping.

Training records will be kept for a period of 5 years. Training may consist of in-person training or on-line/zoom-based training or online modules.

In addition, any changes to the Refinery's PMP/Deicing BMPs will be communicated to the snow removal team at the start of each snow season.

5.3.8 **BMP** - *Be responsible for complying with all applicable BMPs even when deicing practices are contracted out and ensure that contractors are property trained and comply with all applicable BMPs.*

Status - Currently Implemented

Description of Current Implementation

Contracted services used at the Refinery are held to the same standard as Refinery staff and will be required to comply with the training requirements and BMPs as outlined in this plan.

5.3.9 **BMP** - *Complete an annual report, as required by paragraph 3(B) of this order, which is standardized in an electronic format and submitted to the IEPA's website and to the watershed group.*

Status - Will Implement - The first report will be completed in 2023.

Description of Current Implementation - The annual report is an opportunity for the Joliet Refinery to keep record of the progress it has made in implementing the pollution minimization plan/BMPs. It also provides the Refinery with a chance to evaluate the success of the plan and to make any modifications as necessary.

The annual assessment and report will include the following:

- Whether and to what extent cost-effective and reasonable BMPs have been implemented
- Availability of alternative treatments
- Any changes to a facility's NPDES treatment technologies
- Effluent data as required by the Refinery's NPDES permit
- Amount of salt used in the previous year
- A summary of relevant, available instream chloride monitoring data (which may reference data gathered by other parties)
- A summary of relevant, available snowfall data
- Any issues encountered implementing BMPs including a summary of revisions to the Pollutant Minimization Plan over the previous year.
- Proposed changes for the coming year

The annual report will draw information from available records (calibration forms, application rate guidelines, training records, winter maintenance logs, and any other relevant documentation) of the implementation of the plan. The annual report will be submitted each year by July 1.

5.3.10 **BMP** - *Obtain and put into place equipment necessary to implement all salt spreading/deicing measures specified in the required BMPs.*

Status - Will Implement

Description of Implementation - The Refinery has fully implemented all but one of the BMPs. As noted, in section 4.3.2 above, the refinery will progress the purchase of truck mounted equipment for pre-wetting of salt for the 2023/2024 winter season. If the equipment cannot be procured by the start of the 2023/2024 winter season, alternate or interim measures will be developed and implemented to pre-wet the salt at the salt pile prior to use.

6.0 Additional BMPs

The Joliet Refinery will implement the following BMP with respect to process operations:

BMP - *Water Treating/Softening Salt Storage* – The Refinery uses salt for water softening operations. The refinery will progress construction of salt storage facilities so that salt for use in water treating/softening operations is covered and stored on an impermeable pad. This project is currently being developed and it is anticipated that the project will be completed by the end of 2023. If the facilities are not constructed by December 31, 2023, the Refinery will develop and implement alternate/interim measures to cover salt for use in water treating/softening operations.

7.0 Other Chloride TLWQS Required Milestones

The Joliet Refinery will implement these specific milestones as outlined by the Chloride TLWQS.

7.1 Milestone – Establish a mechanism for tracking of de-icing salt usage for each facility.

The Refinery has created forms for tracking of deicing salt usage which will be completed by the snow removal team (Appendix 5).

7.2 Milestone – July 1st of every year (beginning year 2) - Discharger must submit an Annual Report for the previous year (beginning on May 1 and ending on April 30 of the following year) to the Agency and the chlorides workgroup on. The report shall document salt usage for deicing and steps taken to minimize salt use.

7.3 Milestone - July 1st of year 2 (2024), year 8 (2030) and year 13 (2035) - The chlorides workgroup must submit a Status Report to the IEPA which includes an analysis on the following:

- Chlorides monitoring data;
- A report on the chloride workgroup's outreach strategy, which includes outreach efforts to expand coverage of the TLWQS, and outreach and training for nonpoint sources;
- Identification of any new BMPs, treatment technology or salt alternatives;
- Identification of the impediments and potential solutions of those impediments faced by dischargers and those granted coverage under the TLWQS that prevent them from completing the training and making all capital purchases necessary to implement the required BMPs; and
- Identification and description of any assistance (financial, technical, or otherwise) that the chloride workgroup may be able to provide.

7.4 Milestone – November 12, 2026 - the Chlorides workgroup submits to the Illinois Pollution Control Board its first proposed TLWQS re-evaluation consistent with the Illinois Pollution Control Board's order granting the TLWQS. Subsequent submittals are required in 2031 and 2036.

8.0 Plan Modifications

Modifications to this plan may be made as necessary. All modifications shall be consistent with the Refinery's NDPES permit ILG103005 / Chloride TLWQS General Permit. Substantive changes/modifications made during the year will be documented in the Refinery files and will be summarized in the next annual report due on July 1 each year.

Appendix 1 – Snow / Ice Removal Prioritization Map

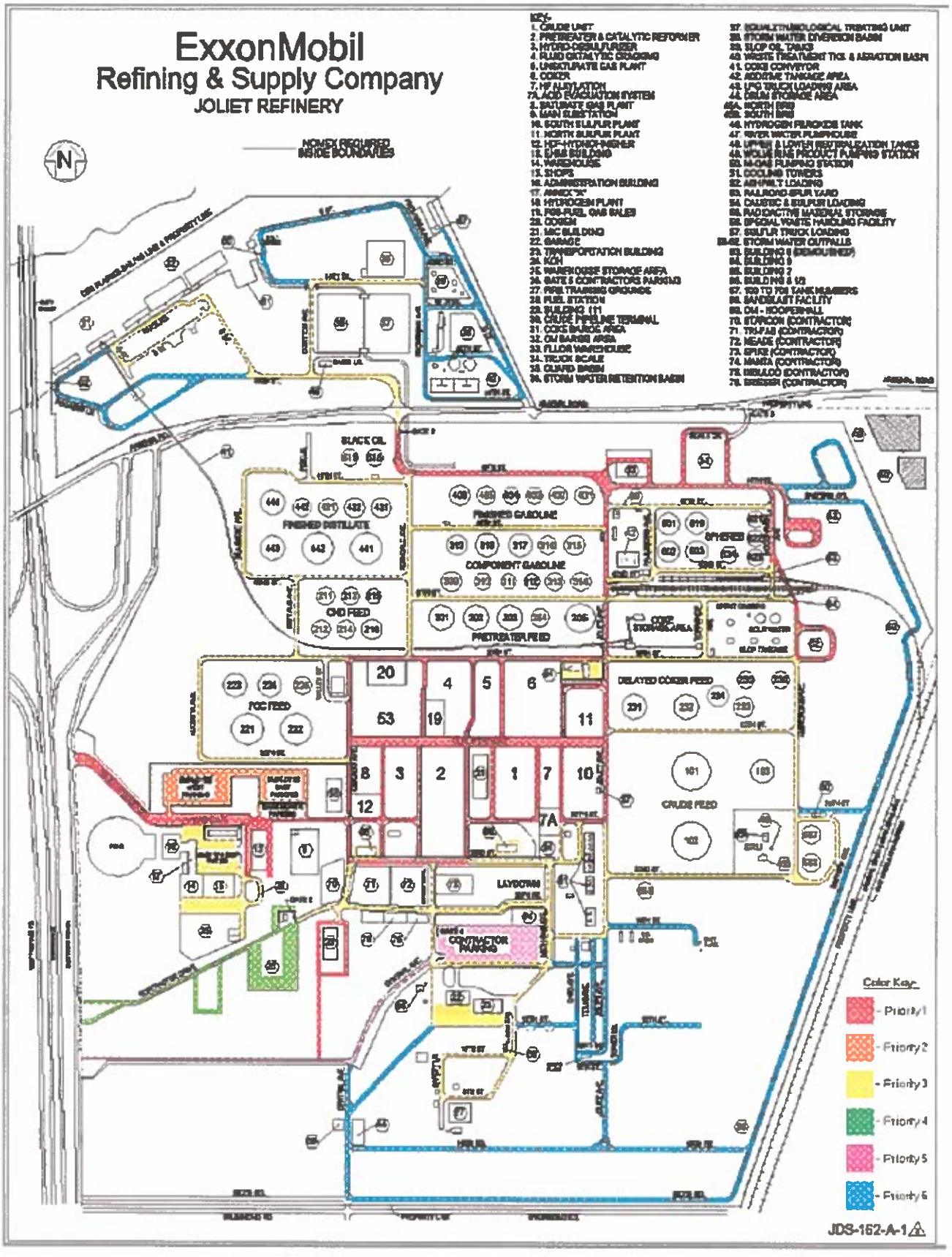
Appendix 2 – Salt Storage Area Inspection Form

Appendix 3 – Snow Captain Winter Maintenance Storm Log

Appendix 4 –Deicing Application Guidelines

Appendix 5 – Anti-Icing/Deicing Material Tracking

Snow / Ice Removal Prioritization Map



Salt Storage Area Inspection Form[4]

Name:		**Date:**	

The salt storage area should be inspected monthly during the snow season (November - April)

If you have any questions regarding this inspection, please contact the Environmental Water Advisor

Upon completion, promptly scan and send a copy of the form to the Environmental Water Advisor

Is salt stored on an impermeable surface (concrete or asphalt)?		Yes	No	If no, describe below
Note salt should be stored on impermeable surface. If salt is not stored on impermeable surface Contact The Environmental Water Advisor and develop plan to have salt moved to an impermeable surface promptly.				
Are there any defects (cracks, holes, etc.) in the apron?		Yes	No	If yes, describe below –indicate if cracks are slight, moderate or severe[5].
Are there any defects (cracks, holes, etc.) in the pad?		Yes	No	
Review any defects with the Environmental Water Advisor and develop a plan to fill / repair as appropriate				
Is drainage in the area such that rain/snow melt is directed away from the salt storage area?		Yes	No	If no, describe below
If no – contact the Environmental Water Advisor and develop a plan for directing rain/snowmelt away from the salt storage area.				
Does the Building appear to be in good condition?		Yes	No	If no, describe below
Walls?		Yes	No	
Roof?		Yes	No	
If repairs are necessary contact the environmental water advisor and document plan for repairs below				
Has salt from loading and unloading operations been cleaned up and returned to the salt storage building?		Yes	No	If Yes, describe below
Are any piles of salt present outside the salt storage building?		Yes	No	If Yes, describe below
Is there evidence of excessive salt / poor housekeeping in the surrounding area?		Yes	No	If Yes, describe below
Is there trash/debris in the area that should be removed?		Yes	No	If Yes, describe below
If cleanup is required please document how the housekeeping issues were resolved and the date completed				
Any additional concerns?		Yes	No	If Yes, describe below
Notes:				

[4] Similar form or electronic form/records may be utilized

[5] Examples of slight, moderate and severe are provided in the Wisconsin Salt Storage Self-Inspection Guidance

Snow Captain Winter Maintenance Storm Log[6]

Upon completion, attach material use logs for this event, scan and send to the Environmental Department

BASIC INFORMATION			
Name:		Date:	

PRIOR TO EVENT						
Expected Weather Conditions						
Expected Storm Dates:						
Precipitation						
Type: (Circle One)	*Rain*	*Freezing Rain*	*Snow*	*Ice*	Depth (in.):	
Sun Exposure: (Circle One)	*Sunny*	*Partly Cloudy*	*Cloudy*			
Air Temperature						
Max (°F):		Min (°F):				
Wind and Humidity						
Strength (mph):		Direction:				
Humidity (%):		Dew Point:				

Procedure	Circle One	
Is plowing or Mechanical removal of snow required?	Yes	No
Is anti-icing required?	Yes	No
Is salting required?	Yes	No
Are abrasives required?	Yes	No
Are other materials required?	Yes	No

AFTER EVENT		
Evaluation of Weather Forecasting		
Were the expected weather conditions accurate?	*Yes*	*No*
If no, was the storm more or less intense than expected? (Stronger winds, more snow, etc.)	*More*	*Less*
If no, was the temperature higher or lower than expected?	*Higher*	*Lower*

Evaluation of Procedures

Results	*Excellent*	*Good*	*Can Be Improved*	Comments/Details
Anti-icing				
Plowing				
Salting/De-icing				
Abrasives				
Other				

General Comments

[6] Similar form or electronic form/records may be utilized

Deicing Application Rate Guidelines for Parking Lots & Sidewalks

Pavement Temperature (°F) and Trend (↑↓)	Weather Condition	Maintenance Actions	Application Rate in lbs. per 1000 Square Foot Area	
			Salt Pre-wetted/ Pretreated with Salt Brine	Winter Sand (abrasives)
>30° ↑	Snow	Plow, treat intersections only	0.75	Not Recommended
	Frz. Rain	Apply chemical	1.25	Not Recommended
30° ↓	Snow	Plow & apply chemical	1.25	Not Recommended
	Frz. Rain	Apply chemical	1.50	Not Recommended
25 - 30° ↑	Snow	Plow & apply chemical	1.25	Not Recommended
	Frz. Rain	Apply chemical	1.50	Not Recommended
25 - 30° ↓	Snow	Plow & apply chemical	1.25	Not Recommended
	Frz. Rain	Apply chemical	1.75	3.25
20 - 25° ↑	Snow or Frz. Rain	Plow & apply chemical	1.75	3.25 for frz. rain
20 - 25° ↓	Snow	Plow & apply chemical	2.00	Not Recommended
	Frz. Rain	Apply chemical	2.50	3.25
15 - 20° ↑	Snow	Plow & apply chemical	2.00	Not Recommended
	Frz. Rain	Apply chemical	2.50	3.25
15 - 20° ↓	Snow or Frz. Rain	Plow & apply chemical	2.50	3.25 for frz. rain
0 to 15° ↑↓	Snow	Plow, treat with blends, and hazardous areas	Consider alternative	5.00 spot treat as needed
< 0°	Snow	Plow, treat with blends, and hazardous areas	Consider alternative	5.00 spot treat as needed

Anti-Icing Application Rate Guidelines Goals for Parking Lots & Sidewalks

Condition	Gallons per. per 1000 Square Foot Area		Other Products
	Salt Brine (NaCl)	$CaCl_2$ or $MgCl_2$	
Regularly scheduled applications	0.2 – 0.4	0.3 – 0.6	Follow manufacturers' recommendations
Prior to frost or black ice event	0.2 – 0.4	0.3 – 0.6	
Prior to light or moderate snow	0.2 – 0.4	0.3 – 0.8	
CAUTION: Too high an application rate may result in slippery conditions or tracking.			

Truck Winter Maintenance Storm Log[7]

Once completed, immediately scan and send to Environmental Department

Basic Information			
Name:		Date:	
Start Time:		End Time:	

Pavement Temperature (obtain from Snow Captain)					
Min Pavement Temp (°F):		Time:		Location:	
Max Pavement Temp (°F):		Time:		Location:	
Is temp ↑ or ↓ ?					

Activities check all completed on your shift				
Anti-Icing	Plowing/ Shoveling	Salting / De-icing	Abrasives	Other

Truck Material Usage						
Material	1 Salt	2 Brine	3 Sodium Acetate	4 Abrasives	5 Sodium Acetate	6 Other[1]
Truck #:			Empty Truck Weight[2]:			
Obtain Truck Weights at Scale	Refill #1		Refill #2		Refill #3	
	Material	Truck Weight	Material	Truck Weight	Material	Truck Weight
	Refill #4		Refill #5		Refill #6	
	Material	Truck Weight	Material	Truck Weight	Material	Truck Weight
	1 - Describe "Other" materials:					
	2 – Empty truck weight can be obtained at the start of the winter					
	Log additional truck refills on the back of this sheet					

[7] Similar form or electronic form/records may be utilized

Misc. Winter Maintenance Storm Log[8]

Once completed, immediately scan and send to Environmental Department

Basic Information			
Name:		Date:	
Start Time:		End Time:	

Pavement Temperature (obtain from Snow Captain)					
Min Pavement Temp (°F):		Time:		Location:	
Max Pavement Temp (°F):		Time:		Location:	
Is temp ↑ or ↓ ?					

Activities check all completed on your shift				
Anti-Icing	Plowing/ Shoveling	Salting / De-icing	Abrasives	Other

Material Usage			
Application Type	Material	# of Refills	Bag Size/Volume
Application types include use of spreader, sprayer(brine) or hand application			

[8] Similar form or electronic form/records may be utilized